Charnwood Forest:

A Living Landscape

An integrated wildlife and geological conservation implementation plan

Leicestershire & Rutland Wildlife Trust

March 2009

Cover photograph: Warren Hills, Charnwood Lodge Nature Reserve (Michael Jeeves)

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Bradgate Park (photo: Stephen Woodward)

1. Executive summary

Background
The Leicestershire and Rutland Wildlife Trust has always considered Charnwood Forest to be a place of special importance for nature conservation and it has as a result tried to acquire land in the area and to lobby for its protection. It has identified the Forest as a priority for landscape-scale conservation work.

Attempts to secure the designation of the Forest as an Area of Outstanding Natural Beauty have failed, but it has been identified in the East Midlands Regional Spatial Strategy as a possible Regional Park. The Trust is uncertain as to the usefulness of this non-statutory designation and is concerned that it could result in damaging recreational development. Furthermore, the Trust still believes that the importance of Charnwood Forest is greater than regional. Neverless, the Trust has participated in stakeholder events held by Leicestershire County Council and has commented on the draft vision statement for Charnwood Forest.

Purpose of the plan
A decision was therefore made to evaluate the present nature conservation importance of the Forest, as well as the threats to it and the opportunities to enhance it, and to produce a plan that the Trust, with support from others, could use to advance its aims in a more structured way than hitherto. Reviewing the report *Wildlife Conservation in Charnwood Forest*, prepared in 1975 by the Nature Conservancy Council, LRWT, LCC and Loughborough Naturalists' Club, would assist this process. The plan would also be used to influence the objectives of other organisations.

The boundary
The geological boundary of Charnwood Forest can be drawn with much more certainty than its ecological counterpart. The former, however, excludes many ecologically important sites of Charnwood Forest character. There is no firm historical boundary to Charnwood Forest.

The Trust has therefore selected a boundary that includes within it all of the land that it considers has Charnwood Forest character, including some peripheral land the character of which is intermediate between the Forest and the adjacent area. The area covers about 17,000 ha.

Description
Its Precambrian rocks and a landscape of craggy hilltops that is strikingly different to anywhere else in the lowland East Midlands define Charnwood Forest. The rocks, which are of volcanic origin, weather to produce poor, acid soils that until comparatively recently were very unattractive to farmers. The difficult terrain has contributed to the survival of substantially more biodiversity than elsewhere in Leicestershire. Trees and woodland, grassland (including heath, neutral and marsh) wetland (fast-flowing streams, man-made pools and reservoirs), rocks and built structures are the main wildlife habitats present.

Evaluation
The geology of Charnwood Forest is of international importance and it contains a variety of wildlife habitats that are considered to be of national, regional and local importance. Semi-natural ancient woodland, pasture woodland, unimproved neutral grassland and marsh are the most valuable habitats. The Bradgate Park Estate (340ha), Charnwood Lodge, including Charley Woods (220ha) and Ulverscroft Nature Reserve (56ha) are the most important properties. A number of species groups are of regional significance.

The 21 legally protected Sites of Special Scientific Interest (SSSIs) in the area cover 8.2% of it, compared to about 1.3% over Leicestershire as a whole. Local Wildlife Sites cover 5.3% of the Forest, compared to 1.25% of Leicestershire and Rutland. There can be little doubt that Charnwood Forest is the most important area in Leicestershire for both wildlife and geology.

Review of the 1975 report
Despite the publication of the 1975 report, the nature conservation importance of Charnwood Forest has subsequently declined. All of the best sites have lost plant species, the reservoirs have become eutrophic (nutrient rich), Buddon Wood has been greatly reduced in size by quarrying and changes in farming practices have greatly reduced numbers of farmland birds. Old pasture land has been badly affected, but heath-grasslands have fared better, with significant restoration work taking place. Quarry companies have carried out some valuable habitat creation work. Nature reserves have maintained a higher quality than most other key sites.

Animal and plant populations have inevitably changed. Some, for example the Snipe, have been lost through habitat destruction and degradation, while a few, such as the Buzzard, have returned, probably because of less human persecution.

Geological conservation now receives greater recognition and there are a network of Regionally Important Geological and Geomorphological Sites (RIGS), with improved access and interpretation.

Few of the recommendations in the 1975 report have been fully achieved, probably partly because of the absence of a regular mechanism for review, as well as resource and other problems such as the lack of a co-ordinated attempt to secure community support. The most ambitious recommendation was that all SSSIs should be managed as nature reserves, but sadly no further SSSIs became nature reserves in the subsequent 33 year period.

Current threats
There are still many threats to wildlife in the Forest, especially from habitat destruction, habitat fragmentation and climate change. The last two were not listed as threats in 1975.

Existing initiatives
There are many nature conservation initiatives currently being promoted to address the needs of wildlife and geology. These include legal protection and management of the best sites, targeted advice to the owners and managers of the best non-statutory sites, advice to farmers on fertiliser run-off and soil erosion in

the Blackbrook Reservoir catchment, nature reserves, Country Parks, The National Forest, stakeholder events and RIGS. There is, however, no initiative dedicated to conserving nature in Charnwood Forest as an entity.

New long-term objectives
These are:

- **To maintain geological and geomorphological features**
  Existing sites must be protected and new ones sought.

- **To enhance the best wildlife sites**
  Conserving these remains the most important aim in wildlife conservation.

- **To create new habitats and improve habitat connectivity and complexity**
  The creation of new habitats, which will not be the same as old ones, is essential to make existing sites more viable in the long-term and to provide for species that have insufficient habitat at present.

- **To allow changes to occur through the dynamism of nature, including climate change**
  Landscapes are always changing, as are habitats and the species that occur in them. A balance needs to be struck between trying to maintain existing features such as old meadows and allowing change to occur. The latter is an important part of nature conservation too. Nature conservation should be an explicit objective over as large a proportion of the land surface as possible to allow dynamic processes to maintain wildlife.

- **To enable people to experience nature in a sustainable way**
  Large numbers of people already visit Charnwood Forest and an increase could put further pressure on the natural environment. There is, however, significant potential in the area to inform people about the special nature of Charnwood Forest and help them enjoy and learn from it. Careful planning is therefore essential, and nature reserves must remain as places where nature takes priority. Opportunities for recreation should be sought in the surrounding area, especially that part of The National Forest outside of Charnwood Forest.

Action plan
This covers a five-year period and aims to address the objectives set out in the implementation plan. Work on some of the actions is already taking place, but not in a co-ordinated way. Funding will be needed to do more. The action plan is written for the Trust to work on, but the support of others will be needed in order to make progress on some of the actions. The intention is to prepare an annual work plan that can be costed and progress assessed.

A vision of the future
'Our vision is for a Charnwood Forest that has a healthy environment, rich in geology, wildlife and wild places, with opportunities for people to learn about and enjoy the beautiful and exceptional landscape. It will be a place where wildlife can move through it freely and not be confined to a few special sites, and natural processes are allowed to function, in other words a living landscape'.

2. Introduction

2.1 Location

Charnwood Forest is located in north-west Leicestershire, part of it being in The National Forest.

Although the location of the core area of Charnwood Forest is clear, opinion varies as to where the exact boundary should be drawn. Fig. 1 shows the boundaries chosen for use in both this and the 1975 reports. In addition to the core area of Precambrian rocks, the new boundary (which encloses approximately 17,000 ha of land) includes the Mountsorrel granite zone and all of the land inbetween. The south-east and south boundries follow the route of the Rothley Brook, the north-west boundary stretches to take in the Grace Dieu Brook, Holly Hayes Wood and Coalville Meadows, and the northern boundary also stretches to include Hookhill and White Horse Woods.

The boundary chosen for this plan, which is not very different from that of Natural England's Natural Area, enables the Trust to focus its attention on an area that encompasses all of the important sites that various authorities consider to be of Charnwood Forest character and to try to knit them together into one entity. That is landscape scale nature conservation.

2.2 Nature conservation context

There are 21 Sites of Special Scientific Interest in Charnwood Forest, covering 1397.66 ha (Figs. 2 & 3). Hirst (1997) stated that 12% of the Forest was SSSI, although this would appear to be over-estimated and 8.2% is a better figure. Leicestershire as a whole has only about 1.3% SSSI cover, one of the lowest of any English county, while the national average is about 6%.

