NERC Open Research Archive sharing our research

Centre for Ecology & Hydrology
NATURAL ENVIRONMENT RESEARCH COUNCIL

Chapter (non-refereed)

Pollard, E.. 1981 Population studies of woodland butterflies. 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, 120-124. (ITE Symposium, 8).

Copyright © 1981 NERC

This version available at http://nora.nerc.ac.uk/7062/

NERC has developed NORA to enable users to access research outputs wholly or partially funded by NERC. Copyright and other rights for material on this site are retained by the authors and/or other rights owners. Users should read the terms and conditions of use of this material at http://nora.nerc.ac.uk/policies.html#access

This document is extracted from the publisher's version of the volume. If you wish to cite this item please use the reference above or cite the NORA entry

Contact CEH NORA team at
nora@ceh.ac.uk

28. POPULATION STUDIES OF WOODLAND BUTTERFLIES

E. POLLARD

The population ecology of several rare or locally distributed butterflies has been studied in the Institute of Terrestrial Ecology to understand factors determining their abundance and so possibly enable appropriate conservation measures to be taken. Counts of individuals at each stage of the life cycle have been made over several generations, with the subsequent compilation of life tables. Using these data it has been possible to use 'k factor' analyses in attempts to show at which stage or stages major fluctuations in mortality occur which determine fluctuations in numbers of adult butterflies. Although, in the longer term, there may be underlying trends in population size attributable to slow and perhaps imperceptible habitat changes, these trends are likely to be masked, in the relatively short period of a population study, by annual fluctuations related to short term factors such as seasonal differences in weather, or in the abundance of predators or parasites. Nonetheless if 'sensitive' stages are identified, it may be possible to modify the habitat by management, to improve survival and increase the numbers of the species in question.

This paper briefly describes 4 population studies of woodland butterflies and refers to a new scheme for monitoring the abundance of butterflies, specifically designed to identify longer term trends.

1. Population studies

1.1. White admiral *Ladoga camilla* L.

At the beginning of this century the white admiral had a very much more restricted distribution in England than now. It was largely confined to an area centred around the New Forest, but in the 1930s and early 1940s it spread across much of southern England, as far north as Lincolnshire, arriving at Monks Wood during this period. Its larvae feed on honeysuckle, *Lonicera periclymenum* L. The larval stage lasts from late summer of one year to June of the next. At Monks Wood annual fluctuations are largely the result of differences in survival of late instar larvae and pupae in early summer (Pollard, 1979). In cool weather, these stages are protracted and mortality caused by bird predation is high, whereas in warm weather they are of short duration, mortalities are few and hence large numbers of adults emerge. Thus, there is a direct association between temperature and adult numbers, early (and by definition warm) seasons favouring this species. A historical analysis of the spread of the species based on reports in entomological journals, showed that the spread of this butterfly coincided with a period when early summer temperatures were consistently high (Plates 20 and 21).

However, the extended geographical distribution of the white admiral is unlikely to be solely attributable to weather; habitat changes are almost certainly also involved. Its eggs are laid in areas of light shade at the edges of rides or within woodland, usually on old honeysuckle. The adults fly widely and exploit areas of light shade which abound in neglected coppice. In contrast, an actively managed coppice woodland provides virtually no areas of suitable habitat as it changes too quickly from an open stand to dense shade.

Coppice management declined late in the 19th century, the decline continuing until amounts of actively managed coppice are now negligible (eg Peterken, 1976). However, during the warm early summers of the 1930s and 1940s, large areas of neglected coppice seem to have provided ideal conditions for the build up and spread of the white admiral. Subsequently, the white admiral has been lost from many, but not all, of the sites which it colonised in the 1930s and 1940s. However, its conservation in nature reserves is probably not too difficult, provided rides are kept wide to provide some sunny areas. Otherwise, lack of management, especially of old coppice woodland, will in this case ensure that suitable breeding areas are retained. The species may, however, always be at risk in exceptionally cold summers.

1.2 Black hairstreak *Strymonidia pruni* (L.).

This species, one of the rarest British butterflies, was studied by Thomas (1974). It occurs almost exclusively in woods on heavy clay soils in a belt between Oxford and Peterborough; its colonies are localised within woods and sometimes persist for long periods, even up to 50 years. Its larvae feed on blackthorn, *Prunus spinosa* L., typically in glades, rides and at woodland fringes, the clearance of blackthorn for forestry or other purposes accounting for the disappearance of most colonies.

