

The Large Blue and the Trust

There has been considerable progress with the Large Blue butterfly reintroduction programme since 2001. 2004 was a particularly successful year for the butterfly. These exciting new developments are explained by Matthew Oates, the Trust's butterfly specialist.

The Large Blue *Maculinea arion* is the only British representative of a group of six species globally, five of which occur in Europe. All six are in serious decline and are classified by IUCN as being either endangered or vulnerable at global and European levels (IUCN, 1990). One of them (*M. rebeli*) occurs only in Europe.

In effect, large blue butterflies can be ranked amongst the most vulnerable species in the world. In Europe, the Large Blue still occurs in 37 countries but it has declined by some 50-80% in recent decades overall and its status is deemed stable in only seven countries (Van Swaay & Warren, 1999). Its decline has been particularly severe in northern Europe. Conservationist scientists in the UK are spearheading attempts to conserve the Large Blue in northern Europe. The National Trust is a key player in that process.

The ecology of all six large blues is unusually complex, involving vital associations between their larvae and particular species of red ants from the genus *Myrmica*. The larvae of all six blues feed for a short time on a species of plant before being adopted by ants and taken to ant nests where they become predators of ant broods. Research suggests that four of the five European species are associated with single species of ants; the fifth (*M. alcon*) is associated with different ant species in different parts of its range. However, a considerable amount of research is happening at this moment, with new and often amazing discoveries being made with increasing regularity. The ants themselves have highly specific habitat requirements. For details see Elmes & Thomas, 1992, or Thomas, 1995.

In February 2002, a four year European project was launched to investigate crucial aspects of the ecology of the European Large Blues and associated scarce wildlife, funded through the EU Fifth Framework Programme. This is called the MacMan Project (effectively, *Maculinea butterflies as tools for conservation management*), and involves eight principal partners in six European countries. The project staged a successful conference in Budapest in January 2004. For further details check out www.macman-project.de. Further details will be presented at the Butterfly Conservation symposium at Southampton University on 8th-10th March 2005.

The National Trust is an active partner in the Large Blue Recovery Programme and on the Large Blue Committee. The recovery programme is a partnership made up of a variety of organisations and individuals, including Butterfly Conservation, the Centre for Ecology & Hydrology (formerly ITE), English Nature, and the wildlife trusts for Cornwall, Gloucestershire and Somerset.

The partnership seeks to further the conservation of the Large Blue in Europe and, in particular, to re-establish the butterfly at sustainably-managed sites in England. Scientific expertise is provided by Dr Jeremy Thomas of CEH. David Simcox, who has worked as Jeremy's assistant for many years, is employed as a part-time Project Officer.

Introduction to the Ecology of the Large Blue

In the UK, the Large Blue adult season lasts for some three or four weeks during June and July, with the timing of the flight season varying from region to region and from year to year, with much depending on seasonal weather. Individual butterflies live for four to five days, on average, but they do not all emerge at once; indeed, individuals tend to emerge over a period of 10 to 20 days.

The female Large Blue lays her eggs in the buds of thyme (*Thymus*, particularly *T. polytrichus*) that are in the tight bud stage. This necessitates full synchrony between the bud stage of the thyme and the butterfly's flight season; this synchrony is ensured mainly through appropriate grazing. The eggs hatch after some seven to 14 days, depending on the weather.

Young larvae feed on thyme flowers for about two weeks during late July and early August. Then, they fall to the ground and are adopted by red ants and taken off to the underground ant nests where they feed on ant grubs. Any species of red ant will pick up the caterpillars, which secrete a sticky sugary substance which ants love.

The chemistry of this inter-relationship is complex and important, and the subject of on-going research. However, only large, queen-less colonies of a single species of red ant, *Myrmica sabuleti*, produce the right number of suitable grubs for the larva. Even in nests of this ant the larvae are seldom secure, for if a queen ant is present she will secrete chemicals that encourage the workers to attack large grubs that could become potential queens, and Large Blue larvae closely resemble such large grubs (Thomas & Wardlow, 1990). Moreover, if more than one Large Blue larva enters a single ant nest the ant brood is quickly consumed and the larvae consequently starve. So, frequent and large nests of this single species of ant are essential to the Large Blue. The larva spends 10 months as a predator in the ant nests, then pupates there.



