

FLUCTUATIONS IN BIRDLIFE IN A SUBALPINE BASIN

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ABSTRACT

Results are given of a monthly survey of birdlife in the subalpine Lake Harris basin, north-west Otago Alps. Fluctuations over a year, from May 1976 to April 1977, were tallied by species and by numbers of individuals. Comments are made on effects of climatic conditions and resources available to birds at such altitudes in the Southern Alps along the Main Divide. Arising from observations made so far, it is suggested that the Rock Wren (*Xenicus gilviventris*) may hibernate during harsh winter months.

INTRODUCTION

In order to study the changes in birdlife in a representative subalpine zone over a yearly cycle the author paid monthly visits (from May 1976 to May 1977) to the "Harris Basin" below Lake Harris in the Routeburn River headwaters of Mount Aspiring National Park.

This area was chosen because of its ease of accessibility from a road, and because suitable accommodation was available almost on the site (at the Routeburn Falls hut, owned and operated by the Park Board). Since the completion of the new vehicle bridge across the Dart River (18 km above Glenorchy at the head of Lake Wakatipu) it is now possible to motor to the roadend at the old Routeburn Lodge, from which an easy 2½ hours' tramp up the well-known "Routeburn Track" leads one to the Falls hut. (In summertime, by leaving Alexandra about 4 p.m. it is thus possible to reach the hut before dark).

The main drawback of this area for study is the fact that the subalpine scrub is not particularly tall and luxuriant compared with some other similar headwaters close to the Main Divide, and hence perhaps does not harbour the diversity of species within the scrub zone that one might expect, as will be discussed more fully later.

Nevertheless, the area is fairly typical of dozens of such basins near the heads of alpine streams above the beech treeline east of the Main Divide of the Southern Alps of New Zealand.

GENERAL DESCRIPTION

The "Harris basin" (Fig. 2) is a large montane cirque, about 3 km in diameter, scoured out by ancient iceflows, and now enclosed

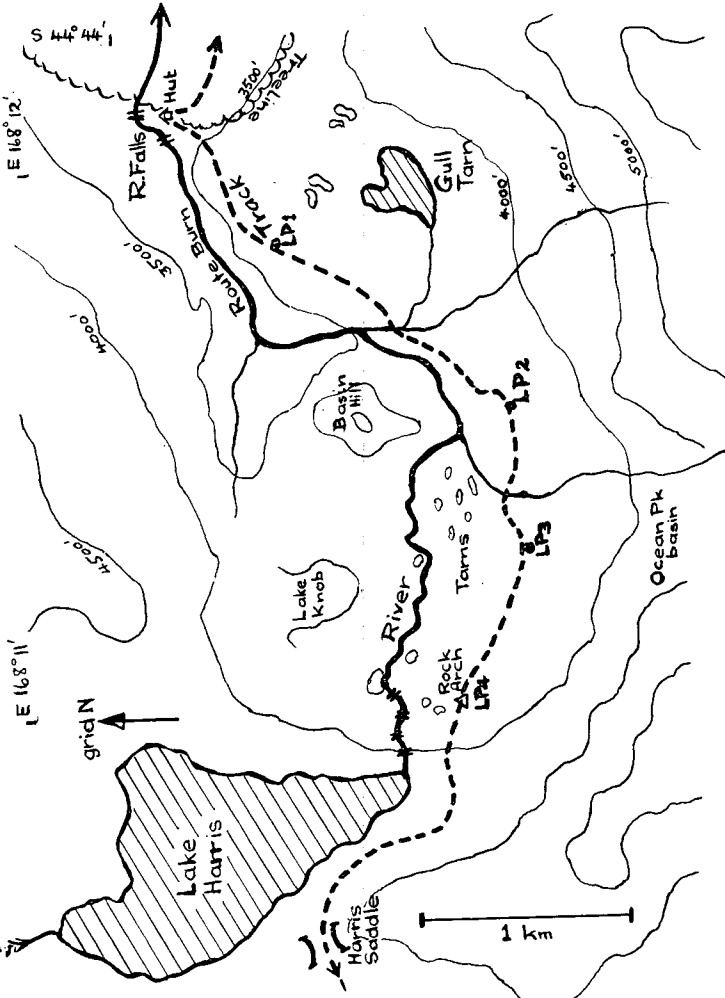


FIGURE 1 — Sketch map of the study area, with natural landmarks and listening post (LP). Adapted from NZMS1/S112, Hollyford.

in impressive bluffs and peaks (to 1912 m) of the Humboldt Range. It is a region well-known to trampers for the picturesque cascades and waterfalls below the lake outlet, as well as over its eastern lip, and for the deep dark lake just below the saddle at 1340 m (4400') on its western exit, this saddle giving various routes of access to the lower Hollyford valley.

