Definition of Favourable Conservation Status for Duke of Burgundy *Hamearis lucina*

Defining Favourable Conservation Status Project

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NATURAL ENGLAND

Contents

About the DFCS project

Natural England's Defining Favourable Conservation Status (DFCS) project is defining the minimum threshold for thriving habitats and species in England.

We are doing this so we can say what good looks like, recommend actions to get them there and keep them that way.

Using Natural England's expert evidence and specialist knowledge, our DFCS definitions will set out our aspirations for these species and habitats in England.

We are publishing these tools so that you, our partners and decision-makers can do your bit for nature, better.

As we publish more of our work, the format of our definitions may evolve, however the content will remain largely the same.

This definition has been prepared using current data and evidence. It represents Natural England's view of FCS based on the best available information at the time of production.

All blocks of evidence within the definition should be given one of three confidence levels [High, Moderate, Low], based on the quality of the evidence, its applicability and the level of agreement.

Quality of evidence is defined as follows:

- Robust evidence is that which has been reported in peer-reviewed literature, or other reputable literature, from well-designed experiments, surveys or inventories that shows signs of being applicable generally.
- Medium evidence is that reported from well-designed experiments, surveys or inventories but from only one or a small number of sites, with uncertainty over its more general applicability, or is correlational or circumstantial evidence.
- Limited evidence includes 'expert opinion', based on knowledge of ecological factors that plausibly suggest an effect, but there is no circumstantial or direct evidence available.

Confidence levels are assigned as shown in the following matrix (after IPCC 2010):

High agreement Limited evidence	High agreement Medium evidence	High agreement Robust evidence
Medium agreement Limited evidence	Medium agreement Medium evidence	Medium agreement Robust evidence
Low agreement Limited evidence	Low agreement Medium evidence	Low agreement Robust evidence

Introduction

This document sets out Natural England's view on the contribution England needs to make to achieve Favourable Conservation Status (FCS) for **Duke of Burgundy butterfly *Hamearis lucina***. The England contribution is defined in terms of three parameters: the natural range and distribution of the species; population of the species; extent of habitat necessary for long-term maintenance of populations.

This section provides the summary definition of the England contribution to FCS. Sections 2 – 6 describe the evidence considered when defining FCS for each of the three parameters. Annex 1 lists the references.

This document does not include any action planning, or describe actions, to achieve FCS where the species is not considered to be in FCS. These will be presented separately, for example within restoration strategies.

England contribution to FCS
The Duke of Burgundy is a rare and localised butterfly found largely within southern-central England but also at a few northern locations. The species is associated with scrubby calcareous grassland or open clearings within woodland. Colonies fluctuate in occurrence as habitat becomes temporarily unoccupied due to natural succession and rotational habitat management. Duke of Burgundy suffered an estimated overall decline of 62% in the number of colonies between the 1970s and 2011, due to the loss or degradation of suitable habitat. Since then many populations on calcareous grasslands have increased in size whilst populations in many woodlands have been stabilised and may even be increasing locally. Favourable Conservation Status will be achieved when at least 360 colonies exist in effectively functioning meta-populations across the species' current range.

Definitions and ecosystem context

Species definition

Duke of Burgundy (*Hamearis lucina)*
No sub-species in UK

Threat status

Red list status:

- **Global**: Not assessed. *Source: IUCN Red List*
- **European:** Least concern. *Source: European Red List, IUCN*
- **GB:** Vulnerable. *Source: Fox, Warren & Brereton 2010.*

Habitat for the species definition

Duke of Burgundy occurs in two different habitats in England – clearings, wide rides and glades in woodland and scrubby calcareous grassland. The main larval foodplant is cowslip *Primula veris*, but primrose *Primula vulgaris* is also used. The species prefers lush, non-desiccated plants for feeding so foodplants within longer grassland swards (5-20 cm) are preferred and is where the insects attain greatest abundance. Many grassland sites are on north or north-west facing slopes, probably also for this reason. A grassland mosaic is required, with areas of shorter grassland to encourage regeneration of *Primula*, and scattered scrub to provide shade and prevent desiccation of the plants. Woodland sites require a continuous supply of open clearings to be produced either through coppicing on rotation, or through management of rides/glades.

