

# MONITORING AND EVALUATION OF THE 'SOUTH DOWNS WAY AHEAD' NIA PROJECT (2012 – 2015) IN SUSSEX USING FIVE FOCAL INDICATOR SPECIES OF BUTTERFLY



South Downs Way Ahead  
Partnership



South Downs  
National Park Authority



Butterfly  
Conservation

Saving butterflies, moths and our environment

Neil Hulme, March 2015

## CONTENTS

	Page
1. Summary	3
2. Background	4
3. Methodology	5
3.1. Status of Focal Indicator Species	5
3.2. Surveying and Monitoring	6
3.3. Caveats	6
4. Duke of Burgundy	8
5. Silver-spotted Skipper	17
6. Adonis Blue	23
7. Chalk Hill Blue	28
8. Small Blue	32
9. 'Chantry to Chanctonbury' NIA Subproject	36
10. Conclusions	41
11. Acknowledgements	44
12. References	46
13. Glossary of Scientific Names	47

## 1. SUMMARY

Five focal indicator species of butterfly were chosen for the purposes of monitoring and evaluation of the 'South Downs Way Ahead' NIA project; Duke of Burgundy, Silver-spotted Skipper, Adonis Blue, Chalk Hill Blue and Small Blue.

Observed changes in abundance and/or distribution of these species are considered a proxy indicator of the benefits afforded them by NIA project work. Conversely, population changes in the focal indicator taxa, which are all habitat specialists, provide an indication of the success, or otherwise, of the NIA project, in improving the quality, extent and connectivity of areas of chalk grassland.

One of the species, Duke of Burgundy, was assigned a NIA Project Indicator Value of 'Increasing', and the observed population increase and spread is considered to have been driven by NIA project work, with a high degree of confidence.

The Silver-spotted Skipper was also assigned a NIA Project Indicator Value of 'Increasing'. NIA project work is considered to have been a contributory factor in the observed geographical spread of this species, which is reacting positively to climate warming. This link is made with a medium level of confidence.

The Adonis Blue, Chalk Hill Blue and Small Blue were all assigned a NIA Project Indicator Value of 'Stable'. Factors including weather-related fluctuations in abundance, and significant gaps in annual monitoring, made it difficult to assess apparent changes in population. However, there is no evidence that there have been any negative changes in distribution.

Spectacular, local increases in the abundance of several non-focal species were observed in the 'Chantry to Chanctonbury' NIA subproject area, including Dark Green Fritillary and Green Hairstreak. These changes are considered to have been driven by NIA project work, with a high degree of confidence.

It is considered likely that the increased extent of habitat managed to secure species-specific needs (another project indicator), within the NIA, will encourage further positive changes in the focal indicator species in future years.

## 2. BACKGROUND

In February 2012 DEFRA announced that it had chosen the 'South Downs Way Ahead' project, headed by the South Downs National Park Authority (SDNPA), as one of twelve national Nature Improvement Areas (NIAs). The project was awarded a grant of £608,000 towards an ambitious £3 million plan to safeguard and enhance endangered chalk grassland between Winchester and Eastbourne.

The three year project (2012 – 2015) aimed to improve the quality, extent and connectivity of this species-rich habitat along the South Downs Way National Trail, and over five expanded (focal) areas along its route.

The project set five objectives:

**Walk the Chalk:** To broaden the South Downs Way National Trail as a semi-natural corridor and improve the natural qualities of the route.

**Linking the Fragments:** To achieve real improvements to the conservation and management of chalk grassland at the heart of the matrix of downland habitats.

**Surface to Groundwater:** To demonstrate the viability and benefits of an input based approach to the improvement of groundwater quality.

**Town to Down:** To assess and demonstrate the benefits of ecosystem services to urban populations.

**Valuing the Chalk:** To attribute environmental, economic and social values to the benefits and services provided by chalk downland.

The 'South Downs Way Ahead Partnership' was formed, bringing together nearly thirty organisations, including Butterfly Conservation (BC). A strong element of the project proposal was the success already achieved through the close working relationship between SDNPA (and its forerunner the South Downs Joint Committee) and BC Sussex Branch, in conserving the endangered Duke of Burgundy butterfly on a landscape scale, thus providing a platform for the continuation and expansion of this work.

Volunteers from BC Sussex assisted in meeting the first two project objectives, by offering detailed habitat management advice on numerous sites, by attending regular work parties to control scrub, and by monitoring the populations of five focal indicator species. In the far west of West Sussex and in the Hampshire part of the NIA project area, assistance was provided through the BC national project 'Dukes on the Edge', co-ordinated by Dr Dan Hoare.

### 3. METHODOLOGY

#### 3.1. Status of Focal Indicator Species

Five focal indicator species of butterfly were chosen for the purposes of monitoring and evaluation of the 'South Downs Way Ahead' NIA project; Duke of Burgundy, Silver-spotted Skipper, Adonis Blue, Chalk Hill Blue and Small Blue.

Observed changes in abundance and/or distribution of these species are considered a proxy indicator of the benefits afforded them by NIA project work. Conversely, population changes in the focal indicator taxa, which are all habitat specialists, provide an indication of the success, or otherwise, of the NIA project, in improving the quality, extent and connectivity of areas of chalk grassland.

A baseline position for each species was established (NIA Baseline Indicator Value), through reference to changes and trends documented by the UK Butterfly Monitoring Scheme. The applicability of this data to the NIA is discussed, based on a comparison of the spatial coverage of national and NIA populations. The more recent, local history of each focal indicator species was also considered, based on records collated by the Sussex Branch of Butterfly Conservation.

An assessment has been made of any apparent changes in the abundance and distribution of each focal indicator species over the NIA project period, resulting in the assignment of a NIA Project Indicator Value. An attempt has also been made to assess whether any of these changes are likely to be attributable to work performed as part of the NIA project, together with a confidence level in making such a link.

However, the interpretation of apparent changes in butterfly populations is subject to a number of caveats, including weather patterns and recording effort. Where possible, these have been taken into consideration.

It should also be noted that the time-span of the project, covering the summers of 2012, 2013 and 2014, is shorter than the period often necessary to either promote or determine positive population changes in response to habitat management work.

It is, however, considered likely that the increased extent of habitat managed to secure species-specific needs (another project indicator), will encourage further positive changes in the focal indicator species, beyond those already detected, long into the future. Although outside the scope of this report, some mention is made of the suitable habitat patches created for the Duke of Burgundy.

### **3.2. Surveying and Monitoring**

The butterfly abundance and distribution data upon which this report is based was generated by a number of means. A large number of records were derived from activities which were ongoing irrespective of the NIA project, including regularly walked Transects, annual records collected in an unstructured manner by the local recording community (mainly by Butterfly Conservation Sussex Branch members), and from sightings submitted to the Sussex Branch website.

However, the aim of monitoring populations of the five focal indicator species, chosen for the purposes of monitoring and evaluation of the 'South Downs Way Ahead' NIA project, required a more focused and concerted recording effort. This in itself required a considerable commitment in terms of time, effort and expense on the part of volunteers. It is perhaps unsurprising that the majority of this work was undertaken by a very small number of individuals, and their contributions are gratefully acknowledged.

### **3.3. Caveats**

For several of the more widespread focal indicator species, most notably the Adonis Blue, it was not possible to visit all known colonies during all years of the project time-span. The absence of a distribution dot on the NIA focal indicator species maps does not therefore infer an extinction event.

The incomplete nature of the monitoring data for some of the Blue species was one of the factors which made assessment of apparent changes in population difficult. This was taken into account when assigning a NIA Project Indicator Value (in these cases 'Stable'). However, there is no evidence that there have been any negative changes in distribution.

One of the main variables affecting the annual abundance of butterflies is the weather. Poor weather also impacts on recording effort. 2012, the first year of

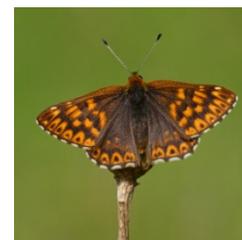
the NIA project, was the worst on record for butterflies, with almost every British species demonstrating a weather-related dip in numbers. The absolute abundance figures recorded for the focal indicator species, and any changes in their abundance over the subsequent years, should therefore be viewed in context, and interpreted with caution.

In this respect it is important to recognise that the distribution of the focal indicator species, measured in terms of either 1 Km square occupancy on a larger scale, or the number of habitat patches occupied on a smaller scale, is considered a more reliable indicator of population health. However, both measurements were taken into consideration when assigning a NIA Project Indicator Value.

As previously noted, the limited time-span of the project (three summers) is shorter than the period often necessary to either promote or determine positive population changes in response to habitat management work.

## 4. DUKE OF BURGUNDY

**Introduction:** The Duke of Burgundy is one of the two most rapidly declining and threatened species of butterfly in the UK, facing potential extinction unless conservation measures are successful in halting and reversing the long-term national trend of population losses, in terms of both abundance and distribution.



Approximately 100 colonies remain, with West Sussex being at the eastern margin of the species' geographical range, with the exception of a few isolated outliers in Kent. The vast majority of remaining colonies are very small, comprising no more than a handful of adult insects on the wing at any time during its late April to early June flight season. Populations where maximum daily counts exceed 30 butterflies are now very rare and in 2003 the total number of Duke of Burgundy adults seen in the county was just 8.

The high level of conservation concern attributed to this species made it an obvious candidate for inclusion within the list of five focal indicators.

**NIA Baseline Indicator Value:** A NIA baseline position for the Duke of Burgundy was established, firstly by looking at the national situation as documented by the UK Butterfly Monitoring Scheme (Botham et al., 2013). This provides a 20 year % change of -58 and trend (Indicator Value) of 'Rapidly Declining', and a 10 year % change of -51 and trend (Indicator Value) of 'Stable'.

However, this position is not necessarily directly transferable to the NIA project area, as there is a relatively limited commonality between the spatial coverage of national and NIA populations, with the former including colonies in the southern Lake District and the North York Moors, where they are associated with habitats quite different to those in the NIA area.

The more local history of this species contains opposing strands. Until very recently the Duke of Burgundy in the NIA area was declining at an alarming rate, being at the rapidly retreating eastern margin of its geographical range. It had been lost from East Sussex and was facing imminent extinction in West Sussex during the early part of the 21<sup>st</sup> Century (Pratt, 2011).

However, a close working partnership between Butterfly Conservation Sussex Branch and the South Downs National Park Authority (and its forerunner the South Downs Joint Committee) has been successful in arresting this decline.

Working in co-operation with landowners and local conservation groups, such as the Murray Downland Trust, the Duke of Burgundy has started to recover. On several sites the population has increased rapidly, proving that focused habitat management work can bring about positive changes in the butterfly's fortunes. This work has provided a platform for the continuation and expansion of conservation efforts through the NIA project.

Taking all of the data into account, a NIA Baseline Indicator Value of 'Stable' was assigned to this species, with some grounds for optimism.

**NIA Project Data:** Total annual counts of Duke of Burgundy adults over the Sussex part of the NIA project area rose from 360 to 1011 between 2012 and 2014 (NIA project recording period), an increase of 181% (Fig. 1).

In the 'Chantry to Chanctonbury' NIA subproject area, total annual counts increased by 398% during this same period, from 82 (2012) to 408 (2014) (Fig. 2). One of the new colonies established, set up more than 0.5 Km east of the 2012 start point, contained up to 25 butterflies, making it one of the strongest in West Sussex. All of the habitat patches within this metapopulated area demonstrated an increase in numbers over the project time-span (Fig. 3).

Further west, at Heyshott Escarpment near Midhurst, peak daily counts rose from 31 in 2012 to 104 in 2014, an increase of 235% (Fig. 4).

