OBSERVATIONS ON HABITAT SELECTION BY SOUTH ISLAND FERNBIRDS (*Bowdleria punctata punctata*)

By H. A. BEST

ABSTRACT

A survey of the distribution of South Island Fernbirds in relation to vegetation types was made in part of the Kongahu Swamp, Karamea district, West Nelson. The data show that Fernbirds have a marked preference for areas with low, dense ground vegetation and emergent shrubbery, and are infrequently seen in cut-over kahikatea forest bordering on swampland, or in level pakihi vegetation lacking shrubs. Observations on Fernbird habitat at other places are compared with those for Kongahu Swamp.

INTRODUCTION

Little research has been done on New Zealand's endemic Fernbirds *(Bowdleria punctata)* and published accounts of its biology are restricted to general accounts only, e.g. Oliver (1955), M'Lean (1906), Stead (1936, 1948), Blackburn (1967). A detailed study on the Snares Fernbird was carried out by Best (1973) but the results have yet to be published.

The lack of documentation on Fernbirds may be partly because they inhabit typically a dense cover of reeds, fern and scrub growing about swamps, lagoons, river flats and poorly drained terraces. In addition, Fernbirds have an inconspicuous appearance and cryptic behaviour. As a large amount of habitat has been converted into productive land, populations of Fernbirds in the North and South Islands have declined. For example, Fernbirds were plentiful in Canterbury at the start of European settlement (Potts 1884) but were considered by Stead (*in* Oliver 1955) to have become extinct about 1898 as a result of habitat destruction. Although Fernbirds still appear to be widely distributed in areas of suitable habitat in mainland New Zealand (*Notornis,* annual Classified Summarised Notes), they have become localised and greatly reduced in numbers.

Quantitative information on the habitat preferences of South Island Fernbirds was gathered from a survey of part of the Kongahu Swamp in the Karamea district of Nelson. The field work took place on 28 June 1974, in warm sunny conditions and a light breeze. I have also observed Fernbirds at various sites throughout New Zealand.

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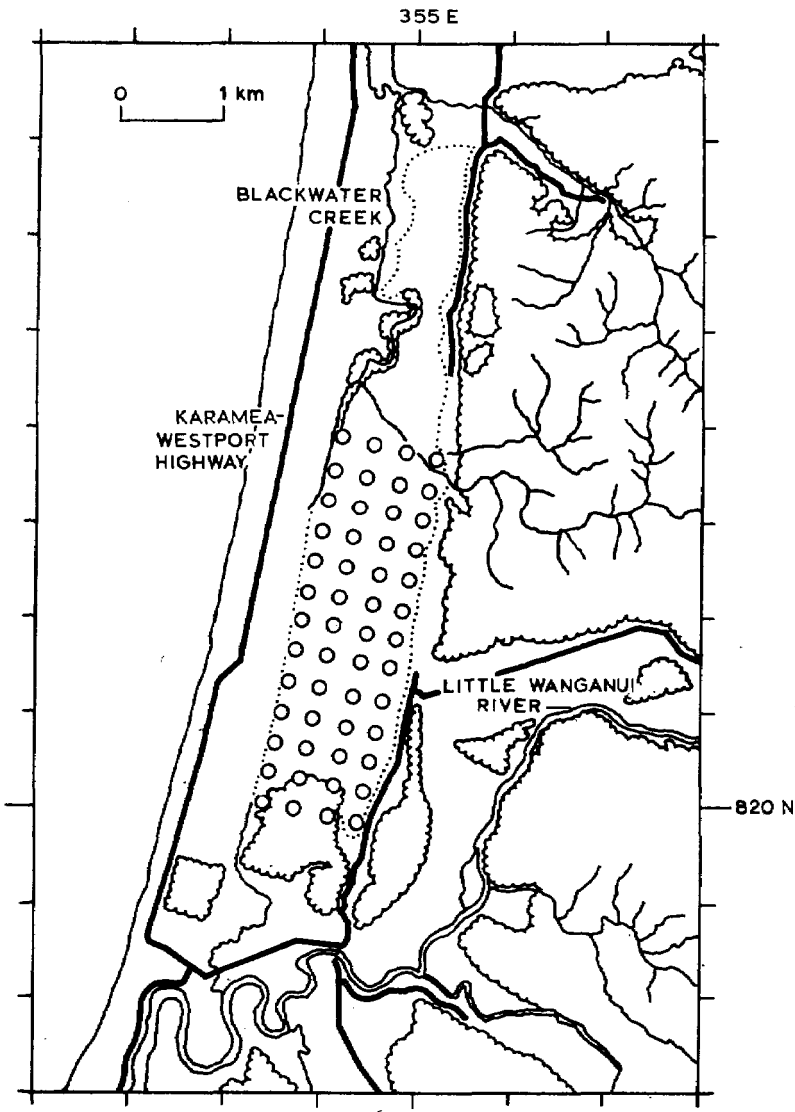