Fig. 2 Charnwood Forest Sites of Special Scientific Interest

Name	Area (ha)	Reason for notification
Bardon Hill	13.2	Heathland/woodland/invertebrates
Bardon Hill Quarry	78.8	Geology
Beacon Hill, Hangingstone and Outwoods	140.8	Birds/alder woodland/geological
Benscliffe Wood	10.1	Lichens
Blackbrook Reservoir	38.6	Mesotrophic lake/marginal plants/crayfish/birds
Botcheston Bog	3.19	Marshy grassland
Bradgate Park and Cropston Reservoir	392.6	Ancient parkland/wet heath/marginal plants/breeding birds/geology
Buddon Wood and Swithland Reservoir	190.72	Birch-oak woodland/tall-fen and inundation plants/wintering wildfowl/geology
Charnwood Lodge	137.6	Moorland/geology
Cliffe Hill Quarry	20.1	Geology
Coalville Meadows	6.2	Neutral grassland

Grace Dieu Wood and High Sharpley	89.3	Heathland/geology
Groby Pool and Woods	29.39	Alder woodland/grassland/marsh/ reedswamp/open water
Main Quarry, Mountsorrel	14.2	Geology
Newhurst Quarry	9.1	Geology
One Barrow Plantation	1.91	Geology
Roecliffe Manor Lawns	1.28	Fungi
Sheet Hedges Wood	22.57	Ancient woodland
Swithland Wood and The Brand	86.2	Ancient woodland
Shepshed Cutting	6.1	Geology
Ulverscroft Valley	105.7	Grassland/heathland/woodland/wetland

Local Wildlife Sites are also very well represented in Charnwood Forest, with a remarkable concentration in the Ulverscroft valley (Fig. 3). It should be noted, however, that survey work particularly in the north-west of the area is incomplete and and further LWS will be identified there. Important streams that will certainly meet LWS criteria, especially the River Lin, Grace Dieu Brook and part of the Rothley Brook, have also not yet been evaluated.

At present designated LWS cover 893ha (plus 33km of linear habitats), covering 5.3% of the Forest. The cover over Leicestershire and Rutland as a whole is only 1.25%.

2.3 Background

The 1973 Leicester and Leicestershire Structure Plan identified a concern that growing recreational use of Charnwood Forest was causing problems including 'increasing destruction of the natural resource'. Leicestershire County Council resolved to follow an interim policy of looking for new recreation areas away from Charnwood Forest and to undertake a major study of the Charnwood area. As part of this study the Council requested a report from the Nature Conservancy Council on wildlife conservation in Charnwood Forest (Anon. 1975). It was compiled by a working party composed of representatives of the Nature Conservancy Council, Leicestershire and Rutland Wildlife Trust, Leicestershire County Council and Loughborough Naturalists' Club, and despite its title also addressed geological conservation.

The 1975 report included recommendations for the conservation of Charnwood Forest's natural heritage, but there has been no concerted attempt to implement them. Moreover, since the 1970s recreational pressure on the Forest has certainly not abated and new threats to wildlife have emerged. There have been calls for the Forest to be declared an Area of Outstanding Natural Beauty, in order to provide more protection to it, and more recently a proposal has been made that it should become a Regional Park. Leicestershire County Council has initiated new public discussion on the future of the Forest and LRWT therefore decided to undertake a review of nature conservation progress in the area since the publication of the 1975 report.

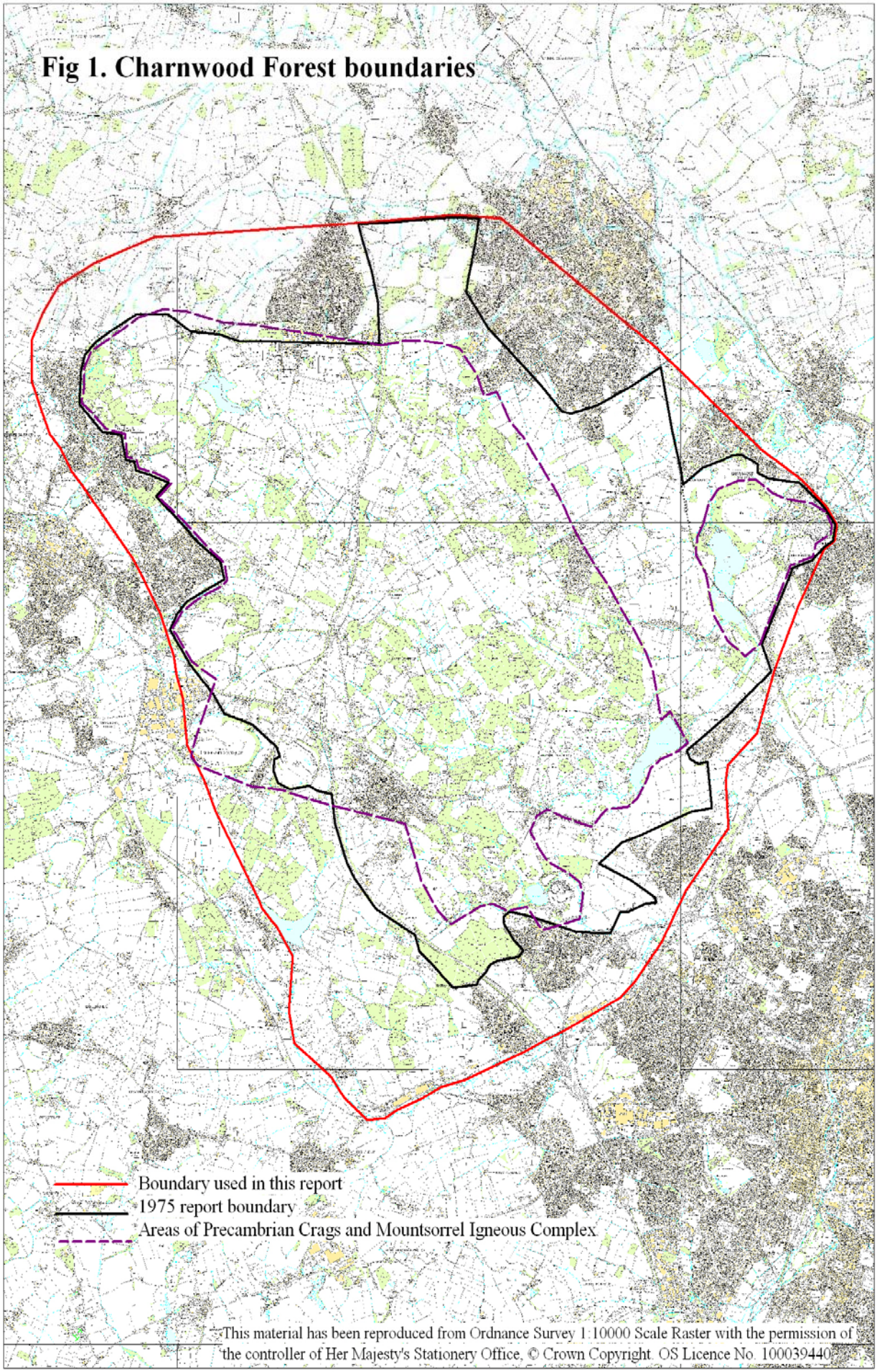
Fig 1. Charnwood Forest boundaries
Boundary used in this report
1975 report boundary
Areas of Precambrian Crags and Mountsorrel Igneous Complex
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This plan reviews the nature conservation importance of Charnwood Forest without repeating all of the valuable information contained in the original document. It makes makes use of much new information that has become available in the last 30 years, looks at how effectively the recommendations in the 1975 report have been implemented and makes new recommendations for the future, taking into account new pressures and new ideas in nature conservation. It also aims to utilize all of the work that has gone into the Leicester, Leicestershire and Rutland Biodiversity Action Plan process over the last 10 years. An Action Plan section is included that can be worked on by LRWT, with support by others.

The following habitat actions plans relevant to Charnwood Forest appear in the LLRBAP (see www.lrwt.org.uk/bap.asp):

