ENGLISH NATURE

Opportunities for Renewing Sherwood's wildlife

English Nature Habitat Restoration Project

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SHERWOOD FOREST TRUST

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English Nature
Habitat Restoration Project

Opportunities for:

"RENEWING SHERWOOD'S WILDLIFE"

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SHERWOOD FOREST TRUST

HABITAT RESTORATION PROJECT

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PREFACE

The history and legends of Sherwood Forest are an essential part of England's national character and identity. For the hundreds of thousands of visitors who visit Sherwood each year, the name conjures up images of mighty oaks and wild woodland. In fact, to think of Sherwood as just as dense oak woodland full of ancient trees is misleading. Extensive heaths and grassland have probably always been present, with marshes along the riversides.

The nation's need for coal, timber and agricultural produce has fragmented this once continuous mosaic of semi-natural habitats. The wildlife that depended on these habitats has dramatically declined and many of the remaining species are still at risk because of the small size and isolation of the patches of woodland, heathland, grassland and wetland which are left.

In signing the International Biodiversity Convention at the Rio Earth Summit of 1992 the Government committed itself to the task of reversing this trend and of increasing the variety of wildlife in our countryside. The UK Biodiversity Action Plan (HMSO 1995) which was produced following the Summit states that 'the fragmentation or isolation of key habitats [is] to be avoided and wherever practicable past fragmentation [is] to be reversed'.

The first priority must always be to protect what remains. Having done this, in order to reinvigorate the landscape, we want to recreate habitats to increase the size of the existing patches and to provide corridors and stepping stones to link them.

English Nature and the Sherwood Forest Trust are working together to achieve this in the Sherwood Trial Area of the Habitat Restoration Project. In this document we will set out the opportunities available for the restoration of Sherwood's wildlife, to enable people working in the countryside to restore the habitats which will benefit wildlife the most. The opportunities are based on the best available ecological knowledge and local experience, and incorporate experimental ideas that we will evaluate by ecological monitoring. Lessons learnt in Sherwood will be shared throughout the UK to increase our national wealth of wildlife under the direction of the UK's Biodiversity Action Plan.

This initiative is not something which English Nature and the Sherwood Forest Trust can or should do alone. To be successful it must involve everyone with an interest in the local countryside. It is about building support and enthusiasm among landowners and managers, voluntary conservation organisations, Government bodies such as MAFF and the Forestry Authority and local authorities.

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1. INTRODUCTION

1.1 Habitat Restoration Project

The Sherwood Trial Area is part of the national Habitat Restoration Project initiated by English Nature in April 1996. The aim is to investigate ways of increasing the variety and abundance of wildlife, the biodiversity of our countryside. The project is focussing on reversing the effects of habitat fragmentation using existing Environmental Land Management Schemes (ELMS) such as Countryside Stewardship.

Four Trial Areas, each of 100 km^2, have been chosen to represent a range of landscapes typical of lowland England. Practical habitat restoration will be encouraged in these areas, in cooperation with landowners and managers, and the benefits to wildlife will be monitored over a ten year period. Experience gained from the Trial Areas will be promoted nationally to enable conservation organisations to identify the most effective ways for them to reverse habitat deterioration and fragmentation using the ELMS available, and to identify any constraints which need to be overcome.

This Project provides us with an opportunity to develop flexible procedures and practices to help everyone who wants to make the countryside a richer and more attractive place for wildlife and for people. It forms part of English Nature's contribution to achieving the targets of the UK's Biodiversity Action Plan and its aims also accord with Article 10 of the EC Habitats Directive.

The project is being promoted within the Sherwood area by the Project Officer, Gordon Hewston.

1.2 Sherwood Forest Trial Area - Physical Characteristics

The Trial Area is centred on the Dukeries area in the northern part of Sherwood Forest, so called because of the predominance of large estates owned by the aristocracy. The Trial Area covers some 100 km^2 and extends from Clumber Park in the north to Clipstone Forest in the south. The eastern boundary runs around Ollerton and the western edge lies just outside Warsop.

The area lies in the rain shadow of the Pennines and has a low annual rainfall (average annual rainfall 1961 to 1990 was 600mm) and drought conditions are common. The soils in Sherwood are very sandy and freely draining, and rainwater quickly percolates through the soil and sandstone to collect in an aquifer below. Frost may occur in any month of the year and this can affect the vegetation in low lying hollows.

Three rivers, the Poulter, Maun and Meden, cross the Trial Area from west to east; while Rainworth Water flows up the southern and eastern edge and into the Maun. These rivers have created a series of valleys surrounded by gently rolling hills which characterise the landscape.

2. BACKGROUND TO THE SHERWOOD TRIAL AREA

2.1 History of land use (summarised from Windrum 1997)

Before humans arrived, Sherwood was covered in oak and birch woodland. Little human activity occurred until the Roman era, but by the end of their reign the woodland had largely been cleared. Between the 5th and 10th centuries, the population declined, and the woodland regenerated. In places grazing prevented succession to woodland and heathland developed.

Doomsday (1086) shows a sparsely settled, and barely cultivated area, characterised by wood-pasture grazed by pigs and sheep. The Norman kings began the process of establishing the Royal Forest, which protected the land for centuries. Woodlands were managed for timber and game and heathland was grazed. In the 13th century, much of the Forest was given to the church and managed by eight monasteries. The woods were still maintained for hunting but the increased demand for wood and timber gradually eroded large areas.

By the 16th century the monastic estates had been confiscated from the church and were in the hands of a few aristocrats, hence the area became known as "the Dukeries". Great country houses were surrounded by landscaped vistas and ornamental lakes, while large areas of parkland were retained for hunting. Later Dukes were pioneers of modern agricultural techniques and created water meadow systems in the river valleys to make use of the loam soils and alluvial nutrients.