The basin floor is above the beech forest at c. 1070 m (3500'), with most of its expanse lying open to the morning/early afternoon sun, except its steep northern slopes which are in shade most of the day and which are cold, snow-covered and usually well frozen during the winter (from about May to September).

For birds it provides several types of habitat:—

- i. the lake itself, larger tarns and river backwaters suitable for waterfowl and gulls.
- ii. the scrub zone for the small passerines.
- iii. the high tussock knolls and ridges (with exposed mineral substrate) for Pipit.
- iv. the scrubby bluffs, mountain cliffs and vegetated ledges favoured by Falcon and Kea.
- v. the consolidated jumbles of huge boulders intermingled with scrub and herbfield which, with suitable bluffs above, furnish ideal terrain for the endemic Rock Wren.

Being on the Main Divide the area is subject to sudden changes in weather, severe storms, heavy annual precipitation (probably about 4700 mm), and frequent snowfalls, with deep snow lying most winters from about late May to early September. However, because of the enclosing mountains, the basin itself is relatively sheltered from high winds.

CHANGES IN WEATHER CONDITIONS

By chance, the night of the first visit (8 May 1976) coincided with the first heavy snowfall (to 150 mm) of the winter, and although the following day was clear and calm only the tips of the Hebes were showing through. The snow thawed slowly on sunny faces, and then was cleared almost completely by heavy north-west rains just before the mid-June visit. This was followed later in the month by heavy snowfalls and severe frosts, so that by mid-July the basin was completely plastered white with snow to 1 metre or more deep, ice and icicles festooning the bluffs and mountainsides, with hardly a patch of rock showing, and air temperatures very low. Two Keas were the only birds recorded. (Under slightly less severe conditions in mid-July 1974, one Kea was the only bird recorded, even though some bluffs and shrubby extremities were clear on that occasion.)



FIGURE 2 — A general view of the Harris Basin from below the 'Gull Tarn' looking west to the Harris Saddle (extreme right). A faint line leading upwards on the left through the scrub is the tramping track. Lake Harris is above the main snow patches below the bluffs on the right (from a colour negative, May 1977).

Photo: P. Child

By mid-August tips of shrubs, bluffs and boulder sides on sunny slopes were clear but the general snow-cover was still 0.5 m deep. A month later shrubs were more exposed on the sunny faces with frozen snow patches up to 300 mm deep in the shade. The tarns and lake were still snow and ice-covered, with ice 250 mm thick on the lake. After some windy, mild days in early October, the basin was clear of snow up to the level of the lake, the lake itself still being covered in snow and ice except for some melting at the shoreline on the warmer southern side and around the outlet. (The scrub was now becoming inhabited by Hedge Sparrow and Yellow Hammer.) By mid-November, however, there was a sudden reversal of conditions; a week of bitter southerly weather produced snow up to 600 mm deep with only the tips of shrubs, etc., showing through again, although it was thawing quickly on north-facing bluffs and ledges.

December, January and February had the usual changeable alpine summer weather, mainly mild days but frequent showers and heavy rainstorms.

Most of the autumn was mild and settled with occasional storms putting a fresh skiff of snow on the tops but the basin warm enough for it to remain clear until at least mid-May 1977.

THE VEGETATION

Sodden peat swamp, dotted with small muddy-bottomed tarns, characterises much of the basin floor, with a typical bog vegetation of short sedges and grasses, cushions of *Oreobolus*, *Donatia* and *Phyllachne* and a mixture of small herbs, including a sundew (*Drosera arcturi*). Extending up the lower gentler slopes of the basin walls is a belt of subalpine scrub, about 100 m wide, not particularly dense except in a few patches, interspersed with tall snow-tussock (*Chionochloa flavescens*) and the large southern speargrass (*Aciphylla horrida*). Below the shrub canopy is a rich variety of alpine herbs, prominent among which are the largest mountain daisy (*Celmisia coriacea*) and the great mountain buttercup (*Ranunculus lyallii*). Of the scrub itself *Hebe odora* and *Olearia moschata* are generally co-dominant, with occasional conspicuous patches of snow totara (*Podocarpus nivalis*), three species of turpentine scrub (*Dracophyllum uniflorum*, *D. menziesii*, and *D. longifolium*) and stunted ribbonwood (*Hoheria lyallii*); Mountain flax (*Phormium cookianum*), whipcord hebe (*Hebe hectori*), at least two coprosmas and a few others are scattered throughout. Except for a few stands the scrub is rather rounded and stunted, mostly only about 1 - 1½ m tall (see Fig. 3).