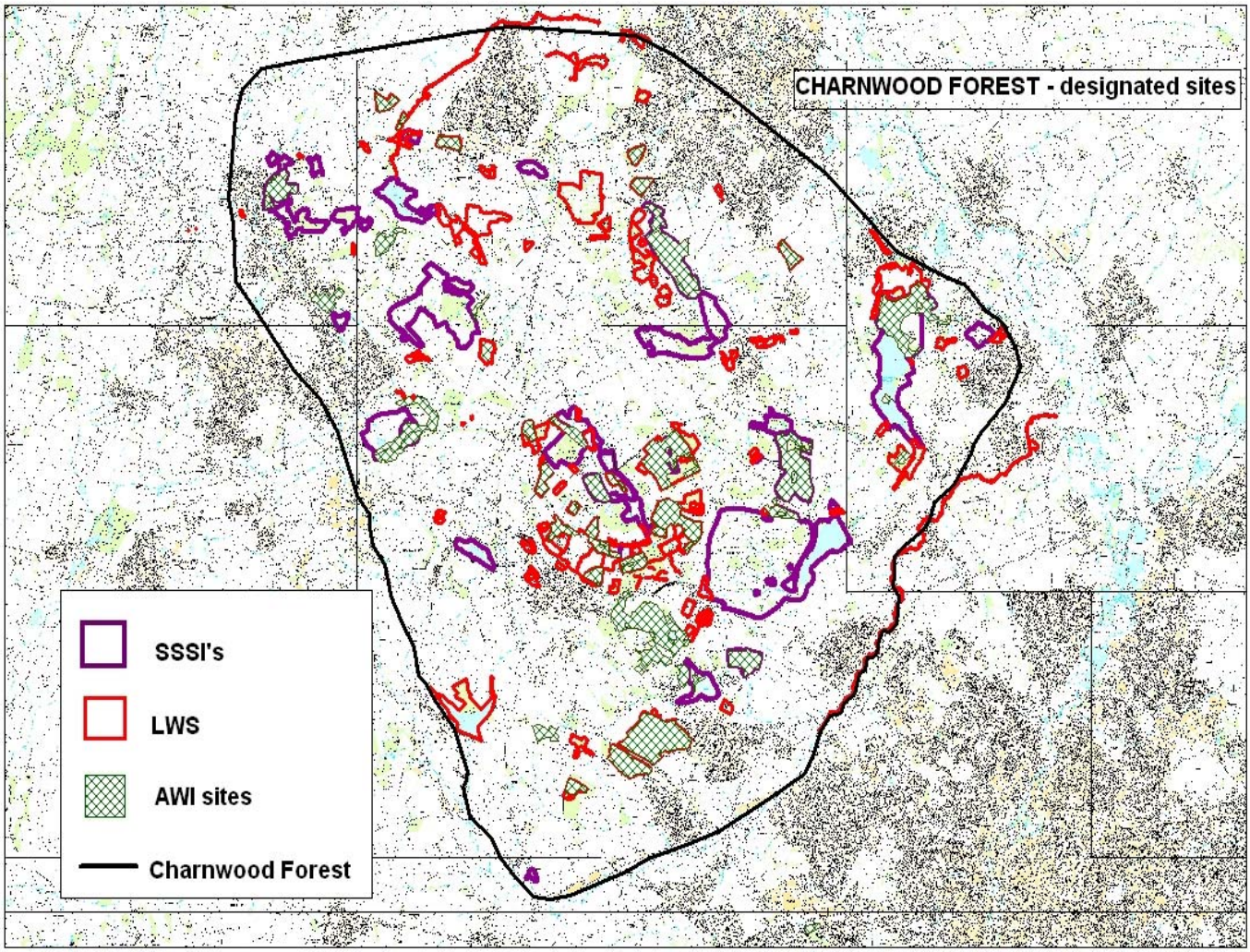
- Broad-leaved woodland
- Eutrophic standing water
- Fast-flowing streams
- Field margins
- Heath-grassland
- Hedgerows
- Lowland wood-pasture and parkland
- Mature trees
- Mesotrophic lakes
- Neutral grassland
- Reedbed
- Roadside verges
- Rocks and built structures
- Sphagnum ponds
- Springs and flushes
- Wet woodland

Several of the LLRBAP species action plans are relevant to Charnwood Forest, viz:

- Otter
- Water Vole
- Bats
- Redstart
- White-clawed Crayfish
- Violet Helleborine

The plan will guide the work of the Trust in Charnwood Forest. It will also be used to influence others and seek their support. Targets on habitat creation have been omitted because they would be arbitrary and experience has shown that measurement of their delivery is not possible. Instead the emphasis is on identifying priorities and then focusing on securing a future for wildlife and geology in the Forest. Success will be measured through long-term monitoring work, but will be dependent upon the support and energy of all those people involved in this special place.

Fig. 3 Map showing SSSI and Local Wildlife Site distribution



Note: AWI = Ancient Woodland Inventory site

3. A summary of the geological/geomorphological interest

3.1 Introduction

Geologically and geomorphologically Charnwood Forest can be defined by a line loosely enveloping the hard rocky crags that characterise the higher parts of the area. This is Charnwood Forest *sensu stricto* (Fig. 1). These rocky crags are largely formed of volcanic and sedimentary rocks belonging to the Charnian Supergroup. The depressions and valleys between the rocky crags are underlain by much younger, Triassic, mudstones and by Quaternary glacial sediments and other superficial deposits (drift). The immediate Mountsorrel area also has hard rocky outcrops – these rocks belong to the Mountsorrel Igneous Complex. This Complex is younger than the Charnian, but they can usefully be included within an extended Charnwood *sensu lato* (Fig. 1). Fig. 4 gives a geological outline of the Forest – a sequential list of the main events and of the formations, geological systems with dates etc.

Fig. 4 Tabulation of main geological formations and events in Charnwood

Eon	Era	System/Period	Date (mya)	Main layered rock units, or *{events}*
PHANEROZOIC	CENOZOIC	**Quaternary**	**0**	Holocene – head and alluvium Pleistocene - Anglian glaciofluvial deposits and Oadby and Thrussington Tills
		Tertiary	**2**	*none*
	MESOZOIC	***Cretaceous***	**55**	*none*
		Jurassic	**100**	*none*
		Triassic	**205**	Mercia Mudstone Group Sherwood Sandstone Group
	PALAEOZOIC	**Permian**	**250**	*none*
		Carboniferous **Carboniferous (Upper)**	**290**	***{movements and intrusions associated with Variscan Orogeny}*** Pennine Coal Measures Group
		Carboniferous (Lower)		Ticknall Limestone Formation (of Carboniferous Limestone Supergroup)
		Devonian	**355**	*none* ***{Caledonian Orogeny earth movements (part)}***
		Silurian	**417**	***{Caledonian Orogeny earth movements (part)}*** *none*
		Ordovician	**443**	*none* ***{Mountsorrel Granodiorite Complex}***
		Cambrian **Cambrian (Middle and Upper)**	**495**	Stockingford Shale Group ***{?South Charnwood Diorite Complex?}***

		Cambrian (Lower)		Charnian Supergroup (part): Brand Group (includes Swithland Formation)
PRECAMBRIAN	**NEOPROTEROZOIC**	**Vendian or Ediacaran**	**543**	***?North Charnwood Diorite and Lubcloud Microgranite?}***
				Charnian Supergroup (main part – c.560-c.615mya): Maplewell Group: Bradgate Formation Beacon Hill Formation (and also Charnwood Lodge Volcanic Formation with Whitwick Volcanic Complex) Blackbrook Group: Blackbrook Reservoir Formation Ives Head Formation (Morley Lane Volcanic Formation)
			4500	

(mya = million years ago)

The geological/geomorphological importance of the Forest is reflected in the number of geological/geomorphological SSSIs (Fig. 2), and in the number of RIGS (Regionally Important Geomorphological/Geological Sites) (Fig. 5). Seventeen localities in the Forest have been included as Geological Conservation Review (GCR) sites and have been published (in the Precambrian, the Cambrian and Ordovician, and the Caledonian Igneous Intrusions GCR volumes respectively). Charnwood Forest *sensu stricto* and the Mountsorrel area have both been recognised in a provisional listing of Geological /Geomorphological Local Site Systems that has been produced for Leicestershire and Rutland. There is preliminary investigation into the feasibility of having the area declared an International Geopark, or perhaps a World Heritage Site.

Many of the more important sites within the Forest occur on existing LRWT nature reserves, or on lands managed by local authorities and others as amenity/recreation/conservation areas.

3.2 Main features of interest

- **Charnian Supergoup**.
  The Late Precambrian (Charnian/Ediacaran) volcanic and volcaniclastic rocks from c.615 mya to 560 mya (Maplewell and Blackbrook Groups) can be studied from the perspective of the processes of volcanic rock genesis, sediment transport and deposition, and the palaeoenvironmental/plate tectonic setting. Apart from the

central volcanic complex itself, the late Precambrian structures of the area include two possible (and potentially significant) non-sequences (one at the top and one in the middle of the Precambrian sequence). These Precambrian rocks represent a significant component of the Avalonia terrane (which includes most of the crust of southern Britain and northern France), part of the collage of volcanic arcs that formerly bordered the Iapetus Ocean. [These are all features of national and regional significance.]

- **Ediacaran/Charnian fossils**
  These include the first properly recognised/published Precambrian body macrofossils. Are they early metaphytes, or early metazoans, or perhaps a distinct 'third way' to multicellular life? They extend through a good proportion of the time in the local Precambrian sequence. Recent exciting discoveries, and on-going work, show that we have one of the most significant palaeontological sites in the UK (and the World) in these local rocks (see photo on p56). [They are of great international significance in relation to this early stage in the evolution of multicellular life.]

