

# **Bat Monitoring in Taranaki 2012-13 Report**



**Native Birds Taranaki**

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**Dave Bell**

Cover picture by Dave Bell: Short-tailed bat Roost Tree No 4, Mohakatino Conservation Area, North Waikato. 19 November 2012.

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# Contents

<b>Contents</b>	<b>i</b>
<b>1. Introduction</b>	<b>1</b>
<b>2. New Zealand Bats</b>	<b>1</b>
<b>3. Historical Bat Records for Taranaki</b>	<b>1</b>
3.1 NZ Wildlife Service Fauna Survey	2
3.2 DOC National Bat Database	2
3.3 New Plymouth AO STB Population Survey	2
<b>4. Monitoring for 2012-13 Season</b>	<b>3</b>
<b>5. Results of Monitoring</b>	<b>3</b>
<b>6. Discussion</b>	<b>3</b>
6.1 Long-tailed Bats	3
6.2 Short-tailed Bats	4
6.3 Timing of Bat Passes	4
6.3.1 Long-tailed Bats	5
6.3.2 Short-tailed Bats	5
<b>7. Conclusion</b>	<b>5</b>
<b>8. Acknowledgements</b>	<b>5</b>
<b>9. References</b>	<b>6</b>
<b>Annexes:</b>	
<b>A.</b> Historical Bat Records for All of Taranaki	<b>A1</b>
<b>B.</b> Results from Bat Monitoring at Waitaanga	<b>B1</b>
<b>C.</b> Timing of Bat Passes	<b>C1</b>

# Bat Monitoring in Taranaki

## 2012-13 Report

### 1 Introduction

New Zealand bats use a form of sonar known as echolocation to navigate, orientate and forage. The frequency of bat echolocation calls is generally much higher than humans can hear (ultrasonic). Bat detectors can be used to listen to these calls, and are useful tools to unobtrusively survey, monitor and identify bat species (Sedgeley, 2008).

Following acquisition of five TrakaBatII<sup>®</sup> Automatic Bat Monitors (ABM), a project monitoring for these rare and endangered species was undertaken in Taranaki and this report details the activities and results for the 2012-13 season.

Bats are New Zealand's only native terrestrial mammal being endemic to the three main island but are under significant threat from not only introduced predators but also by competition from numerous introduced species, for food and habitat.

### 2 New Zealand Bats

Three bat species, all of which are endemic, are known from New Zealand, the lesser short-tailed bat (*Mystacina tuberculata*), greater short-tailed bat (*M. robusta*) and long-tailed bat (*Chalinolobus tuberculatus*) (O'Donnell et al 2010).

The long-tailed bat 'North Island' has been recorded widely throughout the North Island, whilst the 'Central' lesser short-tailed bat is present in forests of the central North Island and has been recorded from northern Taranaki (O'Donnell et al 2010).

Under New Zealand Threat Classification System (NZTCS) the long-tailed bat 'North Island' is classed as Threatened – Nationally Vulnerable whilst the 'Central' lesser short-tailed bat is regarded as At Risk – Declining (O'Donnell et al 2010).

### 3 Historical Bat Records

When undertaking any type of bat monitoring it is best to go to areas where bats have been reported in the past, no matter how long ago, even 50-60 years (Lloyd, 2011). To this end initial efforts were concentrated in ascertaining the availability of previous records of bats for Taranaki.

A total of 96 records for bats in Taranaki were obtained from three sources, of these 63 were for Short-tailed bats (STB), 5 only for Long-tailed bats (LTB) and the remaining 28 were for unknown species. A consolidated schedule of these records is at Annex A.

Below are the three sources of records for bats in Taranaki, together with some explanatory details.

### **3.1 NZ Wildlife Service Fauna Survey**

The earliest complete records found for bats in Taranaki were eight records for STB from a NZ Wildlife Service Fauna Survey Unit survey undertaken in 1981. The records were taken directly from maps of the results for this survey, which are currently held by Taranaki Area Office, Department of Conservation (DOC).