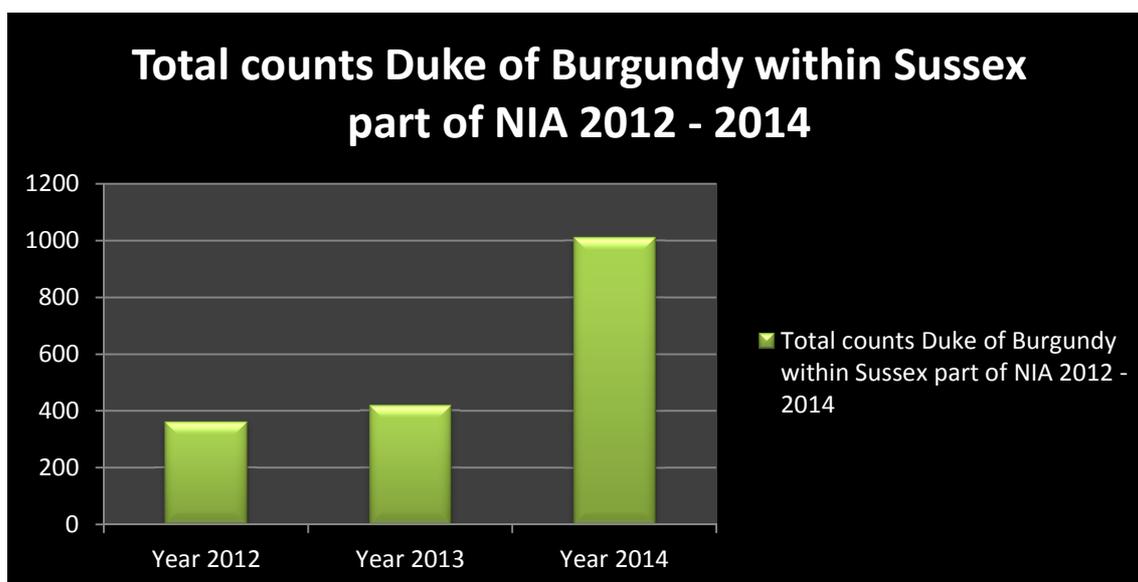


Fig.1

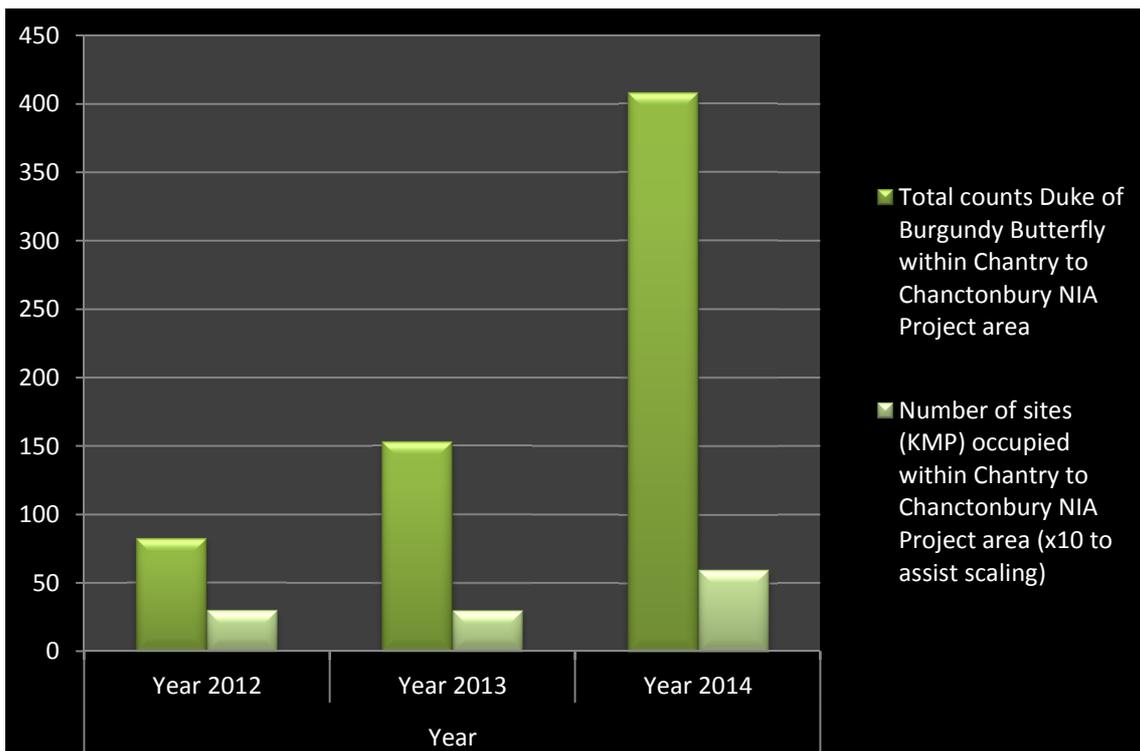


Fig. 2

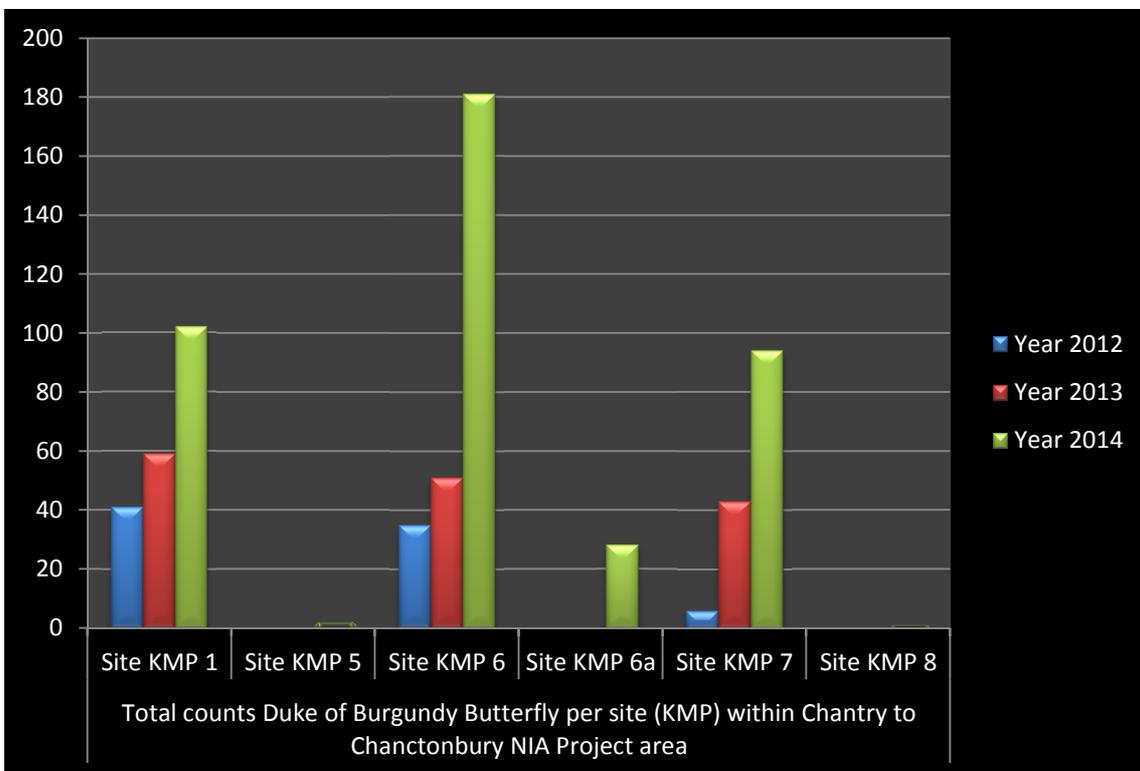


Fig. 3

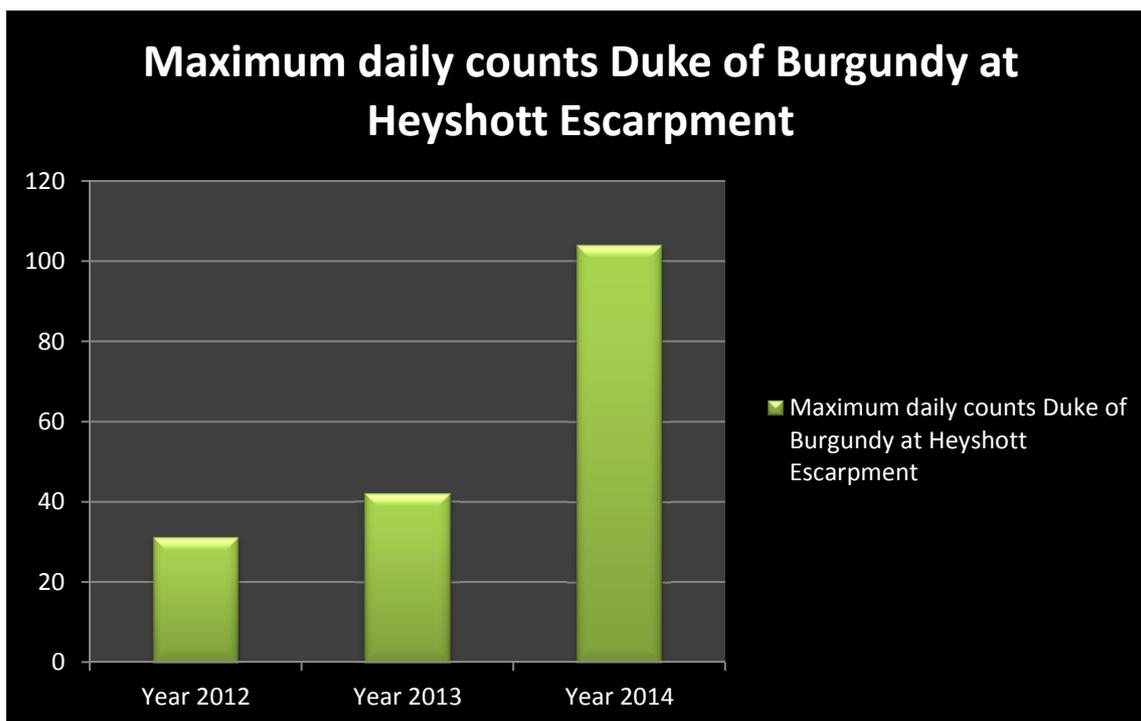


Fig. 4

These abundance figures (based on an almost identical number of total site visits per annum), and rates of increase, appear very impressive. However, they must be viewed in the context of weather-related fluctuations in the population. 2012 was a poor year for almost every species, including Duke of Burgundy, due to inclement weather throughout most of its flight period. One might therefore reasonably expect numbers to increase again in subsequent years.

However, these rates of increase are so rapid that they can be seen in themselves as an indication of good habitat condition. Furthermore, if it were not for the weather-related dip in numbers at the beginning of the NIA recording period, one might reasonably expect the absolute abundances recorded in all years 2012 to 2014 to have been considerably higher.

Nevertheless, as already discussed, the distribution of the focal indicator species, measured in terms of either 1 Km square occupancy on a larger scale, or the number of habitat patches occupied on a smaller scale, is considered a more reliable indicator of population health.

Figs. 5 – 8 show the distribution (at 1 Km scale) of the Duke of Burgundy in the Sussex part of the NIA between 2012 and 2014, and 1 Km square occupancy.