Source: *http://butterfly-conservation.org/files/duke-of-burgundy-psf.pdf*

Ecosystem context

The species' is endemic to the Western Palearctic, occurring widely but patchily from northern Spain east to the Ural mountains. It has declined in many European countries in recent decades. In Europe it occurs in a similar habitat to that in the UK – primarily flower-rich woodland clearings and adjacent meadows. The larval foodplants used are the same as in UK.
As Duke of Burgundy requires a structurally complex mosaic of habitats, especially in grassland, maintaining suitable habitat for this species will tend to provide habitat for the whole suite of grassland and scrub invertebrates, rather than just a section of them (as a uniform sward produced by certain grazing regimes would). In woodlands, the maintenance of wide glades or regular coppicing will also favour other species which require either a similar open habitat or the re-growth that occurs after coppicing (e.g. Nightingale *Luscinia megarhynchos*). Such management would significantly increase the overall biodiversity of both habitats by increasing their structural diversity and creating more niches for more species.

Sources: *Bourn & Warren 1998; http://www.ukbutterflies.co.uk/species.php?species=lucina*

Natural range and distribution

Metric

National Character Area (NCA).

Historical range

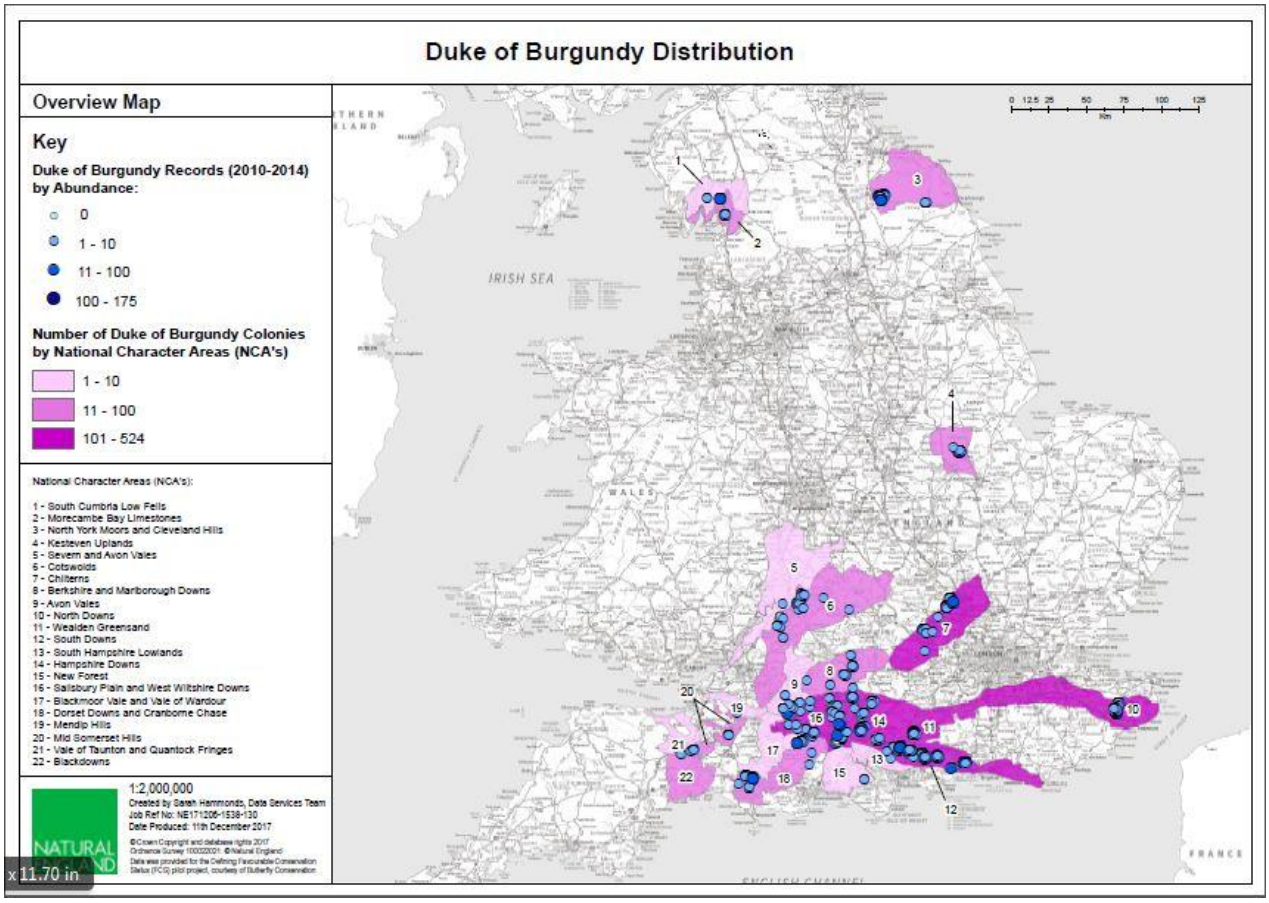
There is no evidence that the Duke of Burgundy range has changed in England.
The 2015 State of the UK's Butterflies report shows that between 2005 and 2014 the distribution increased by 3% (derived from 1km square resolution occupancy modelling), primarily due to targeted habitat management. However, in the longer term, between 1976 and 2014, the distribution decreased by 84%.

