

TREASURES IN THE UPPER HURUNUI

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Introduction

The upper Hurunui river catchments (Fig. 1) are not as easily accessed as, for example, the Waiau near Lewis Pass, or the upper Waimakariri. In recent times, Lake Sumner has been popular for boating and fishing. Other recreational activities in the region include canoeing down the main Hurunui below Lake Sumner and travel by foot on the major tramping route starting in the Hope Valley (Waiau Catchment), crossing the Kiwi Saddle to Lake Sumner, then up the North Hurunui to Harper Pass and down the Taramakau Valley (or vice versa). As we shall see, there is fine scenery as well as many excellent biological features in the two upper Hurunui valleys.

For reasons that are not clear, there has been lack of recognition of just how important the natural features of the upper Hurunui valleys are for conservation. I hope, with this article, to raise awareness of the need to preserve the shoreline vegetation of Lake Sumner and the forests of upper North and South Hurunui catchments.

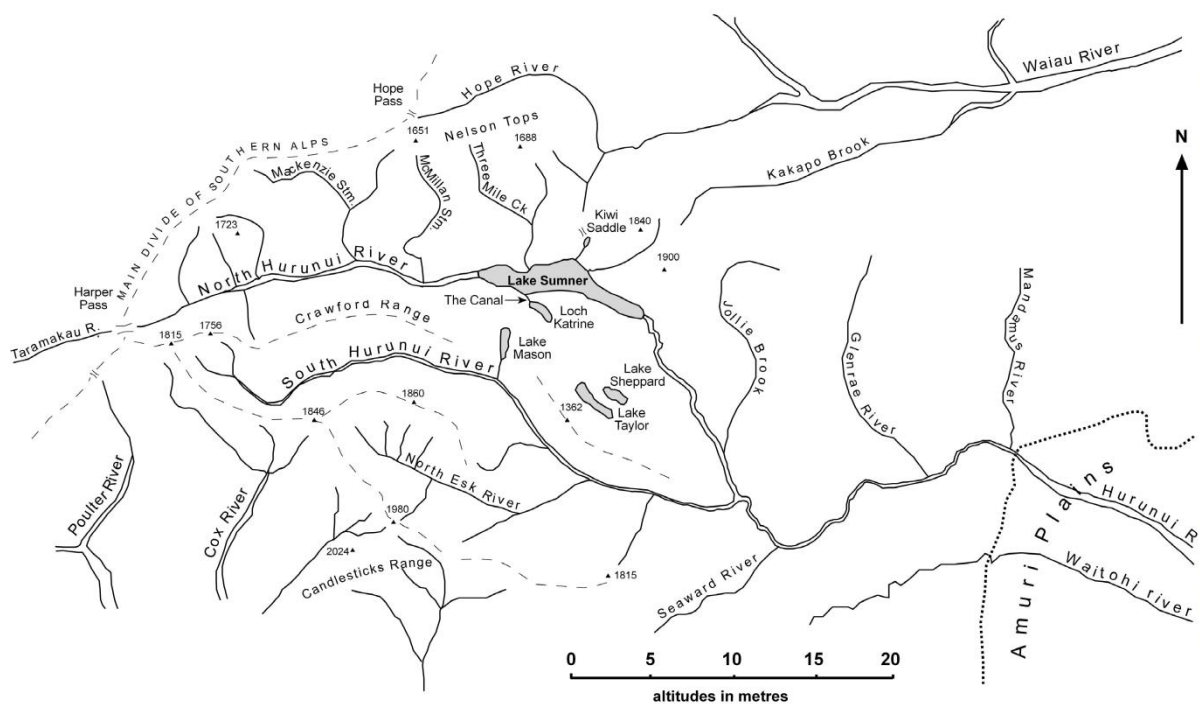


Figure 1 Map of the upper Hurunui River catchments and surroundings.

Natural and cultural features of the Upper Hurunui, other than the biota

Geology and landscape

The predominant rock type in the region is slightly metamorphosed sandstone and argillite of the Torlesse Supergroup, Triassic in age (Gregg

1964). A major fault line, the Hope Fault, extends tangentially from the Alpine Fault at Inchbonnie, Westland up the Taramakau Valley, across Harper Pass and down the North Hurunui to McMillan Stream where it passes into the Hope River Valley (Waiau Catchment). Then it continues down the Waiau Valley to Hanmer and beyond, meeting the Pacific Ocean north of Kaikoura. Hot springs at Hanmer and in the North Hurunui are associated with the Hope Fault. Movements on the fault generated damaging earthquakes in 1888 and 1948. The Hope Fault is considered to be the site of most of the plate movement (between Pacific and Australian Plates) in the northern South Island (Coates 2002).

