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Food and foraging behaviour of the Snares fernbird

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The Snares fernbird (*Bowdleria punctata caudata* Buller, 1894) is an opportunistic insectivore, its prey ranging greatly in size and type. Birds forage over a wide variety of sites, including forest, tussock, boulder beaches, cliffs, penguin colonies, and floating kelp. Foraging methods vary with the prey sought, and at times birds adopt specific "search images" when hunting certain insects. Details of foods brought to nestlings are given. Four postures used by fernbirds when foraging actively are described.

INTRODUCTION

The diet and foraging behaviour of the Snares fernbird (*Bowdleria punctata caudata*) were studied on North East Island, The Snares (105 km SSW of Stewart Island, New Zealand) during 18 November 1970 to 10 March 1971 and 18 December 1971 to 22 March 1972. Previous accounts of the feeding

habits of the Snares fernbird have consisted only of brief notes (Stead 1948, Warham 1967). Similarly, there is little knowledge of the feeding of other forms of genus *Bowdleria*.

Most of the research on North East Island was carried out in a 7 ha area between Boat Harbour and Punui Bay (Fig. 1), although birds in other

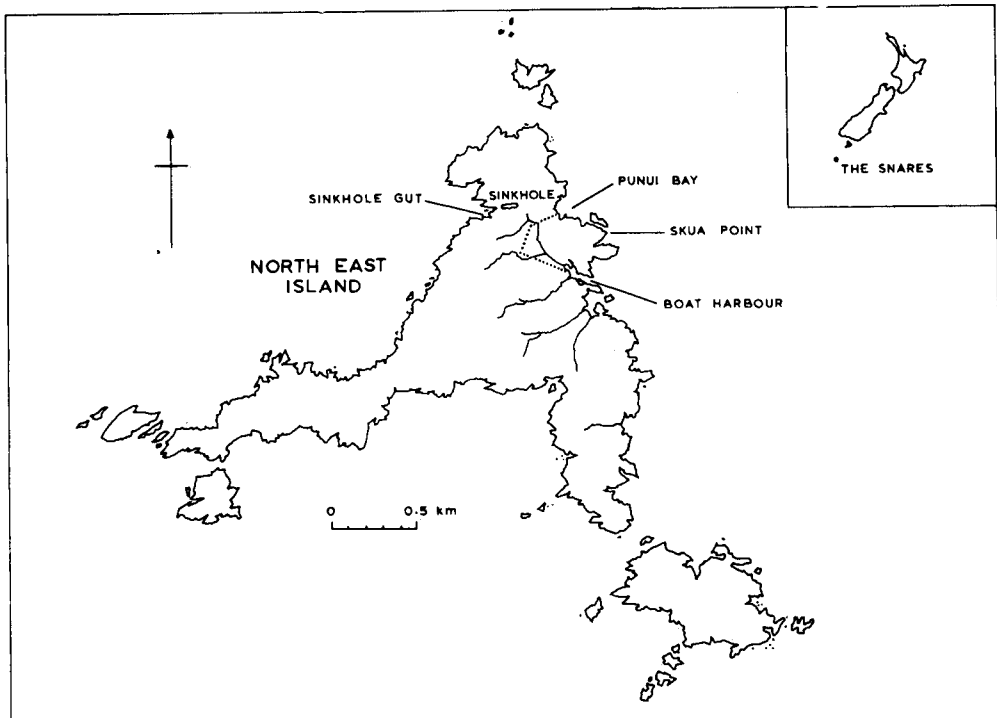


Fig. 1. Map of The Snares, minus the outlying Vancouver Reef and Western Chain. Dotted line encloses the 7 ha Snares fernbird study area.

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parts of the island were observed also. The study area comprised rolling country which terminated in cliffs along the coast, except from Skua Point to Boat Harbour, where the land sloped gently to the sea. Daisy tree forest of *Olearia lyallii* and *Senecio stewartiae* formed the dominant vegetation, and this was fringed in places by the shrub *Hebe elliptica*. From Skua Point to Punui Bay the coastal fringe was clad in *Poa astonii* and *P. tennantiana* tussocks.

