



Butterfly
Conservation

Saving butterflies, moths and their habitats

Conservation Review

2000-2008



Acknowledgements

Volunteers

All of the projects described here rely on the contributions of a small army of volunteers, co-ordinated by our network of 31 Branches around the UK. We owe these volunteers a huge debt of gratitude not only for their time and commitment but also for their expertise and enthusiasm. We have calculated that over 10,000 people are helping in our fight to halt the widespread decline in butterflies and moths, who between them contribute over 80,000 days of their valuable time which is the equivalent of 380 full time staff. This is valued at over £5.4 million of voluntary effort every year.

Partners

Each project within this report has specific acknowledgements but the report and our work would not have been possible without the significant support of the national Government Agencies and their nominated officers: Natural England (David Sheppard), Countryside Council for Wales (Adrian Fowles), Scottish Natural Heritage (Chris Sydes) and Northern Ireland Environment Agency (Richard Weyl).



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Introduction



Orange-tip Anthocharis cardamines
(Robert Thompson)

Butterfly Conservation was founded in 1968 in response to a growing awareness of the plight of butterflies and moths during the post-war period. Since then, it has developed a wide range of projects that are helping us understand the problems facing butterflies and moths as well as achieving practical conservation on the ground.



Butterfly Conservation volunteers contribute the equivalent of £5.4 million of effort to conservation every year. (John Davis)

This review celebrates the charity's 40th anniversary by summarising some of our key conservation projects around the UK and Europe. They range from national recording and monitoring schemes, which are some of the largest of their kind anywhere in the world, to action programmes for threatened species and public involvement projects.

The review shows that our work on butterflies and moths is more important than ever. Five of our 60 resident butterfly species have become extinct and over three-quarters have declined over the last two decades (see page 6-7). Almost half of our butterflies are considered to be threatened. The story is similar for moths, where overall numbers of common species have dropped by one-third over the last 35 years, while two-thirds are declining (see page 8).



The extinction of the Large Blue Maculinea arion in 1979 epitomises the loss of butterflies while its successful re-establishment over the last two decades is a flagship for successful conservation. (Martin Warren)

There is good evidence that the declines in butterflies and moths are greater than for other well-known groups such as birds and plants. If their decline is representative of other insects, which seems likely, then this

signals a greater loss of biodiversity than previously thought. Moreover, it means that measures to conserve them will make a major contribution to halting the loss of all terrestrial biodiversity.

Butterflies and moths are also important because they provide us with an early warning of changes to other less well-known wildlife groups and they are valuable indicators of the health of the environment. We are therefore delighted that the UK government has adopted butterflies as indicators both at UK level and in several constituent countries (page 10-11). We hope that they will soon be adopted at EU level and be used to assess the target of halting biodiversity loss by 2010.

A key element of Butterfly Conservation's strategy is to conserve butterflies and moths at the landscape scale. This is vital not only to reduce the impact of decades of habitat loss and fragmentation, but also to allow species a chance to adapt to the new threat of climate change and ensure their long-term survival. Many examples of successful landscape scale projects are highlighted in this review.

While we celebrate our achievements, we are aware that the pressures on our environment are growing every year and we need to maintain and increase our efforts. However, in our first 40 years we have pioneered many projects to help achieve our goal of a countryside rich in butterflies and moths, and a healthier environment in which we all can live.

A handwritten signature in blue ink that reads "Martin Warren".

Dr Martin Warren
Chief Executive,
Butterfly Conservation

Scarlet Tiger Callimorpha dominula
(Robert Thompson)

Without knowing where species and habitats are, biodiversity conservation is almost impossible. For this reason, distribution records are the foundation for almost all our efforts to conserve butterflies and moths.

Recording and monitoring



Butterfly recording for conservation



Pearl-bordered Fritillary. (Robert Thompson)

The backbone of the scheme is a network of local co-ordinators, expert volunteers who take responsibility for the collation, verification and computerisation of butterfly distribution records in their county. Through this network, thousands of recorders and hundreds of organisations contribute their butterfly observations to the BNM scheme. Their data are used widely for biodiversity conservation, land-use planning, policy development, education, scientific research, raising awareness and other uses at local, national and international scales.

The BNM project was launched in 1995 and has provided the impetus for more than a decade of the most intensive butterfly recording ever undertaken in Britain and Ireland. Data from the first five-year recording period (1995-99) were used to prepare *The Millennium Atlas of Butterflies in Britain and Ireland* (Asher *et al.* 2001). Some 10,000 volunteer recorders contributed a total of 1.7 million butterfly records covering 98% of the 10km grid

squares of Britain and Ireland during this five-year period. The second five-year survey (2000-04) also proved to be an unqualified success. A further 1.6 million records were added and coverage was even improved in some areas. These additional data were used to produce an update to the Millennium Atlas, *The State of Butterflies in Britain and Ireland* (Fox *et al.* 2006), which provided a new analysis of distribution change for all resident butterfly species. Recording continues with a third five-year survey (2005-09).

The recording since 1995 is only one facet of the BNM project. Historical butterfly records have been incorporated. In total, the database currently holds five million records, spanning the period 1690-2007.

The BNM data set provides an excellent source of location information for butterflies, without which many conservation initiatives would be impossible. Data contribute to the development and implementation of national, regional and local Biodiversity Action Plans,

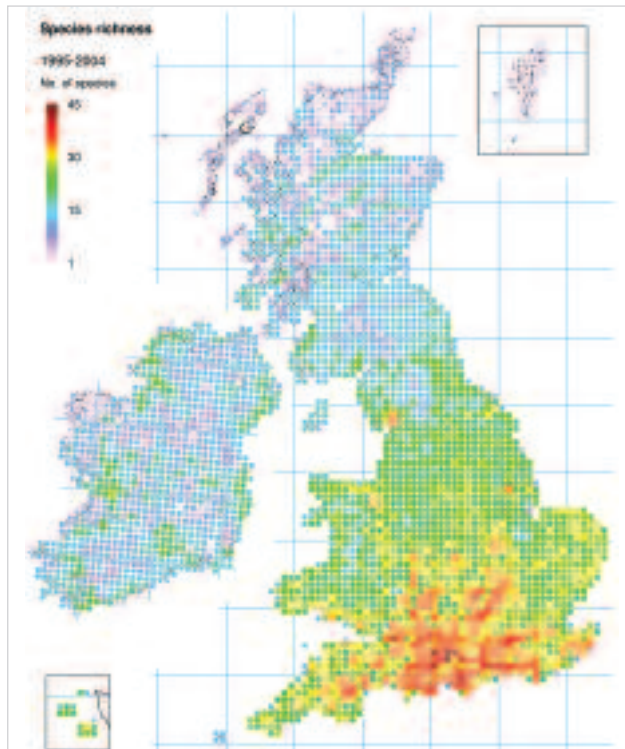
as well as to site designation, habitat management and planning decisions. In addition, the records can contribute in many ways to policy implementation e.g. targeting the Higher Level Environmental Stewardship Scheme, Common Standards Monitoring of SSSIs and guiding habitat management and restoration as part of landscape scale conservation projects. Innovative analysis of the BNM data produced a conservation priority map of Britain, which identified landscapes essential for the survival of the entire butterfly fauna.

The BNM distribution data, interpreted with care, also provide information on species' trends through time. Research demonstrated that even single snapshot surveys contain reliable signals of past and future status. Comprehensive BNM data exist from several time periods and so can be compared to yield distribution trends for species. Such analyses identified a major decline of Britain's butterflies, which outstrips those of birds and

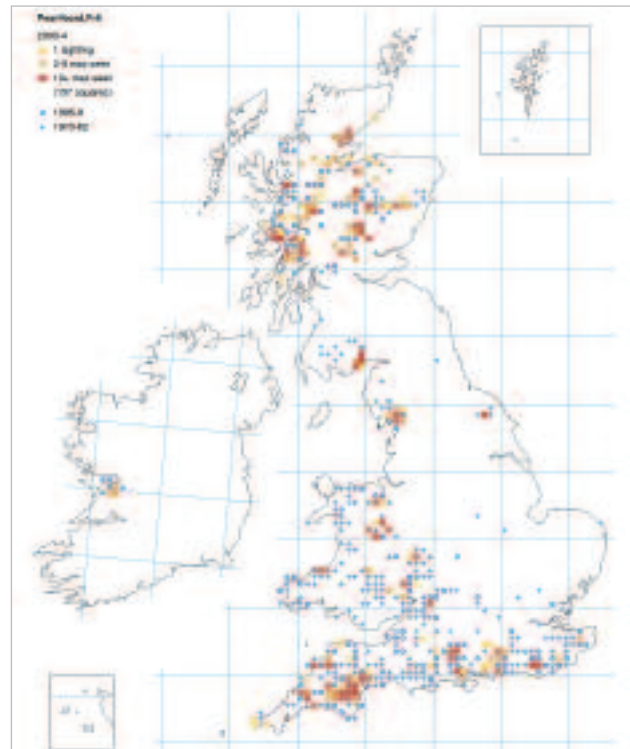


Recording and monitoring of butterflies has enabled the Millennium Atlas and State of Butterflies in Britain and Ireland to be published.

Butterflies for the New Millennium (BNM) is the distribution recording scheme for butterflies in the UK, Republic of Ireland, Isle of Man and Channel Islands.



The number of butterfly species recorded in each 10km square by the BNM project 1995-2004.



BNM data reveals the dramatic decline of the Pearl-bordered Fritillary.

flowering plants. The recorded distributions of 76% of the 54 resident butterfly species assessed in The State of Butterflies in Britain and Ireland decreased since the 1970s. 93% of the habitat specialist butterflies had decreased. In contrast, some wider countryside species had undergone dramatic expansions of range. These important messages have been communicated effectively to policy makers, the conservation community and the general public.

The butterfly trends provided a major source of objective data for the recent review of the UK BAP (see page 17), the development of national priorities by the devolved administrations and a new Red List for British butterflies. BNM data and

trends also contributed to the European butterfly atlas and Red Data Book.

The BNM data have been used extensively in ecological research, particularly to assess the impact of recent and future climate change on butterflies and other biodiversity in Britain and further afield (see page 56).

Thanks to dedicated volunteers who contribute an estimated 45,000 days of time and expertise each year, the BNM project provides essential information on the location of breeding colonies of all resident butterfly species, as well as trends that can be used to determine species status and conservation priority.

Contact:

Richard Fox

rfox@butterfly-conservation.org

Butterflies for the New Millennium is organised by Butterfly Conservation and the Dublin Naturalists' Field Club in association with the Biological Records Centre (operated by the Centre for Ecology and Hydrology and Joint Nature Conservation Committee). Funding contributions for the 2000-04 recording period were provided by the Bernard Sunley Charitable Foundation and Esmée Fairbairn Foundation. At present, Natural England is contributing towards project funds.

Moths Count



The Figure of Eight Diloba caeruleocephala is one of many rapidly declining 'common' moths. It declined by 95% over the period 1968-2002. (Robert Thompson)

Moths Count began in 2006 undertaking a major programme of outreach, training and publicity to raise awareness of the importance of moths and to stimulate and encourage moth recording.

Moths make up a significant part of UK biodiversity and play essential roles in ecosystems, as herbivores, pollinators and prey. They occur in huge numbers and great diversity yet recent research showed that moths are in serious decline. The total number of moths had decreased by a third (1968-2002) and two-thirds of 337 widespread species studied had suffered population declines.

Moths Count is a key part of Butterfly Conservation's response to this crisis (see also Action for Threatened Moths project page 34-35). The four-year project is a partnership of individuals, voluntary

groups, government agencies, NGOs and businesses, all intent on raising awareness and establishing an evidence-base of distribution records to underpin conservation and research.

The establishment of the National Moth Recording Scheme is a vital step and one that will greatly enhance the existing efforts of moth recorders, creating a wider understanding and an important resource for conservation. The first local data sets were uploaded at the end of 2007 and the national database has grown rapidly during 2008, with data being made available for conservation, research and education. Ultimately, Butterfly Conservation aims to publish an atlas but, in the meantime, provisional distribution maps will be available on the internet.

People are key to Moths Count, not just active recorders taking part in the national scheme, but wider audiences too. Through a range of outreach activities, Moths Count will encourage participation, sowing the seeds of interest among the moth recorders of the future. Annual 'citizen science' projects such as Garden Moths Count and National Moth Night will spearhead this work, while over 200 local events will offer training opportunities to beginners and existing recorders alike.

Moths Count is a major step forward for moth recording and conservation, coming at a time when interest in moths has never been greater but when moth populations are in decline.

Visit www.mothscount.org for more information.

Contact:

Richard Fox

rfox@butterfly-conservation.org

Subscribe to the Moths Count mailing list by contacting nmrs@butterfly-conservation.org

Moths Count is a partnership of many organisations, individuals and businesses, led by Butterfly Conservation. Principal funders include the Heritage Lottery Fund, Butterfly Conservation, British Entomological and Natural History Society, City Bridge Trust, Countryside Council for Wales, Environment Agency, Environment and Heritage Service, Natural England, Royal Entomological Society, RSPB and Scottish Natural Heritage. Many other organisations are involved, providing support and helping to host events.

Moths Count is one of the most ambitious projects ever undertaken by Butterfly Conservation. It aims to set up a long-term, UK-wide National Moth Recording Scheme covering more than 900 species of larger moths.

Moth recording (Robert Thompson)



Developing butterfly monitoring through the UK Butterfly Monitoring Scheme

Large Heath *Coenonympha tullia* – one of eight new species for which a national trend has been compiled through the UKBMS. (Peter Eeles)



Since 2005, there has been major development and re-expansion of butterfly monitoring and a single United Kingdom Butterfly Monitoring Scheme (UKBMS) created; leading to improved species status assessments and the development of Government adopted biodiversity indicators.

The Butterfly Monitoring Scheme (BMS) was set up by CEH (formerly Institute of Terrestrial Ecology) in 1976 to provide information on changes in the abundance of butterflies at selected monitored sites throughout the UK, with the number of sites increasing steadily to 134 by 2004. Over the period, the BMS became a world-renowned and widely copied scheme because it not only enabled the status of butterflies to be assessed at a variety of scales (local through to national), but also provided a mechanism for understanding butterfly ecology and for assessing how climate, land-use and habitat changes are affecting biodiversity. As testament to this, over 100 scientific publications using BMS data were produced over the period.

BMS transect methodology has been taken up by many conservation organisations, landowners and amateur naturalists and the number of transects operating outside the BMS grew steadily at first, but increased rapidly after 1990. By 2004, over 500 additional transects were being recorded, with the data collated by Butterfly Conservation, principally to assess the impacts of agri-environment schemes on butterfly populations in England.

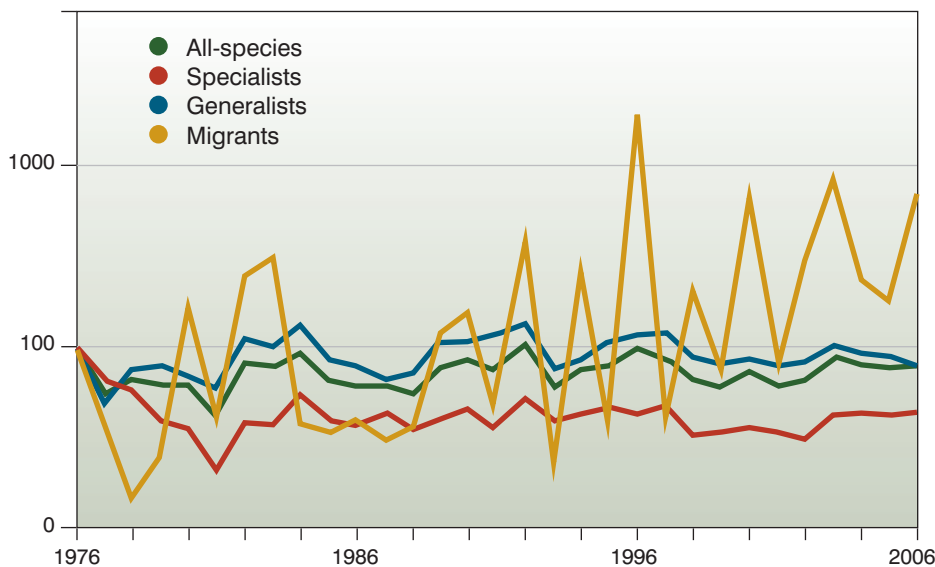
In 2005, a consortium of government agencies provided funding to substantially develop butterfly monitoring in the UK and to develop butterflies as Governmental Biodiversity Indicators through the

Annual scientific monitoring of butterfly populations has been carried out at a network of sites in the UK since 1976, through transects co-ordinated by the Centre for Ecology and Hydrology (CEH) and Butterfly Conservation.

| | Pre-UKBMS Number of sites 2004 | UKBMS Number of sites 2007 | % increase 2004-2007 |
|------------------|--------------------------------------|----------------------------------|-------------------------|
| England | 93 | 719 | 673 |
| Northern Ireland | 3 | 26 | 767 |
| Scotland | 27 | 63 | 133 |
| Wales | 11 | 65 | 491 |

The number of sites used to compile national species abundance indices, pre-UKBMS (2004) and since the launch of the combined scheme (2007).

