



Species Action Plan

Silver-spotted Skipper
Hesperia comma

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This species action plan is an unpublished working document produced to focus and coordinate the conservation of the Silver-spotted Skipper butterfly in the UK over the next five to ten years. It has been prepared under the *Action for Butterflies* project which is funded by WWF-UK, English Nature, the Countryside Council for Wales and Scottish Natural Heritage. The Action Plan was prepared in consultation with the following organisations in the hope that they will participate in the actions outlined: English Nature, National Trust, MAFF, Local Authorities, Wildlife Trusts, and Leeds University.

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Butterfly Conservation (the British Butterfly Conservation Society) has an overriding objective to ensure a future for butterflies, moths and their habitats. In order to achieve this objective its aims are to:

- raise public awareness of the plight of our butterflies and moths and encourage public involvement in conservation.
- halt the decline of butterflies and moths and maintain or improve the present status of threatened species.
- improve the extent and suitability of key lepidoptera habitats and the environmental quality of the countryside as a whole for all lepidoptera species.
- work with and advise other conservation groups, local bodies and agencies on techniques of land management which favour butterflies and moths and related wildlife.
- acquire and manage habitats for butterflies and moths.
- encourage the research (both at amateur and professional levels) on butterflies and moths.
- support and encourage butterfly and moth conservation world-wide.

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Summary

- The Silver-spotted Skipper, *Hesperia comma* is listed in the Red Data Book as a rare species and is protected under the Wildlife and Countryside Act 1981 for sale only. In the UK the Silver-spotted Skipper is currently confined to southern chalk downland in 8-14 centres of population. It requires short, sparse downland turf where it breeds exclusively on Sheeps Fescue, *Festuca ovina*.
- Its status has improved in the last 10 years, although the species remains highly conservation dependent. **High** priority should be afforded to implement this plan though if the species continues to increase we envisage this may drop to a medium priority in the future.
- The main future threats to the butterfly are the wholesale destruction of its habitat; the intrinsic low dispersal capacity of the species in relation to the increasing fragmentation of its habitat, and the dependence of management regimes on Rabbit grazing (where a collapse in the Rabbit population will lead to habitat deterioration). The successful conservation of this species requires the maintenance of large populations and networks of populations (which require networks of habitat patches). The difficulties in maintaining such networks of suitably managed habitat under different conservation ownership are also a threat to this species. Overall climate change and droughts may also constitute a general future threat as this may change the distribution of suitable habitats which the species may then be unable to exploit.
- The broad objectives of the Plan are to maintain populations at all occupied sites or clusters of sites including some strategically placed large populations; restore the UK distribution to the 1940-1950 level and reduce the reliance on Rabbit grazing in habitat maintenance. A longer term objective is to restore the pre 1940 range of butterfly in the UK.
- The objectives of the Plan will be achieved by ensuring that appropriate habitat management is carried out on all sites of the Silver-spotted Skipper, and creation or restoration of suitable habitat to provide diverse conditions within single large sites, and within networks of habitats. The range of the species in the UK will be extended by natural recolonisation into restored habitat near to existing colonies and by strategic introductions where natural recolonisation would not occur (i.e. beyond 5-10km from known colonies). Further research and survey work will be supported and will include the identification of potential unoccupied habitats and research into habitat techniques with less reliance on Rabbits.
- This Action Plan, the conservation of the Silver-spotted Skipper, and how it illustrates the problems of habitat fragmentation in the UK will be publicised. Funds will be sought to ensure that the proposed strategy can be accomplished.

- The Action Plan embodies 1) the concept that management for the Silver-spotted Skipper should be integrated with the needs of other calcicolous species especially warmth-loving fauna and flora characteristic of short sparse turf, and 2) that an Action Plan should be developed for this biotope.
- The Action Plan covers the next ten years, will be monitored annually and reviewed in 2000 or such earlier time as the situation demands.

Part 1 Overview

1.1 PRIORITY STATEMENT

The Silver-spotted Skipper is included in the British Red Data Book of Insects (Shirt 1987) as a rare species (i.e. as it occurred in less than 15-ten km squares at the time of inclusion). Its range has declined by more than 50% in the last 35-40 years (Thomas *et al.*, 1986; Warren *et al.*, in prep.), and is now confined to between eight and fourteen centres of population in the UK (see Appendix 2). Its status has improved in the last ten years, due to increased grazing levels on its grassland habitat following the recovery of Rabbit populations and improved conservation management. However the Silver-spotted Skipper is still a species that is highly conservation dependent although the level of threat to its existence has receded over the last decade. **High** priority should currently be afforded to conservation action to increase the size, number and security of Silver-spotted Skipper colonies in the UK. If the species continues to increase in the next five years, we envisage that a **medium** priority will be given to its conservation action in the future.