Conducted in 1981, in all probability during the summer period at one end of that year, but no other details are available. Two of the records (from Marangae Stream, Tangarakau Forest) are from the same position but it is presumed that these were for differing days.

### **3.2 Department of Conservation National Bat Database**

DOC maintains a National Bat Database to which access was obtained and 53 bat records for Taranaki were extracted. These records fell into two parts.

In the first part were 26 records that had complete usable data, including bat species, full date and type of survey. Whilst the second part of 27 bat records was lacking much data but did have useable location details and is therefore of limited benefit.

Of particular relevance in the first 26 records are details from January-February 1994 of 11 records by John Heaphy of STB in the Waitaanga area and also 8 records from 1995 for the Hutiwai and South Waitaanga forest.

### **3.3 New Plymouth Area Office STB Population Survey**

During the second half of the 1990's (late 1994-99) the then New Plymouth Area Office (now Taranaki Area Office) of DOC, undertook a Short-tailed Bat Population Survey, based at Waitaanga, in Northern Taranaki. This survey was a complimentary to a similar survey being undertaken in the Central North Island, based around Ohakune.

Access to the limited amount of material from this survey was made available from which relevant representative data for 33 records were obtained on locations where STB were located, captured or roost sites located.

## **4. Monitoring for 2012-13 Season**

With a considerable number of the historical bats records being from the wider Waitaanga area in North Taranaki (60 of the 96 records/63%), it was therefore decided to concentrate efforts for the first summer season (2012-13) at Waitaanga.

Hence the aim of the monitoring for the 2012-13 season was to follow-up on and determine the continual presence of both short-tailed and long-tailed bats at Waitaanga.

Additional surveys were undertaken at Rotokare Scenic Reserve, as part of the Inventory and Monitoring Plan for that Trust and those results are the subject of a separate report (Bell, 2013).

## **5. Results of Monitoring**

Seven surveys were undertaken in the Waitaanga area over five months between November 2012 and February 2013, involving a minimum of 10 nights monitoring for each survey. Total nights monitoring for each survey was dependent on weather conditions, access and personal circumstances.

All up 322 nights monitoring was completed with the TrakaBatII<sup>®</sup> Automatic Bat Monitor (ABM) of which 201 nights were classified as 'low-noise nights' suitable for bat monitoring.

During these 201 nights of suitable conditions a total of 2,024 bats passes were recorded, 1,619 for long-tailed bats, 236 for short-tailed bats and 169 passes were Unclassified (not able to be distinguished).

A detailed summary of the results obtained is shown at Annex B. It will be noted that not all the surveys had results for all of the five ABMs, this was initially due to faulty set-up for some and then the theft of a monitor from NG Tucker SR.

## **6. Discussion**

First and foremost bats (either LTB and/or STB) were picked up on all of the seven surveys conducted but not necessarily by all ABMs at that survey, a very pleasing result.

The number of passes and species of bat varied greatly between surveys and was very much dependant on the location and 'view' that the ABM had – these are detailed and explained at Annex B.

### **6.1 Long-tailed Bats**

For the long-tailed bat the most passes picked up (593) were from Survey 1, four ABMs for 10 nights located along SH40 (metal road) passing through Waitaanga Conservation Area, with the ABM facing down the road.

The second most numerous survey for LTB (390 passes) was Survey 7, again only four ABMs for 10 nights, two located on the 4x4 entrance road and two on ATV tracks within the Mohakatino Paraninihi Trust land at the end of Mohakatino Road.

Survey 3 on the main ATV track well inside the Mohakatino CA (site of the Tawhitiraupeka Transect of bat detectors from the 1994 and 95 surveys) produced 218 passes for the 5 ABMs over 10 nights (at an average of 21.8 passes a night). Survey 4 along a bush ridge (site of the previous Hard Beech Ridge transect from the 1994 and 95 surveys) resulted in 334 passes for the 5 ABMs but over 16 nights (at an average of 20.8 passes a night).