Sources: *Fox, Warren & Brereton 2010; Fox, R and others 2015;* [*http://butterfly-conservation.org/files/duke-of-burgundy-psf.pdf*](http://butterfly-conservation.org/files/duke-of-burgundy-psf.pdf)

Confidence: *Moderate*

Current range

Duke of Burgundy occurs in 22 NCAs largely within southern-central England, but also further north in the Kesteven Uplands, on the North York Moors and the Morecambe Bay Limestones. The largest numbers of colonies are found in the Chilterns, the North Downs in East Kent, the Wealden Greensand, the South Downs in West Sussex, the Hampshire Downs, and on Salisbury Plain and the West Wiltshire Downs.



Source*: Natural England 2017*

Confidence: *Moderate*

Range required for future maintenance of populations and diversity

The range required is the species' current range. There is no evidence that the species' range has ever been substantially greater or different at the NCA scale. Conservation needs to emphasise increasing suitable habitat within its current range to increase its Area of Occupation and maintain or re-establish strong meta-populations across its range.

***Source**: http://butterfly-conservation.org/files/duke-of-burgundy-psf.pdf*

***Confidence**: Moderate*

Potential for restoration of the natural range

Range can be maintained through the provision of suitable habitat (see section 6).

***Source**: http://butterfly-conservation.org/files/duke-of-burgundy-psf.pdf*

***Confidence**: Moderate*

Favourable range

The favourable range is the NCAs where the species currently occurs.

Population

Population metric

Colonies within meta-populations.

As with many other invertebrates, the number of individuals may fluctuate significantly from year to year. The existence of a colony rather than the numbers within a colony is the important attribute. Furthermore, as colonies may be lost as others are gained within a landscape, the key attribute is the persistence of the species (as measured by the number of colonies) in distinct geographic areas (meta-populations), and is used as the population metric.

Occurrence of colonies of this species fluctuates, as some suitable habitat will be temporarily unoccupied due to natural fluctuations and rotational habitat management. A stable population is where local colony extinctions equals re-colonisations so networks of colonies are required to ensure the overall population is stable. A functioning meta-population is a network of colonies that are close to each other to allow movement between each 'colony' so that re-colonisations can occur naturally if others become extinct.

Historical populations

Many colonies have been lost from within the species' range and many of the remaining ones have been substantially reduced, with many now having very small numbers of individuals. The population in England was at a low point in or around 2011. The total number of colonies known in the period 2008 to 2012 was 160, equating to an estimated loss of 62% in the number of colonies known in the 1980s. The reasons for these losses are almost certainly entirely due to loss or degradation of suitable habitat through successional development and lack of appropriate management.

Within the last decade there has been a recovery in some areas, especially in the south-east and on the North York Moors, due to dedicated conservation work, mainly involving habitat restoration and management. In such areas populations have increased and some former colonies have been re-established.