1.2 BROAD OBJECTIVES

1. Maintain populations at all occupied sites or clusters of sites including some strategically placed large populations.
2. Restore UK distribution to 1940-1950 level (see Appendix 1).
3. Reduce reliance on Rabbit grazing in habitat maintenance.
4. Long term objective of restoring pre 1940 former range.

1.3 LEGAL STATUS

The Silver-spotted Skipper has minimal legal protection being listed under schedule 5 of the 1981 Wildlife and Countryside Act sale only.

1.4

The Status and Level of Biological Knowledge

Population	-size	Represented in the UK by 8-14 population centres.
	-trend, numbers	Reduced to 9-10 refuge regions by 1982. Has expanded in some areas since 1980 and the number of habitat patches occupied on the South and North Downs has increased by 30%.
	-trend, range	Declining (>50% in the last 35-40 years); recent slight recovery attributed to increased stock and Rabbit grazing.
Knowledge of	-status	Good.
	-trends	Good in the south-east.
	-conservation requirements	Good, but little is known about some ecological aspects e.g. the immature stages of the species and the parasitoids of all stages.

Part 2 Biological Assessment

2.1 INTRODUCTION

The Silver-spotted Skipper, *Hesperia comma* is restricted to calcicolous grasslands, where its larvae feed on Sheep's Fescue, *Festuca ovina*. It is a widespread but local insect in central and southern Europe, and was once widely distributed on most of the limestone outcrops in the southern half of Britain. At least three different forms of the Silver-spotted Skipper have been recognised across its range (Higgins and Riley, 1970). These include the form that occurs in Britain and over central and southern Europe; a darker form that occurs in the Arctic, and a form that occurs in N Africa where the butterfly has brighter markings to its upper wings.

2.2 ECOLOGY

In Britain, the Silver-spotted Skipper is restricted to calcicolous grassland, where it breeds solely on Sheep's Fescue grass, *Festuca ovina*. It is therefore a species that has a strong affinity with the NVC community type CG1 - *Festuca ovina* - *Carlina vulgaris*: warm temperate limestone grassland (Rodwell, 1982-1989). The eggs are laid in grassland where there is some short turf, typically on small tussocks of grass growing adjacent to patches of bare ground, (Thomas *et al.*, 1986). Most sites occur on steep, south facing slopes with thin soils (Heath *et al.*, 1984). The butterfly selects/requires extremely warm micro-habitats, probably because of the high thermal requirements of the larvae and, to a lesser extent, the adults (Warren & Thomas, 1993 & in press). In hot years there is some evidence that optimum habitats shift to slightly longer turf and cooler slopes (i.e. west or even slightly north facing). Thus some habitat diversity is desirable and may be vital for long term survival of the species.

The butterfly is univoltine typically flying between late July and early September. Eggs are laid singly on leaf-blades of Sheep's Fescue or occasionally on adjacent plants in August or September and overwinter (Thomas *et al.*, 1986). Females show a high degree of selectivity when ovipositing and many growth forms of the foodplant are completely ignored. The preferred sites are small plants in short grazed turf (up to 4cm) usually situated close to a patch of bare ground in a small hollow (Thomas *et al.*, 1986). Studies have shown that the butterfly avoids foodplants that have been heavily nibbled by grazing animals, especially Rabbits *Oryctolagus cuniculus* L.. It thus prefers to lay in areas that have been heavily grazed, but have been ungrazed for a month or more before the flight period. Egg numbers tend to be far higher in areas that are stock grazed in spring, compared to those grazed during mid-summer (July and August) (Thomas and Warren, 1993 & in press). It is common to find small clusters of eggs on an ideal plant in a flourishing colony because separate females choose the same plants repeatedly. The butterfly is characteristically found on heavily grazed sites where considerable numbers of

eggs might be consumed by grazing animals if these are present during autumn and winter months. However this aspect is poorly researched and as eggs become dislodged very easily, the mortalities may be small. Nothing is yet known about egg parasites, predators or mortality rates. Egg parasites are currently being studied by C.D. Thomas and co-workers at Leeds University; substantial rates of *Trichogramma* parasitism have been found at one of the sample sites (Beacon Hill) (*pers. comm.* C.D. Thomas).