METHODS

Diet was assessed from microscopic examination of adult crop castings, the gut contents of dead nestlings, and food brought to nests, and by observing the prey caught by fledgling, juvenile, and adult fernbirds. Over 160 h were spent watching six fernbird nests in the forest of the study area, as well as 16 h at two nests in the steep, tussocked cliffs adjacent to Sinkhole and Sinkhole Gut.

Fernbirds proved indifferent to being observed closely for long periods, and could often be followed at distances of less than 5 m. Most observations on

foraging behaviour were made in open areas such as in the forest (in the majority of which there was scarcely any foliage beneath the 1-m-thick canopy, and the bare forest floor was frequently honey-combed with petrel burrows - Fig. 2) or on areas of bare rock, rather than in *Hebe* shrubbery or tussock meadows, for in the latter two places birds were often hidden by the dense foliage.

FOODS TAKEN

Fernbirds preyed on the largest arthropods present (carabid beetles, wetas, and marine amphipods over 20 mm long) down to mites and beetles less than 1 mm long. Because of the wide range in both size and type of prey identified (Table 1) and in methods of foraging (see below), probably any available arthropods within the given size range were taken.

FOODS OF NESTLINGS

The size of food brought to nests varied with the age of the young. The diet of recently hatched nestlings comprised small, soft-bodied prey such as flies, moths, spiders, tipulids, and a wide range of

Table 1. Prey items identified from the Snares fernbird, Nov-Mar. Items prefixed with an asterisk were taken by nestlings and adults, all others by birds off the nest.

ARANEAE	Empididae, <i>Chelipoda</i> sp.
*Dictynidae, <i>Oramia rubrioides</i> (Hogg)	<i>Hilarempis</i> sp.
Three unidentified species	Syrphidae, <i>Helophilus hochstetteri</i> Nowicki
ORTHOPTERA	<i>Syrphus (Melangyra) novaezelandiae</i> MacQuart
*Rhaphidophoridae, <i>Insulanoplectron spinosum</i> Richards	Coelopidae, <i>Chaetocoelopa littoralis</i> (Hutton)
*Stenopelmatidae, <i>Zealandrosandrus subantarcticus</i> Salmon	<i>Coelopa debilis</i> Lamb
HOMOPTERA	<i>Protocoelopa philpotti</i> Malloch
Psyllidae species common about <i>Senecio stewartiae</i> and <i>Hebe elliptica</i>	Helomyzidae, <i>Allophylopsis lauei</i> (Hutton)
COLEOPTERA	<i>Heloclusia antipoda</i> Harrison
*Tenebrionidae, <i>Pseudhelops quadricollis</i> Broun	Sciomyzidae, <i>Polytocus costata</i> Harrison
Curculionidae, <i>Exeiratus laqueorum</i> Kuschel	Calliphoridae, <i>Xenocalliphora eudypti</i> (Hutton)
<i>Gromilus laqueorum</i> Kuschel	<i>Pollenia</i> sp.
<i>Pentathrum spadiceum</i> Broun	Muscidae, <i>Limnophora</i> , four species from <i>Hebe elliptica</i>
<i>Phrynixus laqueorum</i> Kuschel	<i>Limnohelina</i> sp.
<i>Oclandius vestitus</i> (Broun)	<i>Fannia fuliginosa</i> (Hutton)
Anthribidae, <i>Cacephatus aucklandicus</i> (Brookes)	Chloropidae, <i>Oscinosoma huttoni</i> Malloch
Staphylinidae, species unidentified, in shearwater burrows	LEPIDOPTERA
Carabidae, <i>Mecodema alternans hudsoni</i> Broun	Noctuidae, <i>Graphania insignis pagaia</i> (Hudson)
Colydiidae, <i>Pristoderis</i> spp.	Tortricidae, <i>Planotortrix syntona laqueorum</i> Dugdale
Chrysomelidae, species unidentified, elytra orange with black diagonal stripes	Psychidae, <i>Gryptothecha horningae</i> Dugdale
ACARINA	Oecophoridae, <i>Izatha oleariae</i> Dugdale
Several species, unidentified	Tineidae, <i>Proterodesma byrsopola</i> Meyrick
DIPTERA	HEMIPTERA
*Tipulidae, <i>Leptotarsus (Macromastix)</i> new species	Aphididae, <i>Myzus ornatus</i> Laing
<i>Limonia (Dicranomyia) arthuriana</i> (Alexander)	<i>Brachycaudus helichrysi</i> (Kaltenbach)
Mycetophilidae, <i>Zygomia trifasciata</i> Tonnoir	PHALANGIDA
Stratiomyidae, <i>Bereis</i> species near <i>micans</i> (Hutton)	Several species, unidentified
Psychodidae, species unidentified, on <i>Hebe elliptica</i>	HYMENOPTERA
	Braconidae, <i>Aphidius matricariae</i> Haliday
	AMPHIPODA
	* <i>Orchestia aucklandica</i>
	*Several terrestrial species, unidentified