Overall long-tailed bats were detected at all sites where an ABM was located during all of the surveys at an average of 8 passes per night (1,619 passes over 201 low-noise nights).

## **6.2 Short-tailed Bats**

Results obtained for the short-tailed bats were considerably different, though not totally unexpected. Only two of the surveys (Surveys 3 and 4) recorded more than 20 STB passes during the nights of monitoring.

Survey 3 on the main ATV track inside the Mohakatino CA (site of the Tawhitiraupeka Transect of bat detectors from the 1994 and 95 surveys) produced 77 STB passes for 5 ABMs over 10 nights (at an average of 7 passes a night).

Survey 4 along a bush ridge (site of the previous Hard Beech Ridge transect from the 1994 and 95 surveys) resulted in 110 passes for the 5 ABMs over 16 nights (at an average of 6.9 passes a night). The highest number of STB passes recorded for any site was from Site 5 Survey 4 (just past mist netting site from the 1996-98 population survey) at 47 passes over 16 nights (an average of 2.9 a night).

Overall short-tailed bats were recorded from 20 of the 28 sites during the 7 Surveys at an average of 1 pass per night (236 passes over 201 low-noise nights). As could be expected only Surveys 3 and 4 recorded STB passes at all 5 sites as both were located deeper in the large expanse of the Mohakatino CA forest.

## **6.3 Timing of Bat Passes**

A closer examination at the timing of recorded bat passes can often provide an interesting insight in to bat activity and possible distance to roost sites, though it can also be difficult to unravel.

Two surveys for each species of bats with the most recorded passes were chosen, Surveys 1 and 7 for Long-tailed bats and Surveys 3 and 4 for the

Short-tailed bats. Detailed data on the timing of these bat passes are shown at Annex C.

**6.3.1 Long-tailed Bats.** Detectors 2 and 5 of Survey 1 (along SH40 at Waitaanga) show a fair level of activity quite early on and then a gradual increase as the night progressed before tapering off drastically towards morning. This is consistent with LTB activity recorded at other locations in New Zealand (Griffiths, 2007; O'Donnell, 2000).

Survey 7 (within the Mohakatino Paraninihi block) in particular Detectors 1 and 5 (both located on the 4x4 entrance road) show a fairly regular number of passes throughout the night but then Detector 1 has a major increase in passes just before sunrise. This may indicate that they had moved to a nearby roost or were consistently using a good foraging area (Jess Scrimgeour, pers. comm.), and coincides with emergence from the roost to forage. Low activity in the morning may indicate that they have settled in a roost further away from the detectors than the one they used the day before.

**6.3.2 Short-tailed Bats.** The timing of the passes from both Survey 3 and 4 would tend to indicate that none of the detectors were particularly close to any Short-tailed bat roosts. Though there were some low activity early on Survey 4 that might possibly indicate single roost close by.

## 7. Conclusion

The monitoring for bats undertaken during the 2012/13 summer season conclusively proves that both long-tailed and short-tailed bats are still present at Waitaanga.

What could not be ascertained with this type of automatic monitoring was the numbers of bats, though it could be regarded that LTB were present and common, whilst STB were present but uncommon.

## 8. Acknowledgments

*A project like this could not be undertaken nor successfully completed without the assistance from a number of people and organisations, and acknowledgement is given to the following with appreciation;*

Ian Gill for producing the remarkable TrakaBatII<sup>®</sup> detectors, his cheerful and much used after-sales service and helpful advice.

The Taranaki Area Office, Department of Conservation, in particular Emily King for access to the available historical data, Bryan Williams for his 'insider' information from his time spent at Waitaanga and for the trip into the Roost 4 tree and to Sorrel Hoskins for assistance with Surveys 1 and 2.



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The Mohakatino Paraninihi Trust especially Murray Rowe for permission to access and monitor on their land.