The larva hatches during March and, unlike most butterfly larvae does not feed on the empty eggshell. It immediately spins a selection of fine leaf-blades together to form a small tent-like construction. Although this is usually inhabited by a single larva, up to four have been found together (Emmet & Heath, 1990). Camouflaged in this way, the larvae are very difficult to find in the wild (Thomas 1986). Little is known about the behaviour of the larvae, and their parasites or predators. The larval stage lasts 14-15 weeks, followed by the pupal stage that may last between 10-14 days (Emmet & Heath 1990).

Adult males emerge first and can reach large numbers before a single adult female is seen. Males are more commonly seen than females due to behavioural differences, but there is no evidence that sex ratios are unequal.

Individuals are usually inactive below 20°C and are seldom seen on overcast days. Adults spend the majority of their time feeding or basking in warm, sheltered spots. A wide range of nectar plants are used by adults and no specific preference has been found. Females follow a very distinct behaviour pattern when ovipositing. A fertilised female usually searches for a patch of bare ground, e.g. a hoof-print or Rabbit scrape, and often alights in the middle. She walks to the edge of the patch and meticulously “tastes” the perimeter plants with her forelegs. Ova are carefully placed on suitable plants. This behaviour is temperature dependent in that females may lay straight on plants in very hot weather.

The Silver-spotted Skipper is a species that is highly dependent upon very close-cropped turf. Any domestic stock can produce suitable conditions, but many occupied sites are being grazed by Rabbits alone. In the past the decline in Rabbit numbers led to a dramatic loss of butterfly colonies; in contrast, on a local level given extreme circumstances (especially hot, dry summers) Rabbit pressure can be damaging and colonies can be grazed out, especially on thin soils. It appears therefore that future habitat creation and management for the Silver-spotted Skipper should not rely so heavily on Rabbits, (which are relatively uncontrollable), but instead on more precise forms of management (e.g. domestic animals), although this may incur extra costs initially.

2.3 DISTRIBUTION AND POPULATION

Distribution

The Silver-spotted Skipper is widely distributed from North Africa throughout Europe to the Arctic and eastwards through northern Asia to China and Japan; it occurs in a number of subspecies in North America. The butterfly is widespread in central/southern Europe (Bretherton 1966). Here it can often be found in more overgrown areas than in Britain, although it still shows a preference for warm, calcicolous sites. It does not occur in Ireland.

The Silver-spotted Skipper was formerly very widely distributed but local on calcicolous soils in the UK throughout southern and eastern England and even extended up to Yorkshire (it has never been recorded in Wales, Scotland or N.Ireland). Ploughing of unimproved grasslands and a reduction in stocking with domestic animals led to a gradual decline of the Silver-spotted Skipper in England in the first half of the century, with a retraction southwards. However grazing by previously introduced wild Rabbits ensured that much of the remaining downland did not become overgrown, and the Silver-spotted Skipper survived throughout the southern chalk. When calcicolous grasslands became overgrown following the elimination of Rabbits by myxomatosis in the mid-1950s, the butterfly declined to 46 or fewer refuge localities in 10 regions (Thomas *et al.* 1986). It persisted only where domestic grazing continued, or where the soil had been so skeletal that succession was very slow (Thomas *et al.*, 1986). In south-east England, the Silver-spotted Skipper survived at either end of two ranges of chalk hills, the north and south Downs (see Appendix 1).

Re-introduction of domestic livestock by conservation managers and a gradual recovery of Rabbits during the 1970s and 1980s (Trout *et al.*, 1986; Trout & Tittensor, 1989) has since restored habitat quality to at least 144 habitat patches (varying in size from 0.01ha to several ha) in south-east England, but recolonisation by the butterfly has been limited (Thomas & Jones, 1993). Only six recolonisations were documented up to 1982, and a further 29 took place between 1982 and 1991. Although the number of habitat patches occupied by the Silver-spotted Skipper increased by 30% during this nine year period, over 100 patches of apparently suitable habitat remained unoccupied in 1991. Currently some sites are becoming too heavily grazed by Rabbits and butterfly populations are declining locally.

