THE HEATH FRITILLARY BUTTERFLY, *Mellicta athalia*, in 1982

Report to the Nature Conservancy Council

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INTRODUCTION

This report contains a summary of the major developments on all the M. athalia sites known in Britain during 1982. A considerable amount of additional information (eg, biological details and mark-recapture data) has also been gathered and will be included in a fuller report at a later date.

The names and details of sites and sampling procedures used in the text follow those already described by Warren, Thomas & Thomas (1981).

SITE DETAILS

Greenscombe Wood, Cornwall

M. athalia was very abundant this year and numbers were 2-3 times greater than in 1981. Over the past 3 years the indices of adult abundance (obtained from the two butterfly monitoring transects) have changed as follows:-

	Ridge Transect	Trust Reserve Transect
1980	-	682
1981	555	235
1982	1205	762

An intensive mark-recapture programme was carried out during 1982 when 1258 adults were marked. Preliminary analysis of the data indicates that the total population in the wood was between five and ten thousand individuals.

Spring larvae were also very abundant in 1982, particularly on the ridge where they were feeding mainly on Plantago lanceolata (241 observations) and Veronica chamaedrys (114 obs.). Several plants and even whole patches of plants were completely stripped by the larvae and it is possible that some may have died of starvation. A few larvae were also feeding on Digitalis purpurea (4 obs.), Plantago major (3 obs.), Melampyrum pratense (1 obs.), Veronica serpyllifolia (1 obs.) and Veronica hederifolia (1 obs.). It is thought, however, that the number of larvae feeding on Melampyrum was greatly under-recorded because this food-plant grew in different parts of the wood which were searched less thoroughly and because Melampyrum plants are very small in the spring and easily over-looked. The distribution of spring larvae is shown in Fig. 1.

Despite poor weather during the latter part of the egg-laying period, numerous egg batches and young larvae were found later in the year (Fig. 1). The majority of these were feeding on Veronica chamaedrys (24 larval masses) although several were found on Melampyrum pratense (6 masses). None were found on Plantago

lanceolata, which is abundant in many parts of the wood, despite several hours of searching. This observation suggests that Veronica and Melampyrum may be chosen by egg-laying females in preference to Plantago, although it is difficult to ensure that records are unbiased. However, during 3 years of study only 2 out of 56 recorded larval masses were feeding on Plantago, despite the fact that this food-plant is commonly used by larger, post-hibernation, larvae. Experiments designed to examine the whole aspect of larval food-plant preferences are planned for 1983.

The Nature Conservancy Council will soon be finalising a 25 year management agreement with the Duchy of Cornwall covering M. athalia's main breeding areas in both Greenscombe Wood and Deer Park Wood (See Fig. 2). Management already carried out at Greenscombe Wood includes the removal of most of the conifers recently planted in areas a, c and f. The remaining conifers in these areas will be removed during the 1982/83 winter. During July 1982 two large areas of rosebay willowherb in the western half of a_5 and a_6, and an area of dense bracken in a_3, were cut with a Mayfield Autoscythe. These plant species represent a considerable threat to the breeding habitat of M. athalia and will need close attention over the next few years. Areas a_1, a_2 and the remaining areas of a_{4-6} were all cut in early October 1982 with a "brush-hog" cutter by arrangement with the Duchy of Cornwall. However, the eastern third of areas a_{4-6}, which contained most of the recorded larval masses, was too steep to be cut safely by this machine.

Management of the Cornwall Naturalists' Trust Reserve has also continued during 1982, with some more scrub being cleared in the northern part of the reserve. A large area of bracken has also been cut in the main clearing in the southern half. This latter area contains numerous patches of Melampyrum, mainly beneath the remaining oaks, some of which are used by M. athalia. However, at present the clearings contain no Veronica and very little Plantago, and it is hoped to encourage these plants by introducing seeds into newly disturbed ground during the coming year.

Deer Park Wood A, Cornwall

Only a few spring larvae were found during 1982, despite numerous searches (see Fig. 3). Out of 17 feeding observations 15 were on Plantago lanceolata, 1 on Veronica chamaedrys and 1 on Digitalis purpurea. All of these were found in area a and larvae did not seem to be present on the abundant Plantago in area b,

a ride where numerous adults had been recorded during 1981. This ride may now have become too shaded for oviposition by M. athalia and will be widened during the 1982/83 winter.

Adults were fairly abundant on the site in the early part of the season but numbers quickly declined and none was seen during the latter half of the flight period (from 10-30 June). This suggests that the habitat may now have become unsuitable for M. athalia owing to increased scrub and grass growth over much of the site. Similar developments were thought to have led to its disappearance from Deer Park Wood B during 1981, and its decline in Deer Park Wood A was expected.

The site will soon be included in a 25 year management agreement with the Duchy of Cornwall (see Fig. 2) and it is hoped that the above trends can be reversed. Management will include the cutting back of the vegetation in area a and the opening up of the ride in area b. However, it remains to be seen whether any adults will emerge on the site in 1983 and take advantage of the proposed improvement of the breeding habitat. If not, an artificial re-introduction, using individuals from the large population at Greenscombe Wood, may be necessary.

Lydford, Devon

A re-introduction of M. athalia was attempted this year to a new locality along the disused railway-line near Brentor (Grid Ref 20/492819), about ½ mile south of the old colony. The site is managed as a private nature reserve and is an Approved Conservation Area of the Devon Trust for Nature Conservation.

Fifteen newly-emerged individuals and about 50 pupae were introduced to the site on 5 June 1982. The pupae were placed on a wooden platform standing in a bowl of water in order to protect them from predation by small mammals and invertebrate predators such as carabid beetles. The stock had been cage-reared by I. Looker and originated from 3 females taken from Greenscombe Wood, Cornwall, during 1981.

Some of the introduced adults were seen on the site the following day but unfortunately the weather then changed and the following 3 weeks were mainly dull and wet. During this time nearly all the remaining pupae hatched successfully and a few individuals were seen on each subsequent visit. However, owing to the small number of individuals released, the long span of emergence and the poor weather conditions, it is doubtful whether any eggs were successfully laid.

The site will be closely monitored during 1983 to discover whether this was the case.