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To Marty Hagenson for permission to cross his land by ATV to access the Te Rerepahunu Falls Track at South Waitaanga.

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And to Derek Santer and Aaron Chase for their many valuable and insightful conversations and access to North Waitaanga, their hospitality and the generous provision of the odd bit of wild meat and fresh fish a special thank you.

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## Historical Bat Records for All of Taranaki

No	Bat Species	Date	Location	Map No	Eastings	Northings	Observer	Type of Survey
<b>NZ Wildlife Service Fauna Survey</b>								
1	STB	1981	Farm, North Waitaanga Rd	BG32	1761087	5702102	NZ Wildlife Service	Unknown
2	STB	1981	Off end of Mangakara Rd, East Waitaanga	BG32	1765986	5704407	NZ Wildlife Service	Unknown
3	STB	1981	Off end of Mangakara Rd, East Waitaanga	BG32	1766386	5703808	NZ Wildlife Service	Unknown
4	STB	1981	Airstrip, end of Mangakara Rd, East Waitaanga	BG32	1768386	5704209	NZ Wildlife Service	Unknown
5	STB	1981	SH 40, before Waitaanga Saddle	BG32	1765491	5698906	NZ Wildlife Service	Unknown
6	STB	1981	Moki Road, Tahora	BH31	1753904	5682795	NZ Wildlife Service	Unknown
7	STB	1981	Mangaone Stream, Tangarakau Forest	BH32	1765009	5677503	NZ Wildlife Service	Unknown
8	STB	1981	Marangae Stream, Tangarakau Forest	BH32	1764114	5670502	NZ Wildlife Service	Unknown
9	STB	1981	Marangae Stream, Tangarakau Forest	BH32	1764114	5670502	NZ Wildlife Service	Unknown
10	STB	1981	Panirau Island, Mokau River	BG32	1760677	5712703	NZ Wildlife Service	Unknown
<b>Department of Conservation Bat Database</b>								
1	Unknown	2/02/1993	Mangatatoko Stream, Tangarakau	BH32	1761007	5679600	R MacNab	Stationary
2	LTB	4/11/1993	Waitara River	BH31	1743511	5673586	John Heaphy	Walking
3	STB	18/01/1994	Waitaanga North Road	BG32	1762287	5702704	John Heaphy	Stationary
4	STB	20/01/1994	Waitaanga North Road	BG32	1762287	5702704	John Heaphy	Stationary
5	STB	4/02/1994	Waitaanga North Road	BG32	1762287	5702804	John Heaphy	Stationary
6	STB	10/02/1994	Waitaanga East, SH40	BG32	1762290	5699703	John Heaphy	Stationary
7	STB	11/02/1994	Waitaanga North Road	BG32	1761788	5701603	John Heaphy	Stationary
8	STB	12/02/1994	Waitaanga North Road	BG32	1761788	5701603	John Heaphy	Stationary
9	STB	13/02/1994	Waitaanga North Road	BG32	1761788	5701603	John Heaphy	Stationary
10	STB	14/02/1994	Waitaanga North Road	BG32	1761788	5701603	John Heaphy	Stationary
11	STB	14/02/1994	Eastern End SH40 Waitaanga	BG32	1765691	5698006	John Heaphy	Stationary
12	STB	19/02/1994	Eastern End SH40 Waitaanga	BG32	1765671	5698006	John Heaphy	Stationary
13	STB	21/02/1994	Waitaanga Eastern End SH40	BG32	1765671	5698006	John Heaphy	Stationary
14	STB	24/02/1994	Mangorei Track Egmont National Park	BH29	1690167	5659228	W Hutchinson	Stationary