Its present distribution in the UK, with the exception of one possible site in Somerset, is restricted to a few isolated areas of chalk, and between eight and fourteen centres of population. The number of centres varies according to how exactly “a population centre” is defined which is particularly difficult for the Silver-spotted Skipper. Current information on its dispersal ability suggests that sites are more or less isolated if separated by at least 10km or more of unoccupied land (Thomas & Jones, 1993). On this basis, its main centres of distribution are the North Downs of Surrey, Dorset/W.Hants Downs, east

Hants Downs, east Kent (part of North Downs), east Sussex (part of South Downs), and the southern Chilterns (C. D. Thomas *pers. comm.*). A large number of existing and potential habitats are existing SSSIs and many are in conservation ownership (e.g. National Trust, NNR). For details see Appendices 2 & 3.

Population Dynamics

Research has shown that exchange of individuals between Silver-spotted Skipper colonies does occur and small areas of unsuitable habitat do not act as barriers (Thomas *et al.*, 1986). The butterfly often colonises new sites within 1km of the source population and sometimes colonises sites up to 8.5 km distant, as occurred in the late 1980s (Thomas & Jones 1993).

However, mark-recapture data gathered in 1994 show that small local populations have high immigration and emigration rates, and cannot therefore be regarded as self-sustaining 'colonies' (J.K. Hill, C.D. Thomas and O.T. Lewis, unpublished). From this observation it can be inferred that the number of true separate Silver-spotted Skipper populations is considerably less than the number of habitat patches which support the butterfly.

2.4 LIMITING FACTORS

Historical

Wholesale destruction of chalk grassland by agricultural improvement.

Lack of grazing/abandonment of calcicolous grassland (caused by a decline in stock grazing and reduction of Rabbits following myxomatosis).

Possible Current and Future Limiting Factors

Wholesale habitat destruction.

Possible threat from further decline in Rabbit population. It appears that Rabbit viral haemorrhagic disease (VHD) is unlikely to cause the sorts of decline in wild Rabbit numbers caused by myxomatosis (as immunity is likely to be built up quickly). However if a collapse in the Rabbit population happens from some other factor, the current lack of a domestic grazing infrastructure in many existing habitats will lead to habitat deterioration and possibly local extinction.

Possible local threat from excessive grazing by Rabbits following their recovery from myxomatosis.

Increasing fragmentation and isolation of sites.

Changing management and local extinctions largely caused by habitat change, small patch size and isolation makes it difficult to maintain large populations.

Difficulties in maintaining networks of suitably managed habitats under different conservation ownership.

Climate change/droughts could change distribution of suitable habitats and could lead to decline unless the species is able to exploit this.

Intrinsic dispersal capacity of Silver-spotted Skippers in relation to fragmentation of habitat (leaving some existing suitable habitat unoccupied).

2.5 RESUME OF CONSERVATION TO DATE

The Silver-spotted Skipper has been well studied both at an ecological and population level in recent years. This is a result of work carried out by Jeremy and Chris Thomas and co-workers (Thomas *et al.*, 1986; Thomas and Jones, 1993; Warren & Thomas 1993 & in press).

From 1950 to the mid 1970s the Silver-spotted Skipper underwent a particularly rapid decline. In response to its alarming disappearance, the Joint Committee for the Conservation of British Insects chose it for its annual butterfly survey in 1982. All post-1960 localities and many former sites and other areas that appeared suitable were examined, and it is believed that virtually all the existing colonies were found. It was sometimes difficult to determine the exact boundaries between adjoining sites, but a subjective division gave 53 colonies of this butterfly in 33 more or less discrete localities. Ten of these were large, but over half of the colonies were very small (Thomas *et al.*, 1986).

Subsequent studies on the UK population have monitored not only the increase in patch occupancy by the butterfly but have also studied the detailed dynamics of the populations, including the species recolonisation ability (or lack of recolonisation) and role of refuges. The importance of habitat management has been established as a priority for the butterfly's conservation (BUTT 1986; Warren & Thomas, 1993). It is now reasonably clear what vegetation structure to aim for in the management of grassland for this species

and how to achieve this by stock grazing. There is however uncertainty as to the best way of maintaining suitable habitat on some sites which currently rely on Rabbit grazing, which is unpredictable.