Above the scrub is the usual tall snow-tussock, gradually giving way to shorter species, and the upper alpine herbfield.

There is no forest in the basin, the mountain beech (*Nothofagus solandri* var. *cliffortioides*) limit being at the hut level below the eastern rim at about 1040 m (3400').



FIGURE 3 — Mixed vegetation with scattered scrub in the Harris Basin: speargrass and tall tussock in the foreground; in the middle distance the co-dominant shrubs *Olearia moschata* (light) and *Hebe odora* (dark); on the rocky knoll in the background *Dracophyllum uniflorum* (dark) and some scattered mountain flax (*Phormium cookianum*) (from a colour negative, May 1977).

Photo: P. Child

METHODS

Routeburn Falls hut was usually reached late in the evening and the following day spent in the basin. Most surveys occupied from about 8.30 a.m. to 3 p.m. All birdlife seen or heard was noted for numbers and species. A particular lookout was made in boulder areas known to have been frequented by Rock Wren. Several points en route, usually in the "lee" of a knoll or large boulder were utilised at "listening posts," where hearing was good because of the shelter afforded from the noise of wind or river. The lake itself, river pools and the large "Gull Tarn" (see Fig. 1) were examined for waterfowl or gulls. The southern half of the survey route lay more or less along the line of the tramping track, with appropriate side excursions, the return being across the lake outlet and back via knolls and scrubby slopes on the northern side of the basin to recross the river and rejoin the track near the eastern rim above the hut.

(For comparative purposes, in very different prevailing weather from that experienced a year earlier, a thirteenth visit was made in May 1977.)

RESULTS

Results of individual visits are shown in the table below (Table 1). The monthly total of numbers of individuals and of species is shown graphically (Fig. 4).

DISCUSSION

1. *Numbers and species:*

As one might expect in an area subject to rigorous seasonal climatic change the results show a general increase in both species and individuals from the winter to summer.

The greatest number of individuals (63) occurred in early summer (December) whereas the least (2) occurred in mid-winter (July).

The greatest number of species (9) was recorded in late autumn (April) whereas the least number (1) was recorded when heavy snow filled the basin in mid-winter (July).

Prevailing weather affects movements and hence tallies, the small passerines in particular tending to descend to the shelter of the treeline beeches during severe conditions and during temporary adversities (rain-showers, etc.) to seek cover in the scrub. This was amply exhibited by comparing results of 9 May 1976 (after the first heavy winter snowfall, up to 150 mm deep) when only 4 birds of 2 species were recorded, with a warm, calm, almost snowfree basin on 11 May 1977, when 19 birds of 5 species (including 16 passerines) were present.