©National Trust

Large blue larva being carried to red ant nest

M. sabuleti is a warmth-loving ant that thrives in short, arid grassland on hot south-facing slopes that are heavily grazed. If the grass is allowed to grow higher than 3-4 cm this ant rapidly dies out and other species of ant take over, which cannot support Large Blue colonies. Ant density is adversely affected by cool, wet summers and spring droughts.

The butterflies emerge during the period mid June to mid July, after some three weeks in the pupal stage. Adult numbers tend to vary enormously at individual sites from year to year, as a result of the impact of seasonal weather on the habitat and the weather-sensitive ants, and as a result of habitat conditions generally. Currently, and indeed historically, the flight season is two or even three weeks earlier in some districts than in others.

Brief History of the Large Blue in England

Formerly, the butterfly occurred very locally in Cornwall, Devon, Somerset, Gloucestershire and a small part of Northamptonshire, though it was never known from all these areas at any one time. Strongholds existed during various eras along the north Cornwall and north-west Devon coast and, briefly, along the mid south Devon coast and in the Cotswolds.

Most populations occurred in remote areas. Colonies tended to appear and disappear over short periods of time. Various attempts have been made to document this peculiar and fascinating history, notably by Spooner (1963), Thomas (1989) and Feltwell (1995) and, most recently, a detailed account for Cornwall has been produced by Lee (2000).

The Large Blue was avidly hunted by butterfly collectors, especially during the Victorian and Edwardian eras when butterfly collecting was a popular pastime. Only one other species was

so diligently sought, namely the elusive and arboreal Purple Emperor (*Apatura iris*). Some 3,000 British specimens of the Large Blue exist in museum collections today, and many more will have been lost or destroyed.

There is much speculation in the entomological literature about the impact of collecting on Large Blue populations, though the current consensus is that collecting may only have had an adverse impact locally and briefly. Before cars came into general use, an expedition in pursuit of arion was a major exercise in planning and logistics. To reach the cliffs around Bolt Head, south Devon, where the Large Blue abounded during the 1860s and '70s, collectors caught a train to Dartmouth, and then embarked on a packet steamer to Salcombe, from whence they walked. The north Cornwall coast, where the butterfly was discovered in 1891, was almost as difficult to reach, prior to the opening of the railway line to Bude in 1898.

Concern was expressed about the future of the Large Blue as early as the 1880s. Conservation effort for the species effectively began in 1895, when the great lepidopterist F.W. Frohawk embarked on what proved to be a twenty year pilgrimage to uncover the mysteries of the Large Blue's life cycle. Even once the butterfly's curious association with ants was discovered it was decades before the ecological requirements of the host ant and the true complexity of the butterfly's relationship with the ant were adequately understood.

The crucial pieces in the scientific jig-saw were added by Dr Jeremy Thomas during the 1970s. Sadly, this knowledge came fractionally too late to save the butterfly from extinction in England. Even now, it is likely that there are significant gaps in scientific knowledge, though that knowledge is increasing all the time.

In 1925, the Committee for the Protection of British Lepidoptera was formed, with the conservation of the Large Blue being one of its highest priorities. In 1930, a reserve was established for the Large Blue at The Dizzard, a sea combe on the north Cornwall coast. A local blacksmith called Ern Gliddon was employed to deter collectors, but the established practice of burning sections of the combe, on rotation, was terminated on the grounds that it might be detrimental to the butterfly. A large population promptly collapsed and the last Large Blue was seen there in 1939 (Lee, 2000).

With hindsight, it is clear that the butterfly was dependent on the practice of burning, together with grazing by rabbits and stock. These activities created suitable conditions for the warmth-loving ant and the necessary thyme-rich sward. By the time The Dizzard was acquired by the National Trust in 1968, the combe was severely choked by gorse and blackthorn scrub.



©National Trust
Gorse burning at Large Blue site

Factors leading to the Large Blue's Extinction

The Large Blue was declared extinct in the UK in 1979, following a lengthy period of decline. The reasons behind its loss are complex but, in effect, the butterfly got caught between the hammer of agricultural intensification and the anvil of neglect. Firstly, during the C20th there was a steady decline in stock grazing on the steep, rough hillside grazing land in the West Country that the butterfly favoured. In other words, marginal grazing land was steadily abandoned.

At the same time, agricultural intensification, and in particular the use of artificial fertilisers that promote vigorous grass growth at the expense of small wild flowers such as thyme, brought about many adverse changes, both on the Large Blue sites themselves, and on the intervening land that linked sites together. Then, the loss of rabbit populations to myxomatosis in the 1950s removed the only effective grazing animal from abandoned sites, for rabbits can keep the turf suitably short for the butterfly in the absence of adequate stock grazing.