More recently, there has been a recognition of the importance of sustaining metapopulations in extensive networks of habitat patches to encourage the long-term conservation of the Silver-spotted Skipper. The most recent research carried out by Chris Thomas and co-workers has shown that the rate of emigration out of areas of <5 hectares may be too high for small isolated populations to survive (Hill, Thomas and Lewis, unpublished). This work emphasises the need for networks of suitable habitat where at least some of the habitat patches are large. A preliminary study of genetic variation of populations (source and natural colonisations) on the East Sussex and East Hampshire Downs indicate that English Silver-spotted Skipper populations are quite similar to each other in their genetic diversity (Mallet, Brookes, Rose and Thomas unpublished).

Many of the large and medium Silver-spotted Skipper populations are located on SSSIs; and much habitat with potential for colonisation or re-introduction are SSSIs. The major owners of large sites are the National Trust, Local County Council, or private. (For details see Appendix 3).

Currently conservation management is being implemented on several nature reserves and SSSIs, many with good monitoring procedures. Research on the genetics and metapopulation structure of the species continues to be conducted by Dr C.D. Thomas of Leeds University and Dr J Mallet of University College, London. Other local studies are being conducted by members of Butterfly Conservation (e.g. on the North Downs where the relationship with Rabbit grazing is being studied).

The important message that is emerging from current research on the Silver-spotted Skipper is that their habitats are dynamic. In the longer term, potential habitats for the butterfly are as important as existing habitats since populations of the butterfly may have to move location in the future due to such factors as climate change and drought.

Part 3 Actions and Work Programme

**Organisation(s)
primarily
responsible**

This section has been divided into the standard headings Policy and Legislative; Site Safeguard and Acquisition; Land Management; Species Protection and Licensing; Advisory; International; Future Research and Monitoring; Communications and Publicity; Review. Actions are given a low, medium or high priority. The lead organisation(s) concerned for each action is/are named.

3.1 POLICY AND LEGISLATIVE

Action 1 PRIORITY: HIGH

Promote beneficial land management on existing and potential habitats by including appropriate prescriptions in selected ESAs, Countryside Stewardship, Reserves Enhancement Scheme etc.

**MAFF,
CoCo, EN
etc.**

3.2 SITE SAFEGUARD AND ACQUISITION

Action 2 PRIORITY: HIGH

Protect all known sites and large potential habitats in post 1940 range through management agreements; and reserve acquisition where management agreements fail.

All

3.3 LAND MANAGEMENT

Action 3 PRIORITY: HIGH

Negotiate suitable management agreements on all SSSIs and ESAs with colonies, and potential habitats within post 1940 range.

All

Action 4 PRIORITY: HIGH

Encourage suitable grazing regimes and Rabbit control/management on all existing sites. **All**

Action 5 PRIORITY: HIGH

A. Manage all large populations to maintain population size, which can act as refuges and sources of colonisation. **All**

B. Where very large populations do not exist, maintain networks of smaller habitats. **All**

Action 6 PRIORITY: HIGH

Restore habitats of realistic potential within former range, by scrub removal and reinstatement of appropriate grazing regimes within 10-20km of existing populations. **All**

Action 7 PRIORITY: LOW/MEDIUM

Restore habitats of realistic potential within pre 1950 range, by scrub removal and reinstatement of appropriate grazing regimes on sites further than 20km from existing populations. **All**

Action 8 PRIORITY: MEDIUM

Integrate management on Silver-spotted Skipper sites with the needs of other calcicolous grassland species especially warmth-loving fauna and flora characteristic of short sparse turf, and develop an overall Action Plan for this biotope. **All**

3.4 SPECIES MANAGEMENT AND PROTECTION

Action 9 PRIORITY: LOW

Conduct strategic reintroductions into extensive areas of restored habitats, if natural colonisation is improbable. **BC, Leeds Univ., Chris Thomas**

3.5 ADVISORY

Action 10 PRIORITY: MEDIUM

Advise land management agencies and site owners/managers on practical habitat management for the Silver-spotted Skipper. **BC etc.**

Action 11 PRIORITY: MEDIUM

Produce simple information on habitat management for Silver-spotted Skippers and other downland species. **BC + others**

3.6 INTERNATIONAL

No Actions proposed

3.7 FUTURE RESEARCH, SURVEY AND MONITORING

Action 12 PRIORITY: MEDIUM

Continue existing butterfly monitoring transects on Silver-spotted Skipper sites. **BC, ITE, NT**

Action 13 PRIORITY: MEDIUM

Collate transect data annually and ensure annual monitoring of all large/medium colonies using standard transects with refined requirements (i.e. above 21⁰C, sunny, zero to light wind). **BC, ITE, NT**

Action 14 PRIORITY: HIGH

Identify potentially suitable, unoccupied habitats within 10-20km of existing populations. **BC, Leeds Univ., Chris Thomas**

Action 15 PRIORITY: LOW

Identify suitable unoccupied habitats in former range greater than 20km from existing populations.

