The state of lowland calcareous grassland within the South Downs National Park

2012-2015

Project partners

This project was a partnership between Natural England, The South Downs National Park Authority (SDNPA) and the Sussex Biodiversity Record Centre (SxBRC).

Contractor

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1. Summary

A survey of calcareous grassland Sites of Special Scientific Interest (SSSIs) (121 units in 33 sites, 3054 ha), Local Wildlife Sites (LWS) (148 sites, 3300 ha) and non-designated calcareous grassland (210 sites, 987 ha), within the South Downs National Park was carried out between 2012 and 2015 across the counties of Hampshire, East Sussex, West Sussex and the city of Brighton & Hove. In total, 7342 ha were surveyed or 479 sites.

The survey assessed key target attributes such as sward height, cover of bare ground and the presence of positive and negative indicator species. A favourable site met all its attribute targets. A site was considered unfavourable if one or more attributes fell outside their target range. A site was classed as destroyed or partially destroyed if all or part of the extent of the habitat was deemed non-recoverable.

Biodiversity2020 aims to ensure that 95% of SSSIs and 90% of priority habitats are in favourable or recovering condition by 2020 and that 50% of SSSIs are in favourable condition. This survey identified that 41% of SSSIs surveyed were in favourable condition, with 99% favourable or recovering and 0.83% were unfavourable or destroyed.

21% of the LWS surveyed were favourable with a total of 31% LWS favourable, part favourable or recovering. 58% of sites were unfavourable or destroyed.

10% of undesignated chalk grassland sites were in favourable condition or 13% classed as favourable, part favourable or recovering. 84% of sites were unfavourable or destroyed.

Scrub encroachment was reported as an issue in 245 of surveyed sites. 16% of sites where scrub encroachment was recorded were in favourable condition compared to 60% of sites which were classified as unfavourable or destroyed.

2. Introduction

"By 2050 the iconic English lowland landscapes and heritage will have been conserved and greatly enhanced. These inspirational and distinctive places, where people live, work, farm and relax, are adapting well to the impacts of climate change and other pressures.

People will understand, value, and look after the vital natural services that the National Park provides. Large areas of high-quality and well-managed habitat will form a network supporting wildlife throughout the landscape."

The Vision for the South Downs National Park

2.1 Background

A recent survey of 93 lowland calcareous grassland Local Wildlife Sites within the South Downs Way Ahead Nature Improvement Area (2012-2014) found that less than 30% were in favourable condition.[1] Many of the 93 LWS had not been surveyed since their designation in 1991. Hampshire Biodiversity Information Centre has a program to survey LWS every ten years but no similar scheme exists for LWS in East or West Sussex.

This highlighted the need for a wider survey to create a baseline condition assessment of all the calcareous grassland within the South Downs National Park and was one of the key instigating factors in the undertaking of this project.

The South Downs National Park extends across three counties: Hampshire, West Sussex and East Sussex and the city of Brighton & Hove. The National Park is over 1,600 square kilometres in size.[2] This landscape has a long history of management stretching back to early woodland clearance in the Neolithic and bronze ages followed by sheep grazing. The National Park has been shaped by farmers over thousands of years. This continuity of management and settlement has led to a wealth of wildlife and cultural heritage.

Lowland calcareous grassland (LCG) is one of the most iconic and diverse habitats of the South Downs and is a priority for conservation efforts. It is one of the most species-rich plant communities in north-western Europe[3] and is known as the 'tropical rainforest' of Europe. One square metre can support up to 80 species of vascular plants and mosses. Lowland

1 The South Downs NIA Local Wildlife Sites Surveys 2012-2014 (Forbes 2015)

2 South Downs National Park Management Plan 2013

3 Butaye and others 2005

calcareous grassland contains 25 Biodiversity Action Plan (BAP) species as well as other rare and threatened species including round-headed rampion *Phyteuma orbiculare*, burnt orchid *Neotinea ustulata*, early spider orchid *Ophrys sphegodes*, early gentian *Gentianella anglica*, adonis blue *Polyommatus bellargus,* chalkhill blue *Polyommatus coridon*, the Duke of Burgundy fritillary *Hamaeris lucina* and the wart-biter cricket *Decticus verrucivorus* and provides breeding habitat for a number of scarce or declining birds, including corn bunting *Emberiza calandra* and skylark *Alauda arvensis.*

The underlying geology, which creates thin, low nutrient rendzina soils, as well as the variation in topography and microclimates, has created a rich mosaic of habitats. Over 6,600 hectares of calcareous grasslands are found within the National Park (4% of the total area).[4] These sites are often small and isolated.[5] The majority (36 %) of chalk grassland sites are less than 1ha in size and only 45 sites are larger than 10ha. These sites are at further risk from influences including climate change, invasive species, disease and human disturbance.

Chalk grassland has suffered a significant decline, particularly in the last 70 years. It is estimated that, due to factors such as agricultural intensification, abandonment and urbanisation, approximately 90% of the original habitat has been lost.[6]

4 South Downs National Park Management Plan 2013

5 State of the Park Report 2012

6 Butaye and others 2005

Image 1 Malling Down. Graeme Lyons

2.2 Landscape Scale Conservation

Current conservation policy calls for landscape-scale initiatives to tackle the challenges faced today.[7] Paragraph 117 of the National Planning Policy Framework states that planning policies should plan for biodiversity at a landscape-scale across local authority boundaries and identify and map components of local ecological networks.

Lawton's 'Making Space for Nature' concluded that biodiversity and ecosystem services could be preserved by establishing a coherent and resilient ecological network.[8] Biodiversity2020 set its aim to "halt the loss of biodiversity and ecosystem services by 2020, to restore ecosystems in so far as is feasible, and to step up the EU contribution to averting

7 The Natural Environment White Paper for England (NEWP) (2011). The Water Framework Directive (2000). A biodiversity strategy for England (Biodiversity2020) (2011)

8 Making Space for Nature: A Review of England's Wildlife Sites and Ecological Network (Lawton 2010)

global biodiversity loss" by establishing coherent ecological networks through landscape-scale approaches and improvements to our knowledge.

By 2020 we should aim for:

- 90% of priority habitats in favourable or recovering condition and at least 50% of SSSIs in favourable condition.
- More, bigger and less fragmented areas for wildlife, with no net loss of priority habitat.
- Restoring at least 15% of degraded ecosystems as a contribution to climate change mitigation and adaptation.

Without a robust evidence base and knowledge of the current condition of lowland calcareous grassland habitat, these targets will be difficult to achieve. This report will contribute to the delivery and prioritisation of these targets by creating a baseline for future comparison within the South Downs National Park.

The South Downs National Park Management plan has a policy to "Develop a research programme leading to a robust evidence base about the National Park and the issues affecting it."[9] The outputs from this project will help to achieve this and other key objectives as well as feed in to landscape scale conservation initiatives and act as a blueprint for future projects.

A survey of this nature and scope has not been undertaken since the studies published by Steven (1992), Steven and Muggeridge (1992) and Pardon (1987).

2.3 Biodiversity 2020

The Biodiversity2020 report recognises the importance of partnership to achieve its aims. Partnership between statutory, voluntary, academic and business sectors as well as farmers and land managers - over 70% of land in England is farmed. This project has created a strong working partnership between Natural England, SDNP, HBIC and the SxBRC. The exchange of information between each of these organisations has made this survey possible. Data from this project will be maintained and held by the Sussex Biodiversity Record Centre and Hampshire Biodiversity Information Centre.

9 Policy 46 - South Downs National Park Management Plan

A thriving living landscape lists the following outcomes for the SDNP

- The landscape character of the National Park, its special qualities and local distinctiveness have been conserved and enhanced by effectively managing land and the negative impacts of development and cumulative change.
- There is increased capacity within the landscape for its natural resources, habitats and species to adapt to the impacts of climate change and other pressures.
- A well-managed and better connected network of habitats and increased population and distribution of priority species now exist in the National Park.
- There is widespread understanding of the special qualities of the National Park and the benefits it provides.
- More responsibility and action is taken by visitors, residents and businesses to conserve and enhance the special qualities and use resources more wisely.

2.4 Sites of Special Scientific Interest

There are eighty-six sites designated as Sites of Special Scientific Interest (SSSIs) within the SDNP. Of which, thirty-three, or 38% of sites, (3054 hectares) were identified as containing lowland calcareous grassland. These thirty-three SSSIs were further split into 121 SSSI units.

Within the project area, 42% of the total calcareous grassland is designated as SSSI. These sites often represent the best examples of a habitat and contain some of the rarest and most vulnerable species. Most sites have been protected by SSSI status for decades and receive funding to protect, maintain and enhance their interest features. SSSIs are primarily protected by the Wildlife and Countryside Act (1981) and the Countryside and Rights of Way Act (2000).

Only 45% of calcareous grassland habitat is protected by SSSI status[10], the remainder does not benefit from significant legal protection and is therefore susceptible to damage or neglect.

10 State of the Park Report

National statistics for designated sites show that only 29% of lowland calcareous grassland features are in favourable condition, with 40% of SSSIs classed as unfavourable-recovering. Lack of appropriate grazing is the main cause of unfavourable condition, as well as invasive species and nutrient enrichment.[11]

2.5 Local Wildlife Sites

The term Local Wildlife Sites (LWS) refers to Sites of Importance for Nature Conservation (SINCs) in Hampshire and the sites formerly known as Sites of Nature Conservation Interest (SNCIs) in East and West Sussex and Brighton & Hove. 201 Local Wildlife Sites were initially identified as having the potential to contain calcareous grassland. Of these, 148 sites were surveyed.

Local Wildlife Sites are identified and selected for their local and sometimes national nature conservation value. They protect threatened species and habitats, acting as buffers, stepping stones and corridors between nationally-designated wildlife sites. In Sussex three LWS systems currently exist. These are the East Sussex system led by East Sussex County Council, the West Sussex system led by the Sussex Biodiversity Record Centre (led by West Sussex County Council prior to 2015), and the Brighton and Hove system, led by Brighton and Hove City Council. The SINC system in Hampshire is managed by Hampshire County Council on behalf of the Hampshire Biodiversity Partnership. This includes all local authorities, Natural England, Hampshire Wildlife Trust and many other organisations in Hampshire actively involved with the conservation and management of SINCs.

While LWS have no direct legal protection, they are considered important enough to receive protection through the planning system. National Planning Policy requires Local Authorities to identify and provide for their protection through local policy.

Guidance from Defra states that once Local Wildlife Sites are identified, a partnership should promote the appropriate management of sites and provide support and advice to landowners and/or tenants. Defra also collects data annually on the proportion of LWS in positive conservation management as a proxy measure of if and how Local Authorities are meeting their Biodiversity Duty under Section 40 of the Natural Environment and Rural Communities Act 2006.

Most Local Wildlife Sites in Sussex were identified from the original 1990's surveys, with a subsequent of additions and amendments. Most recently Wealden District has been

11 JNCC website

undertaking a review of their sites (2015). Currently none of the three Sussex Local Wildlife Site systems have strategic plans for the improvement of their systems. This project adds momentum to all three systems with a view to seeing a more robust Sussex LWS framework in the future.

2.6 Undesignated Calcareous Grassland

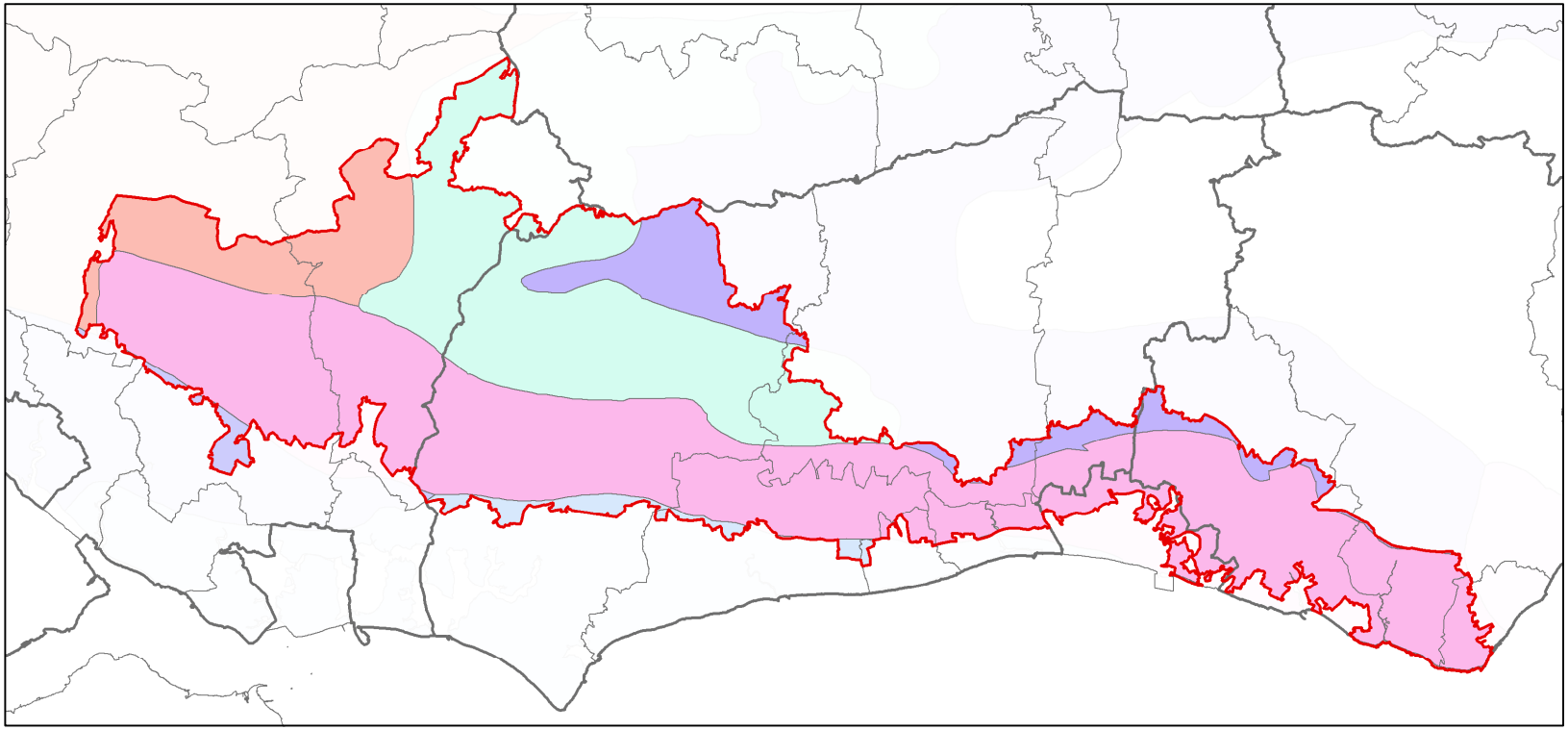
There are a further 210 parcels, larger than 0.2ha that are identified on the chalk grassland inventory held by HBIC and SxBRC. Many of these sites have never been surveyed or assessed for chalk grassland condition.