Coarse grasses and, in particular, dense scrub developed rapidly on many sites. The final straw was the fact that the butterfly's complex ecology was not adequately understood. Many of the Large Blue's former sites may have deteriorated so much that they may never be made suitable for the butterfly again.

The ecology and conservation requirements of the Large Blue were clarified during the 1970s by Dr Jeremy Thomas, a government scientist and butterfly expert. Although his discoveries came too late to save the UK race from extinction, he was able to mastermind the introduction of a closely-similar race, from the island of Oland off the Swedish coast. This race was chosen because of ecological similarities between it and the old British race (notably the same flight time and the same foodplant). Interestingly, the butterfly is now in decline in Oland.

Secret 'Site X'

The last site to support the UK race, and the first site to receive introduced Swedish Large Blues, is on National Trust land in south Dartmoor. It is a small, rather damaged site that is not easy to manage. It does not readily lend itself to open access for a variety of practical reasons, not least because of the amount of scientific research that takes place there, though groups are shown around the site in most seasons. It is therefore kept as an open secret and is known within butterfly circles as 'Site X'.

The Trust would like to make Site X fully accessible, but the time is not yet right and access needs are being met elsewhere.

Here, the Large Blue was experimentally reintroduced in 1983, and once this proved successful a full reintroduction took place in 1986. Since then the butterfly has persisted despite a number of weather-related and sometimes management-related problems. Indeed, the butterfly has rather lurched from crisis to crisis, punctuated by short boom eras, largely because of difficulties in grazing the site to Large Blue specifications and the impact of adverse weather on a small population.

The gap between crises is steadily lengthening now, which is a good sign. With improved management, the Large Blue fared well on Site X during the late 1990s and fared spectacularly well there in 2000. However, it has since declined quite severely, as adults were adversely effected by poor flight season weather in both 2001 and 2002, and laid few eggs. This led to a small emergence in 2003.

All this is within the normal parameters of Large Blue population dynamics. Unfortunately, the site was under-grazed during the autumn of 2002 and the spring of 2003; these are the two critical periods for the Large Blue here, when grazing needs to be tight and precise in order to encourage the right ant densities. The impact of the late summer drought of 2003 has yet to be ascertained. 2004 could be a critical season for the Large Blue here.

The Trust has been grazing the slope carefully with its own small herd of Dartmoor ponies, cared for by the warden and the Trust's tenant farmer, Roger Hutchings, who also runs his cattle on the site. This grazing has to take account of fluctuations in the rabbit population, an added complication.

Clumps of gorse are burnt on a patchy rotation, to provide the warm sheltered glades and mosaic structure that the butterfly needs and to prevent the gorse from taking over. The Trust's management has improved the habitat considerably and the site is now, bar the odd hiccup, under sustainable management.

It is, though, a small site and the Trust needs to maximise conditions on the existing area and expand the area of suitable terrain to make the venture viable in the long term. Consequently, thousands of baby Wild Thyme plants have been planted out on to the site and, especially, on to the adjoining hillside (known as Site Y), in an effort to enhance and enlarge the Large Blue's breeding area.

Volunteers from Butterfly Conservation help with the thyme-planting, the site management and also with butterfly monitoring. The Trust could not manage without them. We are particularly grateful to David Land, of BC Devon branch, who puts in a considerable amount of time and effort at 'Site X'.



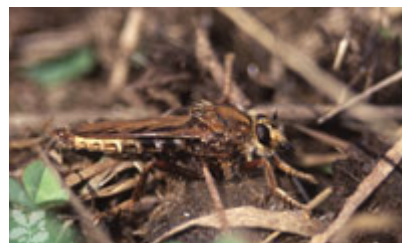
©National Trust
Site X from Site Y, Devon

The main problem with Site X is that it is too small to sustain a permanent Large Blue population by itself, and the main challenge for the Large Blue Project here is to enlarge the area utilised by the butterfly and establish a metapopulation structure. To date, the habitat quality on Site X has been greatly improved and the adjoining hillside, Site Y, has been made suitable.

Currently, the Trust is working with other partners to bring a 2ha paddock a little way up to valley into the Large Blue system. This is probably the paddock where the butterfly was first discovered on south Dartmoor in the 1930s. It is off Trust land, but the owner has agreed to lease it to the Trust so that it can be managed for the Large Blue and other scarce butterflies.