Populations of butterflies: 1976-2005 (United Kingdom)



The UK butterfly indicator, including migrants, showing a 42% decline in habitat specialist species since 1976 (25 species), a 19% increase in wider countryside species (generalists 24 species) and a 645% increase in migrants (3 species).

UKBMS project. The UK BMS, which is jointly run by Butterfly Conservation and CEH has two key objectives: (1) To develop an integrated UK-wide monitoring scheme by merging CEH/BC transect datasets and extending more effective, targeted coverage across the UK and (2) To develop an improved method for monitoring the status of butterflies across the wider countryside, usually defined as land not designated for its nature

conservation interest, i.e. non SSSI, NNR etc (see page 12).

There has been a great deal of progress under the UKBMS project in terms of transect monitoring, with major highlights including:

- Launch of the UKBMS scheme in spring 2006 at the Royal Society, attended by the then Biodiversity Minister Mr Barry Gardiner MP.
- The development, maintenance and support of an integrated

network of over 1400 monitored sites, with more than 750 sites monitored each year.

- Substantial increases in butterfly monitoring coverage especially in Scotland, Wales and Northern Ireland.
- An improved data collation system, with for example 99% of 2007 data collated by early January 2008.
- A five-fold increase in the number of sites used to assess national species trends since 2004.
- An increase in reliable annual indices and population trends for resident and regular migrant butterflies in the UK from 41 to 49 species.
- Butterfly biodiversity indicators developed for England, Scotland and the UK.
- Data contributed to produce a candidate EU headline European Butterfly Indicator.

The adoption of butterflies as Governmental Biodiversity Indicators is particularly important as it helps put the plight of butterflies far higher up the political agenda. We hope the new indicators will lead to firmer policy commitments to address butterfly declines (as has happened with farmland birds) and to provide long-term resources for effective conservation and monitoring.

Contact:
Dr Tom Brereton
tbrereton@butterfly-conservation.org

The UKBMS project is funded by a Defra led consortium of government agencies and is run jointly by Butterfly Conservation and CEH.

Monitoring butterflies in the wider countryside

Through the UKBMS project a new method has been developed to monitor widespread species that we predict will provide annual abundance indices representative of the whole UK landscape.

Emphasis has been placed on designing a scheme that is scientifically sound, efficient and powerful. With just a few visits each year the method is appealing to volunteers and therefore encourage good coverage across the UK.

The methodology is based on the British Trust for Ornithology (BTO) highly successful Breeding Bird Survey (BBS), with some practical



The Small Tortoiseshell is in rapid decline on UKBMS transect sites, and the proposed new method would give more precise information on its changing abundance in the wider countryside. (Jim Asher)

adaptations for butterflies. In the proposed method, butterflies and selected other common insects are counted over a minimum of two summer visits along two 1km survey lines located in randomly selected 1km squares. In this reduced effort approach a minimum of two visits is sufficient because missing counts and indices are estimated from flight period curves derived from a network of sites. This is valid because the ultimate aim is to produce national species indices from the data, rather than precise indices for each square. With a reduced effort approach, a doubling of the number of sites can achieve the same power to detect

trends as conventional transects.

Following a successful season of field-testing by Butterfly Conservation volunteer recorders in 2006, testing was extended to include both Butterfly Conservation and BTO BBS recorders in 2007. Over 300 squares were surveyed across the UK in 2007 with volunteer participation doubling expectations, and with butterfly and bird recorders equally enthusiastic about the fieldwork. In 2007, 42 butterfly species were seen, including most wider countryside species, plus four migrants and 14 habitat specialists. On average nearly 100 butterflies and ten species were seen per square based on two summer

More than 300 squares were surveyed in 2007 by BC (red) and BTO (blue) recorders to road test the proposed survey method. The survey also yielded valuable baseline data on butterfly abundance in the wider countryside.

Research indicates that many wider countryside species underwent substantial declines in local and regional abundance during the 20th century; declines that were largely undetected by monitoring and mapping schemes in spite of a rapid growth in recording effort.

visits.

From the pilot results we predict that well over 1000 volunteers would survey squares if the scheme was launched in the near future. Importantly, the results show that given the predicted participation levels, virtually all the wider countryside species are likely to be detected in a sufficient number of squares to enable calculation of unbiased national abundance indices and accurate assessment of trends over time.

The scheme would be able to report effectively on the status of butterflies across the whole of the UK's landscape, giving the first truly nationally representative population trends for widespread butterflies like the Small Tortoiseshell *Aglais urticae*. As butterflies are widely considered good indicators of the countryside, the data will be of additional value in assessing how insects in general are faring across the countryside.

Further research and volunteer development is currently being carried out and funding is being sought to roll the scheme out across the UK.

Contact:

Dr Katie Cruickshanks
kcruickshanks@butterfly-conservation.org

The wider countryside butterfly monitoring component of the UKBMS project was jointly organised by Butterfly Conservation and CEH, in partnership with the BTO and the Centre for Research into Ecological and Environmental Modelling and funded by a consortium of government agencies led by Defra.

| Species | Occupancy (% squares occupied) | Total abundance |
|---------------------------------|-----------------------------------|-----------------|
| Meadow Brown | 92 | 4950 |
| Large White | 83 | 1662 |
| Gatekeeper | 81 | 2967 |
| Peacock | 71 | 902 |
| Speckled Wood | 71 | 877 |
| Small White | 69 | 2427 |
| Red Admiral | 68 | 555 |
| Green-veined White | 57 | 954 |
| Small Tortoiseshell | 51 | 563 |
| Ringlet | 39 | 942 |
| Comma | 37 | 160 |
| Holly Blue | 34 | 189 |
| Small Skipper | 24 | 289 |
| Common Blue | 19 | 147 |
| Brimstone | 15 | 49 |
| Small Heath | 15 | 124 |
| Painted Lady | 13 | 49 |
| Large Skipper | 12 | 81 |
| Small Copper | 10 | 37 |
| Essex Skipper | 9 | 117 |
| Marbled White | 8 | 38 |
| Silver-washed Fritillary | 8 | 51 |
| Wall | 5 | 20 |
| Dark Green Fritillary | 4 | 43 |
| Brown Argus | 2 | 13 |
| Scotch Argus | 2 | 177 |
| Grayling | 2 | 11 |
| Orange-tip | 2 | 3 |
| Clouded Yellow | 1 | 2 |
| Grizzled Skipper | 1 | 3 |
| Purple Hairstreak | 1 | 2 |
| Small Pearl-bordered Fritillary | 1 | 3 |
| White Admiral | 1 | 2 |
| Brown Hairstreak | <1 | 1 |
| Chalkhill Blue | <1 | 7 |
| Green Hairstreak | <1 | 1 |
| Purple Emperor | <1 | 1 |
| Silver-studded Blue | <1 | 26 |

Most and least widespread species recorded in the pilot. Occupancy is derived from two visits during July-August and total abundance is also presented.

Marsh Fritillary *Euphydryas aurinia*
(Robert Thompson)

This section highlights several of Butterfly Conservation's flagship conservation projects that have been developed over the last 15 years. Much of this development has been driven by the Government's conservation priorities as outlined in the UK Biodiversity Action Plan (BAP).

Conserving threatened butterflies and moths



The UK Biodiversity Action Plan

*The Brown Hairstreak *Thecla betulae* is in decline but benefiting from a huge conservation effort by volunteers and staff in recent years. (Jim Asher)*



Priority species and habitat listings are a significant driving force for biodiversity conservation in the UK. The first list, published in 1995, contained 11 butterfly species and 53 moth species.

Butterfly Conservation was appointed Lead Partner on all but one of these species. Since then Butterfly Conservation has instigated the Threatened Butterflies and Moths Projects, as well as the Regional Action Plans, which have been pivotal in the projects developed by regional staff and volunteers.

Our knowledge of the British countryside has improved a great deal since 1995. Making use of all the new information, a consortium of Government, representatives on Non-Governmental Organisations and volunteers reviewed and produced a new list to update the Biodiversity Action Plan (BAP) in 2007. This

should lead to conservation action for these highly threatened species being taken by national and local government.

The review has resulted in an increase in the number of priority habitats from 45 to 65, and in priority species from 577 to 1149. Butterfly Conservation was heavily involved in this review. This was possible because of the huge datasets gathered by thousands of volunteers, demonstrating the plight of butterflies and moths and making a strong case for listing. The number of butterflies and moths in the list has risen to 24 and 81 respectively. A further 69 are listed as requiring urgent research.

The final list was published and launched on 28 August 2007 by the then Minister for Biodiversity, Ms Joan Ruddock MP.

Some innovative conservation changes have been suggested. The biggest is the grouping of the 'widespread but rapidly declining' species into a single, research-focused plan. This group includes the 71 moths that the Rothamsted Research data have shown have hugely declined in abundance in the last 35 years for mainly unknown reasons and two widespread butterfly species, the Wall *Lasiommata megera* and Small Heath *Coenonympha pamphilus*, that have also declined rapidly in recent decades.



Caterpillar of the Scarce Vapourer *Orgyia antiqua* one of the new BAP Priority species of moth. (Les Hill)

Implications for our work

The new list presents challenges for everyone involved in conservation. However, Butterfly Conservation is making significant progress already on many species through our landscape scale projects (see pages 18-53). Butterfly Conservation will review regional objectives in light of the new priority species and habitat and, where significant gaps exist, develop new conservation programmes.

Contact:
Dr Nigel Bourn
nbourn@butterfly-conservation.org

The UK Biodiversity Action Plan list can be viewed at www.ukbap.org.uk

Conservation at a landscape scale



Many of our landscapes are highly fragmented with small remnants of semi-natural habitat surrounded by more improved land and development. (Caroline Bulman)

Metapopulations and butterflies

The biology and ecology of butterflies have been well studied over the last few hundred years and are one of the most widely understood insect groups. Over the last few decades the population dynamics of many species has become the focus of academic study. With increasing destruction, modification and fragmentation of our

natural and semi-natural habitats, the way that butterfly populations survive within these dynamic landscapes has gained more attention. In particular the way that a species persists within a regional network of suitable habitat, how individuals move between habitat patches, the effect of increasing isolation, changes in patch size and quality and the incidence of extinction and colonisation have become central to what is known as Metapopulation

Biology. Butterfly populations soon became the main study system and these influential studies led Butterfly Conservation to develop its work from a single site basis to operating at many sites within the landscape.

The metapopulation concept can be thought of as a 'population of populations', occupying islands of habitat within a 'sea' of unsuitable habitat. This clearly describes the countryside we see today, where areas of remnant habitat, such as chalk grassland, woodlands and wet meadows, are surrounded by an agriculturally improved and developed landscape. The species which inhabit these remnants tend to be the more specialist species that are rapidly declining - they are more prone to local extinction due to population and environmental changes. If extinction occurs there is the potential for re-colonisation by individuals from a nearby population. However, as further habitat destruction and change takes place, these sites become increasingly isolated, re-colonisation becomes less likely and the metapopulation will be at greater risk of extinction.

In order to allow species to function across landscapes, habitat restoration, appropriate management and habitat re-creation are essential to enable butterflies to move through the landscape and continue to operate as metapopulations. By restoring functioning landscapes we also enable species to be able to respond positively to the increasing threat of climate change.

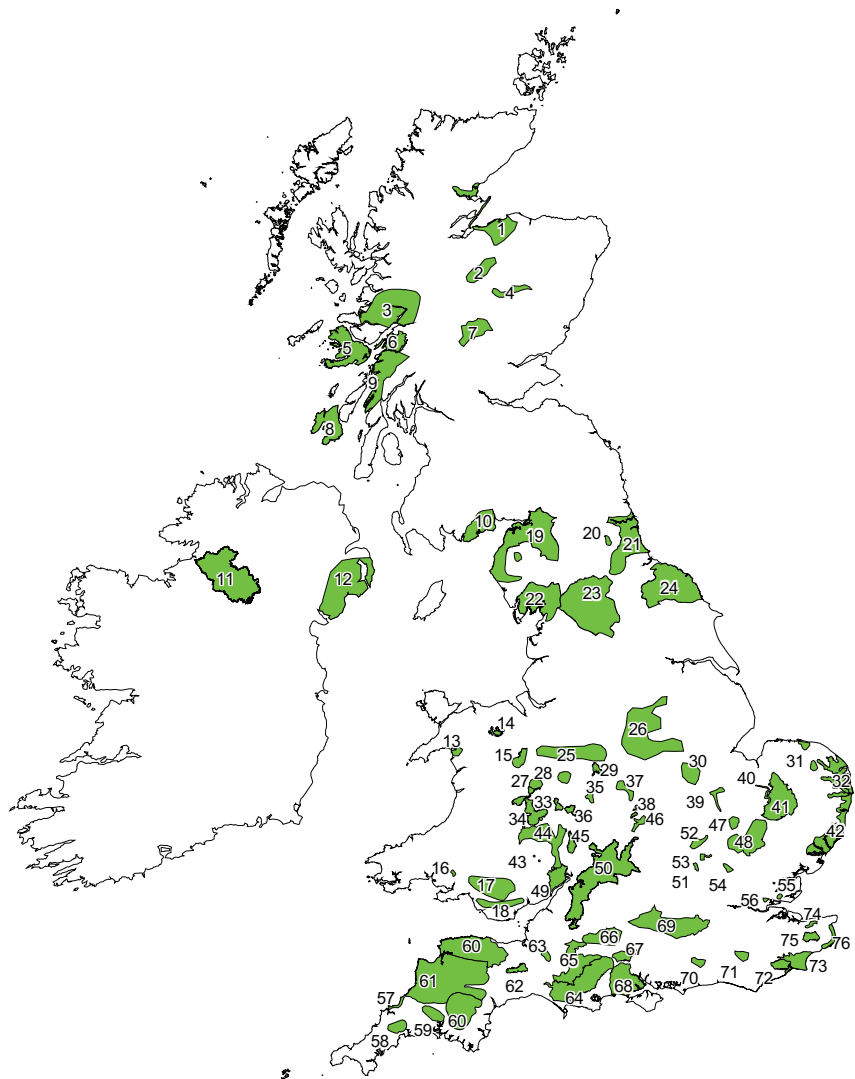
The scope of our landscape projects can vary from working on a very large single site where we work with individual land managers to working with multiple landowners over large areas such as Dartmoor. Some examples of our landscape scale work follow.

Landscape scale conservation involves the coordinated delivery of conservation management across a network of sites, within an ecologically distinct landscape and for a range of species and habitats.

Butterfly Conservation is involved with 76 landscape scale partnership projects across the UK.

Key

- 1 Moray Firth
- 2 Badenoch & Strathspey
- 3 Lochaber
- 4 Upper Deeside
- 5 Mull
- 6 Lorne
- 7 Highland Perthshire
- 8 Islay
- 9 Mid-Argyll & Knapdale
- 10 Solway Coast & Hinterland
- 11 County Fermanagh
- 12 County Down
- 13 Harlech
- 14 Clocaenog Forest
- 15 Oswestry Uplands
- 16 Mynydd Mawr
- 17 South Wales Coal Measures
- 18 High Brown Brackenlands
- 19 North Cumbria
- 20 Durham Coalfield Pennine Fringe
- 21 North East Brownfields
- 22 South Cumbria Low Fells & Morecambe Bay Limestone
- 23 Yorkshire Dales
- 24 North York Moors
- 25 North Shropshire & Staffordshire Mosses
- 26 Notts/Derby Coalfields Brownfields
- 27 South Shropshire Metal Mines
- 28 Telford & Wrekin Brownfields
- 29 Cannock Chase
- 30 Ketton Limestone Area Brownfields
- 31 Norfolk Heaths
- 32 Norfolk Broads
- 33 South Shropshire Wet Flushes & Rush Pastures
- 34 South Shropshire and North Herefordshire Woodlands
- 35 Black Country Brownfields
- 36 Wyre Forest
- 37 North Warwickshire Brownfields
- 38 Princethorpe Woodlands
- 39 Peterborough Brownfields
- 40 Cut off Channel
- 41 The Brecks
- 42 Suffolk Coast & Heaths including the Sandlings
- 43 Herefordshire Commons
- 44 Herefordshire Woodlands
- 45 Malvern Hills
- 46 Southam Lias Grasslands
- 47 Cambridge Elm Belt
- 48 Cambridgeshire & Essex Chalk Grasslands
- 49 Forest of Dean
- 50 The Cotswolds
- 51 Bedfordshire Chilterns
- 52 Bedfordshire Brownfields
- 53 Hertfordshire Chalk Grassland
- 54 Hertfordshire Quarries
- 55 South Essex Woodlands
- 56 Langdon Hills, South Essex
- 57 North Cornwall Coast
- 58 Mid Cornwall Moors
- 59 Tamar Valley
- 60 Two Moors Project
- 61 Reconnecting the Culm
- 62 Blackdown Hills (Neroche Project)
- 63 Polden Hills
- 64 Cranborne Chase & Wessex Downs
- 65 Blackmoor Vale
- 66 Salisbury Plain
- 67 Tytherley Woods
- 68 New Forest
- 69 Thames Basin Heaths
- 70 Surrey/Sussex Woods West Weald
- 71 Ashdown Forest
- 72 Rother Woods
- 73 Dungeness/Romney Marsh
- 74 Blean Woods
- 75 Denge Woods
- 76 Sandwich Bay



The Two Moors Threatened Butterfly project



Volunteers monitoring High Brown Fritillary habitat, Heddon Valley, Exmoor. (Anja Borsje)

Because these National Parks cover relatively intact landscapes, they offer a high likelihood of success for a landscape-scale conservation approach. We are working closely with a number of partner organisations, including Natural England, Dartmoor and Exmoor National Park Authority and the Environment Agency to ensure the security of these species for the future.

