

A Strategy for Arable Biodiversity in the North Wessex Downs AONB



Prepared by

**Simon Smart, Black Sheep Countryside Management
Julie Ewald, Game and Wildlife Conservation Trust**

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Simon Smart
Black Sheep Countryside Management
4 White Horse Cottages
Bratton
Westbury
Wiltshire BA13 4RS
Tel: 07748155143
E-mail: simonsma@tiscali.co.uk

Julie Ewald
Game and Wildlife Conservation Trust
Burgate Manor
Fordingbridge
Hampshire
SP6 1EF
Tel: 01425 652381
E-mail: jewald@gct.org.uk

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1 INTRODUCTION

The North Wessex Downs supports a wide range of nationally and regionally important species associated with arable farmland. This includes farmland birds such as Stone-curlew and Tree sparrow, rare arable plants such as Corn buttercup and Shepherd's needle, and mammals including Brown hare and Harvest mouse. Many of these species are listed on the UK Biodiversity Action Plan. An Arable Biodiversity Strategy is required to help protect and enhance the nationally important arable biodiversity found within the North Wessex Downs.

The Arable Biodiversity Strategy develops a target area approach to landscape scale restoration of the arable habitat and associated species, whilst identifying management strategies to enhance and extend these biodiversity hotspots. The Strategy also promotes a holistic approach, as developed by the Downland Heritage Initiative, to enhance and restore the wider natural and cultural heritage found within the North Wessex Downs.

At present, the North Wessex Downs has established a Chalk Grassland Strategy and a Woodland Strategy. The Grassland Strategy identified areas with potential for further targeted expansion of chalk grassland. The expansion of grassland areas will undoubtedly increase the overall quality of the grassland resource; however, there is a risk that areas of biodiverse arable land, which support important flora and fauna, could be lost due to poorly targeted arable reversion.

In response to this, the Arable Biodiversity Strategy seeks to help refine the targeting of semi-natural habitat recreation and in so doing complement the two existing Strategies. These integrated strategies will provide an ecologically balanced

approach and a robust mechanism for the protection and enhancement of habitats and species within the North Wessex Downs.

1.1 The importance of arable farmland as a habitat

In 2005 there were almost 3 million hectares devoted to the production of cereals in the UK (Defra statistics, available at <http://www.defra.gov.uk/esg>). Agriculture is the main land use in Britain and a considerable part of European biodiversity is associated with farmed habitats (Robinson & Sutherland 2002). Potts (1986) lists up to 300 species of flowering plants, up to 700 species of arthropods, and 70 species of birds that are in some way dependent on arable land.

1.2 The decline of arable biodiversity

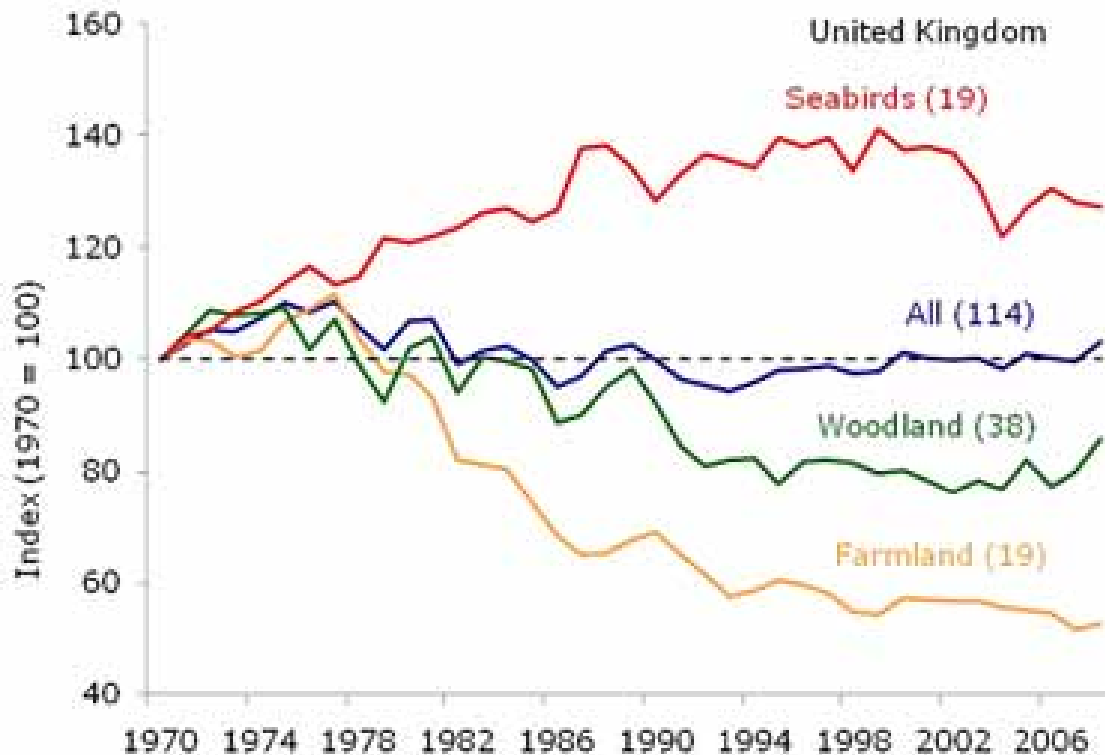
The decline of species associated with arable farmland has been well documented. Over the last 30 years many bird species associated with lowland farmland have declined substantially in both range and population size (Gregory et al. 2004, see Figure 1 overleaf). A range of plants, previously considered weed species, such as Corn buttercup (*Ranunculus arvensis*), and Shepherd's needle (*Scandix pecten-veneris*) have also undergone significant declines during the last century (Marshall et al. 2003). This decline has been brought about by agricultural intensification, driven principally by the Common Agricultural Policy, which encouraged a number of changes in farming practices including an increase in the use of chemical inputs, a switch from spring to autumn cropping, the loss of non cropped habitats, and the loss of traditional rotations (Ewald & Aebischer 1999, Gillings et al. 2005).

It is important to note that significant steps have been taken by the farming industry to improve environmental performance. Defra's 2007 report, *Agriculture in the United*

Kingdom, shows that pesticide use in the UK has reduced by 15% in the last 10 years. In 2010 an initiative known as the Campaign for the Farmed Environment (CFE) was launched by leading farming organisations. This is intended to encourage farmers and land managers to voluntarily adopt good environmental practices with regard to resource protection, farmland birds and farm wildlife.

While some farmland species such as wild birds continue to decline, this should be set against the backdrop of an increase in the amount of farmland that is now managed under a specific environmental scheme. Figures from Natural England show that some 6,236,498 hectares were managed under an environmental scheme in 2010 (Natural England 2010), compared with less than a quarter of that amount (1,410,000 hectares) in 1998 (DEFRA 2008). Projects such as the Farmland Bird Initiatives in the South West of England and Berkshire/Hampshire downs aim to improve the uptake of stewardship options that are thought to benefit farmland birds.

Figure 1. The wild bird indicator. The population trends of a suite of breeding birds in the United Kingdom from 1970-2008.



1.3 The importance of arable farmland as habitat in the North Wessex Downs

The North Wessex Downs covers 1730 km² and approximately 84% of the land within it is classified as farmland with over 60% under arable cultivation. This means that agriculture remains the dominant land use and the major influence determining landscape character and quality. Arable farmland within the North Wessex Downs supports a nationally and/or regionally important range of farmland birds such as Tree sparrow, Corn bunting, and Stone-curlew, as well as priority species of arable flora including Shepherd's needle and Corn buttercup, and mammals such as Brown hare.

2 AIMS AND OBJECTIVES OF THE STRATEGY

2.1 Aim

To increase our understanding of the arable resource within the North Wessex Downs and provide a framework to maintain and enhance the arable environment and its nationally important biodiversity.

2.2 Objectives:

- a) Identify hotspots of arable biodiversity and encourage measures to maintain, enhance and extend them.
- b) Provide a framework for farmers, advisors and statutory bodies to use Environmental Stewardship to target arable biodiversity.
- c) Identify where arable habitats can be managed to reduce diffuse pollution in the River Pang, Kennet, Lambourn and Avon catchments.
- d) Identify opportunities for improving access in arable landscapes.
- e) Ensure that creation of other habitats does not involve the loss of arable habitat of high biodiversity value.
- f) Ensure that arable cultivation does not conflict with the long-term survival of archaeological monuments.
- g) Maintain and enhance local variety and character in the North Wessex Downs landscape.

3 STRATEGIC CONTEXT

3.1 Biodiversity Action Plan Review

In order to maximize the effectiveness of the Arable Biodiversity Strategy it will need to be developed within a framework of international, national, regional, and local policy, regulation and legislation including the following:

3.2 UN Convention on Biological Diversity

The UN Convention on Biological Diversity, one of the main outcomes of the 1992 Rio Earth Summit, explicitly requires all countries to develop national strategies and action plans for the conservation of biological diversity and the sustainable use of biological resources. This led to the development of the UK Biodiversity Action Plan (BAP) and the resultant local BAPs.

3.3 UK Biodiversity Action Plan

The UK government published the UK BAP in 1994. This was aimed at conserving and enhancing biological diversity in the UK and contributing to the conservation of global biodiversity. By 1999, 45 UK priority Habitat Action Plans (HAPs) and 391 UK priority Species Action Plans (SAPs) had been published. This included an Cereal Field Margin Habitat Action Plan. One of the key targets under the UK Cereal Field Margin HAP was to maintain, improve and restore by management the biodiversity of some 15,000 ha of cereal field margins on appropriate soil types in the UK by 2010. There are also a number of Species Action Plans covering species associated with arable habitats. Twelve vascular plant species and five bryophyte species which are associated with arable farmland are included on the list of species of priority concern

in the UKBAP and of the 26 bird species listed as priorities in the UK Biodiversity Action Plan (UKBAP), 13 are species predominantly associated with arable farmland.

A large number of UKBAP species associated with arable farmland occur within the North Wessex Downs.

The UK BAP priorities have recently been reviewed to ensure they include the most relevant species and habitats. There have been relatively minor changes with respect to arable biodiversity. The Cereal Field Margin HAP has evolved into the Arable Field Margin HAP to take into account field margins in other arable crops. The refined definition provides a general description of arable field margins linked to the scope of the current HAP. It also specifies which type of margins are included or excluded. There are a series of new targets which includes expanding the area of cultivated, low-input field margins to 18,800ha by 2015.

Further change to the Arable Field Margin HAP has been proposed to ensure that in-field habitats associated with arable land are recognised for their importance for nature conservation. However, a detailed habitat proposal has not been submitted for this habitat, as the Cereal Field Margins HAP Steering Group advised that they would require at least another two years to produce an informed proposal.

The UK BAP list of priority species has also been reviewed, including those associated with arable habitats. This has included the addition of Harvest mouse as a priority species.

Web Address: www.ukbap.org.uk

For targets and progress see: www.ukbap-reporting.org.uk

3.4 Regional Biodiversity Action Plans

The North Wessex Downs spans both the South West and South East regions as defined by central government. Both regional BAPs state that such regional initiatives are not intended to replace local action but should be used to assist in the delivery of UK biodiversity plans at a local level.

3.5 South West Biodiversity Action Plan

The South West Biodiversity Partnership prepared regional habitat and species action plans in 1997. The aim of the South West Biodiversity Action Plan (SWBAP) was twofold: to influence the developing regional structures and to inform the local BAP process. SWBAP includes an Arable Farmland HAP.

It has since been updated as the SW Biodiversity Implementation Plan (SWBIP).

The SWBIP sets out a framework of policy, priorities and actions, updating those actions included in the SWBAP. The SW BIP identifies key programmes of work under five specific sectors one of which is 'Farming and Food'.

Contact details: South West Biodiversity Co-ordinator, Tel: 03000601120, E-mail: Naomi.brookes@naturalengland.org.uk
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3.6 South East England Action for Biodiversity

This regional biodiversity strategy has recently been reviewed by the South East England Biodiversity Forum (SEEBF) producing the South East Biodiversity Strategy (SEBS) in 2009. The SEBS is primarily a web based resource providing a working guide for the region's policy and action in relation to biodiversity. A central part of this has been the identification of Biodiversity Opportunity Areas (BOA), regional priority areas for restoration and creation of BAP habitats. Arable habitat is not included in

the BOAs but is identified as an important habitat within the region. Rather than develop a new set of targets SEBS signposts to the UK Arable Field Margin HAP.

3.7 Local Biodiversity Action Plans

The primary purpose of Local BAPs is to focus resources, using partnerships, to implement conservation action for the priority habitats and species and locally important wildlife and sites. Local priorities are informed and guided by national targets for habitats and species so that their implementation is linked to national priorities. However, action plans also seek to reflect the values of local people and provide a focus for local initiatives.

A number of local Biodiversity Actions Plans include action towards the conservation of arable habitat and the species it supports.

3.7.1 *Berkshire*

The local BAP for Berkshire is covered in the publication Berkshire County - A Framework for Biodiversity Action in Berkshire published in 1999. Habitat Action Plans have been prepared for five broad habitat types with working groups established for each. There is no separate Farmland or Arable HAP included, however, some of the associated species are mentioned under the unimproved grassland HAP. The Berkshire BAP is being reviewed during 2010 by the Berkshire Nature Conservation Forum.

Contact details: www.berksbap.org Biodiversity Co-ordinator Tel: 01628829574
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3.7.2 Oxfordshire

Oxfordshire's Biodiversity Action Plan was produced by the Oxfordshire Nature Conservation Forum in 2001. The Habitat Action Plan for Farmland incorporates an estimate of habitat area, species and targets. Since 2006 the BAP has evolved to use Conservation Target Areas (CTA) which are equivalent to Biodiversity Opportunity Areas (*see section 3.1.5*)

Contact details: Oxfordshire Nature Conservation Forum, Biodiversity Project Manager
Tel: 01865 407034, E-mail: bap@oncf.org.uk

3.7.3 Hampshire

Produced by the Hampshire Biodiversity Partnership, the Biodiversity Action Plan for Hampshire incorporates estimates for current arable area, numbers of species, current trends and threats, specific targets and actions. There is a Habitat Action Plan covering Arable Habitats, and a Species Action Plan for Seed-eating Farmland Birds.

Contact details: Biodiversity Officer, Hants County Council.
Ecology.group@hants.gov.uk

3.7.4 Wiltshire

Originally produced in 2002 by the Wiltshire BAP Forum the arable farmland HAP contains many species and habitat estimates, current trends and threats; specific targets and policies. In 2008 the BAP was reviewed and its titled changed to Farmland Habitats in order to take account of value of mixed farming.

Contact details: Biodiversity Coordinator, Wiltshire Wildlife Trust. Tel: 01380 725670. www.biodiversitywiltshire.org

3.7.5 Swindon Borough

Originally covered under the Wiltshire BAP, a Swindon BAP was published in 2006 and includes a Farmland HAP with actions and targets specifically relevant to farmland within the Borough. It also contains many species and habitat estimates, as well as specific targets and policies. The BAP was reviewed in 2009

Contact details: Swindon BAP Co-ordinator, Wiltshire Wildlife Trust, Tel: 01380 725670,
E-mail: neilp@wiltshirewildlife.org

3.7.6 Local BAP Summary

A review of the local BAPs identified a number of common targets which relate to arable biodiversity:

- Increase area managed for arable biodiversity.
- Improve knowledge of current distribution of arable biodiversity.
- Raise awareness of importance of arable land for biodiversity amongst landowners, agencies, advisors and the public.
- Provide appropriate training to landowners and advisors.

3.7.7 Adding value to delivery of Local BAPs

The Arable Biodiversity Strategy can ensure the delivery of all themes identified in section 3.1.7 at the North Wessex Downs landscape level.

3.7.7.1 Deliver the objectives of Local BAPs at a landscape scale across county boundaries

Oxfordshire, Berkshire (and Buckinghamshire) are using the same Target Areas process (Conservation Target Areas Mapping Project). The target areas cross county boundaries and also, in some instances, county-based groups from

Oxfordshire and Berkshire are working together in the same area. Berks, Bucks, and Oxon Wildlife Trust (BBOWT), Royal Society for the Protection of Birds (RSPB) and Butterfly Conservation also work in this combined Berks and Oxon area.

There is much less coordination between Wiltshire and Hampshire. This is partly due to the boundary between the South West and South East regions running down the western boundary of Oxfordshire and Hampshire. Improved cross-border coordinated conservation effort would be particularly valuable for species with a restricted range within the AONB such as Tree sparrow.

3.7.7.2 Improve survey effort on county borders

County border areas have traditionally received limited recording effort because county-based groups are less keen to record in survey areas (e.g. tetrads, km squares) which cross into other counties.

3.7.7.3 Assist in the review of Local Biodiversity Action Plans

Ensure that arable habitats and species within the North Wessex Downs are well represented in local BAPs, including North Wessex Downs specific targets and actions.

3.8 PSA Targets

Public Service Agreements (PSAs) set out the key improvements that the public can expect from Government expenditure. They are three-year agreements, negotiated between each of the main governmental Departments and HM Treasury during the Spending Review process.

Following the Government's Spending Review in 2000, Defra adopted, as one of its PSA targets, a commitment to reverse the long-term decline in the number of farmland birds by 2020, as measured annually against underlying trends.

PSA target 3 (i):

“Care for our natural heritage, make the countryside attractive and enjoyable for all, and preserve biological diversity by ... reversing the long-term decline in the number of farmland birds by 2020, as measured annually against underlying trends”

Public Service Agreements targets are now being revised as part of the 2007 Treasury Spending review, with new PSA's to be in place by April 2008.

As part of the review, Defra has proposed 2 PSAs, Climate Change - ‘*Avoiding and adapting to climate change*’, and Natural Environment - ‘*Secure a healthy natural environment for everyone’s well being, health and prosperity, now and in the future; and reflect in the decision-making the value of the service that it provides*’.

The natural environment will have 5 indicators, Water Quality, Biodiversity, Air, Marine, and Land management.

The biodiversity indicator will be measured by wild bird populations in England as a proxy for wider biodiversity, building on the existing PSA3a on Farmland Birds (which remains). There will be separate indicators for woodland birds and wetland birds.

The Farmland bird target is likely to be brought forward to 2015.

Due to its importance for farmland birds, the North Wessex Downs will play a significant role in the delivery of this PSA target.

Web Address: <http://www.bto.org/research/indicators/index.htm>

Defra: <http://www.defra.gov.uk/corporate/busplan/spending-review/psa2007.htm>

3.9 Downland Heritage Initiative

The Downland Heritage Area represents a 'flagship' area within the North Wessex Downs where maintenance and restoration of the open downland landscapes and habitats are a key priority for the North Wessex Downs, in particular remaining areas of chalk grassland. However, the Initiative encourages a multi-objective approach to the management of the downland landscape and highlights the importance of the project area for arable biodiversity. It states the need to ensure that the creation of new chalk grassland is not carried out at the expense of existing habitat, which is valuable in its own right.

The DHI report (Batten 2005) also lists a number of constraints, opportunities and suggested actions relating to arable biodiversity. Many of these issues highlighted by the DHI report were also identified as issues by delegates at the first Arable Biodiversity Strategy Stakeholders' Meeting.

Contact Details: North Wessex Downs AONB, Tel: 01488 680440, e-mail: info@northwessexdowns.org.uk

Report Reference: Batten (2005) *Downland Heritage Project Development*. North Wessex Downs AONB

The Arable Biodiversity Strategy links directly with Policy IU9 which relates to improving understanding (IU) of the 'extent and condition of the key habitats within the North Wessex Downs' and Policy IU10, to develop knowledge of the wider biological resource through co-ordinated wildlife surveys. IU10 specifically mentions farmland birds and arable plants.

The proposed Arable Biodiversity Strategy should be a delivery mechanism for a number of objectives as set out in the AONB's Management Plan, specifically those associated with *Theme 4: Increasing biodiversity* (Objectives 15, 16) and *Theme 7:*

the land-based economy as custodian of the landscape (Objective 25, 27) as well as Theme 13: Establishing common understanding (Objective 47).

The most direct reference in the AONB Management Plan is Objective 14: To protect, appropriately manage and expand.....species-rich arable field margins.....

Contact Details: North Wessex Downs AONB, Tel: 01488 680440, e-mail: info@northwessexdowns.org.uk

3.11 AONB Habitat Strategies

There are currently two other habitat Strategies developed for the North Wessex Downs, a Chalk Grassland Strategy and Woodland Strategy. These strategies describe the extent, distribution and condition of the relevant habitats. These also identify gaps in knowledge and provide strategic level management requirements and priorities, taking into account biodiversity, landscape and cultural heritage. Furthermore, the strategies also examine the potential for habitat expansion and linkage to meet landscape-scale objectives.

An important element of the Arable Biodiversity Strategy, indeed one of the key drivers in its initial development, was the need to integrate policy for arable habitats with the Chalk Grassland and Woodland Strategies to ensure integrated landscape scale conservation so that the creation of semi-natural habitats were achieved without the loss of arable biodiversity.

3.11.1 *Chalk Grassland Strategy*

Although Management Objective 6 of the Chalk Grassland Strategy specifies that it will 'ensure that restoration and re-creation of one habitat does not involve the loss of another that is of value', data on arable biodiversity was not used to inform the identification of strategy focus areas, nor considered when identifying parcels of land targeted for habitat creation. For more detail see section 8.5.2.

Report Reference: WSBRC (2005) *Chalk Grassland Strategy Report*. North Wessex Downs AONB

3.11.2 *Woodland Strategy*

The Woodland Strategy focuses on the existing woodland resource, in line with national, regional and local policies where the emphasis has switched from creating new woodlands towards the management of existing woodlands. Again the identification of areas suitable for potential creation of new woodland did not include arable biodiversity as a constraint, or opportunity.

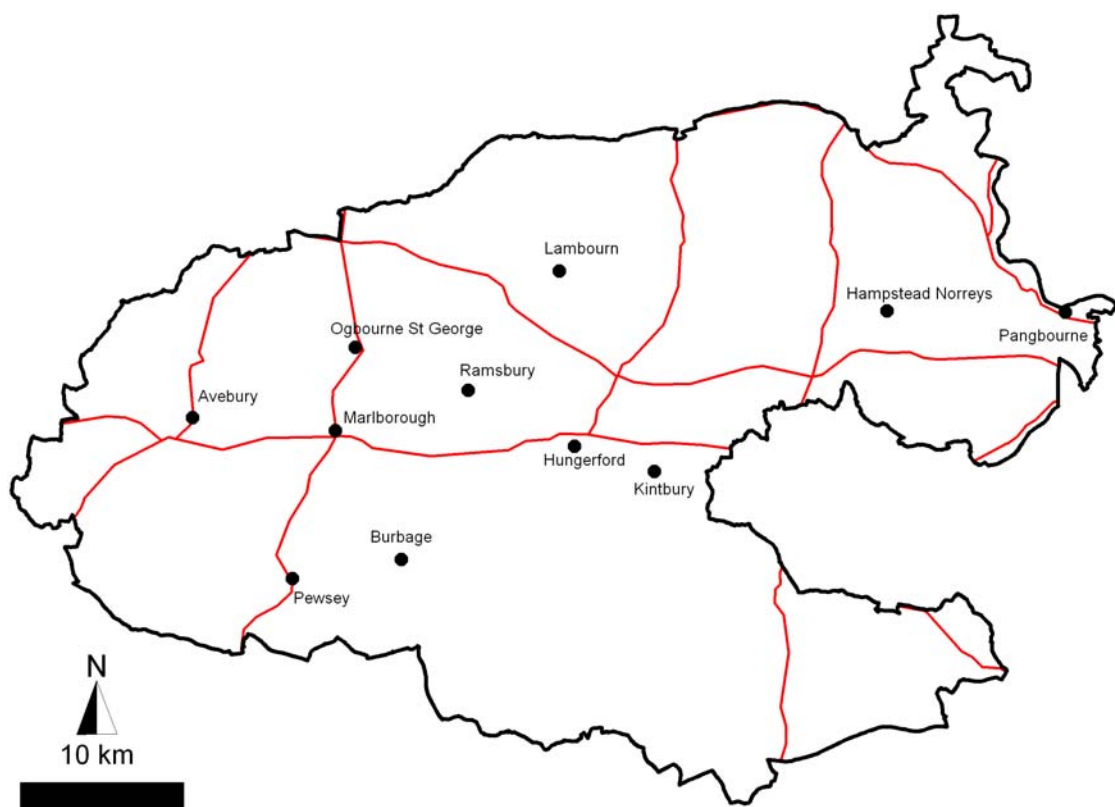
Report Reference: Land and Landscape Management (2005) *Woodland Strategy*. North Wessex Downs AONB

Contact Details: North Wessex Downs AONB, Tel: 01488 680440, e-mail: info@northwessexdowns.org.uk

4 CONSTRUCTION OF AN ARABLE TARGET AREA: METHODOLOGY

We set out to use available information on the distribution of arable flora, farmland birds and arable mammals within the North Wessex Downs (Figure 2) to identify an area to target activities towards the retention and restoration of biodiverse arable land. In addition we also used habitat measures (landcover, elevation, aspect, slope & soil) and historical land use data (Historic Landscape Character) to identify areas for potential population expansion of arable species and areas in which to concentrate survey effort aimed at arable species.

Figure 2. North Wessex Downs, major roads and built-up areas.



4.1 The general approach used for constructing the target area

Agri-environment funds are often prioritised and allocated using a targeted approach that is most often based on recorded sightings of wildlife of conservation concern, with those of declining farmland bird species given particular importance. One drawback to this approach is that the distribution of other fauna and flora are not considered. Another is that using the known local distribution of flora and fauna to construct these maps means that land where no surveys have been undertaken or where the required biodiversity information is not easily available may be excluded.

