# MORTALITY AND SURVIVAL OF BIRDS DURING AN UNSEASONABLE SNOW-STORM IN SOUTH CANTERBURY, NOVEMBER 1967

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**ABSTRACT**

A severe and unseasonable snow-storm in South Canterbury in November 1967 killed many Skylarks, Yellowhammers, Magpies, Thrushes and Blackbirds. A total of 810 dead birds, nearly all introduced passerines, were picked up in homestead gardens and around farm buildings during a three-day visit to the area two weeks after the storm began; no dead birds were found in native forest. Several runholders reported severe mortality to wild ducklings and goslings, though adult ducks and geese survived well. Most passerines resumed breeding soon after the snow melted, but Yellow-hammers and Fantails remained extremely rare.

## INTRODUCTION

In 1967, inland Canterbury and North Otago suffered the heaviest late-spring snowfall ever recorded. It began on 16 November and, although the worst of the storm was over in two days, scattered snow and rain with occasional heavy falls continued, particularly in the high country, for the rest of the month. Up to five feet of snow fell in some areas, but many others had less and most cleared during the following week. A general account of meteorological conditions and of losses to property, stock and wildlife was provided by Hughes (1969).

On 29 November, nearly two weeks after the storm began, the authors accompanied Dr. Norman Adams (then Director of the Tussock Grasslands and Mountain Lands Institute) on a three-day inspection of the district, and collected information on the effects of the snow on birdlife. Lists of dead and living birds were made at each stop (Table I) and D.G.D. recorded all the birds seen en route from his side of the Land-Rover.

During the months following the storm, officers of the Tussock Grasslands and Mountain Lands Institute and of the Department of Agriculture interviewed many high country runholders between the Rakaia River in the north and Lindis Pass in the south and sought information on the effects of the storm on stock, property, communications and birdlife; the results were recorded on questionnaires. A total of 63 reports was obtained and all but three included some reference to birds.

## RESULTS

### A. The November-December Inspection

#### (i) *Dead Birds*

A total of 810 birds (13 species) were found dead (Table I), the most common being Skylarks (494), Yellow-hammers (131), Magpies (50), Song Thrushes (34) and Blackbirds (31).

Most corpses were in or about farm buildings (especially hay barns) and beneath shelter trees; none was found in native forest nor in open paddocks, though these were searched. The few birds, mainly Magpies, found along roadsides may have been killed by passing cars.

## TABLE I — BIRDS FOUND DEAD

| | Species of Bird | Harrier | Skylark | Song Thrush | Blackbird | Hedge Sparrow | Greenfinch | Goldfinch | Redpoll | Chaffinch | Yellow Hammer | House Sparrow | Starling | Magpie | Total Birds |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| On Roadsides | Chch.-Geraldine | - | - | 1 | 3 | - | - | - | - | - | 1 | 5 | 1 | 6 | 17 |
| | Geraldine-Fairlie | - | - | - | - | - | - | - | - | - | - | 2 | - | 15 | 17 |
| | Fairlie-Burke's Pass | 1 | - | - | - | - | - | - | - | - | - | - | - | 22 | 23 |
| | Burke's Pass-Pukaki | - | - | - | - | - | - | - | - | - | - | - | - | 1 | 1 |
| | Edwards Creek | - | 11 | - | - | - | - | - | - | - | 1 | 1 | - | - | 13 |
| Near Farm Buildings, Plantations etc. | Holbrook | - | 318 | 5 | - | 2 | - | 4 | 1 | 6 | 17 | - | 1 | 3 | 357 |
| | Sawdon | - | 81 | - | - | - | - | - | 2 | 2 | 23 | - | - | 1 | 109 |
| | Maryburn | - | 54 | - | 1 | - | 1 | 1 | - | - | 6 | - | - | - | 63 |
| | Dusky | - | 3 | - | 1 | - | 1 | - | - | - | 5 | - | - | - | 10 |
| | Hermitage | - | - | - | - | - | - | - | 1 | 1 | - | - | - | - | 2 |
| | Birch Hill | - | - | 1 | 1 | - | - | - | - | - | - | - | - | - | 2 |
| | Glentanner | - | 2 | 26 | 22 | 11 | - | - | 1 | 12 | 53 | 2 | 2 | 2 | 133 |
| | Pukaki | - | 19 | - | - | - | - | - | - | - | - | - | - | - | 19 |
| | Katherine Fields | - | 6 | - | - | - | 3 | - | - | - | 1 | - | 1 | - | 11 |
| | Blair Athol | - | - | - | - | - | 2 | 1 | - | - | 16 | - | - | - | 19 |
| | Nr. Burke's Pass (Two localities) | - | - | 1 | 3 | - | 1 | - | - | - | 8 | 1 | - | - | 14 |
| | Totals | 1 | 494 | 34 | 31 | 13 | 8 | 6 | 5 | 21 | 131 | 11 | 5 | 50 | 810 |