The landscape of Dartmoor and Exmoor that we see today is the product of centuries of traditional land-use, creating a landscape rich in wildlife. The future of fritillary butterflies in these areas is strongly linked to the continuation of traditional farming practices. The Heath Fritillary *Mellicta athalia* is found in sheltered heathland valleys or combes on Exmoor which have been burnt and grazed maintaining areas where the host plant, Common Cow-wheat *Melampyrum pratense*, thrives. The Marsh Fritillary *Euphydryas aurinia* is one of the

many threatened species occupying purple moor-grass and rush pasture habitat. The sunny, sheltered slopes where there is a patchwork of bracken, violets, grass and scrub are ideal for the High Brown Fritillary *Argynnis adippe*. These conditions depend on traditional farming practices so the project is working with landowners and land managers to maintain and restore suitable habitat. Priority areas have been identified where resources are best spent to ensure large, well-connected areas of habitat are restored, to support metapopulations of the three species.

The project started in 2005 and during this time has visited more than 90 farm holdings, and given habitat management advice for over 1000 hectares, resulting in positive habitat management for more than 750 hectares of fritillary habitat. Scrub has been cleared at 35 sites, and more than 10,000 metres of fencing have been erected to aid grazing. With help from the project, 13 Higher Level

Stewardship agreements have been secured for important fritillary sites, and other forms of funding have been secured for an additional eleven sites.

One of the priority areas for the High Brown Fritillary on Exmoor is the Heddon Valley, consisting of a network of deep, wooded valleys with large areas of Bracken *Pteridium aquilinum* habitat. The majority of the area is owned and managed by the National Trust, and the project has worked closely with them to restore large areas of habitat over the past few years. Areas have been fenced and grazing with traditional Red Devon cattle has been re-introduced. Scrub has been cleared at many sites, and volunteer work parties monitor the density of violets *Viola* spp. and Bracken every year. There are significant areas of privately



Project Officer, Anja Borsje showing Dartmoor landowners the caterpillars of the Marsh Fritillary butterfly. (Caroline Bulman)

owned habitat in the valley, and the project has worked with several private landowners and the National Park Authority to secure suitable habitat management through grazing with Exmoor ponies. In spring 2007,

The national parks of Dartmoor and Exmoor are two of the most important areas in south west England where the Heath Fritillary, High Brown Fritillary and Marsh Fritillary survive in good numbers.



Cattle grazing in one of the priority areas for the Marsh Fritillary on Dartmoor. (Anja Borsje)

the project organised a workshop on habitat management for the High Brown Fritillary for others responsible for managing bracken habitat in the South West. The day was hosted by the National Trust in the Heddon Valley, and well attended by staff from a wide range of organisations.

On Dartmoor, the project has worked closely with many private landowners to improve habitat conditions for the Marsh Fritillary butterfly. One of the priority areas, known as Fernworthy – Long Lane, consists of a large number of sites owned by different landowners. The project has applied for funding for works such as fencing and scrub control for seven of these sites, including four whole farm Higher Level Stewardship applications. Appropriate habitat management has now been secured on more than 80% of all sites in this priority area. In September 2007, the project organised an open day for the local landowners, on two neighbouring farms in the priority area where a Stewardship agreement was

secured. The aim of the day was to further raise awareness of wet grassland habitat and management, and to show the landowners the caterpillars of the Marsh Fritillary. The day was well attended, and was a good opportunity to thank the landowners for their help over the past years.

The main aim of the project is to reverse the declines of the three butterfly species. However, a wide range of other threatened species including Narrow-bordered Bee Hawk-moth *Hemaris tityus*, birds and mammals, benefit from the landscape scale habitat restoration being achieved. Additionally, the whole farm stewardship applications prepared for landowners also result in management and restoration of archaeological and landscape features such as orchards, traditional farm buildings and hedgerows.

The project is providing evidence that by creating strong partnerships with other organisations, and by providing specialist habitat management advice to landowners, landscape scale restoration, and thus long-term conservation of threatened species, is possible and successful.

Contact:

Anja Borsje
aborsje@butterfly-conservation.org

The Two Moors Threatened Butterfly project is run by Butterfly Conservation with funding from Natural England, Environment Agency, Exmoor National Park Authority, Dartmoor National Park Authority, Dartmoor and Exmoor Sustainable Development Funds, Esmée Fairbairn Foundation and the Exmoor Trust.



Exmoor pony grazing has been reintroduced to High Brown Fritillary habitat at farms within the Heddon Valley. (Anja Borsje)

Conserving the fritillaries of the Wyre Forest



Management work recently undertaken in the Hurst Coppice area of the Wyre Forest. (Jenny Joy)

The Back to Orange Project is being funded by the SITA Trust to help to conserve the fritillary butterflies for which the Wyre Forest is so well known. The Back to Orange Project is part of a larger scheme called 'Grow with Wyre'. The £3.8 million partnership project is funded by the Heritage Lottery Fund, led by Forestry Commission England and involving many local organisations and specialist groups who will help to deliver 22 varied projects over the next four years.

The purpose of the project is to enable a three year survey, monitoring and research programme to be focused on key Lepidoptera such as Pearl-bordered Fritillary *Boloria euphrosyne*, Common Fan-foot *Pechipogo strigilata*, Silver-washed Fritillary *Argynnis paphia* and Wood White *Leptidea sinapis*. It will initiate essential restoration work in six special areas to maintain fritillary strongholds. It will

also increase the involvement of local people in Lepidoptera survey and monitoring work as a result of training events set up through the 'Grow with Wyre' scheme.

The Back to Orange project started in May 2007 and has already had a significant impact on the forest and increased our knowledge of specialist butterflies and moths. Monitoring highlights of 2007 included excellent counts of Pearl-bordered Fritillary and a new transect for Wood White. Survey highlights included widespread records for Silver-washed Fritillary, finding hotspots for the White Admiral *Limenitis camilla* (which has only rarely been recorded in the forest in the past) and the discovery that the Drab Looper *Minoa murinata* appears to be double brooded in the Wyre Forest unlike elsewhere in the country. A significant amount of management work has already been undertaken by Forestry Commission

England in the one part of the forest where Wood White still exists. Corridors have been created by removing conifers to provide suitable ride-side vegetation for the butterfly and to improve habitat links. A research project has been set up to see how the habitat quality of two important corridors (an existing power-line and pipeline) can be improved as these could provide even better connections between different parts of the forest than they do now.

Future work looks equally as exciting. There are plans for restoration management work to start on two additional areas of the forest (involving land managed by Natural England and Forestry Commission England). Surveying of the tree canopy will be carried out for the first time using a mobile platform in various parts of the forest. Monitoring work will begin on the Dingy and Grizzled Skippers (*Erynnis tages* and *Pyrgus malvae*) and a research project will investigate the impact of the conversion from conifer plantations to broadleaves (PAWS), on Lepidoptera.

Contact:

Dr Jenny Joy

jjoy@butterfly-conservation.org

Funded by SITA Trust, Heritage Lottery Fund and Wyre Forest Study Group. The Back to Orange Project is being jointly managed by Forestry Commission England and Butterfly Conservation with Natural England a key collaborator. Thanks to Jon Clifton, Dave Grundy, Kate Thorne and Rob Thorne who carried out much of the survey and monitoring work.

The 2,400 hectares of the Wyre Forest is all that survives of a wood that once stretched along the Severn Valley from Worcester to Bridgnorth. It is still one of the largest semi-natural woodlands in the UK and has one of the highest butterfly and moth species counts in the country, around 1,200 species.

Wood White, the first butterfly to benefit from management work. (Jim Asher)



Ponies save the Marsh Fritillary in Wales



Welsh Mountain Ponies, the ideal grazing animal for sites within the Mynydd Mawr. (Deborah Sazer)

The Marsh Fritillary is suffering long-term, ongoing declines across Europe, due to years of habitat loss and mismanagement. The British population fell by 73% between 1983 and 2004 and 30% of its Welsh range was lost between 1990 and 1999.

The butterfly principally uses wet grassland in the UK (with some chalk grassland sites in southern England). Wales holds roughly 35,000 hectares, a considerable share of the UK total.

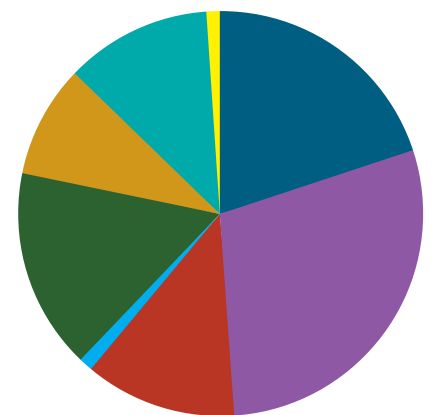
The Mynydd Mawr Marsh Fritillary Project was established in 2004 to prevent the extinction of one of Wales' largest populations of Marsh Fritillary. The project covers roughly 24km² centred at Cross Hands, Carmarthenshire, and includes Butterfly Conservation's reserve at Caeau Ffos Fach. Mining was the main livelihood until the 1970s, and

intensive farming methods were never widely introduced. Thus, many patches of damp grassland survived. In addition to the Marsh Fritillary, these 'rhôs pastures' are alive with spiders, beetles and countless other invertebrates. They are rich in sedges, Whorled Caraway, Greater Bird's-foot Trefoil and, on less acid soils, Meadow Thistle. Many other threatened species are found here, including Snipe, Reed Bunting, Barn Owl and, in the intervening hedgerows, Dormice.

The long-term persistence of the Marsh Fritillary metapopulation relies on the maintenance of large, continuous or closely connected habitat patches, however, much of the habitat has been damaged and fragmented through mismanagement (abandonment, under- and over-

grazing, cutting and use of fertilisers). There are still over 200 hectares of suitable or potential habitat for the Marsh Fritillary, mostly in small, isolated fragments. Owners of these fields have been targeted, to secure, extend and link the remaining habitat through appropriate management.

The Marsh Fritillary's needs are simple: a mosaic of tussocky grasses (12 to 25 cm tall) with plentiful large plants of Devil's-bit Scabious *Succisa pratensis*. Low numbers of cattle or ponies are ideal at creating this structure. Sheep are unsuitable, because they produce a short, tight sward and, unlike cattle and ponies, they eat out the Devil's-bit Scabious, leaving no food for the caterpillars.



| | |
|----------------------------|-----|
| Good condition | 20% |
| Suitable, undergrazed | 29% |
| Suitable, overgrazed | 12% |
| Suitable, foodplant sparse | 1% |
| Potential rank | 16% |
| Not suitable | 9% |
| Scrub | 12% |
| Other | 1% |

Only 20% of land surveyed within the project area is in good condition for the Marsh Fritillary. 58% of land has potential but needs appropriate grazing and management.

The Mynydd Mawr Marsh Fritillary Project is a five-year partnership between Butterfly Conservation and the Countryside Council for Wales (CCW), and is the first Welsh invertebrate landscape scale project. It works with local landowners and residents to enhance and enlarge one of Wales' most important Marsh Fritillary populations.

The key to the project is its own, purpose built agri-environment scheme. CCW makes annual management payments and funds capital works for owners who agree to follow the extensive grazing regime. Anyone with suitable or potential Marsh Fritillary habitat is eligible. The intervening fields are also critical to the metapopulation, and so these too may be eligible if managed sympathetically.

Most landowners have never received any agri-environment payments – most would not qualify for Tir Gofal (the Welsh Assembly Government's agri-environment scheme). The Project Officer does all of the paperwork for them, so that access to the grants is quick and easy (considerably faster and easier than standard agri-environment programmes). The project can also arrange, supervise and pay local contractors directly for installing fencing, gates, water supplies and scrub clearance – owners not only save time but they do not have to pay out any money in advance.

The project is also a mini 'Grazing Animals Project', where landowners with no livestock are matched up with local graziers. There are few local cattle but a wide variety of ponies and horses, from small Welsh Mountain Ponies to large and fussy thoroughbred horses. Most of the agreement sites are pony-grazed, and owners with pet ponies or champion Welsh cobs are understandably unwilling to swap them for hardy native ponies or cattle. Some large ponies habitually graze patches very short and neglect large latrine areas, which become rank and overgrown. The project is developing methods to counteract this tendency, such as mowing paths through the ranker areas to encourage the ponies to move into

these areas.

Seven owners have entered management agreements since April 2006, and nearly 25 hectares have been brought into favourable management. This is in addition to 32 hectares under other agri-environment and SSSI schemes (total 57 hectares). An additional 25–30 hectares are being brought into suitable management each year. The Project funding is guaranteed until 2009, but it is hoped that this will be extended. One of the main lessons of the project is that its ongoing success and expansion relies on the regular contact that only a dedicated project officer can bring, arranging works, monitoring and adjusting the grazing, and giving advice and encouragement.

A further threat to the Marsh Fritillary comes from development, which also seriously fragments the habitat. The area was understandably targeted for economic regeneration following the mine closures, with extensive new housing and a large retail and industrial park. Further land has been allocated for development, causing land values to rocket.

However, while some perceive the rhôs pasture as unproductive wasteland ripe for development, many residents and landowners do wish to retain the rural character of the area, and some are really keen to enhance their land for wildlife.

The use of local contractors and the involvement of the local community are crucial to the project. There is an annual bilingual newsletter, along with coverage in local and national media (in Welsh and English). A number of training days, walks and moth-trapping events have been held, and plans are underway to work with local schools and community groups, to encourage people to appreciate and support their own local wildlife.

Contact:
Dr Deborah Sazer
dsazer@butterfly-conservation.org

This project is funded by the Countryside Council for Wales.



The Marsh Fritillary is the focus for this project. (Tom Brereton)

Conserving the butterflies of the North York Moors



One of the sites for the Duke of Burgundy in the North York Moors, showing before (left) and after (right) scrub management. (Giles Manners, Sam Ellis)

The main aim of the project across this landscape has been to encourage locals and visitors to participate in activities aimed at raising awareness and conserving these threatened species through habitat restoration.

The project has enjoyed a number of successes. Habitat management has been undertaken on over a dozen sites. Inevitably, much of this work has been targeted at the area's most vulnerable species like Pearl-bordered Fritillary and Duke of Burgundy *Hamearis lucina*, although work parties have also addressed problems at both Small Pearl-bordered Fritillary *Boloria selene* and Large Heath *Coenonympha tullia* sites.

Habitat management for the Pearl-bordered Fritillary has involved scrub clearance, undertaken by contractors, volunteers and estate staff. Through their efforts, over one hectare of violet-rich, calcareous grassland and Bracken has been restored at a formerly-occupied site, with further work planned. Natural

recolonisation of this site is likely, as it lies only 0.5km from Yorkshire's largest Pearl-bordered Fritillary colony.

Up to 2007 the Duke of Burgundy occurred on 13 sites. Breeding areas at all sites are small and colony losses in recent years have been continuing, largely due to excessive encroachment by scrub.

Prior to the inception of this

project, Regional Officer Dr. Sam Ellis oversaw an extensive programme of scrub clearance, funded by the CAN DO partnership, at many of the sites. This work has continued under the current project and varying levels of scrub clearance have now been undertaken at every site where need for such action was identified. Evidence now suggests that the future prospects for this butterfly are improving, as within the last two years, several sites have yielded their highest-ever counts in monitoring data stretching back for 15 years (see table). However, further monitoring will be required in order to confirm that this recent upward trend is not merely a temporary phenomenon.

