

Relations Between Vertebrates and Forest after the Balmoral Forest Fire

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INTRODUCTION:

On November 26 to 28, 1955, a forest fire fanned by a north-west gale destroyed approximately one-third of the planted area of the 24,000 acre Balmoral State Forest, the second largest exotic forest in the South Island, New Zealand. This paper records observations made one week and three-and-one-half months after the fire, on the effects of the fire on the vertebrate animals present, and on the effects of the vertebrates on natural regeneration following the fire. Conclusions are preliminary in nature and deal largely with the four-month post-fire period.

Most of the forest trees are between 24 and 39 years of age. The major components of the forest are radiata pine (Monterey pine) (*Pinus radiata*), Western yellow pine (*P. ponderosa*), and Corsican pine (*P. laricio*).

Areas affected by the fire were largely destroyed. In some areas the fire was confined to the forest crown, in others to the ground and the lower tiers, and in other areas only charred and limbless tree trunks were left standing above the ash covered, cracked ground. Several small islands of forest were left almost untouched and completely surrounded by burned trees and some of the fire breaks were little affected by the fire. Most severe ground fires occurred in those areas where pine regeneration and shrub growth were plentiful and where dead trees from early thinnings were lying about.

Birds were watched feeding and crop contents of 32 birds were examined. Fourteen sample lines, each with ten evenly spaced mil-acre plots, were run through typical sections of the burned and unburned areas to record number of seedlings undamaged, damaged or destroyed, the number of wheat seedlings, and the presence or absence of animal droppings.

DIRECT EFFECTS

One reptile, four mammals and sixteen bird species are present in the forest.

Bird species most affected by the fire were the insect feeders, particularly the native species like the yellow-breasted tit (*Petroica macrocephala*). The immediate cause of death for most of the carcasses found was thought to be suffocation. Other insectivorous birds, such as the white-backed magpie (*Gymnorhina hypoleuca*) which normally forages in the fields adjacent to the forest, were probably little affected. There was no evidence of significant reduction of fringilids due to fire.

The distribution of some of the introduced birds changed between early December and mid-March. The lesser redpoll (*Carduelis flammaea*) was the dominant bird species present in December and the principal species involved in the use of the newly fallen pine seeds, but it was comparatively scarce in the burned areas in March.

The European rabbit (*Oryctolagus cuniculus*) population was judged to have been significantly reduced by fire at least in severely burned areas where frequent observations of charred bones were made.

The effect of the fire on red deer (*Cervus elaphus*) numbers was considered to be insignificant, although some deer were killed by the fire.

The full effects of the fire on the animals had become apparent in the first four months. Had the fire occurred several weeks earlier nesting birds would probably have been severely decimated. Thousands of potential nesting sites have been destroyed. The environment for animals in the burned areas has thus been radically altered and in the next few years, as the Forest Service encourages maximum regeneration of trees for timber, the vertebrate populations remaining in the forest can be expected to continue adapting as they are permitted by the ever-changing character of the growing forest.

EFFECT OF VERTEBRATES ON REGENERATION

The ease and frequency with which exotic seed-eating birds were observed to feed on pine seeds leave little doubt that birds consumed a considerable number of pine seeds. One week following the fire, the ratio of crops containing fire-dispersed pine seed to total crops examined were for chaffinches (*Fringilla coelebs*) 2/2, goldfinches (*Carduelis carduelis*) 2/2, greenfinches (*Chloris chloris*) 4/4, and redpolls 15/16. On several occasions one or more of these species was observed feeding on pine seed in burned areas. As the redpoll was the most numerous bird in the forest at this time, it is assumed that this species was particularly significant in reducing the numbers of pine seed per acre.

The percentage of seedlings damaged by introduced birds, mainly greenfinches and house sparrows (*Passer domesticus*), varied from almost nil in one of the unscarified areas, to 23% and 34% in areas which had been partially scarified.

In the first four post-fire months, neither rabbits nor deer played a significant role in

damaging those seeds or seedlings available following the fire.

Six months after the fire rabbits were commonly feeding on the newly-germinated, aerially-distributed wheat which had been dropped as poison grain in an unsuccessful attempt to poison seed-eating birds.

DISCUSSION

K. H. MIERS asked whether any quantitative study was done in respect of animals who died in the fire.

MR. BATCHELER said that no quantitative study was attempted because there were no known techniques for this.

J. S. WATSON asked if the 99% loss of seed on the ground was due to birds? How many of those seeds were viable?

MR. BATCHELER said the figure for the loss of seed could be estimated at over $\frac{1}{2}$ million per acre. Redpolls and goldfinches took a big toll of seed, but they did not do any damage. There was a big loss in the fairly dry soil, which would lower the numbers of seed strikes.



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