The birds had been dead for ten days or more (probably since 17 November) and every hay barn contained partly eaten birds; some had been dragged between hay bales or under stacks, probably by rats or mustelids. Obviously, the birds we found were only a fraction of those that died. At some huts near Pukaki we found 19 dead Skylarks whereas 40 were counted there by local residents immediately after the storm.

The species found dead varied markedly in different places (Table I). Most of the Skylarks, for instance, were at Holbrook, Sawdon and Maryburn where the homestead gardens and outbuildings provided the only shelter in miles of open tussock. Glentanner, on the other hand, had more trees and thickets of sweet briar; only two Skylarks were found here though there were comparatively large numbers of Blackbirds, Thrushes, Hedge Sparrows and Yellow-hammers. Nearly all the dead Yellow-hammers were in hay barns whereas Blackbirds, Thrushes and Hedge Sparrows were usually under trees and hedges. This suggests that the birds sought not only shelter but also suitable food. At Blair Athol, dead Yellow-hammers were found in a trough of oats inside an implement shed and these birds, at least, seemingly had plenty of food; the grain showed no obvious signs of chemical residues, nor was a complete lack of water likely.

Most of the dead Magpies, and many of the Blackbirds and Thrushes, listed in Table I, were young of the year. In addition, we saw some dead nestlings (Starlings, Thrushes and Blackbirds), and broken Starlings' eggs. Several empty nests of various kinds were seen on the ground or in bushes flattened by snow, but we found no occupied nests that would have contained eggs before the storm. Except for one Harrier, probably hit by a car, all the dead birds were introduced passerines.

(ii) *Surviving Birds*

Thirty-three species of birds were recorded alive in the Mackenzie Country (Table II). Despite heavy mortality, Skylarks remained quite common in all suitable places, whereas Yellow-hammers were virtually absent and, judging by the number dead, they must have been fairly numerous before the storm. The only Fantail seen was near Burke's Pass, but we were told several were present at Glentanner before the storm.

Redpolls, House Sparrows and Starlings seemed to have survived the storm quite well. Several Starlings' nests with fresh eggs were found in farm buildings and small flocks of Starlings were quite common in open country between Pukaki and the Hermitage. House Sparrows were carrying nesting material in several places; at Pukaki many of these birds had survived the storm by sheltering in a large Ministry of Works garage. Several patches of native bush between Pukaki and the Hermitage contained moderate numbers of Warblers, Tits, Riflemen, White-eyes, Hedge Sparrows, Chaffinches, Blackbirds and Song Thrushes, most of them singing vigorously. Starlings with fresh eggs, House Sparrows rebuilding, and the chorus of song from other species suggested that most of the surviving passerines had resumed breeding or were about to do so.

Gulls, terns, waders and waterfowl were seen in several places. Many probably lost their nests when melting snow raised river levels,

