# Bats: casual reports

## Version 1.0

This specification was prepared by Jane Sedgeley in 2012.

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Department of Conservation
*Te Papa Atawhai*

# Synopsis

Collecting casual reports of bats is primarily an inventory tool that can be used to collect data on the distribution of both foraging and roosting bats. Records of bat sightings come from three main sources: casual *ad hoc* sightings made by the public, direct solicitation of target observer groups that may encounter bats (e.g. caving groups, rock-climbers, tramping clubs, foresters), and opportunistic records stemming from other survey work (e.g. kiwi surveys).

Casual reports can provide useful records that build an inventory of bat distribution gradually over time. Reports can be collated periodically, either nationally or locally, to identify areas to target for more comprehensive inventory (e.g. bat detector surveys) or identify sites potentially important for management. If observers use bat detectors, or records are derived from incidental captures such as domestic cat kills, or bats are seen in the roost site, then the species of bat can potentially be identified.

Casual reports have been used anecdotally to describe declines in bat populations in New Zealand. However, their use for monitoring is very limited. Simple assessments of reporting rates may provide some inference about gross distribution changes over long time periods if all biases are declared and discussed. Because casual reports are by definition *ad hoc*, they provide no information about absence of bats and can only be used in conjunction with other data sources to make coarse inferences about populations. Absence of reports, or very low frequency of reporting, is not necessarily evidence of rarity, because reporting rates are influenced by casual observer effort, a wide range of environmental factors, visibility in different habitat types, and behaviour of the bats themselves (conspicuousness of different age and sex classes in different seasons).

# Assumptions

- At some time, bats will be reported in an area if present.
- All identifications of bats are reliable (i.e. other animals are not misidentified as bats).

# Advantages

- This method uses information solicited from casual sources at no cost, often taking advantage of sightings from the public, or DOC staff working on other projects.
- This type of record is often the only initial information available about bats from remote areas.
- On occasion, casual sightings yield important information about bats. For example:
    - Location of roosts
    - Location of important populations being threatened by human activities
    - Presence of a species not previously thought to be in an area, or not recorded for a long time

- Casual bat surveys can take place during other inventory exercises (e.g. kiwi surveys), consequently adding value to these surveys.

## Disadvantages

- Bats are exceptionally cryptic, so the chance of encountering them casually is remote.
- Long-tailed bats and lesser short-tailed bats primarily occupy tree roosts and change their roost frequently so the chance of encountering these roosts is remote. However, buildings or caves that have been used over a long period of time may contain sign (droppings or stain; see 'Roost occupancy: field sign'—docdm-590882).
- Absence of reports, or very low frequency of reporting, is not evidence of absence or rarity, because reporting rates are influenced by casual observer effort, a wide range of environmental factors, visibility in different habitat types, and behaviour of the bats themselves (conspicuousness of different age and sex classes in different seasons).
- Bats can be misidentified. For example, swallows and fantails flying at dusk have been mistaken for bats.
- Generally, it is not possible to identify bat species from casual observation unless the bat is in the hand. Although people often assume that bats seen in open areas, or at dusk, are long-tailed bats, these identifications cannot be proven unless the observer has a bat detector. Lesser short-tailed bats often commute to foraging grounds over open areas as well (O'Donnell et al. 1999), although usually when it is dark.
- Casual reports have overemphasised the abundance of long-tailed bats and underemphasised the abundance of lesser short-tailed bats. Lesser short-tailed bats are generally encountered in remote forests after dark where there are few casual observers, whereas long-tailed bats occur in open habitats where casual observers are more likely.

## Suitability for inventory

Collations of casual reports are a suitable first phase for regional and national inventories (see 'Case study A' below and case studies in 'Bats: counting away from roosts—automatic bat detectors'—docdm-590733). Casual reports can confirm presence, but not absence of bats in an area. Casual reports rarely record species of bat accurately unless the observer has a bat detector and is familiar with species identification, bats are present in a roost, or if the bat is in the hand.

## Suitability for monitoring

Casual reports have been used anecdotally to describe declines in bat populations in New Zealand (Dwyer 1962; Daniel & Williams 1984; O'Donnell 2000a). However, their use for monitoring is very limited. Simple assessments of reporting rates may provide some inference about gross distribution changes over long periods if all biases are declared and discussed.