Sources: Fox, Warren & Brereton 2010; Bourn & Warren 1998; Jones *and others* 2013; *http://butterfly-conservation.org/files/duke-of-burgundy-psf.pdf*

Confidence: *Moderate*

Current population

In terms of numbers of colonies, the current population has not been assessed since 2008-2012 (see above). The 2015 State of the UK's Butterflies report shows that between 2005 and 2014 the population index, based on number of individuals, has increased by 67%, primarily due to targeted habitat management. This contrasts with a longer term decrease of 42% between 1976 and 2014. The Duke of Burgundy is still considered rare and localised across virtually the whole of its range, with some of the strongest remaining colonies in the Chilterns and on Salisbury Plain. Reasonable populations also remain on the West Sussex Downs, North York Moors and in East Kent (see Annex 2).

Source*: http://butterfly-conservation.org/6837/Dukes-ontheEdge.html*

Confidence: *Moderate*

Population required for future maintenance of populations and diversity

In order to achieve favourable status, there must be at least 360 colonies within stable meta-populations, distributed across the species' current range.
This figure is derived by restoring a set proportion of the known historical loss – in this case 75% of the historical loss. This is a method for defining a favourable population set out in Defining the

England Contribution to Favourable Conservation Status (Natural England 2018) and is used where there are evidence gaps and large historical losses. By applying the matrix within this method using the Vulnerable status of Duke of Burgundy, a high potential to increase populations through habitat restoration and the high UK biodiversity importance of the species, the method produces a figure for restoration of 75% of the historical loss.
Isolation could be a factor for some remnant colonies and purely restoring on a previously occupied basis may lead to further colonies suffering from isolation. A landscape-scale approach to maintenance and expansion of populations would ensure that this is avoided by establishing networks of colonies so that the effective meta-populations can function. This would ensure maintenance of stable populations by allowing colonisation to occur when one of the colonies becomes extinct. An increase in the number of colonies is required to establish meta-populations, thereby reducing isolation, throughout the range.
There are no sub-species or local variations in England and the species' overall range has not declined substantially, so the genetic diversity of the English population is not thought to be threatened.
Climate change may have contributed to some population increases and, although more research is needed, if this is so then climate change has the potential to benefit populations in the future as well.

Source: *http://butterfly-conservation.org/679-1100/duke-of-burgundy.html*

Confidence: *Moderate*

Potential for restoration of populations

There is good potential to increase the number of colonies through an increase in the area of suitable habitat.

The number of colonies should increase and spread if more suitable habitat could be restored or created in areas that are presently unoccupied across the species' current range. Ideally habitat enhancements should take place sufficiently close to existing populations to enable natural colonisation, but as this species is such a poor disperser, some translocations may be required. Females disperse further than males and have been known to travel at least 5 km.

The landscape-scale approach to conservation is producing good results in some areas, for example the western South Downs and on the North York Moors, where the required habitat is largely calcareous grassland with fairly extensive scrub. However, similar work is being carried out at sites around Morecambe Bay but despite continuity of management some colonies are decreasing and it is unclear for what reason. Further research work in these landscapes is required.

Sources: *Bourn & Warren 1998; http://butterfly-conservation.org/files/duke-of-burgundy-psf.pdf*

Fox, R. and others. 2015; http://butterfly-conservation.org/files/soukb-2015.pdf

Confidence: *Moderate*

Favourable population

It is considered that the population would be favourable when there are at least 360 colonies within meta-populations. There should be sufficient stable meta-populations within each landscape area for the majority of the suitable habitat to be occupied.
This would be measured through transect based monitoring of known colonies and where suitable habitat has been created/ restored. Note that area of managed habitat is not an acceptable proxy of colony numbers or colony occupancy, the species needs to be present.

Source*: Jones and others 2013*

Confidence*: Moderate*

Habitat for the species

Metric

Hectare.

