

Chapter (non-refereed)

Charles, W.N.. 1981 Abundance of field voles (*Microtus agrestis*) in conifer plantations. In: Last, F.T.; Gardiner, A.S., (eds.) *Forest and woodland ecology: an account of research being done in ITE*. Cambridge, NERC/Institute of Terrestrial Ecology, 135-137. (ITE Symposium, 8).

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31. ABUNDANCE OF FIELD VOLES (*MICROTUS AGRISTIS*) IN CONIFER PLANTATIONS

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Field voles (*Microtus agrestis*), which live in grassland, are the most abundant rodent in the uplands of Britain where they are an important prey species for foxes (*Vulpes vulpes*), stoats (*Mustela erminea*), weasels (*Mustela nivalis*), short-eared owls (*Asio flammeus*), long-eared owls (*Asio otus*) and kestrels (*Falco tinnunculus*).

When open ground is fenced, drained and planted with conifers, the standing crop of ground vegetation temporarily increases with concomitant increases in voles. However, after a period of 10-15 years numbers of voles decrease as the growth of the ground layer is deleteriously affected by shading. During this time, vole populations fluctuate from year to year and cyclically reach peaks every 4-6 years (Chitty, 1952) often exceeding 1000 ha⁻¹ compared with minima of c 5 ha⁻¹. Occasional exceptionally dense populations have been recorded (c 2-3000 ha⁻¹) as at the Carron Valley in central Scotland in 1952-53 when the bark of young trees was stripped (Charles, 1956). However, extensive damage is infrequent, the field vole not usually being regarded as an important economic pest of British forests.

1. Assessment

Although the dynamics of many separate populations have been measured in geographically restricted areas of young forests, less is known about their fluctuations on a more extensive scale. Because populations of predators seem, understandably, to reflect those of their vole prey (Lockie, 1955), studies were initiated to record (i) how field voles respond to different types and grades of habitat within, and adjacent to, young forests and (ii) whether changes in different areas are synchronous. Populations of voles have been assessed from 1975 to 1978 inclusively, in 3 habitats (i) open hill, (ii) young conifer plantations, 3-10 years after planting, and (iii) closed conifer plantations, > 20 years after planting, in each of 2 regions of Scotland with considerable amounts of recent afforestation—Eskdale in the Borders, and Galloway in the south-west. In the former, a 'rich' area, the schists are mostly covered by grass whereas at the latter, a 'poor' area, the granitic bedrock has a cover of heaths and bogs. In each region, samples were taken from 3 replicate areas of each type of habitat, blocks of open unplanted ground and young forest usually measuring 10 ha, and 5-15 ha

TABLE 46 Estimated effects of afforestation on populations of voles in 2 areas of Scotland. (Numbers of voles ha⁻¹, 1975/78).

Type of habitat	Areas of Scotland	
	Eskdale	Galloway
Unplanted open hill	<5	10
Young forest, planted 1968-73	130	50
Closed forest, planted before 1960		
(i) Rides	15	18
(ii) Planted areas	<5	<5

respectively. At Eskdale it was also possible to assess in greater detail the effects of differing planting dates in the period 1969-72.

Estimates of vole abundance were obtained in the spring and autumn of each season by using randomly arranged series of snap traps in each study area. Simultaneously, the relative abundance of different ground cover plants was estimated, together with the heights of trees of different species.

2. Progress

Although the data have not been fully analysed, it seems that:—

- a) densities of voles in open ground, which rarely exceeded 10 ha⁻¹, were similar in both Eskdale and Galloway (Table 46),
- b) during the early stages of afforestation (years 1 to 5), numbers of voles increased to about 130 ha⁻¹ and 50 ha⁻¹ at Eskdale and Galloway respectively,
- c) numbers of voles averaged 5 ha⁻¹, in closed forests, and they were probably absent in some areas,
- d) more voles occurred in the rides (15-18 ha⁻¹), than in the planted areas of closed forests,
- e) populations of voles varied seasonally being largest in autumn, at the end of the breeding season, and least in spring before breeding commenced (Figure 58). Densities were largest in 1975 and least in spring 1977.
- f) mean numbers in different compartments ranged from 23 to 280 ha⁻¹, the former on blanket peat with *Calluna vulgaris* dominant and the latter on mineral soils with *Agrostis* spp dominant,
- g) the population shifts in most of the 16 forest compartments measured at Eskdale, some being 15 km apart, were synchronous.

