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THE HEATH FRITILLARY BUTTERFLY, *MELLICTA ATHALIA*, IN 1981

Report to the Joint Committee

For The Conservation Of British Insects

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FOREWORD

In 1980, Dr M S Warren and C D Thomas made a thorough survey of the status of the Heath Fritillary butterfly, Mellicta athalia, for the Joint Committee for the Conservation of British Insects. Records were also made of its biology and apparent habitat requirements, and all results and our proposals for its conservation were embodied in a lengthy report which was distributed to all relevant conservation bodies (Warren, Thomas, and Thomas 1981). We found that this butterfly had declined more seriously in commercially managed woodland than had been envisaged, and that attempts to conserve it on two nature reserves had also been unsuccessful because of inadequate management. We were unable to specify exactly how woods should be managed to encourage this species, nevertheless the attempt was made using all available data. However, we considered it a matter of urgency to learn more about the ecology of M.athalia, to resurvey some sites, to acquire more as nature reserves, and to make much greater efforts to manage these to provide a continuity of early successional habitat.

This new survey of M.athalia in 1981 suggests that our very gloomy predictions about its future survival in commercially managed woodland were, if anything, an understatement of the case, and that the time for conservationists to act is now or never. Some progress has been made since 1980 to set against the natural declines: the RSPB have acquired a large area adjoining the NNR in Kent, which contains three colonies and which will be managed sympathetically; The Devon Trust for Nature Conservation is negotiating a management agreement for W. Pinkworthy Wood; H R H Prince of Wales has encouraged NCC to make management plans for the main area of his Greenscombe Wood; Lydford is being rehabilitated prior to a reintroduction; and an introduction is being considered for an apparently suitable wood in Essex. Furthermore, through the great generosity of the Vincent Weir Trust, World Wildlife Fund, and the Entomological Club, funds were available for Dr Warren to study M.athalia from June to

September inclusively in 1981. No attempt was made to repeat the whole survey of 1980, but most sites were covered at some stage in the season, including all in the West Country. Instead, much more penetrating studies were begun on the habitat requirements and biology of M.athalia.

It was considered unnecessary to make as long or complete (or expensive) a report as that for 1980 because few of the basic conclusions have changed and the results of many of the behavioural/habitat studies are not yet fully apparent. This report therefore mostly contains details of the 1981 survey, a reassessment of the rapidity of M.athalia's decline and the urgency of its need for conservation, and additional data on its larval foodplants.

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INTRODUCTION

Most of the fieldwork described in this report was carried out in M.athalia's West Country localities. The Kent sites were not visited until after the peak of the flight period, so observations made by Barry Hill (Warden of the Blean Woods NNR) and Kathy Henderson (Kent Trust for Nature Conservation) there are also included.

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

SITE DETAILS

S.W.1 Greenscombe Wood, Cornwall

M.athalia was again most abundant on the ridge running between the two valleys, although numbers were lower than in 1980. This area is henceforth to be managed to encourage M.athalia. Most adults were found in sub-sites f and j, and in the newly cleared area adjacent to sub-site j. In contrast, sub-sites g, h and i have become overgrown and contained few adults in 1981.

The butterfly monitoring transect which covers the western part of the wood (including the reserve managed by the Cornwall Naturalists Trust) showed that the adult index of abundance fell from 682 in 1980 to 235 in 1981. This decline to about $\frac{1}{3}$ seemed to be similar throughout the wood.

The area south of sub-site j (including sub-site m) was cleared and planted with conifers during the 1980/81 winter. This produced ideal conditions where the larval food-plant Melampyrum pratense was abundant (e.g. adjacent to sub-site j) but apparently affected the butterfly adversely in sub-site m, a Plantago-rich meadow. In 1980 sub-site m contained the highest density of adults but very few were seen there during 1981, even though Plantago was still abundant. The reason for the decline of M.athalia in this area is unclear, but the scrub-cutter used prior to planting cut the vegetation extremely close to the ground, leaving many patches of bare

earth. It is possible, therefore, that a large proportion of larvae may have been destroyed whilst hibernating in the leaf litter.