In the last 150 years large areas of semi-natural habitats have been lost to coal mining, intensive agriculture and timber production. The landscape is now dominated by spoil heaps, arable fields and conifer plantations, although the Dukeries, including the Trial Area, contains the most striking remnants of the Forest, an important ecological resource and attraction for visitors.

2.2 Current land uses

Much of the Trial Area is covered by four large estates. Clumber Park and the Rufford Estate are owned by the National Trust and County Council respectively. Welbeck and Thoresby are privately owned. The estates manage some land themselves and lease the rest for leisure, forestry and farming. The main land uses in the Trial Area are:

- **Farming** - mainly intensive arable and pigs.
- **Leisure** - including Country Parks, a holiday village, golf courses and farm parks.
- **Forestry** - dominated by coniferous plantations managed by Forest Enterprise and private estates. Such forestry is relatively profitable here compared to other areas in England.
- **Coal mining** - two working pits, owned by RJB Mining Ltd, remain. The associated spoil tips offer large potential for habitat re-creation.
- **Urban** - the historic village of Edwinstowe is the Trial Area's only sizable settlement.

2.3 Summary of the Wildlife in the Trial Area

The Trial Area is characterised by two important wildlife habitats: heathland and wood-pasture Both support a unique assemblage of plant and animal species. Birklands and Bilhaugh, for instance contains ancient wood-pasture with a rich invertebrate fauna, and the largest area of heathland in the county. Areas more obviously influenced by humans, such as coniferous

plantations and arable land with its associated boundary features, are also important for wildlife. Clearings in conifer plantations harbour heathland species, including the nightjar, woodlark and adder. The latter species was thought to be extinct in the county until recently (Windrum 1997). Traditional low intensity arable farming is especially beneficial to ground nesting birds, like skylark and grey partridge.

Despite the free draining soils of the underlying sandstone, there are also significant freshwater habitats in the Trial Area. The ornamental lakes at Thoresby and Welbeck contain open water and fringing habitats important for breeding and wintering wildfowl, while the fringes of Thoresby lake have particularly fine examples of acid grassland, marsh and reedswamp.

Besides their intrinsic importance, these areas can act as sources of wildlife to spread into the wider countryside as fragmentation is reduced. Further details of Sherwood's wildlife are given in Section 3.

2.4 Status of Wildlife Habitats within the Trial Area

Several of the wildlife habitats within the project area are important on a national or international scale. Four Sites of Special Scientific Interest (SSSI), notified under the Wildlife and Countryside Act 1981, as amended; are partly, or wholly, within the Trial Area. One of these, Birklands and Bilhaugh, is also a candidate Special Area of Conservation (cSAC) under the EC Habitats Directive (1992) on the "Conservation of Natural Habitats and of Wild Fauna and Flora". The site has been listed as an example of "old acidophilous oak woods with *Quercus robur* [pedunculate oak] on sandy plains" which is a habitat on Annex I of the Directive.

The Biodiversity Action Plan (HMSO 1995), produced by the Government following the International Biodiversity Convention at Rio in 1992, lists the following Priority Habitats, which occur within the Trial Area:

- Lowland Heath
- Lowland wood-pasture and parkland
- Reedbeds
- Cereal field margins
- Lowland dry acid grassland
- Wet woodlands
- Lowland hay meadows
- Ancient and/or species rich hedges

Eutrophic standing water, rivers and streams are also Priority Habitats in the Local Biodiversity Action Plan "Action for Wildlife", (Nottinghamshire County Council 1998).

2.5 Key Issues in the Sherwood Trial Area

2.5.1 Nitrate Sensitive Areas (NSAs)

The sandstone which underlies Sherwood forms an aquifer which provides drinking water for local towns and cities. The water quality of this aquifer has been affected by the extensive use of fertilizers which is causing nitrate levels to rise (Windrum 1987). Most of the sandstone has, therefore, been designated as a Nitrate Vulnerable Zone, within which farmers will be required to adopt practices to reduce nitrate leaching from their land. Within this zone, in four Nitrate Sensitive Areas, farmers are encouraged to adopt more demanding practices, such as reversion from arable production. Two, Boughton and Amen Corner, are partly within the Sherwood Trial Area.

Payments are available to farmers, through MAFF, for a number of actions to reduce nitrate applications and increase nitrate uptake by crops. Option B, conversion of arable to unfertilised, ungrazed grass using an approved native seed mix, could provide the greatest benefit to wildlife. The botanical benefits are, however, likely to be fairly low, as eligible fields have high nutrient concentrations and an altered pH. This presents practical difficulties in establishing acid grassland or heathland, as they require nutrient-poor, acid soils. It would be more cost-effective to establish native woodland, but the NSA scheme does not currently include an option for tree-planting.

2.5.2 Water Resources

Low flows caused by a combination of drought, abstraction and subsidence have led to loss of wetland habitats. River engineering works to manage water flows have been widespread in the Trial Areas, and attempts to ensure long term water supplies for crop irrigation have led to construction of farm reservoirs filled from watercourses in winter. Several are being constructed in Sherwood and more are likely in the future. This is potentially a problem if lower than average winter flows lead to a decrease in the flooding needed to sustain wetland habitats, although the increase in open water may benefit waterfowl. Current and potential low flow problems in Sherwood's watercourses will be considered in the Environment Agency's current review of abstraction licenses.

2.5.3 Leisure interests

Sherwood Forest and the legend of Robin Hood have been a tourist attraction since Victorian times. A large proportion of land is used for leisure and is often managed to retain its traditional character. Where traditional parklands, woodlands and heaths contribute to the attraction of a leisure development, good nature conservation management will provide benefits for business interests.

2.5.4 Mining subsidence

The Nottinghamshire coalfield has left a legacy of subsidence throughout Sherwood. Most of the watercourses in the Trial Area have been affected by subsidence, leading to altered flows and loss of wetland habitats. Subsidence has led to the destruction of the channels necessary to sustain traditional water meadows.