Further volunteer work parties are scheduled; their aim will be to extend existing breeding patches by clearing areas of adjacent woodland. Meanwhile, keen horticulturists have been busy growing on stocks of the foodplant, Primrose *Primula vulgaris* and Cowslip *P. veris*; these will be planted out at sites that have the potential to support populations of the butterfly. The project is already seeing results with the successful re-

| Site Code | Maximum count pre-management (5 years) | Maximum count post-management |
|-----------|--|-------------------------------|
| 2 | 16 | 44 |
| 3 | 2 | 7 |
| 7 | 0 | 8 |
| 8 | 2 | 13 |
| 9 | 13 | 24 |
| 10 | 10 | 40 |
| 1 | 7 | 2 |
| 5 | 7 | 1 |
| 6 | 2 | 7 |

Changes in maximum count of Duke of Burgundy at sites before and after management. Numbers have increased on most sites against a national decline of 58% (1995-2004)

One of the key areas for butterflies in Northern England is the North York Moors National Park. Pearl-bordered Fritillary, Duke of Burgundy and Dingy Skipper still occur on calcareous grasslands and in woodlands of the moorland fringes, while the open moors support populations of Large Heath and Small Pearl-bordered Fritillary.

colonisation of a former site which has been restored to suitability. A reintroduction was planned for this site in 2009 but with results like this, a captive breeding programme may not be necessary, however other potential sites are more isolated and may need such intervention.

The project has succeeded in recruiting further volunteers, many of whom have become actively involved in the monitoring of sites, surveying and recording butterflies and moths. There are still many parts of this landscape that remain un-surveyed and although no new colonies of Duke of burgundy or Pearl-bordered Fritillary have been found, volunteers have achieved notable finds such as Small Pearl-bordered Fritillary, Dingy Skipper and Dark Green Fritillary *Argynnis aglaja*. Population monitoring remains a priority so that the suitability and success of habitat management can be assessed.

Contact:

Dr Dave Wainwright
dwainwright@butterfly-conservation.org

Funding has been provided by the North York Moors Sustainable Development Fund.

This project has also been funded by the CAN DO partnership which includes Natural England, North York Moors National Park Authority and English Heritage and this is funded through the Heritage Lottery Fund. We are grateful to the Tree Council, The Samuel Storey Family Charitable Trust and the Yorkshire Agricultural Society for additional funding. We would also like to thank the volunteers who have been involved with this project.

The Duke of Burgundy has declined in both distribution and abundance.
(Sam Ellis)



The Re-connecting the Culm project



The Narrow-bordered Bee Hawk-moth, one of the target species for this project. (Richard Fox)

Culm habitat has been greatly reduced in extent over the last 100 years by agricultural intensification. It is estimated that only 20% of the original area of Culm remains and remnant areas are highly fragmented and vulnerable to changing management and abandonment. The Re-connecting the Culm project has been working across this landscape to provide advice on wildlife and habitat management and ensure the long-term survival of its rich biodiversity.



Sitka Spruce plantation to be removed and restored to re-connect remaining Culm grassland. (Peter Burgess)

Culm grasslands are wildlife havens in a landscape dominated by more intensive farming and account for just over 1% of the total land area. The most recognisable Lepidoptera species of the Culm is the Marsh Fritillary which has a stronghold in this landscape with 35 known populations. The Narrow-Bordered Bee Hawk-moth and Double Line moth *Mythimna turca* are also found in relative abundance. In 2006, the Dingy Mocha *Cyclophora pendularia* (a UK BAP Priority moth species) was confirmed for the first time breeding in young isolated willow scrub. Prior to this record the species was only known from a few sites in Dorset and

Culm grassland is a UK Biodiversity Action Plan (BAP) habitat in Devon and North East Cornwall, supporting a diverse range of wildlife including Marsh Fritillary, Double Line moth, Narrow-bordered Bee Hawk-moth, Southern Damselfly, Dormouse and Otter.



The re-introduction of Long Horn cattle to graze Culm grassland. (Peter Burgess)

Hampshire.

The continued survival of these species relies on farmers managing their land in a traditional way, through low input farming practices. The Re-connecting the Culm project ran for three years from 2005, providing support to farmers managing these habitats. Four priority areas were selected to focus the work on habitat, potential habitat and colonies of the key species. Advice and grant support was concentrated in these areas to help ensure long-term sensitive management of the habitats. The remaining grassland fragments were used to target restoration and recreation of Culm grassland. This involved reinstating fencing, constructing cattle handling facilities to allow grazing and extensive scrub clearance.

Over the three years, 105 landowners have been visited and farming and wildlife advice has been provided covering 7400 hectares. Visits have resulted in the submission of over 30 Environmental Stewardship applications, helping to ensure sympathetic management on 782 hectares of high quality grasslands and creation of 111

hectares of Culm habitat from arable land and forestry plantation.

During the last 50 years many areas of Culm grassland were taken out of farming and planted with conifers. These areas are providing some useful opportunities to restore and recreate the grasslands that once flourished. A range of Culm species have a persistent seed bank so if felling and restoration operations are carefully targeted a characteristic grassland can be restored relatively quickly.

With the support of Natural England, a £135,000 project has commenced that will restore 21 hectares of Culm grassland from Sitka Spruce plantation over three years. This is the first time a project of this kind has occurred in the south west, restoring wet grasslands from forestry plantation. This is made even more exciting by the location of the plantation, sandwiched between three SSSIs, three Marsh Fritillary and Narrow-Bordered Bee Hawk-moth populations and numerous Culm grassland county wildlife sites. The plantation has long been identified as a barrier to movement of the Marsh Fritillary between sites. The

result will be a re-connected landscape where the Marsh Fritillary has a far better chance to flourish.

Elsewhere the project has helped Bursdon Moor commoners restore grazing after a long period of abandonment because the common, SSSI and SAC (Special Area of Conservation) is split by a busy main road. Ten hectares of grasslands that were isolated from the main grazing compartment by the road were the last known breeding location of the Marsh Fritillary on the moor.

Permission has been granted by Defra to fence the common, after a long period of consultation with the landowner, commoners association, parish council, Natural England and the Commons and Open Spaces Society. Forestry Commission England were key to the success of this project and have felled over one hectare of Sitka Spruce to enable a drove track to be created linking two areas of the common.

The project has been highly successful in ensuring suitable management on a large area of existing Culm grassland and in creating important links between key areas and starting the process of habitat restoration. These measures will help ensure the long-term viability of the Culm and the priority species that it supports.

Contact:
Dr Caroline Bulman
cbulman@butterfly-conservation.org

The Re-connecting the Culm project was run by Butterfly Conservation with funding from Esmée Fairbairn Foundation and Environment Agency and support from Natural England.

Breathing new life into ancient woodland in Herefordshire



Volunteer work party clearing an area of Haugh Wood for the Pearl-bordered Fritillary. (Anna Jordan)

The two-year Herefordshire Woodlands Project began in December 2005 with the aim of celebrating and conserving threatened butterflies and moths by working with local volunteers and woodland managers.

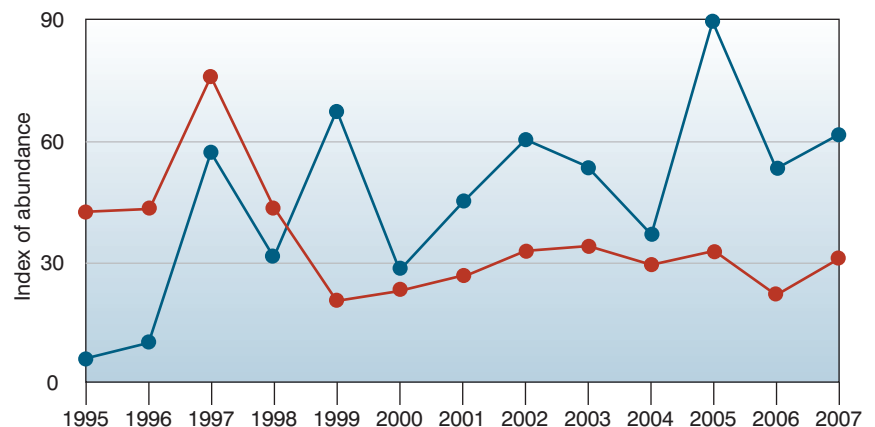
To raise the awareness of butterflies and moths in Herefordshire and to encourage local people to record them, the project held over 40 free events and training workshops for local people, landowners and countryside managers. Over 200 people attended these events. The number of active volunteers with specialised skills has increased and there has been an increase in surveying and monitoring in the county. For example, volunteers are involved in a new weekly butterfly transect in Lord's

Wood and a redundant transect in Haugh Wood North has been reinstated. This data enables Butterfly

conservation and land managers to monitor butterfly populations over time and therefore direct management action.

The project targeted survey action on the following Biodiversity Action Plan species: Pearl-bordered Fritillary and Wood White butterflies and Argent & Sable *Rheumaptera hastata*, Drab Looper and Common Fan-foot moths. Training workshops were held to show volunteers how to monitor adult Pearl-bordered Fritillary and carry out habitat assessments on the remaining sites in Herefordshire. This will help to ensure that these nationally important sites continue to be monitored and management can be prioritised in the future.

Interpretation materials were developed to help increase the amount of recording and management in the county. A butterfly identification chart, woodland management leaflet and five outdoor interpretation panels are now widely available throughout Herefordshire. The project has also contributed towards factsheets for the Wood White, Argent & Sable and Bracken for Butterflies leaflet. These



The abundance of Pearl-bordered Fritillary recorded on the Haugh Wood South transect (blue line) are steadily increasing thanks to active coppice and ride management in comparison to a 50% decline nationally (red line).

The ancient woodlands of Herefordshire are home to some of the most threatened butterflies and moths in the UK.

publications summarise the most up to date knowledge about the habitat requirements of these species as well as providing management advice.

Another major part of the project has been encouraging beneficial woodland management for butterflies and moths. Woodland management and grant workshops were held in conjunction with Forestry Commission England, the Farming and Wildlife Advisory Group (FWAG), Herefordshire Nature Trust's Woolhope Dome Project and the Royal Forestry Society. A sites dossier of ten woodlands in Herefordshire was also produced to give woodland managers information about the butterflies and moths on their land and offer them management advice.

Butterfly Conservation has been working closely with Forestry Commission England in a number of woods in Herefordshire throughout the project. Haugh Wood provides an excellent example of what has been achieved by working in partnership. This is a 342 hectare mixed woodland, designated a SSSI for its outstanding populations of invertebrates. This Plantation on Ancient Woodland Site (PAWS) is owned and managed by Forestry Commission England and is one of the most diverse woods for butterflies and moths in the county. It has populations of locally and nationally scarce species such as the Pearl-bordered Fritillary, Wood White and Drab Looper. It also has historic records of Common Fan-foot (1974) and Argent & Sable (2004).

The wood was traditionally managed as coppice with standards, but in accordance with the policy at the time, it was planted with conifers and broadleaves and the wood became increasingly unsuitable for

Lepidopteran species associated with open conditions. To improve conditions, from the mid 1990s onwards Forestry Commission England have created large areas of clear fell and coppice, connected by wide, sunny, herb-rich rides. This management has been complemented for many years by the work of local groups and Butterfly Conservation West Midlands Branch volunteers, who have organised regular winter work parties to keep important areas of the wood open for key species. The success of this work has been reflected in the Pearl-bordered Fritillary transect results which increased during the mid 1990s (see graph) against the national declining trend.

The continued collaboration between Butterfly Conservation, Forestry Commission England and other woodland owners and managers will ensure a brighter

future for butterflies and moths in Herefordshire.

Contact:

Bernadette Noake
bnoake@butterfly-conservation.org

The Project was funded by Herefordshire Rivers LEADER+, the Heritage Lottery Fund and Countdown 2010. Butterfly Conservation is grateful to Forestry Commission England and other woodland managers and conservation bodies for their involvement in the project. Butterfly Conservation would also like to thank the volunteers who have played a vital role in the project and the conservation of butterflies and moths in Herefordshire.



Pearl-bordered Fritillary – identification workshops were held to encourage volunteers to survey for these difficult to identify species. (Jim Asher)

Brownfields for butterflies and moths



Former collieries are being found to hold some of the biggest Dingy Skipper colonies in the region. This is Chatterley Whitfield, Stoke on Trent where a large colony was discovered in 2004. (Jane Ellis)

Suitable brownfield sites include former quarries, spoil heaps, demolition sites, disused railway lines and former landfill sites. Conserving brownfield sites can make an important contribution to biodiversity as many sites support several threatened species of butterflies, moth and other insects. Some important brownfield sites are under threat from redevelopment and inappropriate restoration. Butterfly Conservation is working to save many of these sites.

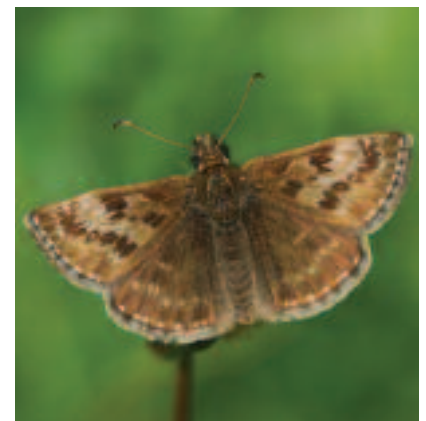
Brownfield sites in the West Midlands

With the rapid redevelopment of large areas of the West Midlands, it

was important to identify the location of key brownfield sites and make this information more widely available to planners, developers and other land managers to help to save populations of target species. Since 2005 Butterfly Conservation has been collating data on sites and distribution of key butterflies and moths to compile a dossier. The report entitled 'Brownfield Sites of Importance for Butterflies and Moths in the West Midlands' was published in 2006 and contains a compilation of existing records for key brownfield species in the region (Grizzled Skipper, Dingy Skipper, Green Hairstreak *Callophrys rubi*, Grayling *Hipparchia semele*, Wall *Lasiommata megera*, and Chalk Carpet moth *Scotopteryx bipunctaria*). The report

lists 134 sites with information on the colony size, landownership and type and level of threat to the colonies on the site. The greatest threat to brownfield sites in the West Midlands is habitat succession (52%) followed by development (17%). In reality, the figure for development threat is likely to be much higher as these sites are often inhospitable to volunteers and therefore under-recorded. The report gives recommendation for future action for those sites highlighted as under the greatest threat.

The document was launched in March 2006 and provided the basis for identifying key landscape areas where urgent work was required to manage, restore and reconnect brownfield habitat for Lepidoptera. The report helped to inform work over the following two years as part of the Countdown 2010 funded 'Brownfields for Butterflies and Moths' project. The document has been circulated to all county and district Planners and Wildlife Trusts in the West Midlands and has helped to raise the profile of brownfield sites for Lepidoptera across the region. We are now actively approached to



Dingy Skipper, a UK BAP Priority species that occurs on many brownfield sites. (Jim Asher)

The term 'brownfield' describes any area of previously developed or post-industrial land which has been abandoned and the natural process of succession has resulted in an area of habitat, such as grassland, heathland or scrub, which is rich in wildlife.

comment on brownfield development and planning matters and have inputted into the Warwickshire Minerals Strategy, the Dudley Urban Parks Plan and the Telford and Wrekin Local Development Framework, amongst others.

Since the document was produced records for many new sites have been submitted and we are currently developing a GIS-based dataset.

Dingy Skipper and Grizzled Skipper are UK BAP Priority Species, which have declined in distribution by nearly 50% since the 1970s. In several English regions these two species are now largely restricted to brownfield sites. In the East Midlands Butterfly Conservation volunteers have been assessing the status of these species across four counties. The species were found on almost 90 sites, with 86% being categorised as brownfield.

Work on the Dingy Skipper in the north east of England revealed a 34% decline in the number recorded over just a 15 year period. The re-development of brownfield sites was identified as the most frequent cause of population extinction.

Disused railway corridors

Until the 1950s the low nutrient, thin soils of railway embankments and cuttings promoted open herb-rich habitats. These were kept open by rabbit grazing, natural slippages and cinders from passing steam trains. Similar conditions occurred on the spoil mounds and coal tips, serving these railways, creating a system of



Four-Spotted. (Mark Parsons)

interconnected habitat for species such as Dingy and Grizzled Skipper and Four-spotted moth *Tyta luctuosa*. In recent years, these networks have broken down as sites have been lost to development or changes in management and disused lines are becoming increasingly covered by scrub. What remains is now highly fragmented.

Butterfly Conservation has been working closely with Network Rail to survey these railway-lines through Stoke-on-Trent and the coalfields of Nottinghamshire and Derbyshire.