During the spring of 1981 about 20 larvae were found whilst searching the vegetation along the track leading up to the reserve (sub-site e). 18 of these were feeding on Veronica chamaedrys and only 2 were found on Plantago lanceolata. Later in the year 16 larval masses were found in the wood; 12 of which were feeding on Melampyrum pratense, 2 on Veronica chamaedrys, and 2 on Plantago lanceolata. This confirms that all three food-plants are used in this locality and suggests that Melampyrum is the most important. Most of the larval masses feeding on Melampyrum were found in the newly cleared area adjacent to sub-site j, where large clumps of the food-plant grew amongst very sparse vegetation. However, following a fairly long period of dry weather, many of the food-plants in this area shrivelled and died when the larvae had only reached their second instar. Two larval masses subsequently moved onto nearby Veronica plants, but the larvae from at least eight masses probably died of starvation as no alternative food-plants were available nearby. Only two of the larval masses found on Melampyrum were able to remain feeding solely on this food-plant until they entered hibernation in their early fourth instar. Numerous hibernating larvae were found close to the ground in ones or twos beneath small webs constructed within dead leaves.

S.W.2, 3 Deer Park Wood A and B

Deer Park Wood B was visited on three separate occasions during the flight period (a minimum of 1.5 hours observation) without the sighting of a single adult. The site has now become dominated by rank grasses and appears to be unsuitable. However the conifers are still only about 2 m tall and Plantago lanceolata is still frequent (rank 3) in the ground vegetation. In contrast adult numbers in Deer Park Wood A, which comprises

a similar type of habitat amongst slightly younger conifers, seemed to be roughly the same as in 1980.

The imminent decline of M.athalia on these sites was predicted following our survey in 1980, but the speed with which Deer Park Wood B colony has become extinct shows that habitat suitability in un-managed habitats may deteriorate far more rapidly than expected. Consequently it seems that the Deer Park Wood A colony will probably become extinct within 1 or 2 years. A butterfly monitoring transect has therefore been established so that these changes can be followed more closely.

S.W.4, 5 Greystone and Gunoak Woods, Cornwall

Single adults were seen in both these sites during 1980 but as the habitat appeared quite unsuitable they were not re-visited during 1981.

S.W.6 Lydford, Devon

Only two males were sighted here during 1980 and, as expected, none was recorded during 1981 despite numerous visits. Some small-scale clearance of the encroaching scrub has been carried out in sub-sites a and b, and further clearance should be undertaken during the 1981/82 winter. It is hoped that a re-introduction will then be attempted during the following summer.

S.W.7 West Pinkworthy Wood, Devon

10 adults were seen here on a 1900 m random walk on 7.7.81, which corresponds to an estimated 22.5 sightings per site at the peak of the flight period. It therefore seems that adult numbers had fallen to about $\frac{1}{3}$ since 1980 when the corresponding figure was 61.4 sightings per site. Nearly all the adults seen in 1981 were confined to sub-site b, which is used for growing Christmas trees. Sub-sites c-f are now largely unsuitable for

M.athalia as the conifers have virtually closed over the ground vegetation.

The Devon Trust for Nature Conservation is currently negotiating a lease with the owner of West Pinkworthy Wood and I have written an outline plan for the management of the proposed reserve which is expected to cover sub-sites b, c and d. Briefly, the plan includes the removal of most of the conifers in sub-sites c and d, and the establishment of experimental plots to study the effects of different forms of vegetation management. Sub-site b will remain planted with Christmas trees until these have reached a saleable size when they will be removed but not re-planted. A few rows of trees will be left to provide some shelter. This management plan is intended to maximise the chances of maintaining a colony on the site, but it should be stressed that the area is very small and may not be large enough to support a viable population indefinitely. Nevertheless the attempt at safeguarding the colony seems well worth the effort given the rapid decline of M.athalia in S.W. England.

S.W.8 Aller Coombe, Somerset

Three visits were made to the site in 1981 (a minimum of 7 hours observation) but no adult was seen. It therefore appears that the small colony reported in 1980 may now have become extinct. During that year a few adults were recorded in sub-site c where Melampyrum occurs thinly scattered (rank 2) amongst the heathland vegetation (N.B. Plantago is absent on the site, contrary to the report quoted in the 1980 survey). This is the only colony known to have occurred in a truly heathland habitat and it is possible that other colonies may exist in similar habitats nearby but have so far been overlooked. Members of the Exmoor Natural History have therefore been encouraged to begin a more extensive search of nearby coombes and woodland in the hope of discovering new colonies.