15	LTB	13/03/1994	Aotuhia, East Taranaki	BJ32	1756825	5655095	M Cook & D Caskey	Casual
16	LTB	14/03/1994	Aotuhia, East Taranaki	BJ32	1756825	5655095	M Cook & D Caskey	Casual
17	LTB	15/03/1994	Ben's Block, Taranaki	BJ31	1752626	5653592	M Cook	Casual
18	STB	22/03/1994	Tatu Coal Mine, East Waitaanga	BH32	1766097	5691406	John Heaphy	Stationary
19	STB	23/03/1994	Tatu Coal Mine, East Waitaanga	BH32	1766097	5691406	John Heaphy	Stationary
20	STB	26/03/1994	Tatu Coal Mine, East Waitaanga	BH32	1766097	5691406	John Heaphy	Stationary
21	STB	27/03/1994	Western Waitaanga Forest	BH31	1755097	5690596	John Heaphy	Stationary
22	STB	27/03/1994	Western Waitaanga Forest	BH31	1755097	5690596	John Heaphy	Stationary
23	STB	27/03/1994	Western Waitaanga Forest	BH31	1755097	5690596	John Heaphy	Stationary
24	STB	26/04/1994	Waitaanga Stream	BG32	1760194	5694501	John Heaphy	Stationary
25	STB	27/04/1994	Waitaanga Stream	BG32	1760194	5694501	John Heaphy	Stationary
26	LTB	7/02/1995	Omoana	BJ31	1735534	5640180	Dean Caskey	Casual
1		14/09/1954	Hills Behind Waitaanga School	BG32	1759617	5700392	Jack Mills	
2		05/04/1974	Waitaanga, North Taranaki	BG32	1759427	5700123	Mrs Collins	
3		1978	Farm, Kahori Stream, Flint Road, Stratford	BJ30	1711513	5647119	A Woodsen	
4		1979	Kara State Forest, Airstrip Area, Ohura	BG32	1768227	5704180	Local farmer	
5		1979	Omapu, Tahora	BH31	1754856	5676834	Local farmer	
6		1979	Off Moki Road, Tahora	BH31	1754500	5683886	Local farmer	
7		1979	Okara State Forest, Whangamomona River	BH31	1752806	5658873	Local farmer	
8		1979	Mangakana State Forest, Waitaanga	BG32	1765797	5698942	Local farmer	
9		1979	Totara Stream, Mokau	BG31	1754345	5711603	Local farmer	
10		1979	NZFS Hut, Waitotara State Forest	BJ31	1753401	5634071	Local Farmer	
11		1979	Marco Road, Whangamomona	BH31	1750676	5671187	Local farmer	
12		1979	Mangaowata Road, Tahora	BH31	1750814	5676214	Local farmer	
13		1981	Deep Sandstone Gorge Outside Waverley	BK31	1739887	5598688	Tony Pritchard	
14		1981	Waitaanga North Road, North Taranaki	BG32	1761693	5702713	Local farmer	
15		1988	Farm at Mount Messenger	BG31	1738339	5694847	Mrs Beard	
16		01/12/1989	Moki Road Tunnel, Uruti	BH31	1738429	5684785	Mrs Charlton	
17		Oct-90	Mt Messenger	BH31	1737738	5692943	Dudley Laing	
18		04/08/1995	Ben's Block, Aotuhia	BJ31	1752626	5653592	Don Ravine	
19		1995	South Tarata	BH30	1719923	5658269	John Heaphy	
20		1995	Hutiwai Forest	BG31	1749890	5698292	John Heaphy	
21		1995	Hutiwai Forest	BH31	1749899	5688291	John Heaphy	
22		1995	Hutiwai Forest	BH31	1739899	5688283	John Heaphy	
23		1995	Hutiwai Forest	BH32	1759908	5678299	John Heaphy	
24		1995	Hutiwai Forest	BH31	1749907	5678291	John Heaphy	
25		1995	Hutiwai Forest	BH32	1759899	5688300	John Heaphy	