# Skills

- No special skills required—just good observation skills. If looking for sign then the ability to recognise bat dropping and feeding remains from those made by other species such as rats would be useful, but samples and photographs can be taken (see 'Bats: roost occupancy and indices of bat activity—field sign'—docdm-590882).
- If the observer uses a bat detector, then the ability to identify bats from their echolocation calls is necessary. For more information, see 'Background to bat detectors' in the 'DOC best practice manual of conservation techniques for bats' (docdm-131465).

# Resources

No special resources required. Purchase of Batbox III bat detectors (c. $300) would be an advantage. Photographs are valuable for identifying bats in the hand and for taking pictures of bat sign at potential roost sites. Each DOC office should have a system for recording casual reports and ensuring that they are entered into each conservancy's bat database. Conservation officers need to be familiar with the protocols for recording reports.

# Minimum attributes

Consistent measurement and recording of these attributes is critical for the implementation of the method. Other attributes may be optional depending on your objective. For more information refer to 'Full details of technique and best practice'.

DOC staff must complete a 'Standard inventory and monitoring project plan' (docdm-146272).

Minimum attributes to record:

- Observer name and contact details
- Location (place name)
- GPS coordinates (7 figure eastings and 7 figure northings)
- Map sheet number
- Date
- Altitude
- Type of record (e.g. one-off casual survey, bat sighting from member of the public, dead bat handed in to local DOC office, bat detector survey, bat droppings in a roost)
- Weather conditions when sighting was recorded, including temperature
- Bat species if known and how the bat was identified (do not speculate on species identification—record as 'unidentified' if not certain of identity)
- Number of bats seen or heard

- Type of detector if using bat detector
- Frequency on which bats were heard if using a bat detector
- How the bat was collected (for dead or injured bats, e.g. cat kill, found in shed) and where the specimen was deposited if the bat was dead
- Dominant vegetation and habitat type (e.g. beech forest edge, podocarp forest interior, riparian willows, cabbage trees)

Minimum attributes can be recorded on a field sheet (Fig. 1).

| | | | | | |
|---|---|---|---|---|---|
| **Casual bat reports** | | | | | |
| **Observer name & contact details:** | | | | **Date:** | |
| **Location:** | | | | **Altitude:** | |
| **GPS coordinates:** | Easting: | | Northing: | | |
| **Map number:** | | | | | |
| **Cloud cover** (0 = clear, 8 = overcast): | | | **Temperature:** | | |
| **Weather:** (circle): | Fine | Showers | Drizzle | Rain | |
| **Wind:** (circle): | Calm | Light | Moderate | Mod-strong | Strong |
| **Type of sighting:** (circle): | Casual | Dead bat | Sign | Bat detector | |
| **Detector type/frequency setting:** | | | | | |
| **Bat species:** | | | | | |
| **Time:** | **Total number of bats seen/heard:** | | | | |
| **Habitat description:** | | | | | |

Figure 1. A standard recording sheet for collecting data in the field.

## Data storage

Forward copies of completed survey sheets to the survey administrator, or enter data into an appropriate spreadsheet as soon as possible. Collate, consolidate and store survey information securely, also as soon as possible, and preferably immediately on return from the field. The key steps here are data entry, storage and maintenance for later analysis, followed by copying and data backup for security.

Summarise the results in a spreadsheet or equivalent. Arrange data as 'column variables', i.e. arrange data from each field on the data sheet (date, time, location, plot designation, number seen, identity, etc.) in columns, with each row representing the occasion on which a given survey plot was sampled.

If data storage is designed well at the outset, it will make the job of analysis and interpretation much easier. Before storing data, check for missing information and errors, and ensure metadata are recorded.

Storage tools can be either manual or electronic systems (or both, preferably). They will usually be summary sheets, other physical filing systems, or electronic spreadsheets and databases. Use appropriate file formats such as .xls, .txt, .dbf or specific analysis software formats. Copy and/or backup all data, whether electronic, data sheets, metadata or site access descriptions, preferably offline if the primary storage location is part of a networked system. Store the copy at a separate location for security purposes.

All bat sightings should be recorded in the DOC bat database. Each DOC conservancy should have a separate Excel spreadsheet for this purpose (Fig. 2). Access rights are held by the conservancy bat contact (see ‘Bat Recovery Group contacts’—docdm-132033). If a conservancy has not set up its own spreadsheet, one can be created using the ‘National bat database template’ (docdm-213136). See the ‘Canterbury Conservancy bat database’ (docdm-213179) for an example of a spreadsheet containing data.