Historical area

The area of suitable woodland habitat is estimated to have declined by over 90% between 1950 and 1990 especially in parts of southern England. This has primarily been due to changes in woodland management, with most clearings and glades becoming overgrown through lack of coppicing, grazing, cutting etc.
The amount of suitable habitat on calcareous grassland sites also declined through changes in management but not as extensively as in woodland. As the Area of Occupation is estimated to have declined by 52% in recent decades it could be reasonably assumed that the area of suitable habitat has been reduced by a similar amount over a similar period, though as noted above this is being restored already in some areas through targeted management.

***Source**: Jones and others (2013)*

***Confidence**: Moderate*

Current area

The current area of suitable habitat is not known, but will only be a small fraction of the total amount of lowland mixed deciduous forest (estimated as 300-500,000 ha within the England FCS statement) and lowland calcareous grassland (57,000 ha within the priority habitats inventory) that exists in England.

***Sources**: Fox, Warren & Brereton 2010*

***Confidence**: Moderate*

Area required for future maintenance of populations and diversity

The restoration or re-creation of sufficient habitat patches to enable meta-populations to be maintained across the range is the critical factor for favourable conservation status. It is likely that this would be approaching the amount of habitat in 1950, before the current serious decline began. Habitat restoration or re-creation should be concentrated in areas within the key occupied landscapes – the Cotswolds, Chilterns, Salisbury Plain/Wiltshire Downs, West Sussex, East Kent, Dorset and Somerset, and in the Kesteven Uplands, North York Moors and Morecambe Bay.

***Source**: Expert opinion J. Curson 2017*

***Confidence**: Moderate*

Potential for habitat restoration

The restoration or recreation of suitable habitat is quite feasible through changes in management, such as restoration of coppicing and/or ride management in woodland complexes, and suitable grazing/ scrub cutting regimes on calcareous grasslands. Such management would significantly increase the overall biodiversity of both habitats by increasing their structural diversity and creating more niches for more species. It would benefit other butterflies and invertebrates that specialise in woodland glade and clearing habitats.

Making assessments on a landscape by landscape basis will be key to ensuring that habitat management is targeted appropriately to enhance the potential of sites to support the species. This may include sites where no records of previous colonies exist but where there is potential for the species due to presence of the host plant in the right conditions.

***Source:** Jones and others 2013)*

Confidence: *Moderate*

Favourable supporting habitat

There should be sufficient suitable habitat throughout the natural range to support favourable numbers of colonies within meta-populations.