- **The Brand Group** (including the Swithland Greywacke Formations (colloquially the Swithland Slate))
  This group is traditionally and most conveniently included within the Charnian Supergroup, but rather than being Precambrian, it is now thought to be early Cambrian (c.543 mya – the earliest part of the Phanerozoic era that extends to the present day) on the basis of distinctive and significant trace fossils. [Features of national perhaps international significance. Relatively rarely do we see a sequence such as this that demonstrates this major transition in the history of life – from Proterozoic (Precambrian) to Phanerozoic.]

- **The intrusions**
  Within the Forest, the North Charnwood Diorite may well be a late Precambrian intrusion, but the South Charnwood Diorite (markfieldite) may represent an early (Cambrian?) phase of the intrusions associated with the Caledonian earth movements – but the dating of both remains very uncertain. The somewhat separate Mountsorrel Complex (principally granodiorite, with diorite, and gabbro) is more clearly Caledonian in age (and gives an Ordovician date). The minor intrusions in the Mountsorrel complex are late Carboniferous in age. [The main intrusions are all of national and/or regional importance.]

- **Caledonian structures**
  The main folding, faulting and low grade metamorphism (with well-developed foliation (cleavage)), is associated with the Caledonian phase of earth movements and mountain building (orogeny) (c. 416-425 mya, i.e. Silurian to Devonian). [These structures are significant in our understanding of this mountain-building phase in which the essential, unified foundation of the British Isles was created.]

- **Buried Permian/Triassic landscape**
  A rocky, low mountainous landscape was developed on the hard Precambrian, Cambrian and later Palaeozoic rocks of the area – probably in part the result of earth movements associated with the Variscan orogeny (c. 290 mya). This landscape, rather than being completely worn down by weathering and erosion, was progressively buried and preserved by the accumulating arid terrestrial sediments of the Mercia Mudstone Group of the Late Triassic period - burial that was complete by about 200 mya. [This buried landscape produces a spectacular unconformity and is clearly of national importance at least.]

- **Mineralogy**
  There are at least three principal phases of mineralisation. The first (and possibly earliest) occurs within the body of the Precambrian rocks and consists of sulphides, quartz, and (most spectacularly) gold, etc. The second phase is associated with the Caledonian rocks of the Mountsorrel Complex (where there are 'subphases'). The third and latest phase is associated with the rocks immediately above and below the Triassic unconformity, and is characterised by various copper minerals. [All phases are of national to regional importance.]

- **Quaternary Geology and Geomorphology**
  The Quaternary ice sheets of 500,000 years ago left their mark on the current topography of the Forest, and deposited tills, and sand and gravel. More spectacularly the hard rocks of the area provided the source of large glacial erratics now found much further south. The most spectacular example is the Humberstone (on the eastern outskirts of the City of Leicester, which can convincingly be shown to be granodiorite from the Mountsorrel Complex). Later ice sheets did not reach the area, but were indirectly responsible for widespread periglacial head deposits. The geomorphology shows a characteristic partial re-exhumation of the Permian/Triassic landscape, the tor-like features of Mountsorrel, and some intriguing features of the drainage such as some water gaps (e.g. Newtown Linford, and Ulverscroft). [The features are all of regional importance.]

Fig. 5 Charnwood Forest Regionally Important Geological Sites

Name	Grid reference
South Quarry, Blackbrook	SK 465172
Morley Lane Quarry, Shepshed	SK 476178
Hunt's Hill, Bradgate Park	SK 524116
Buck Hill, Nanpanton	SK 5017
Park Breccia, Bradgate Park	SK531115
Swithland Camp, Swithland Woods	SK 537122
Swithland Quarries, Swithland Woods	SK 539122
Hangingstone Hills	SK 525151

Lubcloud Dyke	SK 474173
Iveshead	SK4817
Swithland Reservoir, Pump Station	SK 556151
Swithland Reservoir, Dam Wall	SK 556149
Nunckley Hill	SK 569144
Kinchley Shore	SK 560140
Knoll, Swithland Reservoir	SK 556136
Brazil Wood, Swithland Reservoir	SK 556136
Brazil Wood, West Shore	SK 557 135
Old Quarry, Swithland Reservoir	SK 556134
Ulverscroft	SK 492126
Benscliffe Wood	SK 515125
Longcliffe Quarry	SK 490173
Newhurst Quarry	SK 485180

The Bomb Rocks, Charnwood Lodge Nature Reserve (photo: LRWT)

4. Historical ecology since the Devensian glaciation

4.1 Before Domesday

- There are no known pollen deposits to help ecologists understand how the vegetation of Charnwood Forest developed after the last glaciation.
- It seems likely that oak-lime (*Quercus robur, Quercus petraea* and *Tilia cordata*) 'wildwood' (unmanaged woodland) eventually formed, because there are remnants even now in Swithland and Buddon Woods. However, it remains unclear as to how much open ground was present prior to the clearance of the trees by people. Some open boggy areas were surely present, perhaps assisted by the work of the Beaver *Castor fiber*, to account for the later presence of light-demanding plants such as Bog Pimpernel *Anagallis tenella* and Sundews *Drosera* species. Populations of large herbivores such as Aurochs *Bos primigenius* were presumably present, because their remains have been found elsewhere in Leicestershire.
- There is evidence that humans were present during the prehistoric period and also the Bronze and Iron Ages, but their impact on the landscape is not known.
- The Romans certainly were active, for example quarrying slate, and they must have cleared some woodland to facilitate this industry.
- The 1975 report stated that it appeared from the Domesday survey that in the 11th century 'Charnwood had been relatively little altered from its primeval condition', but that must now be considered a very doubtful statement. Poor soils, rocky and boggy ground must, however, have made agriculture unattractive to early farmers.

4.2 The Medieval period to the early 19th century Enclosure

- Clearance of the wildwood appears to have started in earnest after the Norman conquest and de-forestation in the unprotected areas probably occurred quite rapidly.
- Several deer parks were established in the 13th century. Their maintenance produced managed woodlands, grassland and heathland, and veteran pollarded trees.
- Charnwood Forest was not a Royal Hunting Forest, but a Chase. Its boundaries remain undefined.
- The woodlands that survived the destruction of the wildwood were managed as coppice, which presumably restricted the distribution of mature trees to places such as deer parks, boundaries and open wood pasture. The last were largely devoid of old trees by the 17th century (A. Squires pers. comm.).
- Large predators such as Wolf *Canis lupus* and Brown Bear *Ursus arctos* and some large herbivores are unlikely to have survived the wildwood clearances and may have been lost much earlier.
- Grazing, especially by the sheep of Charnwood's monasteries, resulted in the creation of extensive areas of pasture. Ericaceous shrubs probably dominated around the Precambrian rock outcrops and there must have been a lot of boggy land in the valley bottoms. Water meadows, which appeared only in the 18th to 19th centuries (A. Squires

pers. comm.), water mills and damming to form fish ponds, altered the nature of the streams.

- Rabbits *Oryctolagus cuniculus* were kept in warrens during the Middle Ages and later established themselves as a wild population, competing for grass with stock and contributing to a heavily grazed landscape.
- By the 14th century over-grazing was severe in places (Crocker 1981). It seems likely that ericaceous shrubs would have been adversely affected and were probably only abundant around Precambrian rock outcrops, where the soils would have been more suitable anyway and the animals would have found grazing more difficult.

4.3 Post Enclosure

- From the early 19th century fox hunting and game rearing became important. Fox covers were planted (e.g. Gisborne's Gorse) and considerable persecution of predatory birds and mammals lead to the extinction of Pine Marten *Martes martes*, Polecat *Mustela putorius*, Raven *Corvus corax* and Buzzard *Buteo buteo*.
- The 1808 Enclosure Act resulted in major changes to the landscape and its wildlife. The open pastoral landscape was transformed into a compartmented agricultural system with small fields bounded by dry stone walls and hedges. Wet ground was drained.
- Red Grouse *Lagopus lagopus* continued to breed until the 1820s and Black Grouse *Lyrurus tetrix* until the middle of the nineteenth century (Hickling 1978). Habitat destruction and/or human pressure had by then presumably reached intolerable levels.
- Several reservoirs were built, destroying stream-side habitats but creating new wetlands.
- The development of a number of large quarries in the mid twentieth century destroyed woodland and heath-grassland habitats, including most of Buddon Wood, but created opportunities for geological study and new wildlife habitats.
- Coppicing probably ceased as a major activity in the early twentieth century and the structure of the woodlands started to change, with older trees, more dead wood and shade. Many were cleared and planted with conifers, which was a disaster for wildlife.
- The young conifer plantations were, however, a magnet for Nightjars *Caprimulgus europaeus*, with singing males at 13 sites in 1946 and up to 14 singing males at Bardon Hill alone in 1947 and 1948. The population had died out by 1965 (Hickling 1978), presumably because the plantations were maturing.
- Farming methods became more intensive, especially after the Second World War.
- Recreational use of the Forest grew in the twentieth century to become a major land use, particularly at Bradgate Park and Beacon Hill Country Parks.
- Aerial pollution from industry increased, but air quality finally improved towards the end of the twentieth century.