Our approach used information on the location of arable plants and mammals, in addition to farmland birds, to overcome the drawbacks associated with only using one wildlife taxon. We also identified areas with few wildlife records but with similar elevation, aspect and soil types and included these as places where the physical conditions made it likely that the arable plants, birds and mammals we were interested in could be found. Further refinement to the map included only selecting land that historically had been either arable or open land, using English Heritage's Historical Landscape Character (HLC) areas.

In previous work to develop a vision map of arable flora for the North Wessex Downs AONB we had split the data set available for plant species into two using random numbers – one half was used to construct the habitat model – referred to as the “model sample”, the other half was used to test how good this model was after its construction – referred to as the “test sample” (Simmonds & Ewald, 2007). We then used random points throughout the AONB to sample random habitats within the AONB. We compared the habitat at the random points to the habitat at the “model sample” in order to determine which habitats were more closely associated with plant

locations. We were then able to compare how well the vision map we constructed fit the remaining half of the plant data.

We were not able to follow the same procedure here due to the initial bird data provided. Originally we were provided with data that gave bird species occurrence on a combined 2 km basis (i.e. one large object, consisting of combined 2km buffers for each species of farmland bird), which did not allow us to divide the data into two halves – one to construct a target area and the other to test it. We instead settled on using random points as a means to sample both the flora and fauna data, together with the associated habitat data for the North Wessex Downs AONB in order to identify habitats associated with higher number of species. In order to compare like with like we reduced the mammal and plant data to similar combined 2 km buffer objects. We analysed the results of this sampling in order to pick “winning” habitats. Subsequently data did become available for bird occurrence on a 1km by 1 km basis; this did not equate to either the sighting data available for mammals or to the records available for plant species data. But it did allow us to consider habitat at a more localised scale for each of the locations associated with each individual buffer. As we had not managed to divide the previous dataset into a “model and test sample”, we used the full set of data to identify habitats closely related to higher occurrences of farmland species in a similar procedure but based on individual 1km and 2 km buffers around the occurrence/sightings/record location compared to individual 1 km and 2 km random buffers within the North Wessex Downs AONB area.

These two methods allowed us to identify habitats associated with higher occurrences, sightings or records of arable fauna and flora, resulting in two target

areas that incorporated both sighting/occurrence records and habitats associated with these records.

We also used “Hotspot” mapping to identify areas of the North Wessex Downs AONB where current records indicate high densities of bird occurrence, mammal sightings and plant recordings. Two methods of hotspot mapping were possible for the bird and plant data, both density of number of occurrences and density of species recorded, whilst for mammals, only density of number of occurrences was possible. We combined these into a target area representing the best available estimate of biodiverse arable habitat based on available records.

We combined these three target areas in order to arrive at a minimum Arable Biodiversity Strategy target area, selecting land that historically had been either arable or open land, We compared this area to the records used to construct the model. It would be expected that collectively it should be of little interest that the strategy target area fit the arable flora and fauna data used to construct it. But on a taxon or species basis it is, as it will indicate if the target area reflects one taxon or species better than another.

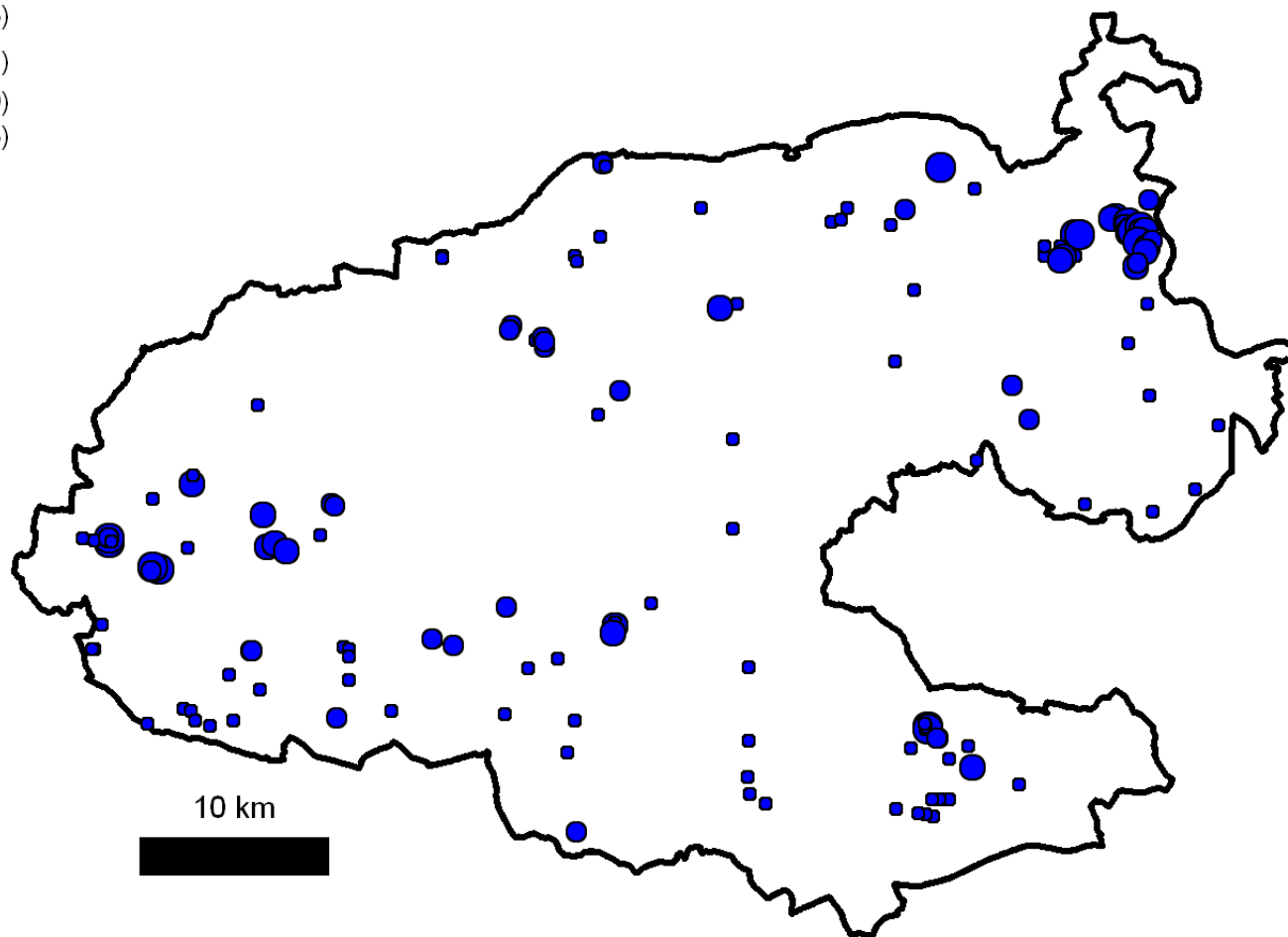
4.2 Plant data used

Plant distribution data was available from the three counties and two unitary authorities who make up the North Wessex Downs: Oxfordshire, West Berkshire, Wiltshire (including Swindon) and Hampshire. Data for Oxfordshire and West Berkshire was made available through the Thames Valley Environmental Record Centre, and the Northmoor Trust. Wiltshire data was made available from the Wiltshire and Swindon Biological Records Centre, Plantlife and Simon Smart. The Hampshire Biodiversity Information Centre contributed data for Hampshire. Not all of the available data was used for the construction of the target area. We selected species that were deemed likely to be specifically part of an arable ecosystem, including uncommon species and those which are thought to indicate the presence of diverse arable plant assemblages. The selected species are listed in Appendix 1 and the locations of the plant records – sightings - are shown in Figure 2. In essence the data used was that from Simmonds & Ewald, 2007, with some additions. The dates of the plant records selected covered a wide range, from 1954 to 2006, though the majority of the information (70%+) was collected from 1995. In some cases multiple species of arable plants were recorded at each location – these are indicated by larger points in Figure 3.

Figure 3. The location of plant species used for the creation of the Arable Biodiversity Strategy target area, with the number of species at each location indicated by the size of the dot.

Species Found
(Number records)

- 5 to 9 (13)
- 3 to 5 (21)
- 2 to 3 (29)
- 1 to 2 (88)



4.3 Bird data used

The distribution of farmland birds within the North Wessex Downs was provided through the Bird Conservation Targeting Project (BCTP)¹, with the aid of Natural England (NE) and the Royal Society for the Protection of Birds (RSPB), the aim of which was to produce the most comprehensive and up-to-date distribution information for a suite of scarce and declining birds in England. The data we used consisted of the location of sightings of seven species of farmland birds: Corn bunting (*Emberiza calandra*), Grey partridge (*Perdix perdix*), Lapwing (*Vanellus vanellus*), Stone-curlew (*Burhinus oediconemus*), Tree sparrow (*Passer montanus*), Turtle dove (*Streptopelia turtur*) and Yellow wagtail (*Motacilla flava*) from 2000 to 2006. Originally the data was supplied as large overlapping buffers of a 2 km radius (Figure 4), but laterally we were given individual 1km buffers indicating which species were recorded per 1 km by 1 km square within the North Wessex Downs. We displayed this in a similar manner to the information on arable plant locations in Figure 5.

¹ The BCTP originally included Natural England, RSPB & British Trust for Ornithology (BTO). These organisations have been joined by the Forestry Commission England, Scottish Natural History, Countryside Council for Wales and Forestry Commission Wales, Centre for Environmental Data and Recording, the Department of Agriculture and Rural Development, the Environment and Heritage Service and Forest Service in Northern Ireland.

Figure 4. Overlapping buffers of 2 km radius for the seven species of farmland bird considered in the production of an Arable Biodiversity Strategy target area.

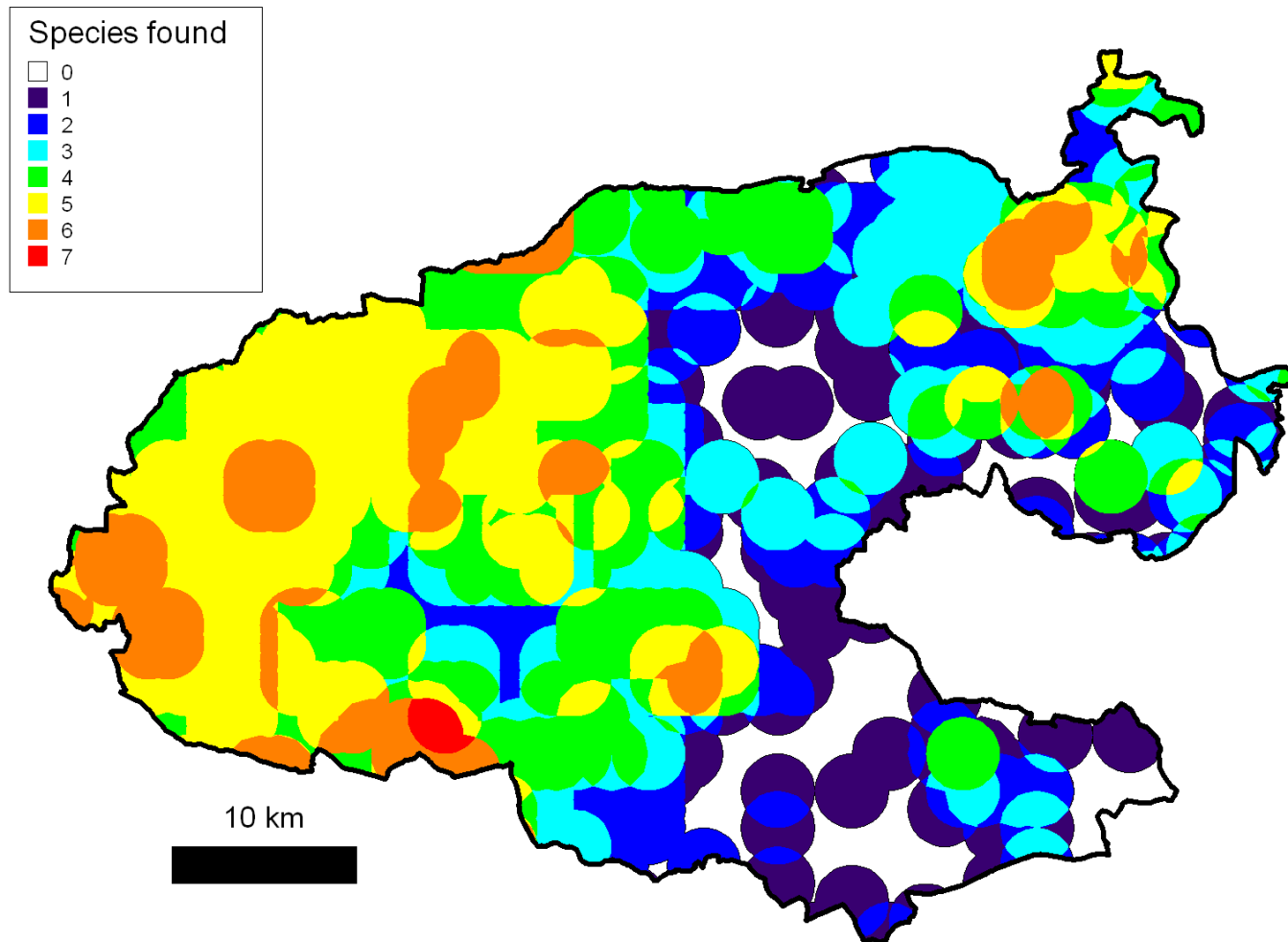
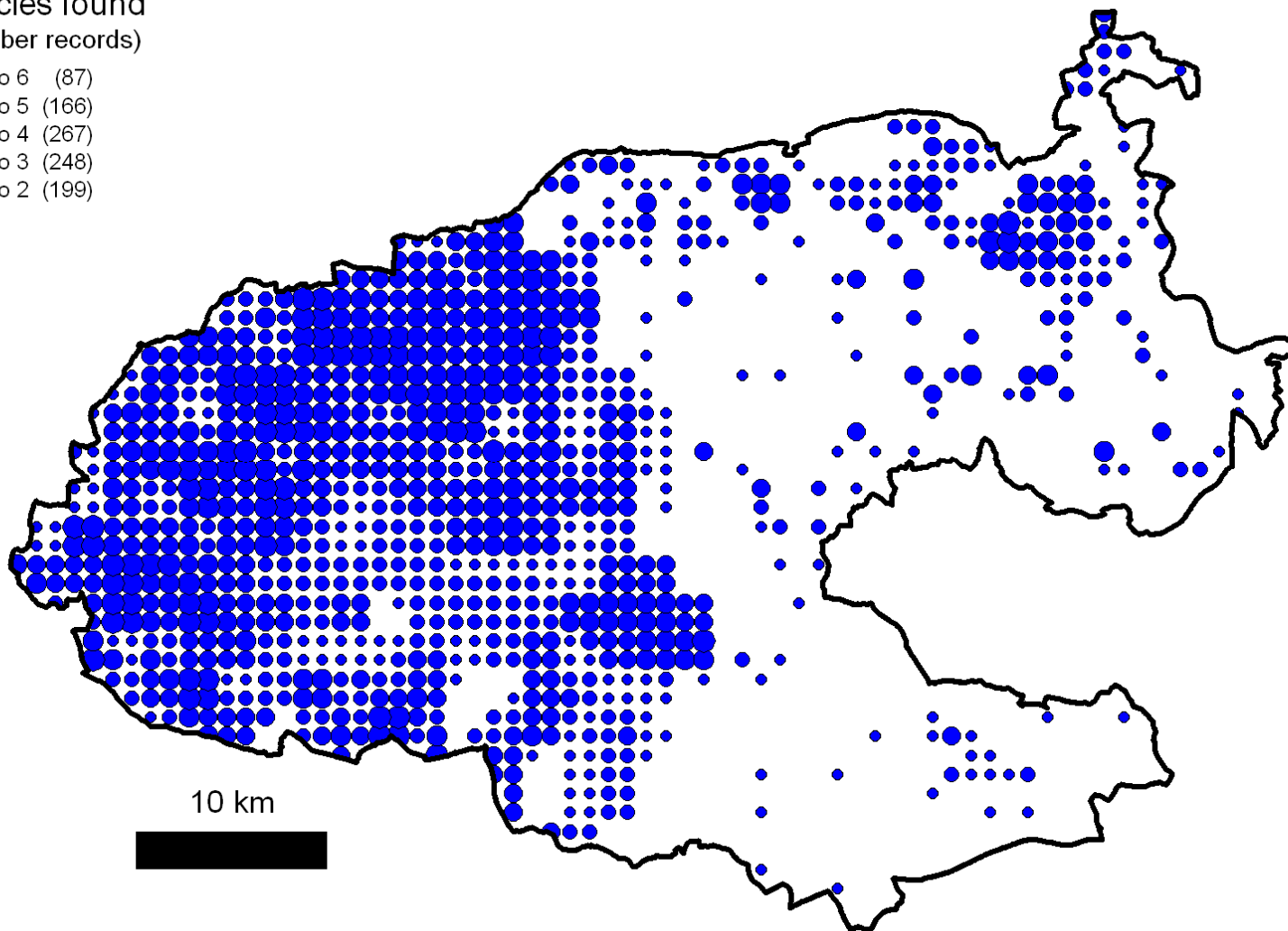


Figure 5. The location of bird sightings used for the creation of the Arable Biodiversity Strategy target area, with the number of species recorded at the centre of each kilometre indicated by the size of the dot.

Species found
(Number records)

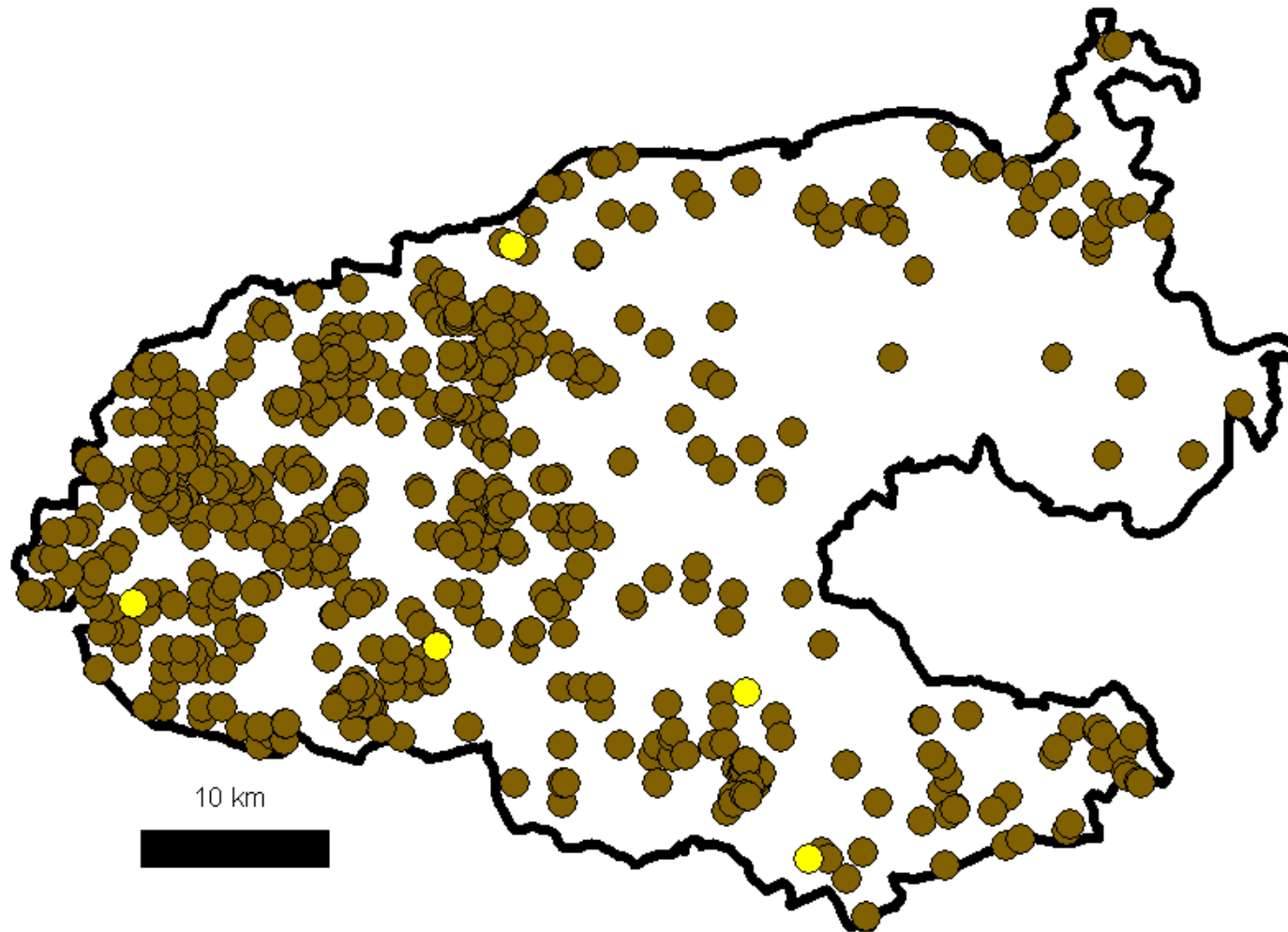
- 5 to 6 (87)
- 4 to 5 (166)
- 3 to 4 (267)
- 2 to 3 (248)
- 1 to 2 (199)



4.4 Mammal data used

Mammal distribution data was available in a similar fashion to the plant data (Figure 6). Data for Oxfordshire was made available through the Thames Valley Environmental Record Centre. Wiltshire data was made available from the Wiltshire and Swindon Biological Records Centre. The Hampshire Biodiversity Information Centre contributed data for Hampshire. Information was supplied on the location of Brown hare (*Lepus europaeus*) and Harvest mouse (*Micromys minutus*) from before 1968 to 2006, with the majority (56%) recorded since 1980.

Figure 6. The location of mammal species used for the creation of the Arable Biodiversity Strategy target area. Brown hare are denoted by brown dots, Harvest mouse by yellow dots.



4.5 “Hotspot” mapping

We constructed “hotspots” of the arable plant recordings, farmland bird occurrence and mammal sightings (Figures 7, 8 and 9, respectively), as well as “hotspots” of species density for arable plants and farmland birds (Figures 10 and 11). The extant data on the location of these species is limited by areas where either organized surveys have been undertaken and the data on species distribution has been recorded either in the Biological Record Centre system or through the BTCP database or where the location of individual species have been recorded through observations but where there may not have been a systematic survey. “Hotspots” of general sightings of plants, birds and mammals summarize this sort of data without making assumptions that all possible species were recorded at all possible locations. It does, however, weigh all locations equally, without giving added emphasis to areas where large numbers of species are recorded. It is likely that areas with high numbers of sightings will have high numbers of species with similar habitat requirements – our groups, but not always. Here we provide the two methods of “hotspot” mapping for arable plants and farmland birds. The method of data collection for the mammals – location of actual sightings – means that the two methods are essentially the same for the mammals.

“Hotspots” were created by overlying a 250-m grid across the area of the North Wessex Downs. At each point of the grid, the density of either sightings/occurrences or species was calculated as (number of points or species within 1 km of the grid point)/(area surveyed within 1 km of the grid point), except for the bird dataset, where the area was extended for 2 kilometres outside of the North Wessex Downs area to avoid extreme edge effects due to the widespread surveying for birds. An

inverse distance-weighting algorithm was applied to this original grid to produce a grid of smoothed values using Vertical Mapper ver. 3.1 (MapInfo Corporation). This algorithm was essentially a spatial moving average such that points nearer the grid point had greater weight in the calculation than more distant ones. We accepted the default setting for the calculation, based on the size of the North Wessex Downs and the distance between the grid points (250m). Contour lines were threaded through these grid points to produce eight contour regions that sought to balance clarity with subdivision into one zone indicating areas of extremely low sighting, occurrences or species density and seven zones of approximately equal area covering the range of sighting, occurrence or species density.

Figure 7. The “hotspot” distribution of records of arable plant within the North Wessex Downs.