Annex 1: References

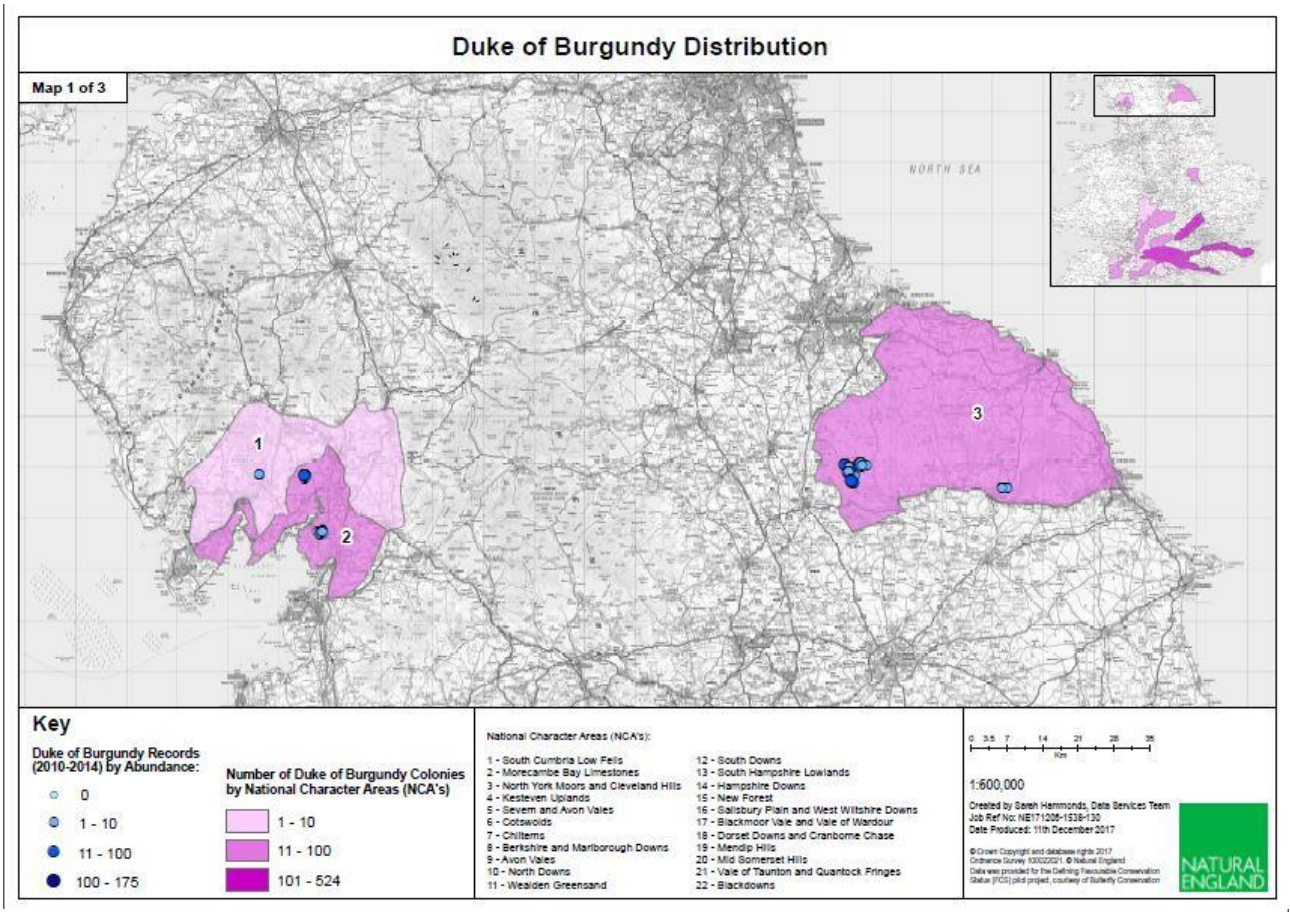
Bourn, N. & Warren, M. (1998) Species Action Plan: Duke of Burgundy *Hamearis Lucina*. Butterfly Conservation (unpublished)