- Roads were widened, straightened and metalled. In 1965 the M1, which slices through the Forest, was opened, with little apparent regard for wildlife.
- Villages and towns grew as the human population increased.
- Nature conservation became an objective after the Second World War, leading to the legal protection of a number of Sites of Special Scientific Interest and the establishment of nature reserves.

The M1 motorway at Copt Oak in 1995 (photo: Michael Jeeves)

5. The main wildlife habitats

5.1 Trees and woodland

With 18% woodland cover in 1975 Charnwood Forest was then a remarkably densely wooded area compared to the rest of Leicestershire. That figure must have increased in the period since due to new planting following the establishment of The National Forest. About 4% of Leicestershire as a whole is now wooded.

The semi-natural woodlands and other tree habitats of Charnwood Forest fall mainly into the following broad categories:

- **Oak woods –** the most characteristic tree species of Charnwood Forest is undoubtedly the oak. Both Pedunculate and Sessile Oaks (*Quercus robur* and *Q. petraea*) occur, the latter largely confined to old woodland while the former readily colonizes hedges and open ground. In Buddon and Swithland Woods magnificent coppiced Small-leaved Limes *Tilia cordata* are found in the oak stands.

- **Alder woods –** Alder *Alnus glutinosa* is frequent along streams and forms small areas of wet woodland, most notably in Swithland Wood, Grace Dieu Wood and alongside Groby Pool.

Wet woodland at Groby Pool in June 2008 (photo: Michael Jeeves)

- **Ash woods –** Ash *Fraxinus excelsior* is an uncommon tree in Charnwood Forest, only forming associations in a few of the more apparently base-rich sites such as Burleigh and Holywell Woods.

- **Pasture woodland –** this habitat is confined to Bradgate Park and Beaumanor Park.

- **Mature trees –** large specimens of Pedunculate Oak can be found throughout the Forest, while there are also individuals and clusters of other species, such as Sessile Oak and Beech *Fagus sylvatica* (the latter is not thought to be native here).

- **Scrub** – willow dominated scrub occurs around open water, while on neglected grassland and in quarries scrub communities include Pedunculate Oak *Quercus robur* and many other species.

The main National Vegetation Classification communities present are W10 *Quercus robur-Pteridium aquilinum-Rubus fruticosus*, W16 *Quercus spp-Deschampsia flexuosa*, W7 *Alnus glutinosa-Fraxinus excelsior-Lysimachia nemorum* and W8 *Fraxinus excelsior-Acer campestre-Mercurialis perennis* woodland, with a number of scrub associations.

Due to the toll taken by conifer planting and quarrying in the twentieth century few woods that contain much in the way of semi-natural vegetation remain in Charnwood Forest. Those that do were surveyed and evaluated in the period 1985-1996 (Jeeves 1993). Out of 56 woods in Leicestershire and Rutland Swithland Wood stood clear, after taking into account the impact of quarrying on Buddon Wood, as the best wood in the two counties and it even compared well to other renowned British woods such as Bedford Purlieus and Monks Wood, Cambridgeshire. Fig. 6 shows the Charnwood Forest woods that were evaluated in this particular exercise.

Fig. 6 Charnwood Forest woodlands in order of vascular plant species-richness

Wood	Size (ha)	Flora score	Some evaluation factors
Buddon Wood	42	151	Much reduced in size by quarrying; still contains a variety of stand-types; habitat creation work on adjacent land
Swithland Wood	70	147	Fine high-forest structure; 9 Peterken stand types; very species-rich; well-recorded history; other habitats within site; Sycamore invasion and public use issues
Grace Dieu Wood	31	112	Very species-rich with several stand types; public use issues
Sheet Hedges Wood	23	106	Sycamore issues
Holywell Wood	7	91	Encroaching development
Burleigh Wood	10	56	Encroaching development

White Horse Wood	9	46	
Stoneywell Wood	19	29	Developing good high-forest structure

Note: The 'Flora score' refers to the number of plants recorded since the eighteenth century, from a defined woodland plant list.

Most of the familiar British lowland mammals, such as Badger *Meles meles* and Fox *Vulpes vulpes*, most of which were probably woodland species originally, are present in Charnwood Forest in good numbers. The Grey Squirrel *Sciurus carolinensis*, having been first recorded in Leicestershire in 1929 is very common and widespread now. This species certainly does damage trees and some naturalists suspect that it may also have an impact on bird populations too, although it remains unknown just how much of an effect that might be. The Red Squirrel *Sciurus vulgaris* was last reliably reported in the Forest in the 1940s.

Deer are uncommon other than in Bradgate Park, where there are thriving herds of Red Deer *Cervus elaphus* and Fallow Deer *Dama dama*. There are occasional sightings of the latter elsewhere and the Muntjac *Muntiacus reevesi* appears only to have established itself at a low density. The impact of deer on the vegetation of the LRWT nature reserves in the Forest is currently slight. The Roe Deer *Capreolus capreolus*, a native species that the place name Roecliffe indicates once roamed Charnwood Forest, is extending its range from East Anglia westwards and may reach Charnwood soon.

Changes in the populations in mammal species are not easy to detect and bats are no exception. Despite this the well-known roost at Charnwood Lodge has been monitored since 1990 and while the populations of Brown Long-eared *Plecotus auritus*, Common Pipistrelle *Pipistrellus pipistrellus*, Soprano Pipistrelle *Pipistrellus pygmaeus* and Natterer's *Myotis nattereri* bats have fluctuated, numbers of most species appear to be fairly stable. The Forest, with its high woodland cover and good habitat connectivity, certainly seems an ideal place for bats.

Polecats *Mustela putorius* are spreading back towards Charnwood from the west and may even have reached the area already. They were eradicated through human persecution in the late nineteenth century, as was the Pine Marten *Martes martes*, which will probably not be able to re-colonise on its own.

The birds of Charnwood Forest have been described more recently by Webster (1996). Unsurprisingly, with its high tree cover woodland birds figure prominently in the area, with Nuthatch *Sitta europaea*, Woodcock *Scolopax rusticola* and Jay *Garrulus glandarius* examples of species that are uncommon elsewhere in Leicestershire (the latter also probably because of less human persecution).

Since the 1975 report both Wood Warbler *Phylloscopus sibilatrix* and Redstart *Phoenicurus phoenicurus* have been lost as breeding birds. The Woodcock also appears to have declined, while on the positive side Nightjars *Caprimulgus europaeus* have been recorded in a couple of years recently and may perhaps return as a regular breeding bird. Buzzard *Buteo buteo* and Raven *Corvus corax* have also re-colonized Charnwood after decades of absence.

Moths are probably the best-recorded invertebrate group in Charnwood and sites have been evaluated in terms of species-richness by Adrian Russell. Fig. 7 has been drawn from his unpublished data. Although most of the sites are woodlands or contain trees, it is not known how many of the moths recorded are true woodland species. The top moth site in VC55 to date is Ketton Quarry with 604 species, while Charnwood Lodge, the richest site in the Forest, is sixth in the VC55 list with 460 (note that these figures are constantly changing).

Fig. 7 Moth species-richness in Charnwood Forest

Site name	No species recorded
Charnwood Lodge	460
Martinshaw Wood	402
Ulverscroft Nature Reserve	385
Swithland Wood	359
Buddon Wood	343
Swithland Sidings	289
Beacon Hill	289
Holywell Wood	283
Lea Meadows	264
The Brand	259
Swithland Reservoir	258
Charnwood Forest Golf Course	243
Stoneywell Wood	239
High Sharpley	226
Morley Quarry	226
Bardon Hill	228
Browns Hay	221
The Outwoods	216
Burleigh Wood	211

The majority of woodland moths are canopy feeders. Knowledge of other insect groups that live in the canopy in Charnwood is mainly limited to beetles and plant bugs. Rare plant-feeding beetles have been found at Buddon Wood (the weevils *Lasiorhynchites cavifrons* and *L. olivaceus*). Ulverscroft Nature Reserve supports several ladybird canopy predators associated with conifers, such as the scarce *Myzia oblongoguttata.* Recording effort on woodland beetles has been patchy, but species-rich communities associated with rotting fungi have been found at Swithland

Wood, while Buddon Wood continues to support a rich leaf litter community, including the weevil *Trachodes hispidus*. However, the largest area of conservation interest concerning woodland beetles is associated with the wood decay habitat, especially in oak trees. Bradgate Park is of regional importance for its wood decay beetle fauna and supports the pselaphid *Plectophloeus nitidus,* which is restricted to old wood-pasture sites with a long history of ecological continuity. Other rich wood decay communities have been recorded at Buddon Wood and Ulverscroft Nature Reserve, where Beech trees planted in the late nineteenth century are now in optimum condition for this specialist fauna. Changes in the beetle fauna since the mid nineteenth century at Bradgate Park and Buddon Wood are summarised by Lott (in prep.).