Fig. 5

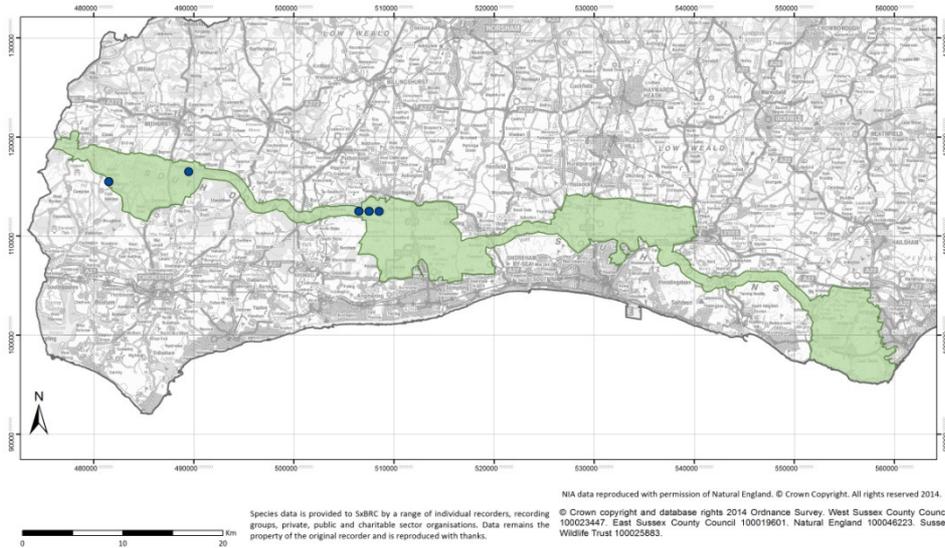


Fig. 6

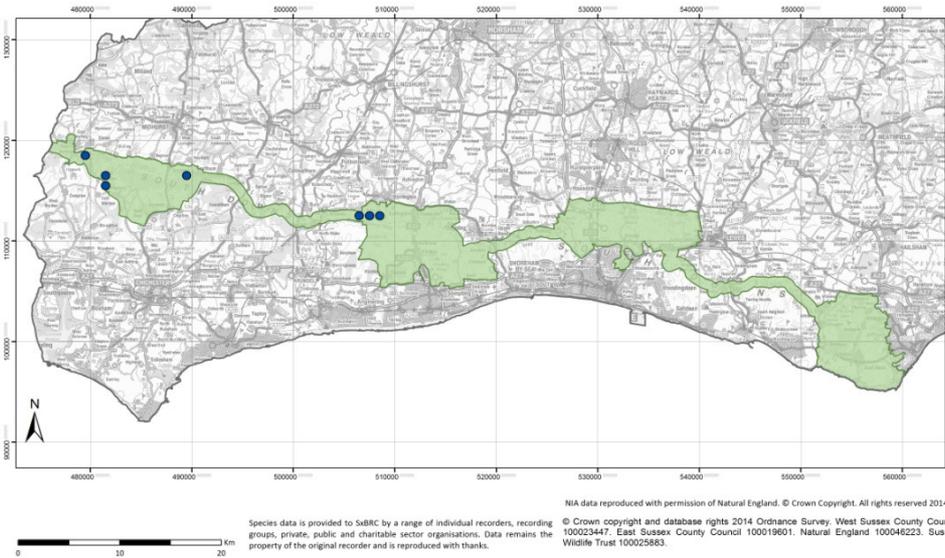


Fig. 7



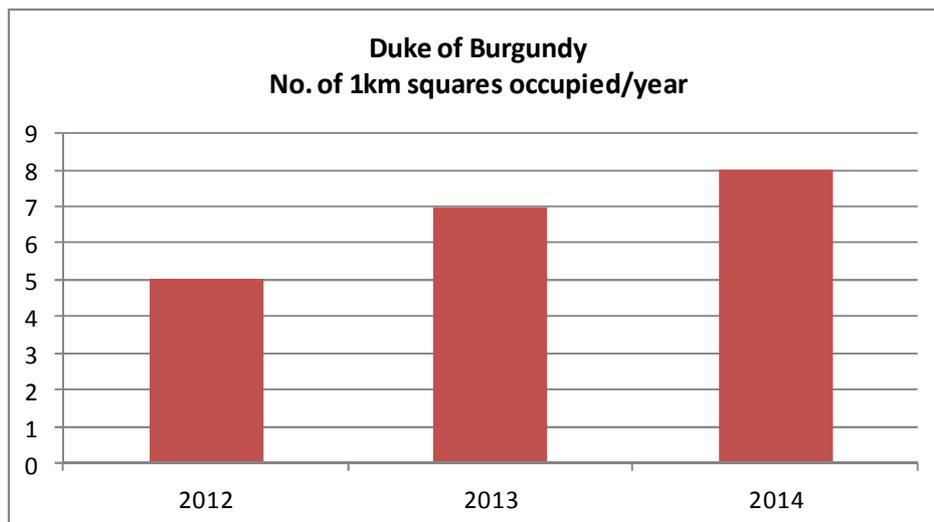


Fig. 8

This increase in distribution at 1 km square level is particularly encouraging, as the Duke of Burgundy is a species which is slow to colonise, or re-colonise, new habitat patches, particularly over distances beyond 1 Km.

The new squares occupied during the duration of the NIA project include an expansion of the colony at Hooksway Down (West Dean Estate), and at Heyshott Down (Murray Downland Trust), where an egg-laying female was observed some distance away from the main colony (Heyshott Escarpment).

This latter record is particularly encouraging, as it is situated very close to a recently created habitat corridor along the crest of the Downs, increasing connectivity with the Graffham Down Trust reserves. A great deal of habitat management to suit the Duke of Burgundy (and Pearl-bordered Fritillary, Drab Looper moth and other species) has been conducted here during the NIA project period, and is ongoing.

Special mention must be made of the conservation work performed at Heyshott Escarpment, managed by the Murray Downland Trust (MDT). Every week between September and March, volunteers from the MDT and Butterfly Conservation Sussex Branch work side-by-side, to clear secondary woodland and manage scrub on a rotational basis.

Grazing is performed by a variety of livestock, including hardy breeds of sheep and, currently, Belted Galloways (courtesy National Trust). These light-weight cattle are ideal for use on steep downland turf, as they cause minimal damage to the sward, but target re-generating scrub effectively. The light poaching of

the ground caused by their hooves is helpful in promoting the germination of cowslips, the Duke of Burgundy's caterpillar food-plant.

Heavy or prolonged grazing by commercial breeds of sheep, particularly after March, is highly detrimental to populations of this butterfly, as it produces a short, tight sward and small, exposed cowslips which are prone to droughting and are unsuitable for egg-laying (unpublished reports, Butterfly Conservation Sussex Branch).



**Conservation grazing with Belted Galloways at Heyshott**

Maximum daily counts of Duke of Burgundy at Heyshott Escarpment now exceed 100, making this one of the largest, discrete colonies in the UK.

In the 'Chantry to Chanctonbury' NIA subproject area the positive changes in population are yet to translate into increased 1 Km square occupancy. However, by focusing in on the distribution of the butterfly, the benefits brought by NIA work are quite clear, despite the weather-related dip in abundances at the start of the project time-span.

Fig. 9 shows the distribution and abundance (maximum daily counts) of the Duke of Burgundy on a map of the western end of the subproject area, between 2005 and 2011.

Fig. 10 shows the distribution and abundance (maximum daily counts) for the NIA project recording period 2012 – 2014. Although the movement is only in the order of 0.5 Km, the geographical range of this species now extends further east than at any time during the 21<sup>st</sup> Century (excluding the Kent populations).

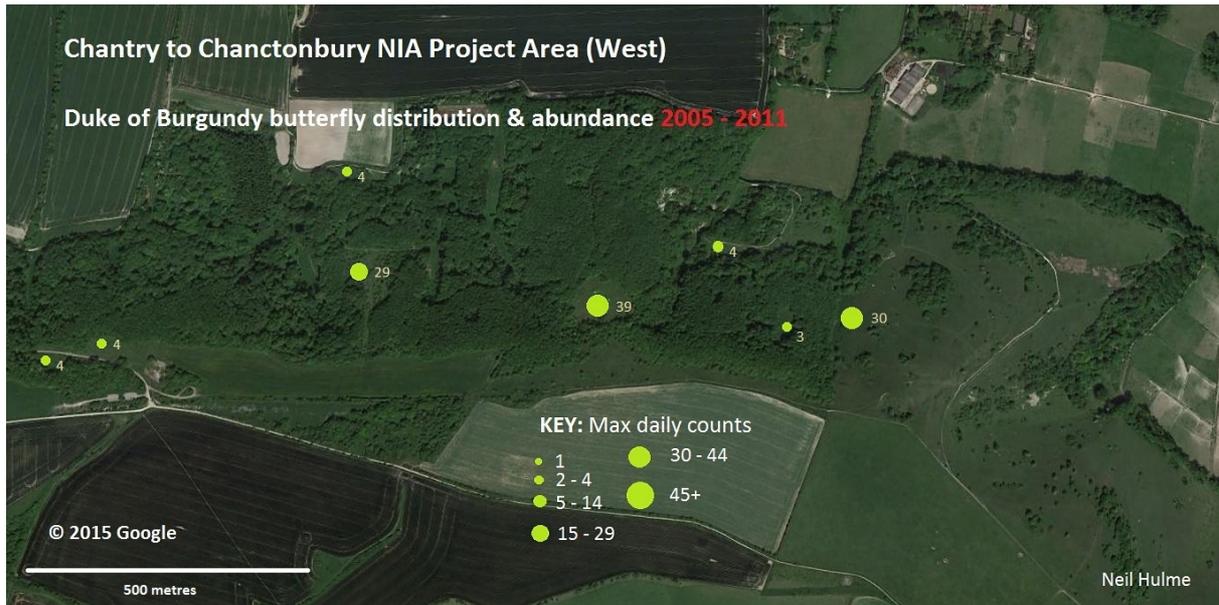


Fig. 9

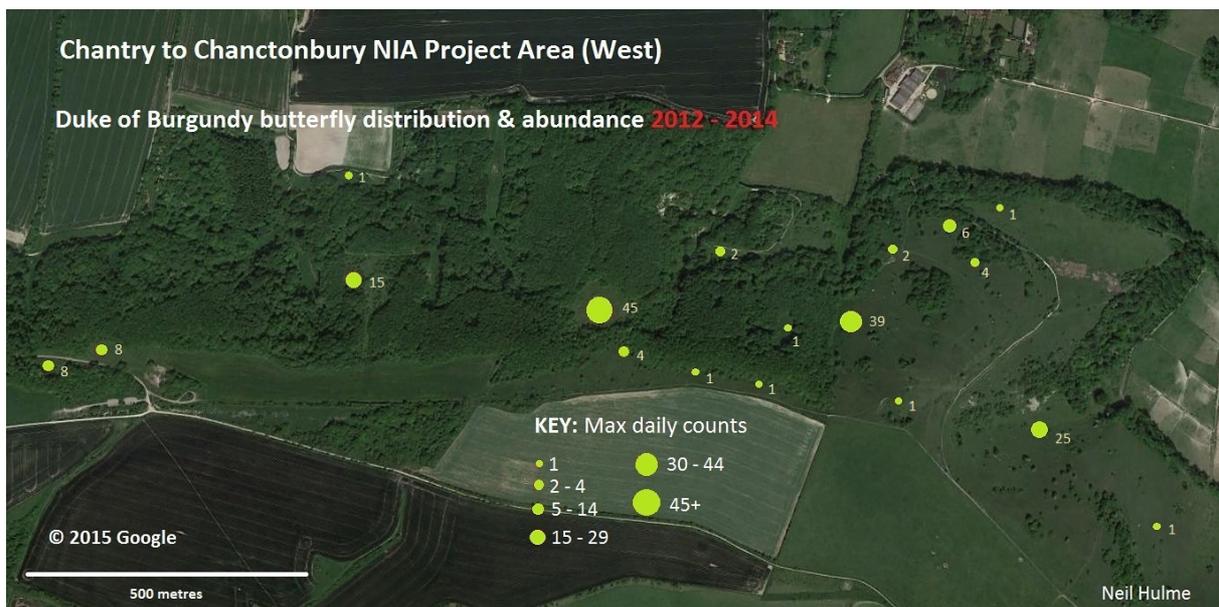


Fig. 10

Bearing in mind the high level of conservation concern attributed to the Duke of Burgundy, it is worthwhile commenting on the increased extent of habitat managed to secure the species-specific needs of this butterfly (another project indicator), within the NIA.

Highly suitable, but as yet unoccupied habitat has been created for this species at Harting Downs, Hooksway Down and Phillis Wood, Heyshott Escarpment and Heyshott Down, Graffham Down, Kithurst Hill, Chantry Hill, Barnsfarm Hill, Washington Chalk Pits, Chanctonbury Ring and the Steyning Downland Scheme area. Also, lying just outside the official NIA project boundaries, additional habitat has been created at Farm Hill and Farm Wood (Barlavington), Houghton Forest and Whiteways Plantation. It is hoped that at least some of these areas will be colonised by the Duke of Burgundy in future years.

**Interpretation:** In consideration of the data discussed above, the Duke of Burgundy has been assigned a NIA Project Indicator Value of 'Increasing', which is an improvement over the NIA Baseline Indicator Value of 'Stable'. As such, it is considered that the Sussex population of this species has demonstrated significant, positive changes during the period of the NIA project time-span.

Furthermore, it is considered that the observed population increase and spread of the Duke of Burgundy has been driven by NIA project work; an assertion made with a high degree of confidence.

## 5. SILVER-SPOTTED SKIPPER

**Introduction:** The Silver-spotted Skipper was in real danger of extinction in Sussex during the mid 1970s when, at its lowest ebb, it was restricted to south-facing slopes within a single valley behind Windover Hill at Wilmington, and at Bible Bottom near Lewes (Pratt, 2011). However, by the early 1980s it had started to expand its geographical range and reclaim lost ground; a trend which continues today.



This resurgence has been attributed to climate warming, resulting in a slightly wider tolerance of microhabitat conditions and allowing colonisation of multi-aspect slopes, thus opening up larger areas of the landscape to the butterfly (Davies et al., 2006; Wilson et al., 2010; Lawson et al., 2014).

By the turn of the 21<sup>st</sup> Century it had moved sufficiently far west to cross the East/West Sussex border and gain a foothold on Newtimber Hill, opposite Devil's Dyke. In 2007, following a period of status quo, it then made a great leap of 18 Km, appearing within the 'Chantry to Chanctonbury' subproject area, which itself lies within the wider Worthing focal area of the NIA project.