BC, Leeds Univ., Chris Thomas

Action 16 PRIORITY: LOW

Investigate the creation of new habitat from thin soil slopes which have been ploughed (e.g. ex-farmland/set aside), especially close to existing colonies.

BC, ITE

Action 17 PRIORITY: HIGH

Monitor the effect of different management on egg laying sites and skipper density, in order to ascertain appropriate conservation techniques.

EN, BC, ITE

Action 18 PRIORITY: LOW

Investigate genetic variation.

BC, James Mallet, Chris Thomas

Action 19 PRIORITY: MEDIUM

Investigate the effect of habitat loss and isolation of colonies on population viability.

BC, Chris Thomas

Action 20 PRIORITY: LOW

Investigate Rabbit VHD and possible/actual effects on Silver-spotted Skipper habitats.

MAFF etc.

Action 21 PRIORITY: HIGH

Monitor Rabbit populations at sites where Rabbits are the sole or primary grazing animals and clarify the extent to which Silver-spotted Skipper habitats can be maintained by Rabbits.

NT, BC

Action 22 PRIORITY: HIGH

Conduct surveys of all colonies and potential habitat every 5-10 years.

**BC, Chris
Thomas**

Action 23 PRIORITY: MEDIUM

Research into the immature life stages in the wild

**Chris
Thomas, BC**

3.7 COMMUNICATIONS AND PUBLICITY

Action 24 PRIORITY: HIGH

Publicise this Action Plan, the status of the Silver-spotted Skipper and measures needed to conserve it.

All

Action 25 PRIORITY: LOW

Publicise how the Silver-spotted Skipper illustrates the problems of habitat fragmentation in the UK.

All

Action 26 PRIORITY: HIGH

Advise land management agencies (e.g. MAFF) on locations of all areas covered by Actions 2 and 3.

BC, EN

3.8 REVIEW

Action 27 PRIORITY: HIGH

Review this Action Plan annually and update in five years.