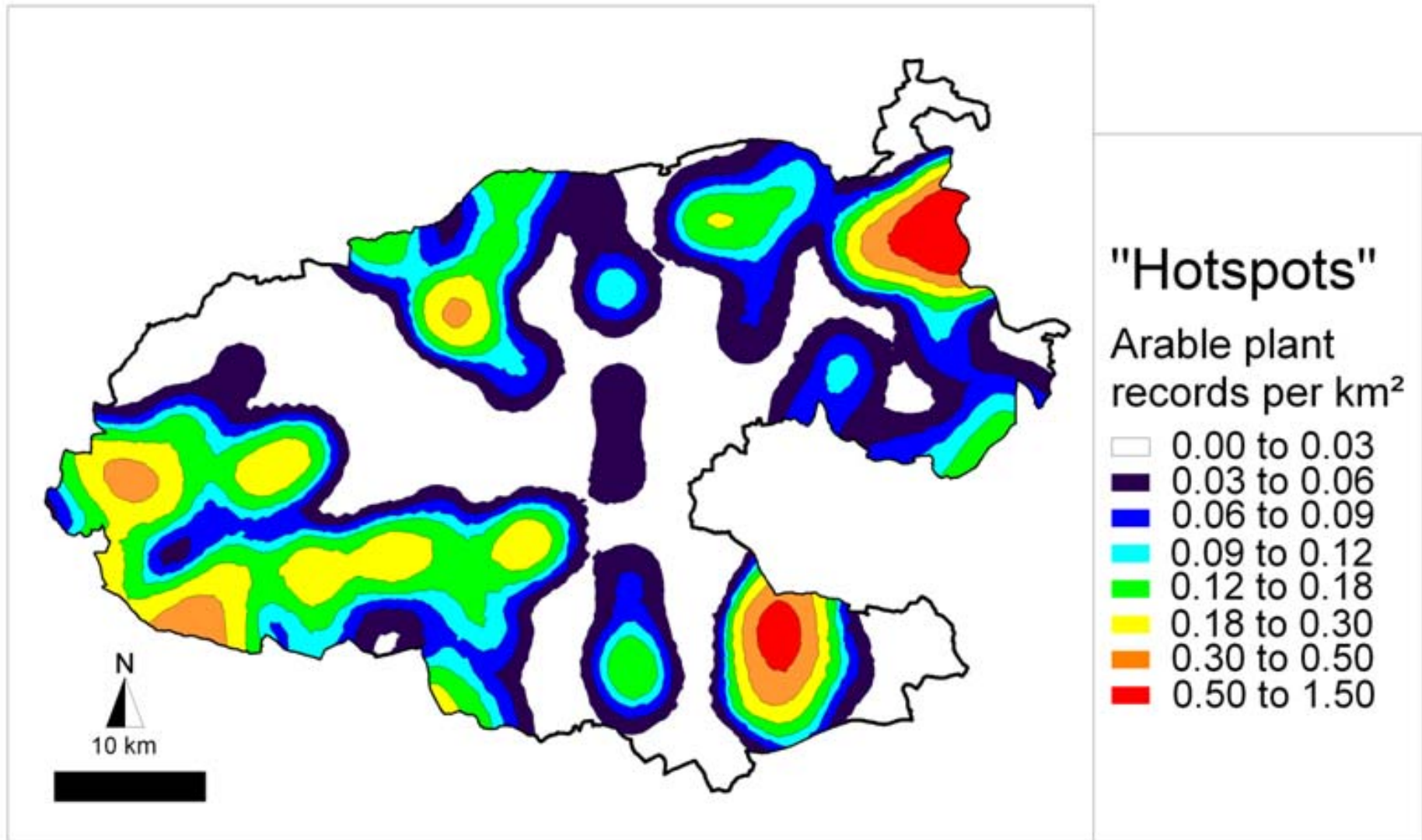


Figure 8. The “hotspots” distribution of arable bird occurrence within the North Wessex Downs.

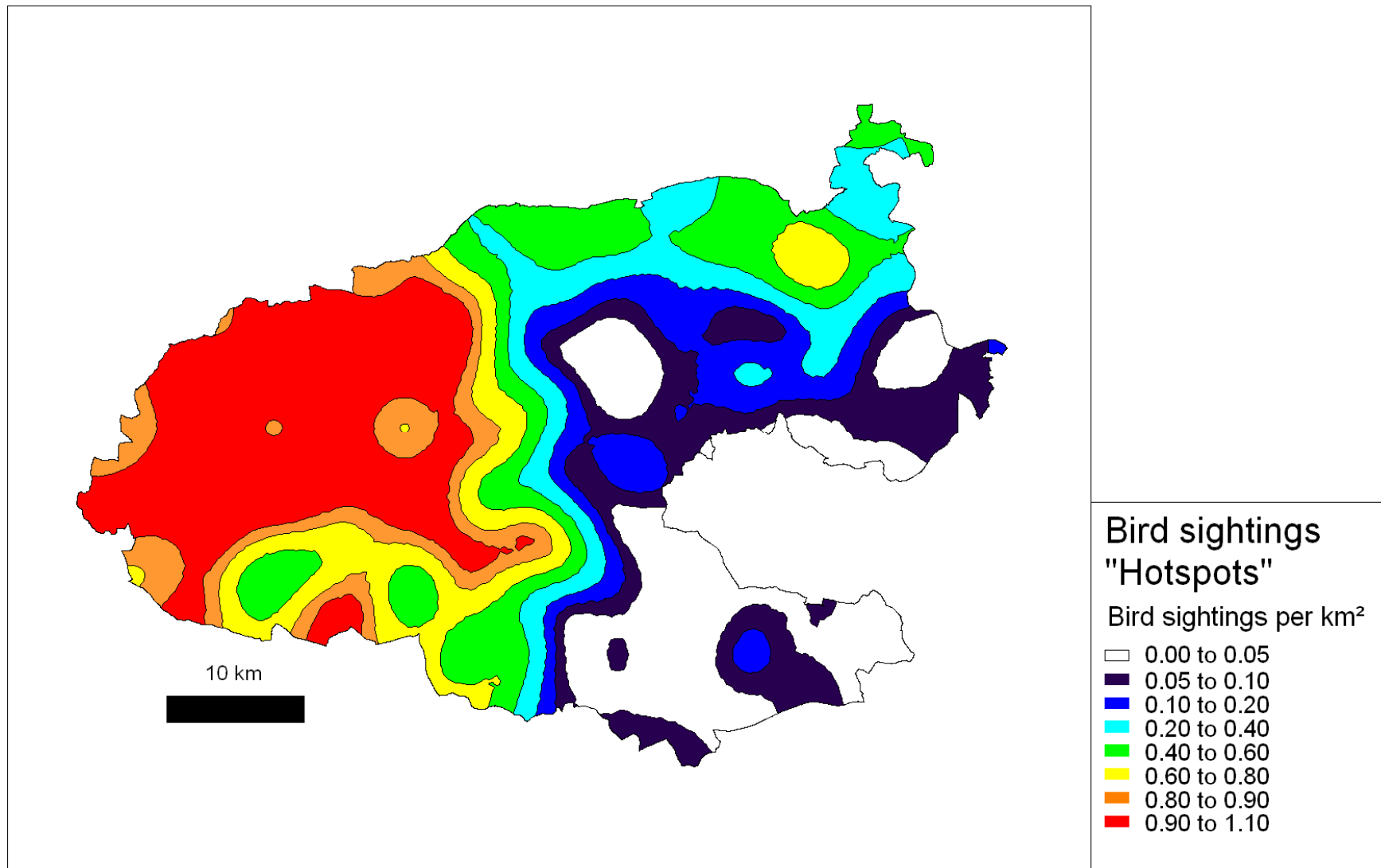


Figure 9. The “hotspots” distribution of arable mammal sightings within the North Wessex Downs.

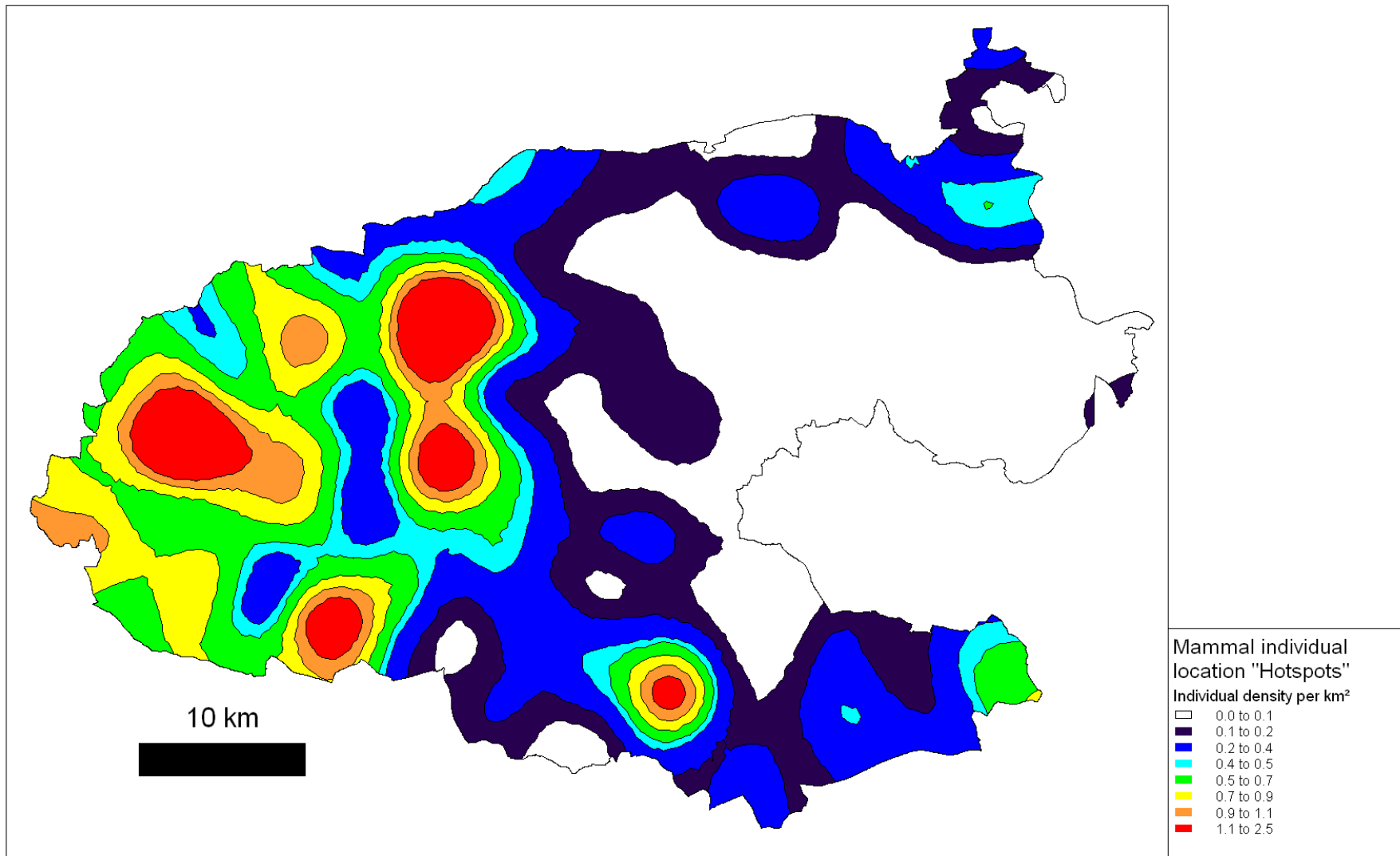


Figure 10. The “hotspot” distribution of number of rare arable plant species density within the North Wessex Downs.

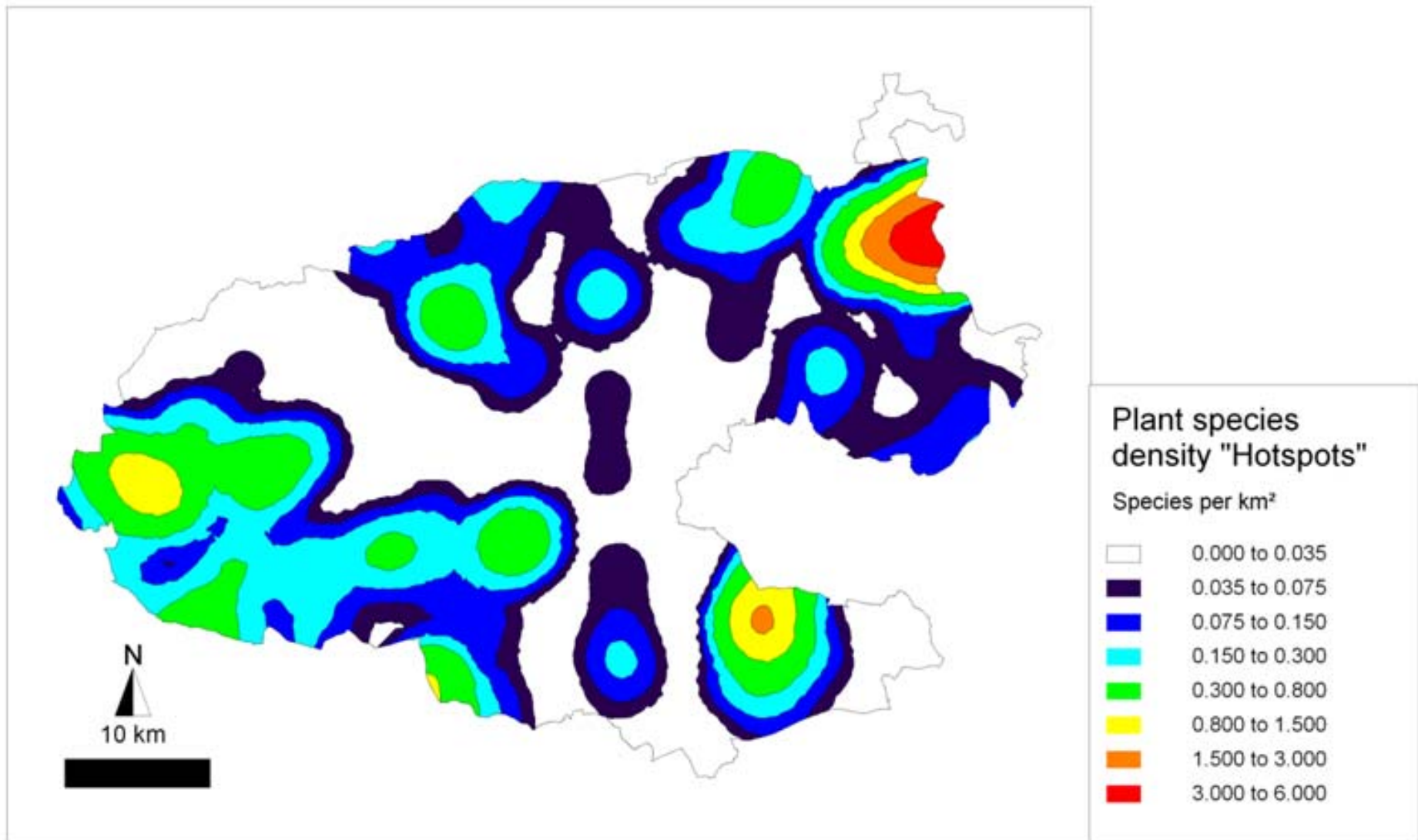
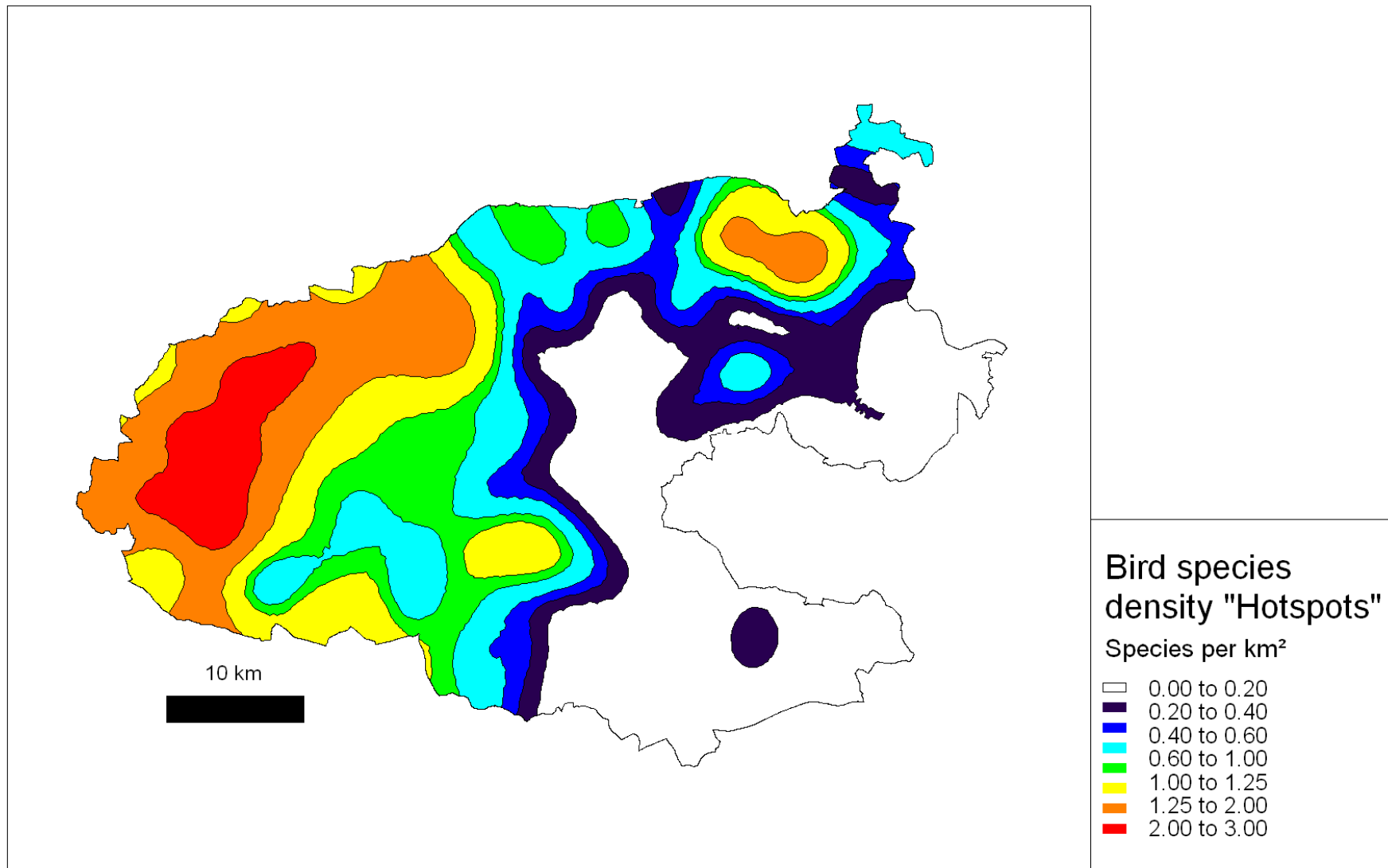


Figure 11. The “hotspots” distribution of arable bird species density within the North Wessex Downs.



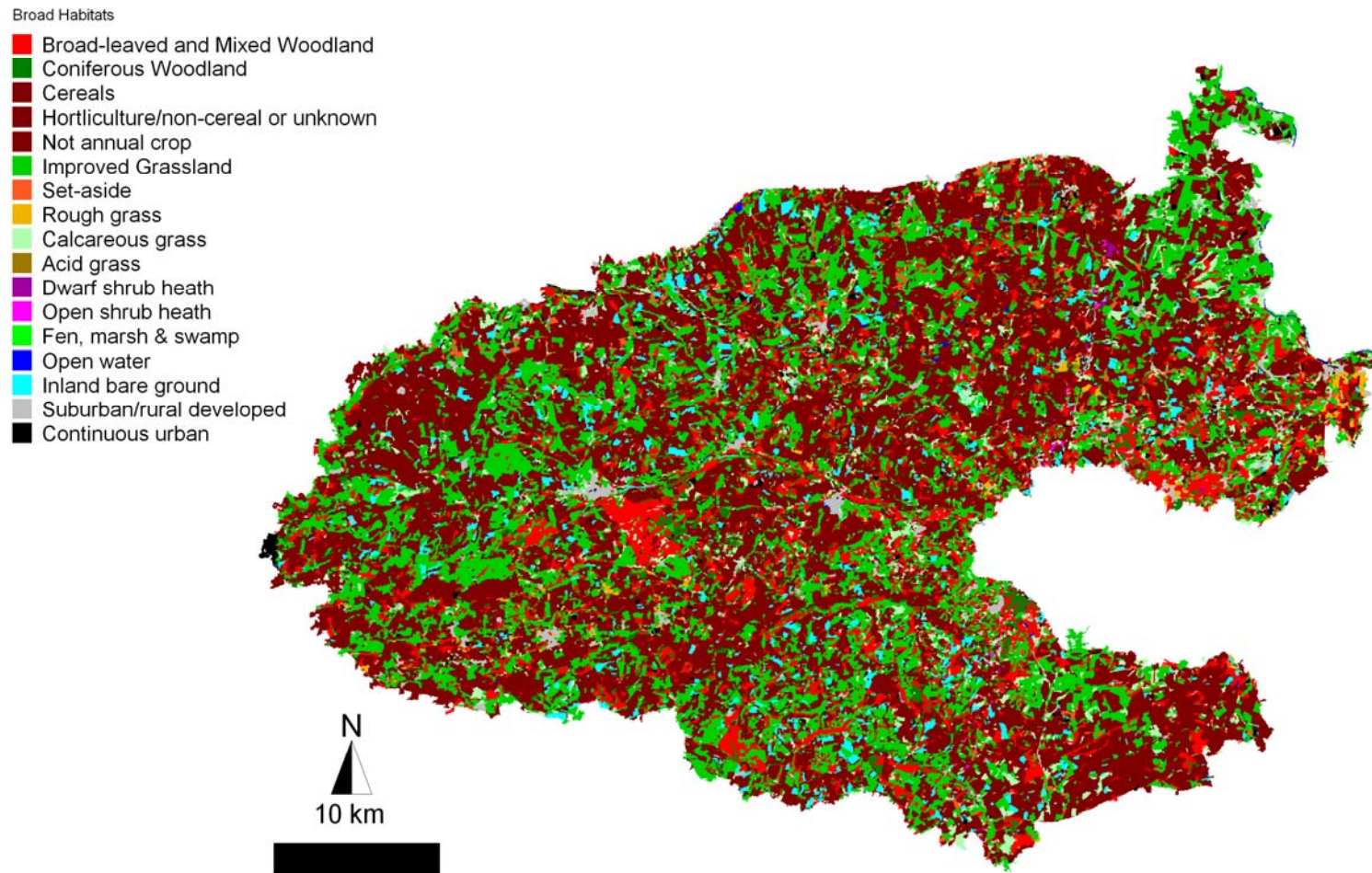
4.6 Habitat data used

The habitat data used for comparison with the plant, bird and mammal data included data on landcover, soils and a Digital Terrain Model (DTM) that included: elevation, aspect and slope.

4.6.1 Landcover data

The landcover dataset was from the 2000 Landcover Map of Great Britain (Fuller *et al.* 2002) and was provided by the NWD AONB for use solely for this project (Figure 12). This data was acquired from satellite passes from 1998 to 2001. We used the landcover data to remove any non-arable area (arable area = cereals, horticultural/non-cereal, non-annual crop or inland bare ground- possible plough) from the final target area.

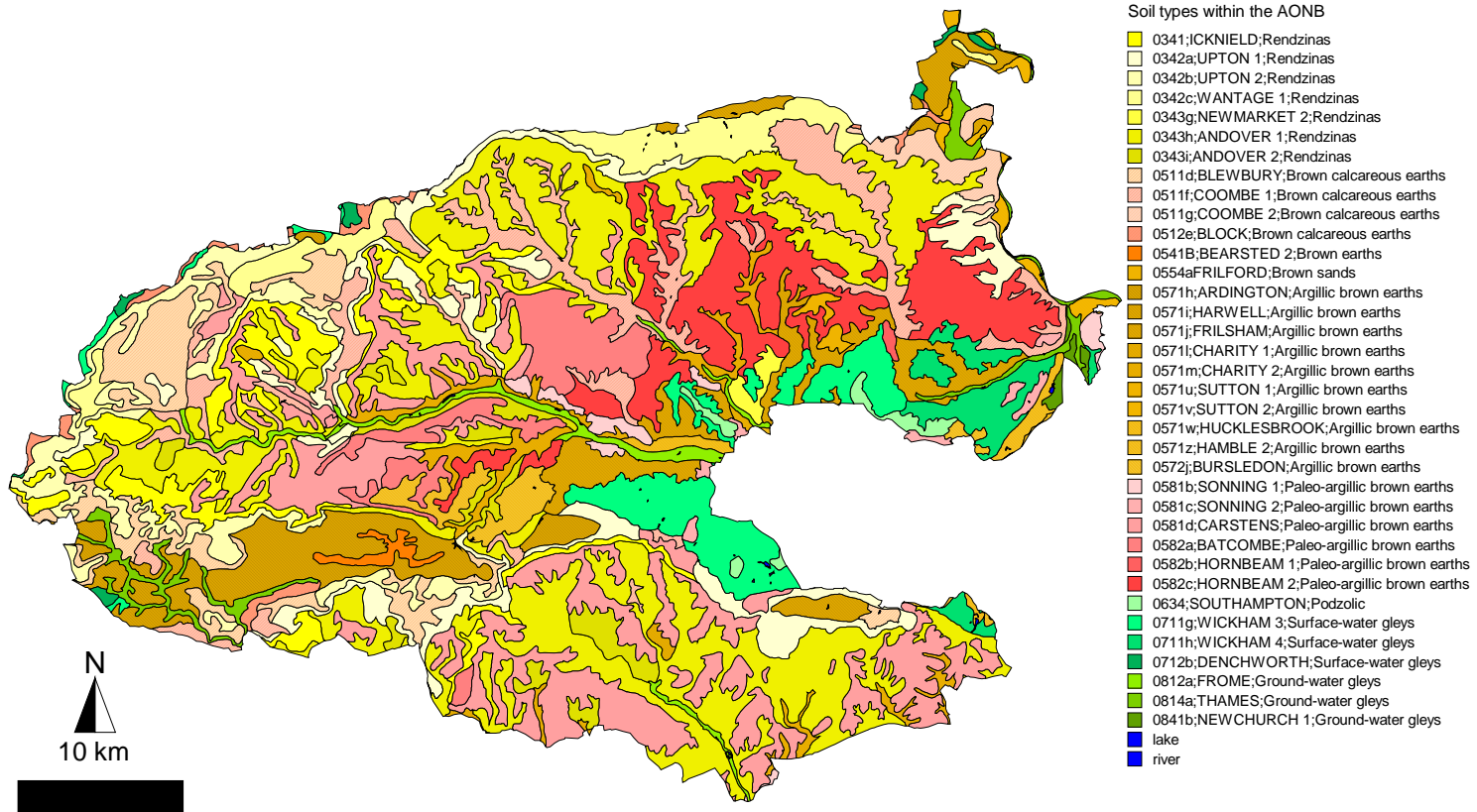
Figure 12. Landcover within the North Wessex Downs.