This fast-moving, compact, warmth-loving species was chosen as one of the five focal indicators, as it is a habitat specialist which thrives on broken, short-cropped turf containing the caterpillar's food-plant, sheep's fescue grass, together with an abundance of chalk grassland flowers.

As it is undergoing a phase of punctuated dispersal and spread, in response to climate warming, it had good potential to act as a proxy indicator of the benefits afforded it by NIA work. Any observed changes in distribution might also reflect the quality, extent and connectivity of areas of chalk grassland habitat.

**NIA Baseline Indicator Value:** A NIA baseline position for the Silver-spotted Skipper was established, firstly by looking at the national situation as documented by the UK Butterfly Monitoring Scheme (Botham et al., 2013). This provides a 20 year % change of +86 and trend (Indicator Value) of 'Stable', and a 10 year % change of -19 and trend (Indicator Value) of 'Stable'.

This position is considered to be consistent with the NIA project area, as there is a relatively large degree of commonality between the spatial coverage of

national and NIA populations. Also, the habitat associations of this species are very similar throughout its entire UK geographical range.

Examination of the recent, more local history of this species reveals a similar situation, with a largely unchanged distribution between 2007 and the start of the NIA project (2012), and with abundance levels fluctuating in response to annual weather patterns.

Taking all of the data into account, a NIA Baseline Indicator Value of 'Stable' was assigned to this species.

**NIA Project Data:** The numbers of Silver-spotted Skipper recorded during the first year of the NIA project (2012) were relatively low, as they were for the majority of species, due to exceptionally poor weather.

However, things changed markedly in the summer of 2013, leading Butterfly Conservation Sussex Branch Species Champion, Crispin Holloway, to comment on the “abundance and distribution not seen in half a century!” (The Sussex Butterfly Report, 2013, Issue 6, p. 33).

This is well illustrated by looking at his transect counts on the best site for this species in Sussex, which lies just outside the Brighton & Hove focal area of the NIA project, at Malling Down (Lewes). The numbers of Silver-spotted Skipper were only marginally lower in 2014 (Fig. 11).

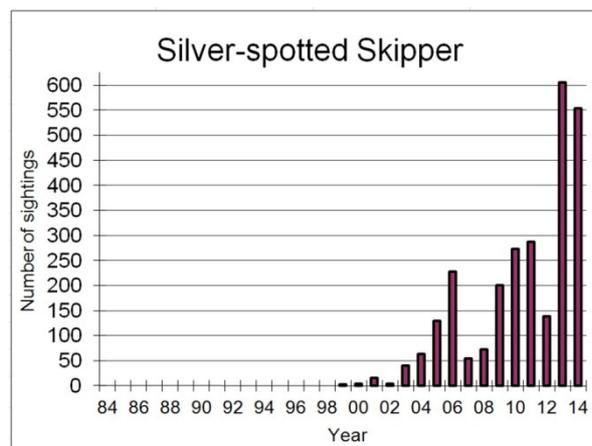


Fig. 11

This scientifically rigorous method of monitoring population trends provides a much clearer picture than the abundance totals generated via more random surveys of the numerous NIA sites, which were strongly influenced by highly variable recording effort.

A more reliable indicator of population health is provided by the distribution of the focal indicator species, measured in terms of 1 Km square occupancy, within the NIA project area (Fig. 12).

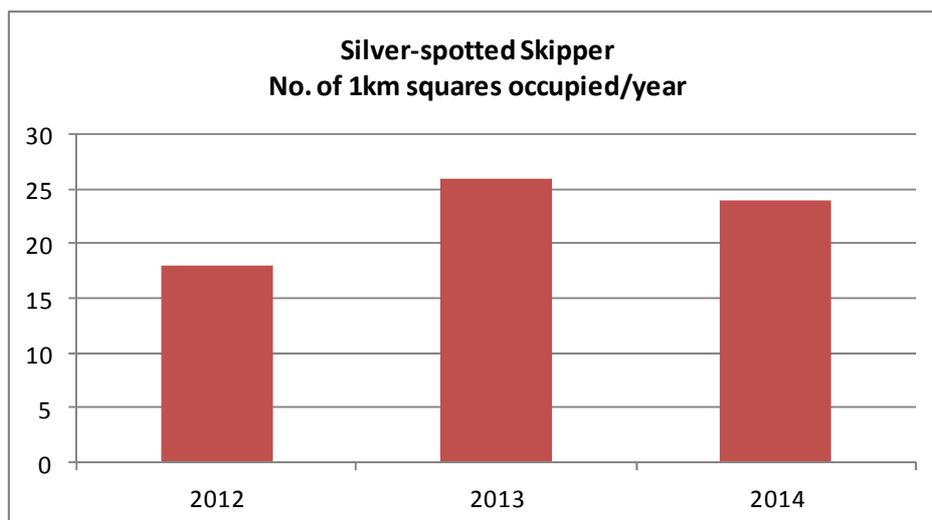


Fig. 12

The number of 1 Km squares occupied within the Sussex part of the NIA project area rose from 17 in 2012, to 26 in 2013, an increase of 53%. It fell back slightly, to 24 1 Km squares, in 2014.

However, of much greater significance is the number of new 1 Km squares occupied within the Worthing focal area of the NIA project. These sites include Washington Chalk Pits and Cissbury Ring (2013 onwards), and Anchor Bottom and Long Furlong (2014).

With the exception of the latter, these sites are regularly and thoroughly monitored. There can be little doubt that these records represent fresh colonisations, as the Silver-spotted Skipper achieved its first significant expansion in geographical range since 2007.

This premise was further supported by newly occupied sites within the Brighton & Hove focal area (e.g. Waterhall), and just outside the NIA project boundaries at Benfield Hill and Mill Hill, all during 2013. These were the first sightings of the species ever recorded at the historically important Mill Hill site (Pratt, pers. comm.).

Figs. 13 – 15 show the distribution (at 1 Km scale) of the Silver-spotted Skipper in the Sussex part of the NIA between 2012 and 2014.

**South Downs Way Ahead NIA (Sussex)  
Silver-spotted Skipper  
2012**

Prepared for Neil Hulme  
14/05/2014  
(ESD/14/254)

Fig. 13



NIA data reproduced with permission of Natural England. © Crown Copyright. All rights reserved 2014.

Species data is provided to sBRC by a range of individual recorders, recording groups, private, public and charitable sector organisations. Data remains the property of the original recorder and is reproduced with thanks. © Crown copyright and database rights 2014 Ordnance Survey. West Sussex County Council 100023447. East Sussex County Council 100019601. Natural England 100046223. Sussex Wildlife Trust 100025883.

**South Downs Way Ahead NIA (Sussex)  
Silver-spotted Skipper  
2013**

Prepared for Neil Hulme  
14/05/2014  
(ESD/14/254)

Fig. 14



NIA data reproduced with permission of Natural England. © Crown Copyright. All rights reserved 2014.

Species data is provided to sBRC by a range of individual recorders, recording groups, private, public and charitable sector organisations. Data remains the property of the original recorder and is reproduced with thanks. © Crown copyright and database rights 2014 Ordnance Survey. West Sussex County Council 100023447. East Sussex County Council 100019601. Natural England 100046223. Sussex Wildlife Trust 100025883.

**South Downs Way Ahead NIA (Sussex)  
Silver-spotted Skipper  
2014**

Prepared for Neil Hulme  
17/02/2015  
(ESD/15/67)

Fig. 15



NIA boundaries reproduced with permission of Natural England copyright 2015. Contains Ordnance Survey data © Crown copyright and database right 2015.

Species data is provided to sBRC by a range of individual recorders, recording groups, private, public and charitable sector organisations. Data remains the property of the original recorder and is reproduced with thanks. © Crown copyright and database rights 2015 Ordnance Survey. West Sussex County Council 100023447. East Sussex County Council 100019601. Natural England 100046223. Sussex Wildlife Trust 100025883.

As already discussed, climate warming has been a driver of the geographical spread of this species over at least the last three decades. However, when making an attempt to better understand the factors which may have influenced the recent colonisations within the Worthing focal area of the NIA project, it is necessary to consider the mechanisms which trigger butterfly dispersal.

A range of factors were examined by Legrand et al. (2014), including population sex ratio and the phenotypical predisposition of some individuals towards dispersive behaviour. However, overriding triggers were determined to be weather conditions and habitat quality.

Nowicki & Vrabec (2011) presented evidence for positive density-dependent emigration in butterfly metapopulations. It seems likely that adventurous, egg-laden females disperse during seasons of high abundance and high population density, factors which themselves may be driven by good habitat quality.

For dispersal to result in successful colonisation it is necessary for habitat conditions to be favourable at both the donor and recipient sites. Within the Worthing focal area of the NIA project it appears highly likely that the donor site was Chantry Hill, lying within the 'Chantry to Chanctonbury' subproject area.

Maximum daily counts at Chantry Hill reached a plateau in 2011, suggesting that the site had reached its maximum carrying capacity. From this season onwards the dispersal of females was probably more likely, when combined with other factors which together may trigger adventurous behaviour.

The closest recipient site (4.25 Km) was Washington Chalk Pits, also lying within the 'Chantry to Chanctonbury' NIA subproject area. A significant amount of scrub clearance work and grazing was performed here during the first year of the NIA project (early 2012).

**Scrub clearance work at Washington Chalk Pits**



**Interpretation:** In consideration of the data discussed above, the Silver-spotted Skipper has been assigned a NIA Project Indicator Value of 'Increasing', which is an improvement over the NIA Baseline Indicator Value of 'Stable'. As such, it is considered that the Sussex population of this species has demonstrated significant, positive changes during the period of the NIA project time-span.

NIA project work is considered to have been a contributory factor in the observed geographical spread of this species. However, this link can only be made with a medium level of confidence, as it is impossible to decipher the balance of contributions made by NIA project work and other factors, including longer term climate warming and shorter term weather patterns.

## 6. ADONIS BLUE

**Introduction:** The Adonis Blue has always been a scarce and highly localised species, but it reached an all-time low in the late 1970s, as sites had become swamped with longer grasses when the rabbit population collapsed in the 1950s due to myxomatosis. However, a slow recovery began in the mid 1980s, assisted by the return of the rabbit and wider conservation grazing (Thomas & Lewington, 2010).



The Adonis Blue is double-brooded, flying during May and June, and again through August and September. The larvae of this species are attended by ants, which provide protection in return for droplets of a nutritious, sugary liquid. This relationship persists through the chrysalis stage; the pupa secretes amino acids and communicates with the ants, via sounds created by flexing a tooth-and-comb structure composed of tough cuticle (Thomas & Lewington, 2010).

This iconic chalk grassland species was chosen as one of the five focal indicators, as it is a habitat specialist which thrives on short-cropped turf containing the caterpillar's food-plant, horseshoe vetch, on warm, south-facing slopes.

Any observed changes in distribution would provide a good indication of improved connectivity between areas of chalk grassland habitat, particularly as it is a sedentary species which demonstrates a reluctance to spread over significant distances.

**NIA Baseline Indicator Value:** A NIA baseline position for the Adonis Blue was established, firstly by looking at the national situation as documented by the UK Butterfly Monitoring Scheme (Botham et al., 2013). This provides a 20 year % change of +305 and trend (Indicator Value) of 'Rapidly Increasing', and a 10 year % change of -1 and trend (Indicator Value) of 'Stable'.

This position is considered to be consistent with the NIA project area, as there is a relatively large degree of commonality between the spatial coverage of national and NIA populations. Also, the habitat associations of this species are very similar throughout its entire UK geographical range.

Examination of the more local history of this species reveals a recent period of stability, with no evidence of significant gains or losses in terms of geographical distribution.

Taking all of the data into account, a NIA Baseline Indicator Value of 'Stable' was assigned to this species.

**NIA Project Data:** Of the five focal indicator species, the Adonis Blue performed the worst, displaying some negative signals in the population trend over the NIA project recording period.

Figs. 16 – 18 show the distribution (at 1 Km scale) of the Adonis Blue in the Sussex part of the NIA between 2012 and 2014. These maps appear to demonstrate a contraction at both the eastern and western ends of its local geographical range.

However, the apparent reduction in spread within the Eastbourne focal area of the NIA project is confidently attributed, at least in large part, to irregular monitoring coverage.

At the western end of its range, one of the 1 Km squares has always relied upon counts in low single figures, making detection difficult, particularly in poor years. Another site, where the species certainly flew in 2014, failed to show on the NIA map, as it straddles the project boundary and inclusion/exclusion is dependent upon the precise grid reference provided for the records.