K.1-3 Church Wood A, B and C, Kent

The following records were made during the main part of the adult flight period in Church Wood A (B Hill, pers. comm.):

23/6/81 - 0 seen
1/7/81 - 2 "
6/7/81 - 0 "
13/7/81 - 5 "
14/7/81 - 3 "
16/7/81 - 0 "

In addition the following records were made on a visit late in the season (25/7/81):

Church Wood A - 0 seen/20 mins
Church Wood B - 2 seen/15 mins
Church Wood C - 0 seen/15 mins

Adult numbers in these colonies appear to have been much smaller than in 1980 even though the status of the larval food-plant, Melampyrum, was very similar. All three sites are now fairly overgrown and will probably become unsuitable in another one or two years' time.

A large part of Church Wood, which includes the three M.athalia colonies, has been purchased by the Royal Society for the Protection of Birds since 1980. They hope to manage the wood so as to encourage this species. They also plan to create some new clearings next to the existing colonies during the 1981/82 winter.

K.4 Mincing Wood NNR, Kent

The following records were made during 1981 (B Hill, pers. comm.):-

23/6 - 0 seen
1/7 - 0 "
6/7 - 1 "
7/7 - 2 "
8/7 - 5 "
13/7 - 4 "
14/7 - 2 "
16/7 - 0 "

The site still seems to support a very small colony even though recent management has made much of the habitat very suitable. The size of

the colony is therefore expected to increase in the coming years provided that other factors, such as weather, are favourable.

K.5 Stock Wood, Kent

The coppice on this site is now very tall and the habitat appears to be unsuitable. No adult was seen during a 15-minute search on 25/7/81, but no record is available for the main part of the flight period.

K.6 Homestall Wood, Kent

No record for 1981.

K.7, 8 Honey Wood A and B, Kent

No adult was seen in Honey Wood during a 50-minute search on 29/7/81, but no record is available for the main part of the flight period. Both sites are now fairly overgrown although they still appear to be suitable. In addition, a large area to the West of Honey Wood A has been coppiced during the 1980/81 winter and now provides some apparently highly suitable breeding habitat.

K.9 Sheafs Wood, Kent

This site is now virtually impenetrable and is almost certainly unsuitable. No adult was seen during a 10-minute search on 29/7/81.

K.10 Cane Wood, Kent

The following records were made during 1981 (B Hill, pers. comm.):-

23/6	4	seen
1/7	1	"
7/7	12	"
14/7	10	"
16/7	1	"

In addition 2 adults were seen during a 5-minute search on 27/7/81. The adults were all seen in the small clearings in sub-site a where

Melampyrum is still common (rank 4). The Nature Conservancy Council have a management agreement on this site and some coppicing will take place during the 1981/82 winter. This should encourage the continuation of the colony for the immediate future.

K.11-15 Thornden Wood A-E, Kent

No adult was seen in Thornden Wood A during a 20-minute search on 29/7/81, but no other record is available for the main part of the flight period. Melampyrum is still frequent (rank 3) but the conifers are now 2-3 m tall and the site is getting overgrown.

2 adults were seen in Thornden Wood B during early July (K Henderson, pers. comm.), although none was seen during a 20-minute search of Thornden Wood B and C on 29/7/81. Melampyrum is still common - frequent (rank 3-4) but both sites have become overgrown and only a few clearings remain.

"Some" adults were recorded in Thornden Wood D during early July K Henderson, pers. comm.) and one was seen during a 20-minute search on 25/7/81. The coppice on the site is now 2-4 metres tall and the clearings are small. However Melampyrum is common (rank 4) in a few of the clearings and along the track at the southern margin of the colony. An area of coppice-with-standards has recently been cut adjacent to the site, and although this contained little Melampyrum (rank 1), it may provide some suitable habitat in the next year or two.

No record is available for Thornden Wood E.