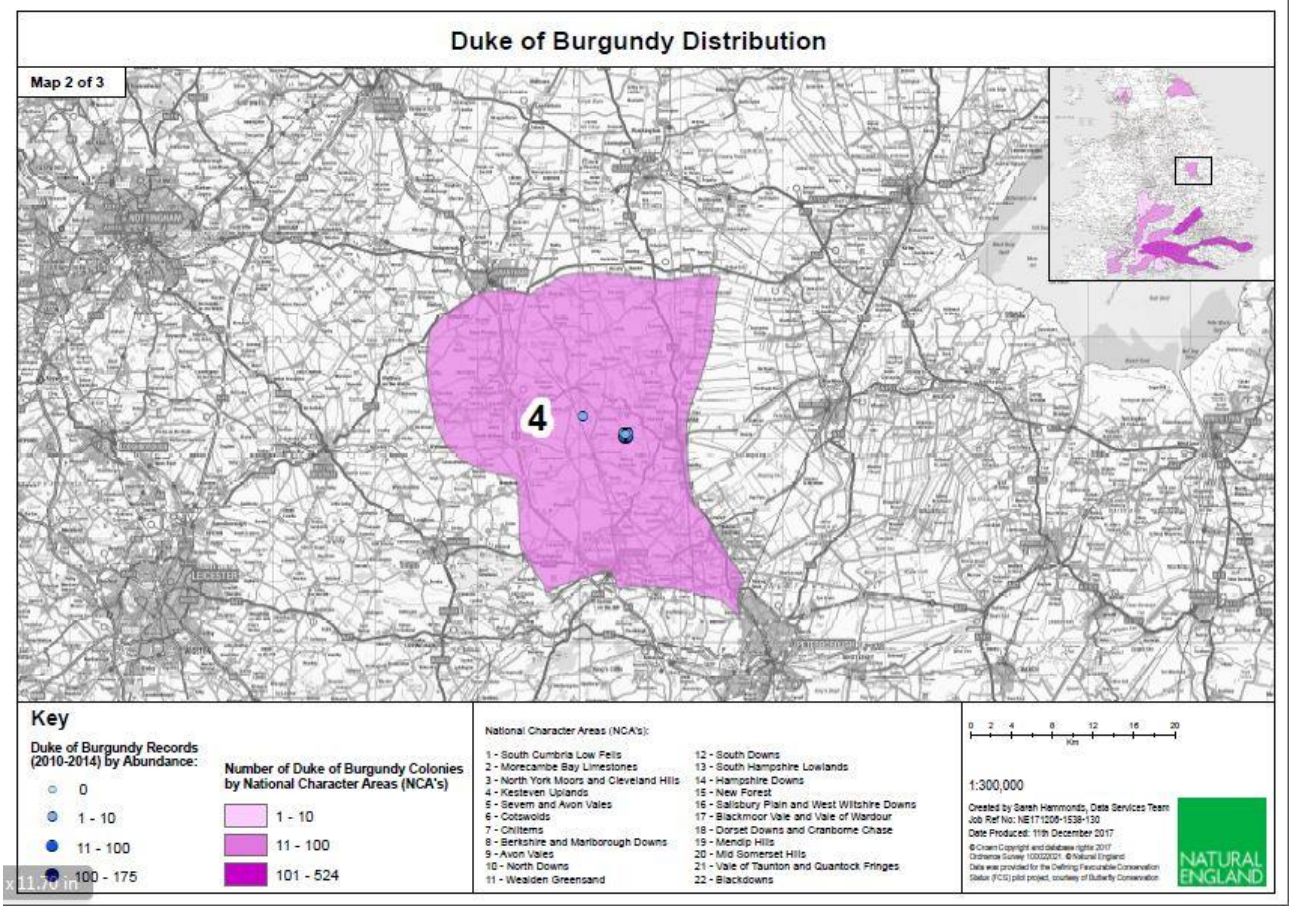
Fox, R., Warren, M.S., and Brereton, T.M. (2010). *A new Red List of British Butterflies*, Species Status 12; 1-32. Joint Nature Conservation Committee, Peterborough.

Fox, R *and others* (2015). The State of the UK's Butterflies 2015. Butterfly Conservation and the Centre for Ecology & Hydrology, Wareham, Dorset.