4.7 Soils data

Information on soil associations within the North Wessex Downs was provided through the use of the 1:250K scale National soil map (Copyright (c) Cranfield University, 2004) covering the area of the North Wessex Downs. This was provided through the North Wessex Downs for the use solely for this project (Figure 13).

Figure 13. Soils within the North Wessex Downs.



4.8 DTM: Elevation, aspect, slope

A Digital Terrain Model was calculated from data available through the Countryside Information System on a 1 km² basis abstracted from the OS 1:50,000 map for England and imported into the GIS as points. This data consists of an average elevation within a 1 km², the 10th percentile elevation within a 1 km² and the 90th percentile of the elevations within a 1 km². Digital terrain models (DTM) were constructed for each of these (mean elevation, 10th percentile, 90th percentile), with resulting maps for slope and aspect (Figure 14) and elevation (Figure 15).

Figure 14. Slope and aspect, from the DTM using the 10th percentile elevation data within the North Wessex Downs.

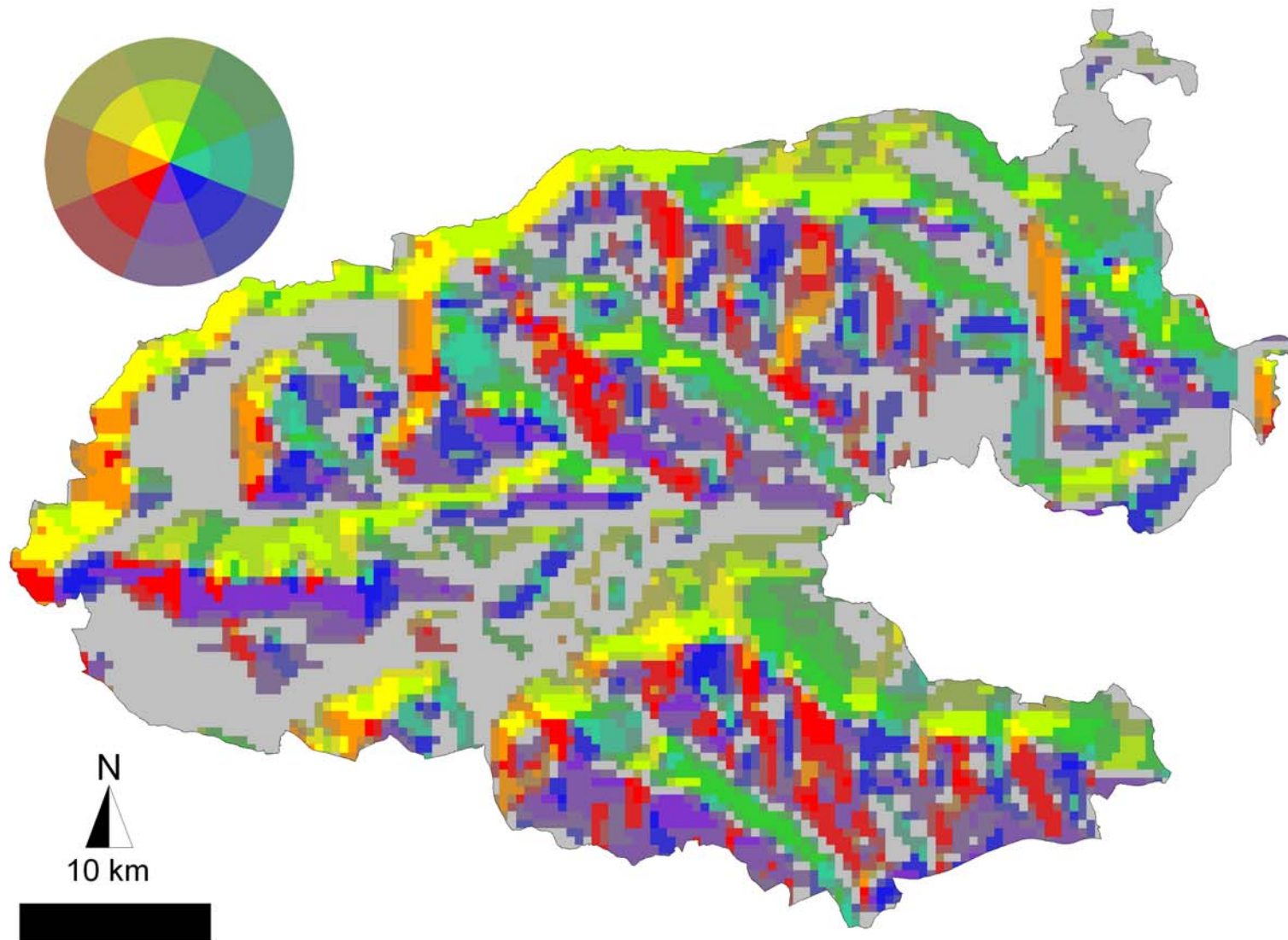
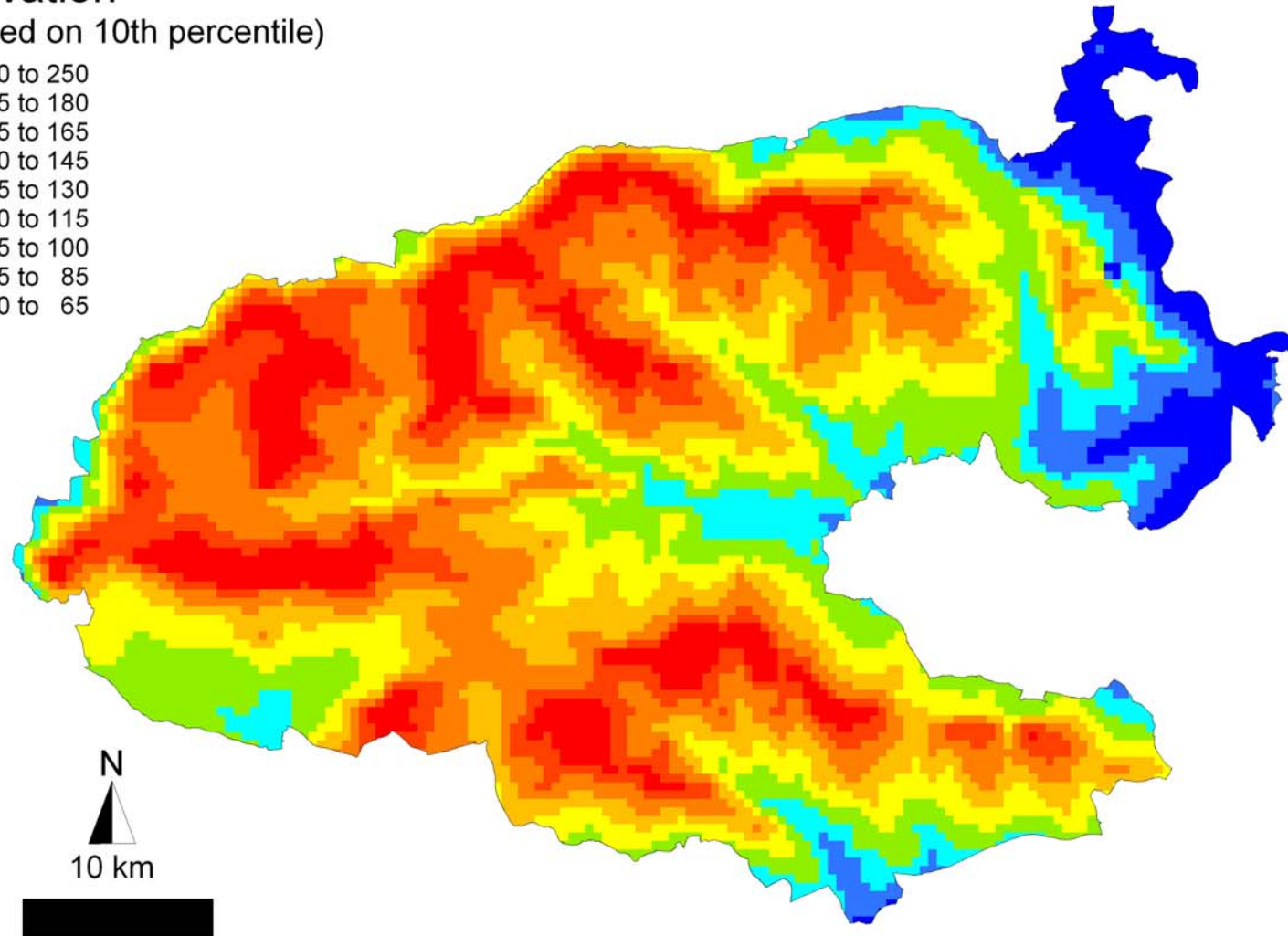
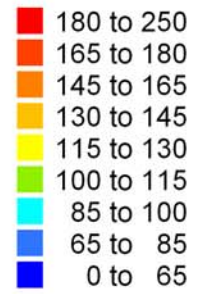


Figure 15. Elevation, from the DTM using the 10th percentile elevation data within the North Wessex Downs.

Elevation

(based on 10th percentile)



4.9 Historical landscape characters

After the selection of arable areas important for arable biodiversity, we processed this against the Historical Landscape Character (HLC) areas (Figure 16) for the North Wessex Downs, selecting polygons that overlaid our modelled area but which historically had been either arable or open land and whose type reflected the open arable landscape (Table 1, Figure 17). These were provided by English Heritage. It was felt this would give a better representation of the area to be targeted on the ground as a priority for the Arable Biodiversity Strategy, particularly for arable plants which are generally found on sites which have a long history of arable cultivation (Wilson, 1990).

Table 1. Historical landscape character area types that were selected for inclusion in the target area.

Selected HLC Groups	Selected HLC types	Excluded HLC types
enclosures and farming	19thC replanned fields amalgamated fields new field parliamentary enclosures post-parliamentary enclosures pre18thC irregular fields pre18thC regular fields pre18thC sinuous fields reorganised fields	assarted enclosure enclosed meadows gallops industrial farming concern market gardens orchards paddocks studs & stables
open land	downland	commons & greens marsh meadow

Figure 16. Historical landscape character areas, provided by English Heritage by the character area group to which they currently belong.

Historical landscape character areas

by Group

- Civic
- Communication
- Enclosures and farming
- Industrial and commercial
- Military
- Open land
- Other
- Parkland
- Recreation
- Settlement
- Water and water management
- Woodland

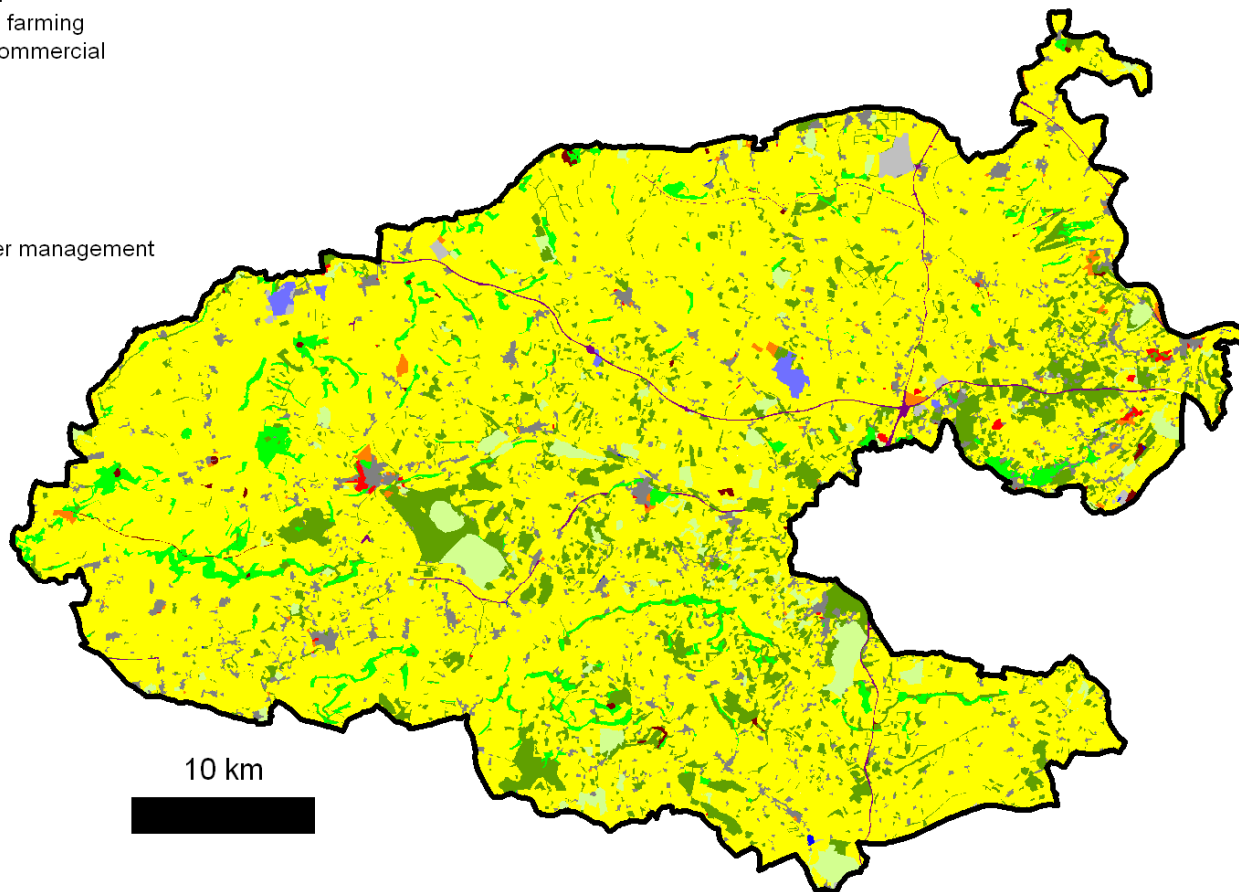


Figure 17. Historical character areas making up the historical arable areas of the North Wessex Downs.



4.10 Other maps used to facilitate comparison of records, occurrences and sightings with habitat data

4.10.1 *Random points*

Five thousand points randomly placed throughout the North Wessex Downs boundary (Figure 18) were used to overlay the combined 2km buffer data for plant, bird and mammal locations, as well as the habitat data (soil, elevation, aspect and slope) in order to identify which habitats were associated with a higher number of plant, bird and plant plus bird plus mammal species. We used forward stepwise Generalised Linear Models (GLM) (McCullach & Searle 2001) with a poisson error and logarithmic link function, to select those habitats (soils, elevation, aspect, slope) associated with higher numbers of plant, bird and a combination of plant, bird and mammal species for random points overlaid onto the original combined species buffers.

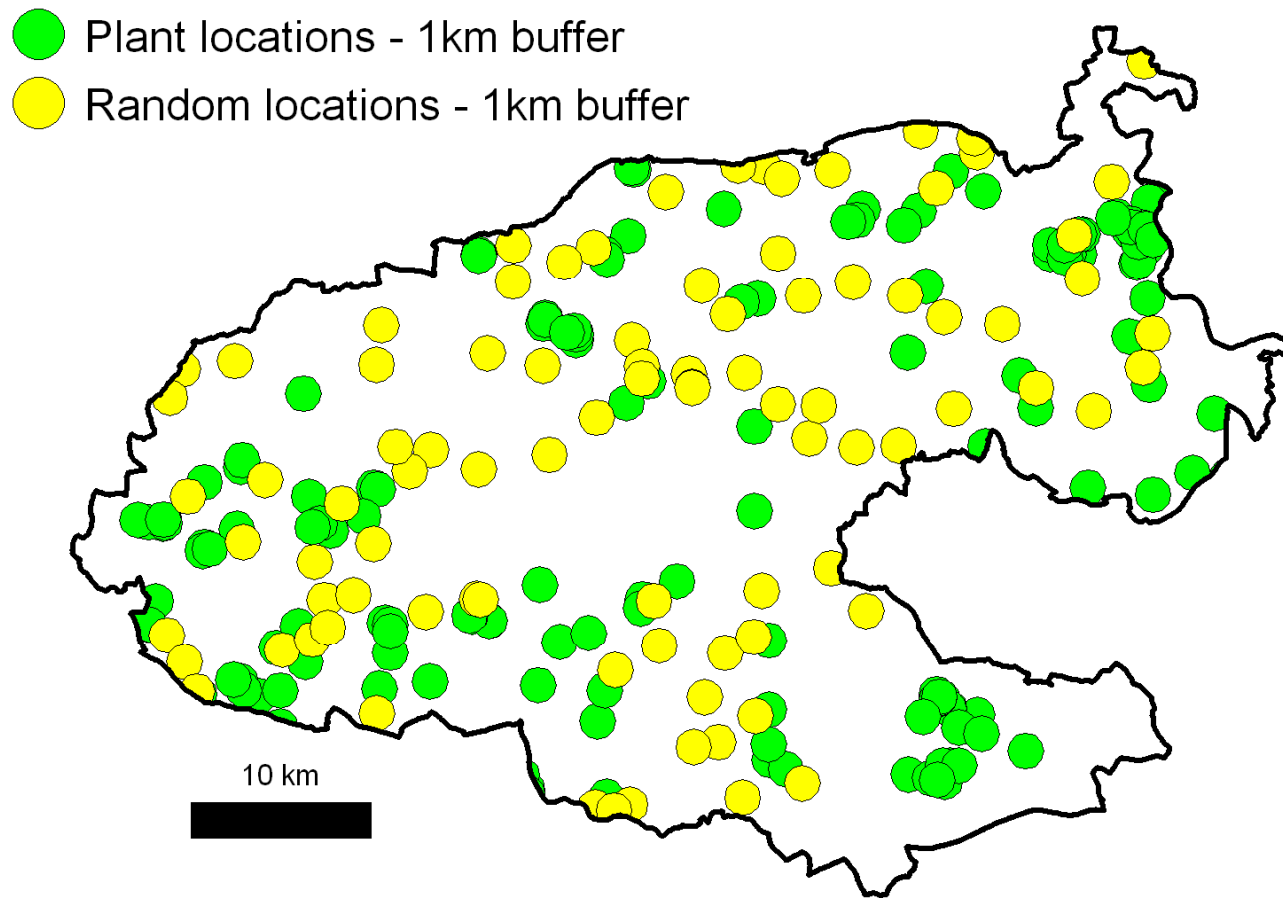
Figure 18. Random points (n=5000) to compare with 2km buffers of plant, bird and mammal locations.



4.10.2 *Random buffers*

One & 2 km buffers randomly placed throughout the North Wessex Downs boundary (Figure 19) were used to randomly “sample” the habitats within the North Wessex Downs to compare to habitats within individual 1 & 2km buffers of plant, bird and mammal observations, in order to identify habitats found more than would be expected by chance around the arable flora and fauna observations. We used a series of t-tests to examine the difference in habitats between the random 1km buffers and 1km buffers around individual plant, bird and mammal.

Figure 19. Randomly placed 1km buffers to compare with 1km buffers around plant observations. Separate random buffers were constructed for comparison with bird and mammal locations.



4.11 Comparing final Arable Biodiversity Strategy target area to flora and fauna records

After the construction of the final target area, we used chi-square analysis to compare the occurrence of each group and individual species within/without the target to the proportion of the North Wessex Downs covered by the target area. We also used Generalised Linear Models with a poisson error and logarithmic link function to examine the density of plant or bird species within/without the target area. All GLM and t-tests were undertaken in Genstat 10.2 (Lawes Agricultural Trust).

5 RESULTS

In general, arable biodiversity tends to be very under-recorded, particularly arable plants. Additional evidence suggests that mammals, particularly Harvest mouse, are poorly recorded across the North Wessex Downs, as are farmland birds in certain parts of the North Wessex Downs. In developing target areas it was important that this lack of recording was taken account of. In order to do this we needed to extrapolate from the places that were identified as important for either birds, plants or mammals “hotspots” to other areas of the North Wessex Downs where the conditions were such (soil, elevation, aspect, slope) that there were likely to be one or the other of these groups present, but where surveys had not been undertaken to confirm presence. This approach would also identify potential areas to target efforts towards expanding information on arable species populations, *i.e.* where to survey.

5.1 Target production: identifying habitats associated with higher biodiversity.

Two different methods were used to identify habitats that were associated with a higher number of the selected arable species. One method was based on using combined 2 km buffers as per the original farmland bird dataset with which we were provided, the other one used individual 1 km and 2 km buffers as per the farmland bird dataset we were provided with secondarily,

5.1.1 Target production based on combined 2km buffers

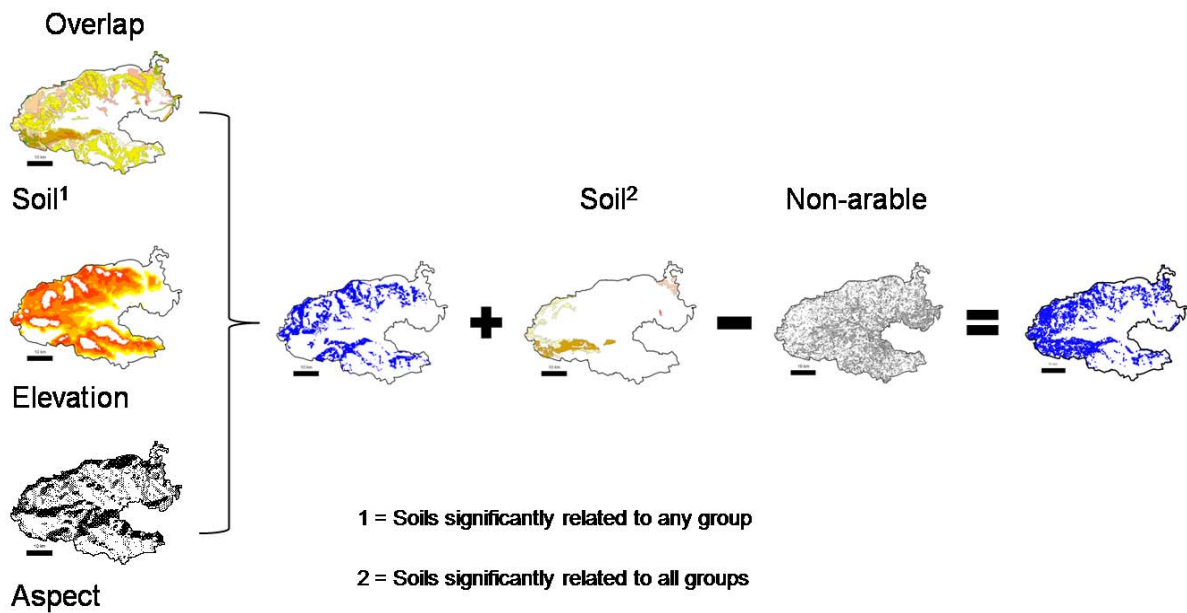
We constructed combined 2km buffers for plant and mammal species, similar to those originally supplied for the bird species. We then overlaid all the 2km buffers with 5000 random points, collating what species buffer each point overlaid, as well

as the soil type, elevation, aspect and slope at each point. We identified which soils, elevation and aspects were associated with higher numbers of species of plants and birds, as well as all species from all groups in these points (Table 2). We included in this target all types of soil, elevation and the aspects found to be significantly ($P < 0.05$) associated with these and overlaid them, including only the area where they all coincided. Then, we added in all soils types that were significantly associated with plants, birds and the combination of all groups –to better represent soils in the target, as the selected elevation and aspects coincided to a greater degree than did the selected soils. Lastly we removed all the non-arable area identified through the landuse map (Figure 20).

Table 2. The selected habitats included in the target based on combined 2km buffers.

Construction	Habitat	Levels of habitats included in model
Overlapped	Soils	Humic rendzinas (ICKNIELD), Grey rendzinas (UPTON 1 & 2), Brown rendzinas (ANDOVER 1), Typical brown calcareous earths (BLEWBURY, COOMBE 1 &2), Gleyic brown calcareous earths (BLOCK), Typical brown earths (BEARSTED 2), Gleyic argillic brown sands (FRILFORD), Typical argillic brown earths (ARDINGTON, CHARITY 1, SUTTON 1 & 2, HAMBLE 2), Stagnogleyic paleo-argillic brown earths (HORNBEAM 1), Pelo-stagnogley soils (DENCHWORTH), Pelo-calcareous alluvial gley soils (THAMES)
	Elevation	140 – 220 m
	Aspect	North, Northeast, East, Eastsouth, Southeast, West, Westnorth, Northwest
Added to overlap	Soil	Grey rendzinas (UPTON 2), Typical brown calcareous earths (COOMBE 2), Typical argillic brown earths (ARDINGTON) Stagnogleyic paleo-argillic brown earths (HORNBEAM 1)

Figure 20. Construction of target using combined 2km buffers.