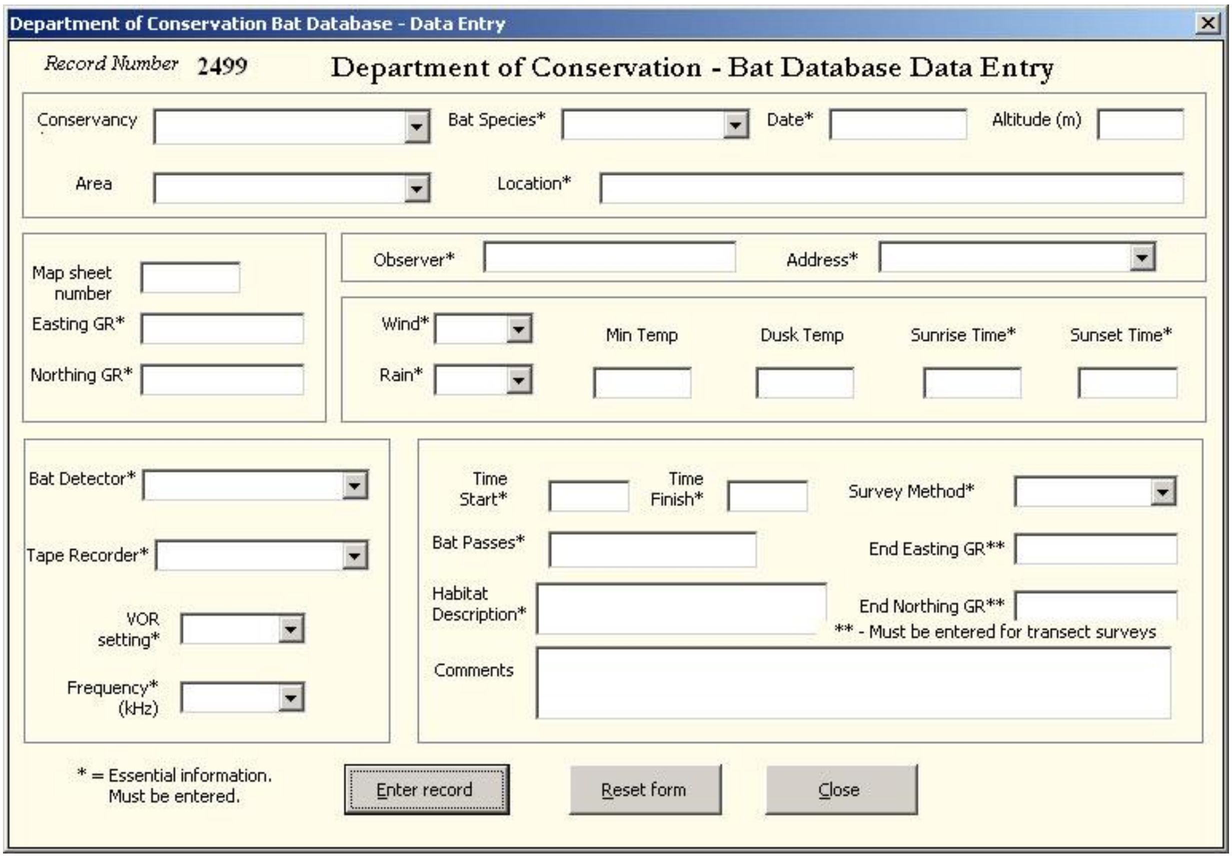


Figure 2. Screenshot illustration of data entry page from the DOC bat database.

# Analysis, interpretation and reporting

Seek statistical advice from a biometrician or suitably experienced person prior to undertaking any analysis.

This method measures:

- Presence of bats
- Frequency of reporting rates

Interpretation is limited. Identification of bats in an area confirms presence but not absence. Reporting many bats in an area in a short time *may* infer something about population size, but reporting few or no bats does not imply that the population is small or that bats are absent because reporting rates are influenced by so many factors (see case studies below).

Simple statistics and maps can be reported for a study area such as:

- Maps of presence of bat species and unidentified bats, and potentially, maps of points where observations were made in favourable conditions, but no bats were reported.
- Total number of bats reported over discrete time frames and in distinct geographic areas.
- Simple statements like ‘bats are present in the study area’, ‘long-tailed bats are present in a district’, ‘short-tailed bats are present in the area targeted for management’, ‘numerous bat reports have been received for the management area’, ‘long-tailed bats have not been reported in the city for 75 years’, etc.