The bar chart illustrating 1 Km square occupancy (Fig. 19) shows an apparently significant decline, from 23 in 2012 and 2013, to 16 in 2014. Similarly, total, annual abundances for the NIA project area dropped between 2012 and 2014.

Although most of these negative signals can be attributed to gaps in the monitoring effort, it is quite possible that the Adonis Blue was in a slightly less favourable position in 2014 than it had been in 2012.

However, it is difficult to make such a judgement with confidence, particularly in view of some conflicting data. Butterfly Conservation Sussex Branch Species Champion, Crispin Holloway, annually reports on the species across its entire Sussex range, and made some interesting observations in The Sussex Butterfly Report (2012, Issue 5, pp. 45 – 46; 2013, Issue 6, pp. 53 - 55).

**South Downs Way Ahead NIA (Sussex)**  
**Adonis Blue**  
**2012**

Prepared for Neil Hulme  
 14/05/2014  
 (ESD/14/254)



NIA data reproduced with permission of Natural England. © Crown Copyright. All rights reserved 2014.

Species data is provided to SxBRCC by a range of individual recorders, recording groups, private, public and charitable sector organisations. Data remains the property of the original recorder and is reproduced with thanks.

© Crown copyright and database rights 2014 Ordnance Survey. West Sussex County Council 100023447. East Sussex County Council 100019601. Natural England 100046223. Sussex Wildlife Trust 100025883.

**South Downs Way Ahead NIA (Sussex)**  
**Adonis Blue**  
**2013**

Prepared for Neil Hulme  
 14/05/2014  
 (ESD/14/254)



NIA data reproduced with permission of Natural England. © Crown Copyright. All rights reserved 2014.

Species data is provided to SxBRCC by a range of individual recorders, recording groups, private, public and charitable sector organisations. Data remains the property of the original recorder and is reproduced with thanks.

© Crown copyright and database rights 2014 Ordnance Survey. West Sussex County Council 100023447. East Sussex County Council 100019601. Natural England 100046223. Sussex Wildlife Trust 100025883.

**South Downs Way Ahead NIA (Sussex)**  
**Adonis Blue**  
**2014**

Prepared for Neil Hulme  
 17/02/2015  
 (ESD/15/67)



NIA boundaries reproduced with permission of Natural England copyright 2015. Contains Ordnance Survey data © Crown copyright and database right 2015

Species data is provided to SxBRCC by a range of individual recorders, recording groups, private, public and charitable sector organisations. Data remains the property of the original recorder and is reproduced with thanks.

© Crown copyright and database rights 2015 Ordnance Survey. West Sussex County Council 100023447. East Sussex County Council 100019601. Natural England 100046223. Sussex Wildlife Trust 100025883.

Fig. 16

Fig. 17

Fig. 18

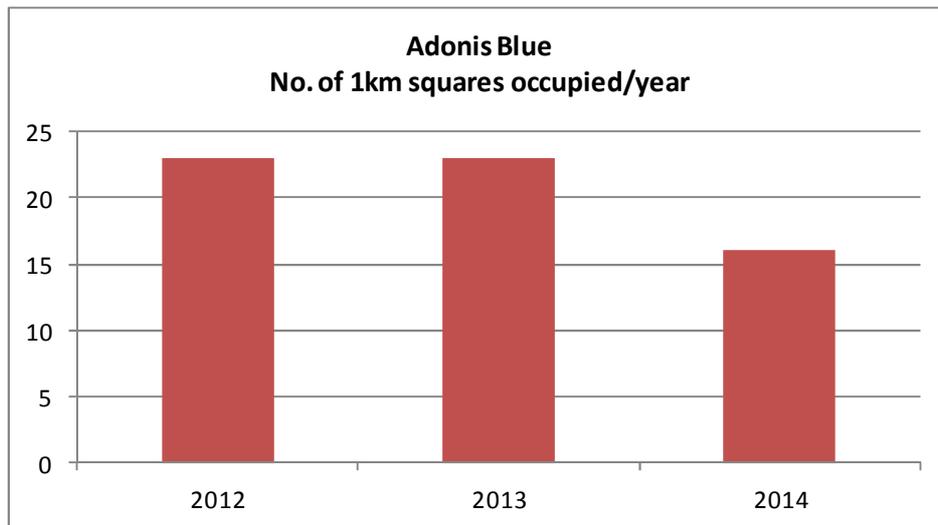


Fig. 19

He considered that, overall, the 2012 season was slightly better than average, despite the generally awful weather, due to a timely respite during the flight period of the second brood. However, he noted the highly variable performance of the species between sites, together with some local population 'spikes'.

These included remarkable daily counts of 918 first brood butterflies on the transect at Anchor Bottom, within the NIA project area, and a maximum of 1699 during the second brood. The Adonis Blue clearly had a much better time on some sites within the NIA than on others.

As with the Silver-spotted Skipper, Holloway's transect at Malling Down (Lewes), which lies just outside the Brighton & Hove focal area of the NIA project, provides a seemingly accurate surrogate indicator for the fortunes of this species within the NIA, despite its irregular nature (Fig. 20).

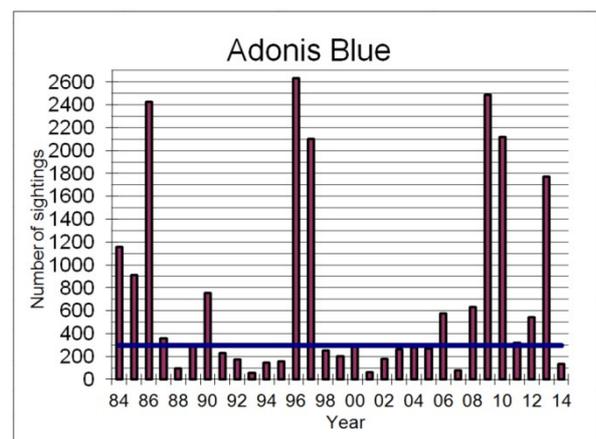


Fig. 20

2013 was certainly a much better year for the Adonis Blue, which produced the record daily transect count of 807 (second brood) at Malling Down. However, even here, one of the best sites, numbers dropped back markedly in 2014.

**Interpretation:** Interpretation of the data for the Adonis Blue is quite complex, with highly variable performance between NIA project recording years, and between different sites within each year. There were some negative signals of population change, punctuated by localised episodes of unusually high abundance. The situation was further complicated by the undoubtedly influential number of gaps in monitoring coverage.

The annual abundance of this species appears to have been strongly influenced by weather patterns; perhaps more significantly affecting first brood larval development in the early spring, than during the adult flight periods. However, there is no firm evidence for a contraction of the species' geographical range during the period of the NIA project time-span.

In consideration of the data discussed above, the Adonis Blue has been assigned a NIA Project Indicator Value of 'Stable', which is unchanged from the NIA Baseline Indicator Value.

It is likely to take a few more years before any potential benefits of NIA work to the Sussex population of Adonis Blue can be established.

## 7. CHALK HILL BLUE

**Introduction:** The Chalk Hill Blue is one of the quintessential butterflies of high summer on the South Downs, flying in a single brood from mid July through September. It overlaps with the second brood of Adonis Blue, and shares the same caterpillar food-plant, horseshoe vetch. It has a similarly close relationship with ants during the caterpillar and chrysalis stages of its life-cycle.



Unlike the Adonis Blue, which over-winters as a larva, the Chalk Hill Blue's eggs do not hatch until the following spring. It is largely due to the different calendars of development (phenologies) between these species, and their dependence upon the thermally-driven activity of ants, that the Chalk Hill Blue can tolerate chalk grassland habitats which are cooler, more humid and less well-grazed. It is therefore less fussy and more widespread than the Adonis Blue.

The slightly different (but overlapping) habitat associations of this species, including a tolerance of swards comprising a much higher proportion of longer grasses, made the Chalk Hill Blue an ideal candidate for inclusion within the list of five focal indicator species.

**NIA Baseline Indicator Value:** A NIA baseline position for the Chalk Hill Blue was established, firstly by looking at the national situation as documented by the UK Butterfly Monitoring Scheme (Botham et al., 2013). This provides a 20 year % change of -21 and trend (Indicator Value) of 'Stable', and a 10 year % change of +15 and trend (Indicator Value) of 'Stable'.

This position is considered to be consistent with the NIA project area, as there is a relatively large degree of commonality between the spatial coverage of national and NIA populations. Also, the habitat associations of this species are broadly similar throughout its entire UK geographical range.

Examination of the more local history of this species reveals a period of stability throughout the 21<sup>st</sup> Century, following a decline in colonies to the west of the River Adur during the last three decades of the 1900s (Pratt, 2011).

Taking all of the data into account, a NIA Baseline Indicator Value of 'Stable' was assigned to this species.

**NIA Project Data:** Figs. 21 – 24 show the distribution (at 1 Km scale) of the Chalk Hill Blue in the Sussex part of the NIA between 2012 and 2014, and 1 Km square occupancy.

As already stated, the distribution of the focal indicator species, measured in terms of 1 Km square occupancy, is considered a more reliable indicator of population health than total, annual abundances. This is true to a far greater extent for the Chalk Hill Blue than for any of the other focal indicator species. In this particular case, absolute abundance data is of minimal significance, such is the skew exerted by the isolated cases of super-abundance observed in 2012.

Whereas the poor, wet summer of 2012 resulted in a significant dip in populations of almost all British species, the Chalk Hill Blue population exploded on several sites, leading to the observation of “numbers rarely seen since Victorian times” (see following reference).

At Friston Gallops, within the Eastbourne focal area of the NIA project, structured surveying and the use of satellite imagery allowed Michael Blencowe, Mike Mullis and Neil Hulme to estimate that at least 820,000 adult insects flew here on the peak day in early August. A week later, Hulme used a similar technique to estimate a flight of approximately 175,000 butterflies at Medley Bottom near Amberely (The Sussex Butterfly Report, 2012, Issue 5, pp. 13 – 15).

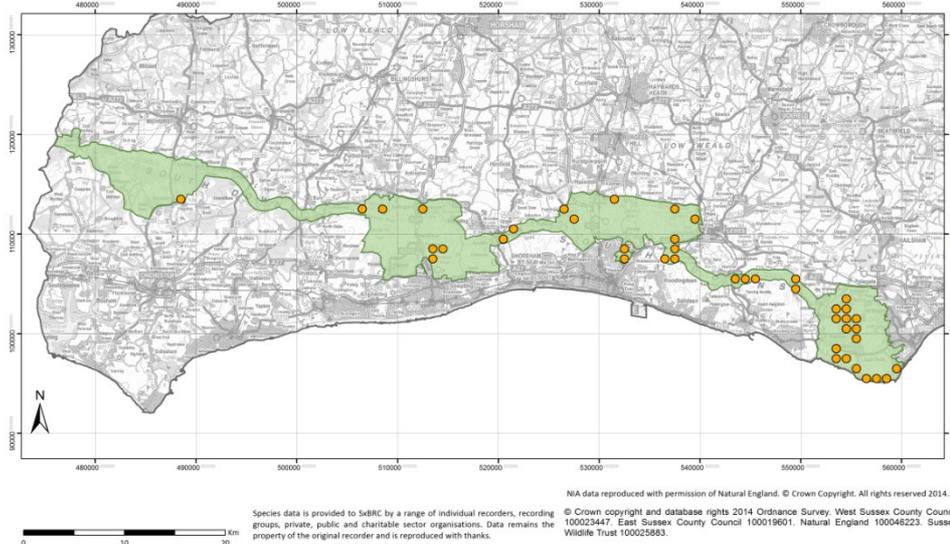
It was surmised that “the continually wet conditions ..... would have led to exceptionally lush growth of nitrogen-rich horseshoe vetch plants, sufficient to support a veritable army of Chalk Hill Blue caterpillars”. Competition for such resources is probably one of the key limiting factors of population size in most years.

Abundance ‘spikes’ aside, the distribution maps and bar chart illustrating 1 Km square occupancy (Figs. 21 – 24) demonstrate a high degree of stability throughout the NIA project recording period. The slightly lower number of 1 Km squares apparently occupied in 2012 (42), probably reflects a slight reduction in recording effort, due to consistently poor weather. The figures for 2013 and 2014 were remarkably consistent, with 47 and 46 1 Km squares respectively.