FIGURE 1 — The study area. The dotted line shows the boundary of Kongahu Swamp. Each circle is a station.

METHODS

Fifty-two stations were sampled once each over part of Kongahu Swamp between 1000 and 1500 hours NZST. These stations were laid out on a grid system, four stations wide by thirteen long (Fig. 1). A distance of 300 m between points was chosen to give a relatively intensive coverage and yet to be far enough apart to prevent the same individual bird being seen or heard at adjacent stations. Although the grid layout gave a systematic coverage of the ground, stations were at random with respect to variations in the habitat or the distribution of Fernbirds.

Six people took part in the survey. At each station, the following information was noted: the number of tiers of vegetation within a 5 x 50 m strip, the average height and the main plants of each tier, and the number of Fernbirds seen or heard over a 20-minute period. No attempt was made to attract Fernbirds and observers remained quiet throughout each period.

THE STUDY AREA

The Kongahu Swamp (Fig. 1), 7 km south of Karamea, is surrounded by a coastal strip of farmland to the west and steep hill country covered in beech forest on the east. The swamp, of about 7.3 km^2, is a typical pakihi* area. Heavy rain had fallen a few days before the survey and water covered the ground to a depth mainly of 0.1 - 0.2 m, although in some concealed hollows along the south and west edges of the swamp, water depth was c. 1.8 m. The swamp often dries out in the summer and autumn, a time when little rain falls (T. P. Fisher, pers. comm.).

The vegetation in the swamp was classified into four main types:

TYPE 1 *Level reedbeds*

Characterised by reedbeds (*Juncus* sp.) 0.6 - 1.3 m high ranging from moderately dense (with the basal foliage and sometimes the ground visible when viewed from above) to very dense (with only the uppermost foliage visible when viewed from above). In areas where the reeds were very dense, there tended to be an equally dense quantity of umbrella fern underlain by a carpet of *Sphagnum* moss up to 15 cm deep. On slightly lower ground the height and density of reeds sometimes declined and umbrella fern and *Sphagnum* tended to become rare, leaving bare ground between the bases of reeds. Stunted cabbage trees *(Cordyline australis)*, flax *(Phormium tenax)* and divaricating *Coprosma* sp. shrubs occurred very rarely. In a few places bracken fern *(Pteridium aquilinum)*, sedge (*Carex* sp.), and *Blechnum discolor* fern were sparsely distributed.

* Pakihi swamp: an association of umbrella fern (**Gleichenia dicarpa**), **Sphagnum** moss, sedges, rushes, and often stunted manuka (**Leptospermum scoparium**) growing on poorly to very poorly drained, partly cemented, podsolised soils of low to very low fertility.