larvae (Table 1). As the young grew, larger prey formed an increasing proportion of the daily intake. By the time the young were at full weight (12–16 days old), large prey such as wetas (Orthoptera) and marine amphipods (the latter inhabiting washed-up kelp, especially along boulder beaches such as at Sinkhole and Sinkhole Gut) constituted a substantial portion of the food brought to the young. Some wetas and amphipods were too large for even the oldest nestlings to swallow, and the parent had to tear the prey into smaller portions.

Some animals, such as moths and tipulids, were caught for nestlings most often in the early morning and late evening, when these cryptic insects were most active. Other food items, e.g., spiders, flies, larvae, and wetas, were brought in at all times of the day. Although wetas were nocturnal, thousands spent the day in petrel burrows, where they were

readily accessible to adult fernbirds. During the observation periods at nests no weevils or carabids were seen to be fed to nestlings, although these insects were taken by adults.

FOODS OF ADULTS

At least three-quarters of the food of adult fernbirds in the *Olearia* forest comprised beetles, especially weevils, and wetas. Provided that birds were not concentrating on one specific prey at a time, they appeared to take any food they came across, including the strong-smelling carabid *Mecodema alternans hudsoni*. Throughout penguin colonies and thickets of *Hebe* shrubbery, and in parts of the supralittoral zone occupied by seals, the main source of food appeared to be flies, especially *Xenocalliphora eudypyi*. On mat plants (*Stellaria media*, *S. decipiens*, *Tillea moschata*, and *Callitriche antarctica*) and in the *Poa tennantiana*-*P. astonii* meadows birds ate



Fig. 2. View inside *Olearia lyallii* forest, The Snares. Note the bare ground, petrel burrows, wind-thrown trees, and absence of understorey. The penguins were commuting between colonies and the sea.

a wide variety of small prey—aphids, small spiders, harvestmen, tipulids, moth larvae, pseudoscorpions, and amphipods.

Small items of food were swallowed alive. Larger and tougher prey, such as carabids and large weevils (e.g., *Oclandius vestitus*), were dashed on the ground or against rocks or trees until dead. During this process the appendages were frequently torn off and sometimes devoured. Most prey items were disposed of within 30 s, although on one occasion a fernbird continued to knock a large weta (*Zealandosandrus subantarcticus*) on the ground for several minutes after it was caught. Finally the weta was pinned to the ground by the bird's foot, and pieces were torn off with the bill and swallowed. Large prey items were nearly always swallowed whole after the appendages had been trimmed off. In all but two instances observed, fernbirds did not go looking for more food until the last item taken had been eaten.