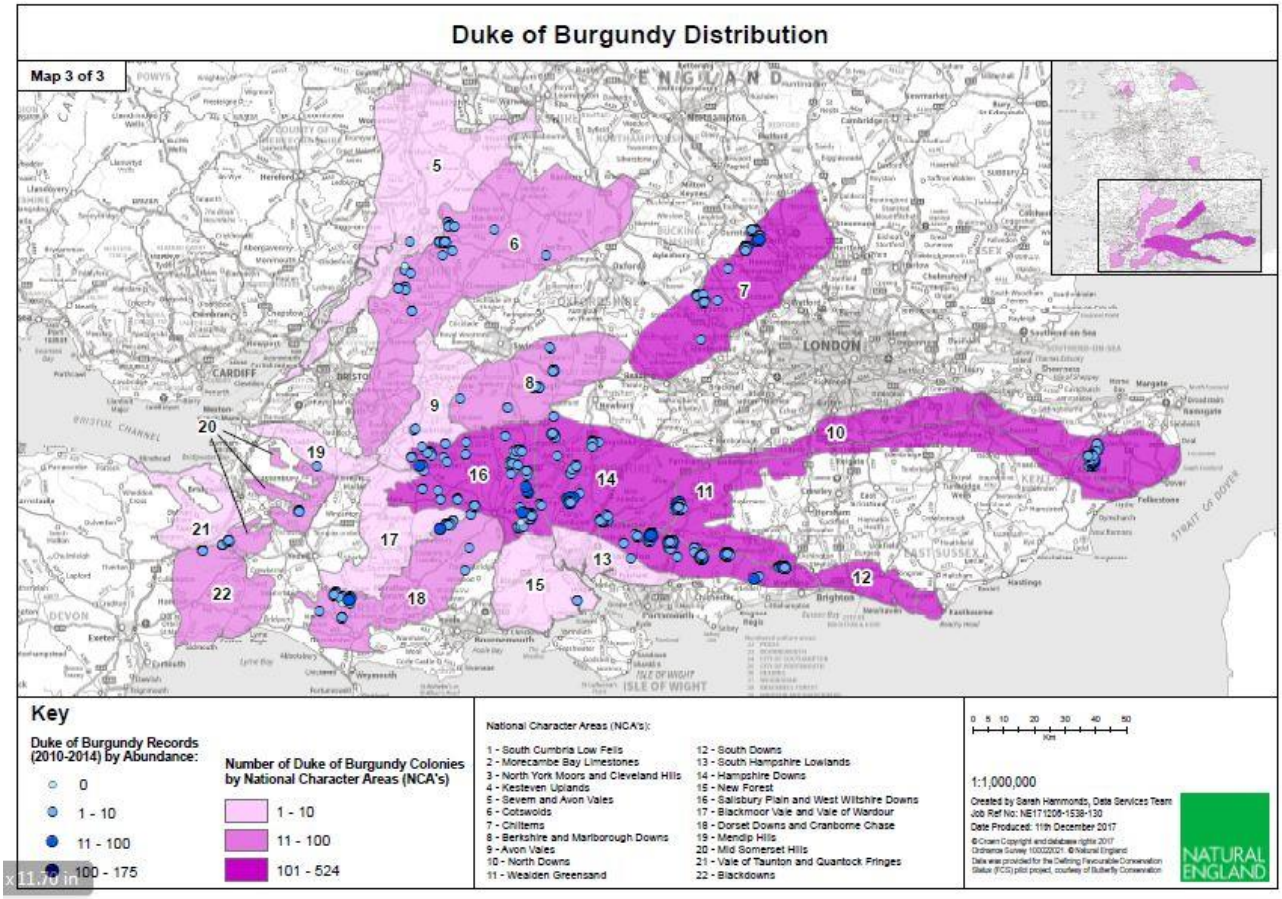
Jones, R. Ellis, S. Hoare, D., Wainwright, D. & Rosenthal, A. (2013). Status and Conservation of the Duke of Burgundy *Hamearis lucina* butterfly in England: Butterfly Conservation Report No. S13-19.

Annex 2: Distribution maps





Duke of Burgundy Distribution



Key

Duke of Burgundy Records (2010-2014) by Abundance:

- 0
- 1 - 10
- 11 - 100
- 100 - 175

Number of Duke of Burgundy Colonies by National Character Areas (NCA's)

- 1 - 10
- 11 - 100
- 101 - 524

National Character Areas (NCA's):

1 - South Cumbria Low Fells
2 - Morecambe Bay Limestones
3 - North York Moors and Cleveland Hills
4 - Kesteven Uplands
5 - Severn and Avon Vales
6 - Cotswolds
7 - Chilterns
8 - Berkshire and Marlborough Downs
9 - Avon Vales
10 - North Downs
11 - Wealden Greensand
12 - South Downs
13 - South Hampshire Lowlands
14 - Hampshire Downs
15 - New Forest
16 - Salisbury Plain and West Wiltshire Downs
17 - Blackmoor Vale and Vale of Wardour
18 - Dorset Downs and Cranborne Chase
19 - Mendip Hills
20 - Mid Somerset Hills
21 - Vale of Taunton and Quantock Fringes
22 - Blackdowns

0 5 10 20 30 40 50
Km

1:1,000,000

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Further information

Natural England evidence can be downloaded from our **Access to Evidence Catalogue**. For more information about Natural England and our work see **Gov.UK**. For any queries contact the Natural England Enquiry Service on 0300 060 3900 or e-mail **enquiries@naturalengland.org.uk** .

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Cover image
Duke of Burgundy *Hamearis lucina*
Leigh Prevost, Butterfly Conservation