Sites such as these are key to increasing connectivity between designated sites, acting as buffer zones to protect species and may be key targets for habitat restoration and enhancement projects and the focus of future management advice.

Map showing Natural Character Areas

April 2016

Sussex Biodiversity Record Centre



Key to Map:

- South Downs National Park
- County Boundary
- District & Borough boundaries

Natural Character Areas

- Hampshire Downs
- Low Weald
- Pevensey Levels
- South Coast Plain
- South Downs
- South Hampshire Lowlands
- Wealden Greensand

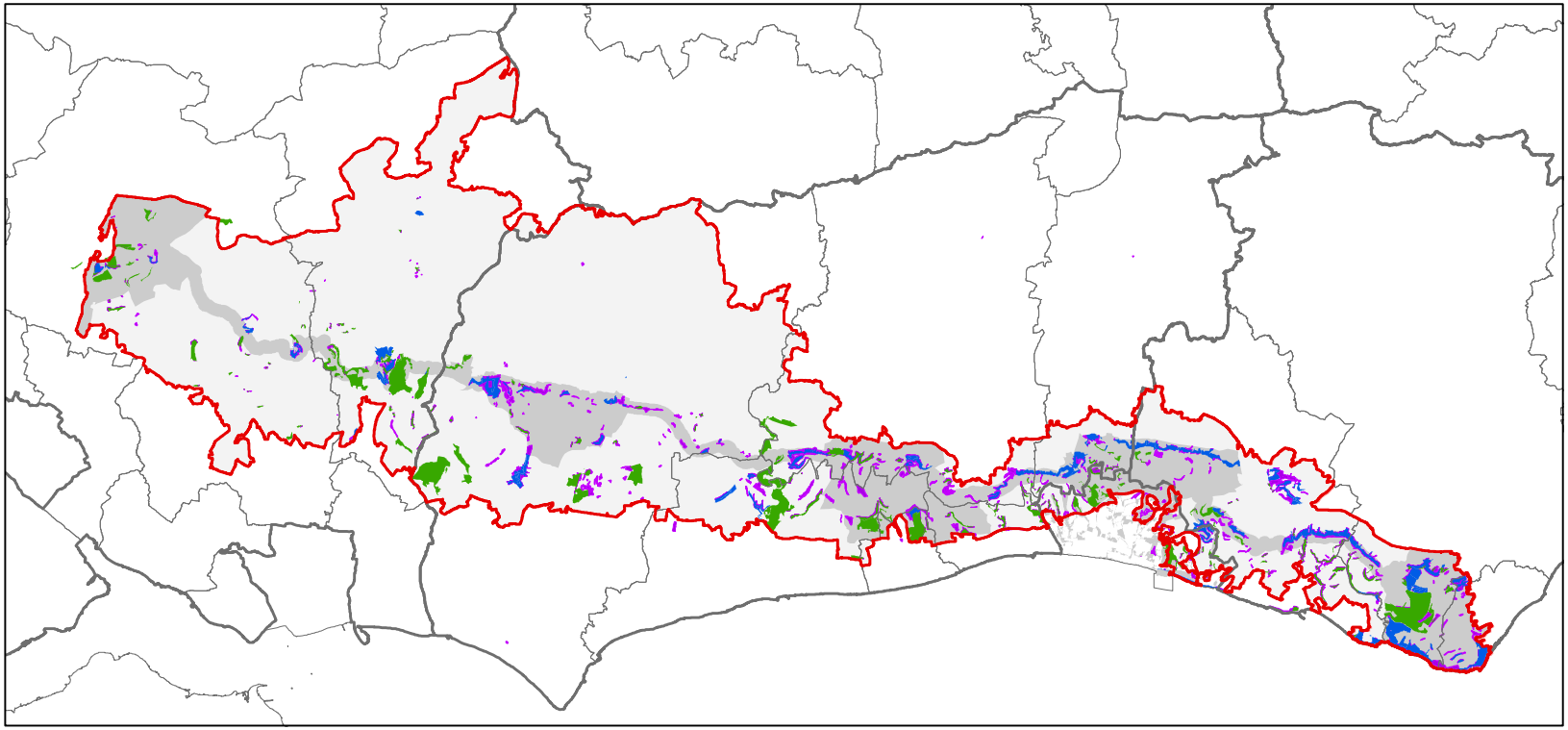
0 2.5 5 10 15 20 Km

N

Map showing the distribution of chalk grassland in the South Downs National Park

April 2016

Sussex Biodiversity Record Centre



Chalk grassland data supplied by Natural England and South Downs Conservation Board. Site of Special Scientific Interest (SSSI), National Park boundaries, and Environmental Stewardship data reproduced with permission of Natural England. Site of Nature Conservation Importance (SNCI) data provided by East and West Sussex County Councils, Brighton & Hove City Council, and Hampshire County Council. © Crown Copyright. All rights reserved 2016.

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0 2.5 5 10 15 20 Km

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Key to Map:

- South Downs National Park
- County Boundary
- District & Borough boundaries
- Nature Improvement Area (NIA)

Site Designations

- Sites of Special Scientific Interest
- Local Wildlife Sites
- Undesignated

3. Methodology

The SSSIs surveyed for this project were initially identified on the basis of whether they had been designated for their calcareous grassland habitat or specialists. But within some SSSIs there were units which contained no calcareous interest features. Therefore, the sites were further refined on a unitary basis in consultation with the relevant Natural England lead advisers. Those units notified for their calcareous grassland habitats or dependent species were included for survey. For a list of interest features see appendix four.

Sites that fell wholly or partially within the National Park were included for surveying. For example, Brighton to Newhaven Cliffs SSSI falls partially within the National Park. However, all SSSI units with chalk grassland features were included in the project, even those that fell entirely outside the National Park.

Natural England maintains an inventory of lowland calcareous grassland in England. This digitised inventory was based on the original work from the 1990s and re-interpreted in light of new datasets and improved digitisation of site boundaries. This dataset was refined by the Sussex Biodiversity Record Centre and will be further refined using the Sussex data from this project.

A further check was carried out against the chalk grassland inventory to ensure that no SSSIs with significant patches of chalk grassland had been excluded from the project.

LWS with calcareous interest features were identified using the chalk grassland inventory, site notes and in consultation with the South Downs National Park Rangers.

Areas of calcareous grassland outside of designated sites were identified using the chalk grassland inventory.

All the sites selected for survey were cross-referenced against current aerial photographs to confirm the presence of grassland habitat. Some sites, particularly undesignated sites, were excluded on the basis of this final check. In some cases, mapping inaccuracies in the chalk grassland inventory or subsequent changes in land use meant that the inventory included arable sites or areas of woodland and dense scrub.

Contact was made with the farmers and land managers to arrange surveys.

3.1 Calcareous Grassland

Calcareous grassland includes both unimproved & semi-improved calcareous grassland and comprises the following National Vegetation Classification (NVC) types: CG1 to CG9, MG2 and U4/U20.[12] Other NVC types may occur within the calcareous grassland matrix, for example MG6/7 where there has been agricultural improvement, especially on the shallower slopes and valley tops and bottoms, MG5b on deeper soils and MG1 where there has been little or no grazing.

For the purposes of this assessment it is primarily the areas of CG communities which form the 'interest feature' to be assessed but other habitats can be included where they form a mosaic with the chalk grassland communities.

Table 1 Showing GIS datasets used

Dataset	Description
Aerial photographs	Accessed 2014
Chalk grassland inventory	SxBRC and HBIC dataset merged, modified from Natural England dataset
Agri-environment scheme	Natural England dataset
SSSI sites	Natural England dataset
NNRs and LNRs	Natural England dataset
LWS	SxBRC, East Sussex County Council, HBIC and BHCC

3.2 Survey methodology

Currently there is no single survey methodology across all three types of sites (SSSI LWS and undesignated). Therefore, as part of this project, a survey methodology for LWS and undesignated sites was agreed on, which would allow for comparison to the SSSI survey data. Positive and negative indicator species were targeted for surveying along with variables such as scrub cover and percentage of bare ground. See appendix six for generic, blank surveying forms for the three different sites.

12 JNCC website. See Appendix three.

For SSSIs within the project area, condition assessments were carried out according to Natural England's guidelines.[13] Surveys took place between May and September 2014 and 2015. 121SSSI units were surveyed. Sites ranged from 0.47 to 193 hectares in size, with a mean size of 12.99 ha per site.

For LWS the surveying protocol used was that developed by the Hampshire Biodiversity Information Centre (2007) which was based on assessment guidance by Natural England for SSSIs and Environmental Stewardship Guidance (FEP methodology). Results from the original South Downs Way Ahead NIA surveys of 93 LWS were incorporated into this project. Surveys of a further 55 LWS were carried out by ecological consultants and HBIC specialists during 2014 and 2015. The sites ranged in size from 0.15 to 714 hectares and had a mean size of 15.39.

This method was modified further for the rapid assessment of undesignated calcareous grassland. Habitats are often in a mosaic of differing NVC types.[14]

210 undesignated sites were surveyed in 2015 by SDNPA rangers and ecological consultants. They ranged in size from 0.2 hectares (most sites were larger than 0.5 hectares only five sites were smaller than this) to 55 hectares with a mean of 4.89ha.

Training in calcareous grassland surveying was provided by the Sussex Wildlife Trust and Natural England and the South Downs National Park attended.

A 'structured walk' formed the basis of the surveying protocol for each site type. Typically this involved stopping at 10 points per 5 hectares. At each stop, positive and negative indicator species and other target variables would be recorded within a one metre radius.

3.3 Condition assessment

A favourable site is one which meets its attribute targets (see table 2 for attribute targets for LWS and non-designated sites). For SSSIs these targets are tailored to individual units/features but include attributes such as the grass to herb ratio and may include sward height, litter cover and percentage of bare ground.[15]

A site was considered to be unfavourable if one or more of the following primary attributes fell outside their target range. A site was classed as destroyed or partially destroyed if all or part of the extent of the habitat was deemed non-recoverable.

13 JNCC 2004. Robertson and Jefferson 2000

14 Rodwell 1992

15 JNCC 2004

The following condition outcomes usually require monitoring over time to ascertain. For many sites, this is the first time they have been surveyed in this nature. A condition assessment of unfavourable – declining means that the site condition is deteriorating and at least one attribute is not meeting its target. These sites will usually require changes to management to return to favourable condition. Similarly unfavourable – no change indicates that a site has remained in an unfavourable state since the last survey. A site that is unfavourable – recovering is one in which the features are not yet fully conserved but management mechanisms or remedies are in place to improve the condition. Provided that work is sustained, it is predicted the site will reach favourable condition in time.

For many of the LWS and all of the undesignated sites, this was the first time a survey of this nature had taken place. As most sites had little historical data for comparison it was often not possible to make an assessment as to whether a site was 'declining', 'recovering' or if there was 'no change.' Instead these sites were simply defined as being 'favourable', 'unfavourable' or 'destroyed' in part or in whole.

- **Table 2** Primary attributes and targets for undesignated sites

Extent	No significant reduction in extent (e.g. through scrub encroachment). A significant reduction in extent (>10%) would lead to the **declining** subcategory (if recovery were possible) or **part destroyed** (if no hope of reinstatement).
Cover graminoids	No more than 10% cover (unless CG4 was present) of *Brachypodium pinnatum/sylvaticum*
Cover of trees and scrub	No more than 5% cover. Stable blocks of mature scrub should not be counted within the interest feature.
Negative indicators	No species/taxa more than occasional throughout the sward. No species/taxa singly or together more than 5% cover. *Cirsium arvense, vulgare & eriophorum, Senecio jacobaea, Urtica dioica, Rumex obtusifolius & crispus*
Positive Indicators	At least four species/taxa frequent plus at least three species occasional throughout the sward. *Agrimonia eupatoria,* ***Anthyllis vulneraria,*** ***Asperula cynanchica,*** ***Campanula glomerata****,* ***Campanula rotundifolia****, Centaurea nigra,* ***Centaurea scabiosa****,* ***Cirsium acaule****,* ***Clinopodium vulgare, Euphrasia spp****.* ***Fillipendula vulgaris****,* ***Gentianella spp****.* ***Galium verum,*** ***Helianthemum nummularium****,* ***Hippocrepis comosa****, Knautia arvensis, Lathyrus pratensis,* ***Leontodon hispidis/saxatilis****,* ***Leucanthemum vulgare****,* ***Linum catharticum****,* ***Lotus corniculatus****,* ***Origanum vulgare,*** ***Pilosella officinarum****, Pimpinella saxifraga,* ***Plantago media****,* ***Polygala spp, Primula veris****,* ***Sanguisorba minor,*** ***Scabiosa columbaria****,* ***Serrtula tinctoria****,* ***Succisa pratensis****,* ***Thymus spp.*** ***Viola hirta*** Those in **bold** are also listed as indicator species on the Farm Environment Plan for G04 (lowland calcareous grassland Biodiversity Action Plan habitat). Underlined species indicate a calcareous grassland specialist

These secondary attributes do not determine whether a site is favourable or unfavourable but help to determine whether a site condition is unfavourable - declining, unfavourable - recovering or unfavourable - no change.