The Hurunui valleys, unlike the big Canterbury valleys further south, show little sign of glacial or glaciofluvial geomorphic processes. On the main valley floors are sheets of alluvial gravels derived from locally eroded debris. In their upper reaches the rivers have gently-sloping, stable courses. East of Lake Sumner the main river course descends moderately steeply to the Amuri Plains; there are reaches with rapids.

Except for the 1,980-2,024 m Candlesticks Range (between the uppermost South Hurunui and the Cox River in the Waimakariri Valley) there are no really rugged summits in the upper Hurunui. The valley-side slopes appear to be relatively stable, without scree, and the ridgelines are convex. Nevertheless, the uppermost high terrain (mostly 1,400-1,800 m) is quite complex. Contrasts between flat valley floors, steep valley sides and undulating ridges (snow-covered in winter) result in a varied and beautiful landscape.

Weather and climate

Sturman (2008) classes the upper Hurunui as part of a zone of *mountain climate*. Annual precipitation at Harper Pass (973 m) is 6,000 mm or more, but at Lake Sumner (542 m) is only 2,000-1,500 mm and on the Amuri Plains (252 m), 1,000-600 mm. The mountainous terrain creates microclimatic diversity within an overall regime that depends on frequent passage of cyclonic air masses (with relatively regular trajectories) across the South Island (Sturman 2008). These weather systems, as they cross the Tasman Sea and meet the Southern Alps, cause wet, westerly airflow that passes, relatively unimpeded through the Taramakau Valley-Harper Pass-North Hurunui corridor.

Easterly and south-westerly air streams also reach the region but their influences are attenuated by the intervening complex of hills and mountains of eastern North Canterbury. In summer, when anticyclonic air masses lie over the mid-to-upper South Island they bring spells of hot dry weather to the region. Foehn effects of advancing cyclonic storms also cause warm conditions. In winter anticyclonic conditions cause clear, frosty weather. The cooling effects on the valley floors are exacerbated by drainage of cold air from upper slopes. The mid-slopes are usually the warmest sites in winter.

Snow covers the alpine zone (above about 1,400 m) for two to three months each winter.

Cultural features

An important route between west and east for Māori in the period before European settlement lay over what is now called Harper Pass. However, no evident signs of their passage have been found (Anderson 2008).

Like most mountain regions east of the Main Divide, the upper Hurunui was occupied by European settlers soon after 1850. The earliest visits were in relation to the use of the Harper Pass route from Canterbury to Westland. Farmers soon took up the land to run their cattle, sheep and horses. Most of the early homestead locations are still occupied (Acland 1975). The overall consequence of more than 150 years of farming and associated activities has been strong modification of the environment of the area east of Lake Sumner and in the lower South Hurunui. This has been brought about by practices such as burning of forest and scrub cover, continuous stock grazing, planting of pasture grasses and other foreign plants, and intensification of farming through fencing and cultivation. Native forest has been replaced near station homesteads by trees such as pines, willows and other species. Weeds, including some unpalatable grasses, have spread widely. There have also been releases, or escapes, of many animals that have subsequently reached pest status levels (rabbits, hares, possums, pigs, red deer, mustelids, rats, mice, some bird species, and European wasps).

In spite of invasion by pest animals, areas of vegetation that are still predominantly occupied by indigenous plants continue to reproduce themselves effectively. Thus the alpine zone and the forested hillsides have retained their essential composition. Foreign plants have invaded and changed the composition of the valley floor vegetation, but native birds and invertebrates, and some native plants still inhabit these areas. There are still extensive native faunas (birds and invertebrates) in the forests and alpine areas. The invertebrate forest faunas have been partially explored in the adjacent Hope Valley (Brockhoff et al. 2008). The state of the lizard fauna is unknown. Trout have been introduced to lakes and streams, but there have been no recent aquatic faunal or floral studies.

Alpine vegetation

Very brief mention is made here of the vegetation cover above the subalpine scrub zone on the Crawford Range and Nelson Tops. The two main vegetation types are short grassland dominated by carpet grass (*Chionochloa australis*) and tall grassland where midribbed snowgrass (*C. pallens*) prevails. An array of herbaceous species, particularly several *Celmisia* species, is also present. Some northern species approach their southern limits here, e.g. *Aciphylla colensoi* and *Gentianella impressinerva*.