| | Totals | | | | | | | | | | | | Ave/Visit | | | | |
|---|--------|---|---|---|----|-----|----|----|----|-----|----|---|-----------|------------------|-------------------|-------------------|---------------|
| | M | J | J | A | S | O | N | D | J | F | M | A | | Indiv Records | Months Records | Months Present | Ave Visits |
| 1. Falcon (<u>Falco novaeseelandiae</u>) | - | 1 | - | - | - | - | - | - | - | - | - | 1 | 2 | 2 | 2 | 0.2 | 1.0 |
| 2. Harrier (<u>Circus approximans</u>) | - | - | - | - | - | - | - | - | - | 1 | - | - | 1 | 1 | 1 | 0.1 | 1.0 |
| 3. Black-backed Gull (<u>Larus dominicensis</u>) | - | - | - | - | - | 2 | - | - | - | - | - | - | 2 | 1 | 0.2 | 2.0 | |
| 4. Paradise Duck (<u>Tadorna variegata</u>) | - | - | - | - | - | - | - | 2 | - | - | - | 2 | 4 | 2 | 0.3 | 2.0 | |
| 5. Grey Duck (<u>Anas superciliosa</u>) | - | - | - | - | - | 1 | - | 1 | - | - | - | 2 | 4 | 3 | 0.3 | 1.3 | |
| 6. Kea (<u>Nestor notabilis</u>) | 3 | 8 | 2 | 3 | 1 | 2 | 2 | 9 | 3 | 16 | 1 | 3 | 55 | 12 | 4.6 | 4.6 | |
| 7. Hedge Sparrow (<u>Fringilla modularis</u>) | 1 | 1 | - | 1 | 17 | 13+ | 12 | 31 | 15 | 15 | 11 | 9 | 126 | 11 | 10.5 | 11.5 | |
| 8. Chaffinch (<u>Fringilla coelebs</u>) | - | - | - | 2 | - | 1 | 1 | 4 | 1 | - | 11 | 8 | 28 | 7 | 2.3 | 4.0 | |
| 9. Redpoll (<u>Acanthis flammea</u>) | - | - | - | - | - | - | - | 10 | 6 | 15+ | 4 | 6 | 41 | 5 | 3.4 | 8.2 | |
| 10. Yellow Hammer (<u>Emberiza citrinella</u>) | - | - | - | 4 | 7 | 1 | 8 | 9 | 6 | - | - | - | 35 | 6 | 2.9 | 5.8 | |
| 11. Silvereye (<u>Zosterops lateralis</u>) | - | - | - | - | - | - | - | - | - | - | - | 7 | 7 | 1 | 0.6 | 7.0 | |
| 12. Pipit (<u>Anthus novaeseelandiae</u>) | - | - | - | 1 | - | - | - | - | - | - | - | 2 | 3 | 2 | 0.3 | 1.5 | |
| 13. Rock Wren (<u>Aenicus gilviventris</u>) | - | - | - | - | - | 2 | - | - | 4 | 2 | 1 | - | 9 | 4 | 0.8 | 2.3 | |

Totals: Indiv/Species 4/2 10/3 2/1 7/4 22/3 28/7 16/4 63/6 42/7 55/6 25/5 40/9

Table 1: Monthly records for tallies of each species.

