THE EFFECTS OF LOGGING ON WINTER BIRD POPULATIONS NEAR KARAMEA

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ABSTRACT

Winter 5-minute bird counts in unlogged and logged native forest near Karamea showed substantial declines in native forest species after logging and a varied response from introduced species.

The results in this paper are part of a longer-term study but are presented now in an attempt to clarify the widely different opinions voiced in the present native forest conservation debate.

METHODS

On 6, 7 and 8 June 1982, I counted birds using the 5-minute bird count method (Dawson & Bull 1975) in the catchment of Mullochy Creek and adjacent streams running into the Little Wanganui River, near Karamea (41°20′ S, 172°10′E). All areas were 100-200 m above sea level.

To assess the effects of logging on bird populations, I counted in an area of unlogged forest; in forest where logging is now taking place; and in two areas of forest that were logged 3-4 and 7-9 years ago.

Dawson (1981) reviewed the factors influencing bird counts. If comparisons are to be valid, variations in the conspicuousness of the birds must be kept at a minimum. Factors affecting conspicuousness include counting technique, season, time of day, weather, environmental noise, observer, habitat, and the age, sex and reproductive group of each bird.

The counting technique was standard in all areas, following the 5-minute count method of Dawson & Bull (1975). Variations with season were obviously avoided by confining the comparison to three days in winter. All counts were done between 0900 and 1600 h and all areas were counted during the morning and afternoon. In fact, conspicuousness did not appear to vary much throughout the day. The weather was fine, sunny and calm for the three days and environmental noise (e.g. running water, wind, chainsaws) was not a problem. I was the only observer.

Most authors assume that habitat does not affect conspicuousness to an extent that might make comparisons invalid, although they try to avoid extreme habitat differences. Birds are likely to be more conspicuous in open than closed (heavily vegetated) areas and in this

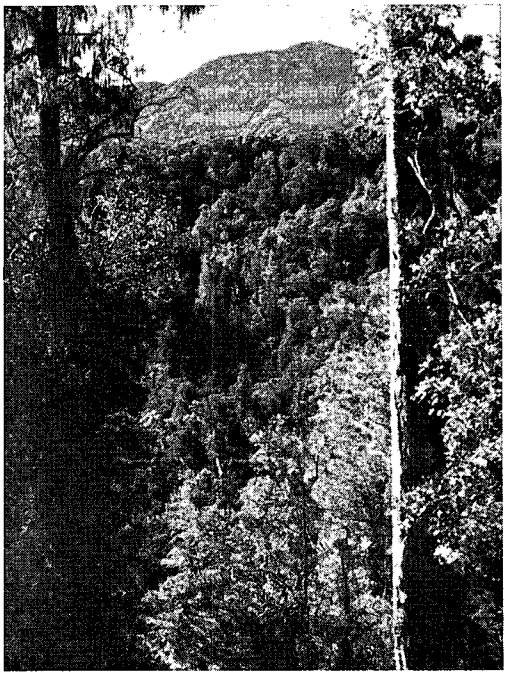

FIGURE 1 — Unlogged rimu/hard beech forest

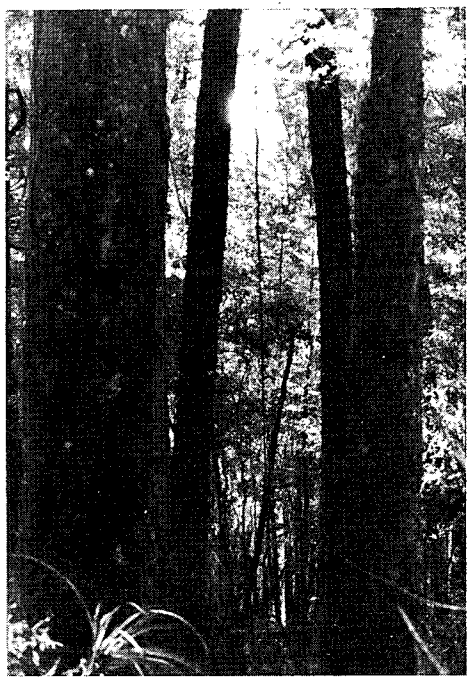

FIGURE 2 — Unlogged forest. Hard beech on a ridge top

study recently logged areas were much more open than unlogged forest. Visual observations were 20% in the open recently logged area but only 8% in the thicker unlogged forest, and so birds were more easily seen in the open habitat. The distance that a bird call or song carries is likely to be greater in an open habitat than in a closed forest, and so both visual and aural conspicuousness increase the number of birds counted in open habitats (in this case logged forests).