**South Downs Way Ahead NIA (Sussex)**  
**Chalkhill Blue**  
**2012**

Prepared for Neil Hulme  
 14/05/2014  
**(ESD/14/254)**

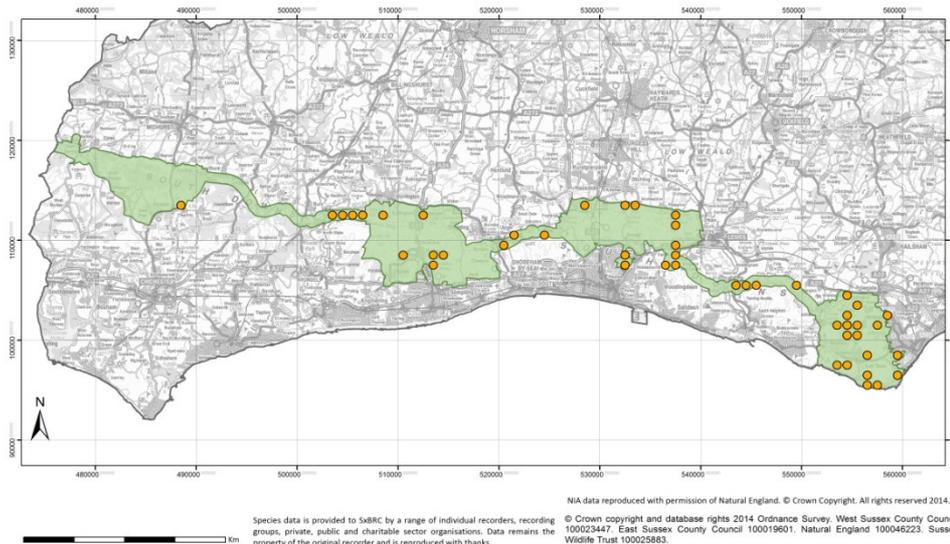
Fig. 21



**South Downs Way Ahead NIA (Sussex)**  
**Chalkhill Blue**  
**2013**

Prepared for Neil Hulme  
 14/05/2014  
**(ESD/14/254)**

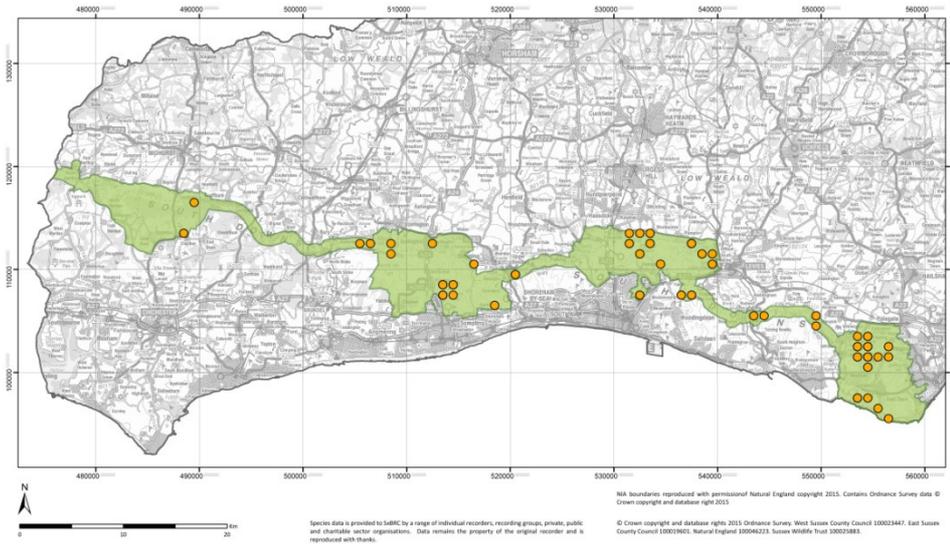
Fig. 22



**South Downs Way Ahead NIA (Sussex)**  
**Chalkhill Blue**  
**2014**

Prepared for Neil Hulme  
 17/02/2015  
**(ESD/15/67)**

Fig. 23



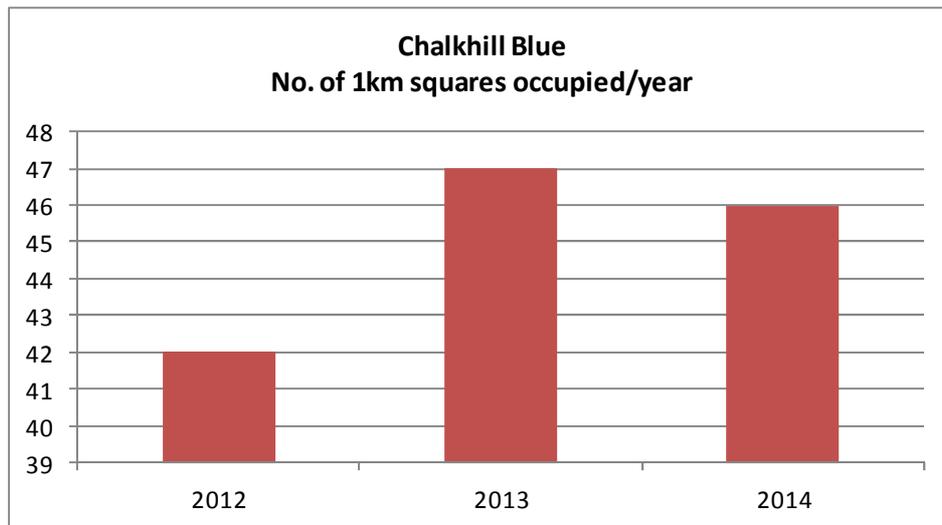


Fig. 24

**Interpretation:** In consideration of the data discussed above, the Chalk Hill Blue has been assigned a NIA Project Indicator Value of 'Stable', which is unchanged from the NIA Baseline Indicator Value.

The limited time-span of the project is shorter than the period often necessary to either promote or determine positive population changes in response to habitat management work, particularly for a colonial species as potentially numerous as the Chalk Hill Blue. It may therefore take a number of years before any benefits of NIA work to this species can be established.

## 8. SMALL BLUE

**Introduction:** The Small Blue is the smallest British butterfly, with a wingspan of between 1.5 cm and 2.5 cm. Both sexes are a charcoal grey colour on the upper-side, and a pale, powder blue beneath. The first brood flies from mid May through June, while a partial to full second brood emerges from mid July onwards. The strength of this second brood can be highly variable.



Colonies are usually small, comprising between only a handful and a couple of dozen adults at best. However, where chalky ground has been disturbed, and the caterpillar's food-plant, kidney vetch, becomes periodically abundant, populations can exceed a hundred, at least for a few years.

The Small Blue was chosen as one of the five focal indicator species for several reasons, including its potential to colonise areas where NIA project work might cause the disturbance or exposure of bare ground.

Given its tiny size, it is also surprisingly mobile and willing to disperse. In 2007 Dr Dan Danahar created an area of surrogate chalk grassland habitat on the Surrenden Campus, which serves a number of educational institutions, including the Dorothy Stringer High School. Set within the urban fringe of Brighton & Hove, just outside the finger of NIA project land which penetrates the city, this site became populated by the Small Blue within two years. The nearest known colony lies 3 Km away (The Sussex Butterfly Report, 2010, Issue 3, pp. 27 – 30).

**NIA Baseline Indicator Value:** A NIA baseline position for the Small Blue was established, firstly by looking at the national situation as documented by the UK Butterfly Monitoring Scheme (Botham et al., 2013). This provides a 20 year % change of +31 and trend (Indicator Value) of 'Stable', and a 10 year % change of +83 and trend (Indicator Value) of 'Stable'.

However, this position is not particularly transferable to the NIA project area, as there is quite limited commonality between the spatial coverage of national and NIA populations, with the former including strongholds across southern Wales, parts of Ireland, and in northeast Scotland. In many of these areas the Small Blue is associated with habitats quite different to those in the NIA area, including coastal biotopes.

Examination of the more local history of this species reveals a quite long-term period of population stability, throughout the 21<sup>st</sup> Century and for several decades before that (Pratt, 2011).

Taking all of the data into account, a NIA Baseline Indicator Value of 'Stable' was assigned to this species.

**NIA Project Data:** Figs. 25 – 28 show the distribution (at 1 Km scale) of the Small Blue in the Sussex part of the NIA between 2012 and 2014, and 1 Km square occupancy.

The Small Blue suffered particularly badly as the result of atrocious weather throughout the spring and summer of 2012. The Butterfly Conservation Sussex Branch Species Champion, Dave Harris, commented that “at some sites in Sussex there was an apparent 80% decline in the numbers of Small Blue compared with 2011, with the second brood almost non-existent!” (The Sussex Butterfly Report, 2012, Issue 5, p. 42).

This species was only recorded in 12 1 Km squares within the NIA project area during 2012, and Harris speculated that there may have been localised extinctions. However, given the small size of many populations, and the difficulties in detection during prolonged periods of poor weather, it is equally likely that abundances simply fell below the recording threshold. Either way, those colonies were soon resurrected.

After a shaky start during the 2013 spring flight, the second brood rallied quite strongly, at least in terms of distribution. 1 Km square occupancy climbed steeply, with the butterfly being recorded in 26 squares by the end of the year, and in 25 during 2014, suggesting a return to a much more stable situation. However, abundances are still to fully recover to pre-2012 levels on some sites.

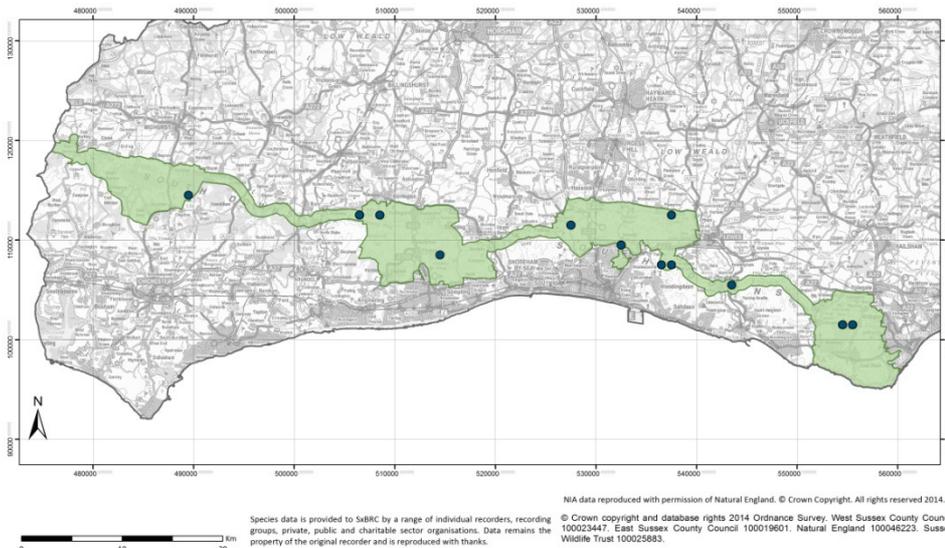
Despite this being a challenging period for the Small Blue, there were one or two examples of its ability to disperse. Following scrub clearance work within the 'Chantry to Chanctonbury' NIA subproject area in early 2012, the species rapidly made its first recorded appearance in one of the coombes below Chantry Hill.

Eggs of the Small Blue were also discovered on a recently engineered road verge (A280) near Clapham village, again some considerable distance from the nearest known colony.