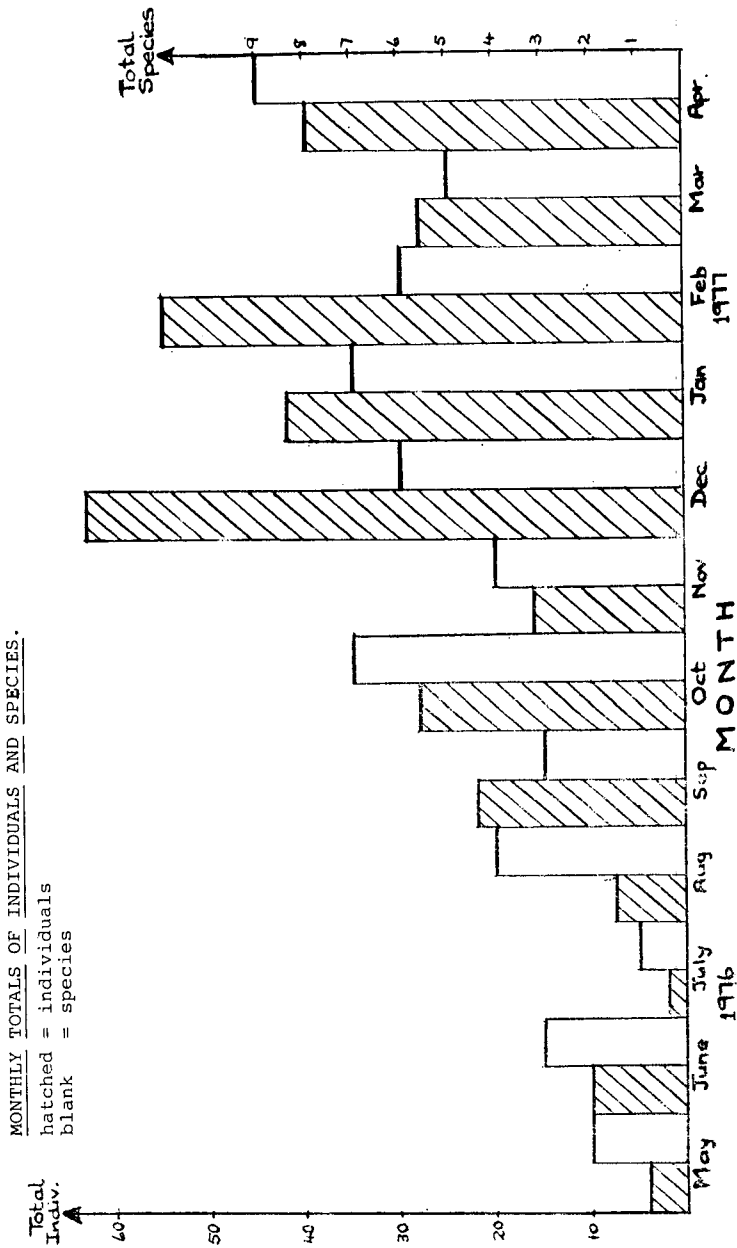


FIGURE 4 — Monthly totals of individuals and species.

Climatic conditions also affect reliability of recording, with snow, fog and rain hindering visibility, and hearing being affected by wind. On most visits during the present survey, however, recording conditions were remarkably good, with very little wind interference. The relatively low totals in January may have been due partly to poor visibility in cool, misty showers.

By contrast the clear, warm autumn day of 16 April provided a tally better than expected, and a record number (9) of species. Contributing to the latter result may have been

- (a) presence of both Paradise and Grey Duck, possibly post-breeding dispersal from valley floors.
- (b) the only (monthly) record of Silvereye — possibly an autumn behavioural characteristic in search of ripe fruit of subalpine shrubs.
- (c) only the second records of Falcon and Pipit, the latter possibly at lower altitude following southerly storms which left a dusting of snow higher up.

As noted elsewhere (Child 1976) the subalpine scrub zone is dominated by aliens, especially Hedge Sparrows, Redpolls, Chaffinches and Yellow Hammers. In this basin there is a surprising absence of Blackbirds (*Turdus merula*), usually typical of this zone, which is probably due to the relative lack of tall scrub. (Blackbirds are present in the forest and valley below.)

More difficult to explain is the absence of the native Grey Warbler (*Gerygone igata*) which is usually a not uncommon member of the avifauna of the shrub zone in other similar areas of the Park.

2. *Habitat Resources available:*

Within the habitats listed under the general description are the following resources:—

(a) *Nesting sites:*

Bluffs — Falcon.

Large boulder falls — Rock Wren, Kea.

Subalpine shrubs — Hedge Sparrow, Chaffinch, Redpoll, Yellow Hammer, Silvereye.

Overhanging tussocks, etc. — Paradise Duck, Grey Duck, Pipit.

“Open” knolls near water — Black-backed Gull.

(b) *Foods:*

Tussock and other small dry seeds — Yellow Hammer, Pipit, Redpoll.

Succulent fruits of Coprosma, Snow Totara, etc. — Kea, Silvereye, Chaffinch.

Insects and other small invertebrates — Rock Wren, Kea, Hedge Sparrow, Chaffinch, Silvereye, Pipit.

Grasshoppers — Black-backed Gull, Kea.

“Wetland” foods — Paradise Duck, Grey Duck.

Small birds — Falcon.

Carrion of birds and mammals — Harrier, Black-backed Gull.

The 1976-77 summer/autumn appears to have been a poor season foodwise for frugivorous and graminivorous birds, with relatively low production of succulent fruits on the subalpine coprosmas, totara, etc., and an almost complete absence of seeding of the snow tussocks in the basin.

3. Some Comments on Individual Species:

(1) *Falcon*: Only 2 sightings, each of one bird, probably the same one judging by size and colouring. Since the Falcon is fairly territorial all year round (Nick Fox, pers. comm.) the Harris basin probably formed only part of its domain — significantly it was seen disappearing over into the Hollyford side of the Humboldt Range on a third sighting in May 1977. During the April visit it was seen to eat a Silvereye — of interest because this was the only month Silvereyes were recorded.

(2) *Harrier*: Only 1 sighting (in February) of a singleton soaring in the basin at about 1220 m (4000'). Of interest because it is only the second record I have made of this species above treeline within the Park.