5.2 Grassland

Classification of the Forest's grass-dominated habitats is not easy. As Primavesi & Evans (1988) indicated, the plant communities of grasslands form a continuum. Any one may contain a number of recognisably different types that grade into one another, producing transitionary types that do not fit neatly into any category. Broadly, the following types are currently present:

- **Dry heath** - areas with frequent ericaceous shrubs, Heather *Calluna vulgaris* and Bilberry *Vaccinium myrtillus*, mainly on and close to thin, dry, acid soils on Precambrian crags.

- **Wet heath** - wet, peaty places with Purple Moor-grass *Molinia caerulea, Sphagnum* mosses and Cross-leaved Heath *Erica tetralix*. These are largely confined to Bradgate Park and Charnwood Lodge now.

- **Acid grassland** - rough, dry ground on acid soils with rock outcrops, sometimes extensive patches of Bracken *Pteridium aquilinum,* occasional ericaceous shrubs and various calcifuge plants such as Tormentil *Potentilla erecta* and Heath Bedstraw *Galium saxatile*.

- **Neutral grassland** - pasture and (rarely) hay meadow containing unimproved neutral to slightly acid (mesotrophic) grassland. Devil's-bit Scabious *Succisa pratensis* and Betony *Stachys officinalis* are often abundant and these grasslands are sometimes very species-rich.

- **Marsh** - wet grassland, on mineral soils, where drainage is poor. These are now rare.

- **Rough grassland** - on roadside verges and track sides, in neglected corners and similar places. False Oat-grass *Arrhenatherum elatius* is a characteristic plant species.

- **Semi-improved and improved pasture** – the commonest type now, often with frequent Rye-grass *Lolium perenne.*

- **Lawns** – these may sometimes be remnants of once larger fields or simply benefit from benign management. The lawns at Roecliffe Manor have recently been notified as a SSSI in recognition of their remarkable fungal communities and a garden lawn on the edge of Loughborough contains the only known Autumn Lady's-tresses *Spiranthes spiralis* plants in Leicestershire.

- **Early successional mosaics** – these occur especially in quarries, where pioneering species are found in the patchwork of vegetation, rock and bare ground.

National Vegetation Classification communities have been assessed at Charnwood Lodge (Gallagher 1999) and Ulverscroft NR (Woodward 1998) and those studies both confirmed the difficulty in assigning areas of vegetation to particular types. The old mesotrophic grasslands are, however, probably mainly of the NVC MG5c *Cynosurus cristatus-Centaurea nigra-Danthonia decumbens* sub-community, while the acid grassland-heathland-moorland matrix includes communities similar to the NVC U2 *Deschampsia flexuosa*, U4 *Festuca ovina-Agrostis capillaris-Galium saxatile*, U5 *Nardus stricta-Galium saxatile* and U20 *Pteridium aquilinum-Galium saxatile* grasslands, the H9 *Calluna vulgaris-Deschampsia flexuosa* and H12 *Calluna vulgaris-Vaccinium myrtillus* heaths, and the M25 *Molinia careulea-Potentilla erecta* mire types, with intermediates. The more acidic unimproved grasslands of the Forest have sometimes been collectively described as 'heath-grassland' (Primavesi & Evans 1988, Jeeves *et al* 1998), while other terms such as 'heathland', 'moorland', 'acid grassland' and 'siliceous grassland' have also been used for variants.

Heath-grassland at Charnwood Lodge Nature Reserve in 2008 (photo: Michael Jeeves)

The high quality and concentration of grasslands in Charnwood Forest make them, in the opinion of LRWT, the area's most important habitats. As was noted in the 1975 report, the Forest's meadows are unique in the East Midlands and a few of them are incredibly varied and species-rich. Herbert's Meadow, despite its small size, with 144 species, has more grassland plants recorded from it than any other grassland in Leicestershire and Rutland (Jeeves in prep.). It has dry acid, dry mesotrophic and marshy grassland all within 1.8 hectares, with notable plants such as the Fragrant Orchid *Gymnadenia conopsea s.l.* Nearby Lea Meadows, also in the Ulverscroft Valley, is exceptionally species-rich too, as is Swithland Wood Meadow. Coalville Meadows, Groby Pool Pasture and Charnwood Lodge are other high quality grassland sites.

Swithland Wood Meadow in 2008 (photo: Michael Jeeves)

The Chimney Sweeper *Odezia atrata* is a characteristic day-flying moth of the old meadows, along with the rarer Forester *Adscita statices*. Specialist moths of the heath-grasslands include the Ling Pug *Eupithecia satyrata*, Beautiful Snout *Hypena crassalis,* Heath Rustic *Xestia* agathina, Northern Rustic *Standfussiana lucernea,* Glaucous Shears *Papestra birea* and Golden-rod Brindle *Lithomonia solidaginis.* Early-succesional vegetation mosaics containing patches of bare ground and short turf are the most important grassland habitat for insects. The aculeate Hymenoptera (ants, bees and wasps) are normally an important component of the insect community associated with this habitat, but they have not been studied in Charnwood since the 1940s. However, there are a few recent records of rare species from Bradgate Park (a cuckoo bee, *Nomada lathbriana,* and the Velvet Wasp *Mutilla europea*). The Green Tiger Beetle *Cicindela campestris* has bred on the margins of sandy tracks in Bradgate since at least 1840, while the Heather Ladybird *Coccinella hieroglyphica* was once

found on isolated patches of heather on a sparsely vegetated outcrop at High Sharpley. Bradgate Park also supports several scarce dung beetles including the Minotaur Beetle *Typhaeus typhoeus* and a dor beetle, *Geotrupes vernalis.*

The heath-grasslands provide good habitat for other invertebrates, with one of the best-worked groups being spiders. Crocker & Daws (1996) evaluated sites in Leicestershire and Rutland using a system based on species-richness with weighting for rarity. Nine sites in the two counties have had more than 100 species recorded from them and a remarkable seven of these are in Charnwood Forest. Fig. 8 lists the Charnwood sites with a score of more than 10.

Fig. 8 Key sites for spiders in Charnwood Forest

Site	No species	Score
Buddon Wood	191	70
Bardon Hill	147	42
Charnwood Lodge	162	40
Bradgate Park	108	31
Swithland Reservoir	119	30
High Sharpley	75	25
Swithland Wood	114	22
Cademan Moor	78	17
Ulverscroft Nature Reserve	107	15
Beacon Hill	44	14
Groby Pool	63	13
Altar Stones	29	13
Stoneywell Wood	60	12
Hill Hole	29	11
Outwoods	65	10
Martinshaw Wood	32	10

The heath-grasslands of Charnwood Forest also form the most important area in Leicestershire for reptiles. In recent years, however, the Adder *Vipera berus* has only been noted from Bradgate Park, where there are also Slow-worms *Anguis fragilis* and Common Lizards *Lacerta vivipara*, and Beacon Hill. Common Lizards are widespread in the Forest, but the Slow-worm is less common. Recent heath-grassland restoration work at a number of sites should improve the fortunes of all these species.

The birdlife of the Forest's grasslands has been considerably impoverished in the last few decades. Skylark *Alauda arvensis*, Linnet *Carduelis cannabina,* Yellowhammer *Emberiza citrinella*, Meadow Pipit *Anthus pratensis* and Tree Pipit *A. trivialis* all still nest on the heath-grasslands, but none can now be considered common and one or more may soon disappear completely. Whinchat *Saxicola rubetra* and Wheatear *Oenanthe oenanthe* no longer breed, but are still regular on passage, and Curlew

Numenius arquata are rare. Common Snipe *Gallinago gallinago* have also ceased to nest in the marshy valley bottoms.

These heath-grasslands are certainly of regional importance, being of a different type to any similar habitat in the East Midlands and containing many regionally important species. They appear ecologically to be somewhere in between lowland and upland types.

5.3 Wetland

The most important wetland habitats in the Forest are:

- **Fast-flowing streams –** several of these flow eastwards towards the River Soar. They have stony beds and sometimes, as in the case of the River Lin, very clean water.

- **Standing water** – Blackbrook, Cropston, Swithland and Thornton reservoirs are all more than 100 years old and probably once had mesotrophic water as a result of the Forest's geology. They are now thought to contain eutrophic water, as does Groby Pool, another large body of standing water. Many smaller ponds are also present.