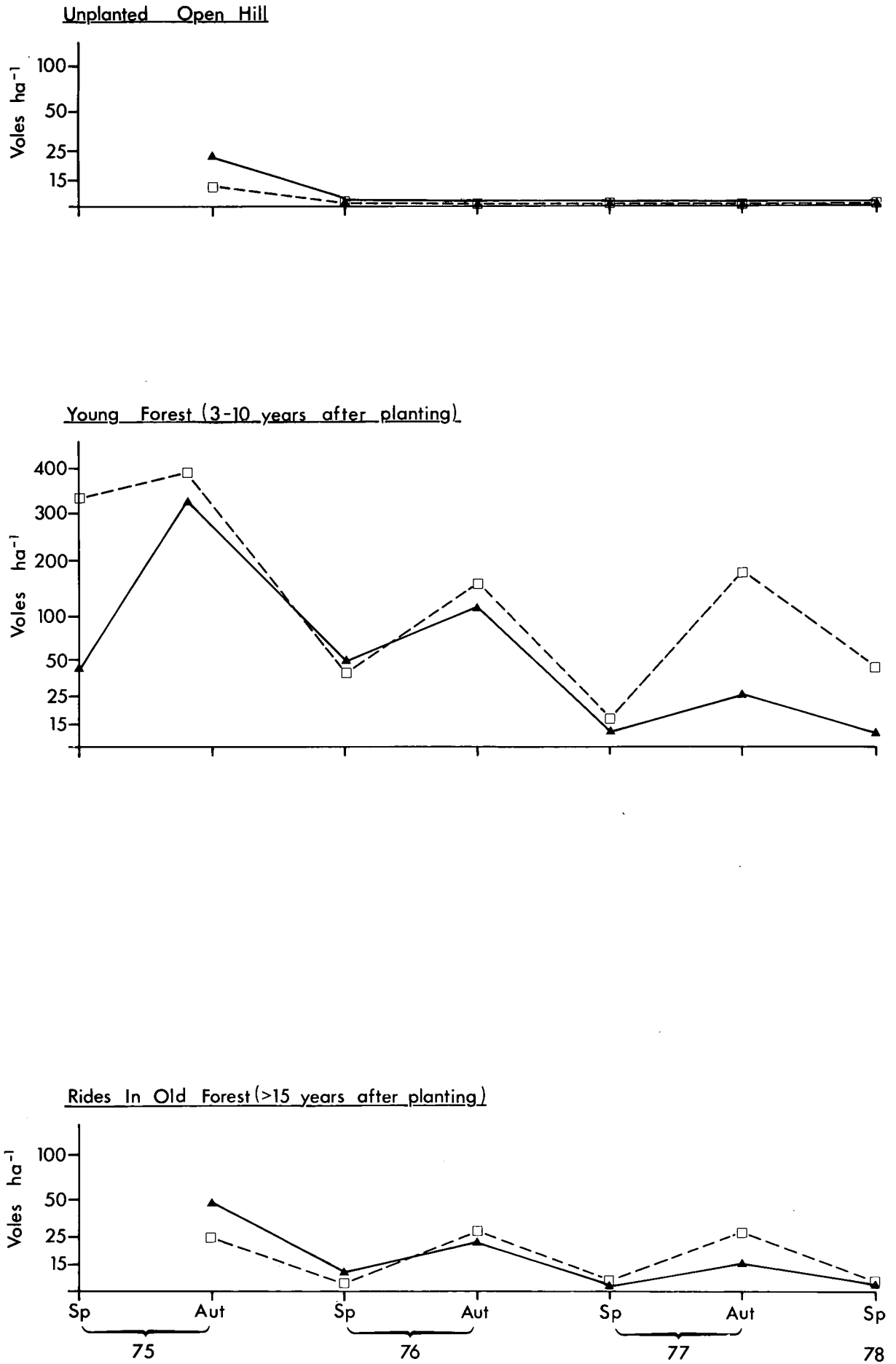


Fig. 58 Changing populations of voles (*Microtus agrestis*), plotted on logarithmic scales, in open hill, young and old forests in Eskdale (---) and Galloway (—), Scotland.

Already it has been possible to identify seasonal influences on the populations of voles which increase immediately after afforesting open hill and later decrease as conifers impose shade on the layer of ground vegetation. Interestingly, the annual changes seem to be synchronous over extensive areas but more observations are required to characterise the geographical extent of this response. These studies were supported by an intensive examination of the changes in avian predators in Eskdale by A. Village, formerly of Edinburgh University, who was mainly concerned with kestrels.

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