As might be expected of such a tenacious species, it is a poor colonizer. Several times it has been successfully introduced to sites only 5-8 km distant from existing colonies. It can, however, colonize new areas within a wood. Indeed it seems to have flourished in woods with long coppice cycles (about 20 years) in which areas of scrub blackthorn were cut back periodically, destroying established colonies but providing regenerating blackthorn for recolonization by the black hairstreak from elsewhere in the wood.

During this century numbers of known colonies have decreased from 60 to 30. This decline will almost certainly continue until the black hairstreak is restricted to areas where conservation measures are taken to ensure the provision of young blackthorn by cutting back old bushes. To help to ensure continuity of the black hairstreak only a small part of a thicket should be cut at a time, a measure not only enabling the transfer of the species from old to young thickets, but also preventing blackthorn from becoming moribund. The existence and survival of the black hairstreak is however incompatible with modern forestry, unless blackthorn thicket is retained and managed appropriately.

1.3 The woodland fritillaries.

The disappearance of several species of the closely related fritillaries (small pearl-bordered, *Boloria selene;* pearl-bordered, *Boloria euphrosyne;* silver-washed, *Argynnis paphia,* and high-brown, *Argynnis adippe*) from woodlands in eastern and central England has been perhaps the most striking change in the woodland butterfly fauna in recent years.

The study of their loss is only in its initial stages, but already it seems to be associated with trends in woodland management. Their larvae feed on violets, *Viola* spp, and are particularly associated with newly cleared woodland, where violets and other woodland herbs flourish. Understandably therefore this group of butterflies has suffered severely from the decline in coppicing, but the timing of their loss, over a relatively short period in the late 1950s and 1960s, additionally suggests that other factors are involved. For instance, the sudden loss of rabbits in the 1950s and the subsequent rank growth of woodland herbs, in the absence of grazing, might be expected to affect low-growing violets adversely.

The importance of coppicing to fritillaries is associated with the regular recreation of open habitats within a single wood or group of woods. These conditions may have been created recently in Monks Wood when the rides were widened but the chances of natural recolonization by one or more species of fritillary may be small because their nearest known source is now some 100 km distant.

1.4 Wood white *Leptidea sinapis* L.

Caterpillars of this species feed on a range of climbing or scrambling leguminous plants of which *Lathyrus pratensis* L. is probably the most important. These plants thrive in the rides of young conifer plantations which account for a large proportion of the current known habitats in England. The abundance of young plantations

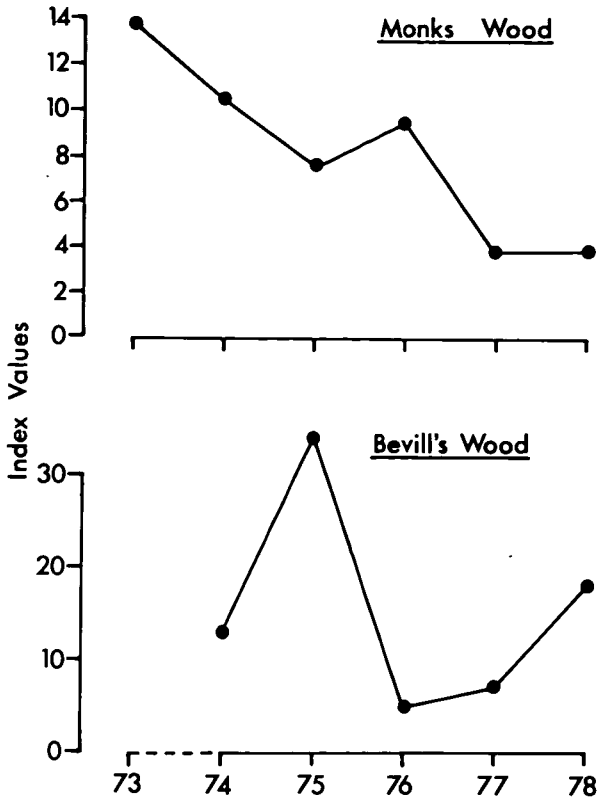

Fig. 52 *Index values (sums of the mean weekly counts) for the speckled wood* (Pararge aegeria) *at Monks Wood and Bevill's Wood.*

in lowland Britain may be the reason for the slight spread of this species in the last few years. At Monks Wood, outside its present breeding range and where suitable food-plants are scarce, 3 individuals have been recorded in the last 4 years. It is unlikely that the species will colonize Monks Wood, as food-plants are uncommon there, but it is possible that a nearby young Forestry Commission conifer plantation with abundant *Lathyrus pratensis* will be colonized.