26		1995	Mohakatino River	BG31	1749881	5708292	John Heaphy	
27		1995	South Waitaanga Forest	BG32	1759891	5698301	John Heaphy	
<b>New Plymouth Area Office STB Population Survey</b>								
1	STB	1/12/1994	North Waitaanga	BG32	1762983	5706305	New Plymouth AO	Transect
2	STB	7/12/1994	Te Rerepahunu Falls Track	BG32	1759593	5695700	New Plymouth AO	Transect
3	STB	19/12/1994	North Waitaanga	BG32	1756387	5701998	New Plymouth AO	Transect
4	STB	29/10/1995	North Waitaanga	BG32	1756387	5701998	New Plymouth AO	Transect
5	STB	18/11/1995	North Waitaanga	BG32	1762983	5706305	New Plymouth AO	Transect
6	STB	12/12/1995	North Waitaanga	BG32	1762282	5707604	New Plymouth AO	Transect
7	STB	19/12/1995	Te Rerepahunu Falls Track	BG32	1759593	5695700	New Plymouth AO	Transect
8	STB	26/10/1996	Te Rerepahunu Falls Track	BG32	1759495	5695000	New Plymouth AO	Stationary
9	STB	26/10/1996	Stream off Waitaanga Stream	BG32	1759993	5696101	New Plymouth AO	Stationary
10	STB	26/10/1996	Te Rerepahunu Falls Track	BG32	1759394	5694900	New Plymouth AO	Stationary
11	STB	26/10/1996	Te Rerepahunu Falls Track	BG32	1759294	5694700	New Plymouth AO	Stationary
12	STB	26/10/1996	Te Rerepahunu Falls Track	BG32	1759894	5694301	New Plymouth AO	Stationary
13	STB	17/11/1996	Te Rerepahunu Falls Track	BG32	1759494	5695000	New Plymouth AO	Capture
14	STB	21/11/1996	Te Rerepahunu Falls Track	BG32	1759294	5694700	New Plymouth AO	Capture
15	STB	4/12/1996	North Waitaanga	BG32	1762183	5707104	New Plymouth AO	Capture
16	STB	7/12/1996	North Waitaanga	BG32	1762183	5707104	New Plymouth AO	Capture
17	STB	10/12/1996	Mangakara Stream	BG32	1764784	5705906	New Plymouth AO	Roost
18	STB	15/12/1996	Headwaters Mohakatino River	BG32	1758184	5705400	New Plymouth AO	Roost
19	STB	17/02/1998	Headwaters Mohakatino River	BG32	1758184	5705400	New Plymouth AO	Roost
20	STB	7/11/1998	Laurence's Hut, Mt Damper	BH32	1757199	5687998	New Plymouth AO	Stationary
21	STB	16/11/1998	Mt Damper	BH32	1758496	5691599	New Plymouth AO	Stationary
22	STB	16/11/1998	Mt Damper	BH32	1758296	5691999	New Plymouth AO	Stationary
23	STB	16/11/1998	Mt Damper	BH32	1759196	5692100	New Plymouth AO	Stationary
24	STB	17/11/1998	Mt Damper	BH32	1759196	5692100	New Plymouth AO	Stationary
25	STB	17/11/1998	Off track south of Mt Damper	BH32	1759098	5689899	New Plymouth AO	Stationary
26	STB	17/11/1998	Track south of Mt Damper	BH32	1758697	5691099	New Plymouth AO	Stationary
27	STB	19/11/1998	Off track south of Mt Damper	BH32	1759598	5689600	New Plymouth AO	Stationary
28	STB	19/11/1998	Off track north of Mt Damper	BH32	1758396	5692399	New Plymouth AO	Stationary
29	STB	21/11/1998	Above Tangarakau River	BH32	1762000	5688002	New Plymouth AO	Stationary
30	STB	21/11/1998	Headwaters Mohakatino River	BG32	1758184	5705400	New Plymouth AO	Roost
31	STB	2/11/1999	Just off Ohura Peak Trig Rd	BH32	1768196	5693408	New Plymouth AO	Stationary
32	STB	3/11/1999	1st Spur, NG Tucker SR Road	BG32	1766103	5696606	New Plymouth AO	Stationary
33	STB	16/11/1999	Close to Mahoewaruwaru peak	BH32	1767295	5693807	New Plymouth AO	Stationary