FORAGING TECHNIQUES

Fernbirds hunted usually alone, but a territorial pair or an adult with young sometimes foraged together. The search for food was concentrated in places where there was accumulated organic litter, or at other sites (e.g., crevices, under stones, among petrel bones in skua middens) where arthropods were likely to be found. A bird's general foraging technique was to investigate a large variety of potential havens for prey, and the search pattern appeared to be cursory until something attracted its attention.

Foraging methods are outlined below, with brief comments on the areas in which birds sought food.

IN THE FOREST

Parts of the forest floor were covered by accumulations of dead *Olearia* leaves up to 20 cm deep. The *Olearia* leaves were leathery-textured and measured c. 12 × 18 cm, compared to a fernbird's 15–18 cm length. The edge of a leaf was grasped with a foot and raised laterally. The uncovered area was scrutinised rapidly, and the underlying material was probed and pecked at to disturb prey. If nothing attracted the hunter's attention, the leaf was released. This behaviour was repeated frequently, first with one foot, then the other, raising and dropping leaves in rapid succession.

If something of interest was detected, leaves, twigs, and other debris were flicked or thrown aside with strokes of one or both legs. Peat clods, small stones, or semi-decomposed vegetation were either pushed away or raked over systematically with the feet. During such activity a bird sometimes cleared a path down to bare peat or tunnelled completely

under the leaves. The concealed bird's position was marked by a small, trembling hummock of leaves from out of which material was ejected vigorously. Periodically the bird pushed its head up through the leaves, looked around briefly, and resubmerged.

Where the forest floor was devoid of leaf litter, birds spent most of their time searching in petrel burrows and among the root systems of partly wind-topped *Olearia* trees. Most visits per petrel burrow lasted 15–30 s, though occasionally a bird remained below ground for several minutes.

IN PENGUIN COLONIES

Snares crested penguin (*Eudyptes robustus*) colonies comprised tightly grouped pairs of birds whose trampling activities and excretory products killed off the vegetation. These colonies had large populations of blowflies (*Xenocalliphora eudypiti*), especially in late November through to February, when there were many chick carcasses and squid fragments (spilt during transfer from penguin adult to chick) for maggots to live in. Although maggots were plentiful, fernbirds concentrated mainly on low-flying adult blowflies. A bird either stood in one place and snapped at any flies coming within range, or stalked flies settled on the ground.

Penguin nests, made of twigs, dead leaves, and stones, were examined similarly to accumulations of dead leaves in the forest. Foraging in penguin colonies continued when penguins were absent, but (cf. Stead 1948) fernbirds appeared not to use these colonies as preferred feeding sites.

AMONG GROUND VEGETATION

When searching for food among ground plants (*Tillea moschata*, *Callitriche antarctica*, *Stellaria media*, and *S. decipiens*) fernbirds strutted (see Fig. 5 and Foraging Attitudes) about on top of the mats and looked for prey flying just above the foliage or resting on top of the plants. The basal vegetation, some 10–20 cm below, was investigated in a manner similar to that in which birds worked through piles of leaves (described above).

ABOUT TUSSOCKS

The skirts of dead leaves drooped around the basal pedestals of *Poa astonii* and *P. tennantiana* tussocks were flicked or pushed aside with the feet (Fig. 3C), and the bird often worked extensively around or even concealed within the skirt. This disturbance of the leaves was intended presumably to flush out insects, thereby making them more conspicuous. The crowns of tussocks were also examined thoroughly, with the main search concentrated among the bases of the leaves, where the foliage was packed most tightly.

GENERAL FORAGING

Although fernbirds were found to be primarily ground foragers, they had preferred areas in trees and shrubs in which they searched for prey. In *Olearia-Senecio* forest, arthropods were sought mainly in crevices and under loose pieces of bark on the trunk and branches, but less often around the bases of tightly packed leaf axils and exposed root systems. Foraging on *Hebe* shrubbery, however, was confined mainly to the outer foliage. The different specific search areas in the forest and shrub vegetation were related probably to the distribution of insect populations in the two types of plants. The insect fauna of *Olearia* and *Senecio* trees was most abundant on or under the loose, flaky bark, whereas the thin, smooth bark of *Hebe* provided little shelter. Insects living on *Hebe* were clustered among the dense, close-set foliage and flowers at the ends of branches.