EN, BC

Key to Abbreviations

All - All organisations listed

BC - Butterfly Conservation

CoCo - Countryside Commission

EN - English Nature

ITE - Institute of Terrestrial Ecology

JNCC - Joint Nature Conservation Committee

MAFF - Ministry of Agriculture, Food and Fisheries

NT - National Trust

WT - Wildlife Trust

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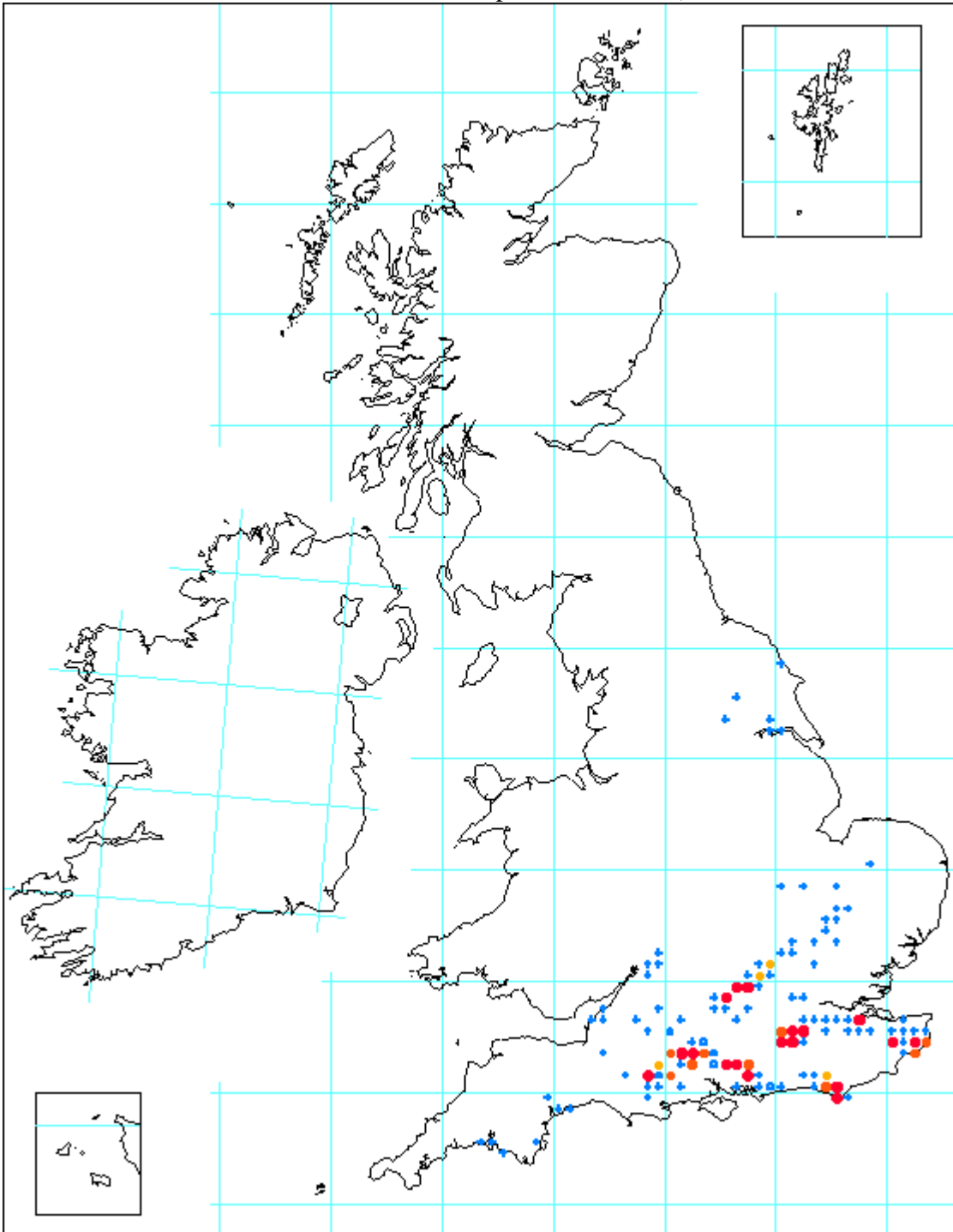
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Appendix 1 The Current Distribution of the Silver-spotted Skipper in the UK.

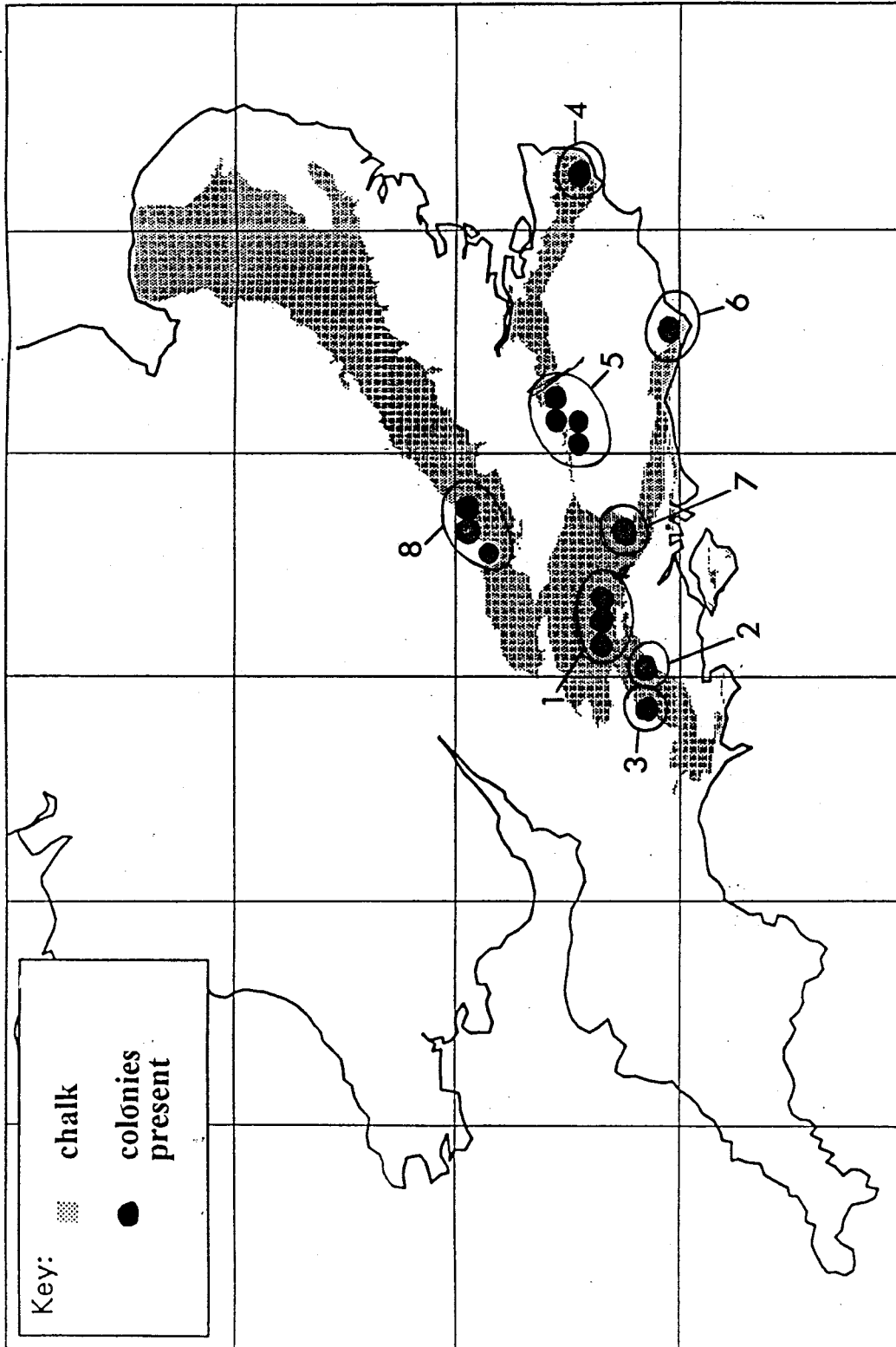
Butterflies for the New Millennium project (2001).