## TABLE II — BIRDS SEEN ALIVE

| SPECIES OF BIRD | Fairlie-Burke's Pass | | | Burke's Pass-Pukaki | | | Pukaki-Glentanner | | | Glentanner Hermitage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A* | B* | C* | A* | B* | C* | A* | B* | C* | A* | B* | C* |
| Shag (Phalacrocorax sp., P. carbo?) | - | - | - | 2 | - | 2 | - | - | - | - | - | - |
| White-faced Heron (Notophoyx novaehollandiae) | - | - | - | - | - | - | 1 | - | 1 | - | - | - |
| Canada Goose (Branta canadensis) | - | - | - | - | - | - | - | - | 1 | - | - | - |
| Paradise Duck (Tadorna variegata) | - | - | - | - | - | 1 | 2 | 4 | 2 | 4 | 7 | 2 |
| Grey Duck (Anas superciliosa) | - | - | - | (1) | - | 2 | - | - | 1 | - | - | - |
| Mallard (Anas platyrhynchos) | - | - | - | - | - | - | - | 2 | 2 | - | - | - |
| Black Teal (Aythya novaeseelandiae) | - | - | - | - | - | - | (4) | 6 | 1 | - | - | - |
| Harrier (Circus approximans) | (1) | - | - | 4 | 4 | 3 | - | 1 | 1 | 2 | - | 1 |
| Pied Oystercatcher (Haematopus ostralegus) | - | - | 2 | - | - | 5 | 1 | - | 1 | 1 | - | 2 |
| Banded Dotterel (Charadrius bicinctus) | - | - | - | - | - | 2 | - | 1 | 1 | - | - | - |
| Wrybill (Anarhynchus frontalis) | - | - | - | - | - | - | - | - | 1 | - | - | - |
| Pied Stilt (Himantopus himantopus) | - | - | - | 2 | - | 1 | - | - | 1 | (2) | - | 1 |
| Black-backed Gull (Larus dominicanus) | - | - | 1 | 4 | - | 2 | - | 2 | 2 | - | - | 1 |
| Black-billed Gull (Larus bulleri) | (20) | - | 1 | - | 25 | 2 | 2 | - | - | - | - | - |
| Black-fronted Tern (Chlidonias hybrida) | - | - | - | 2 | - | 2 | 2 | - | 1 | 4 | - | 1 |
| Rifleman (Acanthisitta chloris) | - | - | - | - | - | - | - | - | - | - | - | 2 |
| Skylark (Alauda arvensis) | - | - | - | 7 | 5 | 7 | 9 | 6 | 3 | 1 | - | 2 |
| Fantail (Rhipidura fuliginosa) | - | - | 1 | - | - | - | - | - | - | - | - | 3 |
| Yellow-breasted Tit (Petroica macrocephala) | - | - | - | - | - | - | - | - | - | - | - | 3 |
| Grey Warbler (Gerygone igata) | - | - | 1 | - | - | 1 | - | - | 1 | - | - | 2 |
| Song Thrush (Turdus ericetorum) | 3 | - | 2 | - | - | 4 | 2 | 2 | 2 | - | - | 1 |
| Blackbird (Turdus merula) | 2 | 1 | 2 | - | - | 5 | 6 | 16 | 3 | - | 1 | 3 |
| Hedge Sparrow (Prunella modularis) | - | - | - | - | - | 2 | - | - | 2 | - | - | 3 |
| Pipit (Anthus novaeseelandiae) | - | - | - | - | - | - | - | 2 | 1 | - | - | 3 |
| White-eye (Zosterops lateralis) | - | - | 1 | - | - | - | - | - | - | - | - | 3 |
| Greenfinch (Chloris chloris) | - | - | - | 1 | - | 5 | - | 3 | 1 | - | - | 3 |
| Goldfinch (Carduelis carduelis) | - | 1 | 1 | 1 | - | 3 | - | - | 1 | - | - | - |
| Redpoll (Carduelis flammea) | - | - | 1 | - | - | 6 | - | - | 2 | - | - | 2 |
| Chaffinch (Fringilla coelebs) | 1 | - | 2 | 2 | - | 4 | 2 | - | 2 | - | - | 3 |
| Yellow Hammer (Emberiza citrinella) | 1 | (1) | 1 | - | - | - | - | - | - | - | - | - |
| House Sparrow (Passer domesticus) | 11 | 30 | 1 | 2 | - | 5 | 7 | 8 | 3 | - | - | 1 |
| Starling (Sturnus vulgaris) | 23 | 32 | 1 | 21 | 34 | 7 | 33 | 66 | 2 | 5 | 108 | 3 |
| White-backed Magpie (Gymnorhina hypoleuca) | 10 | 6 | 1 | 5 | - | 4 | 4 | - | 1 | - | 2 | 2 |
| Unidentified | - | 6 | - | 1 | 2 | - | 19 | 12 | - | 1 | - | - |

* Columns A and B are road counts of the **number of birds** seen from the Land Rover by DGD on the left side of the road. Brackets indicate additional species seen to the right by other members of the party. A indicates outward journey and B the return. Column C lists birds seen during stops and the figures indicate the **number of places** at which the species was recorded.