Bogs surrounded by forest, on the valley floor

Some large, raised *Sphagnum* bogs occur in the North Hurunui west of Lake Sumner. As well as the sponge moss (*Sphagnum cristatum*) a few shrub species are present, notably bog pine (*Halocarpus bidwillii*), bog turpentine bush (*Dracophyllum palustre*), *Coprosma dumosa* and the prostrate *Androstoma empetrifolia*. Small herbs include abundant wire rush (*Empodisma minus*) and sedges (*Carex* spp.). Such bogs, though common in North Westland, are rare in Canterbury. Small examples occur near Lewis Pass but the best are in the Hurunui (Burrows 1969).

Valley floor scrub and grasslands

The valley floor above Lake Sumner is open and grassy, narrowing near Harper Pass. Some native elements include the thorny shrub *Discaria toumatou*, the grasses *Festuca novae-zealandiae*, *Poa cita*, and *P. colensoi* and the sedge *Carex coriacea*. The introduced grasses *Agrostis capillaris*, *Anthoxanthum odoratum* and *Holcus lanatus* are often abundant.

Forest patterns in the North Hurunui

Dense forests occur on the valley floor sides and on the slopes, to a treeline at about 1,400 m. The dominant trees in the forests are species of *Nothofagus*: red beech (*N. fusca*) up to 25 m high, with diameter at breast height 70-120 cm (sometimes more) and to 300-500 years old; silver beech (*N. menziesii*) to 20 m high, with smaller maximum diameter, but also up to 300-500 years old; and mountain beech (*N. solandri* var. *cliffortioides*) to 20 m, with diameter similar to silver beech, but only 250-300 years old. Intricate mixtures of these tree species clothe the valley floor margins, valley sides and up to the treeline. Silver beech is more prominent in the west and high on the slopes. Red beech is found on the valley floor and lower slopes, generally on relatively fertile soils. Mountain beech forms mixtures with the other two and is most prominent in the drier east. Near the timberline the trees of this species are gnarled and low (5 m) (Newell & Leathwick 2005).

Near Harper Pass mosses, liverworts, lichens and ferns form a lush cover on the ground and on tree stems and branches. The forests further east are less luxuriant in this respect, but nevertheless, very mossy. Associated trees and shrubs mingled with the beech trees in the western part of the valley are species abundant in mid-slope to higher level Westland forests. They include marble leaf (*Carpodetus serratus*), neinei (*Dracophyllum traversii*), pokaka (*Elaeocarpus hookerianus*), pink pine (*Halocarpus biformis*), mountain ribbonwood (*Hoheria glabrata*), cedar (*Libocedrus bidwillii*), southern rata (*Metrosideros umbellata*), western kohuhu (*Pittosporum colensoi*), mountain totara (*Podocarpus hallii*), raukawa (*Raukawa simplex*), seven finger (*Schefflera digitata*), and kamahi (*Weinmannia racemosa*). Shrubs include

Archeria traversii, *Carmichaelia arborea*, *Coprosma ciliata*, *C. colensoi*, *C. depressa*, *C. foetidissima*, *C. linariifolia*, *C. pseudocuneata*, *C. rhamnoides*, *C. serrulata*, *Dracophyllum longifolium*, *Gaultheria rupestris*, *Myrsine divaricata*, *Neomyrtus pedunculata*, *Olearia arborescens*, *O. colensoi*, *O. ilicifolia*, *O. lacunosa*, *Pittosporum crassicaule*, *Podocarpus acutifolius*, *Pseudopanax colensoi*, *P. lineare* and *Traversia baccharoides*. Lower cover includes herbaceous species *Astelia nervosa*, *Chionochloa conspicua*, *Jovellana sinclairii*, *Libertia micrantha*, *Luzuriaga parviflora* and *Nertera villosa*, together with some sedges (*Uncinia* spp.), many ferns and some lycopods.

Many of the “western” species extend further down the valley: within the forest, or in the subalpine zone, or along forest margins on the valley floor. Above the forest, most luxuriantly in the uppermost valley, is dense subalpine scrub with some of the shrub species noted above and *Aristotelia fruticosa*, *Coprosma fowerakeri*, *C. propinqua*, *Dracophyllum uniflorum*, *Gaultheria crassifolia*, *Phyllocladus alpinus* and *Podocarpus nivalis*. These species also occur in openings in the higher level forests. A list (Table 1, page 59) for Lake Sumner shore margin plants also includes some of the “western” species as well as others that are found in more eastern locations.