British Coal undertakes corrective work where subsidence affects river flows, and if cultivated land is lost they also compensate farmers or restore the land. Some landowners have accepted compensation from British Coal where subsidence has occurred on floodplain and had the areas restored to wetland habitats rather than farmland. This has the potential to provide significant benefits for wildlife.

2.5.5 Urban fringe issues

Activities such as arson, motorbike scrambling, stock rustling and harassment have become an issue for several land managers in Sherwood. They threaten wildlife in terms of direct habitat loss and constraints on management. For example, due to urban fringe issues and the general lack of pastoral farms, grazing is only carried out on two sites within the Trial Area. Heathlands, which are ideally managed by grazing, are under particular threat. These issues must be faced and overcome if a long term system of sustainable management of heathland through grazing is to be implemented.

3. RESULTS OF THE WILDLIFE SURVEY

3.1 Methodology of the wildlife survey.

A field survey, based on standard Phase 1 methodology (Nature Conservancy Council 1990), was carried out during August and September 1997 after permission had been obtained from all landowners. Additional information on the quality and management of semi-natural areas was included, and a colour map produced to Phase I specifications. The desk study used a range of sources, including Nottingham Geological and Biological Records Centre, Nottinghamshire Wildlife Trust, RSPB, English Nature and Forest Enterprise, to determine the fauna of the Trial Area (Acton & Arnott 1997). A list of Species of Conservation Concern in Nottinghamshire is given in Appendix 1.

3.2 The Wildlife Habitats Recorded

3.2.1 Heathland and acid grassland mosaic

Lowland heathland is a globally rare and threatened habitat. The UK is considered to have about 20% of the world's total lowland heathland (HMSO 1995), despite having lost 75% of its resource since 1800 (Nottinghamshire Heathland Forum undated). In Nottinghamshire, 90% of heaths have disappeared since 1922 (Glasson 1987).

True heathland has at least 25% heather coverage (e.g. Nature Conservancy Council 1990), but the heathland landscape of Nottinghamshire typically comprises a mosaic of acid grassland, trees and scrub with scattered heather. The Nottinghamshire Heathland Forum uses the definition:

> '*any site that includes areas with heather species in the vegetation, and/ or areas of acid grassland with stands or scattered plants of oak, birch, bracken, gorse or broom*' (NHF cited in Fraser and O'Nions 1997).

Most sites consist of a dynamic mosaic of these habitats; and abundance of heathers, compared to acid grassland species such as *Deschampsia flexuosa* (wavy hair grass) and *Potentilla erecta* (tormentil), varies according to management. On any one site dominance may change over time.

Locally rare species of Nottinghamshire heathland include *Genista anglica* (petty whin), *Ulex minor* (dwarf gorse) and *Vaccinium myrtillus* (bilberry); birds such as nightjar and woodlark, and the Portland and small chocolate tip moths.

Much of the county's remaining 250ha of heathland is either within, or a few kilometres from, the Trial Area. Budby Heath, Clumber Park and Sherwood Heath contain sizeable tracts, and elsewhere fragments occur on road verges and glades and rides in woodlands. The heathland and scrub communities on some of the mineral railway embankments present significant further opportunities as potential heathland corridors.

3.2.2 Wood-pasture and parkland

The pasture woodlands of the Thoresby Estate, which include Birklands and Bilhaugh, and Clumber Park, were created by centuries of grazing by sheep, and browsing by pigs and deer. Some of the stag-headed veteran oaks are amongst the country's oldest trees, and support a diverse range of invertebrates and fungi, as well as birds like the green

woodpecker, redstart and treecreeper; and bats such as Noctule and Natterer's (Windrum 1987). Sherwood is also important for invertebrates of old and decaying birch.

A few trees have been measured repeatedly for many years, and on this basis it is estimated that the Major Oak, 10.5 feet in diameter in 1965, was then between 400 and 650 years old (Mitchell, cited in Rackham 1990).

3.2.3 Broadleaved woodland

Most ancient semi-natural woodland in Sherwood is wood-pasture. There are some areas of broadleaved plantations, owned by the large estates, as well as small farm woods. One small area of coppiced oak woodland has probably resulted from an attempted clearance, as coppice management is not characteristic of Sherwood.

3.2.4 Wetland habitats

Due to the porous nature of the underlying sandstone, natural wetlands are scarce in Sherwood. The river valleys were historically prone to flooding, and this was utilised by agriculturalists to create water meadows that flooded in the winter, accumulating nutrients. Although most of the irrigated water meadows which once lined the rivers have disappeared, examples can still be seen on the rivers Meden and Maun (Windrum 1997). Extensive engineering works in the last few decades have reduced flooding, while low water levels have been exacerbated by drought, mining subsidence and over-abstraction, resulting in habitat loss.

Today, the most valuable wetland habitats are the ornamental lakes at Clumber, Thoresby, Welbeck, Rufford and Centre Parcs. They are valuable for wintering and breeding wildfowl (including pochard, shoveler and goosander), and are often visited by migrating ospreys. Although the edges are generally steep banked some, notably at Thoresby, have excellent fringes with marshland and reedbeds, containing plants such as *Lycopus europaeus* (gipsywort) and the nationally scarce *Callitriche truncata* (short-leaved water starwort) (Windrum 1997). Wet grasslands and carr woodland are present along the rivers but are largely isolated in the Trial Area.