Table 3 Secondary attributes for undesignated sites

Bare ground	No more than 10%. No patches greater than 0.05 ha i.e. approx. 20x20 meters.
Cover litter	Total extent no more than 25% of the sward.

3.4 Site Access

Sometimes it was difficult to obtain access to the sites at the optimum surveying period, which would have influenced the quality of the survey results and number of species recorded.

One of the outcomes of this project was to engage with landowners and create opportunities for positive management. Many of the landowners we contacted expressed an interest in seeing the results of the work.

245 sites were reported as overgrown or had unacceptable levels of scrub cover (>5%), in some cases vegetation was so dense it was not possible to carry out a full site survey. Steep slopes sometimes made access difficult, dangerous and some cases impossible or sites were isolated and difficult to locate when in the field, requiring more time to travel to and from the site.

3.5 Survey Methodology

The rapid condition assessment methodology was found to work well for smaller sites, but was not always adequate for those of a larger size and with a variety of habitat mosaics. Where this was the case, surveying in the available time was difficult and the simplified forms did not always allow for the capture of habitat variation across all the features of the site.

The nature of the survey – a rapid assessment - meant that only limited data was collected, with particular focus on positive and negative indicator plant species. A full National Vegetation Community (NVC) survey for each site would have provided a richer, more objective and robust dataset for analysis, but it would not have been possible to survey as many sites. Using experienced surveyors who were familiar with the different calcareous grassland types and could identify variation in habitats mitigated for this somewhat.

Data for all the different primary and secondary variables[16] was not always captured for each site. There were gaps in the data for some sites which meant that subsequent analysis was incomplete. For some variables, such as cover of thatch or scrub the accuracy of estimation varied greatly between surveyors and sites. Some records gave a wide range for percentage cover e.g. >50% whilst others recorded exact percentages. This made direct comparison of variables between sites and surveyors more difficult.

There was often valuable information recorded within the comments on an ad-hoc basis. For example, there were often detailed notes about current management, management

recommendations, grazing levels and sward height. For future surveys it would be useful to amend the survey forms to allow the rapid capturing of this information and speed up data entry of the results.

3.6 Data Analysis

Data entry of the surveying forms was labour intensive, having a consistent format throughout the different site types and making the data available in a way that could be easily read by a computer program would speed up data capture allowing more time for analysis and interpretation of the results.

One of the unforeseen consequences of this project was a review of the features for which SSSIs were designated. Some sites were notified for species that have since disappeared from that location but these species still remain a feature as it is not possible to amend citations without a full renotification of the SSSI. Up to date records on species distribution at each site were passed on to the relevant lead advisor and recommendations for the modification and updating of the Natural England reporting systems were put forward.

Since their notification, rare species such as Adonis blue and Duke of Burgandy have changed in their distribution. For example, Adonis blue is a notified species at five SSSIs including Beeding to Newtimber Hill. However, SxBRC records revealed that the species has been recorded in at least 18 SSSIs. Wilmington Downs SSSI was notified for its population of the Duke of Burgandy butterfly, along with two other sites. It is no longer present at this location however it has been recorded in other sites across the South Downs and is now recovering and expanding its range.

4. Results

In total, 479 sites were surveyed: 121 SSSI units, 148 Local Wildlife Sites (LWS) and 210 undesignated sites. Some of these sites were surveyed in multiple parts and, in accordance with Natural England guidelines, individual features of SSSI units were surveyed separately. This gave a total of 631 site parcels (236 SSSI parcels, 175 LWS parcels and 220 undesignated sites). Where possible results have been reported on a whole site or unit basis, however, where surveyors have split a site into multiple parts and reported different condition statuses for those parts, results have been reported on a parcel basis.

We found that 41% of SSSI units, 21% of LWS and 10% of undesignated sites were in favourable condition. The majority of undesignated sites were found to be unfavourable (84%) and 58% of LWS were unfavourable. 0.83% of SSSIs were unfavourable, declining or destroyed. Many were categorised as unfavourable – recovering (58%), reflecting the significant focus on positive management for these sites. 10% of LWS and 2% of undesignated sites had not been assigned a condition decision. And for both of these site types approximately 1% of sites visited were found not to contain chalk grassland features.

4.1 Major Landowners

Of the SSSI calcareous grassland within the South Downs National Park; 1744ha is influenced by a major landowner such as the National Trust, Natural England, local councils or water management organisations. These organisations are collectively known as the Major Landowner Group. Many of these SSSIs are also designated as National and Local Nature Reserves. Many of the members have strong partnerships with tenant farmers to enable innovative grazing projects such as the use of Exmoor ponies or traditional livestock breeds or have utilised volunteers as sheep wardens or for conservation management to overcome issues involving public access, livestock diseases (bovine tuberculosis, neospora) and management of scrub, tor grass and invasive or alien species.

See Appendix 8 for a detailed analysis of issues affecting the management of chalk-grassland at the Lewes Downs, a site managed by the Sussex Wildlife Trust.

Table 13 Major landowner SSSI influence

Major Landowner	Hectares	SSSI units
Brighton Council	55.23	5
East Sussex County Council	150.24	1
Eastbourne Borough Council	67.53	1
Eastbourne Borough Council\Southern Water Services Ltd	193.07	1

Forest Enterprise - East Anglia	15.69	2
Hampshire and IoW Wildlife Trust	14.99	2
National Trust	713.66	18
Natural England	149.72	11
Natural England\Brighton Council|Southern Water Services Ltd	59.29	1
Natural England\South East Water	6.11	1
Natural England\South East Water Plc	43.42	5
South East Water	69.21	2
Southern Water Services Ltd	47.86	2
Sussex Wildlife Trust	143.52	5
West Sussex County Council	14.94	1
Total	**1744.48**	**58**

4.2 Invasive Species

Invasive native species and alien species such as cotoneaster (see image 2 below) was recorded as dominant at one site where the lower part was almost entirely taken over by the plant and may be irrecoverable. But instances of cotoneaster remained low, being recorded only 8 times throughout the project. Other non-native species included snowberry and Japanese knotweed. However, as the methodology focused on a particular suite of positive and negative indicator species it may be the case that these invasive and alien species were under-recorded.

In 1992 approximately 60% of West Sussex calcareous grassland was CG2 NVC type, demonstrating a species rich sward with little or no invasion by bulky grasses.[17] Only 10% consisted of grassland dominated by *Brachypodium pinnatum*. Almost no *Brachypodium pinnatum* was recorded in the county of Hampshire in 1987 and 39% of the habitat was CG2.[18] In 1992 in East Sussex 22% of grassland was dominated by *Brachypodium pinnatum.*[19]

Mean species number per quadrat was 29 with the highest number as 39. Whilst Steven's survey was more detailed, he only looked at sites greater than 1 hectare.

17 Steven 1992

18 Pardon 1987

19 Muggeridge and Steven 1992

- **Image 2** Cotoneaster at Lewes Downs. Michael Blencowe

4.3 Human Disturbance

Information on human disturbance was not collected in a systematic way. However, many sites had open access or limited access via footpaths. For the 269 sites where this was recorded, 144 had access of some kind. Surveyors reported compaction, frequent bare patches, evidence of nutrient enrichment at these sites.

The SDNP visitor survey revealed that walkers caused the most issues for land managers (59% of issues raised).[20] This was particularly the case when dogs were walked off the lead or when walkers accessed private land. This led to disturbance to livestock as gates were left open and in a few cases animals were attacked by dogs as well as damage to wildlife.

20 SDNP visitor survey

20 See tables 2 & 3

4.4 Tables of results

Table 4 Condition status as a percentage of total chalk grassland (hectares) per county

	Brighton and Hove	East Sussex	Hampshire	West Sussex	Total
Favourable	8.81	22.83	70.83	26.74	27.62
Favourable - part	1.14	3.77	0.71	5.67	4.01
Unfavourable	75.20	39.81	20.29	30.05	37.04
Unfavourable - declining	-	0.55	0.17	0.43	0.43
Unfavourable - no change	-	-	-	0.19	0.07
Unfavourable - recovering	13.18	31.19	2.75	25.98	25.26
Destroyed	-	-	0.15	0.19	0.09
Unknown	1.68	1.84	4.70	9.26	4.89
Not chalk grassland	-	-	0.40	1.49	0.60
Total (ha)	558.35	3343.24	670.11	2769.74	7341.44

Table 5 Percentage condition of SSSI, LWS and undesignated sites

	LWS	SSSI	Undesignated	Total	2020 SSSI targets
Favourable	20.64	41.00	9.53	27.62	50.00
Favourable – part	7.83	-	3.62	4.01	
Unfavourable	57.36	-	83.71	37.04	
Unfavourable – declining	0.36	0.64	-	0.43	
Unfavourable - no change	-	0.17	-	0.07	
Unfavourable – recovering	2.35	58.17	-	25.26	45.00
Destroyed	0.03	0.02	0.49	0.09	
Unknown	10.21	-	2.25	4.89	
Not chalk grassland	1.21	-	0.40	0.60	
Total (ha)	3300.21	3054.32	987.09	7341.62	

Table 6 A summary of condition across the whole SDNP

	# of sites	Size mean (Ha)	Size total (Ha)
Favourable	121	16.76	2027.61
Favourable – part	16	18.39	294.20
Unfavourable	260	10.46	2719.44
Unfavourable – declining	5	6.31	31.56
Unfavourable - no change	1	5.20	5.20
Unfavourable – recovering	72	25.76	1854.37
Destroyed	5	1.28	6.38
Unknown	31	11.58	359.03
Not chalk grassland	5	8.77	43.83
Total	516	11.61	7341.62

Table 7 Showing the percentage area of site designations in Environmental Stewardship

	Undesignated	LWS	SSSI	Total %
Entry Level Stewardship (ELS)	0.89	1.58	0.23	0.93
Higher Level Stewardship (HLS)	9.66	6.17	19.13	12.03
Organic Entry Level Stewardship (OELS)	-	-	0.00	0.00
Mixed (HLS & ELS)	66.85	42.29	64.25	54.73
Mixed (HLS & OELS)	6.66	4.51	4.03	4.60
None	15.94	45.45	12.36	27.72
Total (ha)	987.10	3300.20	3054.33	7341.63

Table 8 Showing the percentage area of site condition and Environmental Stewardship

	ELS	HLS	OELS	HLS & ELS	HLS & OELS	None	Total
Favourable	26.11	31.02	-	26.62	71.73	20.84	27.62
- Part	-	-	-	6.20	1.43	1.74	4.01
Unfavourable	19.84	29.25	-	30.82	18.31	56.39	37.04
- Declining	-	-	-	0.34	-	0.88	0.43
- No change	-	-	-	0.00	-	0.26	0.07
- Recovering	9.60	37.50	100.00	32.64	3.20	9.55	25.26
Unknown	-	0.42	-	3.30	-	8.81	4.89
Destroyed	0.01	-	-	0.04	-	0.24	0.09
Not Chalk Grassland	-	1.82	-	0.03	-	1.30	0.60
Total (ha)	67.95	883.33	0.02	4017.97	337.61	2034.75	7341.63

Table 9 Percentage of sites with litter cover reported as an issue or litter is higher than target levels (>25%)

	LWS	SSSI	Undesignated	Total (%)
Favourable	14.29	19.23	-	15.79
- Part	8.16	-	-	5.26
Unfavourable	71.43	-	100.00	47.37
- Declining	-	3.85	-	1.32
- No change	-	-	-	-
- Recovering	-	76.92	-	26.32
Unknown	4.08	-	-	2.63
Destroyed	-	-	-	-
Not Chalk Grassland	2.04	-	-	1.32
Total (#)	49.00	26.00	1.00	76.00

Table 10 Percentage of sites and their condition status where scrub is reported as an issue or scrub higher than target levels (>5%)

	LWS	SSSI	Undesignated	Total (%)
Favourable	18.00	29.09	4.44	15.51
- Part	6.00	-	2.22	3.27
Unfavourable	60.00	-	92.22	58.37
- Declining	1.00	3.64	-	1.22
- No change	-	-	-	-
- Recovering	3.00	67.27	-	16.33
Unknown	9.00	-	-	3.67
Destroyed	2.00	-	-	0.82
Not Chalk Grassland	1.00	-	1.11	0.82
Total (#)	100	55	90	245

Table 11 Percentage of sites, by designation and condition status, that were reported as undergrazed