At Shirebrook Country Park, a former colliery site on the Nottinghamshire/Derbyshire border, work is being undertaken to reconnect existing colonies of Dingy Skipper. With the support of Network Rail, scrub clearance work is being

undertaken on a stretch of disused railway sidings between the Country Park and the active north-south railway line. Further management on this rail-corridor will help to link the Dingy Skipper colonies northwards with the other sites at Shirebrook, Warsop and Poulter Country Park.

Butterfly Conservation is also working with Network Rail to survey and manage sites for the Four-spotted moth in the Limestone Quarry area of Rutland. This rare species requires hot dry habitats with well drained thin soils, where Field Bindweed *Convolvulus arvensis*, the larval foodplant, occurs. The south-facing embankments and cuttings of the east coast main-line are perfect. Survey work in 2007 found Four-spotted on the banks of the active line in this area and Network Rail staff are now trained to look out for further sites.

In the Eastern Region, site visits with Network Rail have identified Grizzled Skipper habitat on extensive railway sidings at Connington in Cambridgeshire and a large cutting at Stapleford in Hertfordshire. Further surveys will establish the full extent of the butterfly population and identify habitat management work for the future. We will be working with Network Rail to agree and implement management plans for key sections of trackside.

Contact:
Jane Ellis
jellis@butterfly-conservation.org

The work has been funded by the European Regional Development fund through Defra, the Esmée Fairbairn Foundation and Countdown 2010.

Action for threatened moths

Since 1998 the team has developed and implemented programmes of work that have included targeted survey work, monitoring and research as well as working closely with land owners to improve habitat management for the 53 UK BAP priority moth species. This work has also been undertaken by the Regional and Country network of Butterfly Conservation staff, other Butterfly Conservation projects (such as the Moths Count team), as well as many volunteers and contractors. Here we present some examples of progress.

The Dark Bordered Beauty *Epione vespertaria*

Thanks to funding from the RSPB and Natural England, efforts to conserve the Dark Bordered Beauty at its few remaining sites continue. This moth has a split distribution, currently being found in just one site in Yorkshire and at a very few small sites in Speyside and Deeside.

Since 2003 annual workshops have been held at the Yorkshire site to train volunteers in survey

techniques. In July 2007, 21 people helped survey parts of Strensall Common recording 64 adult moths. In each of the last five years, new areas have been found to support Dark Bordered Beauty and it is now known to occur on over 300 hectares, about 50% of the common, making it the largest single site in the UK. Following intensive research by University of York postgraduate students several hotspots have been identified and three of these are being monitored by a modified early morning butterfly transect. In 2007, volunteers Terry Crawford and David Baker recorded 293 adult moths with a peak count of 98.

The moth utilises the less wooded parts of the common and research has shown a breeding preference for taller Creeping Willow *Salix repens* bushes. The foodplant also appears to be associated with disturbance and there are plans for an experimental habitat creation scheme. Following the thinning of birch trees, army bulldozers will be used to create scrapes to remove dense Purple Moor-grass dominated vegetation that should encourage the food plant. Elsewhere selective tree



Newly trained volunteers conducting surveys at Strensall Common. (Sam Ellis)

felling and scrub removal will be carried out by volunteers to prevent shading out of the foodplant.

On the Speyside site, newly created glades were surveyed in July 2007 using actinic light traps. The total of 14 adults was the highest ever recorded on this site and significantly, moths were found for the first time in two of the new glades. Cairngorms National Park Community Investment Programme will be funding the creation of up to 20 clearings at this site. Management has also commenced on adjacent land with conifer removal creating several small clearings. Butterfly Conservation Scotland organised a training day in July 2007 and participants were encouraged to look for the moth in Badenoch and Strathspey. Although no new colonies were found, two potentially suitable areas warrant further investigation.

The two Deeside populations were also monitored in 2007. The moth was recorded from both sites, including a previously unoccupied patch at the first of these. Assessments indicated generally good habitat condition, although a need for some further scrub clearance was identified. This work



Dark Bordered Beauty. (Roy Leverton)

Butterfly Conservation, in partnership with Natural England, established the Action for Threatened Moths Project in 1998.

will also be undertaken over the winter under a grant from the Cairngorms Investment Programme. At the second Deeside site a volunteer work party has been organised to cut back encroaching scrub.

The Marsh Mallow Moth *Hydraecia hucherardi* *osseola*

Butterfly Conservation is now into its eighth year of a project to conserve this highly restricted species which occurs only on Romney Marsh in Kent. The essence of the project has been the surveying and monitoring of key sites as well as providing site advice to land owners and managers. In 2000 just two sites were known for the moth on the Marsh. The project has developed for the first time a standard monitoring method for this species. The methodology is similar to a butterfly transect, only at night, involving a torch to pick out the moths. Since 1999 numbers have declined slightly on the two original sites but the moth has been found on two further sites.

Romney Marsh was clearly a different place when the moth was first discovered there in 1953. The foodplant, Marsh Mallow *Althaea officinalis*, was more widespread but in some areas it is now being planted. Through detailed research, we know that the moth requires extensive stands of the foodplant and is not found on small patches. The project aims to encourage sites with a minimum of 100 plants as these can then support a small population. It is great news that one of the sites where Marsh Mallow has been planted is one of the two new colonisation sites for the species.

Contact:
Mark Parsons
mparsons@butterfly-conservation.org

We would like to thank Natural England, RSPB and Cairngorm National Park Authority for funding the Dark Bordered Beauty work.

We would like to thank Natural England for funding the Marsh Mallow Moth work.

Research on Olive Crescent *Trisatales* *emortualis*



Olive Crescent caterpillar on a dead oak leaf. (Mark Parsons)

The Olive Crescent is an extremely rare UK BAP Priority Species. The only confirmed resident population was on an RSPB reserve in Essex and little was known of its exact habitat requirements.

Following the discovery of large numbers of Olive Crescent caterpillar feeding on dead Sweet Chestnut *Castanea sativa* leaves by a volunteer, a project was established in conjunction with the RSPB to investigate the precise requirements. Small Sweet Chestnut branches were

cut every two weeks during June and July 2006 and were hung in various micro-habitats at the known site. These branches were then examined in September and the number of caterpillars on each branch was recorded. The results showed that most larvae occupied branches cut in mid-June, with smaller numbers in late June and almost none in July. There was also a very clear cut preference for branches left in fully shaded micro-habitats, rather than on ride sides or in young coppice.

In 2007 the studies were repeated with the use of oak *Quercus* spp. leaves in addition to the Sweet Chestnut. Results on micro-habitat preference were similar to those in 2006 but a notable observation was that 80% of the caterpillars were found on oak.

Over the last four years, new populations of the Olive Crescent have been found at two additional sites in Essex and a site in East Sussex. There are also possible colonies at a further site in East Sussex and one in Kent. The next step is to examine other foodplant preferences by offering additional tree species.

The results of this work are being used to inform the management plan for the RSPB reserve and will also allow detailed guidance to be given to other landowners and managers.

Contact:
Tony Davis
tdavis@butterfly-conservation.org

We are extremely grateful to Rick Vonk and colleagues at the RSPB who have carried out much of the fieldwork on the larval habitat investigation and Natural England for financial contribution.

Action for threatened butterflies and moths in Scotland



Chequered Skipper became extinct in England in 1976 but occurs in western Scotland. Our reserve at Loch Arkaig is an important site for this species. (Jim Asher)

The following are some highlights of our recent work, which has focussed on the Cairngorms, Highlands, Argyll and Glasgow; targeting species such as Marsh and Pearl-bordered

Fritillaries, Chequered Skipper *Carterocephalus palaemon*, Slender Scotch Burnet *Zygaena loti* and Dark Bordered Beauty. Our Argyll Islands project is featured on page 39.

| | Number of 10km sq recorded 2003-7 | Number of 10km sq without previous records | % of 10km sq without previous records |
|--------------------------------|-----------------------------------|--|---------------------------------------|
| Argent & Sable Narrow-bordered | 51 | 33 | 65% |
| Bee Hawk-moth | 41 | 26 | 63% |
| Netted Mountain Moth | 15 | 8 | 53% |
| Sword-grass | 30 | 18 | 60% |

Surveys, monitoring and research

Thanks to the efforts of our staff and hundreds of volunteers in Scotland, we know much more about the distribution of UK BAP species as illustrated by the table below of some Priority moths.

We have also improved monitoring of the internationally threatened Marsh Fritillary and have seen numbers fluctuate on roughly a seven-year cycle. During 2007, numbers reached a high point and a larval web survey on Islay recorded 84 new 1km squares! Moreover, two new localities were reported, on Bute and near Mallaig, the first confirmed record outside Argyll for 25 years.

Habitat Management for key species

Management advice has been provided for over 100 sites, and 500 landowners and countryside staff have attended over 40 training workshops. When SNH produced its Species Action Framework, lobbying by Butterfly Conservation meant that three of the 21 species selected for conservation action were Lepidoptera. Urgent work has now commenced managing scrub on sites supporting the Marsh Fritillary and Pearl-bordered Fritillary and the Slender Scotch Burnet.

Influencing policies

From 2008, all funding for land management in rural Scotland will be integrated through 'Rural Development Contracts'. Many UK BAP species depend on woodland edge habitats and have suffered from the artificial divide between forestry and farmland. In readiness for this,

Since Butterfly Conservation established its office in Scotland in 1996 many projects have been developed that have improved our knowledge of priority species, provided management advice to landowners, influenced policies and raised our profile.

we have been helping investigate the practicalities of grazing in woodland.

The Central Belt, around Glasgow and Edinburgh, are important centres of population so access to greenspace is very important, but most of it is poor for wildlife. Our project with the British Trust for Ornithology is therefore designed to improve the quality of Glasgow's greenspaces for birds and butterflies.

The butterfly transect and moth recording network continues to expand and the data has been used to develop both butterfly and moth indicators for the Scottish Government as part of the Scottish Biodiversity Strategy.

Raising the profile of Butterfly Conservation

We now have two nature reserves in Scotland: Loch Arkaig near Fort William, and Mabie Forest near Dumfries. Both are owned by Forestry Commission Scotland and allow us to promote our work and to demonstrate how to manage important colonies of several UK BAP species.

Scotland prides itself in being a world-class eco-tourism destination, and wildlife watching is increasingly promoted. Several butterfly trails have been set up in conjunction with partners such as the Glen Livet and Rothiemurchus Estates.

Contact:
Paul Kirkland
pkirkland@butterfly-conservation.org

Thanks to Scottish Natural Heritage for funding and support.

The Pearl-bordered Fritillary will benefit from improved management on our two Scottish reserves, and support for conservation grazing in woodland.
(Jim Asher)



Butterflies and Burnet moths of the Argyll Islands

Slender Scotch Burnet is endemic to Scotland. (John Knowler)

Butterfly Conservation Scotland has identified the Argyll Islands as one of the richest areas for butterflies and moths in the UK, and a stronghold for two UK BAP Priority species, the Marsh Fritillary and the Slender-Scotch Burnet.

This three year project, which ended in 2008, aimed to work closely with local communities, landowners and conservation bodies to secure sympathetic land management in order to conserve these important and beautiful insects.

The Marsh Fritillary is declining across Europe, and continued losses across the UK, means that colonies on the Argyll Islands are now some of the most important in Europe. The prime reason for the Argyll Islands' importance for the Marsh Fritillary is the very large extent of unimproved grassland and moorland that is still traditionally managed by light grazing.

Within the UK the Slender Scotch Burnet is confined to just five or six colonies on the islands of Mull and Ulva. The moth favours south-facing, steep undercliffs where the

caterpillar's main foodplant, Common Bird's-foot-trefoil *Lotus corniculatus*, grows in an open sward. However, most of these colonies are very small in extent and at serious risk from scrub and bracken encroachment.

The project focussed on giving advice at sites for key species and hosting workshops to encourage local people to get involved in surveying and monitoring on the islands. These workshops trained attendees in the identification of butterflies and moths. Each workshop also included an outdoor visit to a nearby site, where their newly acquired skills could be put into practice. Some workshops focussed on key species e.g. Marsh Fritillary, others were more general.

As a result there has been a dramatic increase in interest and records of butterflies and moths on the Argyll islands, with several new colonies found, most excitingly for Slender Scotch Burnet but also for Marsh Fritillary, Argent & Sable and Narrow-bordered Bee Hawk-moth. Local people are now involved in annual monitoring of the two key species.

Work on Mull has focussed on the Slender Scotch Burnet. At one site cotoneaster is severely threatening a small colony. Contractors were deployed to control this invasive species, a very difficult task on such remote and steep sites.

Recommended control by spraying proved problematic due to the very steep and uneven terrain, thick prostrate nature of the plant and lack of nearby water supply and the use of power-tools were similarly thwarted. The only option was clearance using handtools (loppers and secateurs) with a follow-up herbicide treatment of the regrowth. Work has also been undertaken by local volunteers at a cotoneaster



Many volunteers have been trained to help with surveys and monitoring. (Tom Prescott)

bashing weekend. It is hoped that the bare ground that remains after the cotoneaster has been removed will be an ideal substrate for the colonisation of Common Bird's-foot-trefoil. The work has also allowed easier access by cattle which will hopefully maintain the site in good condition. Bracken and scrub has also been controlled at colonies on Ulva and the Ardmeanach peninsula and is planned at all the other colonies.

Contact:
Dr Tom Prescott
tprescott@butterfly-conservation.org

This work was funded by the Heritage Lottery Fund through Nadair 2 and Scottish Natural Heritage particularly through their Species Action Framework programme. We are also grateful to the many volunteers, landowners and organisations that have assisted with the implementation of this project.



Volunteer clearing cotoneaster from a Slender Scotch Burnet site on the Isle of Mull. (Tom Prescott)

Fritillaries of the Morecambe Bay Limestones



Butterfly Conservation Cumbria Branch volunteers widening a ride in Witherslack Woods, a key woodland site at Whitbarrow, Morecambe Bay Limestones. (Sarah Bradley)

The region is also important for other UK BAP butterflies: Dingy Skipper, Northern Brown Argus *Plebeius (Aricia) artaxeres*, Small Pearl-bordered Fritillary and Grayling, as well as two UK BAP moths, Barred Tooth-striped *Trichopteryx polycommata* and the pyralid *Anania*

funnebris.

Since 1989, conservation action for the High Brown Fritillary and other threatened species has been coordinated by the High Brown Fritillary Action Group (HBFAG), which includes all the main conservation organisations, as well as an army of volunteers.

Altogether 40 transects have been recorded since 1978 within the Morecambe Bay Limestones landscape. Butterfly Conservation has recently analysed the population trends since 1990 across the region. The results show that the High Brown Fritillary has declined by 37%, the Pearl-bordered Fritillary by 77% and the Small Pearl-bordered Fritillary by 76%. Only the Dark Green Fritillary is on the increase by a massive 5700%!

Although the Pearl-bordered Fritillary uses very similar habitat to the High Brown it is declining at twice the rate. Both Pearl-bordered and Small Pearl-bordered emerge in the spring/early summer but despite using different habitats, are declining

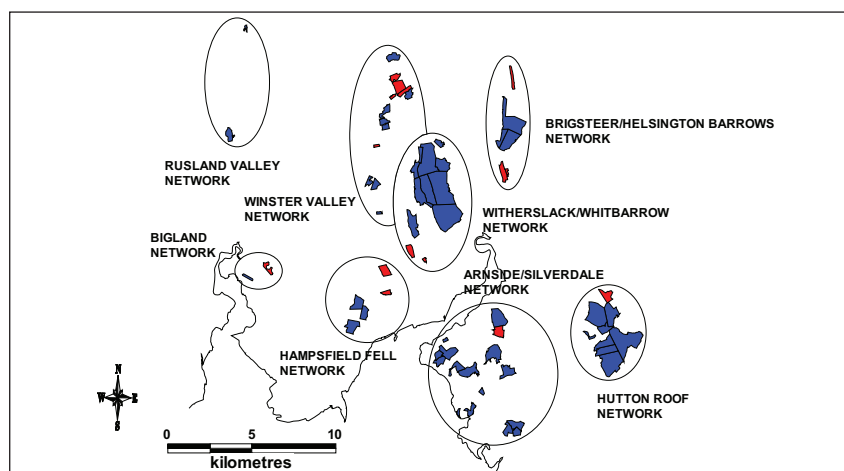
at the same rate. Although changes in habitat quality are likely to be the main cause, other factors such as poor spring weather and lower mobility of smaller fritillaries may also be factors.

Regional transect trends only tell part of the story. Staff and volunteers periodically undertake timed count surveys of non-transect sites. In 2007 the High Brown was recorded at two Hampsfield Fell sites for the first time since 1984 and from Copriding Wood, adjacent to Arnside Knott, for the first time since 1995. An overall assessment of the status of the High Brown suggests it is still present on 50 sites in eight different habitat networks. It is stable on 61% of these, declining on 21% and increasing on 18%, all in the Arnside and Silverdale area.