Birdlife in the forests of the North Hurunui

Numerous native forest birds are present (Table 2, page 62). The two cuckoos are migratory birds, strictly paired with other birds as host parents for their eggs and young. Those marked * have severely depleted populations and are at risk particularly from predatory stoats, rats and depredations of brush-tailed possums on their food plants, which is especially relevant to nectar feeders.

Upper South Hurunui forests

Above Lake Mason the South Hurunui watershed has a similar array of forest types to that in the North Hurunui. Its head is on a high ridge and there is less influence of wet, westerly airflow into the valley than in the North Hurunui (Newell & Burrows 2000; Newell & Leathwick 2005). However, in 1996 6,000 ha of the South Hurunui part of Lake Sumner Forest Park was developed by the Department of Conservation as a “Mainland Island”, a place that could be managed similarly to an island from the viewpoint of control of factors detrimental to the biota. In this case the intention was to develop a mammal pest-free environment. Stringent control of rats, stoats, brush-tailed possums, and deer was especially undertaken to improve the habitat conditions (including food supplies) for mohua, kaka, falcon, kea, parakeets, kiwi and the plants red and yellow mistletoe (*Peraxilla tetrapetala* and *Alepis flavida*, respectively) (Saunders 2000).

An important aspect of the lifestyle of some of the rarest birds in our province (mohua, kaka, and parakeets) is their requirement for big, old beech trees with holes suitable for nesting. Ground level holes are also needed by great

spotted kiwi. The other birds (altogether, the same range of species as in the North Hurunui) build more orthodox, fabricated nests, but all are vulnerable to attack by stoats, rats and possums.

From 1996 onward the “Mainland Island” (with its title now changed to “Intensively Managed Area”) has been managed along the lines of the aims noted above. The upper North Hurunui has been regarded as a “reference area” and monitoring of vegetation and bird populations is also done there. In the South Hurunui much information has been gathered on the ecosystem and the birds. For a time, decline of the bird populations was stemmed. The beech species usually have abundant seed production at three to five year intervals. However, in 1999-2000 a very unusual and harmful event – two successive beech seedings – caused a major setback. Rodents breed well when the beech trees seed. Stoats, which feed on mice and rats, also breed well. When no more seeds are available mouse numbers (prey of rats and stoats) plummet and the predators turn to the birds for their food. Only very slow recovery of the bird populations is occurring (Dean Turner and Simon Elkington, Department of Conservation, pers. comm. 2012).

A survey by Newell and Burrows (2000) provides more details of the forest composition in both the North and South Hurunui catchments, derived from periodically monitored permanent study plots established by the Forest Service and, later, Department of Conservation (Burrows et al. 1976; Jane 1985).

The marginal vegetation zone at Lake Sumner

Lake Sumner is the only large lake in Canterbury with an intact, extensive, forested shoreline (on its north side). On this side dense beech forest (mountain, red and some silver beech), with a relatively sparse associated tree flora, clothes the hillsides almost to lake level. A narrow zone of vegetation with a different composition lies above the immediate lake shore. The southern side of the lake is occupied by shrub-dominant vegetation with some remnant patches of beech forest on the hillside and scattered invading mountain beech. This area will have been completely forested in the past but has undergone destructive fire and is gradually regenerating towards a forested state. The lake marginal vegetation on the south side is not as important for the argument here, but nevertheless is valuable for conservation.

On the north shore, the band of marginal vegetation has developed over a long period and is in equilibrium with the present regime of natural fluctuation of water levels. The stature and species composition of this marginal band of vegetation contrasts sharply with the taller, dense beech forest behind it. The zonation pattern is determined firstly by the relative tolerance of plant roots of various species to periodic flooding and soil waterlogging (with anoxia when the water level is high). Manuka, for example, is very tolerant of waterlogging, while mountain beech is intolerant. Zonation is accentuated by

there being more light available at the margin where the beech canopy is absent. Also, beech trees maintain a dense layer of fine roots near the ground surface beneath them. This is inimical to those species that are confined to the marginal zone because the beeches pre-empt nutrient supplies. In turn, the marginal zone species are less affected by root competition for nutrients where the beeches are absent. Thus, the marginal zone has a concentration of species that can only live where the young stages of beech trees (seedlings, saplings, and poles) cannot establish. However, some beech trees occur in the marginal zone on well-drained sites. Some of the species of the marginal zone are found in other places within beech forest where competition by beeches is weakened e.g., on rock bluffs, beside streams, or around boggy areas. If the beech canopy is destroyed (by wind-throw, or snow-break, or by combinations of influences of insects and pathogenic fungi) (Brockerhoff et al. 2008; Burrows & Wilson 2008) some of the opportunistic species can obtain a footing in the heart of the beech forest, for a time. This happens in small to large patches, at one or more century intervals (or more often). As the beech forest re-establishes the opportunists are excluded.