	LWS	SSSI	Undesignated	Total
Favourable	4.92	39.39	4.88	13.33
- Part	8.20	-	2.44	4.44
Unfavourable	75.41	-	87.80	60.74
- Declining	1.64	3.03	-	1.48
- No change	-	-	-	-
- Recovering	3.28	57.58	-	15.56
Unknown	3.28	-	-	1.48
Destroyed	3.28	-	-	1.48
Not Chalk Grassland	-	-	4.88	1.48
Total (#)	61.00	33.00	41.00	135.00

Table 12 Percentage of sites, by designation and condition status, that were reported as overgrazed

	LWS	SSSI	Undesignated	Total (%)
Favourable	-	-	10.00	3.85
- Part	8.33	-	-	3.85
Unfavourable	83.33	-	90.00	73.08
- Declining	-	-	-	-
- No change	-	25.00	-	3.85
- Recovering	-	75.00	-	11.54
Unknown	8.33	-	-	3.85
Destroyed	-	-	-	-
Not Chalk Grassland	-	-	-	-
Total (#)	12.00	4.00	10.00	26.00

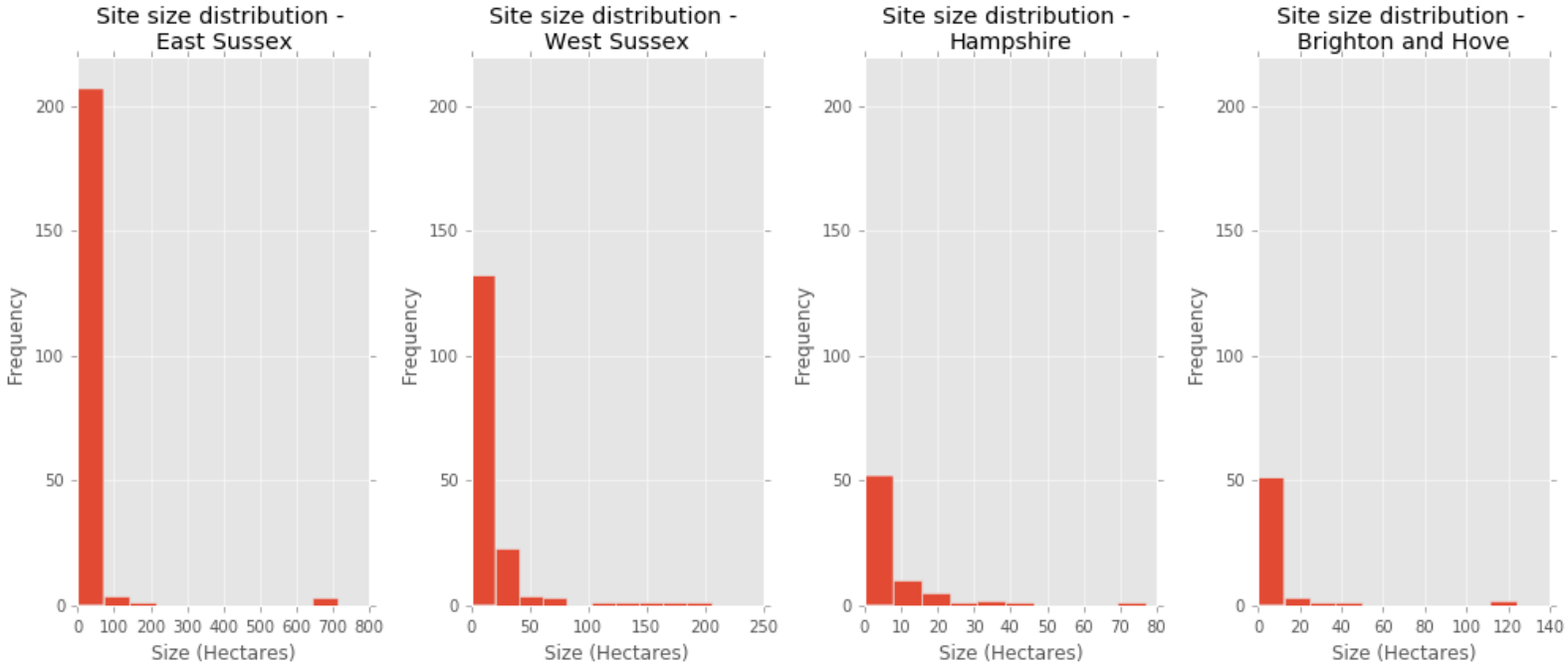

Figure 1 Site size by county

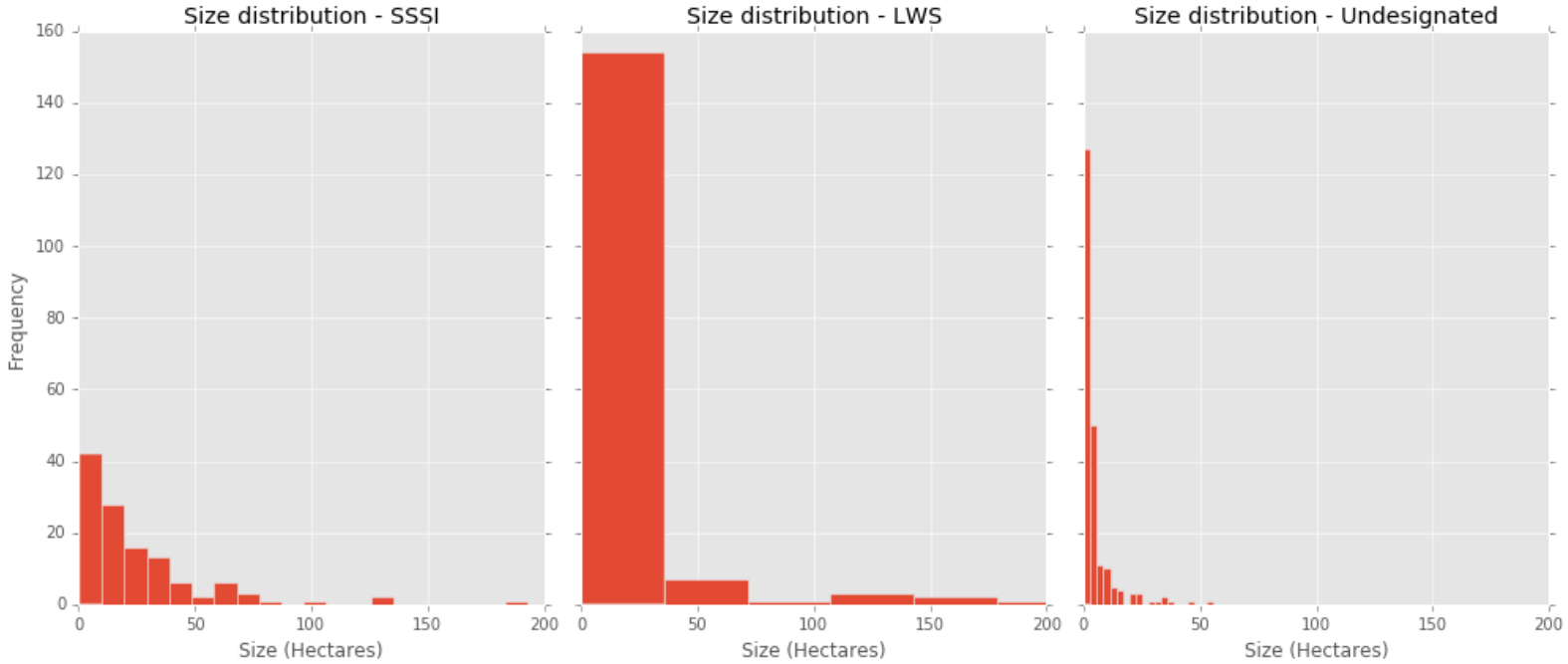

Figure 2 Site size by designation

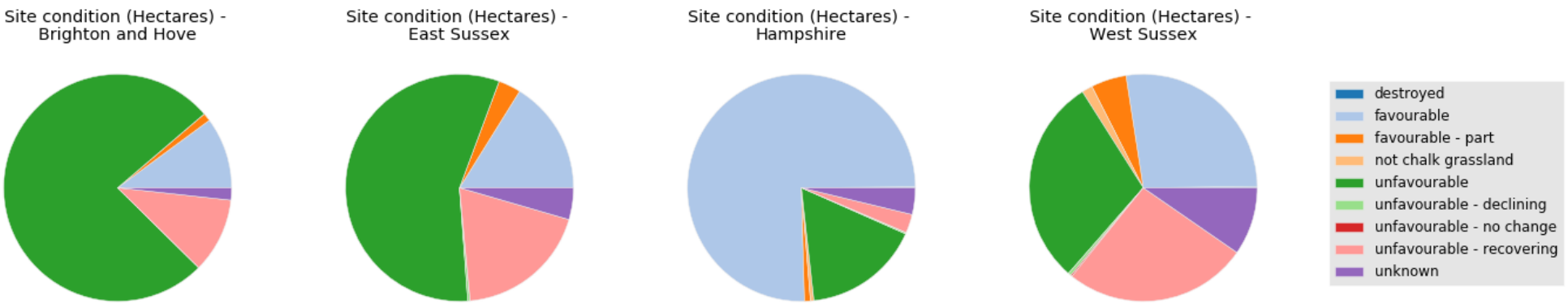

Figure 3 Condition of habitat by county in hectares

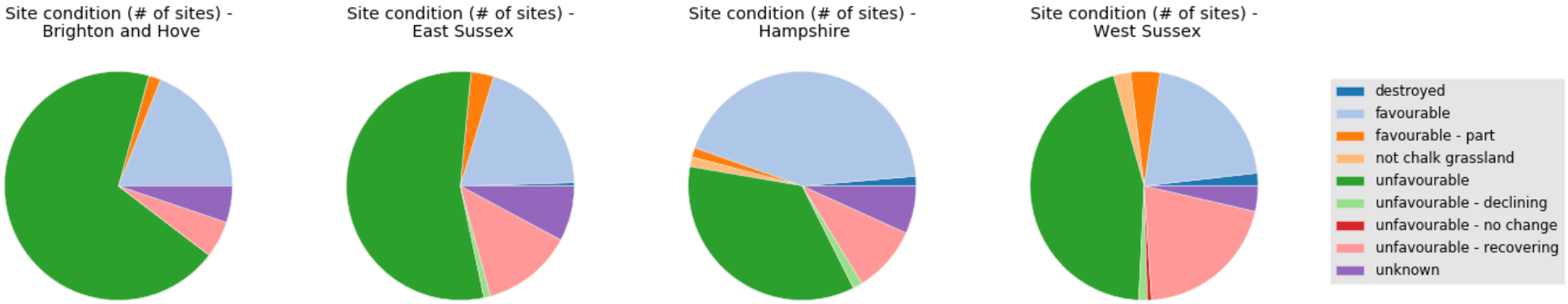

Figure 4 Condition of habitat by county by number of parcels

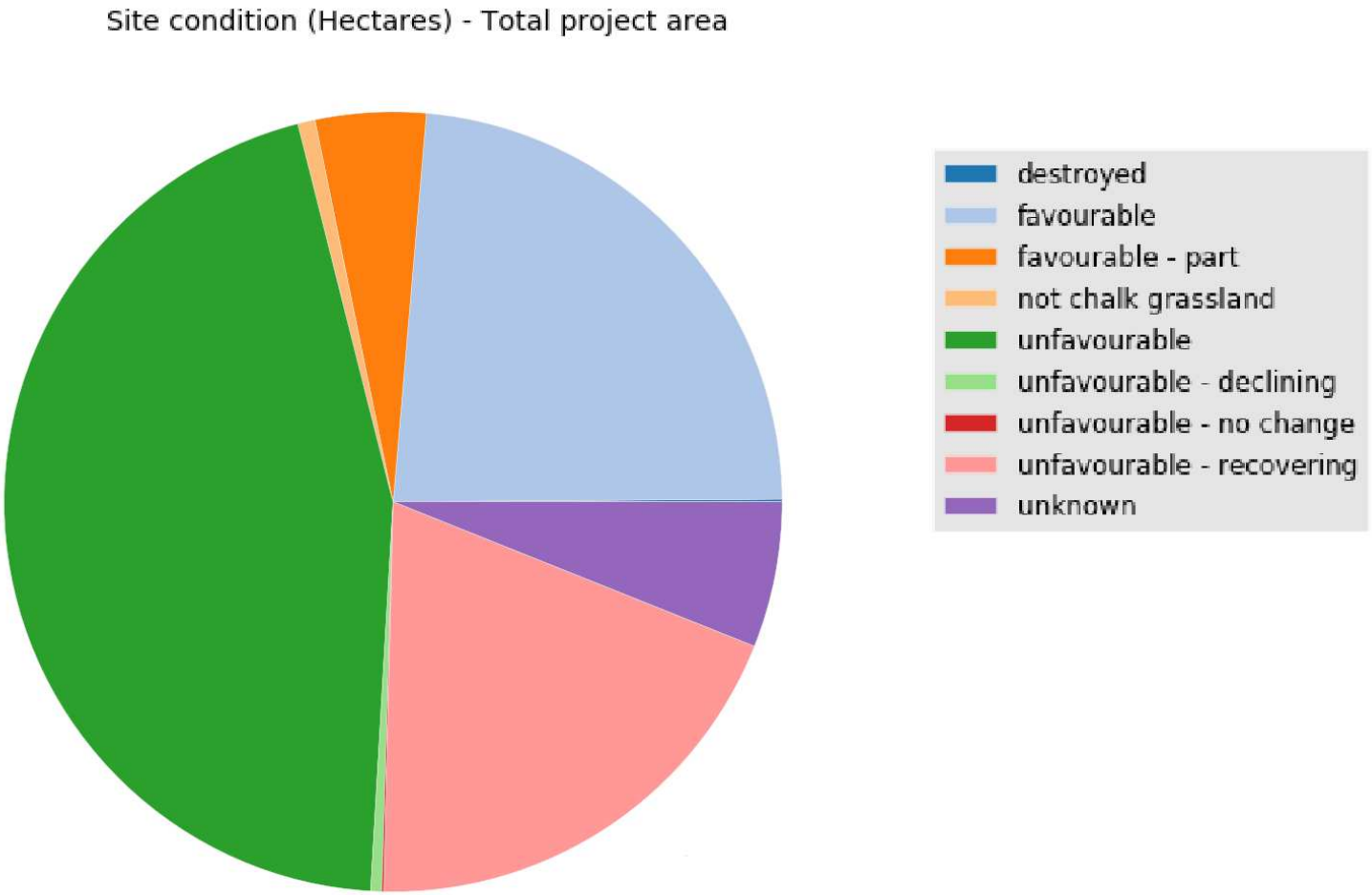

Figure 5 Condition of habitat for the entire project area in hectares

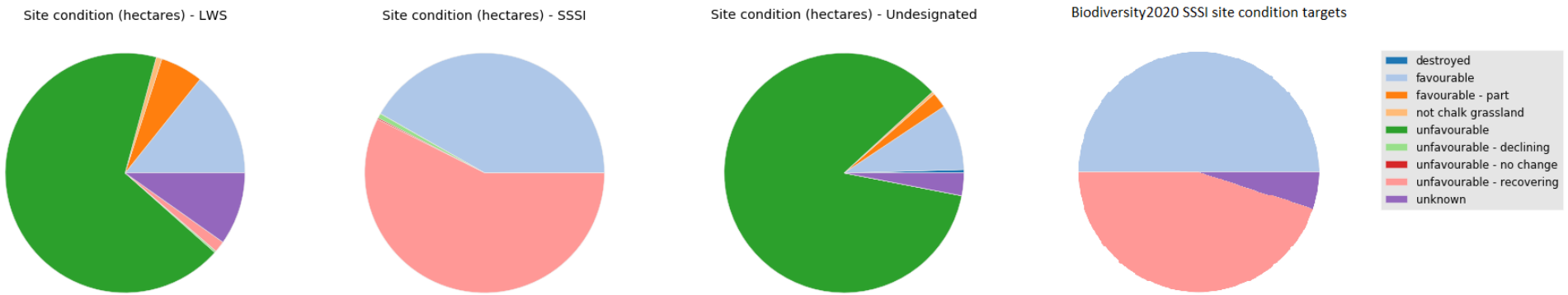

Figure 6 Condition of habitat by site designation in hectares

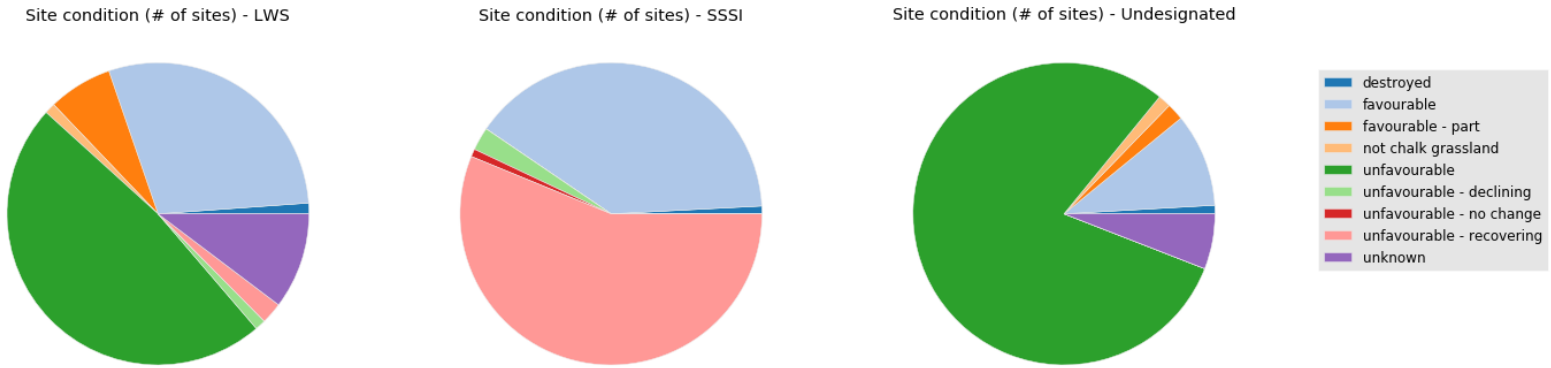

Figure 7 Condition of habitat by site designation by number of parcels

5. Conclusion

Those sites which receive the highest level of support and protection are currently in the best condition. Undesignated sites, which may have suffered from neglect, inappropriate management and lack of support, are largely unfavourable (84% of sites). Whilst we are close to the Biodiversity2020 target for 50% of SSSIs in favourable condition by 2020, we are not meeting the target of 90% of calcareous grassland habitat in favourable or recovering condition.

It is hoped that as a result of this work a more targeted approach to habitat restoration and creation can be formulated to protect those undesignated sites and where appropriate classify them as LWS. Sympathetic management and agri-environment schemes could be targeted to those LWS sites and undesignated sites that show the most potential for habitat enhancement and restoration.

One of the issues highlighted during this project was a lack of or inappropriate management. 135 sites reported a lack of grazing resulting in encroaching scrub and coarse, rank grasses or over-grazing leading to trampling, nutrient enrichment and a decline in habitat quality. 118 sites would benefit to an alteration to the grazing regime such as a change in stock density or the use of other livestock breeds to tackle stubborn scrub and coarse vegetation.

For sites that were mown, issues included the removal of arisings, the timing and number of cuts per year and the tailoring of mowing around site specific features such as paths.

Of the 479 sites surveyed for this project 72% were in an agri-environmental scheme. Surveyors recommended that 118 would benefit from an alteration to their management. And 204 showed little or no management. 33 were recorded as being maintained through rabbit and deer grazing alone. It is evident that these sites would benefit from some form of grazing or mowing to prevent loss of interest features.