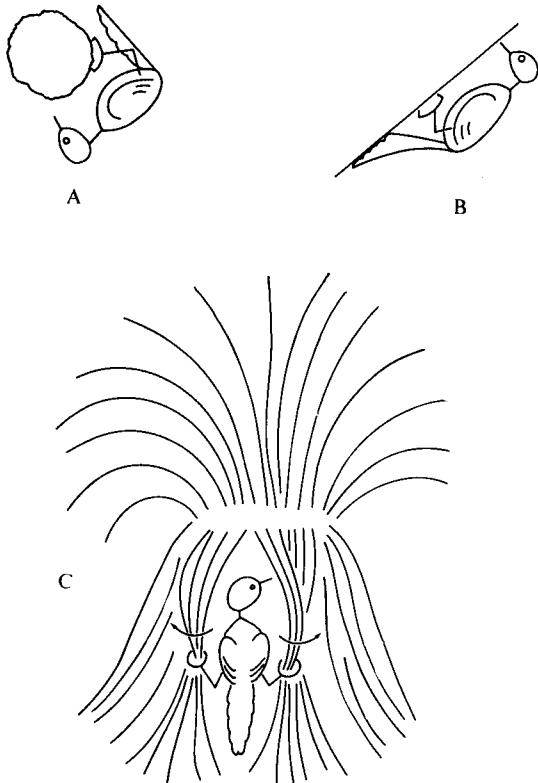


Fig. 3. Snares fernbirds in different foraging situations (schematic): **A**, searching under a branch while standing on side of branch; **B**, typical attitude while holding on to an overhanging surface - note tail pressed hard down on to surface; **C**, method of searching for insects at the base of a *Poa tennantiana* tussock.

Fernbirds moved on trunks and branches mainly in a strutting or stooped posture (see Foraging Attitudes). Steep parts of trees were negotiated either with the feet pointing in line of travel or by the bird sidestepping. Where two twigs grew close together the bird grasped a twig in each foot and walked up or down. This stance was commonly adopted when a bird probed into detritus lodged in the crotch of a branch system.

Although a bird could hang upside down on the undersurfaces of tree limbs it apparently could not walk about in this position. Several methods were used to look at such undersurfaces. If a bird stood on the side of a small branch (Fig. 3A) it could usually clamber back on top of the branch after the search was finished. Overhangs near the ground or less than c. 10 cm above other branches could be looked at by the bird standing on tip-toe, stretching upward fully and rocking from side to side to look at niches from several angles. Less accessible overhangs were investigated by other methods. A fernbird sometimes jumped upward to dislodge loose peat thrown into the bark by burrowing shearwaters. These leaps were sometimes repeated several times, but more often a bird flew up and landed upside down by executing a sudden backflip. While the bird was inverted its tail was pressed down firmly (Fig. 3B). The bird could rip off loose bark with one foot, but it had to flap its wings to maintain balance.

Birds whose territories extended to the sea at times ranged out over the lichen-encrusted granite of the supralittoral zone. A description of typical feeding behaviour follows. A male bird was observed feeding on small beetles and mites (some less than 0.5 mm long) that were living on the lichen and around quartz veins and tension gashes in the granite surface. During its intent search for small arthropods, the bird on several occasions disturbed blowflies that had been settled on seal faeces, but made no attempt to capture them. After 20 minutes the bird suddenly directed its feeding exclusively to blowflies for the next quarter of an hour.