A further re-introduction is planned for 1983 using a larger number of cage-reared individuals. These will again be provided by I. Looker but additional stock should be provided by P. Holdaway who is also rearing individuals from Greenscombe Wood.

West Pinkworthy Wood, Devon

No spring larvae were found in the main breeding area during a 4 hour search, but several Plantago plants showed feeding damage typical of M. athalia larvae. Adults were very abundant however and the larvae must have been overlooked, possibly because of the nature of the vegetation and because Plantago is so abundant. Adult numbers had increased considerably since 1981 and a mark-recapture estimate of the population on 8 June 1982 was 320±44, indicating a population of about 430 at the peak of the flight period (compared with an estimated 61 in 1981). Three egg batches were found and the larvae subsequently fed on Veronica chamaedrys (2 batches) and Plantago lanceolata (1 batch).

The Devon Trust for Nature Conservation is currently negotiating a lease for the main breeding area within the wood, but it now seems doubtful whether this will be finalised. However, the owner does still intend to continue growing Christmas trees on the area, which should allow the butterfly to survive for at least another 5-10 years. By then the gradual spread of Holcus and other grasses caused by the partial tree cover is expected to become critical.

Exmoor sites, Somerset

As in 1981 M. athalia was not recorded at Aller Coombe during 1982, but a new site was reported by R. Butcher at Bin Coombe about 2 miles away (Grid Ref 21/908406). He recorded about 10 adults (mostly males) in about 1 hour of searching on 7 June 1982. The site was visited towards the end of the season on 29 June 1982 and 3 females were seen during a 90 minute search. These results indicate that the population is very small. It is, however, still a possibility that other small colonies occur nearby, but have, so far, been overlooked.

All the female M. athalia were seen in an area of Vaccinium and Calluna heathland where Melampyrum pratense was thinly scattered. No other known food-plant was found on the site and it is therefore presumed that the population

relies solely on Melampyrum. This plant occurs over much of the heathland in Bin Coombe (and several surrounding areas of heathland), but large areas are now covered with dense bracken and are probably unsuitable for M. athalia. The females were all seen in a small area where the bracken was noticeably sparser than elsewhere and it is possible that the habitat would be improved considerably by the removal of some of the dense bracken. However little is known about the requirements of M. athalia in this type of habitat, which is very different to that used elsewhere in the country.

Kent sites

A comparison of the location of Kent colonies in 1980 and 1982 is shown on Figs. 4-9. Briefly, developments on each of the sites have been as follows.

Church Wood A, B and C are now included in a new reserve which was purchased by the Royal Society for the Protection of Birds late in 1981. However, all these colonies are now very small and probably only A will exist next year. During the 1981/82 winter the RSPB cleared an area of woodland adjacent to Church Wood A specifically to encourage M. athalia. This now appears to be highly suitable and the RSPB hope to encourage the butterfly by making similar clearings elsewhere in Church Wood next winter. The population on the National Nature Reserve (Mincing Wood) remains small although recent management continues to provide apparently suitable new habitats. After the good weather during the oviposition period in 1982, numbers are expected to increase on both reserves and the wardens will be monitoring the changes by means of standard butterfly transects.

The following Kent sites are now unsuitable and no adult was recorded during 1982: Stock Wood, Honey Wood B, Sheafs Wood and West Blean Wood B. In addition, Thornden Wood B, C and E, are all only marginally suitable and only single adults were recorded. Two new colonies were found in 1982, one in Homestall Wood (Grid Ref 61/116590) and the other at Shrub Hill (Grid Ref 61/143645). The former is in a young conifer plantation and has probably existed for several years but until now has been overlooked. The latter is a new colony that has appeared since the site was cleared and planted with conifers in 1979/80. However, both sites are now only marginally suitable and the colonies are only expected to continue for another year or two.

The colonies at Cane Wood and West Blean Wood A, C, D and E have all declined and are now very small. They are only expected to continue for another year at most and several may become extinct next year. In contrast, the colonies at Honey Wood A, Cripps Wood and Belce Wood are all still large and the first two have recently expanded into adjacent coppice that has been cut within the last 3 years, (See Figs. 6 and 8). The colony at Belce Wood is now probably the largest in Kent and breeds entirely around the edge of a young conifer plantation where this borders some deciduous high forest. However, the larval food-plant, Melampyrum pratense, is receding in this marginal area and in 1982 only a few plants grew in positions sunny enough to be used for oviposition. Young larvae were found on nearly all these plants and in some cases 2 or 3 egg batches were laid on or near single, isolated plants. It seems certain that the majority of such larvae will die of starvation although some may survive by moving onto nearby plants which occur deeper in the shade of the deciduous woodland.

The colony at Blaxland A is apparently still declining as the habitat becomes increasingly overgrown. The population now depends almost entirely on the Melampyrum that still occurs along the northern edge of the cleared area where this borders some deciduous high forest. This is expected to remain suitable for only one or two years. The habitat at Thornden Wood A has also become unsuitable now but the colony has moved into two adjacent areas which have improved considerably over the last few years (see Fig. 7). The colony now occupies an area of young coppice to the west and part of a new conifer plantation to the north. Finally, the original colony at East Blean Wood appears to have become extinct and only a single adult was recorded in some 4-year old coppice elsewhere in the wood (see Fig. 9). However, several new areas of coppice have been cut during the last two years and now provide suitable habitats. It remains to be seen whether enough adults have survived to colonise these areas, which are otherwise some distance from the nearest known colony in West Blean Wood.

During 1982 an extensive mark-recapture programme was carried out in the Thornden Wood complex, particularly looking at adult movement between the colonies at Blaxland, Belce Wood and Cripps Wood. The amount of movement between the sites was greater than expected and several movements of greater than 1 km were recorded for both sexes. A few adults were also recorded along rides and in compartments with no suitable breeding habitat. These observations suggest that

although the colonies generally occupy a very discrete area, they are components of a much larger population. They should therefore be considered as sub-populations between which there is some movement of adults and almost certainly some genetic exchange. Movement between the separate woodland blocks (eg, Church Wood and Thornden Wood) was not examined in any detail but if any occurs at all, it is likely to be very small and difficult to detect.