88% of SSSIs were in an agri-environment scheme compared to 55% LWS and 84% undesignated sites. 58% of sites that were classed as unfavourable (including those declining or showing no change) were in Environmental Stewardship compared to 84% of sites that were favourable (in whole or part) or were recovering.

Scrub encroachment was reported as an issue in 245 of surveyed sites. Several sites were overcome by scrub to such an extent that most chalk grassland features had now been lost and the possibility of recovery was slim. Active scrub removal was recorded at 38 sites. But in many cases further scrub removal was recommended.

5.1 Recommendations

Now that a baseline condition assessment has been carried out, those sites that show potential can be targeted for further management guidance, funding to enhance biodiversity and other interventions. We can look at recent habitat potential models to identify key, strategic areas where the enhancement of existing chalk grassland would add most value.

The work has shown that the issue of most concern for the biodiversity of chalk grassland is scrub encroachment and undergrazing. Non-designated sites were found to be the most at risk. Focusing on these issues, using a landscape scale approach, will help to ensure that we are able to protect and enhance this precious resource.

The most recent habitat potential model for calcareous grassland in the South Downs found 693 patches of chalk grassland throughout the SDNP, 35% of these were less than 1ha in size.[21] Biodiversity Action Plan targets for habitat recreation across the three counties are set at 926ha. By strategically selecting sites for enhancement whilst looking for opportunities to create more habitat with guidance from the habitat model, we can increase patch size, reduce isolation of these fragmented sites and enhance the habitat network.

Biodiversity2020 sets out five zones that are key to strong ecological networks. These are core zones of high conservation value, wildlife corridors, restoration areas, buffer zones and sustainable use areas. These concepts can be applied to the results of this project to identify strategic biodiversity opportunities.

Maintaining a coherent, connected landscape may offset some of the risks that threaten this habitat and help counteract the effects of factors such as climate change and pollution. In the long term, 22% of priority habitats are at high risk of direct impacts from climate change.[22]

There is also the opportunity to amend and refine the existing chalk grassland inventory in light of these results.

21 Habitat potential models

22 Mitchell, et al, England Biodiversity Strategy – towards adaptation to climate change, final report to Defra for contract CR0327, (2007)

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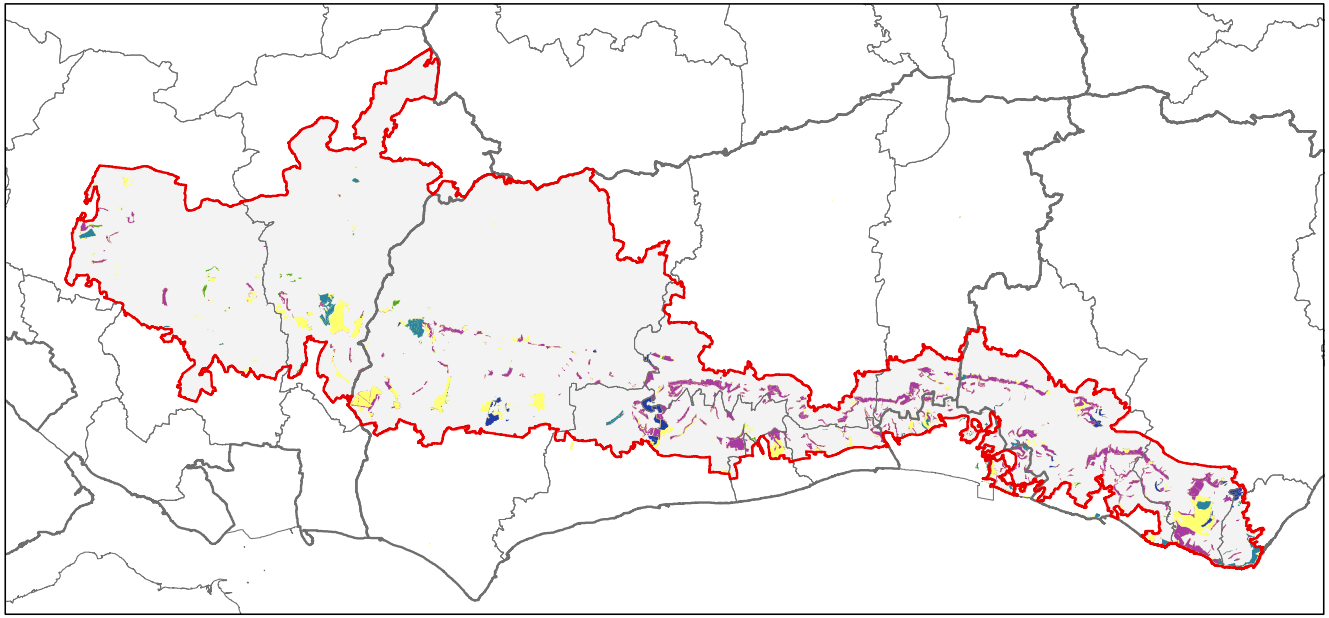
Appendix 1

Chalk grassland sites in agri-environment schemes

April 2016

Sussex Biodiversity Record Centre



Key to Map:

- South Downs National Park
- County Boundary
- District & Borough boundaries

Agri-Environmental Scheme

- Entry Level Stewardship
- Entry Level plus Higher Level Stewardship
- Higher Level Stewardship
- Organic Entry Level Stewardship
- Organic Entry Level plus Higher Level Stewardship
- Not part of a scheme

0 2.5 5 10 15 20 Km

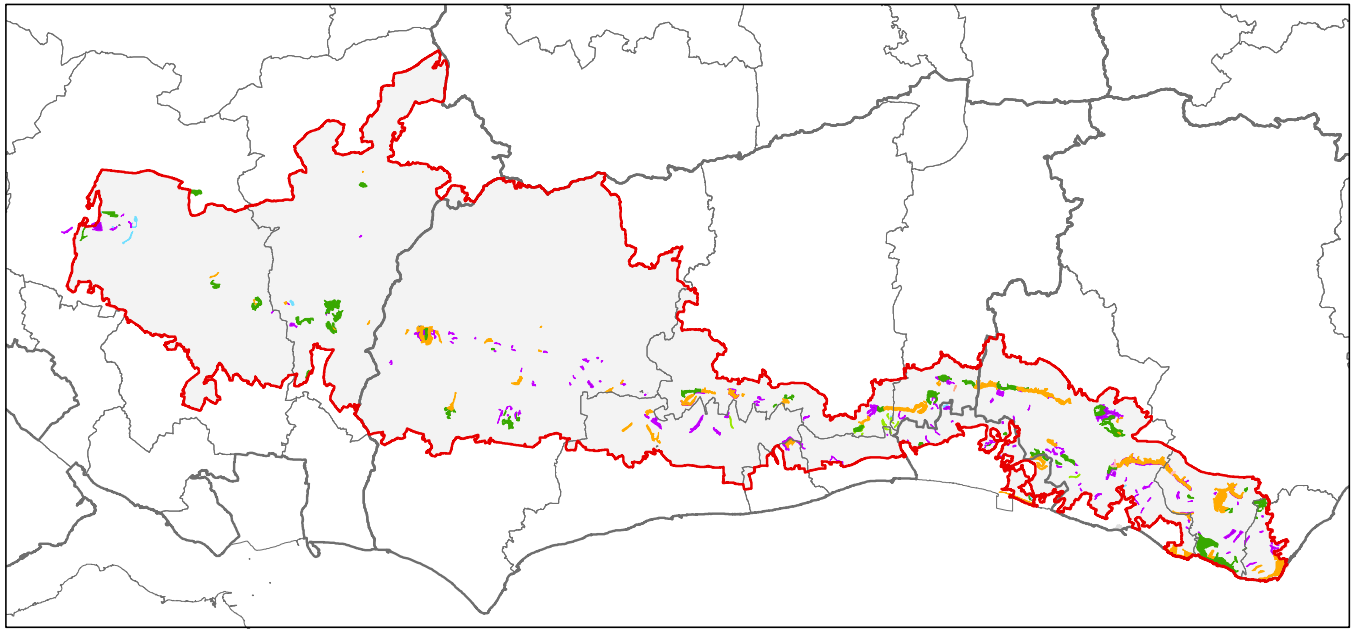
N

Appendix 2

Map showing site condition status

April 2016

Sussex Biodiversity Record Centre



Key to Map:

- South Downs National Park
- County Boundary
- District & Borough boundaries

Site Condition

- Destroyed
- Favourable
- Favourable - Part
- Not Chalk Grassland
- Unfavourable
- Unfavourable - Declining
- Unfavourable - No change
- Unfavourable - Recovering
- Unknown

0 2.5 5 10 15 20 Km

N

Appendix 3

Lowland Calcareous National Vegetation Classification Types. JNCC condition assessment guidelines

U4/U20-related.	Species-rich bracken
CG1	*Festuca ovina-Carlina vulgaris* grassland
CG2	*Festuca ovina-Avenula pratensis* grassland
CG3	*Bromus erectus* grassland
CG4	*Brachypodium pinnatum* grassland
CG5	*Bromus erectus-Brachypodium pinnatum* grassland
CG6	*Avenula pubescens* grassland
CG7	*Festuca ovina-Hieracium pilosella-Thymus praecox/pulegioides* grassland
CG8	*Sesleria albicans-Scabiosa columbaria* grassland
CG9	*Sesleria albicans-Galium sterneri* grassland
MG2	*Arrhenatherum elatius-Filipendula ulmaria* tall-herb grassland

Appendix 4

Summary of Notified Features and their frequency of occurrence for SSSI units in the SDNP project

SSSI Notified Features	Count of SSSI
Butterflies which have experienced substantial declines - *Hipparchia semele*, Grayling	1
CG1 - *Festuca ovina - Carlina vulgaris l*owland calcareous grassland	4
CG2 - *Festuca ovina - Avenula pratensis* lowland calcareous grassland	30
CG3 - *Bromus erectus* lowland calcareous grassland	27
CG4 - *Brachypodium pinnatum* lowland calcareous grassland	9
CG5 - *Bromus erectus - Brachypodium pinnatum* lowland calcareous grassland	2
CG6 - Dry grassland/ scrub transitions (MG1-related, CG2d-related)	4
Combinations of Species – Bryophytes	2
Invertebrate Assemblage	15
Juniperus communis, Juniper	2
MG5 - *Cynosurus cristatus - Centaurea nigr*a grassland	2
Nationally scarce plant - *Gymnocarpium robertianum,* Limestone Fern	1
Population of Nationally rare butterfly species - *Hesperia comma*, Silver-spotted Skipper	1
Population of RDB moss - *Rhynchostegium rotundifolium*, Round-leaved Feather-moss	1
Population of RDB plant - *Centaurea calcitrapa*, Red Star-thistle	1
Population of RDB plant - *Lonicera xylosteum*, Fly Honeysuckle	1
Population of Schedule 5 cricket - *Decticus verrucivorus*, Wart-biter	3
Population of Schedule 5 cricket - *Gryllus campestris,* Field Cricket	1
Population of Schedule 8 plant - *Althaea hirsuta,* Rough Marsh-mallow	1
Population of Schedule 8 plant - *Bupleurum baldense*, Small Hare's-ear	1
Population of Schedule 8 plant - *Filago pyramidata,* Broad-leaved Cudweed	1
Population of Schedule 8 plant - *Leersia oryzoides,* Cut-grass	1
Population of Schedule 8 plant - *Ophrys sphegodes*, Early Spider-orchid	4
Populations of nationally scarce butterfly species - *Hamearis lucina,* Duke of Burgundy	2
Populations of nationally scarce butterfly species - *Polyommatus bellargus,* Adonis Blue	5
Vascular Plant Assemblage	2

Appendix 5

BAP species associated with lowland calcareous grassland

a mining bee *Andrena lathyri*

a cuckoo bee *Nomada armata*

a cuckoo bee *Nomada ferruginata*

Brown-banded carder bee *Bombus humilis*

Large garden bumblebee *Bombus ruderatus*

Shrill carder bee *Bombus sylvarum*

Hornet robberfly *Asilus crabroniformis*

Dotted bee-fly *Bombylius discolor*

Phantom hoverfly *Doros profuges*

a ground beetle *Ophonus stictus*

a ground beetle *Ophonus cordatus*

a ground beetle *Ophonus parallelus*

a ground beetle *Harpalus dimidiatus*

Wart-biter bush cricket *Decticus verrucivorus*

Field cricket *Gryllus campestris*

Lizard weevil *Cathormiocerus britannicus*

Hazel pot beetle *Cryptocephalus coryli*

a leaf beetle *Cryptocephalus nitidulus*

a leaf beetle *Cryptocephalus primarius*

Silver spotted skipper *Hesperia comma*

Adonis blue butterfly *Lysandra bellargus*

Large blue butterfly *Maculinea arion*

Bordered gothic moth *Heliophobus reticulata*

Pale shining brown moth *Polia bombycina*

Four-spotted moth *Tyta luctuosa*

Appendix 6

SSSI calcareous grassland surveying form

Site/Agreement reference(s)		Name/Unit # of Site	
Management options (ES codes)		Grid reference	
Date of survey		Assessed by	

Variable	Measure	Target	Stop readings	Summary / Freq mean	Target pass/fail
Extent of feature	Area in hectares				
Cover of bare ground	Percent cover	No more than 10%.	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20		
Cover of bare ground (localised)	Percent cover	No more than 0.05 ha ie approx 20x20 metres.	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20		
Cover of graminoids	Percent cover	No more than 10% cover (for CG 3 monitor B. pinnatum only for CG4/5 monitor neither).			
Tor-grass Brachypodium pinnatum			1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20		
Upright Brome Bromopsis erecta			1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20		
Cover of litter	Percent cover	Total extent no more than 25% of the sward.	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20		
Cover of negative indicator species (all)	Percent cover	No species/taxa singly or together more than 5% cover.	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20		
Cover of trees and scrub (all)	Percent cover	No more than 5% cover.	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20		
Frequency of negative indicator species (all)	Yes/No with DAFOR summary	No species/taxa more than occasional throughout the sward. Ragwort and nettle only relevant to CG3/4/5 grassland.			
Broad-leaved dock			1 2 3 4 5 6 7 8 9 10		

Rumex obtusifolius			11	12	13	14	15	16	17	18	19	20		
Common ragwort Senecio jacobaea			1	2	3	4	5	6	7	8	9	10		
			11	12	13	14	15	16	17	18	19	20		
Creeping thistle Cirsium arvense			1	2	3	4	5	6	7	8	9	10		
			11	12	13	14	15	16	17	18	19	20		
Curled dock Rumex crispus			1	2	3	4	5	6	7	8	9	10		
			11	12	13	14	15	16	17	18	19	20		
Spear thistle Cirsium vulgare			1	2	3	4	5	6	7	8	9	10		
			11	12	13	14	15	16	17	18	19	20		
Stinging nettle Urtica dioica			1	2	3	4	5	6	7	8	9	10		
			11	12	13	14	15	16	17	18	19	20		
Frequency of positive indicator species	Yes/No with DAFOR summary	CG2: At least 4 spp/taxa F plus at least 3 spp O throughout. CG3/4/5: Bromopsis erecta (if CG3) or Brachypodium pinnatum (if CG4) or both (if CG5) F plus at least 2 species/taxa F and 4 O throughout. Greater Knapweed, Hairy violet, lady's bedstraw, tor grass & upright brome not relevant to CG2.												
Clustered Bellflower Campanula glomerata			1	2	3	4	5	6	7	8	9	10		
			11	12	13	14	15	16	17	18	19	20		
Common Bird's-foot-trefoil Lotus corniculatus			1	2	3	4	5	6	7	8	9	10		
			11	12	13	14	15	16	17	18	19	20		
Common Rock-rose Helianthemum nummularium			1	2	3	4	5	6	7	8	9	10		
			11	12	13	14	15	16	17	18	19	20		
Cowslip Primula veris			1	2	3	4	5	6	7	8	9	10		
			11	12	13	14	15	16	17	18	19	20		
Devil's-bit Scabious Succisa pratensis			1	2	3	4	5	6	7	8	9	10		
			11	12	13	14	15	16	17	18	19	20		
Dropwort Filipendula vulgaris			1	2	3	4	5	6	7	8	9	10		
			11	12	13	14	15	16	17	18	19	20		
Dwarf Thistle			1	2	3	4	5	6	7	8	9	10		

Cirsium acaule	11	12	13	14	15	16	17	18	19	20		
Dyer's Greenweed Genista tinctoria	1	2	3	4	5	6	7	8	9	10		
	11	12	13	14	15	16	17	18	19	20		
Fairy Flax Linum catharticum	1	2	3	4	5	6	7	8	9	10		
	11	12	13	14	15	16	17	18	19	20		
Gentian species Gentianella spp.	1	2	3	4	5	6	7	8	9	10		
	11	12	13	14	15	16	17	18	19	20		
Greater Knapweed Centaurea scabiosa	1	2	3	4	5	6	7	8	9	10		
	11	12	13	14	15	16	17	18	19	20		
Hairy Violet Viola hirta	1	2	3	4	5	6	7	8	9	10		
	11	12	13	14	15	16	17	18	19	20		
Hoary Plantain Plantago media	1	2	3	4	5	6	7	8	9	10		
	11	12	13	14	15	16	17	18	19	20		
Horseshoe Vetch Hippocrepis comosa	1	2	3	4	5	6	7	8	9	10		
	11	12	13	14	15	16	17	18	19	20		
Kidney Vetch Anthyllis vulneraria	1	2	3	4	5	6	7	8	9	10		
	11	12	13	14	15	16	17	18	19	20		
Lady's Bedstraw Galium verum	1	2	3	4	5	6	7	8	9	10		
	11	12	13	14	15	16	17	18	19	20		
Milkwort species Polygala spp.	1	2	3	4	5	6	7	8	9	10		
	11	12	13	14	15	16	17	18	19	20		
Mouse-ear-hawkweed Pilosella officinarum (Hieracium pilosella)	1	2	3	4	5	6	7	8	9	10		
	11	12	13	14	15	16	17	18	19	20		
Oxeye Daisy Leucanthemum vulgare	1	2	3	4	5	6	7	8	9	10		
	11	12	13	14	15	16	17	18	19	20		
Rough/Lesser hawkbits Leontodon hispidus/L. saxatilis	1	2	3	4	5	6	7	8	9	10		
	11	12	13	14	15	16	17	18	19	20		

Sainfoin *Onobrychis viciifolia*			1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20		
Salad Burnet *Sanguisorba minor*			1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20		
Saw-wort *Serratula tinctoria*			1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20		
Small Scabious *Scabiosa columbaria*			1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20		
Squinancywort *Asperula cynanchica*			1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20		
Thyme species *Thymus spp.*			1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20		
Tor-grass *Brachypodium pinnatum*			1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20		
Upright Brome *Bromopsis erecta*			1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20		
Height of sward	Length in centimetres	Sward 2-10 cms (CG 2). 2-15 cms (CG 3/4/5).	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20		
Proportion of grasses to herbs	Percent	40-90%	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20		

Management

CG2 and CG3-5 - Lowland calcareous grassland	
Is the agreed management (management option if in HLS) appropriate to the target feature(s) and outcomes? *(Yes, No, N/A)*	
Activities adversely affecting feature condition?	
Notes	

Actions

Land managers/agreement holders should always be provided with feedback from site assessments. List additional follow-up below.