The picture is gloomier for the Pearl-bordered Fritillary, still present on 37 sites, stable on 57% but declining on the other 43%. The Duke of Burgundy has only been recorded recently from 11 sites, but not all of which represent breeding colonies and only two strong colonies remain in the Morecambe Bay region.

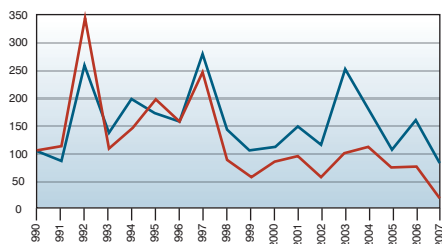
The Morecambe Bay Limestones support a diverse network of habitats, with the rarer species using coppiced woodland, woodland rides, Bracken/violet-rich grassland, limestone grassland and limestone pavement. An important feature of the area is the relative lack of fragmentation. Very few sites are isolated and many are adjacent to other key sites, although in some woodlands suitable glades can be isolated by lack of recent ride management.

About half the sites are owned or leased by conservation organisations and 55% are SSSIs with over 73% in an agri-environment or woodland



Distribution of the High Brown Fritillary on the Morecambe Bay Limestones of south Cumbria and north Lancashire. Extant sites blue, extinct sites red. There are currently 50 occupied sites (blue) but there have been 15 extinctions (red) a 23% loss. As for many species with metapopulation structures, in general, the smaller isolated colonies are more likely to suffer extinction.

The limestone hills of Morecambe Bay are arguably the best area for butterflies and moths in Northern England. They are the national stronghold of the rapidly declining High Brown Fritillary, a core English area for the Pearl-bordered Fritillary, as well as one of two northern outposts for the Duke of Burgundy.



High Brown Fritillary population trends on the Morecambe Bay Limestones. On sites with active, targeted management (coppicing, ride management, scrub clearance) the trend is stable (blue line), whereas on sites without targeted management the butterfly has declined by 74% (red line).

grant scheme. Unsurprisingly, considerable conservation effort has been directed at all these threatened butterfly species. Gait Barrows NNR supports one of the few national expanding Duke of Burgundy populations, responding to a Natural England programme of targeted coppice, glade and ride management. At this site an impressive 18.5 hectares of coppice has been cut since the mid-1980s, 1.6 hectares of permanent glade and a network of interconnecting rides created and maintained. High Brown Fritillaries have responded positively to scrub and coppice management at National Trust sites such as Arnside Knott (4.3 hectares managed since mid-1980s) and Eaves Wood (7.5 hectares) and at the AONB site at Warton Crag LNR (5.5 hectares since 1989). More recently Forestry Commission England restored suitable fritillary habitat by felling 21.5 hectares of Corsican Pine plantation in 2005/06 on Whitbarrow and Hampsfield Fell, with both sites subsequently grazed. On a more local scale the Butterfly Conservation Cumbria Branch is extremely active managing a number of sites, most recently creating three large glades

and undertaking extensive ride management in Witherslack Woods by agreement with Stanley Estates.

More detailed analysis of the transect data showed no significant trend for High Brown Fritillary in both predominantly grassland and predominantly woodland sites, and no significant trend on both agri-environment sites and non-scheme sites. The Pearl-bordered declined at the same rate in both habitat types and regardless of whether the site was in a scheme. However, when the sites with active, targeted management, such as coppicing, ride management or scrub clearance were compared with those with little targeted management, a different story emerges. Although the Pearl-bordered Fritillary still showed a decline, it was at a higher rate (81%) on 'inactive' compared to 'active' sites (69%). The most significant result (see graph) was that High Brown Fritillary had declined by 74% on the 'inactive' sites, but the trend was stable for the 'active' sites.

The sites that are not currently under active management are of major concern and Butterfly Conservation with support from the HBFAG has developed a new project, 'Conserving the High Brown Fritillary on the Morecambe Bay Limestones'.



The High Brown Fritillary. (Jim Asher)

A grant of £247,000 from GrantScape (through the Landfill Communities Fund) was secured in July 2007, with the aim of undertaking ten hectares of coppicing, 11 hectares of ride/glade management, 25 hectares of scrub clearance and 15 hectares of bramble management on 27 sites over the next four years. Management advice will be provided to landowners as well as developing the volunteer network to sustain the work in the long-term. Hopefully this project will turn the tide for our threatened fritillaries in Morecambe Bay.

Contact:
Dr Sam Ellis
sellis@butterfly-conservation.org

Funding for this project has been provided by GrantScape, Friends of the Lake District, Arnside and Silverdale Landscape Trust, National Trust, Restore UK, Butterfly Conservation Branches, Lake District National Park Sustainable Development Fund, Arnside & Silverdale AONB Sustainable Development Fund, William Haddon Charitable Trust, The Mercers' Foundation, Vincent Weir Trust and two anonymous trusts.

Members of the High Brown Fritillary Action Group include Natural England, Lake District National Park, Arnside and Silverdale AONB, Forestry Commission, National Trust, Cumbria Wildlife Trust, Lancashire Wildlife Trust, RSPB, Cumbria Biodiversity Partnership, Lancashire Biodiversity Partnership and Butterfly Conservation.

Marsh Fritillary success in Northern Ireland



Caterpillars of the Marsh fritillary in late summer, feeding on Devil's-bit Scabious. (Helen Bantock)

The exact status of the species and number of sites was long thought to be known but work in recent years has demonstrated the importance of continued surveys and habitat assessment – with spectacular results!

In 1999 a survey identified only nine extant populations of the species in Northern Ireland (NI), a marked decline on previous surveys. This initiated the establishment of a Marsh Fritillary Action Group and the production of a Northern Ireland Marsh Fritillary Action Plan, published in 2005. A conservation programme involving collaboration between the Northern Ireland Environment Agency (NIEA) (formerly Environment and Heritage Service), and Butterfly Conservation is now implementing the action plan. This involves improving knowledge of the ecology of the butterfly across NI and appropriate habitat management.

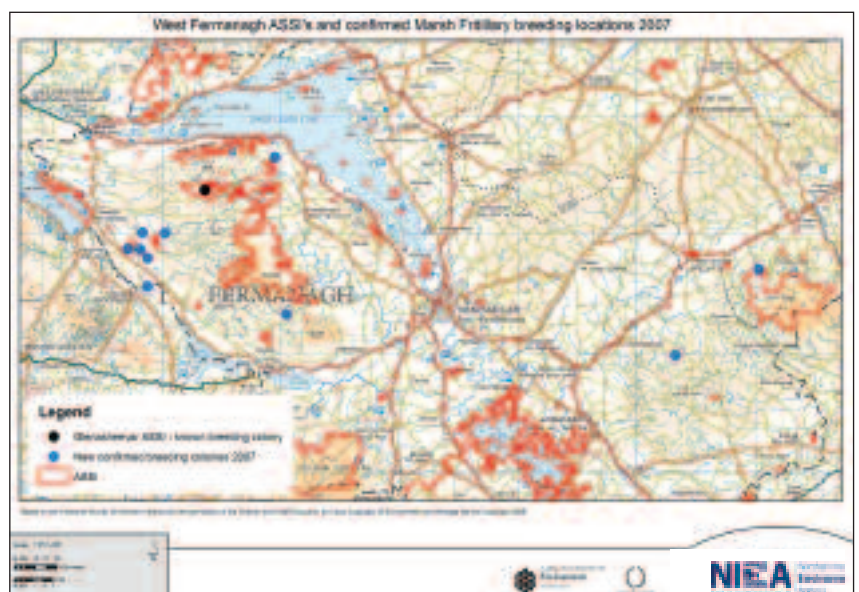
Quercus, the Northern Ireland Research Centre for Biodiversity and Conservation Biology – a partnership between NIEA and Queen's

University, are also playing a fundamental role. Emma Seale, a PhD student contracted by NIEA through Quercus has undertaken much of the field research and will be responsible for the delivery of many

of the action plan targets. At the time when Emma began her field research in 2005, Marsh Fritillary had already been lost from one of the sites where it was recorded in 1999. This left eight known extant sites in 2005.

For the past three field seasons Emma, with assistance from Butterfly Conservation NI Branch members and NIEA staff, has been monitoring the eight known breeding colonies. For the majority of these sites, Emma's research has provided the first year-on-year data on colony size, fluctuations and patterns and shows Marsh Fritillary web counts stable or increasing at all sites.

Since 1999 and the development of the Species Action Plan, the east side of NI, especially County Down with sites such as Murlough, Aughnadarragh Lough and Ballykilbeg, has been home to most known populations. However, in County Fermanagh, a former stronghold for the species, the



Map of West Fermanagh showing the locations of the new breeding sites for Marsh Fritillary. (map kindly provided by NIEA)

With the Marsh Fritillary butterfly still in serious decline across Europe and with England and Scotland reported to be losing colonies every year, Northern Ireland's sites for this iconic species are becoming more and more important.

number of known breeding colonies had declined to just one, at Glenasheevar. With Emma's research showing a marked increase in populations in the east of NI, it was always a puzzle why Marsh Fritillary should not have been more prevalent in the west.

The situation changed dramatically in autumn 2006 however when the EHS Habitat Survey Team (now NIEA) was surveying Purple Moor-grass and rush pasture habitat at Glen West in County Fermanagh – a remote area on private land rarely visited, when a number of Marsh Fritillary webs were found.

This was an important new discovery, resulting in a further search of the area with a larger team. In total over 200 webs were found on a spur of raised ground cutting across a bog, supporting wet grassland rich in Devil's-bit Scabious. It was estimated that there could actually have been between 500 and

1000 webs in total, potentially the biggest population in Northern Ireland.

And there was hope of even more. The site is surrounded by a landscape dominated by swathes of suitable habitat forming an intricate mosaic with wet heath both supporting an abundance of Devil's-bit Scabious – known by the locals as 'blue button'.

Such species-rich communities tend to occur only where land management is not intensive, in particular where traditional farming practices have been maintained. As a result, it is not a widespread habitat in Northern Ireland and is often fragmented, consisting of individual fields, parts of fields or banks. In west Fermanagh, species-rich grasslands and heaths are widespread, particularly where traditional management practices are maintained.

In 2007 nine new Marsh Fritillary

sites were found in County Fermanagh. NIEA propose to declare a number of these sites as Areas of Special Scientific Interest (ASSIs) for their grassland, heath and moor notably the Marsh Fritillary butterfly and Butterfly Conservation would like the international importance of this area acknowledged by designating it a Special Area of Conservation.

Wind turbine proposals are now playing a valuable role in helping discover new Marsh Fritillary colonies. Such projects require detailed Environmental Impact Assessments so sites that would otherwise go unnoticed are now subject to a detailed audit. One new site has been identified in this way at Teiges Mountain in southwest Fermanagh within 10km of another new colony on Golan Big in County Tyrone.

Our known Marsh Fritillary sites have now more than doubled in number over the past two years with 18 sites now known. It will be some time yet before all the potential habitat in the west of the province has been surveyed for this species but our recent discoveries already ensure it has a brighter future in Northern Ireland.



One of the newly discovered sites for Marsh Fritillary at Towermore, Co. Fermanagh. The purple flowers of Devil's-bit Scabious dominate the site. (Maurice Hughes)

Contact:
Maurice Hughes
mhughes@butterfly-conservation.org

This project is funded by the Northern Ireland Environment Agency (NIEA). Butterfly Conservation NI work in collaboration with NIEA and Quercus (Northern Ireland's research centre for biodiversity and conservation biology) at Queens University, Belfast.

Saving the High Brown Fritillary in Wales



Volunteers at work managing the Bracken and scrub. (Richard Smith)

The project has been working to implement a programme of habitat restoration and management work to halt the decline of the High Brown Fritillary at the sole remaining site. A combination of mechanical bracken and scrub cutting by staff and volunteers was used over four winters where restoration potential was high. In 2005 an experimental 1.5 hectare area was fenced to allow the introduction of heavy horses from a neighbouring farm. This combination of grazing and trampling by the horses has helped to prevent further scrub encroachment. Following the success of this work a further 13 hectares was fenced. The use of heavy grazing animals will hopefully extend the length of time the habitat remains suitable for the butterfly and allow volunteers to work on improving areas elsewhere on the site.

The butterfly has responded very well, with both significant overall population increases each year and the appearance of the species on every individual habitat patch managed the previous winter.

In May 2006, habitat quality assessment was carried out to compare the data collected in 2002. The work has had a fantastic effect with a doubling in the percentage cover of violets from 3.0% to 6.3%. Other indicators such as bracken litter, grass, moss and sward height all showed favourable change. As well as measuring vegetation, caterpillar searches found six High Brown Fritillary caterpillars and one

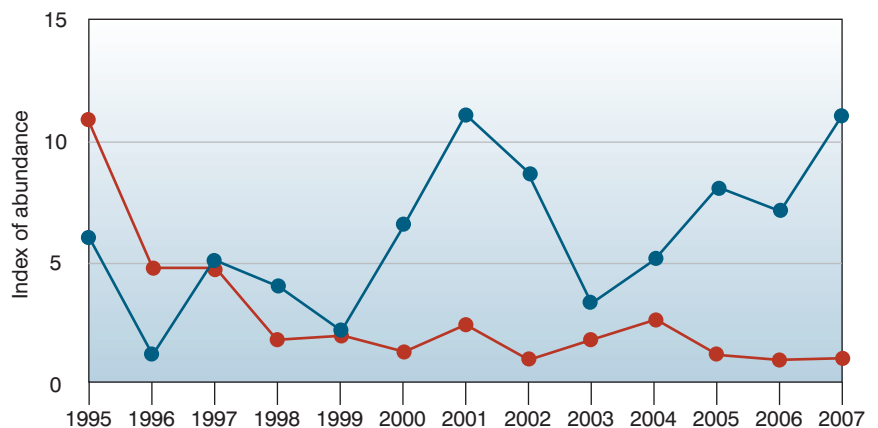
Dark Green Fritillary caterpillar in the restored habitat patches, confirming successful breeding in these areas.

Now that the population is secure, future work will concentrate on restoring suitable habitat nearby to allow re-colonisation and ensure a sustainable population of the butterfly in the long-term.

Contact:

Russel Hobson
rhobson@butterfly-
conservation.org

This project has been funded by Welsh Assembly Government (Aggregates Levy Sustainability Fund), Countryside Council for Wales (Species Challenge Fund), and Vale of Glamorgan County Borough Council. The practical work and monitoring has been led by Butterfly Conservation South Wales Branch, Glamorgan Heritage Coast Countryside Service and many local volunteers and contractors. We are grateful to the owner for providing access and support for this work.



The abundance of High Brown Fritillary recorded on the transect is steadily increasing (blue line) thanks to active bracken management in comparison to an 85% decline nationally (red line).

The High Brown Fritillary is one of our most threatened butterfly species in the UK and in Wales is now only found at one site, the Alun Valley, South Wales. Since 2003 a partnership of local volunteers led by Butterfly Conservation, has been working to save this last remaining population.

The High Brown Fritillary showing the characteristic markings on the under-wing.
(Peter Eeles)



Managing our wooded landscapes in south east England



Active woodland management, such as coppicing, is required for the most rapidly declining woodland species. (Dan Hoare)

The South East Woodlands Project is a three-year programme to stop the declines of some of our rarest woodland butterflies and moths and promote sustainable woodland management.



The Small Pearl-bordered Fritillary, a rapidly declining species in our woodlands.
(Gareth Knass)

This partnership project with Forestry Commission England uses a combination of targeted habitat management, advisory work and grant aid, to enhance some of our most important woodland sites and develop best practice guidance to inform woodland management across the region.

Changing woodland management practices over recent decades, including the decline of coppicing and moves towards 'continuous cover' forestry, have led to a collapse in populations of many woodland specialist butterflies and moths, indicating a broader biodiversity crisis in our woods. Species such as the Pearl-bordered Fritillary and Duke of Burgundy are disappearing from the region at an alarming rate, and are indicators of a loss of open, sunny habitats within woodlands.

The South East Woodlands Project is exploring how to make modern woodland management sustainable while incorporating biodiversity. It aims to conduct

management on a sufficient scale to provide a range of habitats and coordinate management across ownership boundaries to improve connections between woodland fragments.