An uneven distribution of age and sex classes of birds in different habitats, coupled with their differing conspicuousness, could cause sampling problems, but there are no studies that suggest New Zealand forest birds are distributed in such a way. Without detailed study, this factor has to be accepted as a possible limitation of the 5-minute counting technique. Similarly, problems could arise if reproduction, and especially song, were not synchronous in each habitat, but this is not likely to be important in mid-winter, when few birds are singing.

VEGETATION

The unlogged forest was on highly dissected mudstones with a few small remnant granitic gravel terraces at higher levels. Slopes were generally steep and ridge tops sharp with only small flat areas

FIGURE 3 — Logged forest. View over a ridge.

FIGURE 4 — Logged forest. View along the valley floor.

in the valley bottoms. The vegetation was predominantly rimu/hard beech *(Dacrydium cupressinum/Nothofagus truncata)* with a subcanopy of kamahi *(Weinmannia racemosa)*, quintinia *(Quintinia acutifolia)* and toro *(Myrsine salicina)*. Hard beech predominated on the ridge tops, where the canopy was quite open, the subcanopy was sparse and shrub layers were almost non-existent. Rimu was commoner in the valley bottoms, with some large emergent trees over an open hard-beech canopy. The subcanopy was thicker than on the ridgetops and included additional species such as broadleaf *(Griselinia littoralis)* and *Coprosma australis*. Lower layers were also better represented with tree fern *(Cyathea smithii)*, supplejack *(Ripogonum scandens)*, horopito *(Pseudowintera axillaris)*, kiekie *(Freycinetia banksii)* and coprosma species.

This rimu/hard beech association on dissected hill country is characteristic of much of the remaining native forest that the Forest Service proposes to log in the Buller area (NZFS 1982). Figure 1 shows a view over the head of the Mullochy Creek, and Figure 2 a view, within the forest, of hard beech on a ridge top.

Logging is currently taking place in the same type of forest, on the same landform as the unlogged forest. Present logging techniques have almost completely destroyed the lower valley side and valley bottom vegetation. A very open canopy of hard beech has remained on the upper slopes and ridge tops, but much of the subcanopy and most of the shrub and ground layer have been disturbed.

Figure 3 shows a view over a logged ridge (compare with Fig. 1) and Figure 4 a view along a valley bottom.

The area logged 7-9 years ago was also on the same landform as the unlogged forest and would have had a similar vegetation. The present vegetation on the valley sides and bottom consisted of isolated pole-sized rimu and hard beech. Evidence of die-off through exposure after logging was apparent, as over half of the taller standing trees were dead. A very thick shrub layer, up to 3 metres tall, had grown up, consisting of kamahi, quintinia, *Coprosma* species, wineberry *(Aristotelia serrata)*, cutty grass *(Carex coriacea)*, rimu and kahikatea *(Podocarpus dacrydioides)*. An open hard-beech canopy remained on the ridge tops with no thick shrub regeneration underneath. This whole area had been planted with eucalypts, now 3-4 years old (mainly *Eucalyptus delegatensis*). Figure 5 shows planted eucalypts in the shrub layer on the valley sides.

The area logged 3-4 years ago was on a flat granitic gravel terrace of the Little Wanganui River. All but a few podocarps (mainly rimu) had been removed, but the beech canopy was more or less intact. Hard beech predominated, with some silver beech *(Nothofagus menziesii)* and occasional red beech *(N. fusca)*. Kamahi, quintinia and toro formed a moderately dense subcanopy, and the shrub layers were thick in places. The disturbance varied considerably with the distance

FIGURE 5 — Forest logged 7-9 years ago. Eucalypts and shrubs on a valley side.

from the winch sites, and open spaces formed about 15% of the area. The original forest would have been different from that on the dissected mudstones in the other areas, being taller and more stratified. Open areas and winch sites had been planted with eucalypts (mainly *E. delegatensis*), which are now 1-2 years old.