The aquatic plant life of the streams is unsurprisingly poor due to the fast flows, but the large bodies of standing water hold excellent plant communities. There are good swamp associations at Groby Pool, where there are large beds of Common Reed *Phragmites australis,* and also at Swithland Reservoir. The latter also has a rich draw-down plant community containing species such as Brookweed *Samolus valerandi* and Shoreweed *Littorella uniflora.*

Groby Pool (photo: Stephen Woodward)

The Otter *Lutra lutra* was not present in the Forest in 1975, but has spread throughout Leicestershire since then and signs of the animal's presence around the margins of the Charnwood reservoirs have been seen in recent years. The Water Vole *Arvicola terrestris*, however, may not now occur at all. The American Mink *Mustela vison* was first recorded in 1984 (Gamble 1986).

Swithland Reservoir is one of the best sites in Leicestershire for wintering wildfowl.

All three of the newt species recorded from Leicestershire, Great Crested *Triturus cristatus*, Smooth *Triturus vulgaris* and Palmate *Triturus helveticus*, are present in the Forest. Palmate Newts are rarely recorded however.

The Forest streams contain several fish species that are rare elsewhere in Leicestershire, notably Brook Lamprey *Lampetra planeri*, Bullhead *Cottus gobio* and Brown Trout *Salmo trutta*. The last occurs in the River Lin and the Wood Brook, which are considered to be the only native populations in the county, but the Forest reservoirs have been stocked by this species for sporting purposes.

The streams also contain good invertebrate populations. The White-clawed Crayfish *Austropotamobius pallipes* is perhaps the best known species, but there are many stoneflies, mayflies and caddis flies, including *Tinodes pallidulus*. This species of caddis fly is found in the Burleigh and Wood Brooks, but nowhere else in Britain (Hirst 1997). Rich beetle communities associated with natural streams can be found on the River Lin at Bradgate Park and the Grace Dieu Brook at Whitwick. These include both aquatic species and riparian species associated with shingle or wet moss.

Ulverscroft Brook (which later becomes the River Lin), Lea Meadows Nature Reserve 2007 (photo: Michael Jeeves)

Important sites for dragonflies and damselflies in Leicestershire and Rutland have been evaluated by Ian Merrill. Table 9 has been drawn from his unpublished data and shows the best sites in Charnwood Forest.

Fig. 9 Key sites for dragonflies and damselflies in Charnwood Forest

Site name	Species-richness	Species Value Index
Buddon Wood and Brook	14	4.14
Groby Fishponds	16	3.88
Bradgate Park	15	3.80
Charnwood Lodge	15	3.80
Beacon Hill	13	3.77
Swithland Reservoir	11	3.64
Thornton Reservoir	11	3.64
Ulverscroft NR	10	3.50
Blackbrook Reservoir	7	3.14

The top sites in terms of species-richness in the two counties are the Grantham Canal and Priory Water, both with 18. Their Species Value Index, calculated with weighting for rarity, is 4.56.

5.4 Rocks and built structures

From the LLRBAP it can be deduced that the following rock and built structure habitats occur in Charnwood Forest:

- **Natural rock outcrops, scree slopes, shingle and stony ground.**

- **Man-made habitats including quarries, walls, pavements, roofs, culverts, grave stones, wood and ironwork, cardboard, ballast and bridges.**

All of these habitats can be of value to wildlife, especially lichens and bryophytes. Many ferns are also dependent on rocks and built structures, as are cliff-dwelling birds such as Peregrine *Falco peregrinus* and House Martin *Delichon urbica.* The flowering plant Navelwort *Umbilicus rupestris* is confined in Leicestershire to walls and rocks in Charnwood Forest.

6. Overall evaluation

The national importance of Charnwood Forest has been recognised by the notification of 21 Sites of Special Scientific Interest. However, the area is of international importance in respect of its geology. Other features can be considered to be of lesser, but still significant, importance and Fig. 10 lists these.

Fig. 10 Evaluation of nature conservation features in Charnwood Forest

Feature	I	N	R	L
Geology	Yes			
Semi-natural ancient woodland		Yes		
Pasture woodland		Yes		
Mature trees			Yes	
Unimproved neutral grassland		Yes		
Heath-grassland			Yes	
Marsh		Yes		
Fast-flowing streams			Yes	
Standing water			Yes	
Rocks and built structures			Yes	

I = International N = National R = Regional L = Local (County level)

As indicated earlier, the old (neutral/mesotrophic) grasslands of the Forest are considered by LRWT to be its most important biological feature from a national perspective, although Swithland Wood remains one of the best ancient woodlands in Britain. Other exceptional biological sites include Herbert's Meadow, Lea Meadows and Swithland Wood Meadow. These and other key sites are listed in the Appendix to this report.

The Bradgate Park Estate (340ha), Charnwood Lodge and the adjacent Charley Woods Nature Reserves (220ha), and Ulverscroft Nature Reserve (56ha) may be considered the most important properties for nature conservation at the present time, in terms of both biology and geology.

ISIS is a system being developed by Natural England for assessing the conservation interest of different types of invertebrate assemblages that are labelled according to the habitat in which they are characteristically found. ISIS analysis of 1,482 insect species recorded from Charnwood Forest identifies several prominent assemblage types (Fig. 11). Broad assemblage types are widespread assemblage types. The two most species rich broad assemblage types are:

- Grassland and scrub matrix
- Wood decay

If average rarity is used to assess their conservation value, then the three highest scoring broad assemblage types are:

- Wood decay
- Permanent wet mire
- Flowing water

Fig. 11 Invertebrate Broad Assemblage Types in Charnwood Forest listed by ISIS

BAT name	Representation (1-100)	Rarity Score
Grassland and scrub matrix	25	138
Wood decay	15	231
Mineral marsh and open water	12	147
Flowing water	12	172
Permanent wet mire	8	186
Unshaded early successional mosaic	7	141
Arboreal canopy	5	161
Shaded field and ground layer	5	146

Specific assemblage types are more narrowly defined and often have intrinsic value for nature conservation. Several of those listed in Fig. 12a are well represented in Charnwood, while Fig. 12b highlights some habitat resources of particular value to invertebrate species.

Fig. 12a Important ISIS Specific Assemblage Types in Charnwood

SAT name	No. species	Percentage of national species pool
Scrub-heath and moorland	35	10
Open water on disturbed mineral sediments	11	28
Litter-rich fluctuating marsh	8	22
Seepage	8	15
Stream and river margin	6	10
Fast flowing streams and waterfalls	3	14

Fig. 12b Important habitat resources for invertebrates in Charnwood

SAT name	No. Species	Percentage of national species pool
Bark and sapwood decay	118	23
Rich flower resource	57	24
Dung	39	39
Heartwood decay	28	16
Scrub edge	25	14

Fungal fruiting bodies	23	26

Figures 12c to 12f show the important sites identified so far for each assemblage type. Further work will undoubtedly identify more sites and more assemblage types of interest.

Fig. 12c Important sites for wood-decay invertebrate assemblages in Charnwood Forest

Site	ISIS rarity score	Associated assemblage types of importance
Bradgate Park	218	Heartwood decay; bark and sapwood decay
Buddon Wood	223	Heartwood decay; bark and sapwood decay; fungal fruiting bodies
Swithland Wood	210	Bark and sapwood decay
Ulverscroft NR	163	Bark and sapwood decay

Fig. 12d Important sites for flowing water invertebrate assemblages in Charnwood Forest

Site	ISIS rarity score
Grace Dieu Brook	Insufficient data
River Lin	157
Wood Brook	169

Fig. 12e Important sites for permanent wet mire invertebrate assemblages in Charnwood Forest

Site	ISIS rarity score
Groby Pool	188

Fig. 12f Important sites for other invertebrate assemblage types in Charnwood Forest

Site	Assemblage type
Bradgate Park	Dung
Buddon Wood	Arboreal canopy; scrub-heath and moorland
Charnwood Lodge NR	Scrub-heath and moorland
High Sharpley	Scrub-heath and moorland
Swithland Wood	Litter-rich fluctuating marsh
Ulverscroft NR	Scrub-heath and moorland; underground mammal nests

There are many scarce animal and plant species present in the Forest and they have been evaluated in Fig. 13.