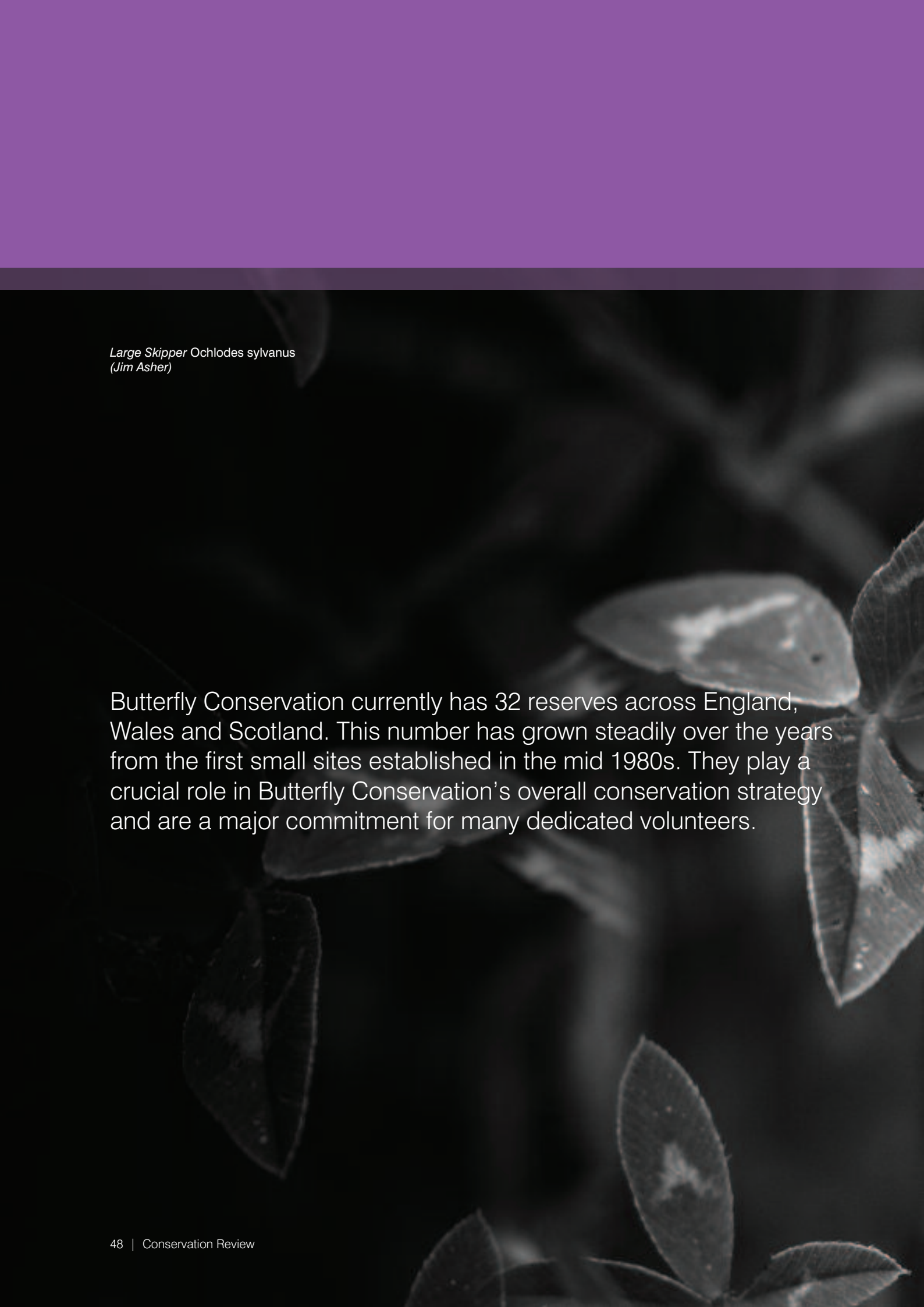
The project focuses on three wooded landscapes: the Denge Woods in Kent, the Rother Woods in East Sussex and the Tytherley Woods on the Hampshire/Wiltshire border, but also supports our conservation work at other key woodlands across the region. These landscapes, which together encompass nearly 50,000 hectares, are being turned into demonstration areas, each with a dedicated Project Officer providing expert advice and assistance to woodland owners, training woodland managers and volunteers, and implementing a programme of habitat improvement. Targeted habitat management for key species in each area is being supported by grants from Forestry Commission England and other funders, and the results are being closely monitored with the help of volunteers to provide

examples of best practice management.

At the same time, we are working to ensure that broader developments in forestry such as woodfuel are implemented in the right way, providing positive outcomes for wildlife and reinvigorating the woodland economy. Local partnerships have been formed to draw together skills from commercial forestry, small woodland owners, wildlife enthusiasts, statutory agencies and conservation groups, and the project is providing a variety of free training in everything from wildlife identification to technical land management. Examples of good practice from the demonstration areas will be incorporated into resources that can promote better woodland management across the country.

Contact:
Dr Dan Hoare
dhoare@butterfly-conservation.org

This project is funded by the Heritage Lottery Fund, the Tubney Charitable Trust, and Forestry Commission England. We are grateful to the many organisations and individuals who have supported this project including Hampshire County Council, the High Weald AONB, the Kent Downs AONB, Southern Water, Ownwoods Ltd, the Ernest Kleinwort Charitable Trust, the Manifold Trust, the Ian Askew Charitable Trust and contributors to the South East Woodlands Appeal, as well as the many Butterfly Conservation volunteers who have given their support.

The image features a purple gradient bar at the top. The background is a dark, monochromatic photograph of a butterfly perched on a leaf. The butterfly's wings are spread, showing a pattern of light and dark spots. The leaf it is on is also visible, with some lighter spots. The overall tone is dark and artistic.

Large Skipper *Ochlodes sylvanus*
(Jim Asher)

Butterfly Conservation currently has 32 reserves across England, Wales and Scotland. This number has grown steadily over the years from the first small sites established in the mid 1980s. They play a crucial role in Butterfly Conservation's overall conservation strategy and are a major commitment for many dedicated volunteers.

Butterfly Conservation's nature reserves



Introduction to our nature reserves



The geographical distribution of BC's reserves reflects both volunteer resources as well as opportunities to acquire sites matching our conservation priorities.

1. Holtspur Bottom.
2. Caeau Ffos Fach,
3. Little Breach.
4. Lydford Old Railway
5. Broadcroft Quarry.
6. Lankham Bottom
7. Perryfields Quarry.
8. Alners Gorse
9. Eyarth Rocks.
10. Mabie Forest
11. Prestbury Hill.
12. Bentley Station Meadow.
13. Magdalen Hill Down
14. Yew Hill.
15. Caederi
16. Millhoppers Pasture.
17. Allt Mhuic
18. Snakeholme Pit.
19. Southrey Wood
20. Catfield Fen.
21. Prees Heath Common
22. Haddon Moor.
23. Mount Fancy Farm
24. Stoke Camp.
25. Thurlbear Quarrylands.
26. Oaken Wood
27. Park Corner Heath.
28. Ryton Wood Meadows.
29. Shipley Railway Station Meadow.
30. Grafton Wood
31. Monkwood.
32. Trench Wood

Our reserves are held under a variety of tenure arrangements, from ownership or leases to joint management agreements with other bodies. These holdings currently cover 675 hectares of land of which 280 hectares are designated SSSI. Of the SSSI part of our holdings 95.3% is currently assessed as being in favourable condition. Of the 13 hectares in unfavourable condition 8.5 hectares is now recovering thanks to our management. The remainder is currently classified as no change, largely due to factors beyond our control.

Our strategy for reserve acquisition is focussed on the presence of Priority butterfly and moth species and opportunities for the conservation of significant populations of declining species. Such sites usually also have good assemblages of commoner species. Our goal is for the reserves to be at the core of landscape scale conservation and restoration projects.

Over two-thirds of our reserves are grasslands or predominantly open grassy habitats, reflecting the importance of these habitats for threatened butterflies and moths. Calcareous grassland is most commonly represented on our reserves, with examples on chalk and limestone and clay. Sites supporting 'neutral' and other grassland communities (including bracken and other acidic vegetation) or woodland, are the next most common categories. There are mosaics and mixtures of habitats within all sites, with scrub an important habitat element for the grasslands, as are rides and other openings in woodlands. Four of our reserves are 'brownfield' sites (such as quarries and landfill – see page 32) which reflects the increased conservation



Re-created chalk grassland at Magdalen Hill Down encouraged by soil stripping (John Davis)

significance of this habitat type. Most of our reserve habitats are of high conservation importance and include Priority UK BAP habitat types. Two reserves are within European designated sites, such as Special Areas of Conservation (SAC).

Three-quarters of the 24 UK BAP priority butterfly species occur on Butterfly Conservation reserves. These include new priorities such as Dingy and Grizzled Skippers and White Admiral.

Over the last few years Butterfly Conservation volunteers have been actively researching the moth fauna of our reserves and have found many important species such as the Dingy Mocha, Striped Lychnis and Drab Looper.

Our reserves allow us to investigate and demonstrate how to maintain the habitats of threatened Lepidoptera. With them we can also provide ideal places for people to see threatened species or just enjoy an abundance of wildlife.

Habitat restoration

On a number of reserves, important habitat restoration and re-creation is being undertaken to ensure that the populations of threatened butterflies and moths can expand and become less isolated in the landscape.

Examples include the re-creation of heathland for the Silver-studded Blue on Prees Heath Common, its last refuge in the whole of the West Midlands (see page 52). At Magdalen Hill Down in Hampshire the original chalk downland reserve (9.6 hectares) has been enlarged with successive extensions onto adjoining, former arable land where 36 hectares of chalk grassland is being re-created with seed from downland sites in the county. The techniques used include scarification, soil stripping, chalk scrapes and planting some species as plugs. Some of the land had been under arable cultivation for over 30 years and the impressive results make it an important demonstration site and draw many visitors. Chalk grassland



White Admiral a new UK BAP Priority Species that occurs in many of our reserves. (Robert Thompson)



*Restoration of our reserve at Magdalen Hill Down and habitat re-creation has been a success for many chalk species such as the Chalkhill Blue *Polyommatus coridon*. (Jim Asher)*

has also been successfully re-created on a former arable field at Holtspur Bottom in Buckinghamshire. In both cases the Small Blue *Cupido minimus* is a notable colonist.

At Broadcroft Quarry on the Isle of Portland in Dorset, excavator-bucket scrapes have exposed the limestone infill of this former quarry, reversing the vegetation succession. The developing flora is now suitable again for the Silver-studded Blue butterfly, their associated black ants (*Lasius* spp.) and a range of specialist bare-ground loving invertebrates.

Landscape scale

Over the past ten years, our reserves have been consolidated through acquiring extensions and ensuring better management of nearby land, bringing some significant conservation gains. Many reserves now play important roles in delivering conservation at the landscape scale.

Particular examples include our Caeau Ffos Fach reserve in south Wales which is at the centre of the Mynydd Mawr Project (see page 24). The Neroche Scheme in Somerset's

Blackdown Hills is a large partnership project led by Forestry Commission England and supported by the Heritage Lottery Fund and local authorities. Through this project, hundreds of hectares of open forest habitat are being re-created through the felling of conifer plantations and the establishment of large forest-grazing units, currently being grazed by Longhorn cattle. These open areas are re-connecting our Mount Fancy Farm reserve and other sites that are managed by volunteers from Somerset & Bristol Branch to allow species movement and colonisation.

Most management on our reserves is achieved by our members, a dedicated and knowledgeable volunteer workforce. They also carry out the monitoring and run many events for the local community. Butterfly Conservation Branches are also involved in the management of many additional 'informal' reserves – key sites for butterflies and moths that are owned by others. We see this flexibility of approach in securing the management of 'reserves' in the broadest sense as a major advantage in achieving landscape scale conservation for our threatened Lepidoptera.

Contact:

John Davis

jdavis@butterfly-conservation.org

We would like to thank the many hundreds of volunteers who give a huge amount of time to improve and manage our reserves. The reserve work is funded by a range of charitable trusts, donations, grants and schemes such as Environmental Stewardship and Reserves Enhancement Scheme.

Focus on Prees Heath Common reserve

*A mating pair of Silver-studded Blues.
(Mark Eccleston)*



Securing the reserve has involved working in partnership with Natural England and Shropshire and Cheshire Wildlife Trusts, with the support of the Prees Heath commoners and local residents. Two public appeals resulted in generous donations from Butterfly Conservation members and the public. This, together with funding from GrantScape, has enabled the purchase and restoration project.

The reserve provides the last remaining sanctuary for the Silver-studded Blue *Plebeius argus* in the English Midlands on fragments of its lowland heathland habitat. Prees Heath Common has witnessed a wide range of uses over the years, many of which have been of a military nature. It was used as a muster point by Royalist forces in the Civil War, and in World War One it became a large trench warfare training camp, with 25,000 men being accommodated on site before being sent to the frontlines. In World War Two it became a bomber training airfield (RAF Tilstock).

After the airfield was decommissioned parts of the Common were let on agricultural tenancies, resulting in intensive arable cultivations and the application of huge quantities of chicken manure. The concrete on the



*Volunteers on the Big Clean-up.
(Mike Williams)*

Butterfly Conservation purchased the western half of Prees Heath Common (60 hectares) in north Shropshire in May 2006. This was the outcome of an extremely long campaign, dating back to 1983, to secure the site.

old runways and the perimeter road was hacked up but not removed. Fortunately this prevented the areas from being ploughed and saved valuable fragments of heathland habitat, with calcium leaching from the concrete providing conditions for some distinctive flora. It is on and around these areas that the Silver-studded Blue butterfly can be seen flying from mid June to early August, coinciding with the flowering of Bell Heather, an important source of nectar.

When the reserve was purchased much of it was in a derelict condition having been used for fly-tipping and motorcycling. Ditches and banks have now been improved or constructed to prevent illegal vehicle access and a vehicle barrier gate and kissing gate installed at the main pedestrian access point.

Through years of neglect, scrub had started to dominate the heathland areas and has only been held in check by grazing rabbits and, over the last two decades, by management work by Butterfly Conservation West Midlands Branch volunteers. They also cut some of the heather in rotation to maintain its suitability for the Silver-studded Blue and the colony has continued to survive in good numbers. Since acquisition of the reserve, the heathland restoration process has increased. However, a Tree Preservation Order applies to the whole of Prees Heath Common and so consent had to be obtained to selectively thin the birch and willow trees shading out the heather. Volunteers have also been active in cutting back the invasive gorse.

The most ambitious piece of work that Butterfly Conservation is carrying out is an attempt to return the arable areas to heathland and acid grassland. Following analysis of the



Work to restore the arable areas of the reserve to heathland and grassland has involved deep ploughing to invert the enriched topsoil. (Stephen Lewis)

highly enriched and modified soil profile and discussion of the various options with Dr Phil Putwain of Liverpool University, a decision was made to invert the soil by deep ploughing using a specialist plough hired from Landlife. This was carried out on 25 hectares in March 2007 and effectively buried the enriched topsoil to expose the sandy subsoil. Since then different parts of these areas have been sown with locally sourced wildflower and grass seed, and the application of heather brash harvested from Cannock Chase. Already heather seeds have begun to germinate.

Another objective of the reserve plan is to re-create a wetland in an area that was known to be marshy before it was drained. This will increase the biodiversity of the site, attracting birds such as lapwing, curlew and snipe, and provide conditions suitable for wet heath vegetation and maybe even arousing the interest of water voles, which are present nearby. This work will be done in partnership with the Environment Agency.

As a new reserve, a comprehensive botanical and entomological survey was conducted to provide a baseline assessment to

measure progress. The varied flora included Pyramidal Orchid, Slender St Johns Wort, Common Bird's-foot-trefoil and Heath Dog-violet and it is hoped that species richness will increase following the restoration work. Small Copper *Lycaena phlaeas* and Small Heath *Coenonympha pamphilus* butterflies are present in good numbers as well as day-flying moths. A desk-top archaeological survey was completed prior to the deep ploughing.

The restoration of Prees Heath Common Reserve is a long-term project but the significant progress so far, with the help of partner organisations, commoners, local residents and volunteers, means that much will be achieved in the years ahead.

Contact:
Stephen Lewis
slewis@butterfly-conservation.org

This work is funded and supported by GrantScape, Waste Recycling Group, Natural England, Shropshire Wildlife Trust and Prees Heath commoners.

Purple Emperor *Apatura iris* (Peter Eeles)

Butterfly Conservation collects and manages some of the largest and most significant data sets on Lepidoptera held anywhere in the world (see section on survey and monitoring) and we are justly proud of the immense use this data has been put to by the Scientific community. Our data has been used for some of the most innovative and ground-breaking research, such as on the effects of climate change.

Research collaborations



Butterflies and climate change



Red Admiral (Martin Warren)



Britain's uplands are highly sensitive to climate change. (Alan Barnes)

Butterflies are highly sensitive to climate and comprehensive baseline data exist thanks to the unique data sets assembled by Butterfly Conservation and its partners through the Butterflies for the New Millennium (BNM) and UK Butterfly Monitoring Scheme (UK BMS) projects (see pages 6 and 10).