**Fairlie-Burke's Pass** (17 miles)
A Outward journey 1308 to 1335 hrs on 29 November; B Return journey 1213 to 1257 hrs on 1 December

**Burke's Pass-Pukaki** (41 miles)
A Outward journey 1335 to 1815 hrs on 29 November: B Return journey 1100 to 1213 hrs on 1 December

**Pukaki-Hermitage** (37 miles)
A Outward journey 0921 to 1244 hrs on 30 November; B Return journey 1505 to 1853 hrs on 30 November

but there were no obvious signs (nor reports) of mortality to adult birds. A Grey Duck and two pairs of Paradise Duck were accompanied by young that must have hatched just before the storm, and a Black-backed Gull was incubating eggs (perhaps laid before the storm) on a high shingle bank beside the river near the Hermitage.

B. The Questionnaires

Rough estimates, supplied by runholders, of the number of dead birds at 59 stations between the Rakaia River in the north and the Lindis Pass in the south are summarised in Table III and show that mortality was general throughout the whole district.

TABLE III — Severity of Bird Mortality

| *No. Dead Birds Found* | *No. Stations Reporting* |
|---|---|
| None | 0 |
| Less than 20 † | 4 |
| 20 to 50 | 12 |
| 50 to 100 | 8 |
| Over 100 * | 35 |
| Total | 59 |

† includes one report of " a few."

* includes reports of " a lot " (1 report), " many " (2), " very many " (1), " 283 " (1), " hundreds " (11), " tremendous numbers " (1), " over 1000 " (1), and " thousands " (9).

The mortality tended to be more severe, however, at higher altitudes (Table IV) though there were several exceptions.

TABLE IV — Mortality at Different Altitudes

| *Altitude of homestead (ft.)* | *No. Stations Reporting* | | *Percent reporting more than 100 dead birds* |
|---|---|---|---|
| | *Less than 100 dead birds* | *More than 100 dead birds* | |
| 1100 - 1400 | 2 | 0 | – |
| 1400 - 1700 | 10 | 6 | 38% |
| 1700 - 2000 | 8 | 15 | 65% |
| 2000 - 2300 | 2 | 5 | 78% |
| 2300 - 2500 | 2 | 9 | |
| Total | 24 | 35 | 59% |

Although mortality seemed higher where the snow was deeper (Table V), the correlation was less striking than with altitude. Possibly the homesteads at higher altitude had fewer suitable trees to shelter birds from the storm.

TABLE V — Mortality in Relation to Depth of Snow

| *Approx. depth of snow at homestead (ft.)* | *No. Stations Reporting* | | *Percent reporting more than 100 dead birds* |
|---|---|---|---|
| | *Less than 100 dead birds* | *More than 100 dead birds* | |
| Under 2 | 6 | 6 | 50% |
| 2 to 3 | 7 | 10 | 59% |
| 3 to 4 | 6 | 11 | 65% |
| Over 4 | 5 | 8 | 62% |
| Total | 24 | 35 | 59% |

Table VI lists the species of birds found dead by runholders and also those thought to have survived reasonably well. These reports must be accepted with caution because some runholders were probably unable to identify all the birds they found, particularly the smaller kinds, and a few people have used unconventional names. Except for Yellow-hammers, House Sparrows have the greatest number of reports of mortality and also of survival (Table VI), and Magpies come next, again in both categories. Probably these species were mentioned frequently because they are easily identified. During and immediately after the storm, runholders were preoccupied with saving stock and could take no more than a passing interest in the effects

TABLE VI — Mortality and Survival of Different Species

| *Kind of Bird* | *No. of Stations Reporting* | |
|---|---|---|
| | *Mortality* | *Survival* |
| Yellow-hammer † | 21 | 0 |
| " Sparrow " | 17 | 12 |
| Magpie | 12 | 11 |
| Skylark | 12 | 1 |
| Blackbird | 9 | 4 |
| " Gosling " | 8 | 0 |
| " Duckling " | 7 | 0 |
| Thrush | 7 | 1 |
| " Finches " ‡ | 7 | 0 |
| Redpoll * | 6 | 0 |
| Chaffinch | 6 | 0 |
| White-eye | 4 | 0 |
| Starling | 3 | 4 |
| Goldfinch | 2 | 0 |
| Fantail | 1 | 0 |
| Warbler | 1 | 0 |
| Adult Duck | 0 | 1 |
| Native Pigeon | 0 | 1 |
| Kea | 0 | 1 |
| Pipit | 0 | 1 |