TYPE 2 *Reedbeds with stunted shrubs*

Very dense reedbeds 0.6-1.3 m high, in association with dense umbrella fern and a 10-15 cm deep carpet of *Sphagnum*, dotted at intervals of c. 2-10 m by stunted manuka shrubs 1.2-2 m high. This community had a typical hummocked form (see Fig. 2). Bracken and *Coprosma* shrubs 1-1.4 m high and flax 1-2 m high were rare to frequent, whereas toitoi *(Arundo conspicua)*, tree fern *(Cyathea dealbata)* and kamahi *(Weinmannia racemosa)* 1-1.5 m high were rare.

TYPE 3 *Scrubland of shrubs, flax, fern and reeds*

Moderately dense to very dense stands of reeds 0.6-1.4 m high, *Coprosma* shrubs, *Blechnum* and bracken fern, kamahi, and sometimes a ground carpet of *Sphagnum* plus flax 1.3-2 m high, spaced at intervals of 1.5 m. An occasional cabbage tree, kamahi, or lancewood *(Pseudopanax crassifolium)* was emergent above the highest flax plants. Sometimes islands of this shrubland were dissected by reed beds growing in a mass of narrow diffuse drainage channels.

TYPE 4 *Cut-over kahikatea forest*

A broken canopy of kahikatea *(Dacrycarpus dacrydioides)*, rimu *(Dacrydium cuppressinum)* and kamahi up to 15 m high was underlain by a thick mass of toro *(Myrsine salicina)*, kamahi, broadleaf *(Griselinia littoralis)*, kahikatea, rimu and tree fern 2-3 m high. The lower understorey, less than 1 m high, comprised fern, *Coprosma* shrubs and hook grass (*Uncinia* sp.). This small block of forest had been lightly logged.

These communities form a natural seral succession from swamp, through scrubland, to a climax vegetation of kahikatea forest. A diagramatic profile of vegetation types 1, 2 and 3 is given in Figure 2, and the distribution of the vegetation types in the surveyed part of the Kongahu Swamp is mapped in Figure 3.

RESULTS AND DISCUSSION

Kongahu Swamp

The distribution and relative abundance of Fernbirds (expressed as the number of birds per station) are shown in Figure 4. Fernbirds occurred discontinuously throughout the area (chi-squared: 6.65, 2 d.f., $P < 0.05$) and were most abundant in vegetation of types 2 and 3 (Table 1); that is, in areas of very dense ground vegetation dotted frequently with shrubbery.

It is likely that the estimate of the relative abundance and distribution of Fernbirds in the kahikatea forest (type 4 vegetation) is wrong as three of the four stations were just inside the forest and birds calling from the adjacent swamp may have been recorded. Because of this and the low number of stations in type 4 vegetation, only the data for birds living in vegetation types 1, 2 and 3 have been tested statistically. It is unfortunate that all the vegetation within

TABLE 1 — RELATIVE ABUNDANCE OF FERNBIRDS IN RELATION TO VEGETATION TYPE

Vegetation type	Number of Stations	Number of Stations with Fernbirds	Percent Occurrence	Number of Fernbirds per Station in that vegetation type
1	17	4	24	0.18
2	24	21	88	2.08
3	7	7	100	2.86
4	4	2	50	1.25
	52	34		

Significance test: chi-squared, 6.65, 2 d.f., $P < 0.05$ for data from types 1, 2, 3. Those from type 4 are probably too high (see text).

earshot at each station was not sampled as birds detected at a station may have been in a different type from that at the station itself.

The degree to which variation in Fernbird counts was caused by differences between observers or time of day is not known. It is believed that these were minimal, for Fernbirds have quite distinctive clear calls that are often repeated several times in a few seconds. From my general experience with Fernbirds, they are relatively sedentary birds and, apart from increased levels of vocal activity in the early morning and at dusk, their calling frequency tends to be fairly constant throughout the day.