K.16 Shrub Hill, Kent

One adult was seen here during a 45-minute search on 25/7/81 (during marginal weather conditions), but no information is available for the main part of the flight period. Melampyrum is still common (rank 4) over much of the site although the ground vegetation is much denser than in 1980 and has

been planted with conifers. The site therefore still appears to be highly suitable, but it is not known whether a breeding population has yet become established.

K.17, 18 Blaxland A and B, Kent

Blaxland A still contained a large colony in 1981, but Melampyrum had declined from being frequent (rank 3) in 1980 to being virtually absent over much of the area. The food-plant is however still scarce - frequent (rank 2-3) along the north and western margins of the cleared area where most adults were seen in 1981. The following adult numbers were recorded in this area (B Hill, pers. comm.):-

2/6	3	seen
10/6	20	"
14/6	15	"
23/6	12	"
1/7	20	"
7/7	60	"
8/7	60 +	"
14/7	20	"

In addition, 3 adults were recorded during a 60-minute search on 30/7/81, and 3 larval masses were found in a 30-minute search along the western margin of the cleared area, where Melampyrum was growing on fairly bare ground.

The decline of this colony seems to have been the result of the ground vegetation becoming very dense over much of the site (following clear-felling in 1978/79), thus causing the sudden depletion of the larval food-plant. It also seems likely that many spring larvae died of starvation during 1981 when Melampyrum failed to appear over a large part of the site. The same fate may await some of the eggs laid along the western margin of the site in 1981, particularly where the vegetation is already fairly dense.

Blaxland B has also become very overgrown and only a few patches of Melampyrum remain. A single adult was seen here during a 15-minute search on 30/7/81, but this may have been a stray from Blaxland A.

K.19 Belce Wood, Kent

A strong colony was again recorded here during early July (K Henderson, pers. comm.). Most adults were found in sub-site a and in some recently cut coppice just to the north. In addition, the following observations were made on 27/7/81:

sub-site a - 7 seen/15 mins
" " b - 0 " /10 mins
" " c - 1 " /15 mins

9 egg masses were found in sub-site a; 7 during a 100-minute search of Melampyrum plants and the neighbouring vegetation, and 2 by observing ovipositing females. Eight of these egg masses were laid on or close to small Melampyrum plants that were growing sparsely (rank 2) along the edge of the young conifer plantation. The remaining egg mass was found on one of the dense patches of Melampyrum (rank 4) growing along the edge of some adjacent deciduous high forest.

The reasons for this apparent selection of small food-plants is unclear, but it may be significant that these were growing amongst very sparse vegetation with much bare ground. However, it seems a curious choice; many of the larvae must have subsequently died of starvation when these exposed food-plants dried out and shrivelled during the dry period towards the end of the summer.

K.20, 21 Cripps Wood A and B, Kent

One adult was seen in Cripps Wood A during a 10-minute search on 28/7/81, but no record is available for the main part of the flight period. The site appears only to be marginally suitable for M.athalia as it has become very overgrown and Melampyrum is rare (rank 1).

In contrast, Cripps Wood B appears to be highly suitable and 7 adults were recorded on 16/7/81 (B Hill, pers. comm.). A single adult was also seen during a 20-minute search on 28/7/81. These butterflies were all

recorded amongst the coppice-with-standards in sub-site c, where Melampyrum is frequent - common (rank 3-4).

K.22-26 West Blean A-E, Kent

The following records were made in West Blean A during 1981 (B Hill, pers. comm.):

10/6 - 1
23/6 - 0
8/7 - 3
12/7 -12

However, none was seen during a 20-minute search on 27/7/81 and the site appears to have deteriorated considerably since 1980.

No adult was seen in West Blean B or C during 10-minute searches on 29/7/81, but no record is available for the main part of the flight period. The clearings in both these sites are now very overgrown, and although Melampyrum is still present, they are only marginally suitable.

A single adult was seen in both West Blean D and E during 15-minute searches on 29/7/81, but no record is available for the main part of the flight period. The status of Melampyrum is similar to 1980 and both sites still appear to be fairly suitable.