In Britain, most butterflies reach a climate-induced limit to their range (either a northern or southern range margin) and many show local adaptation to less than ideal climatic conditions. Using BNM and UK BMS data, a wide range of climate change impacts has already been demonstrated for British butterflies. Northward extensions of range margins, consistent with a climate change explanation, have been identified for 25% of 'southern' butterflies (species with a northern limit) and range contractions to higher latitudes and altitudes for three (Northern Brown Argus, Mountain Ringlet *Erebia epiphron* and Scotch Argus *E. aethiops*) of the

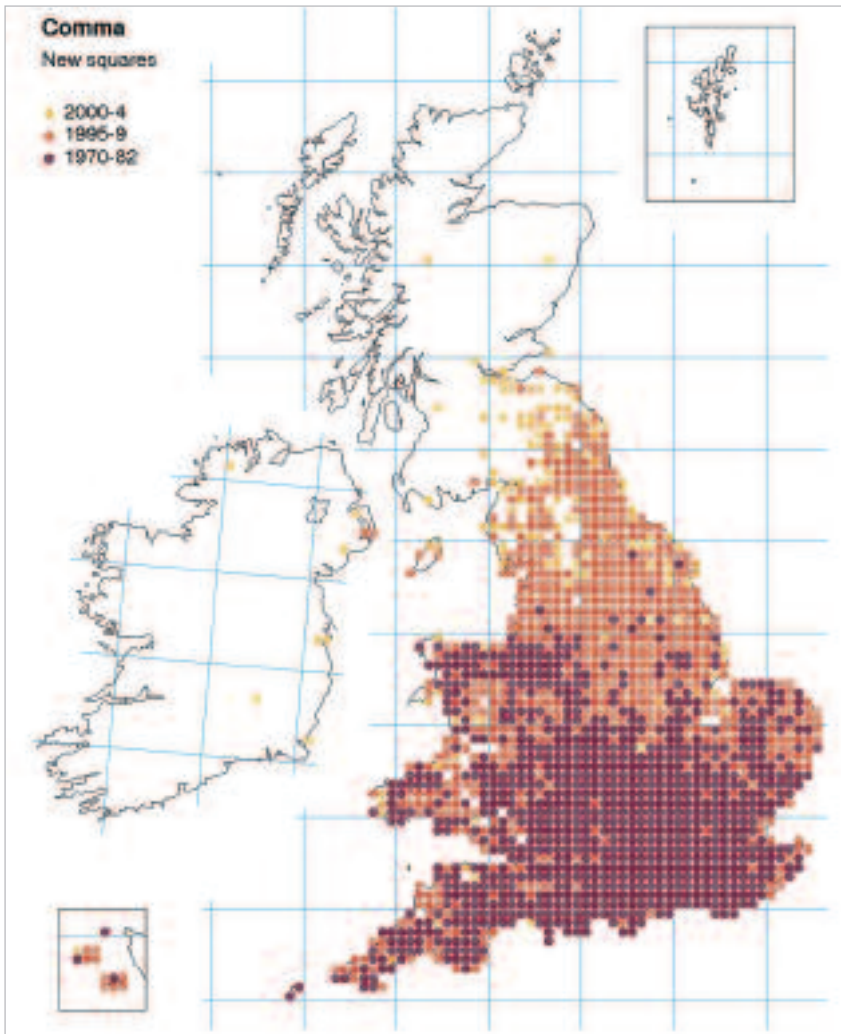


The Mountain Ringlet, Britain's only montane butterfly species, is threatened by climate change. (Ken Willmott)

four species with southern range margins.

Modelling of butterfly distributions and climate variables has increased confidence that these observed changes in species' distributions are not only consistent with those predicted from climate change, but are a genuine response to it. Such models have also been used to predict the future ranges of butterflies in Britain and across Europe under different climate change scenarios. The results warn of severe declines

Butterflies provide an excellent model group for the study and assessment of climate change effects on biodiversity in Britain and beyond.



Comma butterfly. (Robert Thompson)

The Comma is a wider countryside species that has extended its range rapidly northwards in Britain since the 1970s.

appear capable of successful overwintering. The distributions of all these species are expected to continue increasing over the next decade or two. Most are also becoming more abundant and many British butterflies are flying earlier in the year, enjoying longer flight periods and, in some cases, additional generations.

The mechanisms by which butterflies respond, favourably or adversely, to climate change are the focus of ongoing research.

Contact:
Richard Fox
rfox@butterfly-conservation.org

The Centre for Ecology and Hydrology is the main partner in Butterfly Conservation's recording and monitoring programmes for butterflies. Research collaborations have been undertaken with numerous universities and other organisations. The principal collaborations for climate change research using butterfly data have been with York, Leeds, and Durham Universities.

not just for 'northern' species but, when realistic assumptions of habitat availability and butterfly dispersal are incorporated, also for many 'southern' species that are reliant on semi-natural habitats.

The distributions of many butterflies in Britain, even wider countryside species such as the Speckled Wood *Pararge aegeria*, are lagging behind climatic changes because of habitat loss and fragmentation. Nevertheless, many 'southern' wider countryside

butterflies seem to have benefited from climate change in Britain over recent decades, increasing both their distributions and population levels at monitored sites (e.g. the Peacock *Inachis io*, Comma *Polygonia c-album* and Ringlet *Aphantopus hyperantus*). In addition, whilst no new butterflies have colonised Britain or Ireland during the current period of rapid human-induced climate change, two immigrant species (the Clouded Yellow *Colias croceus* and Red Admiral *Vanessa atalanta*) now

The Upper Thames project – farming for moths



Study areas. Targeted areas (shaded ellipses), in which farmers had been systematically targeted to take up Agri-environment schemes (AES), and control areas (clear ellipses) are adjacently situated within the lowland agricultural Upper Thames area of southern England. Shaded polygons represent land under AES.

Moths are considered a sensitive indicator group for measuring biodiversity in terrestrial ecosystems and are indicative of many other insect groups. They form a large part of and play a key role within terrestrial ecosystems in general, and agricultural ecosystems in particular. Rapid and significant declines have been recorded for many common and widespread moth species that inhabit farmland in the UK. Nevertheless, they have hitherto been little studied in relation to the impacts of farmland management.

Agri-environment schemes (AES) provide financial support to farmers for adopting environmentally-friendly ways of managing land. Their implementation is currently considered the key policy instrument through which to reverse widespread biodiversity declines, such as the often severe declines of farmland moth species. However, there is ample room for increasing the cost-effectiveness of these schemes.

Our five-year research project addresses this optimisation issue in three ways: (i) by contrasting the benefits of features that are extensive



The Pale Shining Brown is a UK Biodiversity Action Plan species. In 2006, the strongest known colony in Britain was discovered in the Upper Thames area. (Maarten Jacobs)

within agricultural landscapes (e.g. field margins, hedgerow trees), (ii) by contrasting the impacts of different habitat management practices within AES (e.g. hedgerow flailing), and (iii) by investigating the impacts of an experimentally increased AES uptake at the landscape scale. We achieved these higher levels of scheme uptake by targeting farmers in specific areas within the Upper Thames catchment, encouraging them to take part in the AES and actively supporting them. Such landscape-scale targeting contrasts with the usual method of AES uptake, which depends on

farmers making a voluntary effort to apply for AES (see map). Targeting, in general, is currently seen as a key issue in enhancing the ecological benefits of AES, but so far very little empirical evidence exists that it works.

One of our main results so far, resulting from light trapping for adult moths, shows that one way of enhancing the cost-effectiveness of the current AES would be to apply a targeted landscape approach, including financial incentives for management of hedgerow trees to increase their density and improve age structure. Ongoing research focuses on differential impacts among feeding guilds, among moth families, and even among species, of the presence of wide field margins and hedgerow trees, and of hedgerow flailing. These differential impacts are then interpreted in terms of differences in mobility with data obtained from capture-mark-recapture experiments. We are also looking in closer detail at habitat use and mobility of the Pale Shining Brown *Polia bombycina*, as this formerly widespread UK BAP species, has been discovered in one of our study areas.

Contact:


Dr Thomas Merckx
thomas.merckx@zoo.ox.ac.uk

Butterfly Conservation is the main partner of this research project which is part of the Upper Thames Project (Wildlife Conservation Research Unit, Department of Zoology, University of Oxford). This work is supported by a grant from the Esmée Fairbairn Foundation, within a project framework funded by the Tubney Charitable Trust.

Larger moths are an ecologically diverse and species-rich group, occurring abundantly in farmland landscapes. They are an important food resource for other invertebrates, bats, birds and small mammals.



Typical farmland habitat within the study area, one of the locations for Pale Shining Brown. (Thomas Merckx)



Large Blue *Maculinea arion*
(Martin Warren)

Butterfly Conservation (UK) helped to found Butterfly Conservation Europe in 2004 to act as an umbrella body to stem and reverse the rapid decline of butterflies and moths across Europe.

International



Butterfly Conservation Europe



Scarce Large Blue Maculinea teleius a threatened species across Europe. (Stephen Davis)



BC Europe operates through a network of non-governmental and governmental organisations which join as Network Partners or Associates respectively. Member organisations agree to work together under a set of Operating Principles to ensure good collaboration with minimum bureaucracy.

So far 35 organisations have agreed to become Network Partners, representing 32 countries. Contact points have also been arranged in several other countries where there is not yet an obvious lead organisation. Partners range from specialist Lepidoptera NGOs, and Entomological Society's, to Research Institutes and Museums. They bring together a vast wealth of expertise and experience to help achieve shared goals.

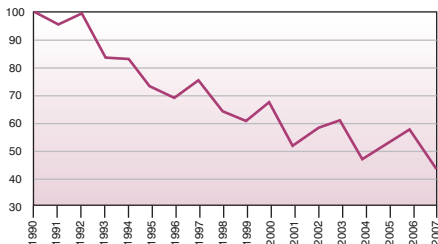
BC Europe is run by a small Board and its Patron is Sir David Attenborough.

Achievements

In just four years BC Europe has already developed some exciting new initiatives across Europe.

Working closely with representatives from Bulgaria, BC Europe published a ground breaking book on the Prime Butterfly Areas of Bulgaria. This highlighted the incredibly rich nature of Bulgaria and the current inadequacies of the protected areas system in the country. BC Europe has been working on using monitoring data

The organisation works with a wide range of partners in Europe to implement the Conservation on Biological Diversity with respect to butterflies and moths and their habitats, and to contribute to achieving the EU target of halting biodiversity loss by 2010.



The European Grassland Butterfly Indicator shows a strong decline: since 1990 numbers have dropped by almost 60%, outweighing the small annual variations, mainly caused by weather effects. (Graph provided by Butterfly Conservation Europe/Statistics Netherlands)



BC Europe has demonstrated that montane grassland butterfly species are rapidly declining and highly threatened. (Chris van Swaay, Dutch Butterfly Conservation)

The inaugural meeting of partners was held in Laufen, Germany in October 2007, attended by over 50 delegates from 31 countries. Priorities for the new partnership and conference resolutions were agreed. The conference stated that butterflies are important flagships of Europe's wildlife. They are indicators of the health of Europe's environment and action to save them will contribute to the wellbeing of all citizens.

The conference called on Governments at European, National and Regional levels to take determined action to stop this serious loss of biodiversity.

from across Europe to produce an environmental indicator, recently publishing a grassland trend (see graph), which highlights a widespread decline in grassland butterflies across Europe.

BC Europe and its partners have developed a climate change atlas that predicts the northward move of butterflies across Europe also demonstrating the threat for many specialist mountain species. BC Europe is currently working on a

revised Red Data book for European Butterflies that will highlight the widespread declines of many of our species.

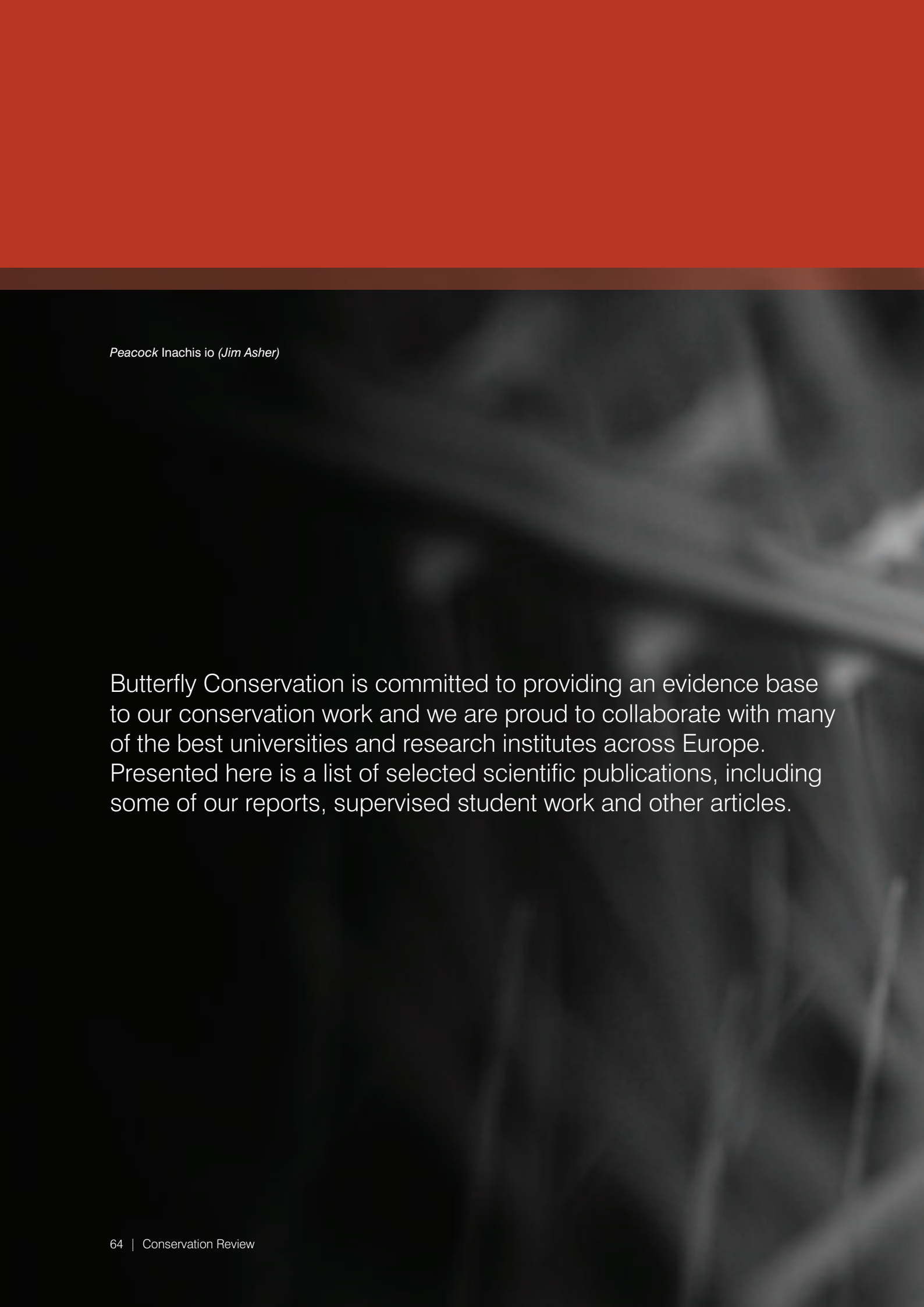
This breadth of information is vital as we educate and lobby within Europe for the policy changes necessary to save our butterflies.



Contact:
Dr Martin Warren
mwarren@butterfly-conservation.org

BC Europe is extremely grateful to the numerous people and organisations who have helped found the new group and to the representatives of the Network Partners who have given their time and expertise.

Details of BC Europe, including partner organisations and proceedings of the Meeting can be found at www.bc-europe.org



Peacock Inachis io (Jim Asher)

Butterfly Conservation is committed to providing an evidence base to our conservation work and we are proud to collaborate with many of the best universities and research institutes across Europe. Presented here is a list of selected scientific publications, including some of our reports, supervised student work and other articles.

Publications



Selected publications in scientific journals, proceedings and books (from 2000 to 2008)

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Marsh Fritillary Euphydryas aurinia (Robert Thompson)

Head Office

Manor Yard
East Lulworth
Wareham
Dorset
BH20 5QP
Telephone: 01929 400209
Email: info@butterfly-conservation.org
www.butterfly-conservation.org

**Butterfly Conservation Northern
Ireland**

Slemish Complex
Knockbracken Healthcare Park
Saintfield Road
Belfast
BT8 8BH

Butterfly Conservation Scotland

Balallan House
Allan Park
Stirling
FK8 2QG

Butterfly Conservation Wales

10 Calvert Terrace
Swansea
SA1 5AR



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