† includes single reports of " yellow hammer heads," " yellow fellows," " yellow-heads " and " birds with yellow on them."
* includes single reports of " robins," " red robins " and " red-breasted robins."
‡ May include some skylarks.

of the storm on birds. For this reason, the data in Tables I and II are probably more reliable than those in Table VI; for instance, Hedge Sparrows are not mentioned in Table VI though we found 13 dead ones (Table I). On the other hand, Canada Geese and ducks (Paradise, Grey and Mallard) are much better known, and the 15 reports of severe mortality to their young are probably well founded and a most useful addition to the very limited data collected on these species in late November. Adult ducks and geese were reported to have survived reasonably well.

The reports from runholders confirmed that small birds often died even in the presence of food and that survivors resumed breeding after the thaw. On the other hand, Canada Geese (and perhaps some other non passerines) did not breed again. Two reports noted that a few small birds died well after the thaw " right up to Christmas time and afterwards."

Many runholders noted that fewer birds were present after the storm, though this was less apparent by the end of December. Species reported to have declined, some almost to extinction, were: " finches," Yellow-hammers, White-eyes, Tomtits, Riflemen, Fantails, Blackbirds, Magpies, Goldfinches, " larks," Chaffinches and Chukor. Most of these, however, were mentioned in only one or two reports.

## DISCUSSION

According to De Lisle (1969), snow usually lies on the higher foothills of Canterbury for over 30 days a year, but the frequency and amount of snow vary a lot from year to year; there have been 12 severe snow storms on the foothills and plains since 1862. The recent fall was unusual, however, in coming so late in the year and this may explain its severe effect on birds: in winter, many probably move to lower altitudes and can draw on fat reserves which are largely lacking during the breeding season.

Although mortality was obviously severe, it was largely confined to passerines as Jehl and Hussell (1966) found in birds breeding in very cold and wet weather in Northern Canada. In Canterbury, however, there was also considerable mortality among newly hatched ducklings and goslings.

Many surviving passerines resumed breeding as soon as conditions improved and the storm is unlikely to have caused more than a temporary reduction in their numbers. In general, this was confirmed by subsequent reports from runholders. Yellow-hammers and Fantails, however, were almost exterminated over much of the district and may take more than a year to regain their former numbers.

In May 1965, R. H. Taylor (pers. comm.) recorded 11 Fantails during a trip from Geraldine to Mount Cook compared with only one seen by us, during three days, a fortnight after the storm. Stead (1927) remarked that a severe snow-storm in 1922 killed " practically every Fantail in Canterbury except those in the native bush, where they were apparently safe, and whence, in a few years they quickly repopulated the whole Province." Survival of small birds in native forest was also demonstrated by the numbers we saw and heard in several patches of bush between Pukaki and the

Hermitage on 30 November, but no Fantails were seen. On the other hand, a report from Mount Algidus claimed that there were many fewer Tomtits, Fantails and Riflemen since the storm.

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# SHORT NOTE

## PUMICE COLLECTING BY A BANDED DOTTEREL

While staying at Port Waikato for ten days in November 1968, I discovered a nest of a Banded Dotterel *(Charadrius bicinctus)* early on the morning of 14/11/68. During that day a hide was moved in stages to a final position of some 10 feet from the nest. When my companion had left, the female immediately returned and settled onto the eggs. She seemed restless though, and after some minutes stood up and moved slowly away picking up chips of pumice and ' throwing them over her shoulder ' as it were, in the direction of the nest. She went for a distance of some 6 - 9 feet and then immediately returned to the nest where she sat; and stretching out, picked up all the chips that had fallen near the nest. These she tucked under her. When she had collected all she could reach without actually getting up, she then repeated the process. At no time did she pick up pumice chips on her way back but would collect only those within reach from a sitting position. The nest at this stage had only two eggs and a third had been added by 16/11/68.

During my stay at Port Waikato I also observed a Red-necked Stint *(Calidris ruficollis)* feeding on the estuary near two Banded Dotterels. From a perusal of the literature it would appear that this is the first record for Port Waikato.

— DON. W. HADDEN