General — Fernbird Habitat

The survey indicates that pakihi vegetation of even height is quite poor habitat for South Island Fernbirds in the Kongahu Swamp. My experience in the pakihi areas of Addisons Flat, Virgin Flat, Caroline Terrace, Totara River, Four Mile River, Charleston, the catchments of the Mawheraiti River and Craigieburn Creek (all areas in Buller) and at Okarito (Westland) show that Fernbird distribution is clumped around areas containing habitat identical in structure and often in composition to the vegetation of types 2 and 3 in Kongahu Swamp. For example, in some areas of Addisons and Virgin Flats and in the pakihis along the Four Mile River, Fernbirds are concentrated into linear home ranges centred on parallel lines of stunted manuka shrubbery that has established along the spoil deposited at the edges of old bulldozed tracks and logging tramways. In contrast, Fernbirds are encountered rarely at any distance out into the level reedbeds. A similar decrease in numbers of Fernbirds occurs in areas of even-height shrubbery, e.g. manuka or gorse *(Ulex europeus)* located beside areas of hummocked vegetation with dense populations of Fernbirds. Apparently, Fernbirds do not penetrate far into mainland forest unless considerable disturbance (windthrow or milling) has allowed suitable habitat to develop in forest clearings.

It is not known why Fernbirds in some places have such a strong

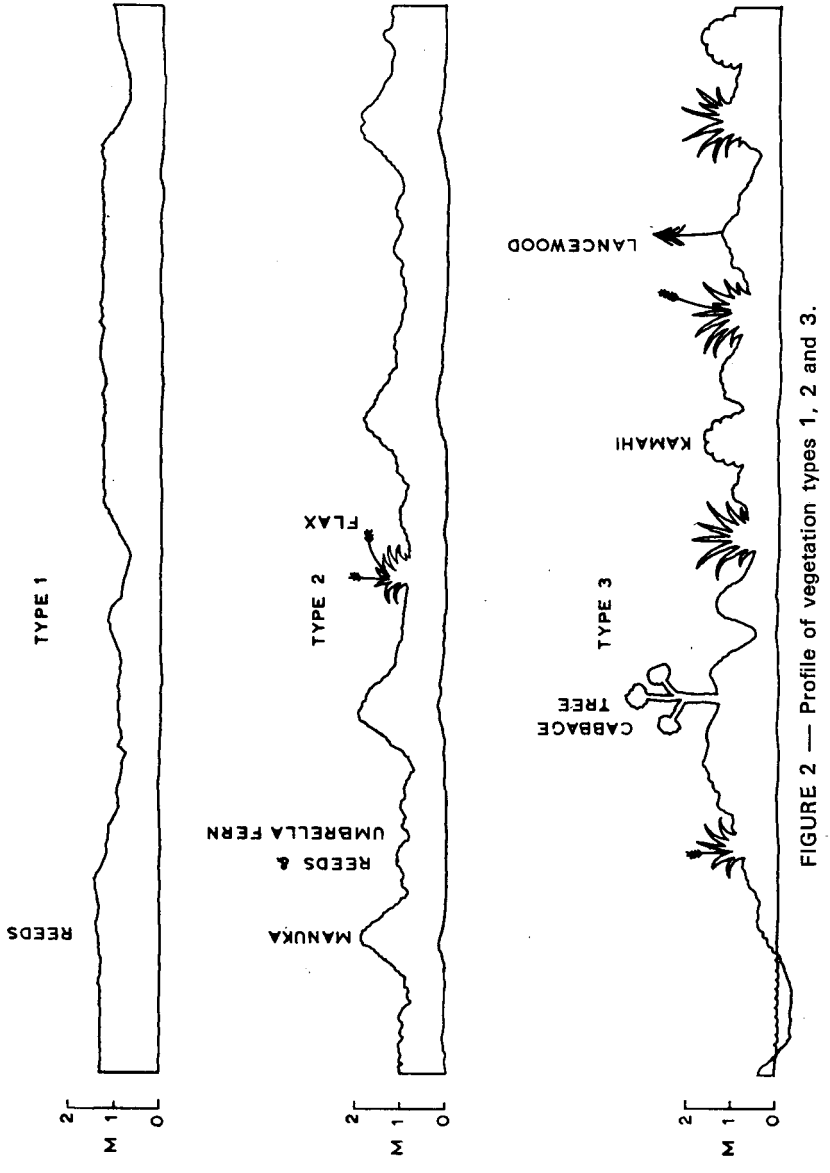

FIGURE 2 — Profile of vegetation types 1, 2 and 3.