The list that follows includes the woody species (and one large herb, harakeke) that live in the marginal vegetation around the north shore of Lake Sumner (Table 2, page 48). Some of these are common, also, on the southern shore and beside “The Canal” and Loch Katrine (Fig. 1, page 50).

Of the 49 species listed, 10 are common and present in much of the scrub around the lake. The remainder are more universally associated with beech forest (many are confined to well-lit sites/forest margins). Among these 39, bird pollination is important for 18 (46%). All are probably useful to the birds that are the main pollinators (bellbirds, silvereyes), but four are very important nectar providers (kotukutuku, southern rata, harakeke, kowhai). Among the 39, bird dispersal of seeds is the usual situation for 24 species (61%). Bellbirds, kereru and silvereyes are the main native species that disperse seeds. Introduced blackbirds do so, as well. Broadleaf, kotukutuku, cabbage tree, five-finger, totara, marble leaf and the *Coprosma* species are regarded as very important fleshy fruit providers. Kereru also eat leaves of many of the tree species.

Ecological and other reasons for not raising the level of Lake Sumner

An earlier proposal, now abandoned, was that the level of Lake Sumner would be raised a metre or more, by means of a weir, to hold water for irrigation. The substantial list of species above and knowledge of the plant-animal interactions reveal an important aspect of the lake’s marginal vegetation. It contains many species of plants that provide native forest birds with supplies of nectar and with the fleshy tissues of fruits. Where beech forest is present, the marginal zone is playing a vital role in the economy of these birds. Two plant species of great consequence to the forest birdlife are at the immediate

edge of the lake – harakeke and kowhai. They would be killed if the lake level were to be raised. The other very important nectar providers are southern rata and kotukutuku. I know from experience at Lake Coleridge that high lake levels cause the death of rata trees (Burrows 1995). They have shallow, large root systems that are easily undercut by wave action.

Another effect of raising the lake would have been the loss of beaches that have developed over many hundreds of years. For The Canal and Loch Katrine this would be a very unfortunate outcome. Furthermore, during draw-down periods there would be exposure of a very unsightly band of barren lake shore. The aesthetic features and shoreline biota of the lake would have been harmed irrevocably by the building of a weir.

The importance of the Upper Hurunui valleys for the Canterbury community and New Zealand

The excellent qualities of these Hurunui valleys have been outlined above. Scenically and biologically they are of National Park quality. The presence of extensive, relatively unmodified forests with a rich associated flora; the presence of a large native bird fauna among which are some of New Zealand's rarest birds (including iconic species such as mohua, parakeets, kaka and kiwi); the presence of a large, very beautiful, unspoilt lake, with dense forest on its northern margin; and the popularity of this region for recreation, each and collectively confirm that the upper Hurunui contains some of Canterbury's greatest natural treasures. The placement of a "Mainland Island" site in the Hurunui catchment makes this a most important location for conservation. Only one other such programme has been established in the South Island, in forest at Lake Rotoiti, Nelson Province. Although the excellent environmental qualities of the upper Hurunui valleys (including Lake Sumner) have not been recognised by the irrigation planners, there is no question of doubt about these matters. Strong efforts are needed to preserve the fine natural qualities from degradation. The achievement of the degree of protection needed will ultimately require substantial input and representations from local residents, tangata whenua, local government, Canterbury citizens and Crown authorities.

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Table 1: Species present in the marginal vegetation zone on the north side of Lake Sumner.