**South Downs Way Ahead NIA (Sussex)  
 Small Blue  
 2012**

Prepared for Neil Hulme  
 14/05/2014  
 (ESD/14/254)

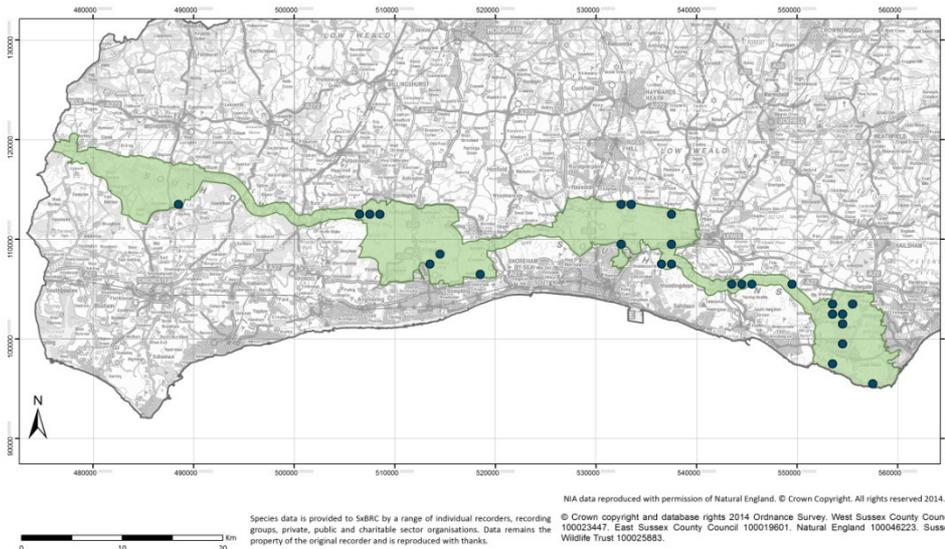
Fig. 25



**South Downs Way Ahead NIA (Sussex)  
 Small Blue  
 2013**

Prepared for Neil Hulme  
 14/05/2014  
 (ESD/14/254)

Fig. 26



**South Downs Way Ahead NIA (Sussex)  
 Small Blue  
 2014**

Prepared for Neil Hulme  
 17/02/2015  
 (ESD/15/67)

Fig. 27



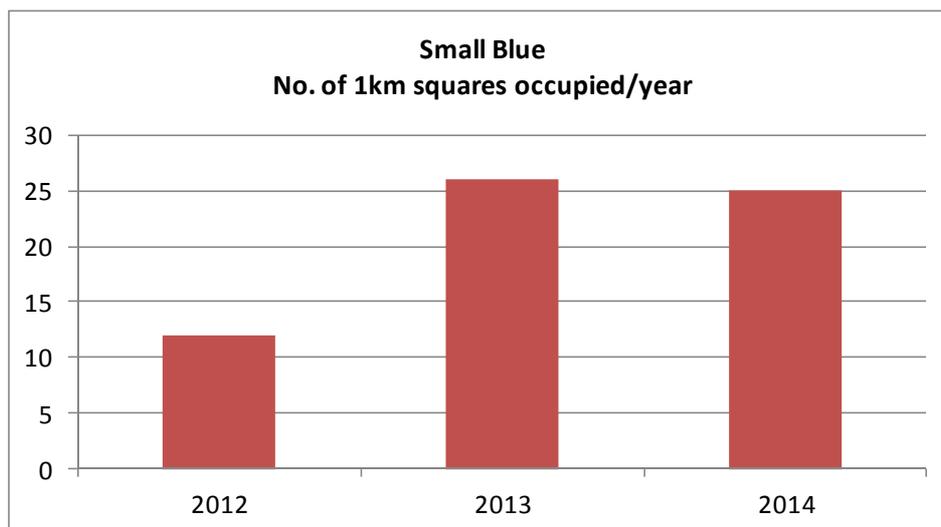


Fig. 28

**Interpretation:** In consideration of the data discussed above, the Small Blue has been assigned a NIA Project Indicator Value of 'Stable', which is unchanged from the NIA Baseline Indicator Value.

There is no evidence for any significant improvement or decline, in terms of either the distribution or abundance of this species, between 2011 (pre-NIA) and the final year of the NIA project recording period (2014). However, the potential for any positive changes would have been suppressed by the 2012 weather event.

Of the three focal indicator species of Blue, this is considered the most likely to register any project-related benefits in the immediate post-NIA years.

## 9. 'CHANTRY TO CHANCTONBURY' NIA SUBPROJECT

**Introduction:** The 'Chantry to Chanctonbury' NIA subproject was designed to build upon a history of successful, landscape-scale conservation work, delivered through a close working partnership between the South Downs National Park Authority (and its forerunner, the South Downs Joint Committee) and Butterfly Conservation Sussex Branch.

With the co-operation and assistance of landowners, this work had already brought benefits to the Duke of Burgundy and other species of butterfly, together with the wider fauna and flora of chalk grassland, on land to the immediate west.

The subproject area covers a 6 Km stretch of downland between Storrington and Wiston (front cover image), much of which was considered to be in less-than-ideal condition. It comprises the north-facing scarp slope, folded into a series of deep coombes, some of which were succumbing to the successional advance of scrub and secondary woodland. Other habitat types include disused chalk workings and semi-mature woodland edge.

The main aspects of NIA work conducted within the subproject area included scrub management, the removal of blocks of secondary woodland, the reinstatement of livestock grazing, and changes to existing grazing regimes. Scrub management did not focus exclusively on its removal, as some areas in the earlier stages of the scrub cycle were retained, in order to provide a mosaic of different habitat and microhabitat types.

This case study, which examines some of the actions and outcomes at the western end of the subproject area (Chantry Hill), has been chosen as it demonstrates the clear benefits afforded by NIA work, as highlighted by the very rapid and positive reaction of two non-focal species of butterfly.

This site forms part of the Amberley Mount to Sullington Hill SSSI and is owned by Grey Friars Farm. The co-operation of Charles Francis and Mark Pockett is gratefully acknowledged.

**Grazing:** The grazing of chalk grassland is one of the key issues in determining its sward structure and quality. The types of animals used, stocking densities, timing and period of residency are all important factors to consider.

Sheep will invariably produce a shorter, tighter, more uniform sward, while cattle tend to create an irregular, clumpy structure. The former outcome is generally considered preferable from a botanical point of view, and is also favoured by a few butterfly species, including the Silver-spotted Skipper and Adonis Blue, particularly when achieved on south-facing slopes.

However, the more varied mosaic produced by cattle (which will also target ranker grasses than sheep) has advantages for the majority of invertebrates. Where it is possible to achieve, a combination of the two grazing effects is desirable over a period of time. This may be easier on larger sites.

Grazing of chalk grassland using cattle is sometimes contentious, and care should certainly be taken particularly when using heavier breeds, so as to avoid excessive poaching or wider damage to the turf. However, if weather conditions and duration of stay are taken into account, and sites are monitored, the positive benefits are considered to far outweigh the potentially negative. The tendency for cattle to congregate in areas where supplementary food may be provided, or seek shelter from the elements, should also be taken into consideration.

Although the long history of sheep grazing on the South Downs is sometimes cited as a reason for the almost exclusive use of these animals in chalk grassland management, the days of the itinerant shepherd are long gone. The effects of intensive grazing by sheep in the modern downland landscape are therefore different to those created through the traditional practices involving high flock mobility.

At Chantry Hill the site had been regularly grazed by sheep for at least a decade. During this period a two-fold subdivision had developed, with the western third of the site receiving all of the grazing pressure from sheep, causing the sward here to become increasingly short and 'sweet'. This encouraged rabbits to target the same area, exacerbating the imbalance of grazing intensity between the western and eastern sections of the slope.

The eastern two thirds of the site accordingly became increasingly rank, with the delicate, chalk grassland flora being swamped by the dominant, longer and coarser grasses. This eastern part of the slope became increasingly impoverished, as clearly demonstrated by the restricted butterfly fauna found here.

Following consultation with Natural England, and with its support, the site was first grazed with Sussex cattle over the winter of 2011/2012.



**Sussex cattle and areas of scrub and secondary woodland clearance at Chantry Hill**

The benefits provided by this change in grazing regime came quickly. The cattle targeted the eastern two thirds of the slope and efficiently removed the thatch of old, coarse grasses. The sward structure improved rapidly over the next two growing seasons, becoming more open and increasingly populated by finer species. Delicate, chalk grassland flowers carpeted the slopes, and grass-smothered ant hills were exposed and almost immediately became active.

One plant which flourished was the hairy violet; caterpillar food-plant of the Dark Green Fritillary. This large, powerful species flies, in a single brood, from mid June through August. In the recent past it had occurred only in low numbers along this stretch of the Downs, with the maximum daily count at Chantry Hill between 2009 and 2012 being just 2.



However, the population of this species reacted to the improved habitat conditions in a spectacular manner, with maximum daily counts reaching 55 in 2013 and 65 in 2014 (Fig. 29), increases of 2650% and 3150% respectively. This is now the largest population of Dark Green Fritillary in West Sussex.

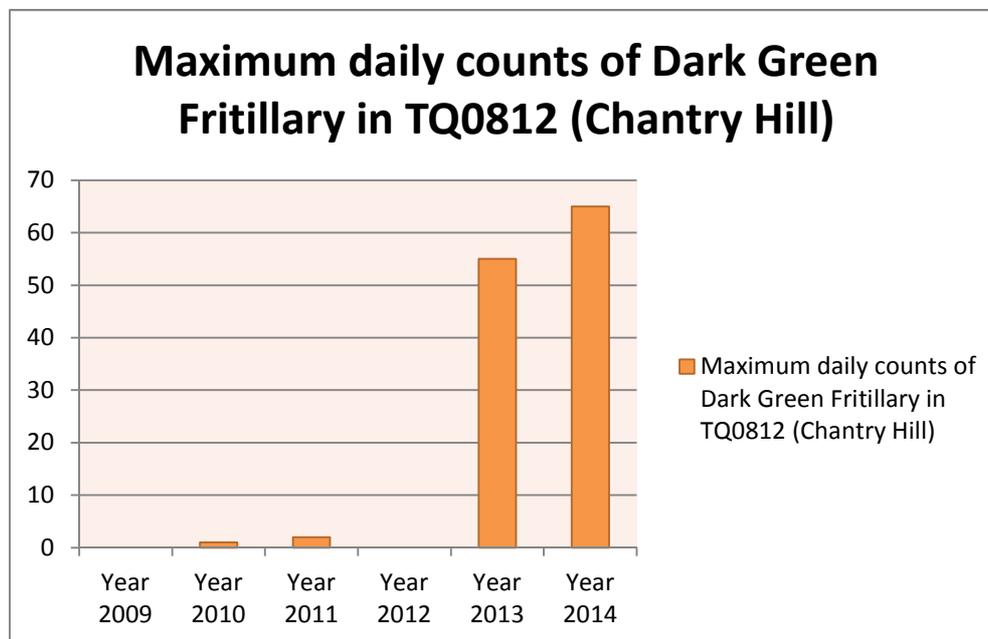
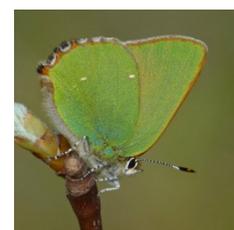


Fig. 29

**Scrub Control:** In areas where there was considered to be no potential benefit to the Duke of Burgundy, some patches of scrub were removed in their entirety, such as that depicted in the upper left-hand corner of the image on page 38.

Although larger stems were treated in order to retard re-growth, the majority of 'soft' scrub was allowed to regenerate, providing an abundance of fresh, suckering growths of shrubs such as dogwood and bramble, together with a rich and varied forb component, including bird's-foot trefoil.

Egg-laying has been observed on all of these plant species at Chantry Hill, which represent just a small selection of the caterpillar food-plants potentially used by the Green Hairstreak.



This small, highly territorial species is single-brooded, flying from mid April through June. The stunning, iridescent green colouration varies according to the angle at which light rays strike its wings, due to the complex, microscopic structures hidden within each scale.

The high density of both freshly-emerged and egg-laying butterflies observed over this area of regenerating scrub is interesting, particularly in view of the wide availability of the more commonly used food-plant, rock-rose, over adjacent areas. As suggested by Prof. Jeremy Thomas (Thomas & Lewington, 2010), the females might be targeting particularly tender, nitrogen-rich growths for egg-laying.

In Sussex the Green Hairstreak is “extremely local and irregular in numbers” (Pratt, 2011) and seldom common. Fig. 30 shows the maximum daily counts of this species at Chantry Hill between 2009 and 2014, with 63 in 2013 and 100 in 2014 representing increases of 1160% and 1900% respectively, over the previous best figure. This is probably now the largest population of Green Hairstreak in Sussex, and certainly so on a per hectare basis.