(3) *Black-backed Gull*: One might normally expect to find a pair at “Gull Tarn” and/or Lake Harris each summer. The pair sighted at Gull Tarn in October were apparently discouraged from nesting by an unseasonal heavy snowfall (up to 600 mm) in the basin in November, and left the area altogether. The common large alpine grasshopper (*Sigauss australis*) is an important food item for this gull, especially as part of the diet of its nestlings.

(4) *Kea*: Kea numbers seemed to be lower than normal over the survey period, with quite small numbers most of the year and a maximum of 16 in February. Four seasons previously there had been 27 at the hut alone. Keas eat a great variety of plant and animal foods, including subalpine shrub berries; roots, bulbs, leaves and stems of some soft herbs; shoots and buds of beech in the growth period (December to March); larger insects at any time available — grasshoppers, beetles and grubs; nectar of mountain flax; seeds of speargrass (Campbell 1976). As mentioned earlier the season was a poor one for shrub fruits and this could have affected numbers present during the survey. For instance, snow totara (*Podocarpus nivalis*) fruit is an important kea food, but fruiting is poor in wet seasons because the plant is wind-pollinated (Jackson 1960). The 1975-76 summer was drier than normal so that heavy fruiting was the rule, while the reverse was true in the 1976-77 season.

Competitors for some of the “Kea foods” in the basin include occasional red deer, chamois, hare, opossum and the frugivorous birds such as Silvereye and Chaffinch.

(5) *Hedge Sparrow*: Next to the Kea, the diminutive Hedge Sparrow was the most tenacious of this habitat, being recorded in all months except one, with a singleton being recorded even in winter visits. Unlike the other small passerines it does not flock in winter, and occasional individuals are evidently able to sustain themselves on whatever small invertebrates they can find among the tips of shrubs protruding from the snow. For the rest of the year they easily form the bulk of this bird community, their short song and communication calls being distinctive on calm days.

(6) *Redpoll*: These were present (as singles, pairs or very small groups) only in summer and autumn when the small seeds of *Celmisia*, *Olearia moschata* and grasses are available.

(7) *Yellow Hammer*: Very small numbers (only in spring and summer) were recorded. Their relative scarcity and sudden disappearance after February is attributed to the almost total lack of seeding of the snow tussocks in this survey period.

(8) *Pipit*: Only 2 records. "Alpine" pipits seem to prefer the shorter tussocks, herbfield and exposed mineral matter of the higher ridges rather than the taller, denser vegetation of the lower basin. (There are no Skylark (*Alauda arvensis*) competing for resources at these altitudes in the western ranges of the Main Divide, as there are on the summits of the unforested ranges of Central Otago. (See Child 1975).

(9) *Rock Wren*: Recorded only from October to March (and, significantly, absent in November when heavy snow again filled the basin). Rock Wrens are usually first heard, and even then are sometimes difficult to locate, being concealed within shrubs or among large boulders. When finally sighted, invariably both members of a pair are fairly close together (within an area of a few square metres) and they can then be subsequently followed as they work their way about the territory searching for small invertebrates among the shrubs, or among lichens and bryophytes on the boulders and damp bluffs. On clear still days in winter when snow fills the basin (with only the tips of the shrubs emerging) they would be particularly conspicuous on top of such shrubs or exposed boulders. Although I have spent many such days in the Harris basin and elsewhere in alpine regions of the Park, Rock Wrens have never been so recorded by me (or any other observer as far as I can ascertain). Neither have they been reported from the protection of the beech timberline where the small exotic passerines shelter and where the related Rifleman (*Acanthisitta chloris*) is usually a common component. It seems, therefore, quite feasible that the Rock Wren exhibits some type of hibernation or torpidity in the heavy snowfall period (about May to September), possibly even retiring to a dry crevice or old nest beneath the boulders for warmth and shelter. Alternatively, it would be possible for it to move about under the snow cover, among the shrub bases and the

spaces under rock piles, gleaning a limited amount of sustenance; but if this were the more typical winter behaviour one might also expect to occasionally hear such activity — unless the high-pitched communication calls were completely absent during this time — an unlikely event? Allied to this is the fact that such a small bird, with its very high surface area to volume ratio, would need to be spending a large part of a winter's day (with very low ambient temperatures) in such food-gathering if it were to remain active and maintain "normal" body temperature and metabolism. On balance, I feel that some kind of hibernation is the more likely behaviour, but whether this can be proven is a matter for some speculation.

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