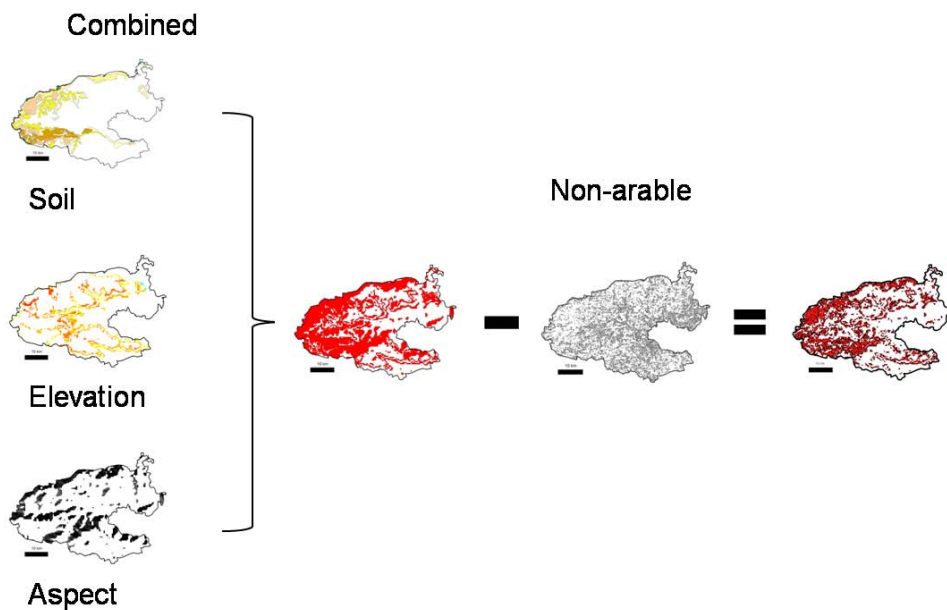
5.1.2 Target production based on individual 1 & 2km buffers

We constructed individual 1 & 2 km buffers around all observation points and also constructed random buffers of the same size in order to compare the habitats found within the buffers around observations to those placed at random throughout the North Wessex Downs. We selected those habitats which were significantly ($P < 0.05$) more likely to be within these buffers (soil & aspect) or where the mean within the observation buffers was significantly different to that from the random buffers (using the 95% confidence intervals to select a range of values). We combined these selected habitats (Table 3) to produce a combined model and then removed all the non-arable area identified through the landuse map (Figure 21).

Table 3. The selected habitats included in the target based on individual 1 & 2km buffers.

Construction	Habitat	Levels of habitats included in model
Combined	Soils	Humic rendzinas (ICKNIELD), Grey rendzinas (UPTON 1 & 2, WANTAGE 1), Typical brown calcareous earths (BLEWBURY), Gleyic brown calcareous earths (BLOCK), Typical argillic brown earths (ARDINGTON), Pello-stagnogley soils (DENCHWORTH)
	Elevation	90-175 m
	Aspect	North, West, Westnorth, Northwest

Figure 21. Construction of target using individual 1 & 2km buffers.

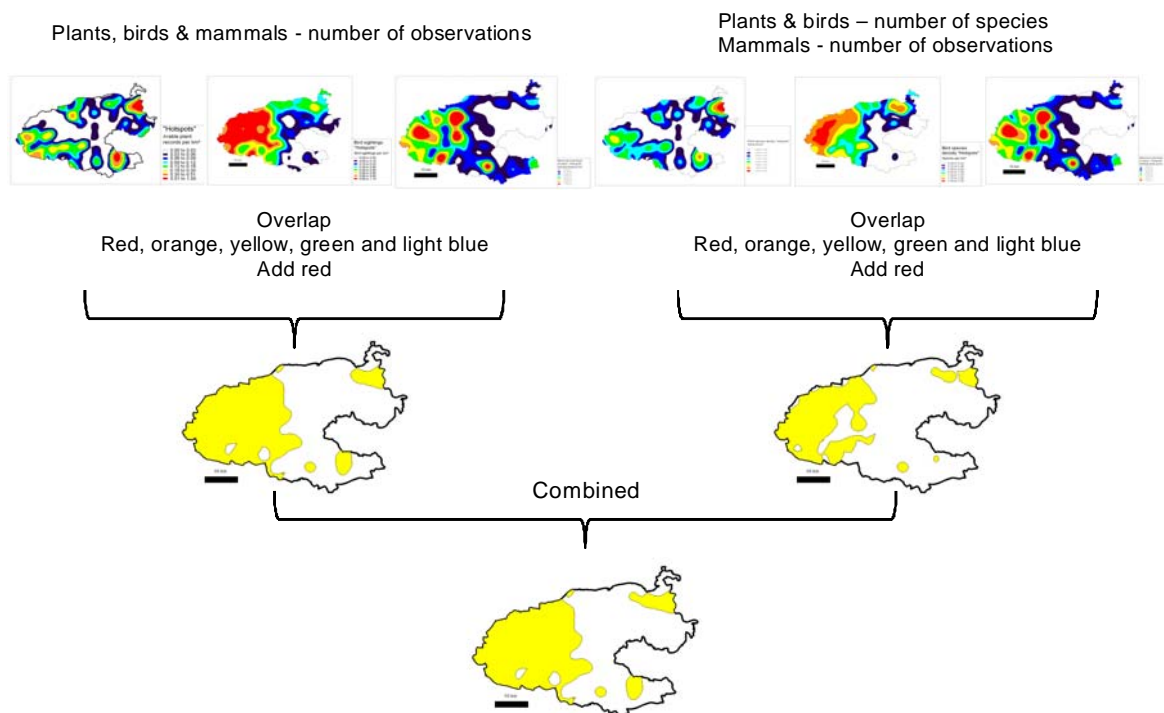


5.1.3 Target production based on hotspots

“Hotspot” mapping (Figures 7-11) was used to identify areas of the North Wessex Downs where there was “currently” either a high density of plant, bird or mammal observations or a high density of plant or bird species. (The manner of data collection for mammals – raw sightings – meant that only the density of observations could be constructed for this group.) We overlaid the ‘hotspot’ maps (Figures 7-11). We undertook this for both those ‘hotspots’ based on the number of observations of any of the species and ‘hotspots’ revealing areas of high and low species density.

We combined all mapped areas that were identified as being of ‘high value’. *i.e.* light blue, green, yellow, orange, and red for each group. The ‘high value’ areas for each group (plants, birds and mammals) were then overlaid and only areas covered by all three were selected. In order to include areas where perhaps only one group was highly represented we added in any areas covered by red contours that were not in this ‘high value’ area. The ‘high value’ areas based on either number of observations or number of species were combined to arrive at a combined hotspot target (Figure 22).

Figure 22. Identification of arable flora and fauna “hotspot” target.



5.1.4 Comparison to historical character areas

We used a combination of the three targets (two based on defining habitats associated with high numbers of observations of arable flora & fauna and one based on current “hotspots” of this flora & fauna) to select (Figure 23) historical character

areas which had been part of the open arable landscape (Table 1). Those arable historical character areas which are currently dominated by improved grassland (identified through the landuse map) were removed, resulting in a final Arable Biodiversity Strategy Target Area (Figure 24) comprising 33% of the North Wessex Downs area, which represents both the known distribution of important arable flora and fauna (pink in Figure 24) or where it is likely that these flora and fauna can be found but where little information currently exists on their distribution (blue in Figure 24).

Figure 23. Production of final Arable Biodiversity Strategy target area.

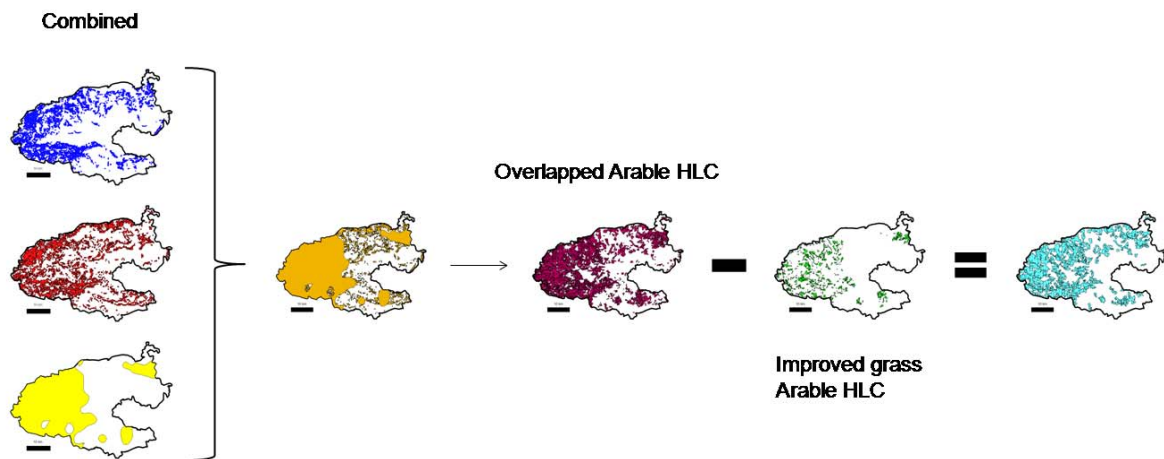
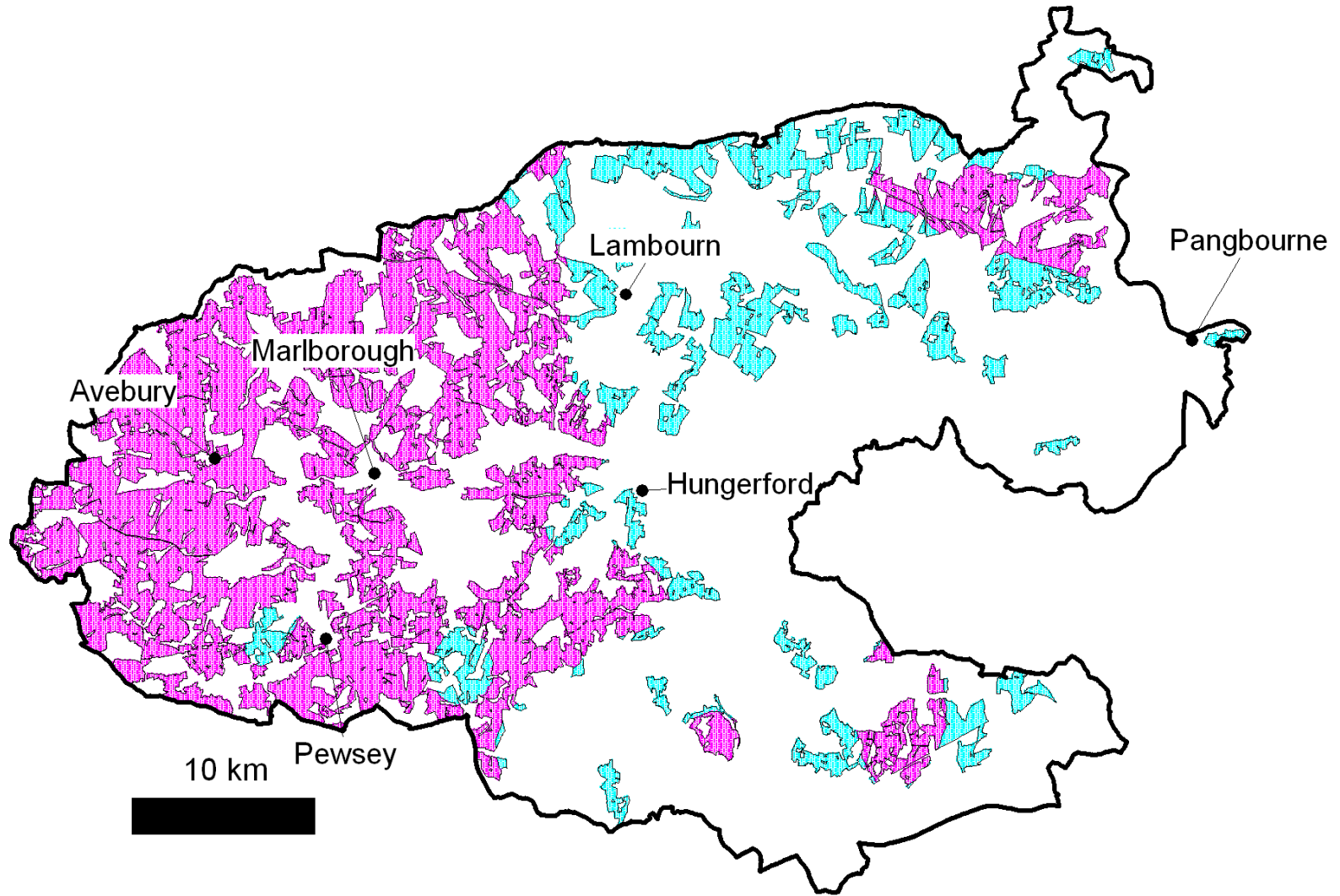


Figure 24. Arable Biodiversity Strategy target area showing where the target overlies the known hotspots of arable biodiversity (pink) and the areas that are likely to be important for arable biodiversity and there is need for survey work to be done (blue).



5.2 Arable Biodiversity Strategy target vs. plant, bird & mammal locations

We compared the number of plant, bird and mammal observation points to the 33% expected if the target area was a random selection of the North Wessex Downs area. We found, unsurprisingly, that the number of observations of all three groups (plants – Chi-square₁ = 8.26, P = 0.004, birds – Chi-square₁ = 96.99, P < 0.001 and mammals – Chi-square₁ = 66.08, P < 0.001) was higher within the target area than was expected by chance. We also compared the number of plant and bird species at each observation point within and without the target area. For plants there was no difference between the number of species in the observation points within the target area versus outwith the target area ($F_{1,149} = 0.01$, P = 0.911) while for birds there were more species found in those observation points within the target area versus outwith the target area ($F_{1,965} = 49.01$, P < 0.001). The occurrence of individual species within the target area was compared to the 33% expected if the target area was a random selection of the North Wessex Downs area (Appendix, Table 2a-c). In general the target area was better at predicting the occurrence of the better-surveyed bird species and Brown hare than it was for arable plants. In particular this highlights the need to better survey arable plants; one way forward is to use this Arable Biodiversity Strategy target area to plan comprehensive arable plant surveys across the AONB.

6 CONSTRAINTS

6.1 Lack of data

- There are a number of issues which cause arable species to be under-recorded – almost all arable farmland is under private ownership which can make getting permission to survey difficult; it is a very extensive habitat (arable cultivation covers over 60% of the North Wessex Downs); large areas may not support much biodiversity which puts many volunteer groups off surveying. This lack of records is particularly prevalent for Harvest mouse and all arable plants.
- Arable plants are a nationally under-recorded group because of the additional complication that they may not appear every year, i.e. seeds in the soil bank may only germinate and grow when conditions are suitable, and this will depend on crop management. The lack of available records (species with only 1-4 records each, Appendix) is probably a major reason for the poor performance of the model for some arable plant species.
- Whilst recording coverage for farmland birds is better, there are still difficulties in terms of the quality of the data and possible gaps, whilst some data will soon be considered out-of-date.
- One constraint highlighted by farmers and landowners attending the stakeholder meetings was there was often a lack of feedback following surveys on their farms. This encouraged a negative view on allowing surveyors access to farms.

6.2 Integration of Advice

- The first stakeholder meeting highlighted the demand for more integrated advice. This is particularly important in an AONB where there are a multitude of interests, hence its designation as nationally important landscape.
- Many farmers felt that they were being approached by many specialist advisers who offered different, sometimes conflicting advice. This could cause confusion leading to a lack of action following such advice.
- Equally many farmers felt that it was not easy to identify who to approach and where to go when specialist advice was required.

6.3 Lack of Management Support

- Difficulties in managing some arable habitats, particularly within the confines of agri-environment scheme prescriptions, was identified as a major barrier to arable conservation and uptake of these options under ES.
- There is a perceived lack of continued management support during agri-environment scheme agreements, leading to options such as wild bird seed mixes failing to deliver their maximum potential due to poor management.
- Within local farming communities management problems such as weed infestations in specific arable options (e.g. cultivated margins) soon gives the options a negative image, dissuading others from undertaking them.
- Equally farmers need to be encouraged to manage their conservation areas as well as their commercial crops. Often, areas such as wildlife seed mixtures are neglected.

6.4 Farming Economics & Policy

Arable farming is under enormous change following the reform of the Common Agricultural Policy, introduction of the Single Payment Scheme and cross compliance. Intervention prices, export subsidies and direct production support have decreased. Decreasing subsidies mean a greater dependence upon trade and sensitivity to market prices and exchange rates. The high level of mechanisation in arable farming also makes it vulnerable to increasing oil prices. Potential volatility in markets and production costs make the direction of arable farming within the AONB difficult to predict.

Other policy changes such as zero percent set-aside, the increased demand for biofuels, and more recently concerns over food security have had, and will continue to have, an impact on arable farming as a business and habitat.

6.4.2 Loss of set-aside

There are concerns that the environmental benefits of set-aside may be lost with the loss of large areas of uncropped land returning to cultivation as a result of the zero rate. Equally, valuable over-wintered stubbles will be lost with the loss of rotational set-aside.

In response to concerns over the loss of setaside Defra is monitoring the effect of the zero per cent set-aside rate. Additionally, in 2009 Defra announced the acceptance of an NFU and CLA proposal for an industry-led approach to retain the environmental benefits formerly provided by set-aside. This proposal has been entitled the 'Campaign for the Farmed Environment'. For more details of the Campaign see section 9.3.3

Set-aside

Set-aside was a policy tool introduced by the EU in 1988 to help deal with surpluses and to control the supply of cereals, requiring farmers to leave a proportion of their land out of production.

In 2007 the EU set the obligatory set-aside rate at zero percent in response to the supply-side shortage on the cereals market.

Before the decision to reduce the rate to zero, a total of 395,500 hectares, or 8.1% of England's arable area, was kept out of production in 2007.

The EU suggested that a zero set-aside rate could encourage farmers to produce between 10 and 17 million tonnes of cereals, in addition to the expected 2008 harvest. DEFRA's Farm Business Survey (FBS) indicated that the non-rotational set-aside area was expected to fall by 35%, while the rotational area by 85%.

6.5 Climate Change

Climate change will have a major impact on arable farmland in the North Wessex Downs. Climate change may affect the types and varieties of crops that can be grown with implications for sowing dates, irrigation, pests, diseases and soil erosion. Such changes, including crop types grown, could have a significant impact on arable biodiversity. Intense rainfall in winter may cause increased soil erosion which could subsequently have a significant impact on water quality and freshwater biodiversity. There will be a need to adapt to the effects of changing climatic conditions. Equally, agriculture may also provide wider opportunities to address climate change issues creating a need to manage mitigation efforts.

Kyoto Agreement

In 2005, the 1997 Kyoto Protocol to control climate change became international law.

Industrialised nations who signed up to the treaty are legally bound to reduce worldwide emissions of greenhouse gases by an average of 5.2% below their 1990 levels by the period 2008-2012.

6.5.1 Energy Crops

Energy crops are used as a substitute for fossil fuels, so they can contribute to a reduction in greenhouse gas emissions and help to combat climate change. However, some crops, such as miscanthus and short rotation coppice, are likely to have a long-term negative effect on arable flora and birds due to enclosure of open space and lack annual cultivation. With its proximity to Didcot, the North Wessex Downs could potentially be a target area for energy crops. Funding is available from Natural England for the establishment of miscanthus and Short Rotation Coppice.

For more information:

<http://www.naturalengland.org.uk/ourwork/farming/funding/ecs>

6.5.2 Biofuels

Biofuels are derived from crop plants such as wheat, oilseed rape and sugarcane, grown specifically for the production of bioethanol and biodiesel. These products are then typically blended with conventional fuels. The production of biofuels also presents a range of risks and opportunities for arable biodiversity. This includes the biodiversity value of the biofuel crop itself which will depend greatly on how the crop is managed. While some bioenergy crops are conventional arable crops, such as oilseed rape, that are already grown in the UK, others are not, and so the effects may be unknown. The growing of these crops also takes up land which would

otherwise be used to grow food crops causing a reduction in food availability in some parts of the world and increases in price.

Biofuels

In the UK the government has set a target of 5% of all fuel sales to be biofuels by 2010 – an increase of 20 times on present levels while the US government wants to cut reliance on oil by 20% by 2017, mainly through a 500% increase in the use of renewable fuels.

At a basic level they could be considered carbon-neutral and renewable, however, there are concerns relating to the environmental, social and economic impacts of different biofuels.

6.5.3 Food production

Food production will need to double by 2050 so it is important that the strategy sets the increasing need for sustainable food production within its context. Further food security has been highlighted as a potential issue with concerns over the UK's self-sufficiency ratio of domestic consumption to production, which has declined over the last decade, and potential disruption caused by factors such as global warming, international energy concerns and geopolitical tensions. In order to achieve increased food production whilst also providing habitat for farmland wildlife there will need to be a maximisation in efficiency on both cropped land as well as areas managed for biodiversity. The Strategy will help achieve this by improving targeting and informing appropriate management approaches.

7 TARGETS AND ACTIONS

The following targets and actions have been suggested in order to deliver improvements to arable biodiversity within the North Wessex Downs. They are designed to address the major constraints and also to take advantage of opportunities as identified by stakeholders and as part of the process of developing the target area models.

	Target	Actions	Suggested lead organisations	Comments
1	Promote an integrated approach to advisory services	<ol style="list-style-type: none"> 1. Identify any gaps in advice provision. 2. Ensure that all farm advisers are aware of the AONB's broad objectives and that specialist advice does not impinge on these objectives. 	AONB	Feedback from stakeholders has highlighted the need for more integrated advice.
2	Actively engage the support of landowners and managers in implementing the strategy	<ol style="list-style-type: none"> 1. Identify pattern of land ownership within target areas 2. Identify existing farmer groups through which awareness and involvement with the Strategy could be gained. 3. Encourage farmers to work together to create suitable arable habitats on a landscape scale. 	Coordinated by AONB, supporting NE Farmland Bird Initiative and other local/regional initiatives	Arable cropping is central to the North Wessex Downs's agricultural industry. Without the support of farmers and landowners, delivery of the Strategy will be impossible
3	Provide farmers and land managers within the target area with specialist support and advice for management of arable habitats	<ol style="list-style-type: none"> 1. Ensure that specialist advice on arable habitat management is available across the North Wessex Downs. 2. Encourage Natural England to provide continued management support throughout Environmental Stewardship agreements. 3. Develop a series of demonstration plots and demonstration farms providing practical display of arable habitat measures and best practice management of agri-environment options. 	Coordinated by AONB, supporting NE Farmland Bird Initiative and other local/regional initiatives	Difficulties in managing some arable habitats, particularly within the confines of agri-environment scheme prescriptions, were identified as a major barrier to arable conservation and to the uptake of these options under Environmental Stewardship

		4. Provide habitat management advice to farm advisers, including agronomists.		
4	Assist landowners and managers to access funding for arable conservation	<p>1. Input into the HLS / ES payment review process being lead by NE on behalf of Defra to ensure accurate data to influence payment review and incentivise payments uptake.</p> <p>2. Where classic scheme agreements have a number of years to run, promote the addition of appropriate arable options.</p> <p>3. Where classic scheme agreements are finishing, support farmers in identifying opportunities under ES to create arable habitats.</p> <p>4. Use farmer-led groups to access LEADER and SDF funding.</p> <p>5. Encourage Natural England to adopt the findings of the Arable Biodiversity Strategy and adopt the opportunity mapping to inform prioritisation of Environmental Stewardship.</p> <p>6. Encourage farmers to work together to develop larger area-based bids for funding for arable conservation and habitat management.</p>	AONB and NE	Many of the opportunities for enhancing the arable habitat for wildlife could involve taking land out of production or altering crop management. Financial support is therefore vital to encourage conservation farming practices and land management
5	Fill in gaps in available data	<p>1. Use the Strategy model to target surveys for arable biodiversity.</p> <p>2. Encourage co-ordinated recording throughout the North Wessex Downs.</p> <p>3. Encourage local volunteer-based recording groups that already cover the North Wessex Downs to survey for arable species.</p>	AONB and Local Biological Records Centres	A major barrier to identifying the distribution of arable biodiversity is the lack of species records available.

		<p>4. Encourage an exchange of information between Natural England, farm advisors and Biological Records Centres.</p> <p>5. Identify and promote existing recording schemes.</p> <p>6. Ensure that information on the distribution of arable species is easily available.</p>		
6	Ensure that energy crop and biofuel crop production does not damage areas important for arable biodiversity	<p>1. Support research into the effects of these crops on arable biodiversity</p> <p>2. Develop guidance on the management and planning of energy crops and biofuels</p>	NE	The impact of many new energy crops on arable biodiversity is not currently fully understood. Crops such as miscanthus, are likely to have a negative impact on arable biodiversity due to enclosure of open landscapes and lack of annual cultivation.

8 BROADENING THE ISSUES – HOLISTIC LAND MANAGEMENT

Whilst the focus of the Strategy is arable biodiversity it is important that account is taken of the many other issues and factors which relate to arable farmland within the AONB.

Following the first steering group meeting and the initial stakeholder meeting a number of other factors were identified.

8.1 Archaeology

Objective F - Ensure that arable cultivation does not conflict with the long term survival of archaeological monuments

The North Wessex Downs is internationally important for the archaeological features it contains. This includes the World Heritage Site at Avebury as well as a number of Iron Age enclosures, bronze age round barrows, and large earthworks such as the Wansdyke. Many of these are designated as Scheduled Monuments.

Arable cultivation can damage archaeological remains by levelling out earthworks, by cutting through and churning up below-ground remains, and by eroding protective layers of soil.

8.1.1 Legislation: Scheduled Monuments

These are nationally important sites protected by law from damaging works.

Scheduling is the only legal designation specifically available for archaeological sites, though they are also protected via the planning system. The key current legislation is the Ancient Monuments and Archaeological Areas Act 1979.

When the current Ancient Monument Act was passed in 1979 it introduced a requirement to seek consent for works to scheduled monuments, in order to prevent or mitigate damaging activities. One exception to this was the Class Consent 1 arrangement, which effectively permits continued unlicensed cultivation of scheduled monuments.