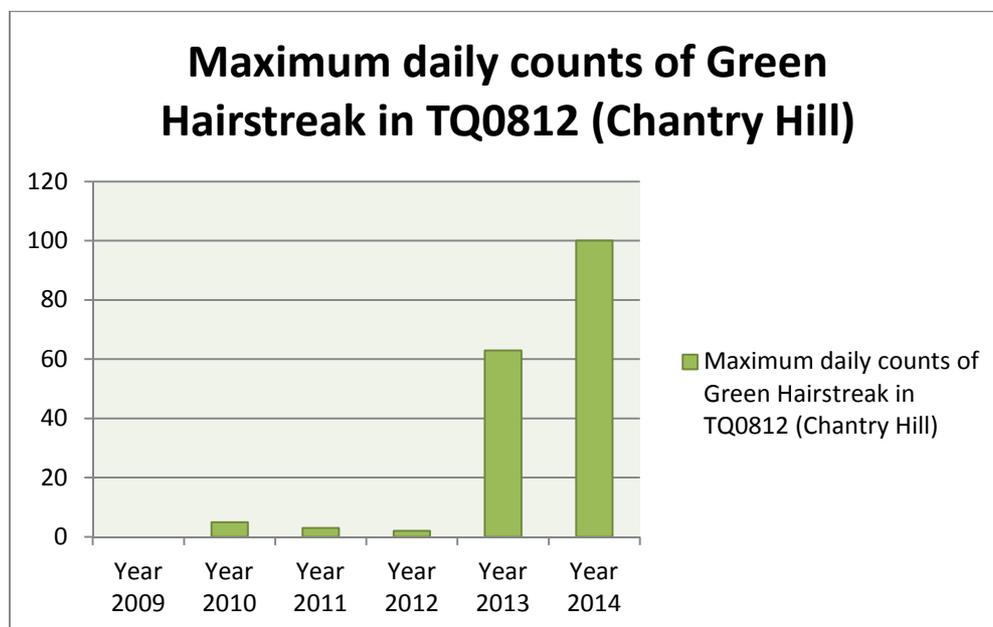


Fig. 30

**Interpretation:** It is quite clear that the local populations of Dark Green Fritillary and Green Hairstreak have benefited greatly as the direct result of NIA project work at Chantry Hill.

Chantry Hill is now considered to be one of the best stretches of chalk grassland habitat within Sussex, and probably the country. The site now supports sizeable populations of both the Duke of Burgundy and Silver-spotted Skipper. These species each prefer chalk grassland habitats at opposing ends of the management spectrum. To find them both thriving on the same site is extremely rare, if not unique within the UK.

## 10. CONCLUSIONS

The 'South Downs Way Ahead' NIA project (2012 – 2015) spanned just three summers, over which the populations of five focal indicator species of butterfly were monitored.

The time-span of the project was considered to be shorter than the period often necessary to either promote or determine positive population changes in response to habitat management work.

However, two of the focal indicator species did provide clear evidence of positive population change, particularly in terms of geographical distribution, which is considered a more reliable indicator than absolute abundance.

The positive population change observed in the threatened Duke of Burgundy was considered to be attributable to NIA project work, with a high degree of confidence.

The observed geographical spread of the Silver-spotted Skipper was judged to have been positively influenced by NIA project work, although the relative contributions of additional factors are difficult to apportion. As such, only a medium level of confidence was attributed to the link made between population change and NIA project work.

The spectacular increases in the abundances of two non-focal species, Dark Green Fritillary and Green Hairstreak, within the 'Chantry to Chanctonbury' subproject area, were undoubtedly driven by NIA project work. The populations of both species at Chantry Hill are now the largest in West Sussex.

The remaining focal indicator species, Adonis Blue, Chalk Hill Blue and Small Blue, did not demonstrate significant, positive (or negative) population changes. Poor weather and incomplete monitoring coverage may have masked any potential benefits afforded to these species by NIA project work.

A significantly longer period may be required to either drive or detect any potential benefits to these species. To this end, the focused monitoring of all focal indicator species will continue beyond the NIA project time-span.

It is considered likely that the increased extent of habitat managed to secure species-specific needs within the NIA, will encourage further positive changes in the focal indicator species in future years.

The positive changes observed in the population of some focal indicator species over such a short period of time is considered quite remarkable. As a group, butterflies act as a sensitive barometer of habitat health. As such, these results provide an early indication of success in meeting some of the NIA project aims; improving the quality, extent and connectivity of areas of chalk grassland (Walk the Chalk; Linking the Fragments).

Unsurprisingly, at such an early stage, a significant proportion of the new or restored habitat created through NIA project work is yet to be colonised by some of the focal indicator species.

However, these habitat patches will undoubtedly contribute to the strengthening of the downland ecological network, by providing either new opportunities for the establishment of sizeable, permanent colonies, or by providing 'stepping stones', or by creating linear wildlife corridors.

Examples of the above, which will benefit the Duke of Burgundy and other species, include the work at Barnsfarm Hill and Chanctonbury Ring, and improvements to the wildlife corridor now better-connecting the large population at Heyshott Escarpment with the improving and increasingly suitable habitat on the Graffham Down Trust reserves.

The 'South Downs Way Ahead' NIA project has been delivered in a manner which fully recognises the overarching philosophy of the "Lawton Report" (Lawton et al., 2010), succinctly summarised as "*more, bigger, better and joined*".

This pivotal review recommended five key approaches necessary to rebuild a coherent and resilient ecological network on a national scale:

- (i) Improve the quality of current sites by better habitat management.
- (ii) Increase the size of current wildlife sites.
- (iii) Enhance connections between, or join up, sites, either through physical corridors, or through 'stepping stones'.
- (iv) Create new sites.
- (v) Reduce the pressures on wildlife by improving the wider environment, including through buffering wildlife sites.

The 'South Downs Way Ahead' NIA project has incorporated the first four of these approaches in work on a more localised, yet landscape-scale, with butterfly monitoring data providing encouraging results at an early stage.

With butterflies in mind, but equally applicable to other wildlife groups, these aims are essential in reducing the impact of, and assisting recovery from, the inevitably increasing regularity of extreme weather events, such as the wash-out summer of 2012 (Oliver et al., 2013).

The 'South Downs Way Ahead' NIA project has already brought substantial, tangible benefits to this iconic chalk landscape. This is a great start, but the momentum must not be lost and it is essential that work of this nature continues long into the future.



“I would go as far as to say that it *must* be done if England is to remain a ‘green and pleasant land’; Prof Sir John Lawton, 2010

## 11. ACKNOWLEDGEMENTS

The 'South Downs Way Ahead' NIA project work described in this report, including the monitoring of butterfly populations and the collation, evaluation and presentation of a large body of data, was achieved through the efforts of a great number of people. Their contributions to the successful delivery of this part of the project are gratefully acknowledged.

**Butterfly Recording:** Every record provided by every recorder is important. However, special mention is made of those most actively involved in the more detailed and time-consuming monitoring of the NIA focal indicator and other species, performed with the NIA project in mind. They include, but are not restricted to:

Adonis Blue – Crispin Holloway, Michael Blencowe  
Chalk Hill Blue – Michael Blencowe, Mike Mullis, Neil Hulme  
Dark Green Fritillary – Dr Martin Kalaher, Neil Hulme (both at Chantry Hill)  
Duke of Burgundy – Neil Hulme  
Green Hairstreak – Neil Hulme (Chantry Hill)  
Silver-spotted Skipper – Crispin Holloway, Michael Blencowe, Neil Hulme  
Small Blue – Dave Harris, Michael Blencowe

**Data Collation:** Clare Blencowe, Michael Blencowe, Crispin Holloway (Malling Down)

**Maps and Charts:** Sussex Biodiversity Record Centre, Penny Green, Bob Foreman, Clare Blencowe, Neil Hulme

**NIA Project Lead:** South Downs National Park Authority (SDNPA), Emily Brennan, Nigel James

**Delivery of NIA Project Work (Staff):** All SDNPA Rangers employed in the Central and Eastern Downs operational areas assisted in the delivery of this part of the NIA project. However, special mention is made of contributions by Simon Mockford and Tom Parry in the 'Chantry to Chanctonbury' subproject and adjacent area, and by Simon Mockford and Ian McConnell for their longer term assistance with Duke of Burgundy recovery work. Ian McConnell has also provided a great deal of support for work on the Graffham Down Trust reserves.

**Delivery of NIA Project Work (Volunteers):** The importance of the contribution made by volunteers cannot be emphasised too strongly. Through their selfless and enthusiastic dedication to the task of clearing invasive scrub, particularly on cold, wet, winter days, the South Downs of Sussex are now a much-improved place for wildlife.

The South Downs Volunteer Ranger Service operates over the entire NIA project area, while other local conservation groups including (but not restricted to) the Graffham Down Trust and Steyning Downland Scheme, regularly work on their home turf.

Special mention is made of the Murray Downland Trust volunteers, who assemble on Heyshott Escarpment every Wednesday from September to March, where they are joined by Butterfly Conservation Sussex Branch volunteers including Colin Knight, Nigel Symington, Garry Philpott and Neil Hulme. This reserve is now of national importance for its butterfly fauna and chalk grassland flora.

**Advice and Guidance; ‘Dukes on the Edge’:** Dr Dan Hoare (Butterfly Conservation, Head of Regions) provided invaluable advice and guidance during the tendering and early planning stages of the ‘South Downs Way Ahead’ NIA project.

He also delivered project work in the far west of West Sussex, under the auspices of the Butterfly Conservation ‘Dukes on the Edge’ project (2011 – 2014). This work continued across (and far beyond) the Hampshire part of the NIA project area, which is not covered by this report.

**Prof Sir John Lawton and Colleagues:** Were it not for the “Lawton Report” (2010) and its recommendation to create Ecological Restoration Zones, which underwent metamorphosis to subsequently emerge as NIAs (Nature Improvement Areas), very little of the foregoing would have been possible.

## 12. REFERENCES

Botham, M. S., Brereton, T. M., Middlebrook, I., Randle, Z. & Roy, D. B. 2013. United Kingdom Butterfly Monitoring Scheme report for 2011. Centre for Ecology & Hydrology.

Butterfly Conservation Sussex Branch. Records database, 'The Sussex Butterfly Report' (2008 – 2013, Issues 1 – 6) and various unpublished reports.

Davies, Z. G., Wilson, R. J., Coles, S. & Thomas, C. D. 2006. Changing habitat associations of a thermally constrained species, the silver-spotted skipper butterfly, in response to climate warming. *Journal of Animal Ecology*, Vol. 75, Issue 1, pp. 247 – 256.

Lawson, C. R., Bennie, J., Hodgson, J. A., Thomas, C. D. & Wilson, R. J. 2014. Topographic microclimates drive microhabitat associations at the range margin of a butterfly. *Ecography*, Vol. 37, Issue 8, pp. 732 – 740.

Lawton, J.H., Brotherton, P.N.M., Brown, V.K., Elphick, C., Fitter, A.H., Forshaw, J., Haddow, R.W., Hilborne, S., Leafe, R.N., Mace, G.M., Southgate, M.P., Sutherland, W.A., Tew, T.E., Varley, J. & Wynne, G.R. 2010. Making Space for Nature: a review of England's wildlife sites and ecological network. Report to Defra.

Legrand, D., Trochet, A., Moulherat, S., Calvez, O., Stevens, V., Ducatez, S., Clobert, J. & Baguette, M. 2014. Ranking the ecological causes of dispersal in a butterfly. *Ecography*, pre-publication online.

Nowicki, P. & Vrabec, V. 2011. Evidence for positive density-dependent emigration in butterfly metapopulations. *Oecologia*, Vol. 167, Issue 3, pp. 657 – 665.

Oliver, T. H., Brereton, T. & Roy, D. B. 2013. Population resilience to an extreme drought is influenced by habitat area and fragmentation in the local landscape. *Ecography*, Vol. 36, Issue 5, pp. 579 – 586.

Pratt, C. R. 2011. *A Complete History of the Butterflies and Moths of Sussex*. Self-published.

Thomas, J. & Lewington, R. 2010. *The Butterflies of Britain & Ireland*. British Wildlife Publishing.

Wilson, R. J., Davies, Z. G. & Thomas, C. D. 2010. Linking habitat use to range expansion rates in fragmented landscapes: a metapopulation approach. *Ecography*, Vol. 33, Issue 1, pp. 73 – 82.

### 13. GLOSSARY OF SCIENTIFIC NAMES

<u>Common Name</u>	<u>Scientific Name</u>
Adonis Blue	<i>Polyommatus bellargus</i>
Bird's-foot Trefoil	<i>Lotus corniculatus</i>
Bramble	<i>Rubus fruticosus</i>
Chalk Hill Blue	<i>Polyommatus coridon</i>
Cowslip	<i>Primula veris</i>
Dark Green Fritillary	<i>Argynnis aglaja</i>
Dogwood	<i>Cornus sanguinea</i>
Drab Looper	<i>Minoa murinata</i>
Duke of Burgundy	<i>Hamearis lucina</i>
Green Hairstreak	<i>Callophrys rubi</i>
Hairy Violet	<i>Viola hirta</i>
Horseshoe Vetch	<i>Hippocrepis comosa</i>
Kidney Vetch	<i>Anthyllis vulneraria</i>
Pearl-bordered Fritillary	<i>Boloria euphrosyne</i>
Rabbit	<i>Oryctolagus cuniculus</i>
Rock-rose	<i>Helianthemum nummularium</i>
Sheep's Fescue Grass	<i>Festuca ovina</i>
Silver-spotted Skipper	<i>Hesperia comma</i>
Small Blue	<i>Cupido minimus</i>