The information described above shows that nearly all the Kent colonies have shifted their location since 1980 and that several have disappeared completely as the vegetation has developed. Changes in the location of colonies have been most pronounced in sites that are now unsuitable but where nearby areas have been cleared, thus creating new breeding habitats (eg, Thornden Wood A and Honey Wood A). There are also several areas within the Blean Woods complex that appear suitable but have not been successfully colonised (eg, East Blean Wood). The butterfly will almost certainly colonise such new areas (as it has at Shrub Hill) but if the site is isolated from existing colonies, it may take several years for the butterfly to become abundant. By this time the habitat is likely to be already deteriorating.

CONCLUSIONS

The 1982 season was generally fairly good for M. athalia and adult numbers increased on several sites. The number of nature reserves containing M. athalia has also increased from two in 1980 to five in 1982. In S.W. England a new colony was discovered at Bin Coombe (Somerset) and two of the other three colonies had greatly increased since 1981. Two of these sites will soon be covered by a management agreement with the Duchy of Cornwall which will be aimed specifically at encouraging M. athalia. The first is at Greenscombe Wood which now contains the largest colony in Britain with an adult population of between 5 and 10 thousand. The second is a much smaller site at Deer Park Wood A where urgent management is planned to halt the butterfly's decline. The Devon Trust for Nature Conservation are trying to negotiate a lease on the remaining S.W. site, West Pinkworthy Wood (Devon), but it now seems doubtful whether this will be finalised.

In Kent the majority of colonies were still small in 1982 but adults were again abundant where the habitat remained suitable. Adult numbers remained small on the N.N.R. (Mincing Wood) despite continuing management to encourage M. athalia.

This reserve is now supplemented by a new R.S.P.B. reserve which covers a large part of Church Wood and contains three small colonies. Some management has already been carried out at Church Wood A and further clearance is planned elsewhere in the wood during 1982/83.

However, the majority of the Kent colonies (and all of the large colonies) still occur in the commercially-managed woodland in the Thornden Wood/West Blean Wood complex where the future of M. athalia is still very uncertain. Seven of the twelve known colonies in this area breed in young conifer plantations which will become unsuitable within the next two or three years and thereafter stay unsuitable indefinitely. A total of 55% of the Thornden/West Blean complex is now planted with conifers, leaving the coppice fragmented and far more isolated than formerly. The effect of these developments on M. athalia is still difficult to predict with any certainty but they will undoubtedly lead to a considerable overall decline in the area. Another effect may be that the more isolated coppice plots may not be colonised after cutting, even if they provide suitable habitats. If this is the case, then artificial re-introductions may be essential to ensure the butterfly's long-term survival.

All the British M. athalia sites will continue to be monitored next year, with particular emphasis on the effects of management on the nature reserves. Research will also continue on the butterfly's life-cycle and some experiments will be designed to investigate the choice of larval food-plants, which in S.W. sites seems to be more complicated than at first thought. Other plans for 1983 include a further attempt to re-introduce M. athalia to a site near Lydford (Devon) and possibly to re-introduce it to Belfairs Wood (Essex). The latter site is a Local Nature Reserve where the butterfly became extinct in 1964 following the cessation of coppicing. However, several areas have been coppiced since 1979 and the site once again appears to be highly suitable.

REFERENCES

Warren, M.S., Thomas, C.D. & Thomas, J.A. (1981). The Heath Fritillary: Survey and Conservation Report. Joint Committee for the Conservation of British Insects, 1981.

SUMMARY OF *M. athalia* SITES IN 1982

Key to changes in habitat suitability: ++ marked improvement; + improvement
= similar; - decline; -- marked decline

Site Name	1980 size category	Change in habitat suitability since 1980	1982 Size category
S.W. ENGLAND			
Greenscombe Wood	1	=	1
Deer Park Wood A	2	-	3
Deer Park Wood B	3	--	0
Lydford	4	-	0 (re-introduced nearby but success doubtful)
West Pinkworthy Wood	2	=	2
Aller Coombe	3?	=	0
Bin Coombe	?	?	4
TOTAL COLONIES IN S.W. ENGLAND: 4 (6 in 1980)			
KENT			
Church Wood A	2	+	3
Church Wood B	3	-	4
Church Wood C	3	-	4
Mincing Wood NNR	4	+	3
Stock Wood	3	-	0
Homestall Wood	0	?	4
Honey Wood A	3	++ (nearby)	2
Honey Wood B	3	-	0
Sheafs Wood	3	--	0
Cane Wood	3	-	4
Thornden Wood A	3	+ (nearby)	2+3
Thornden Wood B	3	-	single sighting
Thornden Wood C	4	-	single sighting
Thornden Wood D	2	-	2
Thornden Wood E	3	-	single sighting
Shrub Hill	single sighting	-	3
Blaxland A	1	--	2
Blaxland B	3	--	0
Belce Wood	1	-	1
Cripps Wood A	3	-	>1
Cripps Wood B	3	++	
West Blean Wood A	3	--	4
West Blean Wood B	4	--	0
West Blean Wood C	4	-	4
West Blean Wood D	3	-	4
West Blean Wood E	3	-	4
East Blean Wood	3	++ (nearby)	single sighting
TOTAL COLONIES IN KENT: 18+4 single sightings (25 colonies in 1980)			