Infrequently, birds examined small, green seaweeds and coralline algae on tidal rock platforms such as those from Boat Harbour to Skua Point at low water, or even ran out on to floating bull kelp (*Durvillea antarctica*), grasping smaller fronds and lifting them with their feet as described for *Olearia* leaves. In places where detached kelp was washed up (e.g., on the western boulder beaches of Sinkhole and Sinkhole Gut), adult coelopid flies buzzing above rotting kelp or their larvae in the rotting debris were taken. Fernbirds also ate the large (20–30 mm long), red-and-grey marine amphipods (*Orchestia aucklandiae*) which lived between the boulders and among decaying wrack. When a bird had finished

hunting on a boulder beach it sometimes changed to foraging along narrow rock ledges in cliffs bordering the beach, and dug through fragments of tussock leaves and peat that had accumulated there.

Fur seals (*Arctocephalus forsteri*) and sea lions (*Phocarctos hookeri*) that hauled out of the sea to rest attracted considerable numbers of blowflies. Fernbirds fed on these blowflies mainly on or around sea lions, which proved less reactive to the birds' activities than did fur seals. Sea lions either showed no reaction to foraging fernbirds or lost interest as soon as they discovered what was moving on them. Flies were taken even around the muzzle and jowls of sea lions as the latter rolled and tossed about in their sleep (Fig. 4). On some occasions a fernbird interrupted its pursuit of flies and snuggled down to rest in the thick, hairy mane of a bull sea lion. Such rests were terminated most frequently when the sea lion rolled over, or a fly came within range of the quiescent bird.

In contrast to sea lions, fur seals proved intolerant of birds moving over their bodies. Birds that persisted were threatened with snorts, huffs, and growls, and a seal would even go back to sea in response to extreme disturbance.

FORAGING ATTITUDES

Four attitudes were used repeatedly by foraging birds. The adoption of these attitudes occurred when a bird was hunting actively. In all attitudes the body plumage was sleeked.

THE STRUT (Fig. 5)

This attitude was most noticeable when a bird moved about on the tips of *Hebe* branches, on sea lions, and in penguin colonies. The bird adopted an upright stance with its neck extended and the bill declined 5–10° from the horizontal. The legs were almost fully extended and, as the bird walked, each foot was carefully raised in a 'goose-stepping' fashion. As each leg was moved forward, the body and head jerked forward. When the leg was put down the body and head jerked backward again before another step was taken. Thus, the bird progressed in an upright, jerky walk.

The Strut was employed apparently to find the approximate position of prey, for it was an upright stance and the head was held high, scanning for quarry. The high, goose-stepping walk was often hesitant, as if the hunter was uncertain as to where to search next for prey.



Fig. 4. Snares fernbird hunting flies on a bull sea lion. Wounds on sea lion caused by fighting other males at breeding grounds on Auckland Is.

THE SLINK (Fig. 5)

In this attitude the bird crouched so that its body, bill, and tail were horizontal, pointing directly at its quarry. The bird appeared to be fixing its gaze on one food item only. The legs were moved in the same careful fashion described for the Strut, but at a higher speed. Slinking birds usually ran, but on occasions walked rapidly.

Slinking was used when prey was sighted and only a few more steps were required to come within striking distance. As the Strut changed into the Slink, the bird often paused and marked time with a number of short steps on the spot. It appeared that the hunter was trying to get the right footing, and was judging the number of steps required to reach its prey.

THE STOOP (Fig. 5)

Sometimes the Strut and Slink were combined into an intermediate attitude, which I have called the Stoop. The body axis was inclined at 30–40° to the horizontal (cf. 50–60° in the Strut) and the legs moved in the typical Slink–Strut fashion. The head was held forward of the body axis with the bill