Prior to this management agreement most of the paddock consisted of tall dense bracken, which was too dense even for the associated fritillary butterflies. Cattle grazing has been restored to this paddock, called Site W, and the bracken is being reduced in order to make it suitable for Pearl-bordered Fritillary and High Brown Fritillary. Tree and scrub reduction is also being carried out to link Site W to Site X.

A range of other scarce animals and plants have benefited from the grazing and gorse-burning that is primarily aimed at assisting the Large Blue. Site X is therefore not an example of 'single species management'.



©National Trust
Hornet Robberfly

Several other scarce butterflies are thriving at Site X, including two of Britain's most rapidly-declining species, High Brown Fritillary and Pearl-bordered Fritillary, and two other scarce species, Small Pearl-bordered Fritillary and Grayling. A scarce violet, the Pale Heath Violet, has increased spectacularly on the site and is now abundant, offering wonderful purple haze vistas in spring. Also benefiting from management aimed at conserving the Large Blue are a rare bee-fly, the Hornet Robberfly, a beautiful green tiger beetle and, believe it or not, a scarce native cockroach.

In effect, the Large Blue is a 'flagship' species for a range of scarce plants and animals that favour hot, arid grassland slopes, all of which have undergone severe declines in the UK since Myxomatosis. Most important of all, the Trust's management of Sites X and Y would not be too different if the Large Blue was absent, for these other species require similar conditions.



©National Trust
Green Tiger Beetle

The management of the site is now arguably on a sustainable basis, partly as a result of funding from the Dartmoor ESA scheme. The main challenge now is to continue to extend the area of suitable habitat and to seek to restore comparable habitat within the wider landscape.

Other Potential Sites on National Trust Land

The National Trust has been associated with attempts to conserve the Large Blue since the 1920s. Many of the 90 or so colonies that have existed in England occurred on land now owned by the Trust, especially along the north Cornwall coast. However, the butterfly had died out from nearly all of them prior to Trust acquisition. Most of the former sites along the north Cornwall coast are now owned by the Trust, and the Trust also owns former sites along the south Devon coast and in the Cotswolds (see account by Oates, 1995).

In 2000, the butterfly was introduced to a large sea combe owned by the Trust on the north Cornwall coast, vaguely near Tintagel, which has been made suitable for the butterfly through cutting and burning of gorse, and grazing by hardy breeds of cattle and pony. The work started in 1994 when the combe's potential was realised. The bulk of this restoration work has been carried out by the warden, Derek Lord.

Some 10,000 baby Wild Thyme plants have been introduced. Ten female Large Blues and two males were released in this combe on 27th June 2000. These were the first Large Blues to fly in Cornwall since 1975. Also, 300 young larvae were carefully released there in mid July, having been hand-reared by David Simcox. This combe could support a sizeable colony within a few years. However, the weather has played havoc with the butterfly here so far, with deluges during the flight season reducing flying opportunities and egg-laying, and drought impacting hard on the ant and thyme populations.

Unfortunately, access is difficult, for there is no car parking within miles. Consequently, it will never be possible to promote the combe as a site where anyone can go to see the Large Blue, though in time the ardent enthusiast will be able to venture there.

The Trust is also working hard to return the butterfly to another combe on the North Cornwall coast, close to the Devon border. This combe, called The Tidna, was purchased as a reserve for the Large Blue and donated to the Trust by the late Malcolm Spooner, an eminent entomologist who tried hard to save the butterfly from extinction. Sadly, the combe was acquired in the year before the butterfly died out there due to severe habitat deterioration.

Suitable conditions are steadily being restored to the crucial south-facing slope. At the current rate of progress the butterfly may be flying there within a decade. Recently, considerable progress has been made towards restoring suitable conditions at The Dizzard, the original Large Blue reserve mentioned above.

The Trust is now involved in a partnership that has received a start-up grant from the Heritage Lottery Fund to develop a conservation project that aims to restore and provide access to habitats and historic landscapes associated with this butterfly along the North Cornwall coast. Called the Atlantic Coast and Valleys Restoration Project, the partnership is led by North Cornwall District Council and is bidding for a sizeable Landscape Partnership Grant under the HLF programme.

If all goes well, 11 sea combes associated with the Large Blue and associated wildlife, perhaps including the Chough, will receive vital funding to bring them back into suitable condition, and to carry out other enhancements to link these combes together. Six of the 11 are owned by the Trust. A decision is expected from the HLF by the spring of 2005.