3.2.5 Farmland Habitats

i. Hedges

Hedges are the most important wildlife habitats in the areas of intensive agriculture. They provide a refuge for some grassland and woodland species and can act as corridors between semi-natural habitats. Hedges are a key habitat for many farmland birds, including grey partridge, linnet, corn bunting, turtle dove and tree sparrow, as well as providing nectar for invertebrates. Holly hedges are a distinctive feature of Sherwood's historical landscape. The droughts of the last decade have seen Sherwood's hedges suffer, and funding is available for restoration work from Countryside Stewardship or the County Council's Landscape Conservation Grant Scheme.

ii. Field margins and Beetle banks

Field margins are especially important for ground nesting birds. When a dense sward is created in a field margin, weeds such as cleavers and blackgrass can be eradicated, eliminating the need for spraying. This can then allow the hedge to regenerate, making

it more valuable as a stock fence (if grazing is occurring on the other side), wildlife habitat and landscape feature. Beetle banks, narrow (two metre) grass strips sown across fields, can provide similar benefits by providing cover for beneficial insects and nesting sites for game and other farmland birds.

iii. Set aside areas, small woodlands and old buildings

Other farmland habitats include set aside and small woodlands. These can act as stepping stones or corridors for butterflies, birds and small mammals to move between larger habitat patches. Old buildings and nest boxes can provide nesting sites for birds and bats.

4. OPPORTUNITIES FOR HABITAT RESTORATION

4.1 Introduction: identifying Target Habitats and Species

There is much scope for habitat restoration in the Trial Area; reversing fragmentation, restoring degraded habitats and improving the value of farmland for wildlife through less intensive agriculture. Using the following information, a series of target habitats were defined:

- topography and distribution of soil types
- past and present distribution of semi-natural habitats and farmland;
- the UK Biodiversity Action Plan (HMSO 1995) and EC Habitats Directive which identify national and international priority habitats and species;
- the Nottinghamshire Biodiversity Action Plan: Action for Wildlife (Nottinghamshire County Council 1998a) and the Sherwood Natural Area Profile (Windrum 1997), which identify those habitats and species which are locally most threatened;
- the Nottinghamshire Countryside Appraisal (Nottinghamshire County Council 1998b);
- local knowledge;

For each target habitat, target species were selected. These are species of international, national or local importance chosen as indicators (which demonstrate a high quality habitat able to support a suite of other species characteristic of the community), and as flagship species with popular appeal. They will be used in monitoring, and to promote the value of the habitats.

4.1.1 Target Habitats and Species

i. **Heathland:** a mosaic of lowland heathland and lowland dry acid grassland

ling and hoary ling heather	petty whin	western gorse
skylark	woodlark	nightjar
grey partridge	common lizard	green tiger beetle
hazel leaf beetle		

ii. **Wood-pasture and parkland**

veteran oaks (English and sessile)	ling heather	Natterer's bat
	long-eared owl	nightjar
green woodpecker	redstart	dead-wood beetles
false scorpions	spiders	

iii. **Broadleaved woodland:** oak-birch woodland on acidic, sandy soils

English and sessile oaks	bluebell	noctule bat
wood warbler	bullfinch	purple hairstreak butterfly

iv. **Wetland habitats:** eutrophic standing open water, rivers and streams, reed beds, wet pasture (lowland hay meadows) and wet woodlands

short-leaved water starwort	yellow iris	marsh marigold
tussock sedge	common reed	European otter
water vole	gadwall	pochard
teal	kingfisher	heron
brown trout	brook lamprey	

v. **Farmland habitats:** cereal field margins, ancient and/or species rich hedgerows

pipistrelle bat	yellowhammer	linnet
grey partridge	tree sparrow	song thrush
turtle dove	skylark	bullfinch

4.2 How the Area can be Improved for Wildlife

The best habitats are generally located on the higher, drier land between the rivers; where most leisure facilities and forestry are also located. The lower, moister land is intensively farmed, effectively forming barrier strips along the rivers, restricting movement of wildlife between patches of semi-natural vegetation. The Poulter, running through Clumber Park, is an exception.

To enhance wildlife populations we will seek to:

- Extend and link patches of semi-natural habitat on the higher ground; by restoring adjacent land, and creating buffer zones of sensitively managed land.
- Create new areas of semi-natural habitat.
- Link the main patches of semi-natural habitat by creating corridors or stepping stones of new or restored habitats running through the lower, arable land in the valleys.
- Enhance frequently flooded land in the river floodplain, including areas subject to subsidence, to form corridors of wetland habitats.

4.2.1 Action for Heathland and Acid Grassland Mosaic

i. Restoring heathland / acid grassland

Heathland which has become dominated by coniferous, mixed or broadleaved scrub or woodland can be restored relatively simply. If rides or glades are opened, relict heathland plants will benefit from the increased light. Heather seeds remain viable in the seed bank beneath conifer plantations for several decades, and even where no heathland plants are evident, successful restoration can be carried out by creating wide rides and clearings and controlling bracken. Restored heathland will need long-term management, preferably grazing. Management of bracken and birch scrub may also be required, although the latter should not be completely cleared as it is a valuable habitat for birds and invertebrates.

ii. Re-creating heathland / acid grassland

Heathland can be created on acidic soils (pH should be less than 6.5) with low nutrient levels (extractable P should be less than 25 ppm). These conditions will prevent competition from grasses. Several methods have been used locally, including transplanting turfs, seeding heather and scattering seed-bearing heather brash. Bare mineral soil provides the ideal substrate for heathland re-creation, and deep ploughing can be used to bury too-fertile topsoil and expose the sandy subsoil. The necessary machinery and expertise is available locally. Acid grassland provides a habitat for heathland species, and can be created on land that has been improved for agriculture.

iii. Funding sources:

Countryside Stewardship

- Management £20-50 /ha/yr
- Bracken and/or scrub control £50-500 /ha/yr
- Creation £275-325 /ha/yr

County Council Landscape Conservation Grant:

- Up to 75% of cost for small schemes*

4.2.2 Action for wood-pasture and parkland

i. Restoring wood-pasture and parkland

Wood-pasture which has succeeded to high forest, or been under-planted with conifers, can be opened up by clearing glades (especially around veteran trees, to relieve them of competition). To keep the habitat open, it will need to be grazed. Very dense bracken can restrict regeneration and can be controlled by whipping, rolling or spraying.