Copyright of Butterfly Conservation/Biological Records Centre.

(Dark full spot all records from 1995-1999; open circles all records between 1970-1982; cross all pre 1970 records).



Appendix 2 The Main Centres of Population of the Silver-spotted Skipper (G. Jeffcoate & C. D. Thomas *pers.comm.*).



Appendix 3 Details Of The Main Centres Of Population (C.D. Thomas, *pers. comm.*)

Key to Table: (location numbers) refer to areas defined in Appendix 2; NT = National Trust; EN = English Nature; NNR = National Nature Reserve.

Dorset/W Hants Downs (1)	>1000 (1982)	3+ (1990)	2	1 NT; 1 Chemical & Biological Defence Establishment.	These were previously regarded as isolated populations. They could therefore be regarded as two major population units; colonisation of at least one site between the two, by 1990, may provide linkage to one metapopulation.
Dorset/ W Hants Downs(2)	>1000 (1982)	1+ (1982)	0 in 1982, possibly one now.	Unknown	
Dorset/W Hants Downs (3)	>1000	1 (1992)	1 (1982)	NT (Dorset Trust Reserve)	Further colonisation of sites in Hampshire , Wiltshire and Dorset could eventually reunite area 1 to area 3 sites, and possibly even the East Hants sites (7). No survey of this area was carried out in 1991, so information on recovery in the area is sparse.

Location of Main Centre Of Metapopulation	Total Pop Size	No. Local Pops	No. Local Pops >1000	Ownership Of Local Pops > 1000	Comments
East Kent (4)	>1,000	3 (1991)	1 or 2	Kent Trust For Nature Conservation.	
Surrey (5)	>10,000	51 (1991)	Few if any	Most large pops NT.	A lot of occupied habitat patches are very small (< 0.5 ha)
East Sussex (6)	>10,000	21 (1991)	Probably 4	2 private;, 1 NT; 1 Eastbourne City.	Many occupied patches are very small (<0.5ha).
East Hampshire (7)	>1000	4 (1991)	2	Both are NNRs owned by EN.	
Chilterns (8)	>10000	9+ (1982)	4+	1 NNR(EN); I NT	The Chilterns area could reasonably have been split into two groups or metapopulations in 1982, a NE and SW group of sites. There is however no recent information on recovery since then, and for the purposes of this analysis they have been lumped as one metapopulation with two main clusters of sites.