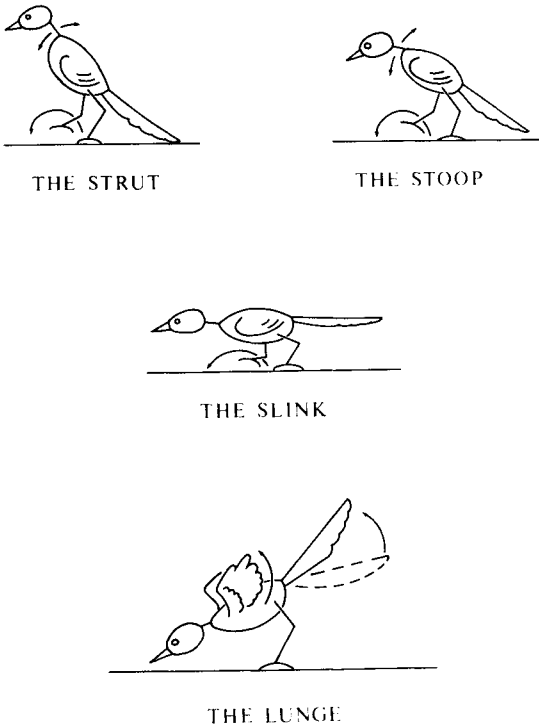


Fig. 5. Foraging attitudes adopted by Snares fernbirds when hunting actively (schematic).

declined at 5°, giving a stooped appearance. Stooping birds moved mainly in a partly crouched attitude and at a walking pace.

THE LUNGE (Fig. 5)

Slinking, strutting, or stooping birds suddenly stopped walking and lunged forward. In a vigorous Lunge the body was thrust forward and tilted down head first. The tail and wings flicked up momentarily to help the bird maintain balance and regain its upright posture. At the furthest extent of the Lunge a loud *snip* was heard as the mandibles were closed.

DISCUSSION

Little has been published on the food and feeding behaviour of fernbirds outside the scope of this study, and much of what has been recorded is based on the foods brought to the nest. In the North Island, M'Lean (1906) examined the crops of several birds and found "remains of insects and in one case a number of pieces of shells from a freshwater snail", and Moon (1967) reported that "chicks . . . are given a large variety of insects, spiders and grubs at intervals of every four to five minutes with rest periods of up to 20 minutes". Soper (1965) noted that South Island fernbirds feed their young on "grubs, caterpillars, insects and spiders". For The Snares, Warham (1967) described lifting of *Olearia* leaf litter, foraging in petrel burrows, and the "habit of hanging upside down below branches like *Parus* titmice. Large terrestrial amphipods were taken and chicks were fed largely on the larvae of a noctuid moth". Stead (1948), also for The Snares, noted birds "foraging for insect food among the dead leaves on the floor of the bush, or on the bark and among the branches of trees themselves", and that the young at one nest were fed on billsful of maggots collected from a decomposing sea lion carcass.

Snares fernbirds appeared to adopt a specific search image, since at times they fed on one prey item to the exclusion of others immediately available, then switched to another species of prey in the manner described for *Parus* titmice by Tinbergen (1960). Such behaviour allowed presumably more efficient foraging, instead of chasing all manner of prey and having to change hunting techniques rapidly.

Personal observations in the North and South Islands and on Codfish and Stewart Islands indicate that birds forage among detritus and crevices, and that prey is similar to that described above. Like Snares birds, the other forms appear to be opportunistic feeders with a broad food spectrum and highly adaptable foraging methods that enable them to exploit a wide variety of situations.

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REFERENCES

- M'LEAN, J.C. 1906: The fernbird of New Zealand (*Sphenoeacus punctatus* Quoy et Gaim.). *Emu* 6: 1-7.
- MOON, G.J.H. 1967: *Refocus on New Zealand Birds*. Reed, Wellington.
- SOPER, M.F. 1965: *More New Zealand Bird Portraits*. Whitcombe & Tombs, Christchurch.
- STEAD, E.F. 1948: Bird Life on The Snares. *N.Z. Bird Notes* 3: 70-9.
- TINBERGEN, L. 1960: Natural control of insects in pine woods. 1. Factors influencing the intensity of predation by songbirds. *Archives Neerlandaises de Zoologie* 10: 265-89.
- WARHAM, J. 1967: Snares Island birds, *Notornis* 14: 122-39.