2. Butterfly monitoring scheme

This discussion of woodland butterflies has usually been based on (i) knowledge of their general distribution (through the Biological Records Centre mapping scheme (Heath, 1973) and (ii) their biology and population ecology at specific sites. To understand the more general trends in numbers, a scheme coordinated at ITE Monks Wood for the Nature Conservancy Council has been initiated with the aim of monitoring butterfly abundance. It is based on weekly transect counts made along fixed routes (Pollard, 1977) at 60 sites including 19 woodland habitats. This national scheme was started in 1976 but records have been taken at (i) Monks Wood since 1973 and (ii) Bevill's Wood, a 20 years old Forestry Commission conifer plantation to the south of Monks Wood,

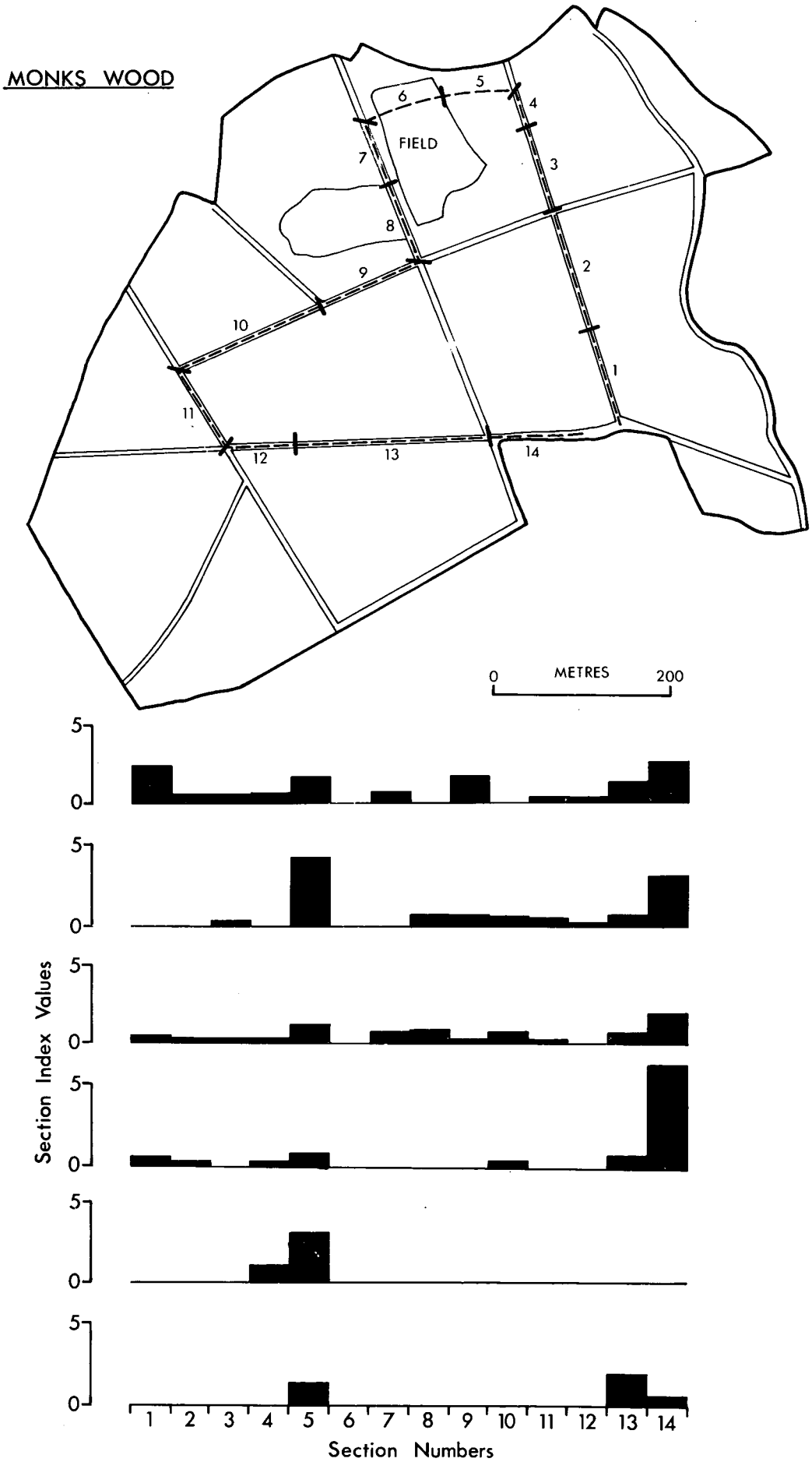

Fig. 53 *Section index values (sums of the mean weekly counts) for the speckled wood* (Parage aegeria) *at Monks Wood 1973-78.*