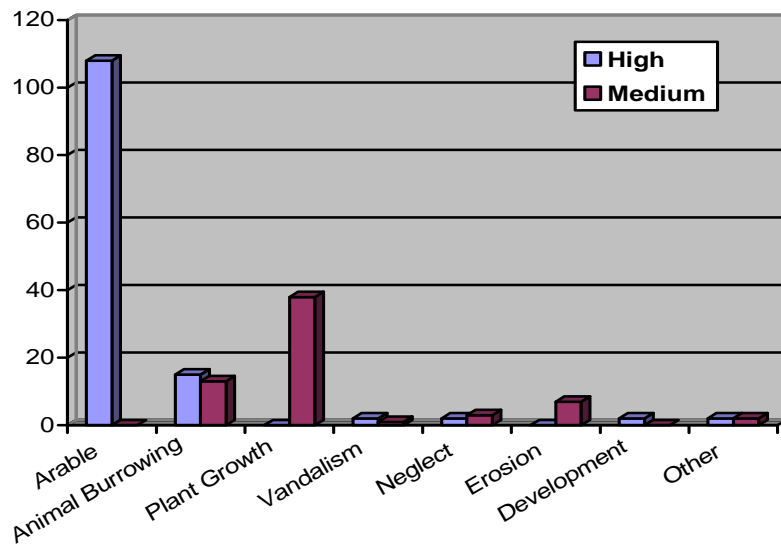
A useful report for land managers with Scheduled monuments is *Scheduled Monuments: A guide for owners and occupiers*, English Heritage, 2004. This can be downloaded from www.english-heritage.org.uk

The locations of scheduled monuments can be checked on the Multi-Agency Geographic Information for the Countryside website at www.magic.gov.uk

8.1.2 Scheduled Monuments at Risk

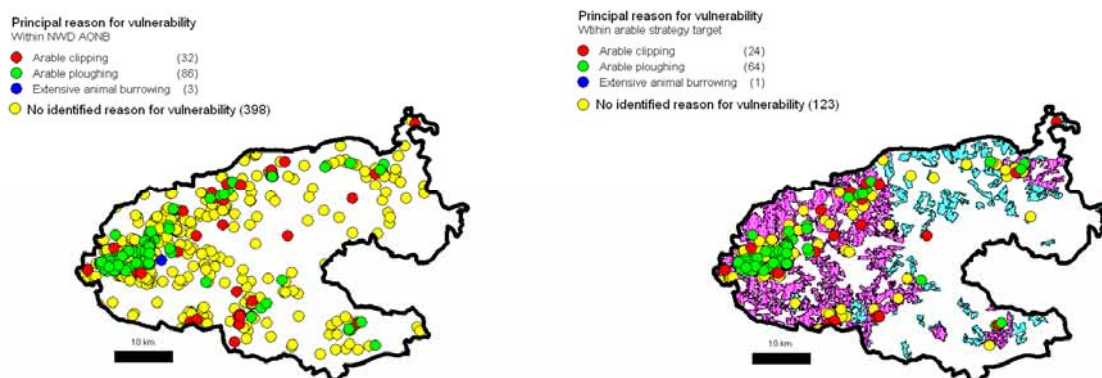
A recent report 'Scheduled Monuments at Risk' (sm@r) has been produced for Wiltshire and Swindon which provides a risk assessment for all Scheduled Monuments in the County (Williams 2006). The report identifies arable ploughing as a main cause of damage to archaeological features and classes those monuments subject to arable ploughing as high risk.

Figure 26. Main vulnerabilities of monuments in North Wessex Downs AONB (in Wiltshire & Swindon).



As shown in Figures 26 & 27, the most widespread impact on scheduled monuments in the North Wessex Downs and in the Arable Biodiversity Strategy Target area, is arable cultivation which accounts for 82% of monuments at high risk in the Wiltshire and Swindon part of the North Wessex Downs. This is mirrored in the south east with arable clipping (cultivations which encroach on the edges of monuments) and ploughing accounting for 58% of monuments at high risk (Clark & Roberts 2007).

Figure 27. Scheduled monuments at risk within the Arable Biodiversity Strategy target areas



In the appendices of Williams (2007) all Scheduled Monuments at medium and high risk are listed, together with details of current condition and required management to

improve condition. This dataset will allow the specific targeting of monuments at risk from cultivation damage.

The report accepts that where arable farming is predominant, as in the North Wessex Downs, removal of monuments from cultivation is difficult to achieve without the support of grant aid. Where complete removal of arable farming is not possible, reduced tillage depth may be appropriate in some circumstances.

For information on Scheduled monuments contact:

Inspector of Ancient Monuments, English Heritage South West Region. Tel. 0117 975 0699

Inspector of Ancient Monuments, English Heritage South East Region. Tel: 01483 252000

Archaeology and Historic Buildings, Landscape Planning and Heritage Group, Tel: 023 8038 3429

The Archaeology and Historic Buildings Record is available at <http://historicenvironment.hants.gov.uk/AHBSearch.aspx>

Wiltshire

Wiltshire Archaeology Service, The Wiltshire and Swindon History Centre. Tel: 01249 705503

The Wiltshire and Swindon Sites and Monument Record Search is available at http://history.wiltshire.gov.uk/smr/smr_search.php

Oxfordshire

Oxfordshire County Archaeological Services. Tel: 01865 810825

The Oxfordshire Historic Environment Record is available at <http://www.oxfordshire.gov.uk/wps/portal/publicsite/doitonline/finditonline/heritage>

West Berkshire

Archaeology Service. Tel: 01635 519534

Computerised data is currently not publicly accessible, but you can make an Historic Environment Record Enquiry at

<http://www.westberks.gov.uk/index.aspx?articleid=3320>

8.1.3 Non Scheduled Archaeology

There is also a large amount of important archaeology which is not scheduled within the North Wessex Downs. Each County Archaeology Service records all archaeology, maintaining the County Sites & Monuments Records, and negotiate with landowners and developers to ensure that ancient sites are not damaged or destroyed. Most of the County Sites & Monuments Records are now accessible online.

8.1.4 Integration

The best way to protect a ploughed archaeological site is to remove it from cultivation. Taking land out of cultivation, however, is not always a viable proposition and may not suit all arable systems. Arable management techniques such as direct drilling and minimum cultivation techniques can prevent further damage to archaeological features.

Farming the historic landscape Caring for archaeological sites on arable land, 2004, English Heritage.
This leaflet offers advice on identifying archaeological features and highlights best practice management

The North Wessex Downs Joint Venture Project aims to develop and test guidance on integrating the management of cultural and natural resources to use in the delivery of Environmental Stewardship Schemes. The guidance is designed to be a resource for advisers/surveyors, farmers, land managers and others. It will provide sources of practical management information on both archaeological and biodiversity management, and integrates the two by identifying potential conflicts, via an impacts matrix, and provides advice on how to reconcile them.

8.1.6 Opportunities

- Arable reversion to protect archaeology could create a more mixed landscape and valuable non cropped habitat.
- Arable reversion payments have been improved under ES
- ES offers minimum/reduced depth tillage options where arable reversion is not possible or where arable interest is high.

Constraints	Solution
Many archaeological features are still being damaged through ploughing.	-Promote ES options available to protect archaeology e.g. reversion and minimum tillage. -Use Scheduled Monuments At Risk Report to target monuments. -Locate ES arable options away from archaeological features where these could cause damage, or manage them to minimize damage e.g. minimum tillage establishment.
Potential conflict between arable reversion to protect archaeology and conservation of arable flora and fauna.	-Improve distribution data for arable flora and fauna. Make this data more widely available. -Avoid arable reversion on sites known to be important for arable flora. -Promote use of Joint Venture Project to integrate and prioritise management.

8.1.7 Funding

8.1.7.1 Environmental Stewardship

Protection of archaeological features and the historic landscape is a key objective of Environmental Stewardship with a range of management options under both ELS and HLS.

ES Management Options:

ELS: ED2 – ED5 *

HLS: HD6 –HD11 *

* For description of options see relevant scheme handbooks

8.1.7.2 *English Heritage*

English Heritage have a Historic Buildings, Monuments and Designed Landscapes grant. Visit <http://www.english-heritage.org.uk> for more details.

8.2 Resource Protection

Objective C - Identify where arable habitats can be managed to reduce diffuse pollution in the River Pang, Kennet, Lambourn, and Avon catchments.

Agriculture is being increasingly required to protect the physical environment (air, water and soil). Diffuse water pollution including, nitrogen, silt and other materials from farms is a significant problem and a number of initiatives and guidelines exist to help reduce the impact on water quality. These include:

- Catchment Sensitive Farming.
- Nitrate Vulnerable Zones .
- Best practice guidelines.
- Farm waste management planning.

8.2.1 Legislation

- Single Payment Scheme cross compliance requires farmers and landowners to manage and protect soils under GAEC 1 to 4 and protect water bodies under Statutory Management Requirements SMR2, 3 and 4.
- The Water Framework Directive (2000/60/EC) also requires Member States to protect, enhance and restore all bodies of surface water and groundwater with the aim of achieving good status by 2015.

- The Nitrates Directive (91/676/EC) is an environmental measure designed to reduce water pollution by nitrate from agricultural sources and to prevent such pollution occurring in the future. The Directive requires Member States to designate as Nitrate Vulnerable Zones (NVZs) all land draining to waters that are affected by nitrate pollution.
- The PSA target (2003-2006, currently under review), of 95% of Sites of Special Scientific Interest (SSSIs) being in favourable condition by 2010 is relevant to those water courses within the NWD AONB which are designated as SSSIs.

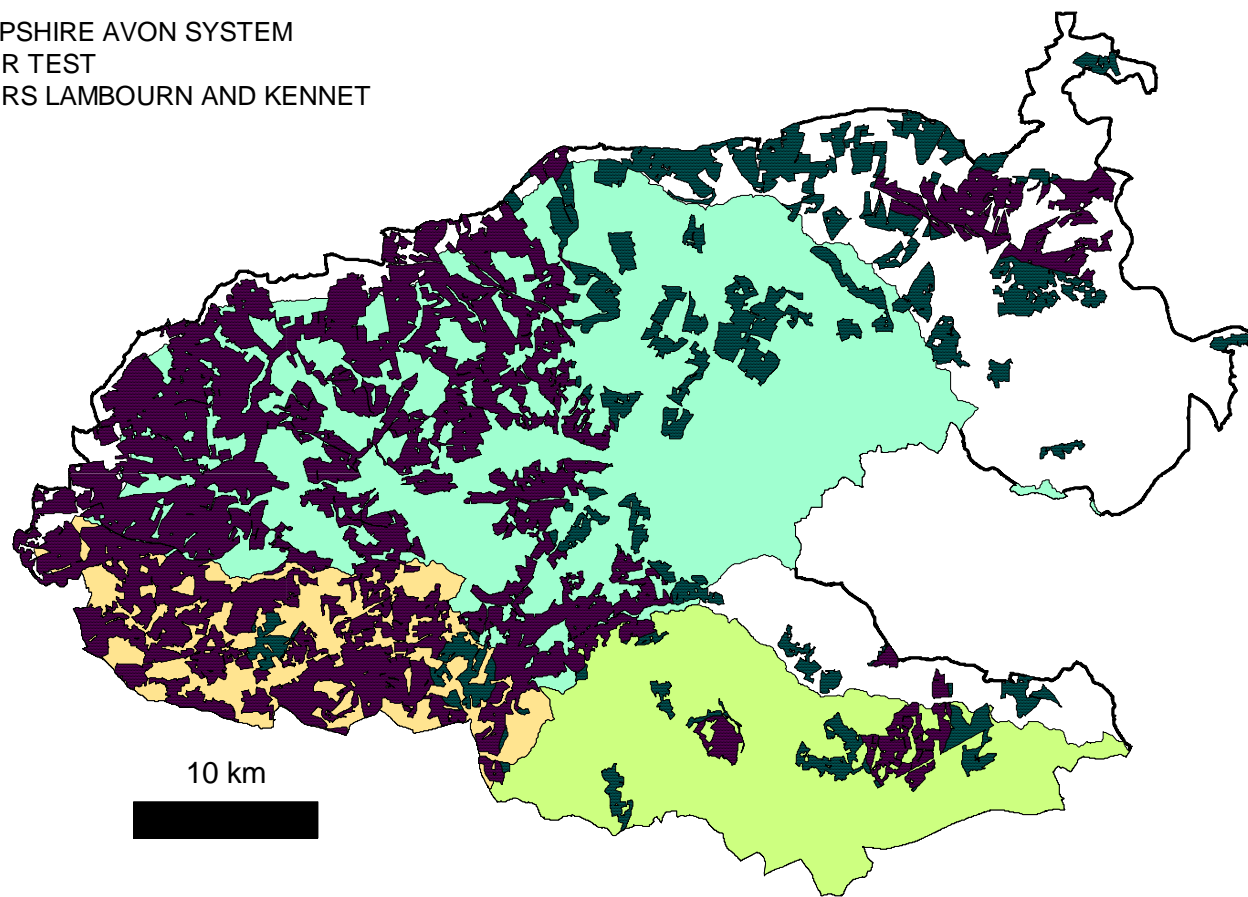
8.2.2 Catchment Sensitive Farming within the AONB

Defra is promoting Catchment Sensitive Farming (CSF) to reduce diffuse pollution (Figure 28). CSF is land management that keeps diffuse pollution to levels that protect rivers, groundwaters and other aquatic habitats, both in the immediate catchment and further downstream. This includes limiting the use of fertilisers, manures and pesticides, promoting good soil structure and rain infiltration to avoid run-off and erosion, and protecting water courses from sedimentation and pesticides.

Figure 28. Priority Catchments within the North Wessex Downs.

Catchments within the NWD AONB

- HAMPSHIRE AVON SYSTEM
- RIVER TEST
- RIVERS LAMBOURN AND KENNET



Within the North Wessex Downs there are three priority catchments which have been identified for this initiative:

- Rivers Test and Itchen.
- Hampshire Avon Catchment.
- Rivers Lambourn and Kennet.

Each catchment has a Catchment Sensitive Farming Officer who works with farmers through a range of methods including workshops and farm visits.

Other projects working on diffuse pollution within the North Wessex Downs include Sustainable River Catchments for the South East (Surcase) Project, Upper Kennet Landwise project, and Kennet Chalkstream Restoration. These projects are working together to prevent duplication and enhance effort, covering diffuse pollution from agriculture, access, urban drainage and water resources.

The boundaries of these catchments can be found on the MAGIC website (www.magic.gov.uk) under the layer name "England Catchment Sensitive Farming Delivery Initiative 2006-2008: Priority Catchments"

Management undertaken to reduce diffuse pollution can benefit arable wildlife. However, in some instances, actions that will benefit the physical environment may conflict with the requirements of arable biodiversity.

8.2.4 Opportunities

- There has been increased awareness of diffuse pollution issues. Management to protect physical resources can reduce input costs for farmers.
- Arable habitats important for arable biodiversity such as over-wintered stubbles and buffer strips may also help reduce diffuse pollution.

- Habitats beneficial for arable biodiversity (e.g. wildlife seed mixtures) can be managed to reduce diffuse pollution.

Constraints	Solution
Inappropriate management of some arable options such as fallow plots and cultivated margins may increase diffuse pollution	Work with Catchment Sensitive Farming. Projects to develop management advice for these options to reduce diffuse pollution.
Climate change: We are experiencing higher intensity rain fall than we did in the past. This means fields that have not had soil erosion issues in the past may do so in the future.	Promote soil management planning. Maintaining good soil structure will allow water to percolate down and reduce surface or sub surface flow.
Farm tracks and gateways can connect fields directly to water courses. If erosion is occurring, seeds, nutrients and pesticides are likely to be leaving the field.	Promote appropriate farm track management.

Shurmer (2006) *Protecting soils and enhancing biodiversity*. Wessex Downs & Chilterns Farmland Bird Project. RSPB & Thames Water.

Provides a good explanation of some of the situations where soil management and species conservation can have mutual benefit, and where soil management may be detrimental to biodiversity. Where there is a negative impact the report suggests ways of mitigating this.

For information on reducing diffuse pollution visit
<http://www.environmentalsensitivefarming.co.uk/>

or contact the Catchment Sensitive Farming Project:

Rivers Test Natural England, Lyndhurst
Tel: 0300 060 4835 Andrew.fielder@naturalengland.org.uk

Hampshire Avon System Environment Agency, Blandford Forum
Tel: 01258 483475 ellie.mantell@environment-agency.gov.uk

Rivers Lambourn and
Kennet Kate Ody, Natural England, Reading
kate.ody@naturalengland.org.uk

8.2.5 Funding

8.2.5.1 Environmental Stewardship

Resource Protection is a key objective of Environmental Stewardship with a range of management options under both ELS and HLS.

ES Management Options:

ELS: EE1-EE7, EJ2,5,9-10,13**

HLS: HJ3-HJ8*

* For description of options see relevant scheme handbooks

8.2.5.2 England Catchment Sensitive Farming (CSF) Capital Grant Scheme

CSF provide capital grants to support land managers in priority catchments in England. The grants can provide a range of opportunities to improve or install facilities that will benefit water quality by reducing diffuse pollution.

For more information go to

<http://www.defra.gov.uk/foodfarm/landmanage/water/csf/grants/index.htm>

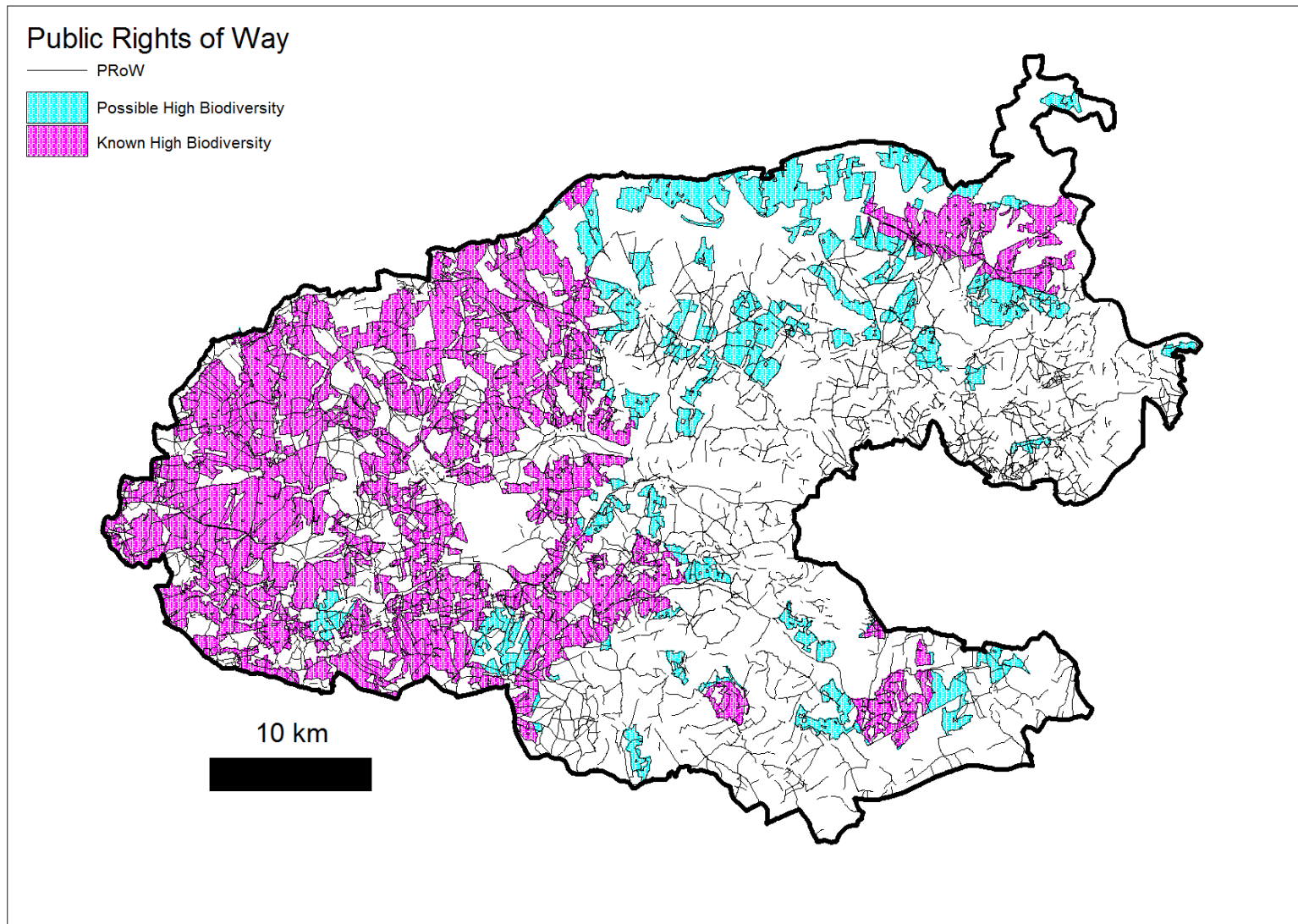
8.3 Access

Objective D - Identify opportunities for improving access in arable landscapes

Access to the countryside is an important part of the lives of people who live in the AONB and also for visitors as a tourism asset. Features such as green lanes, including the Ridgeway, form an important part of the landscape.

However, access must be balanced with land managing interests, as well as other issues such as conservation. Greater and improved access should be encouraged where this can be achieved without undue cost to conservation or the landowner's use of the land. The provision of access, including improving accessibility of Crow Open Access land, provides a valuable opportunity to increase public enjoyment of the countryside and to raise awareness of the work farmers do to protect and enhance the environment (Figure 29).

Figure 29. Public Rights of Way in the North Wessex Downs (not including Oxfordshire)



8.3.1 Legislation

8.3.1.1 Countryside and Rights of Way Act(CRoW)

The Act provides for public access on foot to certain types of land, amends the law relating to public rights of way, increases protection for Sites of Special Scientific Interest (SSSI), strengthens wildlife enforcement legislation and provides for better management of Areas of Outstanding Natural Beauty (AONB).

Land managers have responsibilities for the new 'Open Access Land'

Natural England have produced a landmanagers guidance pack for Open Access <http://www.naturalengland.org.uk/ourwork/enjoying/places/openaccess/default.aspx>

8.3.1.2 Rights of Way Improvement Plans

The CRoW Act, requires every county/unitary authority to set out their plans for improvement of the Rights of Way network through the production of a Rights of Way Improvement Plan (RoWIPs).

These plans, which cover the 5 year period, 2006-2011, identify opportunities for improving access to the countryside and as such could help maximize the benefits of access on arable land. Equally there is an opportunity, as highlighted at the stakeholders meeting, for the Arable Biodiversity Strategy to feed into the County RoWIPs. The target completion date for RoWIPs was November 2007. So far only Oxfordshire has completed its Plan.

8.3.2 Opportunities

- Permissive Access routes on grass margins could provide improved access to CRoW Act land.

- Neighbouring farmers can work together to create continuity of permissive access in local areas.
- Use public access to increase awareness of farmland biodiversity.

Constraints	Solution
Grass margins established for wildlife enhancement are often used as unlawful access by the public	Plough up the ends to break the popular routes. Promote public education including interpretation boards and farm walks for the public. Provide marked routes where public are able to go.
Public access may cause disturbance to species, particularly ground nesting birds	Provide public education and alternative routes to encourage people away from sensitive areas.
Parts of the North Wessex Downs close to urban conurbations suffer from illegal hare coursing. Dogs not kept under control can also cause disturbance to wildlife.	North Wessex Downs to organise liaison meeting between farmers and police
Fly-tipping including burnt out cars, as well as unauthorised vehicular access, has damaged areas managed for arable species including field corners and buffer strips.	

For information on RoWIPs and general access issues contact:

Countryside Access Officer, Oxfordshire County Council, Tel: 01865 810226,
countryside@oxfordshire.gov.uk

Rights of Way Officer, Environmental Services Department, Wiltshire County Council, Tel: 01225 756178, rightofway@wiltshire.gov.uk

Rights of Way Officer, West Berkshire Council, Tel: 01635 519070,
elcox@westberks.gov.uk

Hampshire Rights of Way Office, Hampshire County Council, Tel: 0845 603 5636
countryside@hants.gov.uk

8.3.3 Funding

8.3.3.1 Environmental Stewardship

The provision of improved access is a key objective of Environmental Stewardship with a range of management options under the Higher Level Scheme including permissive access and educational access.

ES Management Options:

HLS: HN2-HN8*

** For description of options see relevant scheme handbooks*

8.4 Landscape

Objective G - Maintain and enhance local variety and character in the North

Wessex Downs landscape

The North Wessex Downs landscape has been shaped by farming, and arable areas form an important part of this landscape. As such, changes in the management of arable land can have a large impact on the landscape both positive and potentially negative.

The North Wessex Downs is a nationally important landscape centred around characteristic open downland, where the dominant landuse is large-scale, open arable farmland characterized by few hedgerows and occasional small wooded areas. In fact, the North Wessex Downs contains a number of different landscapes.

8.4.1 Landscape types

The AONB supports a diversity of distinct landscape types including:

- Downs Plain & Scarp
- Open Downland

- Downland with woodland
- Wooded Plateau
- High Chalk Plain
- Vales
- River Valleys
- Lowland Mosaic

Each of these generic landscape types has a distinct and relatively homogenous character with similar attributes, including geology, landform, land cover and historical evolution.

8.4.2 Landscape Character Areas

Landscape types can be further sub-divided into their component landscape character areas.

These individual geographic areas share the common characteristics of the landscape type, but have a distinct and recognisable local identity.

The distribution of some arable species is likely to be influenced by the landscape type, for example, Grey partridge and Corn bunting are generally associated with more open landscapes such as the Downs Plain & Scarp, and Open Downland.

Arable conservation should use Landscape Type and LCA descriptions to ensure that arable habitat management does not degrade the landscapes of the North Wessex Downs and indeed should seek to enhance it (Figure 30).