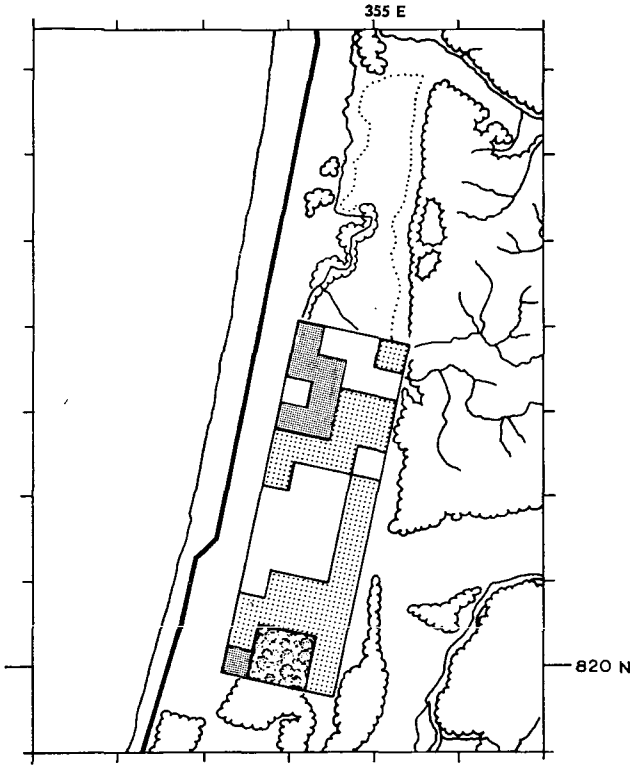

FIGURE 3 — The distribution of the vegetation types. Blank areas = type 1, light stipple = type 2, dense stipple = type 3, forest motif = type 4.

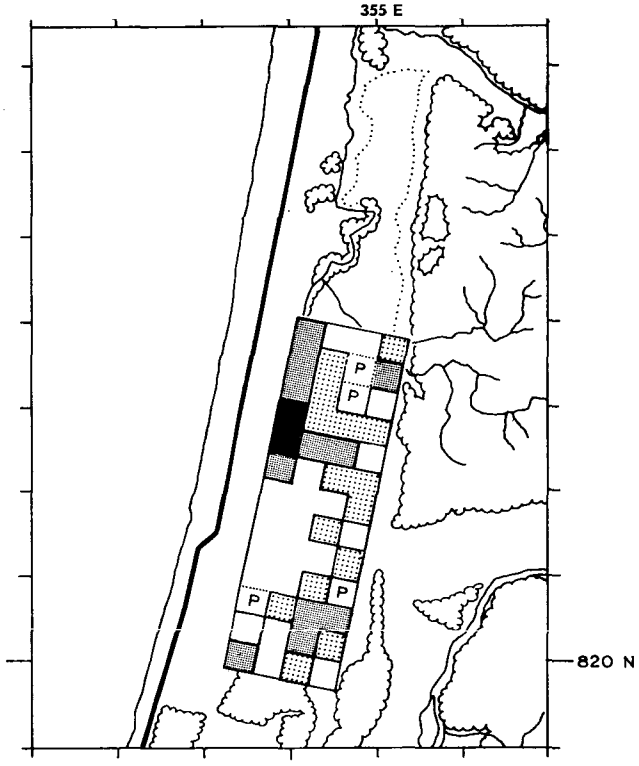

FIGURE 4 — The distribution and relative abundance of Fernbirds. Blank areas = no birds recorded, P = present but not recorded during 20 min count, light stipple = 1-2 birds, dense stipple = 3-4 birds, black = 5-6 birds.