Provide further advice	**Yes/No :**	Report/follow up non-compliance	**Yes/No :**
Renotify/denotify SSSI features	**Yes/No :**	Change SSSI unit boundary	**Yes/No :**
Amend FCT	**Yes/No :**	Identify any condition threats and populate ENSIS	**Yes/No :**

Comments

LWS calcareous grassland surveying form

Site Name		
Site Grid Ref		
Area of Feature (ha)		
Survey Assessment Date		
Surveyor		
Condition		
Primary attributes One failure = unfavourable condition	**Target**	**Estimate of attribute**
Extent of interest feature	**No loss**	
Sward composition (grass/herb ratio)	**30-90% herbs**	
Scrub/tree cover (frequency and % of all species together, excluding Juniper)	**< 10% cover No more than occasional**	
Frequency of positive indicators See structured walk results Agrimonia eupatoria (**O**) Anthyllis vulneraria ( ) Asperula cynanchica ( ) Campanula glomerata ( ) Campanula rotundifolia ( ) Centaurea nigra (**O**) Centaurea scabiosa ( ) Cirsium acaule ( ) Clinopodium vulgare ( ) Euphrasia spp.( ) Fillipendula vulgaris ( ) Gentianella spp. ( ) Galium verum (**F**) Helianthemum nummularium ( ) Hippocrepis comosa ( ) Knautia arvensis ( ) Leontodon hispidis/saxatilis ( ) Lathyrus pratensis ( ) Leucanthemum vulgare ( ) Linum catharticum ( ) Lotus corniculatus ( ) Origanum vulgare (**R**) Pilosella officinarum ( ) Pimpinella saxifrage ( ) Plantago media ( ) Polygala spp, ( ) Primula veris (**R**) Sanguisorba minor **(R**) Scabiosa columbaria ( ) Serrtula tinctoria ( ) Succisa pratensis ( ) Thymus spp. ( ) Viola hirta (**R**)	**At least two species frequent and three species occasional, and at least 3 should be species**	
Cover of Brachypodium pinnatum/sylvaticum	**Both < 10%**	
Frequency & % cover of negative indicators Cirsium arvense ( ) Cirsium vulgare ( ) Cirsium eriophorum ( ) Senecio jacobaea ( ) Urtica dioica ( ) Rumex obtusifolius ( ) Rumex crispus ( )	**No species more than occasional, or singly/together more than 5% cover**	
Secondary attributes	**Target**	**Estimate of attribute**
Extent of bare ground	**< 10% or no patch bigger than 20x20m**	
Litter in a continuous layer, either in patches or one larger area	**Total extent < 50% of sward**	

Structured walk recording form

Frequencies : Totals out of 10 stops 1-2= rare, 3-4= occasional, 5+ = frequent or more

Totals out of 20 stops 1-4= rare, 5-8 = occasional, 9+ = frequent or more

Attribute /Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total	Freq

Management : Comments/Observations

Undesignated sites calcareous grassland surveying form

Site Name					**Area (ha)**			
Surveyor					**Grid Ref**			
Date					**Public Access?**	**Yes**	**No**	
Email					**Chalk grassland?**	**Yes**	**No**	
Management	Grazing	Mowing	Scrub control		**Amend CG Inventory?**	**Yes**	**No**	
Condition	**Favourable**	**Unfavourable**	**Destroyed**		**Designate site?**	**SSSI**	**LWS**	**Unsure**
			All	**Part**				

Comments including key species/groups observed, especially any BAP/protected species

Sward composition	grass to herb ratio		**Scrub & tree cover**	excluding Juniper
	%			%
Extent of bare ground	Overall cover	Largest patch	**Litter cover**	in patches or one large area
	%	m by m		%

Frequency of positive indicators (use DAFOR scale)			
Species	Freq.	Species	Freq.
Agrimonia eupatoria		Lathyrus pratensis	
Anthyllis vulneraria		Leucanthemum vulgare	
Asperula cynanchica		Linum catharticum	
Campanula glomerata		Lotus corniculatus	
Campanula rotundifolia		Origanum vulgare	
Centaurea nigra		Pilosella officinarum	
Centaurea scabiosa		Pimpinella saxifrage	
Cirsium acaule		Plantago media	
Clinopodium vulgare		Polygala spp	
Euphrasia spp.		Primula veris	
Fillipendula vulgaris		Sanguisorba minor	
Gentianella spp.		Scabiosa columbaria	
Galium verum		Serrtula tinctoria	
Helianthemum nummularium		Succisa pratensis	
Hippocrepis comosa		Thymus spp.	
Knautia arvensis		Viola hirta	
Leontodon hispidis/saxatilis			

Frequency of negative indicators	
Species	Freq.
Cirsium arvense	
Cirsium vulgare	
Cirsium eriophorum	
Senecio jacobaea	
Urtica dioica	
Rumex obtusifolius	
Rumex crispus	
TOTAL (% cover over site)	%
Brachypodium pinnatum	%
Brachypodium sylvaticum	%
Other species:	

Habitats	
	☐
Unimproved grassland	
Semi-improved grassland	
Wet grassland	
Ancient woodland	
Semi-natural woodland	
Coniferous woodland	
Pond/lake	
Fen/marsh	
River/stream	
Scrub	
Heathland	
Other features of interest:	

Appendix 7

Table of species frequency across the SDNP

Species	Frequency
acer campestre	17
aceras anthropophorum	3
achillea millefolium	90
agrimonia eupatoria	200
agrostis capillaris	42
agrostis spp	1
agrostis stolonifera	89
alopecurus pratensis	18
anacamptis pyramidalis	30
anisantha sterilis	3
anthoxanthum odoratum	26
anthriscus sylvestris	12
anthyllis vulneraria	101
aquilegia sp	1
arctium minus	18
arenaria serpyllifolia	8
armeria maritima	2
arrhenatherum elatius	93
artemisia vulgaris	8
arum maculatum	14
asperula cynanchica	179
astragalus danicus	2
atropa belladonna	3
bellis perennis	25
beta vulgaris maritima	2
blackstonia perfoliata	53
brachypodium pinnatum	156
brachypodium sylvaticum	80
briza media	99
bromopsis erecta	188
Buddleja	1
calluna vulgaris	3

Species	Frequency
campanula glomerata	38
campanula rotundifolia	111
canadian flebane	1
carduus crispus	9
carex flacca	166
carex nigra	1
carex spp	1
carlina vulgaris	64
centaurea nigra	254
centaurea scabiosa	160
centaurium erythraea	13
cerastium fontanum	61
chamerion angustifolium	10
cichorium intybus	3
cirsium acaule	359
cirsium arvense	262
cirsium eriophorum	11
cirsium vulgare	186
clematis vitalba	53
clinopodium vulgare	159
conopodium majus	1
convolvulus arvensis	27
cornus sanguinea	33
corylus avellana	35
cotoneaster horizontalis	5
crataegus monogyna	81
crepis capillaris	66
cruciata laevipes	39
cynoglossum officinale	11
cynosurus cristatus	53
dactylis glomerata	105
dactylorhiza fuchsii	46
danthonia decumbens	7
daucus carota	41
dioscorea communis	6
dipsacus fullonum	12

Species	Frequency
erica cinerea	1
erica tetralix	2
Erigeron acer	1
euonymus europaeus	13
eupatorium cannabinum	23
euphorbia amygdaloides	1
euphrasia nemorosa	125
euphrasia officinalis	12
euphrasia spp	32
fagus sylvatica	10
fallopia japonica	1
festuca ovina	51
festuca rubra	100
festuca spp	2
filipendula vulgaris	209
fragaria vesca	18
fraxinus excelsior	45
galium aparine	28
galium mollugo	83
galium saxatile	1
galium verum	389
genista tinctoria	9
gentianella amarella	18
gentianella spp	78
geranium molle	17
geranium robertianum	14
glechoma hederacea	31
helianthemum nummularium	87
helictotrichon pubescens	28
heracleum sphondylium	44
Hieracium	23
hippocrepis comosa	101
Holcus	1
holcus lanatus	93
hypericum perforatum	34
hypericum spp	13

Species	Frequency
hypochaeris radicata	4
ilex aquifolium	8
juniperus communis	9
knautia arvensis	58
lamium album	12
lathyrus pratensis	61
leontodon autumnalis	35
leontodon hispidus	104
leontodon hispidus/saxatilis	326
leontodon sp	1
leucanthemum vulgare	142
ligustrum vulgare	33
limonium spp	1
linaria vulgaris	22
linum catharticum	367
lolium perenne	54
lotus corniculatus	459
luzula campestris	7
medicago lupulina	61
mercurialis perennis	12
odontites vernus	37
onobrychis viciifolia	5
ononis repens	54
ophrys apifera	10
orchidaceae spp	45
origanum vulgare	150
orobanche sp	1
papaver sp	1
pastinaca sativa	25
phleum pratense	22
phyteuma orbiculare	81
picris echioides	4
picris hieracioides	13
picus viridis	14
pilosella officinarum	237
pimpinella saxifraga	176

Species	Frequency
pimpinella spp	1
Plantago	1
plantago coronopus	2
plantago lanceolata	91
plantago media	131
poa trivialis	27
polygala calcarea	19
polygala serpyllifolia	1
polygala spp	134
polygala vulgaris	60
Potentilla	1
potentilla anserina	19
potentilla erecta	23
potentilla reptans	40
primula veris	278
primula vulgaris	2
prunella vulgaris	67
prunus spinosa	32
pteridium aquilinum	2
pyracantha	1
ranunculus acris	36
ranunculus bulbosus	46
ranunculus repens	35
rhinanthus minor	50
rosa canina	36
rosa spp	2
rubus fruticosus	65
rubus spp	4
rumex acetosa	36
rumex acetosella	3
rumex crispus	29
rumex obtusifolius	45
sambucus nigra	36
sanguisorba minor	434
saponaria	1
scabiosa columbaria	262

Species	Frequency
sedum spp	1
senecio erucifolius	36
senecio jacobaea	298
senecio spp	1
senecio vulgaris	4
serratula tinctoria	3
sherardia arvensis	2
sorbus aria	13
spiranthes spiralis	6
stachys officinalis	19
stachys sylvatica	20
stellaria media	6
succisa pratensis	173
symphoricarpos albus	1
symphytum officinale	4
taraxacum officinale agg	5
teucrium scorodonia	7
thymus polytrichus	47
thymus praecox	1
thymus pulegioides	12
thymus serpyllum	1
thymus spp	166
torilis japonica	24
tragopogon pratensis	18
trifolium campestre	4
trifolium pratense	84
trifolium repens	58
trifolium sp	1
trisetum flavescens	40
ulex europaeus	13
ulex minor	1
urtica dioica	136
verbena officinalis	8
veronica chamaedrys	66
veronica hederifolia	1
veronica montana	2

Species	Frequency
veronica serpyllifolia	6
veronica sp	3
viburnum lantana	21
vicia cracca	22
viola hirta	151
viola odorata	3
viola riviniana	20
viola spp	29

Appendix 8

A case study showing issues affecting management of chalk-grassland on the Lewes Downs

Sussex Wildlife Trust manages two sites that together comprise a large portion of the Lewes Downs and are both designated as SSSIs and Special Areas of Conservation (SACs), primarily for their orchid interest. These are Malling Down and Southerham Farm, which cover 85 and 132 ha respectively. Malling Down sits on a hill over-looking Lewes and is very scrubby (both establishing scrub and scrub in the sward are an issue) having passed through a long period of under-grazing. It has been owned by SWT since 1983. Southerham Farm comes from a more traditionally managed background and although it was gifted to the Trust in 2001, the predominant method for management, grazing, has changed little except in the detail. It remains the hub for SWT's grazing operation. Southerham Farm, although being more than 50% larger than Malling Down, sits in a secluded valley at the centre of the Lewes Downs, from which the outside world is not visible or audible and phone signal is poor. The traditional farming background means that both established scrub and developing scrub in the sward are very limited. The sites are separated only by a golf course.

From an NVC point of view, the sites are very similar, with CG3 the dominant community with CG2 more prominent on the thinner soils on the south facing slopes and patches of CG4 scattered about both sites. Anecdotal evidence suggests that this latter appears to be becoming an issue in the area known as the Coombe at Malling Down. Grazing the grassland in spring with ponies in temporary fenced plots and digging out some of the Tor-grass are both trial methods currently being planned for Malling Down as extensive grazing alone has not been successful.

Both areas have arable reversions which are very similar in nature, where the sward is best considered as MG6c passing towards something more similar to CG3 or MG5b. They have often been grazed as 'layback' which means they can get a harder graze in some years than would best suit them ecologically, which becomes more of an issue if it occurs in the summer months. When grazed more appropriately, these fields are rich in nectar sources with a wealth of Wild Carrot, Lady's Bedstraw, Hedge Bedstraw, Wild Marjoram and Red Bartsia being evident. Species such as Round-headed Rampion, Dwarf Thistle and Autumn Lady's-tresses are starting to appear in the fields. A three-tiered approach to the grazing has been adopted with the chalk-grassland obviously being the highest priority, the valley bottoms and species-poor grassland being seen as layback and the arable reversions sitting

somewhere in between. This is a step change which moves away from the arable reversions being seen as more summer layback, particularly for sheep, which are very good at removing structure and nectar sources in summer.

Image 3 The Coombe in July 2015 showing a wealth of structure and nectar sources, flowering grass is present but not dominating. Common Rock-rose, Dropwort, Salad Burnet and others are all plentiful making this CG2.

Appropriately timed grazing has not always been possible in recent years, mainly through lack of summer layback and poorly-maintained internal fences but these issues are being rectified. Winter grazing should be extensive and sheep are relied upon heavily for this where summer grazing is much lighter and predominantly carried out by cattle. Winter grazing by cattle on slopes is limited to prevent large amounts of poaching and soil compaction. Annual assessment of the sward using the Rapid Grazing Assessment (RGA) approach is key to checking that both summer and winter grazing is appropriate. Beyond the presence of key species in the sward, abundance of structure and nectar is desired. During a comparative invertebrate survey of Malling Down and Southerham Farm in 2015, it was evident that here was a disparity in how well the sites were being grazed. The Coombe at

Malling Down for example looked as good as it possibly could have scoring well on the RGA shown in image 3.

While the corresponding area of rich CG2 and CG3 (Bible Bottom) habitat at Southerham Farm had not had enough winter graze in 2014/15 and then too late in the spring, livestock were brought on. This resulted in a lack of structure and nectar sources at the same time as a build-up in thatch. Image 4 was taken on the same day as image 3 above. During a recent (March 2016) walk over Southerham, it was clear that a much harder winter graze had occurred in the winter of 2015/16, setting a good foundation for a diverse and floribund sward in the summer. This scored as heavily over-grazed on the RGA.

Image 4 Last year's stems of grasses are clearly evident, a sign the compartment didn't have enough grazing in the winter of 2014/15. The sward is very uniform and nectar sources are almost entirely missing.