GREENSCOMBE WOOD, CORNWALL

FIG.1 Distribution of spring larvae(1,6etc) and egg batches(•), 1982

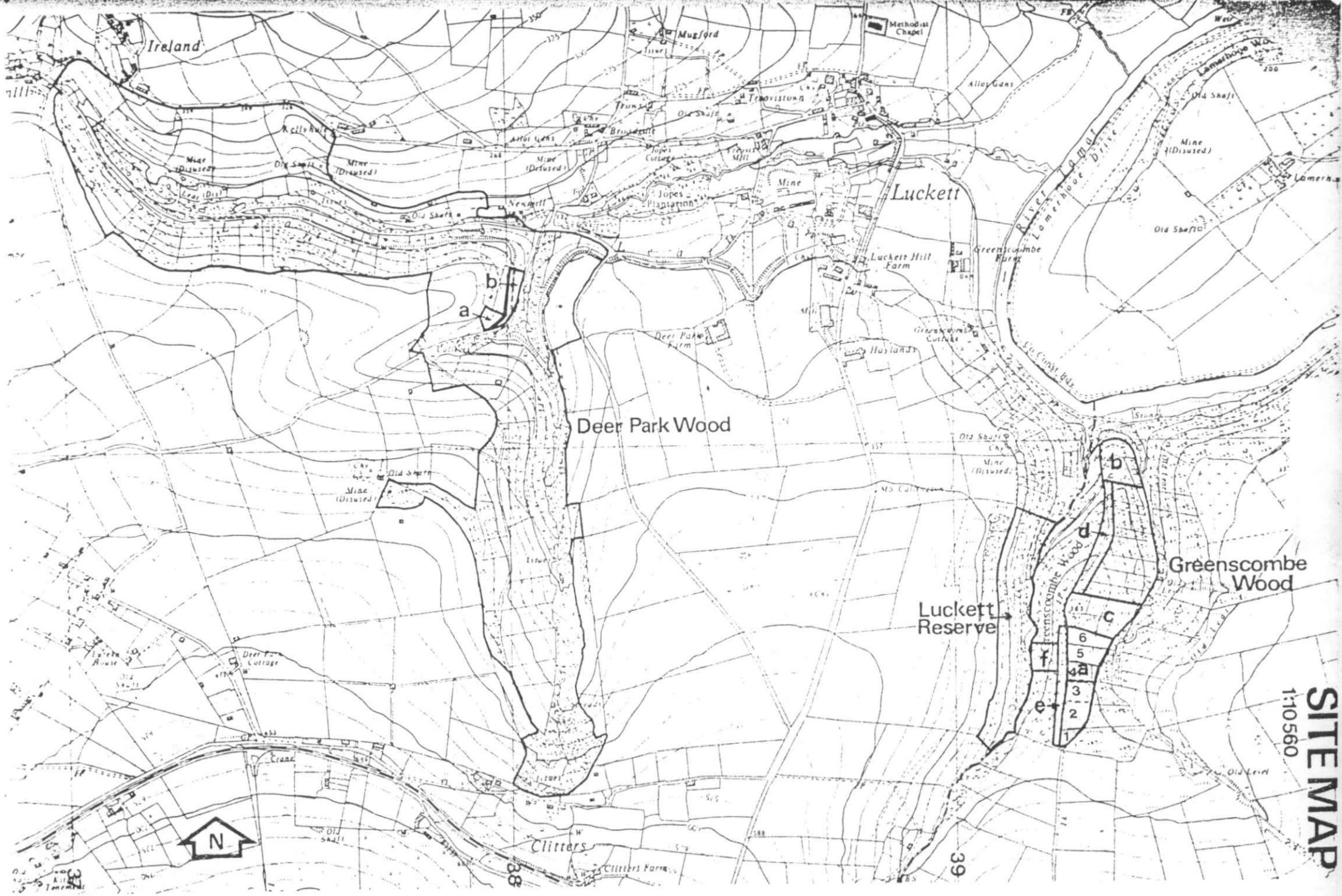

FIG.2 Provisional map of areas to be covered by a management agreement with the Duchy of Cornwall