K.27 East Blean Wood, Kent

No adult was seen here during a 60-minute search on 27/7/81, but no record is available for the main part of the flight period. The area where adults were recorded in 1980 now appears to be only marginally suitable, although ideal conditions exist elsewhere in the wood (e.g. the recently cut coppice by the road at grid ref 61/188642).

SUMMARY OF M.ATHALIA SITES IN 1981

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

Site Name	1980 size category	Change in habitat suitability since 1981	Adult status 1981
S.W. ENGLAND			
Greenscombe Wood	1	=	Numbers slightly reduced
Deer Park Wood A	2	-?	Similar
" " " B	3	--	Absent
Lydford	4	=	Absent
West Pinkworthy Wood	2	=	Numbers slightly reduced
Aller Coombe	3?	=	Absent
TOTAL COLONIES IN S.W. ENGLAND - 3 (6 in 1980)			
KENT			
Church Wood A	2	-	Numbers greatly reduced
" " B	3	-	Present
" " C	3	-	?
Mincing Wood NNR	4	+	Similar
Stock Wood	3	-	Probably absent
Honey Wood A	3	++	?
" " B	3	-	?
Sheafs Wood	3	--	Probably absent
Cane Wood	3	-	Present
Thornden Wood A	3	-	?
" " B	3	-	Present
" " C	4	-	?
" " D	1	+?	Present
" " E	3	?	?
Shrub Hill	Single sighting	=	? Small colony
Blaxland A	1	--	Numbers greatly reduced
Blaxland B	3	--	Present
Belce Wood	1	=	? Similar
Cripps Wood A	3	-	Present
" " B	3	+	? Similar
West Blean Wood A	3	-	Numbers probably reduced
" " " B	4	-	?
" " " C	4	-	?
" " " D	3	=	Present
" " " E	3	=	Present
East Blean Wood	3	=	?
TOTAL COLONIES IN KENT - 15 + 9? (25 in 1980)			

CONCLUSIONS

The 1981 season was generally very poor for M.athalia and adult numbers were lower in nearly every colony that was analysed. In S.W. England, the total number of colonies has halved since last year and the species now only occurs on three sites. The sites where it has probably become extinct are Aller Coombe (Somerset), Lydford (Devon) and Deer Park Wood B (Cornwall). The extinction of M.athalia on the first two sites was perhaps predictable as they only contained very small populations in 1980; but its loss from Deer Park Wood B was surprising as adults were numerous there in 1980. Food-plant abundance had remained roughly the same on this site and it seems likely that extinction was the result of rapid successional changes which have led to increasing vegetation height and shade. Similar changes will probably lead to the extinction of M.athalia on at least one of the remaining sites (Deer Park Wood A) within the next year or two. The status of the butterfly on the other two sites in S.W. England (Greenscombe Wood and West Pinkworthy Wood) is satisfactory and it is expected that both will be managed at least partially for its conservation in the coming years.

In Kent, the total number of M.athalia colonies was probably similar to 1980, although habitat suitability on many sites appeared to have declined, sometimes considerably. For example, the largest colony in 1980 (Blaxland A) was far smaller this year, probably because the larval food-plant failed to appear over much of the breeding habitat. However, the suitability of a few sites has actually increased since 1980 as a result of recent coppice management.

Many of the changes described above were predicted in last year's report, but the speed at which they have affected M.athalia populations has been much greater than expected. Whilst these changes have been deleterious to the butterfly itself, they have also provided important insights into the effects of habitat management and natural succession. For example, it now

seems that Melampyrum-rich clearings or coppice plots in Kent may only remain suitable for 5 or 6 years and occasionally for as little as 3 or 4 years. Consequently, unless newly cleared areas are colonised extremely quickly, they may never be utilized by M.athalia. The recent increase that has occurred in the size of individual coppice plots in Kent, the longer rotation time, and the overall reduction in the total area of coppice that has resulted in the fragmentation of this woodland, may be a more serious threat to M.athalia than was previously thought.

The declining status of M.athalia in the U.K. therefore continues to be a serious cause for concern and should be closely monitored in the coming years to detect any further changes. This is particularly important as the management of several sites is now under review and may be modified specifically for its conservation. It is also important that the effects of management on existing (and future) nature reserves are examined with respect to M.athalia so that management recommendations can be stated more precisely.

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