©National Trust
Belted Galloways grazing Rodborough Common

Finally, in the Cotswolds, the Trust is working towards restoring suitable conditions for the butterfly on the steep limestone grassland slopes of Rodborough Common, Stroud. This common has been suffering from 'under-grazing' in recent years and is currently dominated by coarse grasses. However, in 1999 the Trust acquired a small number of Belted Galloway cattle, specifically for grazing on the steep slopes in order to safeguard the nature conservation interest there and to make the grass 'keep' on the slopes more suitable for the commoners' cattle. The initial results have been most promising with, for example, a spectacular increase in the abundance of the rare Pasque Flower. It may be that within a decade or so the Large Blue will fly again on Rodborough Common.



©National Trust
Pasque flower on Rodborough Common

Collard Hill: The NT Open Access Large Blue Site

One of the main challenges for the Large Blue project has been to establish the butterfly at sites where people can readily see this magnificent insect. It is appropriate that the National Trust should take a leading role here. The Trust feels that it is important that rare butterflies are accessible to as many interested people as possible and, under the 'use it or lose it' principle, that it is essential to the future of rarities like the Large Blue that these treasures become genuinely valued within our culture. The Trust is determined to facilitate actual and intellectual access wherever possible, and without compromising the butterfly or its habitats.



©David Simcox
Collard Hill

Collard Hill, just south of Street in mid Somerset, has been developed as an open-access Large Blue site.

Twelve females and three males were released there in late June 2000, and 267 larvae were introduced in late July. A sizeable colony should develop, providing the correct level of grazing can be sustained and the site does not suffer from major weather problems (especially spring drought and wet and windy flight season weather). A key point about this site is that the necessary habitat conditions can easily be maintained under a simple commercial grazing regime run by a sympathetic local farmer.

The site is grazed on and off, all-year-round, by cattle and sheep, with grazing concentrated in late summer and spring and stock being removed for the flight season. Furthermore, it is part of a network of potential and actual Large Blue sites within the wider Polden Hills landscape, much of which is under positive management by a range of conservation organisations. This site is therefore part of an attempt to re-establish the Large Blue butterfly by establishing an extensive metapopulation structure at landscape level. Already, some natural spread and colonisation has been noted in the Poldens, a wonderfully healthy sign.

A modest emergence occurred in 2001, commencing on 17th June and finishing in early July, having laid an estimated 7500 eggs (an impressive tally). Unfortunately, it was not possible to open the site in 2001 due to Foot-and-Mouth Disease restrictions. However, we did open in 2002 which was, though, a very poor butterfly year generally. The first Large Blues emerged then on 17th June, numbers peaked over the last weekend of June before the butterfly tailed-off badly during poor weather in early July. The last specimens were seen at Collard on 12th July. Only an estimated 1100 eggs were laid, and then almost exclusively in the favoured core area, a 1ha slope called the East Bank.

The prospects for 2003 were therefore not good, especially as there was then an early spring drought that adversely affected ant numbers and necessitated the premature removal of livestock. However, on 24th April the drought ended, rather spectacularly. Although this may have saved the ant densities it meant that the grass grew unduly, after stock had been taken off. Consequently, several parts of the site were unsuitably long for the butterfly during 2003. A good June and July saved the day; in fact the butterfly emerged in highly pleasing numbers, commencing on 14th June and reaching peak season around Midsummer Day. Numbers nearly tripled on 2002. The flight season finished rather abruptly, as the butterfly shot over in the heat, and the last specimen was recorded on 4th July. The flight season lasted only 21

days, compared to 26 days in 2002. An estimated 3500 eggs were laid in 2003. Best of all, the butterfly spread along the entire slope and was not restricted to the East Bank.

2004 Update

The prospects for the Large Blue at Collard Hill in 2004 were quite good, though the late summer drought of 2003 could have reduced ant populations. In the event, good weather prevailed from late April through to late June and the butterfly emerged in pleasing numbers. It is probable that the odd individual emerged in late May, which is exceptionally early, though the flight season really began circa 6th June.

Numbers steadily built up and by the 14th one could expect to see upwards of 10 individuals during an afternoon visit. Peak numbers were observed during the days around 20th June. However, the fine weather then ended and a lengthy spell of cool, wet and windy weather ensued. This curtailed the flight season, and the last individual was recorded on 6th July.