Parkland which has been cultivated can be restored to pasture and restocked with trees. A new generation of Veteran Trees can be encouraged by initiating pollarding of semi-mature trees and planting saplings. Acid grassland field margins or set aside, and restoring and creating new hedgerows will increase the value to wildlife.

ii. Funding sources:

Countryside Stewardship:

- Re-creating grassland on cultivated land £280-320 /ha/yr
- Lowland pasture / heathland management £20-115 /ha/yr
- Tree planting £6 per tree, £30 per guard
- Tree surgery £22.50 minor or £50 major
- Bracken and/or scrub control £50-500 /ha/yr

Forestry Authority Woodland Improvement Grant and Woodland Grant Scheme:

- Management £35/ha/yr or 50% contribution towards net costs of capital works
- Restocking £525 /ha

County Council Landscape Conservation Scheme

- up to 75% funding for small schemes*

4.2.3 Action for Broadleaved woodland

i. Managing and restoring broadleaved woodland

In this area, ungrazed woods were traditionally managed as high forest. The area around veteran trees should be opened up, and dead wood should be allowed to stand or lie where it falls; as it is a valuable habitat for invertebrates and fungi. Management of bracken, where necessary, can be carried out as for wood-pasture and parkland.

ii. Re-creating broadleaved woodland

Grants are available for establishing new native woods by natural regeneration or planting. Natural regeneration should always be considered but if planting is used, it is important to consider the provenance; local stock (from the Sherwood Natural Area where possible) will be adapted to local conditions. The Woodland Grant Scheme allows a lower stocking density for broadleaves, if conservation is the primary objective. Plantations on improved grassland or arable land can also be counted as set aside, and attract extra funding. The main tree species should be oak and birch, along with shrubs

like holly, rowan and hawthorn. New woods can be located throughout the area but should not be established on extant semi-natural habitat.

iii. Funding sources:

Forestry Authority Woodland Grants:

- New woodland establishment £1350 /ha (an extra £600 is available for planting on improved grassland or arable and the area can count towards your set aside obligation if the field is IACS registered.)
- Natural woodland regeneration £525
- Management of existing woods £35 /ha/yr
- Restocking of existing woods £525
- 50% of costs can be met under the Woodland Improvement Grant to improve a woodland for biodiversity
- Timber thinned or felled can produce an income in its own right.

County Council Landscape Conservation Scheme

- up to 75% funding for small schemes*

4.2.4 Action for Wetland Habitats

i. Wetland restoration

For greatest value to wildlife, banks should slope gently, to support a range of submerged, floating, emergent and marginal plant species. Sections of the bankside should be kept free of dense vegetation; and other sections allowed to develop into willow and alder scrub, which will attract birds such as the lesser spotted woodpecker. Opportunities for reed bed creation should be taken.

ii. Wetland re-creation

Countryside Stewardship funding is available to return cultivated riverside land to meadow or pasture; or to establish buffer strips of grassland or woodland, which reduce soil erosion and pollution. Floodplains offer an opportunity for creating wildlife corridors, which will benefit species like the water vole and otter. Flood plain woodland is being increasingly considered. Mining subsidence has already led to the creation of a small number of wetlands (see 2.5.4) and further opportunities will be explored. Irrigation lagoons are an increasingly common feature of farmland, due to uncertainty over the long term stability of abstraction licenses. These can be beneficial for breeding and wintering waterfowl.

iii. Funding sources:

Countryside Stewardship

- Re-creating grassland on cultivated land £280-320 /ha/yr
- Lowland pasture / meadow management £50-85 /ha/yr
- Culvert £40
- Soil bund £40
- Timber sluice £140

4.2.5 Action for Farmland Habitats

Farmers are traditionally the guardians of the countryside and support, in terms of funding, practical assistance, and appropriate seed materials and machinery, is

increasingly available to help them in this role. Linking habitat patches through intensive arable farms can be funded using Countryside Stewardship and Forestry Authority woodland grants as well as the County Council Landscape Conservation Grant Scheme. Tall, bushy hedges, set aside and field margins can be very valuable for wildlife. Field margins can buffer existing habitats, and set aside strips sown with acid grassland species could be located to strengthen heathland corridors provided by mineral railways, woodland rides and road verges. Small woodlands in difficult or unproductive field corners may act as stepping stones for woodland birds.

i. Hedgerow restoration

The ideal hedge for wildlife and weed control is about 2m tall, dense, bushy and broad at the base. Funding is available to restore gappy hedges, by coppicing, laying and/or planting. Ideally, trimming should occur only once every two or three years, or alternate sides be trimmed each year; and ploughing right into the base of the hedge should not occur. A field margin with a dense grass sward will help eradicate weeds, and provide nesting and feeding habitat for game birds such as the grey partridge. Oak is ideal for planting in gaps or beside the hedge, besides supporting more species of wildlife than any other tree, it is deep rooting and will not interfere with cultivation. Trees can shade out other species, so shade-bearing shrubs like holly should be planted beneath them.

ii. Hedgerow creation

New hedges can be used to re-establish links between existing hedges and woods. They also help to reduce the loss of topsoil caused by wind blow which is common in dry spells. Species-rich hedges are not characteristic of Sherwood, but a range of shrubs including hawthorn, blackthorn, crab apple and holly will provide most benefit for wildlife, especially if oaks are planted every 20m or so.

iii. Field margins and Beetle banks

Field margins, including beetle banks, command £580-750 /ha/yr from Countryside Stewardship, which is quite favourable compared to crop yields. If weeds are a problem, a properly managed, dense grass sward will eradicate them, and 6m margins can be used as an informal farm track. A range of grass seeds are suitable, but the acid grassland seed mix (set out in **vi** below), would be most suitable.