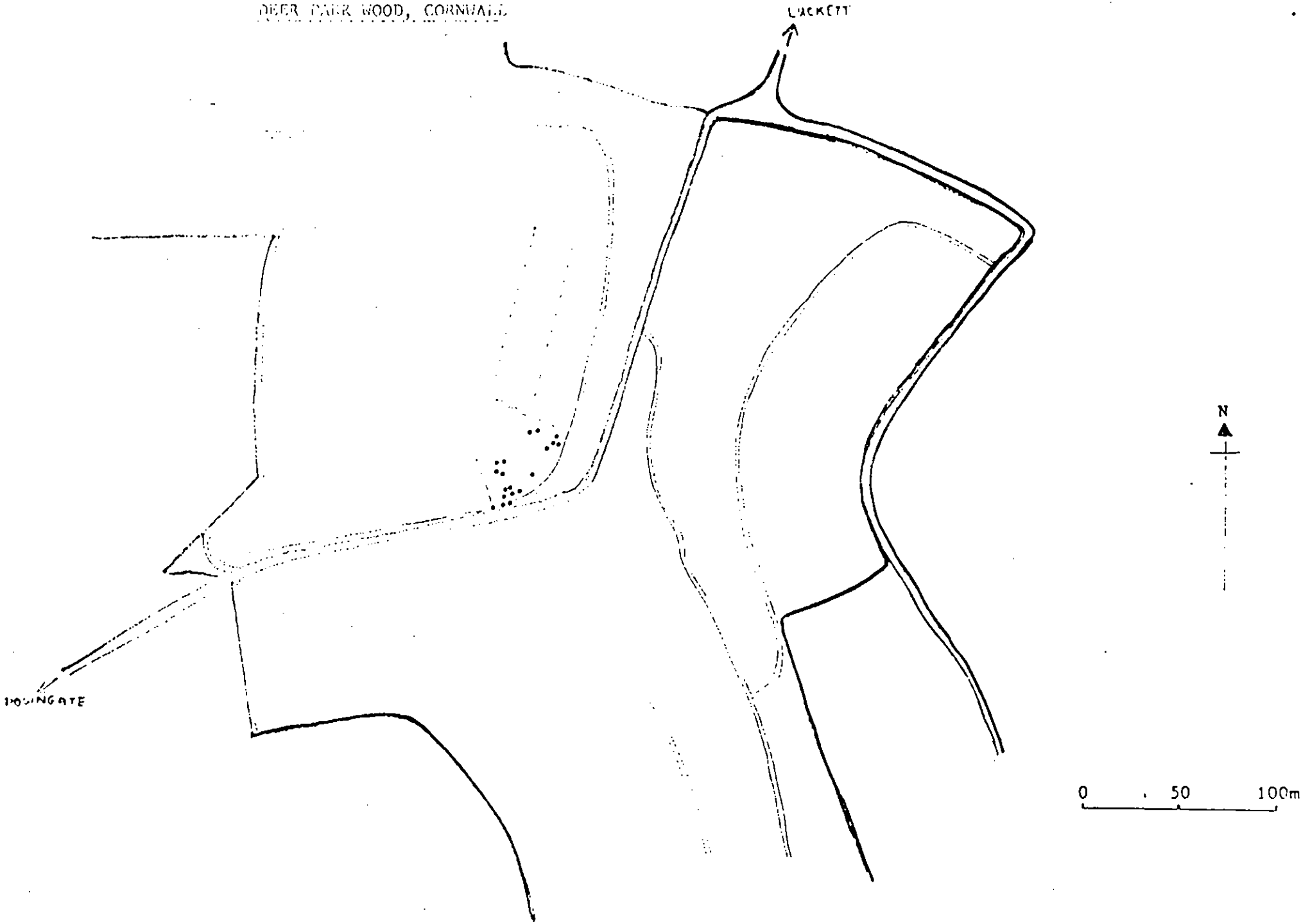

FIG.3 Distribution of spring larvae, 1982

K.1-3 CHURCH WOOD A-C
K.4 MINCING WOOD

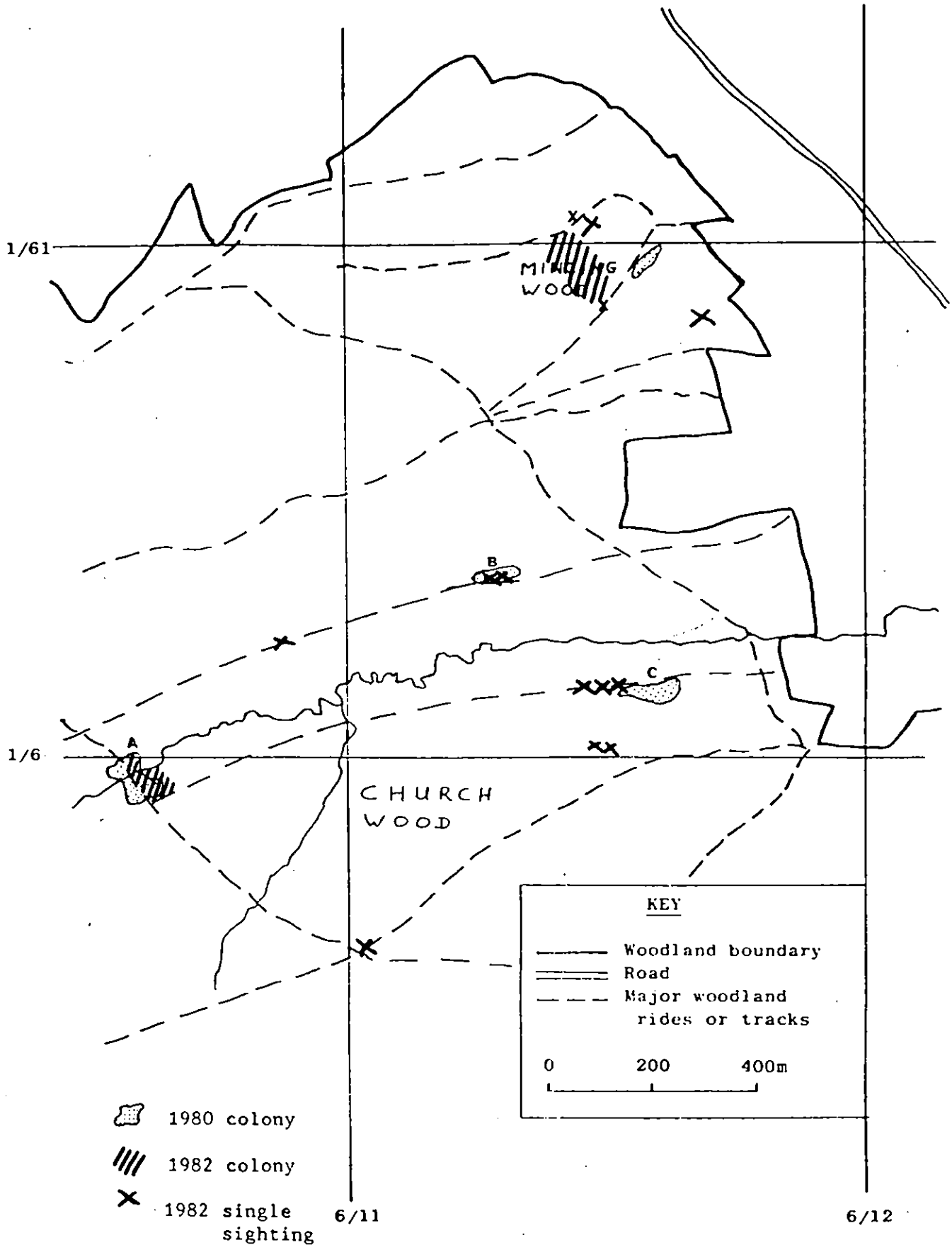

FIG.4 The location of colonies at Church Wood and Mincing Wood (N.N.R.)