## Results from Bat Monitoring at Waitaanga, North Taranaki Summer of 2012-2013

**Note:** that these results have been forwarded to Head Office DOC for inclusion in the National Bat Database.

Survey No	ABM No	Location			Site	Total No Nights	Passes for Low-noise Nights				
		Eastings	Northings	Description			No Nights	STB	LTB	UC	Total
1	1	1765785	5698048	SH 40, Waitaanga	Road	10	9	1	26	1	28
	2	1765538	5698913	SH 40, Waitaanga	Road	10	9	0	80	0	80
	4	1763246	5700197	SH 40, Waitaanga	Road	10	8	3	285	9	297
	5	1762343	5699756	SH 40, Waitaanga	Road	10	10	9	202	11	222
2	1	1758301	5705439	Mohakatino CA, North Waitaanga	Bush	10	7	0	2	3	5
	5	1761605	5705720	Mohakatino CA, North Waitaanga	Clearing	10	5	0	33	0	33
3	1	1761969	5706252	Mohakatino CA, North Waitaanga	ATV	10	7	26	37	33	96
	2	1762327	5706171	Mohakatino CA, North Waitaanga	ATV	10	6	12	33	3	48
	3	1762775	5706116	Mohakatino CA, North Waitaanga	ATV	10	8	27	37	3	67
	4	1763216	5706200	Mohakatino CA, North Waitaanga	ATV	10	7	7	88	3	98
	5	1763470	5706262	Mohakatino CA, North Waitaanga	ATV	10	8	5	23	0	28
4	1	1761821	5706588	Mohakatino CA, North Waitaanga	Bush	16	7	12	19	8	39
	2	1761795	5706698	Mohakatino CA, North Waitaanga	Bush	16	4	32	81	8	121
	3	1761805	5706823	Mohakatino CA, North Waitaanga	Bush	16	6	5	63	2	70
	4	1761961	5706959	Mohakatino CA, North Waitaanga	Bush	16	6	14	75	20	109
	5	1761966	5707028	Mohakatino CA, North Waitaanga	Bush	16	9	47	96	46	189
5	1	1766999	5697258	NG Tucker Scenic Reserve	4x4	11	5	8	9	3	20
	3	1767513	5696777	NG Tucker Scenic Reserve	4x4	11	3	0	1	0	1
	4	1767899	5697152	NG Tucker Scenic Reserve	4x4	11	2	0	3	1	4
	5	1768042	5697619	NG Tucker Scenic Reserve	4x4	11	2	3	21	1	25

<b>6</b>	1	1759122	5696740	Te Rerepahupahu Falls Track	Bush	12	10	4	6	0	10
	3	1759271	5696434	Te Rerepahupahu Falls Track	Bush	12	9	0	4	0	4
	4	1759524	5696180	Te Rerepahupahu Falls Track	Bush	12	9	0	1	0	1
	5	1759482	5695765	Te Rerepahupahu Falls Track	Bush	12	10	1	4	0	5
<b>7</b>	1	1756691	5701875	Mohakatino Paraninihi	4x4	10	7	6	237	6	249
	3	1756318	5701872	Mohakatino Paraninihi	ATV	10	10	1	34	0	35
	4	1755844	5701741	Mohakatino Paraninihi	ATV	10	10	0	37	1	38
	5	1757041	5701877	Mohakatino Paraninihi	4x4	10	8	13	82	7	102
<b>Total =</b>						<b>322</b>	<b>201</b>	<b>236</b>	<b>1619</b>	<b>169</b>	<b>2024</b>

**Site Description:**

**Road** – Formed public road sealed or metal surface

**4x4** – Unformed non-public road/track requiring 4 wheel drive

**ATV** – Track requiring ATV bike, often forestry/bench tracks

**Track** – formed walking track

**Clearing** – bush clearing, often forestry skid site

**Bush** – no formed/unformed access way

## Timing of Bat Passes

Details of the timing of bat passes for Surveys 1 and 7 for Long-tailed bats and for Surveys 3 and 4 for Short-tailed Bats.