iv. Set-aside

Options include natural regeneration, wild bird cover, a combination of two different crop groups, or woodland (under the Farm Woodland Premium Scheme). Again, the most suitable for wildlife is the acid grassland mix. Set aside will be most useful for wildlife if it is either located in strips throughout the farm to act as wildlife corridors, or adjacent to a wood or heath to act as a buffer. Permanent set-aside is better habitat than rotational, and not cutting until after the spring will benefit breeding game birds.

v. Nitrate Sensitive Areas

There are two NSAs in the Trial Area and four in Sherwood as a whole. There are various options within the current NSA scheme designed to reduce nitrogen inputs on farmland. Option B, conversion of arable land to unfertilized, ungrazed grass using an approved seed mix, would be the best option for wildlife.

vi. Acid grassland seed mix

A mix of common bent, sheep's fescue and wavy hair grass can be sown on set aside and in field margins. This creates a tussocky sward that effectively controls weeds like cleavers, as well as providing valuable wildlife habitat. Advice and access to seed is available.

vii. Funding sources:

Countryside Stewardship

- Hedgerow management £1 /m
- Hedgerow restoration £2-3 /m
- 6m field margin £35 /100m/yr (equivalent to £580 /ha/yr)
- 2m field margin and beetle banks £15 /100m/yr (equivalent to £750 /ha/yr)

Woodland Grant Scheme for small farm woods

- as for broadleaved woodland

Nottinghamshire County Council Landscape Conservation Grant Scheme for hedges or tree planting

- up to 75% funding for small projects*

Nitrate Sensitive Area Payments

- Option B £590 /ha/yr

Funding sources: *Figures quoted above provide an indication of the level of funding available for habitat restoration in financial year 98/99. The figures are likely to be revised for 99/00.*
** This is a special rate partly funded by the Habitat Restoration Project.*

4.3 The Restoration Opportunities Map

The information presented above has been used to identify those parts of the Trial Area where particular types of habitat restoration and creation will benefit wildlife most. This information is shown in Map 1. Existing areas of broadleaved woodland, wood pasture and parkland; conifer plantation, heathland and acid grassland; and open water habitats are also shown.

The map has been designed to show interested land managers how their land fits into the ecology of Sherwood as a whole, and presents options which if adopted, would benefit wildlife through the area as a whole. The options range from relatively small scale works, like restoring hedgerows, to large scale heathland restoration.

It should be emphasised that the information provided in this report is designed to help farmers and other land managers to decide which option, if any, to adopt on their land. The final extent and location of any new or restored habitats will depend entirely on their co-operation and goodwill.

5 IMPLEMENTING THE RESTORATION OPPORTUNITIES

5.1 Implementation

Section 4 identifies priority habitats and species within the Sherwood Trial Area and the mechanisms and financial incentives available to assist its implementation (summarised in appendix 2). The project will only succeed with the support and assistance of farmers, other landowners and our partner organisations.

5.2 Progress to date

In the first 6 months of the Project we have concentrated on the following:

i. Discussions with landowners and managers about the project and how they can get involved. Many have allowed us to survey the existing wildlife value of their land, and have participated in an assessment of their views of the value of existing Environmental Land Management Schemes (ELMS).

ii. Discussions with representatives of statutory and non-statutory countryside organisations; how we can work together to achieve wildlife gain, and what ELMS are available to farmers and other land managers to enable them to enhance biodiversity on their land. The ways in which other organisations can support the project are listed in Table 1.

iii. Setting up an Advisory Group and a Steering Group, comprising representatives of countryside organisations and the landowning community.

iv. Using the results of our wildlife survey, and existing local records, to identify priority habitats and species which are present, or have recently been recorded, within the area.

v. Combining this information to develop opportunities for restoring a more wildlife friendly countryside, with particular reference to Biodiversity Action Plan habitats and species.

vi. Seeking opportunities to assist land managers with habitat restoration work, to publicise habitat restoration and to facilitate sharing of best practise amongst land managers.

Work carried out by a number of organisations is already contributing to the Project's success:

- Forest Enterprise (FE) are re-creating and restoring oak-birch woodland and heathland. In addition, the conifer rotation supports a dynamic succession of temporary patches of heathland, linked by a network of permanent heathland in rides and small clearings. This provides habitats for a range of wildlife including woodlark, nightjar and common lizard. FE are also restoring wood-pasture in western Birklands by clearing the area around veteran trees. Such creative forest management is a model for further work in the Trial Area. Countryside Stewardship Scheme and the Forestry Authority Woodland Improvement Grants are available to private owners.

- There is a high level of awareness among some leisure interests, and some have spent much effort maintaining and restoring wildlife habitats. Well-managed woodland or

heathland can exist alongside a large number of visitors and are attractions in their own right. Positive links have been established between these interests and the Habitat Restoration Project.

- Two coal pit tips within the Trial Area will be restored to woodland and heathland as well as to agriculture. RJB Mining Ltd are restoring three tips just outside the Trial Area to heathland, which will be valuable links between three adjacent heathland SSSIs.

5.3 Promotion

Over the next few months we will consult more widely over the vision and its implementation. Ways in which partner organisations can help are summarised in Table 1. We will be working on the following issues:

5.3.1 Canvassing opinion on the vision statement and its implementation by consulting with the following:

i The Advisory Group.
ii Farmers and other landowners.
iii Statutory and non-statutory countryside organisations.

5.3.2 Implementing the vision at farm level by:

i Continuing to promote habitat restoration, ELMS, local advisory services and other support mechanisms to land managers in the farming, forestry, mining and leisure sectors. Face to face visits will be followed up with guidance and support where necessary.
ii Maintaining and developing working relationships with other public sector providers of countryside management advice, and working with them to develop a consistent, coherent and efficient service for land managers.
iii Providing advice and practical help for landowners; including assisting with ELMS applications, identifying other sources of funding and facilitating access to specialist machinery, advice, labour and seeds (of local provenance where possible).
iv Seeking opportunities to add value to existing initiatives and to work with partners. One such opportunity is to work with Nottinghamshire's Heathland Strategy Steering Group, who have set targets for habitat recreation and management and amassed significant support for such work.