For details of the different Landscape Types and Local Character Areas:



The North Wessex downs landscape: A landscape assessment of the Area of Outstanding Natural Beauty, 2002, AONB.

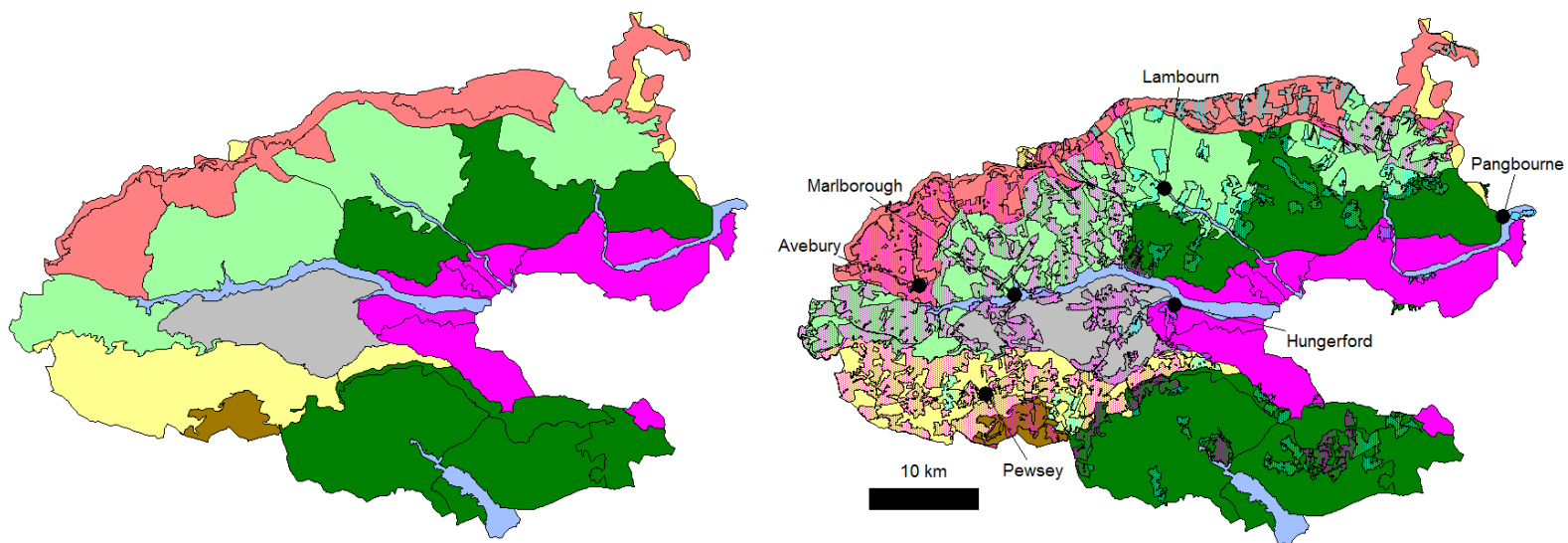
Available to download at

<http://naturalengland.communisis.com/NaturalEnglandShop>

Figure 30. Landscape Types and Landscape Character Areas of the North Wessex Downs.

North Wessex Downs Landscape Character Assessment

- | | |
|--|--|
|  Open Downland |  Known High Biodiversity |
|  Downland with Woodland |  Possible High Biodiversity |
|  Wooded Plateau | |
|  High Chalk Plain | |
|  Downs Plain and Scarp | |
|  Vales | |
|  River Valleys | |
|  Lowland Mosaic | |



Landscape Character Areas may be a good format for delivering arable conservation through farmer groups. Farms within each area would be similar in terms of cropping and habitat types with similar issues regarding arable management and conservation of arable species. This could certainly work for those in Table 4, which contain a high proportion of the Arable Biodiversity Strategy Target area. However, this approach would not work well in some areas such as the Hampshire Downs where only a small proportion of the LCAs are within the Target area. Additionally, the Target area crosses boundaries of LCAs which may indicate that mobile species (such as farmland birds) may be utilising habitats from more than one LCA. Therefore using individual, separate LCAs may not be a very good format on which to deliver arable conservation.

Table 4. LCAs containing highest proportion of target area.

Landscape Type	Landscape Character (LCA)	Area	Area of LCA (ha)	Area of LCA covered by priority target area (ha)	% of LCA covered by priority target area	Rank
Downs and Scarp	Plain Avebury Plain		6599	4753	72	1
Open Downland	Horton Downs		7098	3946	56	2
Vales	Wanborough Vale		256	137	54	3
Downs and Scarp	Plain Chiseldon Wanborough Plain	-	4262	2015	47	4
Vales	Vale of Pewsey		15815	6676	42	5

8.4.3 Historic Landscape Characterisation (HLC)

Historic Landscape Characterisation is an analysis of the countryside, which uses evidence from old maps to create a new, digital map of historic landscape 'character'. This is achieved by analysing land use and the various historical influences which have created today's landscape of fields, woods and other components of the landscape.

Of particular interest for the Arable Biodiversity Strategy HLC uses:

- Current land use
- Past land use
- Field morphology (size, shape, group patterns)
- Boundary types

HLC is a valuable method of raising awareness of the historic dimension of the landscape, and a means of ensuring that landscape, and its archaeology, is taken into account alongside those of the natural environment when development proposals are considered. It is therefore an especially relevant tool for advising on habitat creation and restoration.

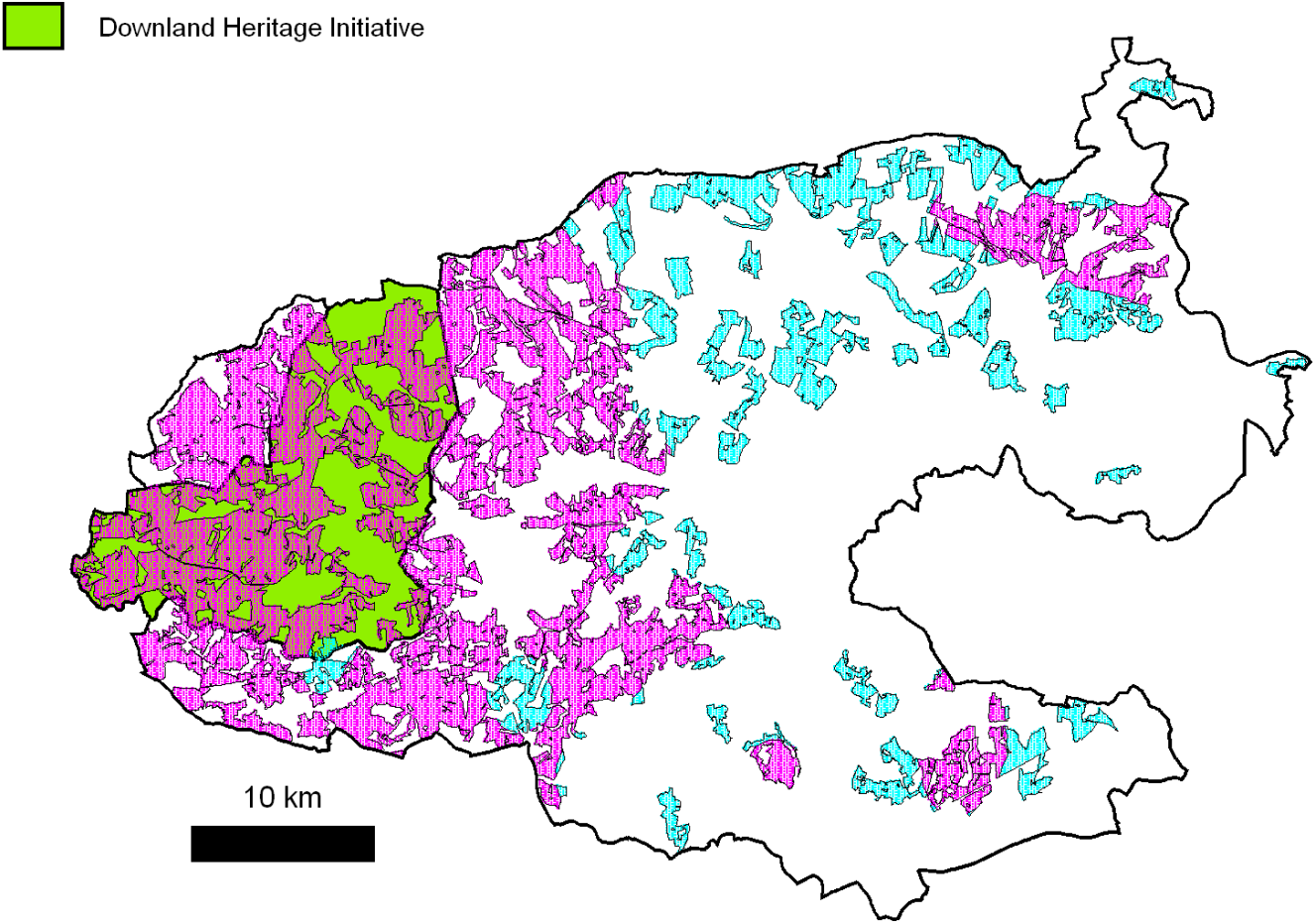
HLC could be a very important tool for the conservation of arable biodiversity. It offers potential to improve targeting of new habitat creation and help identify areas with potential for downland restoration (Appendix). HLC identifies the historical distribution of semi-natural habitats including woodland and grasslands and as such can help refine the process of identifying priority areas for new habitat creation.

HLC can also identify those areas with a long history of arable cultivation, and therefore, those areas which could potentially support a rich arable flora – there is an association between length of cultivation and species richness of the arable flora (*Wilson 1990*).

8.4.4 Downland Heritage Initiative

See section 3.3. The Downland Heritage Initiative (Figure 31) could offer an important mechanism through which to deliver integrated arable and downland conservation, particularly for the western section of the North Wessex Downs.

Figure 31. The Downland Heritage Initiative Area.



8.4.5 Opportunities

- In order to achieve increases in arable biodiversity, conservation effort needs to be carried out at a landscape scale (*Vickery et al 2004*)
- Some arable species are associated with particular landscape types.(see Table 4.) Within the North Wessex Downs this is often the more open, downland landscape including that found within the DHI area. Management to strengthen the landscape character can be mutually beneficial.

Constraints	Solution
Some agri-environment options have been poorly placed within the landscape: e.g. wild bird seed mixtures.	Use HLC and Landscape Type descriptions to assist in appropriate location of arable options.
Some hedgerows, sometimes including trees, have been planted inappropriately in the downland landscape. This affects the landscape and a number of arable species which inhabit open downland landscapes (e.g. Stone-curlew and Lapwing).	Promote appropriate planting of hedgerows. Encourage that those which have already been planted are kept short where there is a potential impact on the landscape. Ensure that improved guidance is provided on appropriate hedgerow location.

8.4.6 Funding

8.4.6.1 Environmental Stewardship

Landscape is a key objective of Environmental Stewardship. Part of the Farm Environment Plan includes an assessment of how the landscape of the farm fits in with the existing Joint Character Area (JCA) description of the wider landscape, identifying opportunities for enhancement of landscape features on the farm. This is used to help prioritise and highlight appropriate management options.

For landscape issues contact:

Landscape Officer, Wiltshire County Council, Tel: 01225 713314

Landscape Planning and Heritage Group, Hampshire County Council, Tel: 01962 846724

Landscape Officer, Oxfordshire County Council, Tel: 01865 792422

West Berkshire HLC Duncan Coe, E-mail: DCoe@westberks.co.uk
or

North Wessex Downs AONB, Tel: 01488 685440, E-mail
info@northwessexdowns.org.uk

8.5 Semi-natural habitats

Objective E - Ensure that creation of other habitats does not involve the loss of arable habitat of high biodiversity value

The North Wessex Downs supports a wide range of important habitats including semi-natural ancient woodland and the nationally important remnants of unimproved chalk grassland on the steep scarps. It is this diversity of habitats, particularly the mix of arable and species rich chalk grassland, which helps support the nationally important arable fauna. It is important that the Arable Biodiversity Strategy integrates with the other North Wessex Downs AONB Strategies, *i.e.* Chalk Grassland and Woodland.

8.5.1 Legislation

8.5.1.1 Environmental Impact Assessment (EIA)

The Environmental Impact Assessment (Agriculture) Regulations 2006 came into force on 10 October 2006. The Regulations protect uncultivated land and semi-natural areas from being damaged by agricultural work. They also guard against possible negative environmental effects from the restructuring of rural land holdings.

For more information on EIA visit:
<http://www.naturalengland.org.uk/ourwork/regulation/eia/default.aspx>

8.5.1.2 Cross Compliance

Cross compliance includes requirements to protect permanent pasture. Measures applied under GAEC provide a baseline of environmental protection for habitats and landscape features. This includes protection of permanent pasture under GAEC 5 which relates to changing the landuse of uncultivated land and semi-natural areas by reinforcing EIA.

For more information on Cross compliance and habitats visit:
<http://www.crosscompliance.org.uk>

8.5.2 Chalk Grassland Strategy

As part of the Chalk Grassland Strategy three target areas were identified and the opportunities for chalk grassland restoration and creation within these were investigated. An opportunity mapping exercise highlighted potential areas for arable reversion in order to link up and expand the chalk grassland resource within these target areas. Whilst this approach is a very valuable conservation measure for chalk grassland, no account was taken of the arable interest within those areas.

Therefore, it is vital that the Arable Biodiversity Strategy integrates with the Chalk Grassland Strategy to enable the enhancement of the chalk grassland habitat without any loss of arable biodiversity. Thus, the Arable Biodiversity Strategy will form a proactive 'restraint' model to inform chalk grassland creation, and more broadly the downland landscape. Figures 32 and 33 show the relationship between the chalk grassland target areas and the Arable Biodiversity Strategy target areas. Just over 40% of the area highlighted as suitable for arable reversion by the Chalk Grassland Strategy is identified as a target area for arable biodiversity. Where these two models overlap the biodiverse arable should be maintained or enhanced and should not be reverted. If the priority is to revert to grassland a thorough survey for arable biodiversity should be undertaken to ensure species will not be lost. Both target areas obviously occupy similar areas, which is no coincidence. Farmland birds and mammals utilise both the arable and chalk grassland. Therefore, within these areas, it should be the priority to maintain a diversity of habitats which includes species rich semi-natural grassland alongside extensively managed arable farmland.

Figure 32. Chalk grassland Strategy Target Areas.

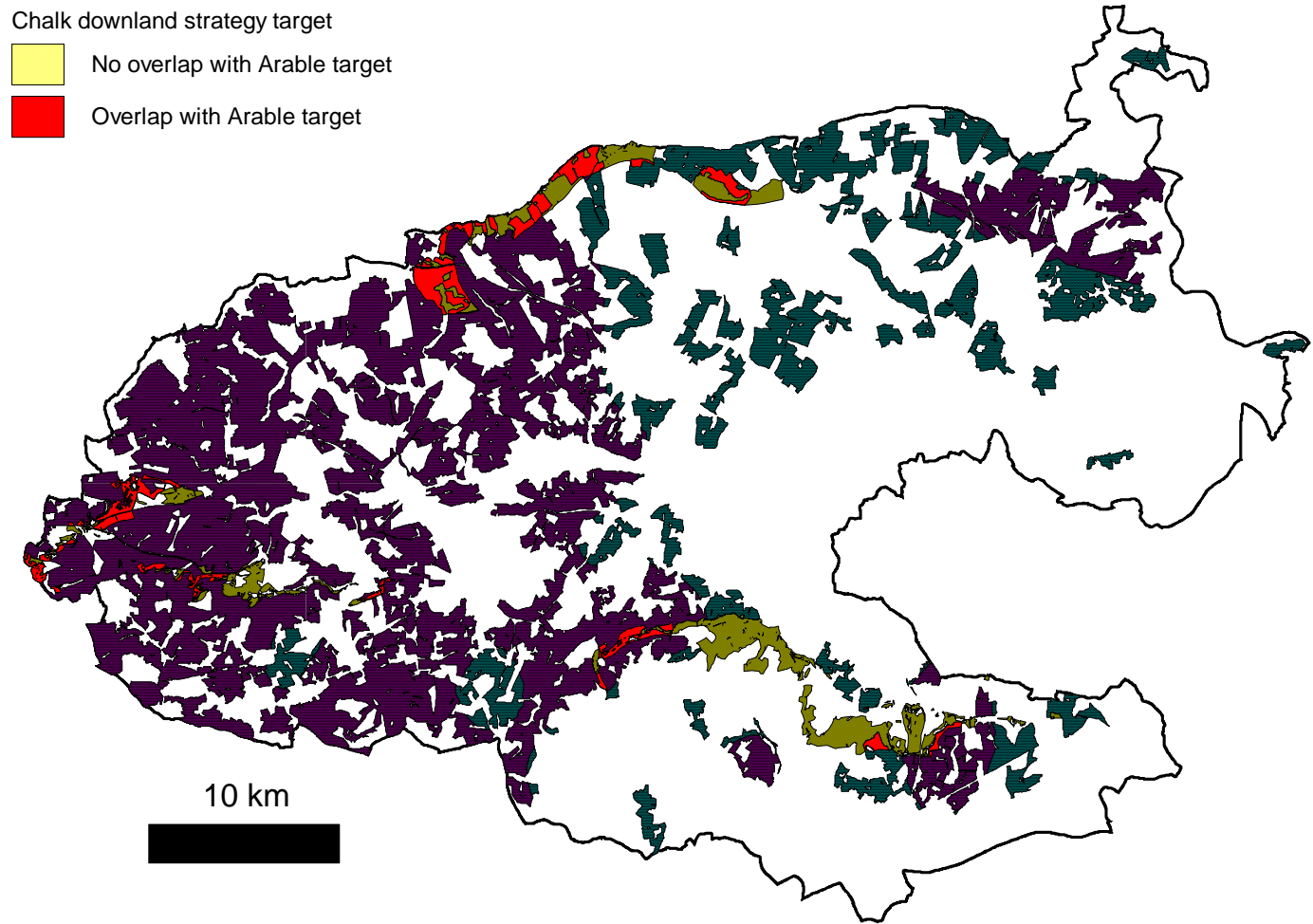


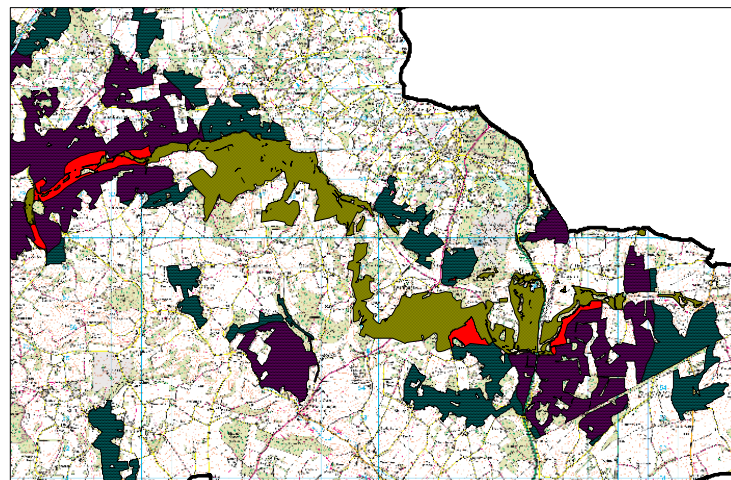
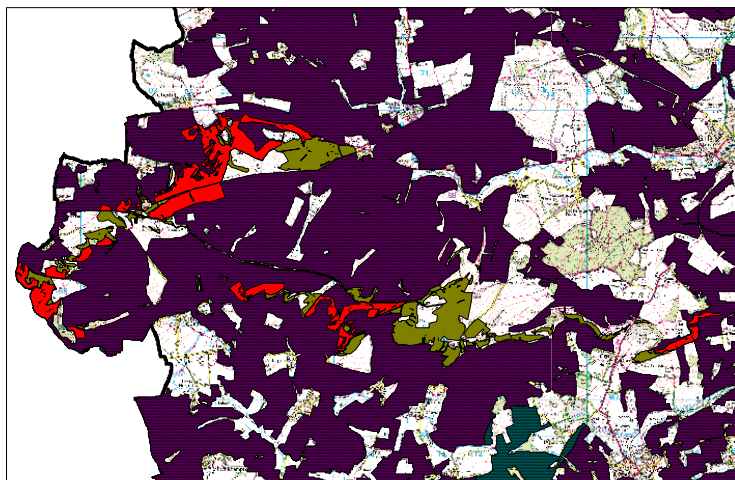
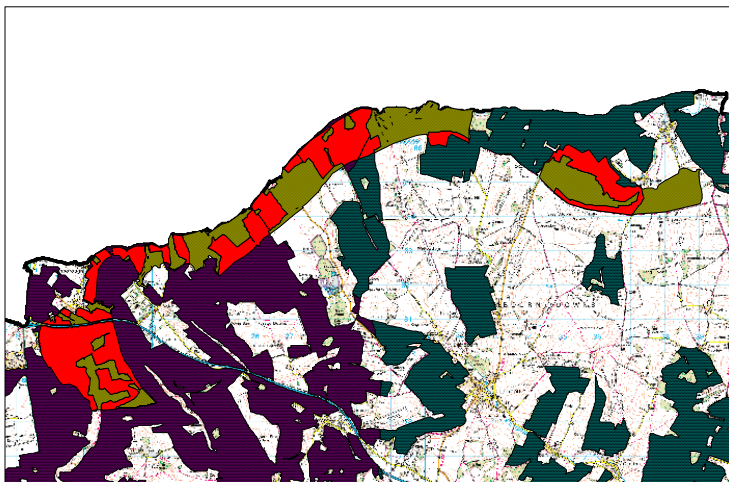


Figure 33. Close up of the individual Chalk Grassland Strategy Target Areas in relation to the Arable Biodiversity Strategy Target Areas

-  No overlap with Arable target
-  Overlap with Arable target



8.5.3 Opportunities

- Many arable species utilise other habitats such as calcareous grassland and require a mosaic of habitats.

Constraints	Solution
Reversion has been promoted on fields which have historically been arable.	<ul style="list-style-type: none"> -Use Arable Biodiversity Strategy Target to identify potential areas of conflict. -Undertake surveys for arable plants, focusing on those areas identified as areas of high potential within the AONB Arable Flora Project Report.
Large scale arable reversion is being promoted in areas important for arable biodiversity.	Ensure that the chalk grassland strategy and Arable Biodiversity Strategy are integrated and that information on arable biodiversity distribution is used to better inform targeted arable reversion.

For information on the different habitats within the AONB contact

Strategic Landscape Team, Wiltshire County Council, Tel: 01225 713241,
StrategicLandscape@wiltshire.gov.uk

Biodiversity Officer, Hampshire County Council, 01962 841841,
ecology.group@hants.gov.uk

County Ecologist, Oxfordshire County Council, Tel: 01865 810469

County Ecologist, West Berkshire Council, Tel: 01635519682,
jdavy@westberks.gov.uk

8.5.4 Funding

8.5.4.1 Environmental Stewardship

The protection and restoration of semi-natural habitats is a key objective of Environmental Stewardship, with a wide range of management options under ELS and HLS.

ES Management Options:

ELS: EB1-11, EC1-4, EK2-5 **

HLS: HC5-HC21, HK6-HK19, HQ13, HO1-HO5, HQ1-HQ12 *

* For description of options see relevant scheme handbooks

8.5.4.2 Wiltshire Biodiversity Improvement Grant

The aim of this grant scheme is to enable small practical projects that contribute to the conservation of Wiltshire's wildlife and landscape heritage. Previous grants have been given for planting and management of hedgerows, species rich grassland creation/management, and habitat creation for protected species.

For More information contact:

Strategic Landscape Team 01225 713314, StrategicLandscape@wiltshire.gov.uk

For more information on the other habitat strategies contact the North Wessex Downs AONB office for copies:

Wiltshire and Swindon Biological Records Centre (2005) *Chalk Grassland Strategy Report for North Wessex Downs AONB*. North Wessex Downs AONB

Matthews (2005) *North Wessex Downs AONB Woodland Strategy*. North Wessex Downs AONB

9 FUNDING

Additional funding sources are available specifically through the NWD AONB. Eligibility for these relates to the broad objectives of the NWD AONB.

9.1 Sustainable Development Fund (SDF)

The SDF supports projects that bring environmental, social and economic benefits to the North Wessex Downs and contribute to the objectives of Natural England. Grants, usually between £250 to £10,000, are available for projects in the North Wessex Downs.

Core criteria for eligibility include projects which help to deliver the North Wessex Downs AONB Management Plan, raise awareness, understanding and appreciation of the unique qualities and sensitivities of the North Wessex Downs, help to conserve and enhance the natural beauty of the North Wessex Downs or promote sustainable use of the natural environment. There is scope for projects which relate to the conservation of arable biodiversity under all of these core criteria. In particular this may be a good source of funding to support an arable plant survey of the North Wessex Downs.

For further information see <http://www.northwessexdowns.org.uk/>

9.2 LEADER Funding

LEADER is a scheme for delivering an important new source of funding for farmers, foresters, rural businesses and community organisations. The funding is part of the Rural Development Programme for England (RDPE) with the money coming from Europe via the South East England Development Agency (SEEDA) and the South West Regional Development Agency (SWRDA).

The North Wessex Downs Local Action Group (LAG) has successfully secured £2.5 million for allocation to local projects during the period 2009 to 2013. The funding will be available for a wide range of activities such as farm diversification, adding value to timber, tourism activities and projects that will benefit local communities. To maximise opportunities for arable biodiversity, funding through LEADER should complement Environmental Stewardship funding to provide an integration of activities and advice.

9.3 Environmental Stewardship

Environmental Stewardship will be the main delivery mechanism for implementing arable conservation habitat measures within the North Wessex Downs.