Simple regression analyses on reporting rates were used to make inferences about population decline in long-tailed bats (O’Donnell 2000a). Analyses that are more complex are now potentially available. For example, combination of logistic regression and GIS techniques could be used to compare sites where bats have been reported with random sites (Greaves 2004; Greaves et al. 2006). However, careful justification is needed for such an approach because so many factors influence reporting rates, not least observer effort and ability. Such analyses should be considered exploratory, used to set up more rigorous studies, and all assumptions and biases should be declared and discussed.

# Case study A

**Case study A: using historical and anecdotal information to focus survey effort**

## Synopsis

The DOC Golden Bay Area Office conducted a bat survey using automatic detection and recording units over two summers between 2001 and 2004. They surveyed a total of 33 sites that were selected based on availability of suitable habitat, accessibility and historical and anecdotal evidence. Historical and anecdotal records were compiled from previous DOC reports and sightings reported into the area office from members of the public. Additional records came in from local residents as news of the survey got around the community. Records spanned from 1914 to the 1990s.

The survey was completed using a combination of time dedicated solely to bat surveying and as an add-on to other work such as lizard surveying, kiwi listening and snail monitoring. Long-tailed bats were recorded at nine of the sites surveyed. Further details of the survey can be found in Hayward (2004).

## References for case study A

Hayward, S. 2004: Golden Bay bat survey 2001–2004. Unpublished report to the Department of Conservation, Takaka.

# Case study B

**Case study B: use and misinterpretation of distribution maps**

Distribution maps are often used to make assumptions about how common a species is, even though they should not. Casual reports of bats have been used for both national (Dwyer 1960; Daniel & Williams 1984; Molloy 1995; O'Donnell 2000a; Lloyd 2005) and regional (Barrie 1995; Borkin 1999) assessments of distribution of New Zealand bat species (e.g. Fig. 3).

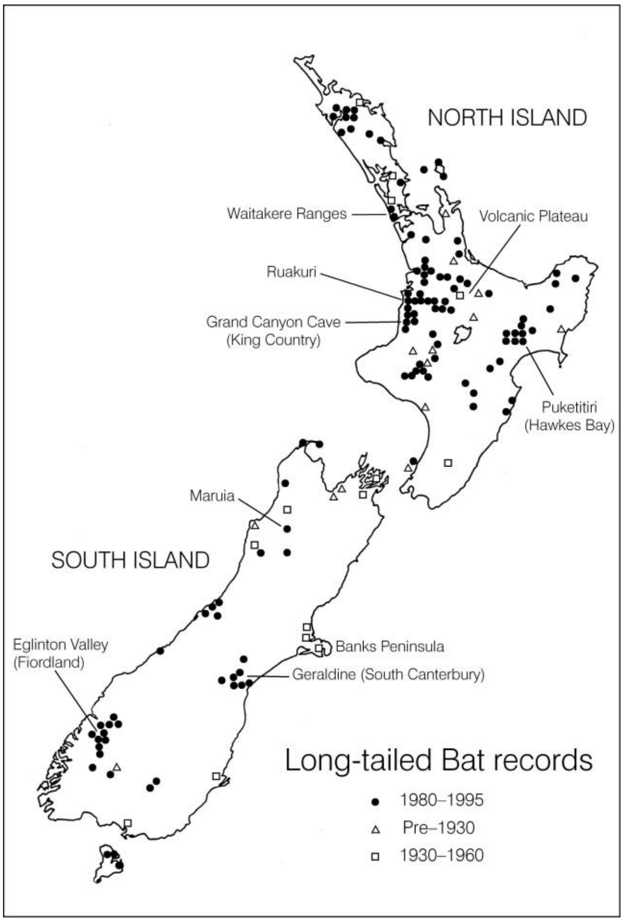


Figure 3. Distribution of reports of long-tailed bats in New Zealand, 1930–1995 (after O'Donnell 2000a).

## Overestimating the distribution of long-tailed bats

National distribution maps collated by Dwyer (1960, 1962) and updated by Daniel & Williams (1984) and Molloy (1995) indicated that long-tailed bats were widespread throughout New Zealand and several offshore islands (Fig. 3). Daniel & Williams (1984) concluded that long-tailed bats were common in comparison to lesser short-tailed bats and therefore of lesser conservation concern. However, subsequent research showed that this interpretation of the status of long-tailed bats was flawed because long-tailed bats were rare or absent from most areas surveyed (O'Donnell 2000a) (Fig. 3).