K.5 STOCK WOOD
K.6 HOMESTALL WOOD

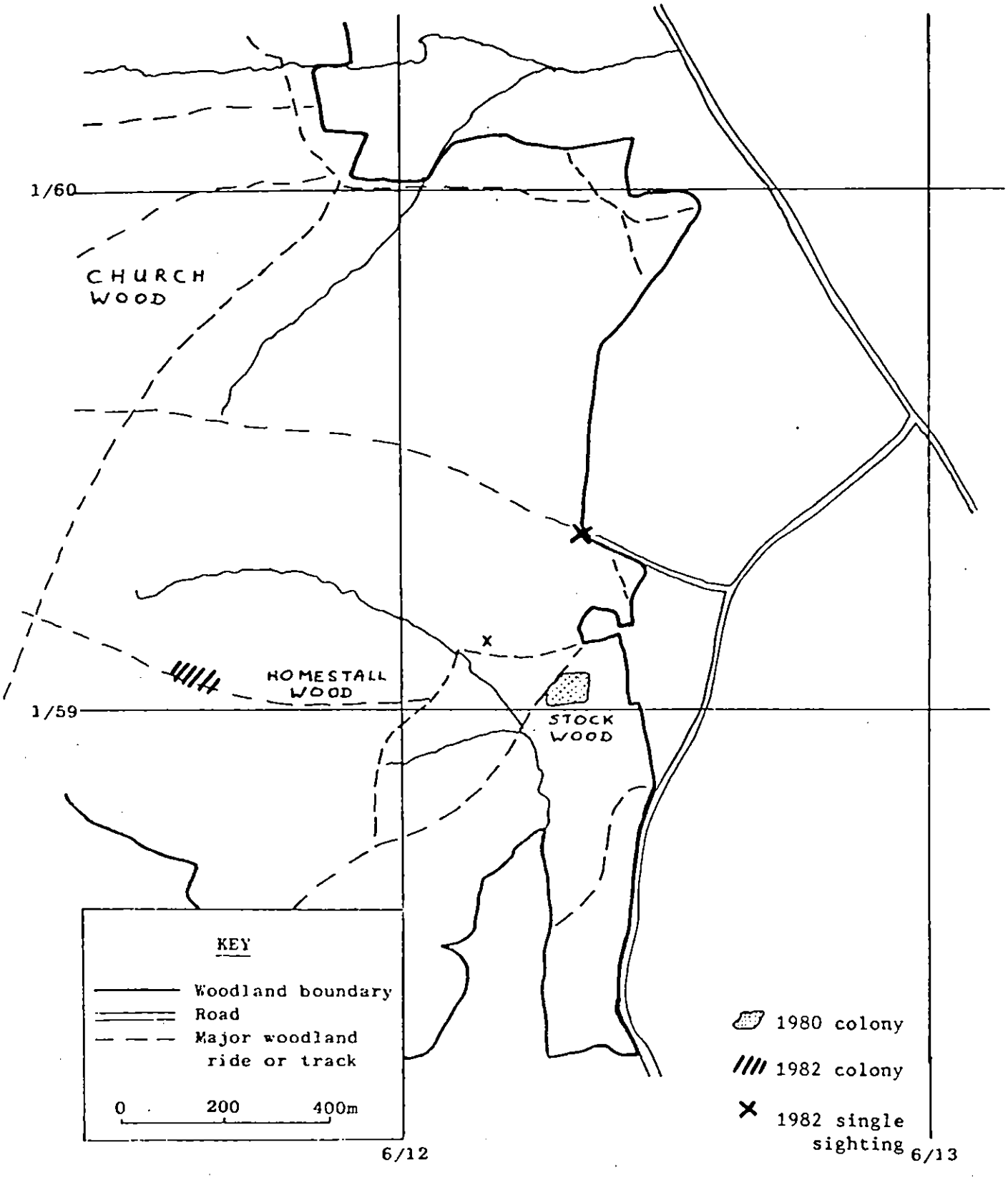

FIG.5 The location of colonies at Homestall Wood and Stock Wood

K.7,8 HONEY WOOD A,B
K.9 SHEAFS WOOD

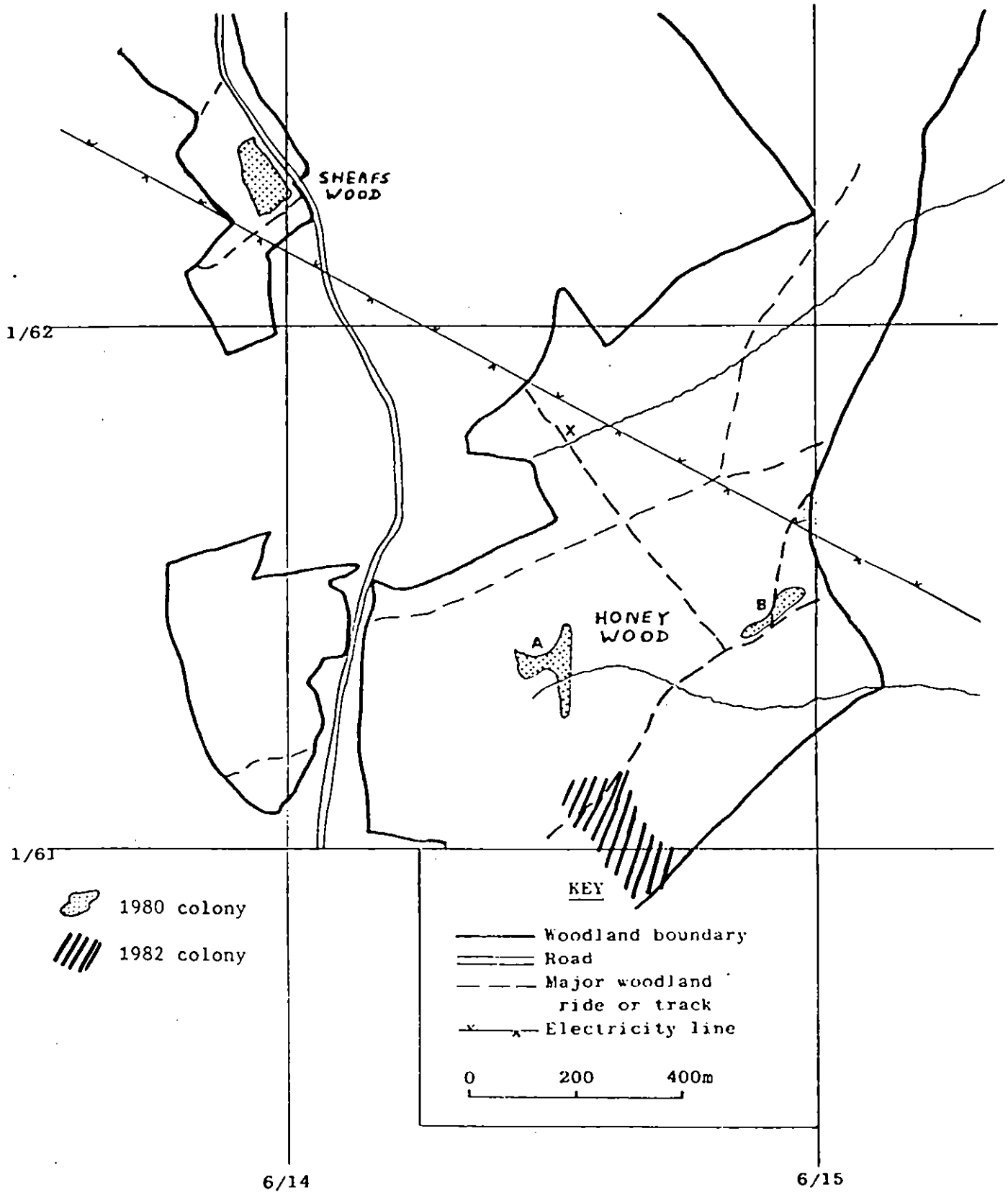

FIG.6 The location of colonies at Honey Wood and Sheafs Wood