Figure 6 shows an open winch site replanted with eucalypts.

RESULTS

Table 1 gives the comparison of averaged counts between logged areas and the unlogged forest. Except for Harrier, Kea and Grey Duck (which, for the purposes of this discussion, are not considered forest species), all counts of native species were lower in logged than in unlogged forest. These reductions are highly significant ($p < 0.01$, chi-squared test) for Silvereye, Bellbird, Tui, Grey Warbler, Tomtit and Pigeon and significant ($p < 0.05$) for Robin. Only the Fantail maintained relatively high numbers in logged forest. Few Wekas, Kakas and Parakeets were counted and the differences between the counts were not statistically significant, but the trend to lower numbers in logged forest appeared to parallel that of the other native forest species.

FIGURE 6 — Forest logged 3-4 years ago. Eucalypts planted in an open winch site.

TABLE 1 — Comparison of counts in unlogged and logged native forest, Little Wanganui, 6, 7, 8 June 1982.
* indicates a significant difference ($p < 0.05$, chi-squared test)
** indicates a highly significant difference ($p < 0.01$)
Index of change, derived from $100(A-B)/(A+B)$

SPECIES	Unlogged forest (B)	Logged forest (A)	Index of change
Silvereye *Zosterops lateralis*	5.39	3.05**	- 28
Bellbird *Anthornis melanura*	3.39	1.86**	- 29
Tui *Prosthemadera novaeseelandiae*	1.55	0.72**	- 37
Fantail *Rhipidura fuliginosa*	1.50	1.14	- 14
Grey Warbler *Gerygone igata*	1.09	0.54**	- 34
Yellow-breasted Tit *Petroica macrocephala*	0.91	0.38**	- 41
NZ Pigeon *Hemiphaga novaeseelandiae*	0.66	0.08**	- 78
Robin *Petroica australis*	0.23	0.03*	- 77
Weka *Gallirallus australis*	0.07	0.03	- 40
Kaka *Nestor meridionalis*	0.07	0	- 100
Yellow-crowned Parakeet *Cyanoramphus auriceps*	0.05	0	- 100
Harrier *Circus approximans*	0.02	0.03	+ 20
Kea *Nestor notabilis*	0	0.03	+ 100
Grey Duck *Anas superciliosa*	0	0.05	+ 100
Song Thrush *Turdus philomelos*	0.64	0.76	+ 9
Chaffinch *Fringilla coelebs*	0.43	1.27**	+ 49
Blackbird *Turdus merula*	0.34	0.54	+ 23
Redpoll *Carduelis flammea*	0.27	0.94**	+ 55
Goldfinch *Carduelis carduelis*	0.16	0.14	- 6
Greenfinch *Carduelis chloris*	0.09	0.05	- 29
Dunnock *Prunella modularis*	0	0.14**	+ 100
Number of 5-minute counts	44	37	

Introduced species showed a greater ability to adapt to logged forest. Chaffinch, Redpoll and Dunnock gave significantly higher counts in logged forest.

Table 1 also includes an index of change derived from $100(A-B/(A+B)$, where B is the unlogged forest count and A the logged forest count. Values vary from 100 (a total increase) through 0 (no change) to -100 (a total decrease). It dramatically illustrates the degree of reduction in native forest bird numbers when forest is logged.

Table 2 compares the counts from unlogged forest and each area of logged forest separately. Of the 11 native forest species recorded in unlogged forest, only five were recorded in the area where logging is now taking place and all of these except the Fantail and Tomtit were in significantly lower numbers.

In the area logged 7-9 years ago, only five native forest species were recorded, and for all species the counts were lower than in unlogged forest. These reductions are significant for Silvereye, Bellbird, Tui, Tomtit and Pigeon.

In forest logged 3-4 years ago, I recorded nine species of native forest birds; all except Tui and Weka had reduced counts compared with unlogged forest and the differences are statistically significant for Silvereye, Bellbird and Robin.

The introduced species had some similar counts in logged areas and unlogged forests, but there were significant increases in Chaffinches in the current and 3-4 year logged areas, Redpolls in the 3-4 and 7-9 year areas, Blackbirds in the 3-4 and Dunnocks in the 7-9 year areas.