Although the weather collapsed when the butterfly was at peak season a large number of eggs were laid, probably in the region of 7000. Around 150 Large Blues were recorded on transect, which is over twice the 2003 tally. These figures are very good for the fourth year of an introduced Large Blue colony, especially as much of the slope was under-grazed and effectively out of the Large Blue breeding system in both 2003 and 2004.

The challenge now for the Trust is to achieve closed grazing on the slope, particularly at the western end which is dominated by Upright Brome grass. In 2003 and 2004 stock were removed too early in the spring, because the grass had stopped growing or been grazed down - only for the grass to grow strongly after stock removal.

Visiting Collard Hill for the Large Blue

To date, about 1000 visits have been made to see the Large Blue at Collard Hill. 500 visits were recorded in 2002 and 400 in 2003. This is just about the right level of visiting for the site. The vast majority of visitors have seen the butterfly. The Trust employs a seasonal assistant who is there primarily to facilitate visits but also to conduct basic monitoring and help with other scientific recording. Invaluable support is provided by Butterfly Conservation Somerset branch. During the flight season, there will always be at least one person present on site to meet and assist visitors.



©National Trust
Large Blue Visitors, Collard Hill, Somerset

To date, the only problem has been visitors appearing on site after the butterfly has finished for the year - and the Large Blue flight season can end very abruptly indeed. The last thing the Trust wants is people travelling from afar and failing to see the insect.

The Trust has been running a Large Blue phone line – 01793 817732 - from early June to mid-July. It provides information on how to see the Large Blue at Collard Hill. The message is updated regularly, particularly before weekends. Information is given on the state of the flight season, as well as parking, access and health and safety arrangements.

Large Blue Sites off National Trust Land

Attempts have also been made to re-established the butterfly at other sites owned by other bodies, in Gloucestershire and Somerset, with varying degrees of success. The butterfly has taken spectacularly well on at least one nature reserve in central Somerset and a small colony has been established on another reserve nearby. Conversely, it appears that a rather diffuse population on a nature reserve in the Mendips has died out.

It has proven rather difficult to establish the Large Blue in the Cotswolds. To date, releases have taken place at three Cotswold sites, though attempts have failed at two of these sites. The essential difficulty has been that the butterfly was emerging at these two sites in early or mid July, long after the thyme had passed its peak flowering period – whereas the females need to lay their eggs in thyme that is in bud, or in the initial stage of flowering. Consequently, the females were seeking out the later-flowering thyme growing in longer turf or in shady spots, in places that were unsuitable for the *M. sabuleti* ants.

It may be that the phenology of the Swedish race of the Large Blue is inappropriate for the Cotswolds, and that the Large Blue project needs to import a different race that will emerge earlier in the summer. It may also be that a significant percentage of Large Blue individuals may take two years to develop in the cooler Cotswolds, for it has recently been discovered that the larvae of another European large blue, *M. rebeli*, take two years to develop in ant nests. The author's opinion, which may be wrong, is that introduction effort should concentrate in the Stroud area, which is the sunniest part of the Cotswolds, and that the two sites (both former Large Blue sites) where the butterfly has failed to date have a distinctly cloudier and cooler local climate.

The butterfly was released at a third Cotswold site in 1999. A small emergence was recorded there in 2000, which was rather disappointing. However, following further management effort a sizeable emergence and egg lay occurred in 2003, which means that at last there is some confidence that the Large Blue will take in the Cotswolds, especially as it has emerged in synchrony with the bud stage of the thyme flowering period.

Conclusion

In 2003, the Large Blue flew at 11 sites in England, the majority of which are in mid Somerset. Four of these sites are owned by the National Trust. Best of all, more Large Blues flew in England in 2003 than in any year for at least 50 years. Furthermore, the butterfly was seen by more people than, in all probability, ever before.

Conservation effort for the Large Blue butterfly has experienced many vicissitudes. However, a considerable amount of progress has been made in recent years, particularly through the partnership approach. The National Trust recognizes that in many situations conservation is best facilitated through partnership, with other organisations and with local people. The main challenge for the Large Blue, and for rare butterflies in general, concerns how to achieve conservation at landscape level; for it has become apparent that many butterflies need to occur in clusters of loosely-connected colonies (often called metapopulations) over large areas of landscape that is relatively intact, and in which many areas of actual and potential habitat are present.

The National Trust, with its landscape holdings, is therefore particularly well-placed to assist the conservation of butterflies. The other major challenge, particularly for butterflies associated with grassland habitats that depend on grazing, concerns the need to get habitat management on to bases that are ecologically, economically and culturally sustainable.

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