The distribution maps produced from 1960 to 1995 were based on presence/absence of records on the large scale 10 000-yard national grid during different periods. However, presence on the maps was difficult to interpret because records could equally have referred to one bat sighting over many years, or many sightings over a few years. The scale at which the bats ranged over was also over-emphasised by putting one large dot in each 10 000-yard grid square (were the bats throughout the area or just at one spot?). No measures of survey effort were possible because the maps were based on casual sightings from the public and most likely reflected the distribution of observers only. The maps were inadequate for examining population trends and status, except in very general terms.

In addition to these concerns, a preliminary review of reports lodged in the national bat database (administered by DOC) and used to formulate the most recent distribution map (Molloy 1995) contained many errors. O'Donnell (2000a) checked whether reports had been correctly entered as long-tailed bats. Most of the reports were actually of *unidentified* bat species (181 records) (Fig. 4), and it appears that the collators of reports had assumed that unidentified bats were more likely long-tailed bats, largely because of the perceived rarity of lesser short-tailed bats. Many reports were vague; for example, 'bats reported by farmer sometime in last 10 years' while others probably referred to lesser short-tailed bats because they described bats with audible calls and bats singing from trees. Additionally, six records had not been entered in the correct chronological period (pre-1930, 1930–1960, 1961–1983, and 1980–1995) and some were not even confirmed as bats.

The amended database was used to generate a new contemporary map of the distribution of long-tailed bats based on presence of sightings in 10 000-yard grid squares (Fig. 3) (O'Donnell 2000a). Surveys of areas where bats were once present also indicated that long-tailed bats were rare in most locations where they had been reported (13 of the 15 study areas; O'Donnell 2000a). This result contradicted Daniel & Williams (1984) and Daniel (1990) who recorded long-tailed bats as being 'the only common species of bat in New Zealand' with a 'secure' conservation status.


Figure 4. Distribution of reports of unidentified bat species misidentified as 'long-tailed bats' in the Bat Recovery Plan (Molloy 1995) (after O'Donnell 2000a).

## Underestimating abundance of lesser short-tailed bats

In contrast to long-tailed bats, the national distribution maps for lesser short-tailed bats indicate that their range is very limited (Lloyd 2005). However, while the range may be limited, recent counts of bats emerging from their roost sites indicate that lesser short-tailed bats are abundant at some of these sites. For example, counts from individual roost trees on Codfish Island numbered up to 1345 bats (Sedgeley 2001); in the Eglinton Valley, 1184 bats (C. O'Donnell, unpubl. data); and at Rangataua Forest, c. 6000 bats in two or three colonial roosts (Lloyd 2005). Lloyd (2005) estimated the present total population of lesser short-tailed bats at < 50 000 in 13 known populations.

## Conclusions

While the long-tailed bat has often been referred to as the commoner New Zealand bat species (Daniel 1990), this reputation may simply reflect greater conspicuousness of the species. Foraging long-tailed bats frequent forest edges (O'Donnell 2000b) and they leave their roosts before sunset (O'Donnell 2005). In comparison, lesser short-tailed bats live deep in the forest and usually emerge only when it is fully dark (O'Donnell et al. 1999, Lloyd 2005), so are rarely encountered even where they are common. Examples in this case study highlight the danger of over-interpretation of casual distribution records.

## References for case study B

Barrie, A.N. 1995: New Zealand bats: I. A summary of historical records and a survey of their current distribution. University of Otago Wildlife Management Report No. 70. University of Otago, Dunedin.

Borkin, K. 1999: Long-tailed bat distribution in the Waikato Conservancy. Diploma of Wildlife Management Report, University of Otago, Dunedin.

Daniel, M.J. 1990: Order Chiroptera. In C.M. King (Ed.): The handbook of New Zealand mammals. Oxford University Press, Auckland.

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

Dwyer, P.D. 1960: Studies on New Zealand Chiroptera. MSc thesis. Victoria University, Wellington.

Dwyer, P.D. 1962: Studies on the two New Zealand bats. *Zoology Publications from Victoria University of Wellington 28*: 1–28.