<b>Long-tailed Bat Passes</b>					
<b>Survey 1</b>					
30 Oct to 9 Nov 2012					
Sunset - 2005			Sunrise - 0610		
	Det 1	Det 2	Det 4	Det 5	
2000 - 2100	1	31	2	12	<b>46</b>
2100 - 2200	9	17	31	27	<b>84</b>
2200 - 2300	3	9	59	34	<b>105</b>
2300 - 0000	4	16	87	42	<b>149</b>
0000 - 0100	3	4	44	20	<b>71</b>
0100 - 0200	2	1	49	25	<b>77</b>
0200 - 0300	1		12	17	<b>30</b>
0300 - 0400		2	1	5	<b>8</b>
0400 - 0500	3			12	<b>15</b>
0500 - 0600				8	<b>8</b>
0600 - 0700					
	<b>26</b>	<b>80</b>	<b>285</b>	<b>202</b>	<b>593</b>
<b>Survey 7</b>					
6 to 16 Feb 2013					
Sunset - 2030			Sunrise - 0645		
	Det 1	Det 3	Det 4	Det 5	
2000 - 2100	3			9	<b>12</b>
2100 - 2200	18	4	6	17	<b>45</b>
2200 - 2300	9			7	<b>16</b>
2300 - 0000	12		3	6	<b>21</b>
0000 - 0100	16		4	5	<b>25</b>
0100 - 0200	21	2		10	<b>33</b>
0200 - 0300	17	8	2	3	<b>30</b>
0300 - 0400	6	10	3	7	<b>26</b>
0400 - 0500	5	3	3	4	<b>15</b>
0500 - 0600	112	7	15	13	<b>147</b>
0600 - 0700	18		1	1	<b>20</b>
	<b>237</b>	<b>34</b>	<b>37</b>	<b>82</b>	<b>390</b>

<b>Short-tailed Bat Passes</b>						
<b>Survey 3</b>						
10 to 20 Dec 2012						
Sunset - 2045			Sunrise - 0550			
	Det 1	Det 2	Det 3	Det 4	Det 5	
2000 - 2100						
2100 - 2200	1					<b>1</b>
2200 - 2300	14	6	6	2	1	<b>29</b>
2300 - 0000	4					<b>4</b>
0000 - 0100	5					<b>5</b>
0100 - 0200	1	1				<b>2</b>
0200 - 0300			2			<b>2</b>
0300 - 0400		2	5	3	2	<b>12</b>
0400 - 0500	1	3	14	2	2	<b>22</b>
0500 - 0600						
0600 - 0700						
	<b>26</b>	<b>12</b>	<b>27</b>	<b>7</b>	<b>5</b>	<b>77</b>
<b>Survey 4</b>						
20 Dec 2012 to 5 Jan 2013						
Sunset - 2050			Sunrise - 0600			
	Det 1	Det 2	Det 3	Det 4	Det 5	
2000 - 2100						
2100 - 2200		2	1		1	<b>4</b>
2200 - 2300	5	5		1	7	<b>18</b>
2300 - 0000	2	1		1	6	<b>10</b>
0000 - 0100		2	1		3	<b>6</b>
0100 - 0200	2	4	1	3	4	<b>14</b>
0200 - 0300	2	5		7	6	<b>20</b>
0300 - 0400		7			8	<b>15</b>
0400 - 0500	1	5	2	2	11	<b>21</b>
0500 - 0600		1			1	<b>2</b>
0600 - 0700						
	<b>12</b>	<b>32</b>	<b>5</b>	<b>14</b>	<b>47</b>	<b>110</b>