K.10 CANE WOOD
K.11-15 THORNDEN WOOD A-E
K.16 SHRUB HILL

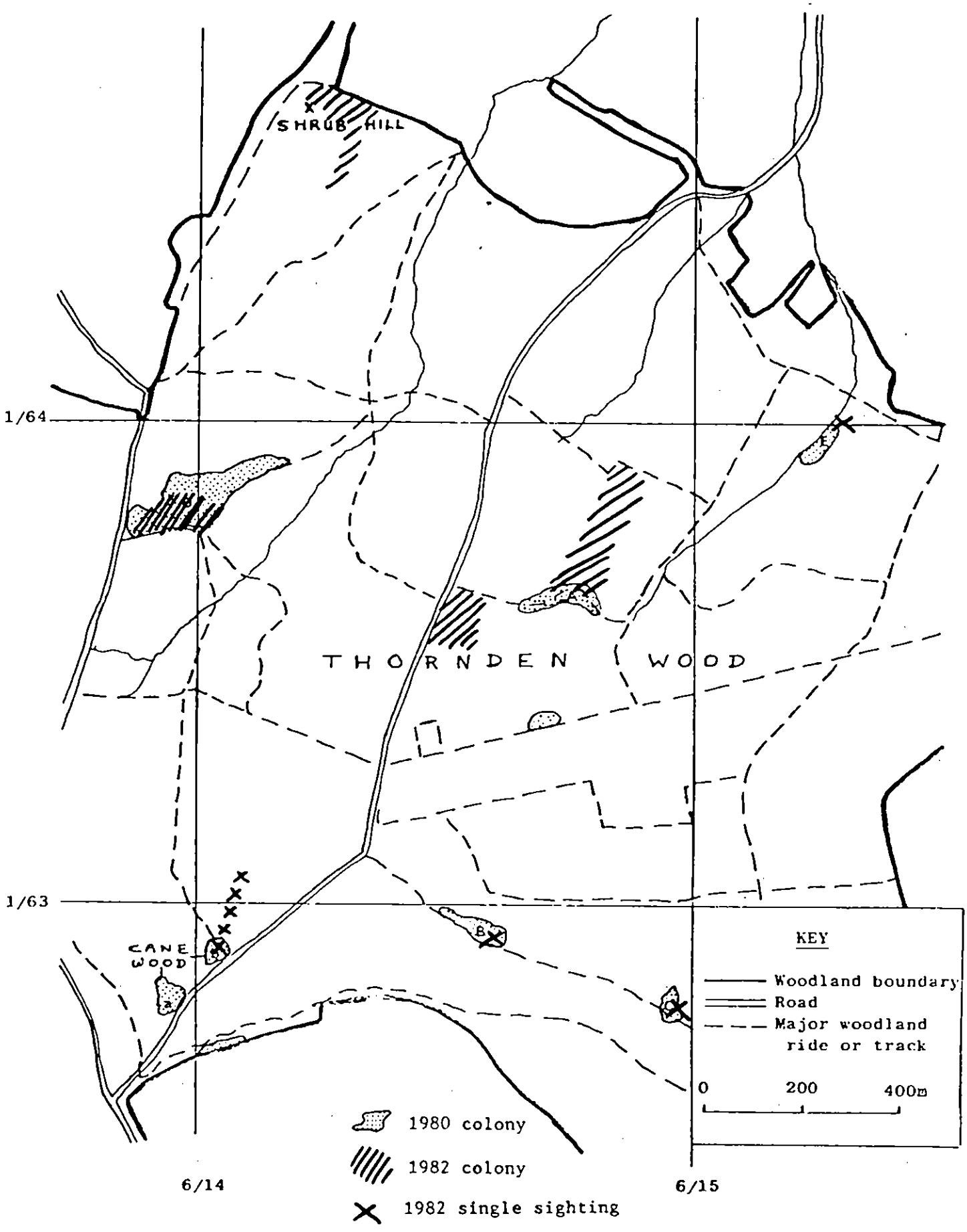

FIG.7 The location of colonies at Cane Wood, Thornden Wood and Shrub Hill

K.17,18 BLAXLAND A,B
K.19 BELCE WOOD
K.20,21 CRIPP'S WOOD