Lloyd, B.D. 2005: Family Mystacinidae. In C.M. King (Ed.): The handbook of New Zealand mammals. 2nd edition. Oxford University Press, South Melbourne, Australia.

Molloy, J. (Comp.) 1995: Bat (pekapeka) recovery plan (*Mystacina*, *Chalinolobus*). *Threatened Species Recovery Plan Series No. 15*. Department of Conservation, Wellington.

O'Donnell, C.F.J. 2000a: Conservation status and causes of decline of the threatened New Zealand long-tailed bat *Chalinolobus tuberculatus* (Chiroptera: Vespertilionidae). *Mammal Review 30*: 89–106.

O'Donnell, C.F.J. 2000b: Influence of season, habitat, temperature, and invertebrate availability on nocturnal activity by the New Zealand long-tailed bat (*Chalinolobus tuberculatus*). *New Zealand Journal of Zoology 27*: 207–221.

O'Donnell, C.F.J. 2005: New Zealand long-tailed bat. In C.M. King (Ed.): The handbook of New Zealand mammals. 2nd edition. Oxford University Press, South Melbourne, Australia.

O'Donnell, C.F.J.; Christie, J.; Corben, C.; Sedgeley, J.A.; Simpson, W. 1999: Rediscovery of short-tailed bats (*Mystacina* sp.) in Fiordland, New Zealand: preliminary observations of taxonomy, echolocation calls, population size, home range, and habitat use. *New Zealand Journal of Ecology 23*: 21–30.

Sedgeley, J.A. 2001: Winter activity in the tree-roosting lesser short-tailed bat, *Mystacina tuberculata*, in a cold temperate climate in New Zealand. *Acta Chiropterologica 3*: 179–195.

# Full details of technique and best practice

- Collecting casual reports of bats is primarily an inventory tool that can be used to collect data on the distribution of both foraging and roosting bats.
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Dwyer, P.D. 1960: Studies on New Zealand Chiroptera. MSc thesis. Victoria University, Wellington.

Dwyer, P.D. 1962: Studies on the two New Zealand bats. *Zoology Publications from Victoria University of Wellington 28*: 1–28.

Greaves, G. 2004: Modelling the distribution of New Zealand bats as a function of habitat selection. MSc thesis, University of Otago, Dunedin.

Greaves, G.; Mathieu, R.; Seddon, P.J. 2006: Predictive modelling and ground validation of the spatial distribution of the New Zealand long-tailed bat (*Chalinolobus tuberculatu*s). *Biological Conservation 132*: 211–221.

Hayward, S. 2004: Golden Bay bat survey 2001–2004. Report to the Department of Conservation, Takaka (unpublished).

Lloyd, B.D. 2005: Family Mystacinidae. In C.M. King (Ed.): The handbook of New Zealand mammals. 2nd edition. Oxford University Press, South Melbourne, Australia.

Molloy, J. (Comp.) 1995: Bat (pekapeka) recovery plan (*Mystacina*, *Chalinolobus*). *Threatened Species Recovery Plan Series No. 15*. Department of Conservation, Wellington.

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O'Donnell, C.F.J. 2005: New Zealand long-tailed bat. In C.M. King (Ed.): The handbook of New Zealand mammals. 2nd edition. Oxford University Press, South Melbourne, Australia.

O'Donnell, C.F.J.; Christie, J.; Corben, C.; Sedgeley, J.A.; Simpson, W. 1999: Rediscovery of short-tailed bats (*Mystacina* sp.) in Fiordland, New Zealand: preliminary observations of taxonomy, echolocation calls, population size, home range, and habitat use. *New Zealand Journal of Ecology 23*: 21–30.

Sedgeley, J.A. 2001: Winter activity in the tree-roosting lesser short-tailed bat, *Mystacina tuberculata*, in a cold temperate climate in New Zealand. *Acta Chiropterologica 3*: 179–195.

# Appendix A

The following Department of Conservation documents are referred to in this method:

| | |
|---|---|
| docdm-132033 | Bat Recovery Group contacts |
| docdm-590733 | Bats: counting away from roosts—automatic bat detectors |
| docdm-590882 | Bats: roost occupancy and indices of bat activity—field sign |
| docdm-213179 | Canterbury Conservancy bat database |
| docdm-131465 | DOC best practice manual of conservation techniques for bats |
| docdm-213136 | National bat database template |
| docdm-146272 | Standard inventory and monitoring project plan |