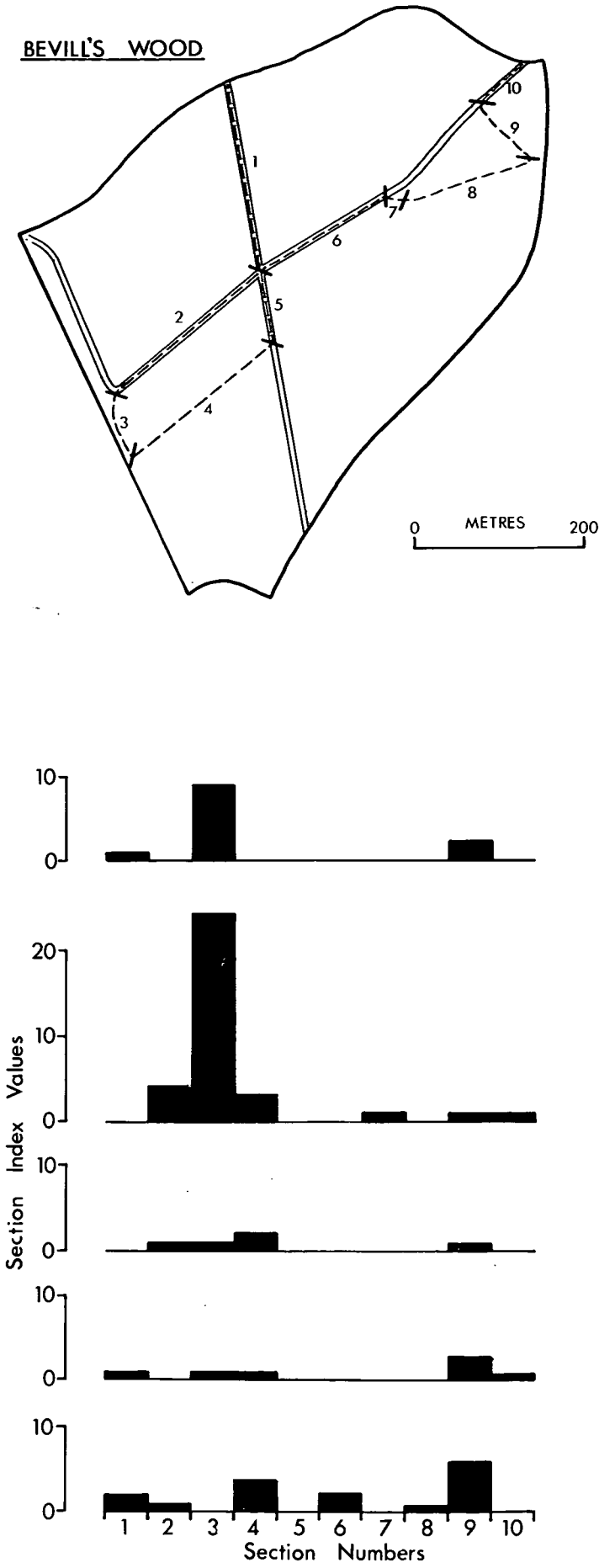

Fig.54 *Section index values (sums of the mean weekly counts) for the speckled wood* (Parage aegeria) *at Bevill's Wood 1974-78.*

since 1974. Although these periods of observation are short in relation to the timescale of woodland habitat changes, there is a discernible suggestion that the abundance of the shade loving speckled wood butterfly (*Parage aegeria* L.) has decreased at Monks Wood (Figure 52). On more detailed examination of transect data it seems that the speckled wood is becoming more widespread in the increasingly shaded Bevill's Wood whereas its distribution in Monks Wood is becoming less extensive as the number of shady rides has been reduced by management (Figures 53 and 54). In the former, the removal of deciduous scrub in 1975 was associated with a sharp decrease in the abundance of the speckled wood in 1976. The monitoring scheme may help us to identify changes in the fauna of a site while there is time to take action, before populations are seriously threatened.

References

Heath, J. 1973. Provisional distribution maps of the resident species. In: *South's British Butterflies,* edited by T.G. Howarth, 163-192. London: Warne.

Peterken, G.H. 1976. Long term changes in the woodlands of Rockingham Forest and other areas. *J. Ecol.,* **64,** 123-146.

Pollard, E. 1977. A method for assessing changes in the abundance of butterflies. *Biol. Conserv.,* **12,** 115-134.

Pollard, E. 1979. Population ecology and change in range of the white admiral butterfly *Ladoga camilla* L. in England. *Ecol. Entomol.* **4,** 61-74.

Thomas, J.A. 1974. *Ecological studies of hairstreak butterflies.* PhD thesis, University of Leicester.