DISCUSSION

For native forest birds the general pattern that emerges is that most species are reduced in numbers in logged forest and some are apparently eliminated entirely.

The native species which adapted best to logged forests were Fantail, Silvereye, Bellbird, Tui, Grey Warbler and Tomtit. These were also the most numerous species in unlogged forest and are the most numerous and widespread native forest species in New Zealand (Bull *et al.* 1978). Silvereyes, Fantails and Grey Warblers occur in many highly modified habitats throughout New Zealand. Robins were severely affected by logging and they are neither abundant nor widespread in New Zealand as a whole. The same seems to be true of Kaka and Yellow-crowned Parakeet, but I did not see enough of these species to demonstrate the effect. Thus it seems that the species which are rare and local are most affected by logging in their habitat.

There was no noticeable return of birds to the logged areas 7-9 years after the end of logging operations, despite the regeneration of a thick shrub layer.

TABLE 2 — Comparison of bird counts in unlogged forest with three logged forests. Little Wanganui, 6, 7, 8 June 1982.
* indicates a significant difference ($p < 0.05$)
** indicates a highly significant difference ($p < 0.01$) between a logged site and an unlogged one

SPECIES	Unlogged forest	Logged forests		
		Current	3–4 yrs	7–9 yrs
Silvereye	5.39	2.9**	2.57**	3.69*
Bellbird	3.39	1.8**	2.21*	1.54**
Tui	1.55	0.4**	1.57	0.08**
Fantail	1.50	1.2	1.14	1.08
Grey Warbler	1.09	0**	0.71	0.77
Yellow-breasted Tit	0.91	0.4	0.71	0**
NZ Pigeon	0.66	0*	0.21	0**
Robin	0.23	0	0.07**	0
Weka	0.07	0	0.07	0
Kaka	0.07	0	0	0
Parakeet	0.04	0	0	0
Harrier	0.02	0.1	0	0
Kea	0	0	0.07	0
Grey Duck	0	0.2	0	0
Song Thrush	0.64	0.2	1.07	0.85
Chaffinch	0.43	1.0*	2.14**	0.54
Blackbird	0.34	0.3	0.79*	0.46
Redpoll	0.27	0.1	1.00**	1.54**
Goldfinch	0.16	0	0.07	0.31
Greenfinch	0.09	0.1	0.07	0
Dunnock	0	0.1	0.07	0.23*
Number of 5-minute counts	44	10	14	13

Logging techniques on dissected hill country (present logging and 7-9 year areas) caused much more damage to the forest than logging carried out on flat terrace country (3-4 year logged area). The number of bird species was higher and reductions in counts generally less in the less modified flat terraces. This agrees with counts in the Western Paparoas (Onley 1980), which suggested that, within different types of unlogged forest, more species occurred and bird numbers were higher in tall closed-canopy, multi-tiered vegetation than in low or less stratified vegetation.

The New Zealand Forest Service, in its Draft Buller Management Plan (1981), proposes to manage approximately 51 000 ha of native

forest. Much of this is hill-country rimu/hard beech forest, where present logging techniques cause great damage. If these proposals are adopted, we can expect to find in winter only the five or six most widespread New Zealand native forest birds at all commonly, with the other species reduced to very low numbers, to vagrancy, or to local extinction.

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SHORT NOTE

SOUTH ISLAND PIED OYSTERCATCHERS NESTING IN HAWKES BAY

During Labour Weekend, October 1980, we saw a pair of South Island Pied Oystercatchers *(Haematopus ostralegus finschi)* with two well-grown but unfledged young on the Ngaruroro River near Mangatahi in Hawkes Bay. This is a large expanse of shingle riverbed about 30 km inland. We saw this family on three occasions, but the last time we saw only one of the young. We had previously seen a pair of SIPO in this area in the summer of 1979.

In 1981 they were again present but frequent observation throughout spring and early summer produced no real evidence of breeding. A second pair was also seen, but they were on a section of shingle inaccessible to us.

1982 proved to be a luckier season. On 31 August we made the first sighting, a lone bird which spent most of the day feeding along a small stream. On 12 September, two birds were present and our approach produced 'false brooding' behaviour. On our next visit on 26 September, both birds were together. On investigation we found a nest containing two eggs. The scrape was on a small sand mound among the shingle and was lined with small dry twigs. A