5.3.3 Publicising the Project and habitat restoration by:

i Facilitating the development and promotion of best practice by organising demonstration events alone and in conjunction with Advisory Group members for all sectors of the land management community.
ii Continuing to submit articles to specialist publications and the popular press.
iii Seeking opportunities for joint publicity with partner organisations through press releases, events and publications.

5.3.4 Monitoring the success of the project by:

i Monitoring take-up of ELMS within the Trial Area.
ii Maintaining a dialogue with land managers to evaluate their opinions of these schemes.
iii Ecological monitoring of the Trial Area over a 10 year period.

5.4 Acknowledgments

The authors would like to acknowledge the assistance given by the large number of people and organisations who have commented on earlier drafts of this report, particularly the members of the Sherwood Trial Area Steering Group. Acknowledgement should also be made to the many English Nature specialists who contributed to this report, and to Sallie Bailey of EN's Geographic Information Unit, who produced the opportunities map.

Table 1. Ways in which other countryside organisations can support the Sherwood Habitat Restoration Project.

Organisation	Potential Contribution
Ministry of Agriculture, Food and Fisheries	Responsible for administering the ELMS including Countryside Stewardship Scheme, Set-aside and Nitrate Sensitive Area (NSA)
Farming and Rural Conservation Agency	The Stewardship Officer is able to advise on the acceptability of individual Countryside Stewardship applications. The NSA officer is responsible for liaison with farmers regarding advice and applications under this scheme.
Agricultural, Development Advisory Service (ADAS)	Able to provide advice on habitat restoration and management at a whole farm level, and on Environmental Land Management Schemes (ELMS).
Countryside Commission	Can provide advice on the landscape implications of the Habitat Restoration Options for Sherwood.
Forestry Authority	Responsible for administration of the Woodland Grant Scheme (WGS) and Woodland Improvement Grant (WIGS) and can advise on individual applications.
Forest Enterprise	Responsible for the management of several sites where wood-pasture and heathland restoration projects are being undertaken.
Environment Agency	Advice on river and flood plain restoration. May be able to promote small projects such as tree planting, ponds, riverside strips and reedbed creation.
Country Landowners Association	Able to promote the project among its membership, including assisting with farm walks and demonstrations.
National Farmers Union	Able to promote the project among its membership, including assisting with farm walks and demonstrations.
Nottinghamshire County Council	Help and advice including use of its Conservation Grants. Can enhance the value of road verges as linking habitats through its management policies
Nottinghamshire Heathland Forum	Help and advice with practical conservation work and sharing best practice.
Game Conservancy Trust	Able to provide advice, including a range of fact sheets on many aspects of habitat restoration and management. An advisor on restoration management for wildlife and game is available to assist with farm demonstration events.
Farming and Wildlife Advisory Group	Able to provide advice, including a range of fact sheets on many aspects of habitat restoration and management. FWAG's whole farm "Landwise Plans" provide a suitable methodology for delivering the aims of the project.
Royal Society for the Protection of Birds	Able to provide advice, including published fact sheets on many aspects of habitat restoration and management. Can provide detailed advice on habitat restoration/management for birds.
Nottinghamshire Wildlife Trust	Able to provide help and advice on all aspects of habitat restoration and management. In particular in relation to SINCs and NWT Nature Reserves.
Woodland Trust	Able to provide help and advice on all aspects of woodland creation and management.

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Appendix 1. Species of Conservation Concern in Nottinghamshire

The following Species of Conservation Concern in Nottinghamshire (Nottinghamshire County Council 1997) are known to occur in the Trial Area. The plants were recorded during the Phase I survey, the lists of birds, mammals, herptiles and insects were compiled from the desk study. Priority Species under the UK Biodiversity Action Plan (HMSO 1995), and those mentioned in the Natural Area Profile for Sherwood Forest (Windrum 1987), are indicated as follows:
BAP Priority = Priority Species for the UK Biodiversity Action Plan,.
NA = mentioned in the Natural Area Profile as a significant species for one or more habitats.
NAE/D = mentioned in the Natural Area Profile as Extinct or Declining in Sherwood.

Vascular Plants Scientific Name	**English Name**	**BAP Priority**	**NA**	**NAE/D**
Agrimonia procera	Fragrant agrimony			
Anagallis arvensis	Scarlet pimpernel			
Anchusa arvensis	Bugloss			
Callitriche stagnalis	Common water-starwort			
Callitriche truncata	Short-leaved water-starwort		✓	
Calluna vulgaris	Heather			
Carex muricata ssp lamprocarpa	Prickly sedge			
Crepis capillaris	Smooth hawk's beard			
Epipactis helleborine	Broad-leaved helleborine			
Euphorbia peplus	Petty spurge			
Euphrasia anglica	Eyebright spp			
Geranium pratensis	Meadow crane's-bill			
Gnaphalium sylvaticum	Heath cudweed			
Hyacinthoides non-scripta	Bluebell			
Hydrocotyle vulgaris	Marsh pennywort			
Hypochaeris glabra	Smooth cat's-ear			
Lapsana communis	Nipplewort			
Onopordum acanthium	Cotton thistle			
Papaver dubium	Long-headed poppy			
Persicaria lapathifolia	Pale persicaria			
Potentilla argentea	Hoary cinquefoil			
Quercus x rosacea	Hybrid Oak			
Reseda luteola	Weld			
Ribes alpinum	Mountain currant			
Ribes nigrum	Black currant			
Rorippa nasturtium-aquaticum	Watercress			
Rosa sherardii	Sherard's downy rose			
Salix pentandra	Bay willow			
Sinapis arvensis	Charlock			
Stellaria graminea	Lesser stitchwort			
Stellaria uliginosa	Bog stitchwort			
Thymus polytrichus	Wild thyme			
Trifolium dubium	Lesser trefoil			
Ulex gallii	Western gorse			
Ulex minor	Dwarf gorse			
Vaccinium myrtillus	Bilberry			
Veronica agrestis	Green field-speedwell			
Viola riviniana	Common dog violet			