preference for reedbeds with stunted shrubs, and for scrubland of shrubs, flax, fern and reeds. The birds' territorial behaviour may partly explain this preference. In the Buller district, territories are defended from August to February, that is, just before and during the breeding season. Thereafter, maintenance of territories declines but pairs occupy home ranges which include some or all of their breeding territories. Before breeding (at Buller and The Snares), fighting between neighbours is frequent, but as boundaries become established and recognised, overt aggression declines and defence is maintained by males calling regularly for prolonged periods (sometimes more than 30 minutes) from elevated sites. Such territorial advertising often induces neighbouring males to call from similar places within their territories, showing their occupation of that land and readiness to drive off intruders. Thus, the strong preference for areas of hummocked profile over those of even height may be related in part to the presence or absence of suitable " calling posts." If male birds were to maintain territories in vegetation of even height, they would find it difficult to call from a conspicuous place, and the birds may have to spend more time searching for and evicting intruders than is necessary in hummocked areas. In my experience, calls given from within dense vegetation are subdued and are used almost exclusively to maintain contact between the members of a pair or a family.

A territorial male can more easily detect an intruder from a high vantage point for, although intruders may be hidden in the dense ground vegetation, their movements make the vegetation tremble and rustle. Intruding birds are even more conspicuous in emergent shrubbery than among dense ground foliage and thus are more likely to be driven away.

I have seen Fernbirds at a variety of sites spread over the King Country, NW Nelson, North Westland, South Westland, Codfish Island, southern Stewart Island and on The Snares. It would be incorrect to say that the preferred habitat found in the Kongahu Swamp is the ideal or only type occupied. It appears that local conditions can determine where Fernbirds live, especially on islands. For example, Fernbirds live in high densities in the forest on The Snares and the islands off the south-west of Stewart Island, but apparently nowhere else. However, it is clear that Fernbirds show a strong preference for certain habitats, two of which are the types 2 and 3 at Kongahu Swamp.

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SHORT NOTE

HOMING BEHAVIOUR IN THE YELLOW-EYED PENGUIN

On 29 September 1977 I was asked by W. J. Baguley, master of the Lyttelton to Diamond Harbour launch, to remove a Yellow-eyed Penguin *(Megadyptes antipodes)* from Diamond Harbour, Banks Peninsula (172°44'E 43°37'S). A Yellow-eyed Penguin had been seen regularly in Diamond Harbour since September 1976 (B. N. Norris, pers. comm.). Mr Baguley was concerned for the penguin's life as it had recently started to swim alongside the launch into Diamond Harbour, even during berthing, with a risk of being crushed against the wharf.

On the morning of 29 September, R. A. Savill and I found the Yellow-eyed Penguin crouched under a car parked 20 m from the wharf. The penguin was captured, taken to Birdlings Flat (172°42'E 43°49'N), about 87 km by sea from Diamond Harbour, and liberated at 1430 hours on the beach, 1 km from the base of Ellesmere Spit. It was hoped that the penguin might become integrated with other Yellow-eyed Penguins known to breed on the southern coastline of Banks Peninsula (see Harrow 1971, *Notornis* 18: 199-201). Two days later, on the morning of 1 October 1977, a Yellow-eyed Penguin was reported in Diamond Harbour (B. N. Norris, pers. comm.). This was assumed to be the same bird as there had been no report of Yellow-eyed Penguins in Diamond Harbour from 29 to 31 September.

On 8 October B. N. Norris captured the penguin in Diamond Harbour. A Wildlife Service officer then took it to Otago where it was flipper-banded (J-1480) and released on 10 October 1977 at Pilots Beach, Otago Peninsula (173°43'E 45°47'S).

On 8 October B. N. Norris found a Yellow-eyed Penguin egg about 100 m south of the Diamond Harbour wharf. It was on bare ground under scrub, just above the uppermost limit of the rocky