Conservation of arable species, particularly farmland birds, is a primary target for Environmental Stewardship.

There has been intensive research into the decline of arable biodiversity, particularly farmland birds. This has been used to develop a wide range of management options under Environmental Stewardship which are designed to address the factors causing declines in farmland species.

ES Management Options:

ELS: EF1-EF11, EG1-EG3 **

HLS: HE10, HF12-HF20, HG7 *

* For description of options see relevant scheme handbooks

For birds, as an example, this generally means ensuring year-round habitat, including nest sites, chick food and over-winter food.

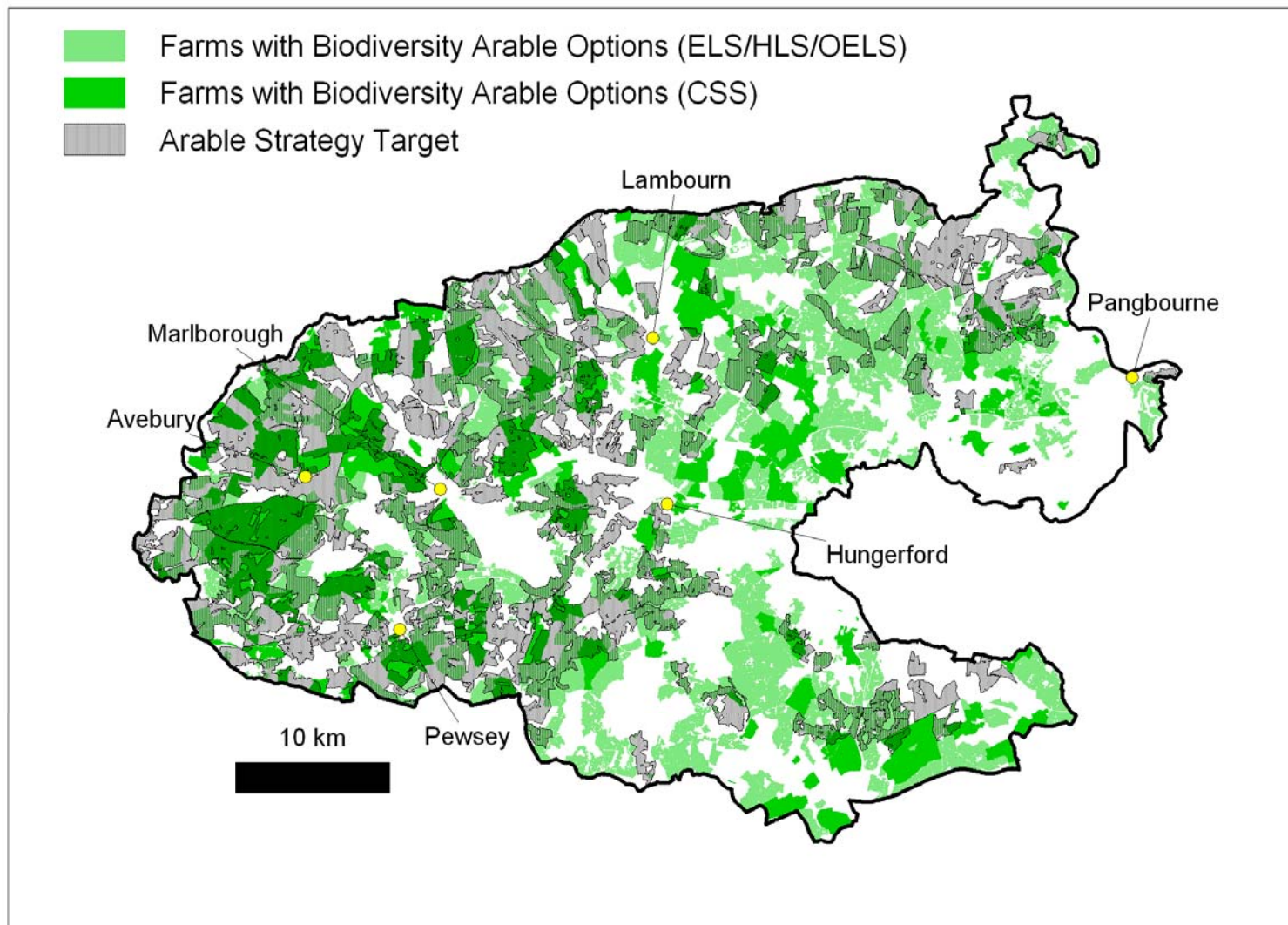
It is crucial that arable conservation is delivered at a landscape scale. The current recommendation is that the delivery of 6% - 8% of a 1 km square of farmland as suitable arable habitat for farmland birds should deliver their long term recovery.

(Aebischer and Ewald 2004, Vickery et al 2004)

Table 5. Areas of arable options under all agri-environment schemes in the AONB.

CSS ARABLE OPTIONS (ha)	ELS ARABLE OPTIONS (ha)	HLS ARABLE OPTIONS (ha)	TOTAL ARABLE OPTIONS (ha)
2006	2429	208	4643
Total Area of AONB (km ²)			1730
Total Area of AONB (ha)			173000
Area of farmland (%)			84
Area of farmland (ha)			145320
% of farmland as arable options (target of 6-8%)			3.19

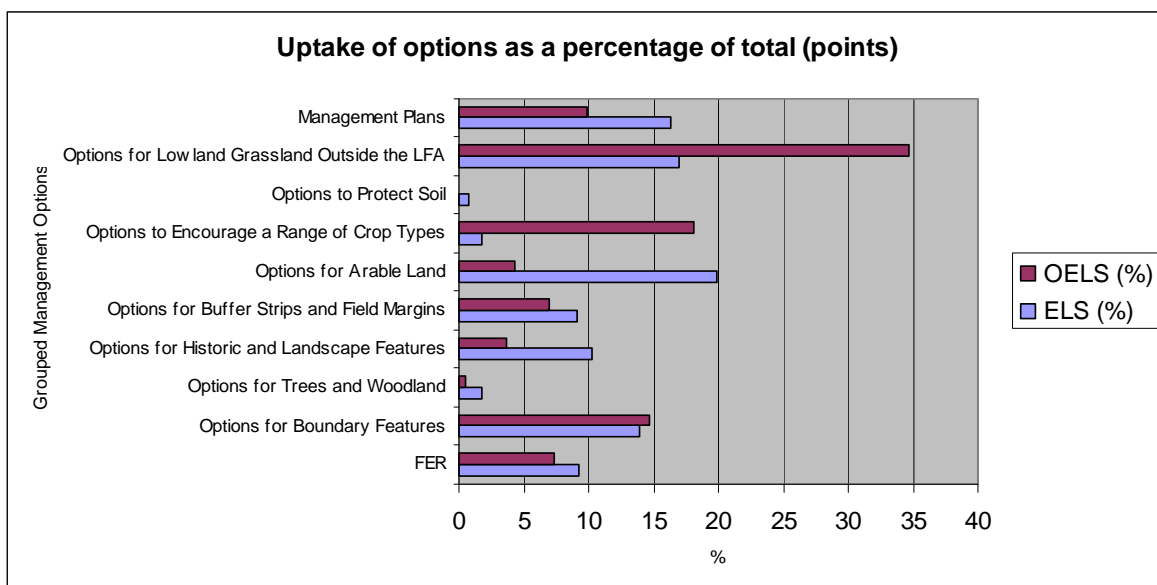
Figure 34. Agri-environment schemes containing arable options.



Whilst Figure 34 shows that a relatively large area of the North Wessex Downs is under agri-environment schemes which contain arable options, Table 4 shows that the percentage of farmland currently under arable options specifically, is just over 3%, only half of what is required. A major aim of arable conservation within the North Wessex Downs should be to double the amount of arable options currently under agri-environment options.

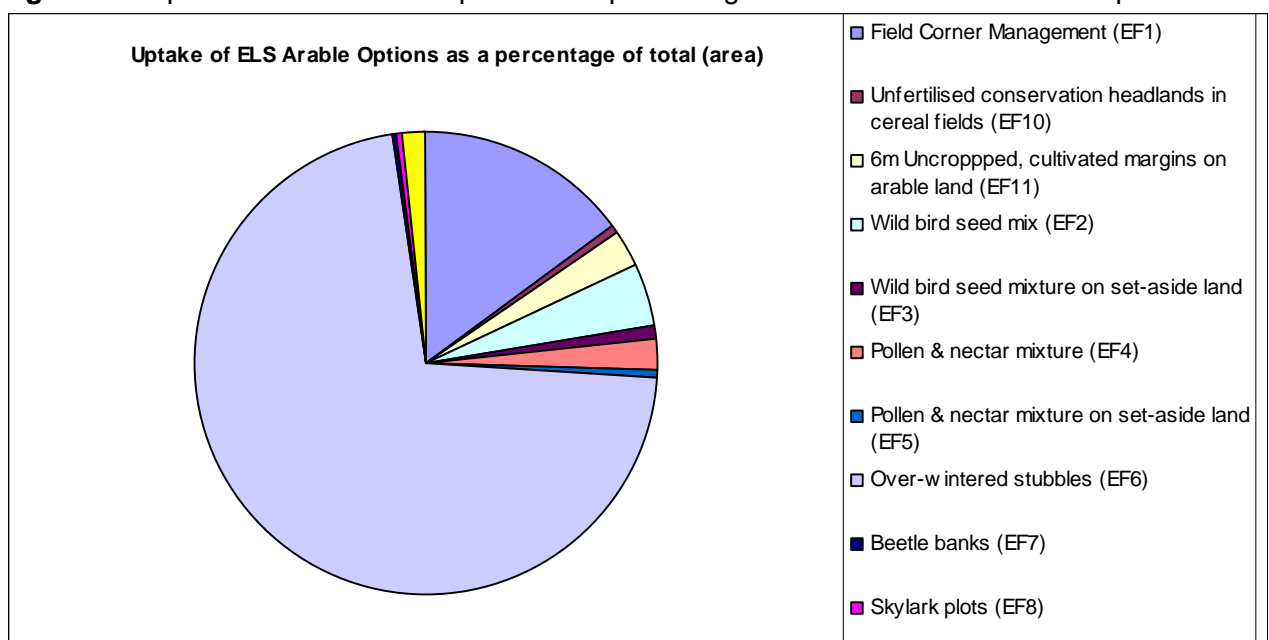
Nationally the uptake of arable options under ELS and OELS is approximately 4% of all points. Encouragingly, arable options account for about 20% of all points within the North Wessex Downs (Figure 35). ‘Options to Encourage a Range of Crop Types’ and ‘Arable Options’ should be considered jointly as they have been developed specifically to provide habitats for arable biodiversity. OELS agreements contain mostly ‘Options to Encourage a Range of Crop Types’. This may be due to the more grass and ley-based rotations of organic farms using management such as undersowing.

Figure 35. Uptake of ELS and OELS options as a percentage of the total within the North Wessex Downs.



The higher-than-average percentage of arable options in the North Wessex Downs is made up primarily of over wintered stubbles (Figure 36). Within the North Wessex Downs, spring cropping still forms a relatively large part of the crop rotation and so over-wintered stubbles would be an easy option to undertake for most farmers. This option would also not be taking land out of production. The second most popular option is field corner management, likely due to its ease of management and its use to remove awkward, unproductive parts of fields.

Figure 36. Uptake of ELS Arable Options as a percentage of the total area of arable options.



Organic Farming and OELS

Some studies have shown that organic farming may offer benefits to arable biodiversity. This is primarily due to three broad management practices which are associated with organic farming. This includes prohibition/reduced use of chemical pesticides and inorganic fertilisers, sensitive management of non-cropped habitats, and maintenance of mixed farming (Hole et al 2005). These practices are not exclusive to organic farming and indeed some practices used in organic systems, such as mechanical weeding, may be damaging to arable biodiversity. However, a number of species have been shown to be more abundant on organic farmland, including Cornflower, Corn Buttercup, and Skylark, all of which occur in the North Wessex Downs.

9.3.1 Opportunities

- Under Environmental Stewardship stubble payments have been increased making it a more economically attractive option.
- Large range of ES arable options available.
- The Arable Biodiversity Strategy can help influence and focus ES within the North Wessex Downs.
- HLS will fund nest boxes which could help support and expand nest-box scheme run by the Wiltshire Tree Sparrow Recovery Project on the Marlborough and Pewsey Downs.
- The intention by Natural England to gain greater biodiversity benefit from ELS in the future, via a 12-month review of the scheme, could provide an opportunity to encourage uptake of in-field arable options.

Constraints	Solution
There is no incentive to encourage farmers to establish cultivated margins, which require more complex management, rather than grass buffer strips.	Lobby for increased incentive for cultivated margins in recognition of the complex management requirements.
ELS options too prescriptive.	Feedback to NE re details of the flexibility wanted/ needed and where the prescriptions are considered too prescriptive so this can be fed in to the ES review.
Some of the HLS options are seen as too complicated.	Lobby for more flexibility within options.
Problems with undesirable weed species in cultivated margins is discouraging uptake of this option.	Provide farmers and their agronomists with specialist advice on weed management. Promote research in to weed control techniques .
Lack of funding for HLS. Farms which cannot meet all scheme requirements but have important arable biodiversity interest cannot get an agreement.	This is being addressed under Phase 2 targeting.
Most popular ELS options are boundary and management plan options. There has been a very low uptake of infield arable options.	Lobby for an increase in ELS option points for arable options. input into ES review re need to change ES to incentivise and promote uptake of range of options

<p>ELS buffer strips have to buffer an environmental feature (hedgerow etc.). Cannot put them along a hedge-less boundary which would be good to break up arable blocks and as nesting habitat for Grey partridge or foraging habitat for Corn bunting.</p>	<p>Lobby for more flexibility in locations of buffer strips.</p>
<p>Most farmers have already done ELS. They will be unwilling to change them to add arable options as they can only make one change within the 5 year agreement.</p>	<p>Lobby for opportunity to make an additional amendment to add arable options to ELS agreements.</p>
<p>Wildlife seed mixtures are often grown on poorest land and receive little management.</p>	<p>Encourage active management to maximise seed yield.</p>
<p>Some existing CSS agreements did not include arable options but still have a number of years to run.</p>	<p>Lobby to make additions to existing agreements.</p>
<p>Grass buffer strips have been established in areas important for arable flora.</p>	<p>Provide farmers and their advisers with information on the location of important arable flora communities. If appropriate, promote change to more suitable management - cultivated margins etc. Lobby for an increased incentive for cultivated margins above grass margins.</p>
<p>Cross compliance GAEC 14 requires 2-metre uncultivated strip from the centre of hedgerows. This is a part of the field where a number of important arable plants live (edge species such as ground pine.)</p>	<p>Inform farmers that an exemption can be requested from the RPA when such management will enhance the environment such as for the conservation of arable plants.</p>
<p>Many farmers who have entered ELS are new to agri-environmental management. They may not be aware of how to manage the options to maximise environmental gain.</p>	<p>Provide best practice management advice for ELS agreement holders. Hold farm walks to introduce them to farmers who have had previous experience of agri-environmental management.</p>
<p>Blocks of wildlife seed mix can only be a maximum of 0.5ha under ELS. These run out of seed quickly and some farmers are put off because they are too small for the points return per block.</p>	<p>Lobby for an increase in permissible block size under ELS and to concur with BTO research on plot size.</p>
<p>Farms which have completed their 10 year CSS agreement may not necessarily get an HLS agreement so any environmental value developed during the scheme will be lost.</p>	<p>Seek to identify farms with CSS agreements coming to end-of-term to guide advisory targeting and continue to lobby and input into Scheme review to safe-guard habitat within key areas.</p>

9.3.2 North Wessex Farmland Bird Project

This North Wessex Farmland Bird Initiative forms part of the South West Farmland Bird Initiative which was developed in response to the decline in farmland birds in the south west and Natural England's adoption of the PSA 2020 as a delivery target.

The initiative consists of four Projects including the North Wessex Farmland Bird. Using Environmental Stewardship, the project will deliver a combination of workshops, tailored advice and 1:1 farm visits to help farmers put the right package of management measures in place for farmland birds and other wildlife. The main aims of the project fit well with those of the Arable Biodiversity Strategy, stemming the decline of farmland birds, increasing the quantity and quality of habitats, whilst also providing co-ordination of all farmland bird management and advisory activity in the region, developing and implementing a targeting and delivery strategy for the Farmland PSA target for all NE regions, and engagement with stakeholders.

The Western half of the North Wessex Downs has been identified as a main focus area for the project where there is a high concentration of farmland birds.

It is important that there is mutual integration and support between this project and other arable conservation work being carried out within the North Wessex Downs.

For further information contact Sarah Blyth, RSPB: 01380 737015, sarah.blyth@rspb.org.uk

For more information and advice on providing habitat for arable species, including using Environmental Stewardship arable options visit:

<http://www.arableplants.org.uk/Arable-agri-environment>

<http://www.rspb.org.uk/ourwork/farming/advice/>

<http://www.gct.org.uk/conservationguides>

9.3.3 Campaign for the Farmed Environment

Although not a source of funding, as with the North Wessex Farmland Bird Project , this is an initiative developed, in part, to promote Environmental Stewardship.

The aim is to re-capture the environmental benefits that were provided by set-aside through an industry led, voluntary approach.

The Campaign is a three year programme with defined targets in respect of the main arable areas of the country, including most of the North Wessex Downs. There are three themes to the campaign, namely farmland birds (working with the RSPB), resource protection (working with the Environment Agency) and wider biodiversity (working with Natural England). The main targets for the Campaign for the three year period are to:

- Double the uptake of in-field options of Environmental Stewardship
- Retain the current area of un-cropped land (179,000 ha nationally) and improve the environmental management on at least a third of it
- Increase the area of land voluntarily managed for the environment by at least 30,000 ha

For more information visit: <http://www.cfeonline.org.uk/>

Acknowledgements: People and Organisations

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Graham Hawker (Thames Valley Environmental Records Centre)

Purgle Linham (Wiltshire and Swindon Biological Records Centre)

Craig Blackwell (Oxfordshire County Council)

Heather White (North Wessex Downs AONB)

Sally Fisher (RSPB)

Duncan Gammon & James Phillips (Natural England)

Tim Frayling (Natural England)

Julia Gallagher (RSPB)

Jeremy Davy (West Berkshire District Council)

Tom Butterworth (Oxfordshire Nature Conservation Forum)

Melanie Hardie (TVERC)

Dan Dines (Wessex Agronomy)

Richard Butler (Eastwick Farm, Wooton Rivers)

Tim Carson (Manor Farm, Alton Barnes)

Karen Davies (FWAG)

With funding from North Wessex Downs AONB

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11. APPENDICES

1. List of species selected as 'rare arable weeds' for the purpose of this analysis.

Common name	Scientific name	UK BAP	Page in Wilson & King*	Records
Broad-leaved spurge	<i>Euphorbia platyphyllos</i>		196	2
Corn buttercup	<i>Ranunculus arvensis</i>	✓	62	7
Corn chamomile	<i>Anthemis arvensis</i>		78	4
Corn cleavers	<i>Galium tricornutum</i>	✓	80	2
Corn marigold	<i>Chrysanthemum segetum</i>		154	6
Corn parsley	<i>Petroselinum segetum</i>		162	3
Corn spurrey	<i>Spergula arvensis</i>		202	3
Corncockle	<i>Agrostemma githago</i>		82	2
Cornfield knotgrass	<i>Polygonum rurivagum</i>		148	1
Cornflower	<i>Centaurea cyanus</i>	✓	84	19
Cut-leaved dead-nettle	<i>Lamium hybridum</i>		104	6
Dense-flowered fumitory	<i>Fumaria densiflora</i>		116	20
Dwarf spurge	<i>Euphorbia exigua</i>		198	35
Few-flowered fumitory	<i>Fumaria vaillantii</i>		118	1
Field gromwell	<i>Lithospermum arvense</i>		136	15
Field madder	<i>Sherardia arvensis</i>		152	11
Field woundwort	<i>Stachys arvensis</i>		226	3
Grey field-speedwell	<i>Veronica polita</i>		194	10
Henbit dead-nettle	<i>Lamium amplexicaule</i>		106	3
Knotted hedge-parsley	<i>Torilis nodosa</i>		140	5
Mousetail	<i>Myosurus minimus</i>		156	6
Narrow-fruited cornsalad	<i>Valerianella dentata</i>		92	2
Prickly poppy	<i>Papaver argemone</i>		180	13
Red hemp-nettle	<i>Galeopsis angustifolia</i>	✓	146	25
Rough poppy	<i>Papaver hybridum</i>		182	17
Round-leaved fluellen	<i>Kickxia spuria</i>		110	12
Sharp-leaved fluellen	<i>Kickxia elatine</i>		112	15
Shepherd's-needle	<i>Scandix pecten-veneris</i>	✓	184	9
Slender tare	<i>Vicia parviflora</i>		208	1
Small toadflax	<i>Chaenorhinum minus</i>		212	6
Spreading hedge-parsley	<i>Torilis arvensis</i>	✓	142	3
Thorow-wax	<i>Bupleurum rotundifolium</i>	✓	210	1
Venus's-looking-glass	<i>Legousia hybrida</i>		216	24
Wild candytuft	<i>Iberis amara</i>	✓	70	4
Yellow vetchling	<i>Lathyrus aphaca</i>		220	6

*Arable Plants – a field guide. P.Wilson & M. King, 2003, English Nature and Wildguides.

2 (a). Comparisons for each plant species location with the final Arable Biodiversity Strategy target. The Arable Biodiversity Strategy target covered 33% of the NWD AONB area.

Common name	In target (%)	Out of target (%)	Chi-sq
Broad-leaved spurge	1 (50%)	1 (50%)	0.06
Corn buttercup	1 (14%)	6 (86%)	0.43
Corn chamomile	0 (0%)	4 (100%)	0.76
Corn cleavers	0 (0%)	2 (100%)	0.06
Corn marigold	4 (67%)	2 (33%)	1.74
Corn parsley	0 (0%)	3 (100%)	0.36
Corn spurrey	1 (33%)	2 (67%)	0.36
Corncockle	1 (50%)	1 (50%)	0.06
Cornfield knotgrass	1 (100%)	0 (0%)	0.13
Cornflower	11 (58%)	8 (42%)	4.24*
Cut-leaved dead-nettle	3 (50%)	3 (50%)	0.20
Dense-flowered fumitory	15 (75%)	5 (25%)	14.08***
Dwarf spurge	16 (46%)	19 (54%)	2.00
Few-flowered fumitory	0 (0%)	1 (100%)	0.13
Field gromwell	3 (20%)	12 (80%)	0.64
Field madder	4 (36%)	7 (64%)	0.01
Field woundwort	0 (0%)	3 (100%)	0.36
Grey field-speedwell	5 (50%)	5 (50%)	0.65
Henbit Dead-nettle	3 (100%)	0 (0%)	3.43
Knotted hedge-parsley	3 (60%)	2 (40%)	0.65
Mousetail	4 (67%)	2 (33%)	1.74
Narrow-fruited cornsalad	0 (0%)	2 (100%)	0.06
Prickly poppy	5 (38%)	8 (62%)	0.01
Red hemp-nettle	1 (4%)	24 (96%)	8.26**
Rough poppy	10 (59%)	7 (41%)	4.01*
Round-leaved fluellen	8 (67%)	4 (33%)	4.71*
Sharp-leaved fluellen	7 (47%)	8 (53%)	0.72
Shepherd's needle	2 (22%)	7 (78%)	0.11
Slender tare	0 (0%)	1 (100%)	0.13
Small Toadflax	3 (50%)	3 (50%)	0.2
Spreading hedge-parsley	0 (0%)	3 (100%)	0.36
Thorow-wax	0 (0%)	1 (100%)	0.13
Venus's-looking-glass	14 (58%)	10 (42%)	5.85*
Wild candytuft	0 (0%)	4 (100%)	0.76
Yellow vetchling	6 (100%)	0 (0%)	9.32**

* $P < 0.05$, ** $P < 0.01$, $P \leq 0.001$.

2 (b). Comparisons for each bird species location with the final Arable Biodiversity Strategy target. The Arable Biodiversity Strategy target covered 33% of the NWD AONB area.

Common name	In target (%)	Out of target (%)	Chi-sq
Corn bunting	315 (57%)	242 (43%)	138.19***
Grey partridge	331 (52%)	309 (48%)	100.14***
Lapwing	374 (52%)	341 (48%)	119.17***
Stone-curlew	22 (45%)	27 (55%)	2.6
Tree sparrow	100 (64%)	56 (36%)	66.66***
Turtle dove	82 (51%)	80 (49%)	21.85***
Yellow wagtail	192 (59%)	131 (41%)	100.62***

* $P < 0.05$, ** $P < 0.01$, $P \leq 0.001$.

2 (c). Comparisons for each mammal species location with the final Arable Biodiversity Strategy target. The Arable Biodiversity Strategy target covered 33% of the NWD AONB area.

Common name	In target (%)	Out of target (%)	Chi-sq
Brown hare	291(49%)	308(51%)	64.73***
Harvest mouse	3(60%)	2(40%)	0.65

* $P < 0.05$, ** $P < 0.01$, $P \leq 0.001$.

3. Relationship between HLC downland polygons and Chalk Downland Target Area.

During the course of the work for this project we examined the distribution of HLC areas designated at one time or another as downland. By selecting HLC areas using the different columns that indicate changes in the polygon on consecutive maps we were able to track changes in downland recorded on maps in the series abstracted by the HLC (Figure A).

Changes in Downland

- Current Downland
- Previous downland: One recorded non-downland management
- Previous downland: Two recorded non-downland managements
- Previous downland: Three recorded non-downland managements
- Chalk downland target area