The invertebrate assemblage was quite different between the two sites. Malling was overall much richer, in part due to the presence of more scrub and the shelter and structural diversity this brings but also due to more appropriate grazing levels in 2015. More species associated with woody vegetation and flowers were found at Malling than Southerham but so

were species associated with bare and revegetating ground and short herbaceous vegetation. The rarity quality was higher at Malling compared to Southerham too. There were some unusual specific differences. Scarce Forester was abundant in Bible Bottom but wasn't found at all Malling Down, despite its food plant Knapweed, being abundant at both sites. Cistus Forester was found only at Malling Down as its food plant, Common Rock-rose, is abundant there but it is not present on Southerham. The Red Data Book (RDB) Carthusian Snail, is in most places at Southerham, the most abundant snail. However, not even a single empty shell was found at Malling. This shows how key continuity of management is and how slow some species are to move about. Or perhaps that something as seemingly benign as a golf course and/or secondary woodland to the south of Malling Down can act as a barrier.

Appendix 9

Boxplots

The following boxplots show the distribution of data for the relevant variables depicted. Blue rectangles plot the spread of data from the lower quartile (25% of data is less than this value) to the upper quartile (25% of the data is greater than this value). The red line represents the mean value for the data. Outlying data points are shown as crosses and vertical lines demonstrate the spread of the data, if outliers are ignored.

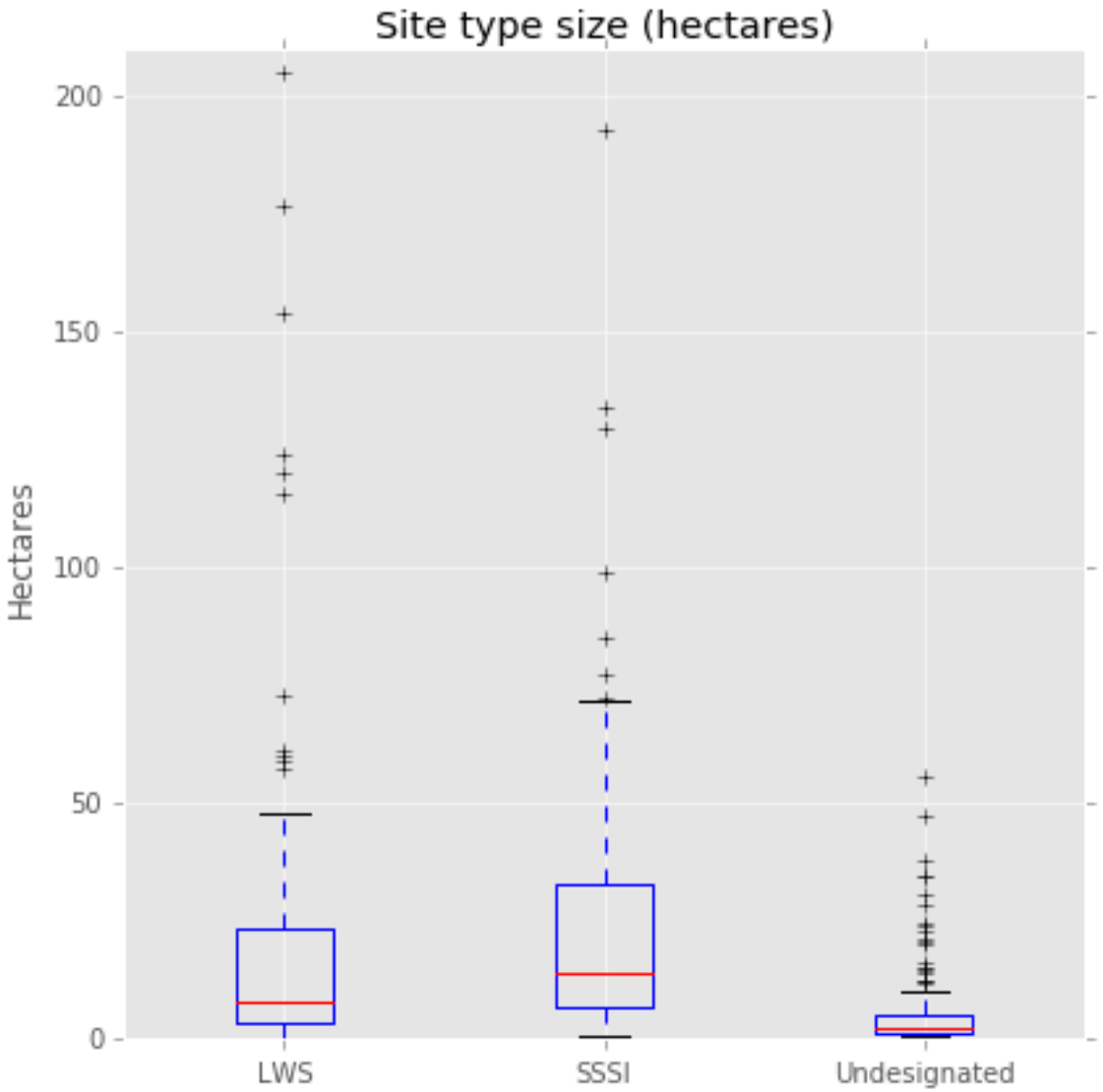


Figure 8 Boxplot showing size distribution of sites.

One outlier (a LWS with size of 714ha) has been excluded in order to present the data at a suitable scale for viewing the data

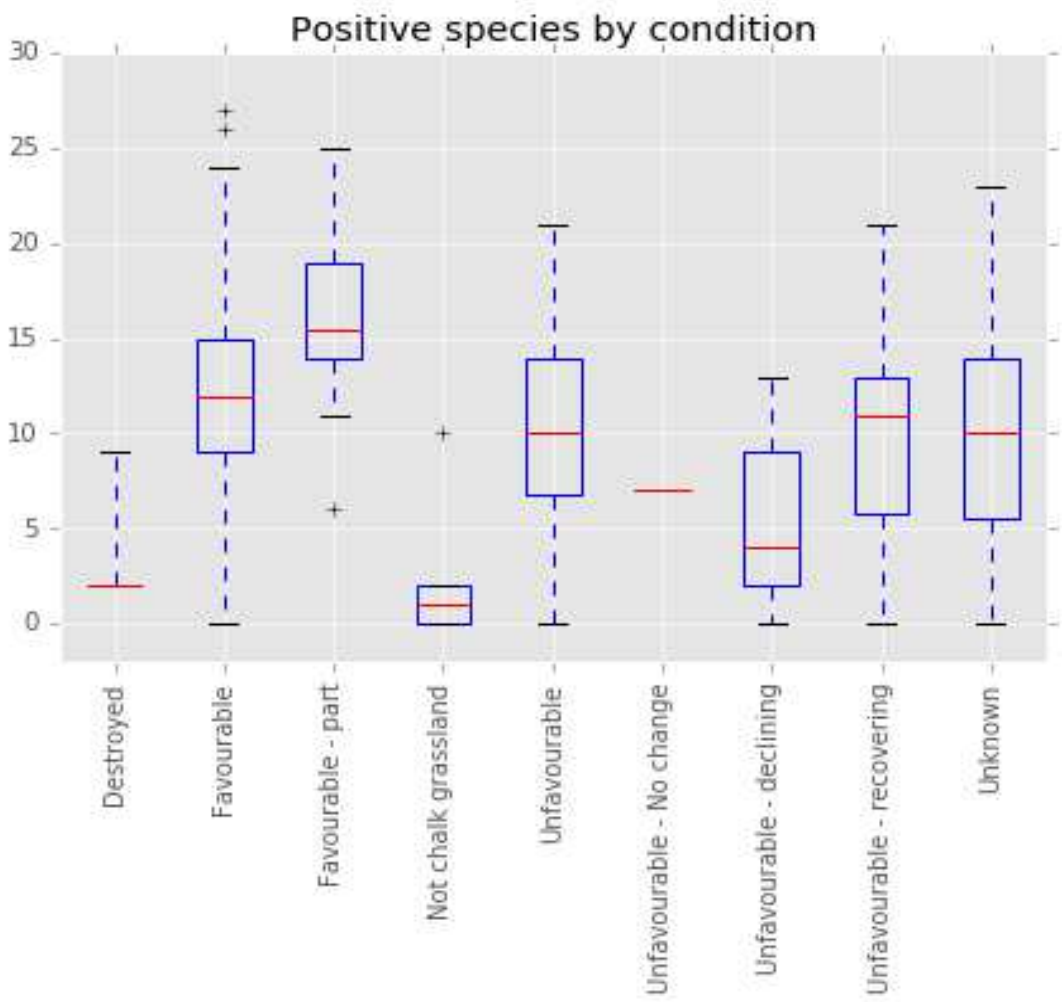


Figure 9 Positive indicator species by site condition

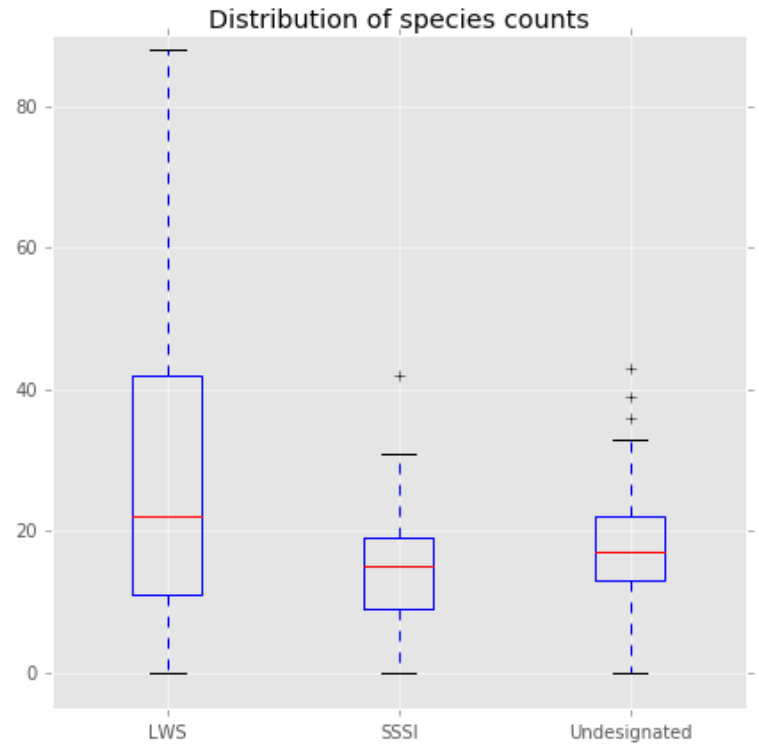


Figure 10 Total species count by designation

Appendix 10

Results tables in hectares

Table 13 Condition status by county in hectares

	Brighton and Hove	East Sussex	Hampshire	West Sussex	Total
Favourable	45.90	451.74	302.88	639.79	1440.31
– part	6.35	134.56	4.74	135.72	281.37
Unfavourable	420.90	1453.17	87.91	801.55	2763.53
- declining	-	14.80	1.16	11.96	27.92
- no change	-	-	-	5.20	5.20
- recovering	26.02	642.03	10.73	504.89	1183.67
Destroyed	-	0.24	0.78	5.38	6.40
Unknown	9.67	78.09	21.06	261.15	369.97
Not chalk grassland	-	-	2.67	41.15	43.82
Total	508.84	2774.63	431.93	2406.79	6122.19

Table 14 Condition of SSSI, LWS and undesignated sites in hectares

	LWS	SSSI	Undesignated	Total
Favourable	685.43	660.44	94.45	1440.32
– part	258.81	-	22.55	281.36
Unfavourable	1864.57	-	898.96	2763.53
– declining	11.96	15.96	-	27.92
– no change	-	5.20	-	5.20
– recovering	77.58	1106.09	-	1183.67
Destroyed	1.01	0.52	4.85	6.38
Unknown	338.64	-	31.33	369.97
Not chalk grassland	39.92	-	3.90	43.82
Total	3277.92	1788.21	1056.04	6122.17

Table 15 Showing the area, in hectares, of site designations and Environmental Stewardship

	Undesignated	LWS	SSSI	Total
Entry Level Stewardship (ELS)	8.80	52.02	7.12	67.94
Higher Level Stewardship (HLS)	95.36	203.63	584.34	883.33
Organic Entry Level Stewardship (OELS)	-	-	0.02	0.02
Mixed (HLS & ELS)	659.86	1395.76	1962.36	4017.98
Mixed (HLS & OELS)	65.77	148.87	122.97	337.61
None	157.31	1499.92	377.52	2034.75
Total	987.10	3300.20	3054.33	7341.63

Table 16 Showing the area, in hectares, of site condition and Environmental Stewardship

	ELS	HLS	OELS	HLS & ELS	HLS & OELS	None	Total
Favourable	17.74	273.99	-	1069.76	242.18	423.95	2027.62
- Part	4.74	-	-	249.25	4.83	35.38	294.20
Unfavourable	13.48	258.37	-	1238.34	61.81	1147.44	2719.44
- Declining	-	-	-	13.68	-	17.88	31.56
- No change	-	-	-		-	5.20	5.20
- Recovering	6.52	331.23	0.02	1311.57	10.80	194.23	1854.37
Unknown	25.46	3.69	-	132.55	17.99	179.33	359.02
Destroyed	0.01	-	-	1.52	-	4.86	6.39
Not Chalk Grassland	-	16.05	-	1.30	-	26.48	43.83
Total	67.95	883.33	0.02	4017.97	337.61	2034.75	7341.63