K.22-26 WEST BLEAN WOOD A-E

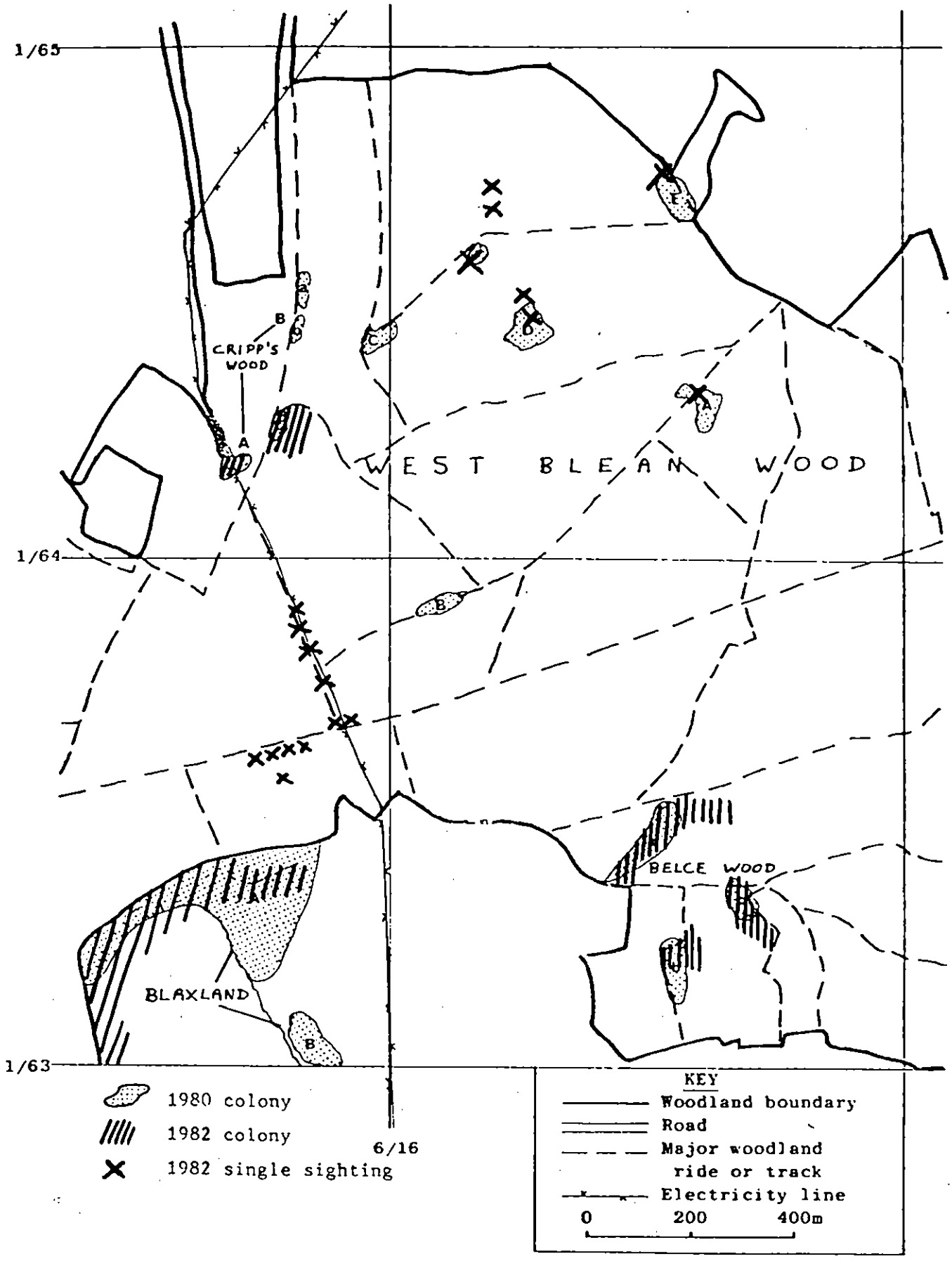

FIG. 8 The location of colonies at Blaxland, Belce Wood, Cripp's Wood and West Blean Wood

K.27 EAST BLEAN WOOD

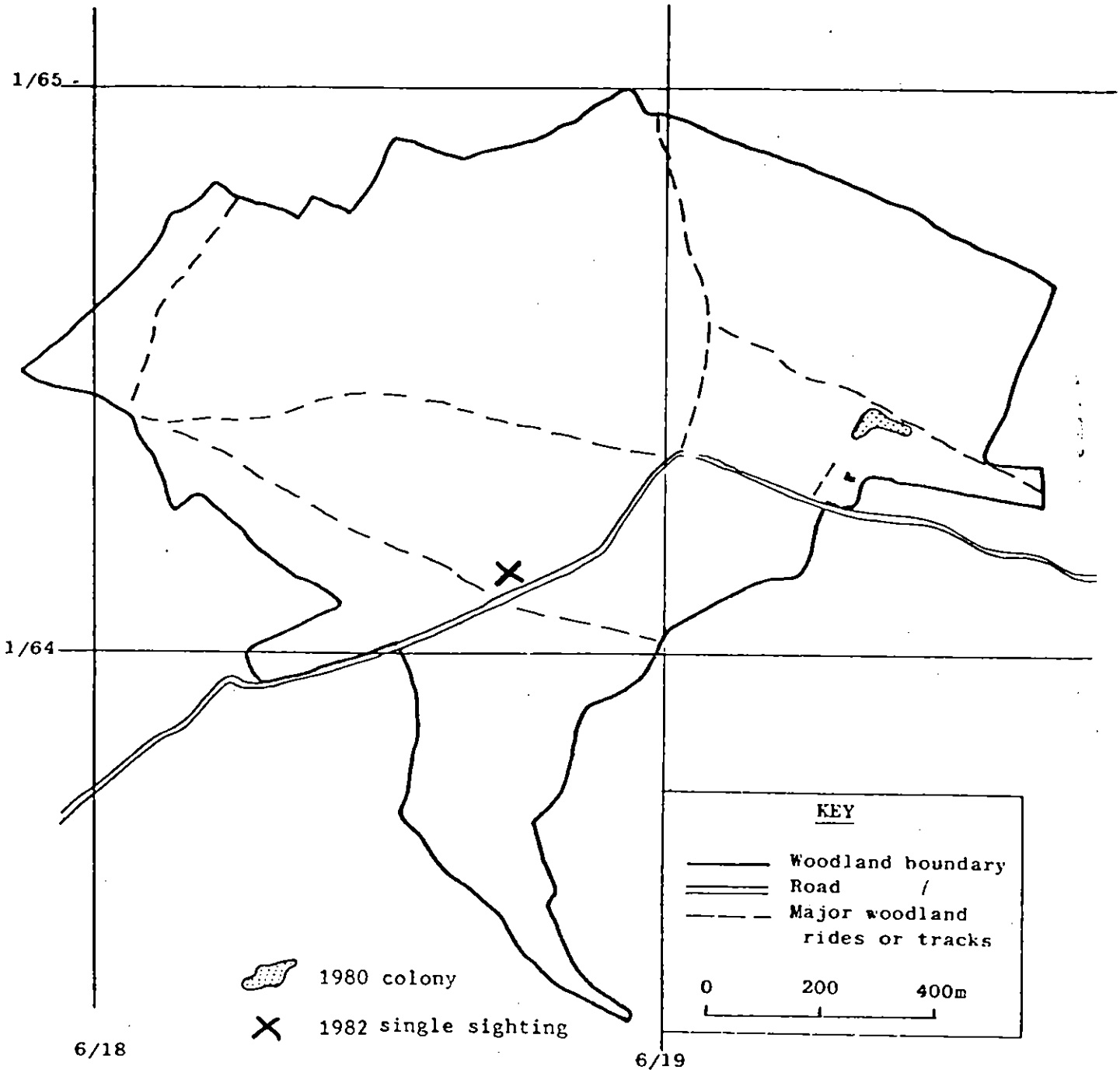

FIG.9 The location of colonies at East Blean Wood