Birds	BAP Priority	NA	NAE/D
Barn owl			✓
Bewick's swan		✓	
Black tailed godwit			
Blackbird			
Blackcap			
Blue tit			
Brambling			
Bullfinch	✓		
Buzzard			
Chiffchaff			
Coal tit			
Common tern			
Curlew			
Dunnock			
Fieldfare			
Gadwall		✓	
Garden warbler			
Garganey			
Golden plover			
Goldfinch			
Goshawk			✓
Grasshopper warbler			
Great tit			
Greater spotted woodpecker			
Green Woodpecker			
Greenfinch			
Grey partridge	✓		✓
Grey heron			
Grey wagtail			
Hawfinch			
Hen Harrier			
Herring gull			
Hobby			
Honey Buzzard		✓	
House martin			
Kestrel			
Kingfisher			
Lapwing			✓
Lesser whitethroat			
Lesser black-backed gull			
Lesser spotted woodpecker			✓
Linnet	✓		
Mallard			
Marsh tit			
Meadow pipit			
Merlin			
Mute swan			
Nightjar	✓	✓	
Nuthatch			

Birds (Cont'd)	BAP Priority	NA	NAE/D
Oystercatcher			
Pied wagtail			
Pintail			
Pochard			✓
Redstart			
Redwing			
Reed bunting	✓		
Reed warbler			
Sedge warbler			
Shelduck			
Shoveler		✓	
Skylark	✓	✓	
Snipe			✓
Song thrush	✓		
Spotted flycatcher	✓		
Starling			
Stock dove			
Stonechat			✓
Swallow			
Tawny owl			
Teal		✓	
Tree pipit			
Tree sparrow	✓		
Treecreeper			
Tufted duck			
Turtle dove	✓		
Waxwing			
Whinchat			✓
Whitethroat			
Whooper swan			
Wigeon			
Willow warbler			
Willow tit			
Woodcock			
Woodlark	✓	✓	
Yellow wagtail			
Yellowhammer			
Mammals			
Badger			
Brandt's bat			
Brown long-eared bat			
Brown hare	✓		
Common shrew			
Daubenton's bat			
Fallow deer			
Hedgehog			
Leisler's bat			
Natterer's bat		✓	

Mammals (Cont'd)	BAP Priority	NA	NAE/D
Noctule		✓	
Otter			
Pipistrelle	✓		
Pygmy shrew			
Red deer			
Roe deer			
Stoat			
Water vole	✓		
Weasel			
Whiskered bat			
Yellow-necked mouse			
Herptiles			
Adder			
Grass snake			
Common lizard			
Slow worm			
Great-crested newt	✓		
Smooth newt			
Common frog			
Common toad			
Dragonflies			
Common hawker			
Black darter			
Butterflies			
Green hairstreak			

Appendix 2. Summary of the Key Mechanisms and Incentive Schemes for Implementing the Restoration Opportunities

MAFF Countryside Stewardship

This scheme provides revenue and capital payments for the management of a wide variety of key habitats and traditional land uses, with additional payments for provision of new public access. Acceptance into an agreement is discretionary, and lasts for 10 years.

MAFF non-rotational and rotational set-aside

Payments are eligible for set-aside land that falls into grassland or natural regeneration management options. Relevant areas of land are eligible for the basic set-aside payment under the Arable Area Payments Scheme.

MAFF Nitrate Sensitive Areas

This scheme provides payments for farmers in exchange for actions to reduce nitrate applications and increase nitrate uptake by crops. A number of options are available but currently "Option B": Conversion of arable to unfertilised, ungrazed grass using an approved native seed mix, provides the greatest potential benefit to wildlife.

Forestry Authority Woodland Grant Scheme

Capital payments are made for tree planting with the highest payments available for planting on arable land or improved grassland. 70% of the payment is made after planting and the remaining 30% five years later. There is a capital payment for re-stocking with broad-leaved species. Additional payments are available for woodlands of special environmental potential; any woodland which has public access; woodland which needs to be protected from grazing stock; and for any work needed to encourage natural regeneration.

MAFF Farm Woodland Premium Scheme

Revenue payments are made for woodland which is planted on qualifying agricultural land which has been planted under the Woodland Grant Scheme. Payments are given over 15 years for broad-leaved plantations and over 10 years for conifers.

English Nature Schemes

Reedbeds: Capital payments are available for the restoration of existing reedbeds and the creation of new reedbeds. The scheme is administered by the RSPB.

Wildlife Enhancement Scheme: Revenue and Capital payments are available for up to 100% of the costs of managing SSSIs.

Nottingham County Council - Landscape Conservation Grant Scheme

Grants up to 75% to assist with small conservation projects. This a special rate partly funded by the Habitat Restoration Project.

Organic Aid Scheme

This is aid available to farmers who wish to convert to organic production during the period of conversion. Payments are progressively reduced over 5 years and payments vary from area to area. A standard additional payment is made for the first 5ha for all farmers and growers.

A number of grants from a variety of sources are also available for community groups.

In addition to the incentive schemes, the following should also be considered as options to assist in the implementation of the project:

- **FWAG Landwise and Whole Farm Plans.**
- **Heritage lottery funds.**
- **European Union LIFE funds**
- **assistance from the Nottingham Countryside Management Service**
- **assistance from the Environment Agency**