Species	Common name	Pollination mode¹	Seed dispersal mode²	Notes³
Trees				
<i>Carpodetus serratus</i>	marble leaf	b, i	b	
<i>Cordyline australis</i>	cabbage tree	b, i	b	
<i>Fuchsia excorticata</i>	kotukutuku	b	b	×
<i>Griselinia littoralis</i>	broadleaf	b, i	b	
<i>Kunzea ericoides</i>	kanuka	b, i	w	•
<i>Metrosideros umbellata</i>	southern rata	b, i	w	×
<i>Nothofagus fusca</i>	red beech	w	w	
<i>N. menziesii</i>	silver beech	w	w	
<i>N. solandri</i> var. <i>cliffortioides</i>	mountain beech	w	w	
<i>Pittosporum tenuifolium</i>	kohuhu	b	b	
<i>Plagianthus regius</i>	manatu	i	w	
<i>Podocarpus hallii</i>	mountain totara	w	b	
<i>Pseudopanax arboreus</i>	five-finger	b	b	
<i>P. crassifolius</i>	lancewood	b, i	b	
<i>Sophora microphylla</i>	kowhai	b	g	×
Shrubs				
<i>Aristotelia fruticosa</i>	shrub wineberry	b, i	b	•
<i>Carmichaelia australis</i>	New Zealand broom	i	g	
<i>Coprosma areolata</i>	marble-leaved coprosma	w	b	
<i>C. dumosa</i>	bog coprosma	w	b	
<i>C. foetidissima</i>	stink wood	w	b	
<i>C. linariifolia</i>	yellow wood	w	b	

coprosma				
<i>C. microcarpa</i>	small-fruit coprosma	w	b	
<i>C. propinqua</i>	mikimiki	w	b	•
<i>C. rhamnoides</i>	varied-leaved coprosma	w	b	
<i>C. rigida</i>	stiff coprosma	w	b	
<i>C. rugosa</i>	blue-berry coprosma	w	b	
<i>Corokia cotoneaster</i>	korokio	b, i	b	•
<i>Discaria toumatou</i>	matagouri	i	g	•
<i>Gaultheria antipoda</i>	bush snowberry	?	b	
<i>Hebe odora</i>	fragrant hebe	b, i	w	
<i>H. salicifolia</i>	koromiko	b, i	w	
<i>H. traversii</i>	travers hebe	b, i	w	
<i>Leptecophylla juniperina</i>	mingimingi	?	b	
<i>Leptospermum scoparium</i>	manuka	b, i	w	•
<i>Melicytus alpinus</i>	wharekarara	i	b, lizard	•
<i>Myrsine divaricata</i>	weeping mapou	?	b	
<i>Olearia avicenniifolia</i>	silver akeake	i	w	
<i>O. nummularifolia</i>	yellowish shrub daisy	i	w	
<i>Ozothamnus leptophylla</i>	tauhinu	i	w	•
<i>Pittosporum divaricatum</i>	tangle branch pittosporum	?	b	
<i>Pseudopanax colensoi</i>	three-finger	b	b	
Vines				
<i>Clematis forsteri</i>	medium green clematis	b, i	w	
<i>C. marata</i>	small green	b, i	w	

clematis				
<i>Muehlenbeckia australis</i>	pohuehue	i	b	
<i>M. complexa</i>	waekahu	i	b	•
<i>Rubus cissoides</i>	lawyer	b	b	

Herbs

<i>Coriaria sarmentosa</i>	tutu	i	b	•
<i>Phormium tenax</i>	harakeke	b	w	×

Mistletoe

<i>Alepis flavida</i>	yellow mistletoe	b	b	□
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¹ Pollination mode: b – birds; i – insects; w – wind.

² Seed dispersal mode: b – birds; w – wind; g – gravity (fall, roll, or float)

³ Notes: • – shrub, common, generally in scrub; × – important nectar provider for bellbirds, tui, and kaka; □ – species in danger of extinction (possum damage).

Table 2: Birds present in the forests of the North Hurunui and notes on their food sources.

Species common name	Notes
bellbird ^{1,2}	
brown creeper ³	
falcon ⁴	
fantail ³	
great spotted kiwi ^{3*}	
grey warbler ³	
kaka ^{1,2,3,4*}	
kereru ^{2,5}	
long-tailed cuckoo ^{3*}	hosts: brown creeper and mohua
mohua ^{3*}	
morepork ^{3,4}	
parakeets (orange and yellow-crowned) ^{2,5,6*}	
rifleman ³	
shining cuckoo ³	host: grey warbler
tomtit ³	
tui ^{1,2}	

Foods: ¹ nectar; ² fruits (swallowed whole and seeds dispersed); ³ invertebrate animals; ⁴ birds, lizards; ⁵ other plant parts; ⁶ seeds digested.