Fig. 13 Evaluation of species groups in Charnwood Forest

Group		Importance		
	National	**Regional**	**Local**	**Uncertain**
Flowering plants & ferns		Yes		
Mosses and liverworts		Yes		
Algae				Yes
Fungi		Yes		
Saxicolous lichens	Yes			
Corticolous lichens		Yes		
Bats		Yes		
Other mammals			Yes	
Birds			Yes	
Reptiles & amphibians			Yes	
Fish		Yes		
Dragonflies & damselflies			Yes	
Grasshoppers & crickets			Yes	
Butterflies & moths			Yes	
Flies				Yes
Bees, ants & wasps				Yes
Beetles		Yes		
Spiders		Yes		
Molluscs				Yes
Other invertebrates				Yes

Flowering plants and ferns

With no nationally rare plants and only four recently recorded nationally scarce species (*Callitriche truncata, Campanula patula, Juncus filiformis* and *Potamogeton trichiodes*), Charnwood Forest cannot be considered to be nationally important for its vascular flora. However, habitats on neutral to acid, nutrient poor soils at relatively high altitudes are rare in the East Midlands and as a consequence there are quite a number of plants in Charnwood that are rare or uncommon in the region. Examples are *Anagallis tenella, Carex echinata, Littorella uniflora, Melampyrum pratense, Salix repens* and *Vaccinium myrtillus.*

Fig. 14 has been drawn from data given by Jeeves (1993b). It can be seen that a remarkable eight out of the 11 richest sites in Leicestershire and Rutland in terms of rare species were in Charnwood Forest. Bradgate Park and Charnwood Lodge, with 11 species each, were easily the most important sites in the two counties. The data in that work is now old and therefore should be interpreted with caution. Nature reserves are now even more important for rare plants because of losses elsewhere.

Fig. 14 Leicestershire Red Data Book plants in Charnwood Forest

Site	No. LRDB plants	Rank of site in Leics & Rutland
Bradgate Park	13	1
Charnwood Lodge	13	1
Beacon Hill	7	5
Buddon Wood	7	5
Cropston Reservoir	6	8
Groby Pool	6	8
Swithland Wood	6	8
Ulverscroft NR	6	8
Blackbrook Reservoir	5	12
Botcheston Bog	4	16
Grace Dieu Wood	4	16
Swithland Reservoir	4	16
Bardon Hill	3	23
Lea Meadows	3	23
Thornton Reservoir	3	23
Coalville Meadows	2	37
Kinchley Lane Grassland	2	37
Martinshaw Wood	2	37
Ratby Burroughs	2	37

Mosses and liverworts

A number of mosses and liverworts are confined or nearly so to Charnwood Forest in Leicestershire. These include several *Sphagnum* species, such as *S. inundatum* and *S. palustre*, *Polytrichum formosum* and *Dicranum scoparium.* Ballard & Fletcher (1997) and Ballard (2004) identified the area as being of particular interest in Leicestershire, but its importance is probably regional. Examples of valuable habitats are woodland, grassland, heathland, disturbed ground such as quarries, and churchyards.

Algae

There is insufficient information available to enable an evaluation.

Fungi

The distinctive and regionally important fungus flora of Charnwood Forest is due to the area's low nutrient acid soils and the distinctive upland heathland and woodland environment. Some nationally important taxa have been recorded and one site, Roecliffe Manor Lawns, was notified as a SSSI because of its nationally important fungal assemblage.

Lichens

Charnwood's saxicolous lichens, growing on stone, are nationally important. Of particular note are the lichens on the pyroclastic Precambrian formations, at sites such as Bradgate Park, Charnwood Lodge and the Altar Stones. These localities are remarkable for their abundance of saxicolous species.

Corticolous lichen species, those growing on wood, are considered to be of regional importance in Charnwood Forest. They have suffered from the worst excesses of industrial pollution, but as a result of recent dramatic improvements in air quality there is now a resurgence of lichen colonization on trees.

Mammals
The mammal fauna is generally fairly typical of the East Midlands, but the bat population is considered to be of regional importance. Relatively high woodland cover, tree-lined hedges and streams, large patches of agriculturally unimproved land, substantial water bodies and many old buildings all contribute to this. Leisler's Bat *Nyctalus leisleri* and Natterer's Bat *Myotis nattereri* are particularly notable.

Birds
The avifauna, too, is generally fairly typical of the East Midlands. The relatively high density of woodland has resulted in good numbers of species that are less common elsewhere in Leicestershire, for example Jay and Nuthatch. Tree Pipits are now probably confined to Charnwood Forest as a breeding bird. Swithland Reservoir was notified as a SSSI for its wintering wildfowl.

Reptiles and amphibians
All of Leicestershire and Rutland's species are present in Charnwood Forest and the Adder, Slow-worm and Palmate Newt are particularly notable. These species are localized elsewhere in the East Midlands.

Fish
Fast-flowing streams such as the River Lin hold regionally important populations of species such as Brook Lamprey, Bullhead and native Brown Trout.

Dragonflies and damselflies
The 16 species of Odonata considered to be resident in the Forest are typical of the East Midlands. Although some habitats within the Forest appear well suited for Common Hawker *Aeshna juncea* and Black Darter *Sympetrum danae*, species that prefer heathland areas and more acidic water bodies, neither of these species are currently to be found. It may be that the remaining habitat has become too small and fragmented to support viable populations or that the species have never occurred as residents. Therefore the handful of recent Black Darter *Sympetrum danae* records from the Forest are best considered to relate to migrant individuals.

Freshwater insects
Fawcett (1971) recorded several species of stoneflies that were confined within Leicestershire to fast-flowing streams in Charnwood Forest. More recent work on mayflies and caddis-flies as part of the ISIS project has established that these groups are also well represented in Charnwood streams.

Tinodes pallidulus is a national red data book caddis-fly that has been recorded from Charnwood at its only known extant site in Britain.

Grasshoppers and crickets
Being a predominantly southern group in Britain, grasshoppers and crickets are not particularly well represented in Charnwood. However, within Leicestershire the Mottled Grasshopper *Myrmeleotettix maculatus* is more or less restricted to Charnwood, where it prefers open heath-grassland and recently disused quarries with bare ground.

Bugs
A number of species of Heteroptera have been recorded from Charnwood, but the only Charnwood speciality is *Hesperocorixa castanea*, a lesser water boatman of acid waters that is unrecorded from elsewhere in Leicestershire.

Butterflies and moths
The butterfly fauna of Charnwood Forest is not exceptional, although there is a strong population of the local Green Hairstreak *Callophrys rubi* at Charnwood Lodge. There are a number of good moth sites, but few nationally notable species have been recorded (McPhail & Morris 1997).

Flies
A trawl through post 1980 national recording scheme records published on the NBN gateway caught 225 taxa that have been recorded from Charnwood. Three crane-flies are listed in the national red data book and 16 further species from several families are designated as nationally scarce. The ISIS database holds records of further species and contains Charnwood records for another nationally scarce species and the national red data book sciomyzid, *Pteromicra leucopeza*. Despite the fact that a large number of nationally scarce species have been recorded from Charnwood, flies have received relatively little attention and further rarities undoubtedly await discovery. The vast number of species (over 6,000 in Britain) and difficulties in identification currently restrict their practical use for assessing conservation interest to a few well-known families.

Bees, ants and wasps
Only 30 species were returned for Charnwood from a search of post 1980 records held by the national recording scheme for aculeates, which covers about 500 species. This low total indicates a lack of recent recording activity. However, these records included one nationally scarce species, *Nomada integra*, and there are further records of species of local interest given by Archer (1990). *Andrena humilis*, *Nomada lathbriana* and *Priocnemis schioedtei* are Charnwood species listed by Lott (1997) as key species for the Leicestershire and Rutland BAP on account of their national conservation status. However, their current national distribution no longer supports their designations.

Beetles
1,112 species have been recorded in Charnwood since 1980 out of around 4,000 species on the British list. The relatively good coverage compared to

most other species-rich invertebrate groups coupled with the high sensitivity of beetles to environmental factors make them very useful for assessing invertebrate conservation interest. *Plectophloeus nitidus* is a national red data book wood-decay species recorded from Bradgate Park. Another national red data book species, *Ernoporicus caucasicus*, is a bark beetle associated with limes, *Tilia* spp., but its current national distribution no longer justifies its status as anything more threatened than nationally scarce. Another 100 species have a rarity status equivalent to nationally scarce, while further species of local interest are listed by Lott (1995).

Spiders

Around 250 species have been recorded from Charnwood since 1980. Twenty-three species are listed by Crocker & Daws (1996, 2001) as being confined or almost confined to Charnwood within Leicestershire. This total includes two national red data book species, *Mastigusa macrophthalmus* and *Lepthyphantes beckeri*, an enigmatic species that has so far been recorded on only two occasions worldwide.

Molluscs

Mollusc data is effectively inaccessible, both from the local record centre, whose records are not yet digitised, and from the national recording scheme, who place restrictions on the scale at which the records can be displayed on the NBN Gateway. Lott (1997) listed no Charnwood species as key species for the Leicestershire and Rutland BAP.

Bluebells in Burrow Wood (photo: Michael Jeeves)

7. Summary of changes since the 1975 report

Some of the most important or striking changes in the wildlife and geology of Charnwood Forest over the 33 year period since the 1975 report are listed below, in no particular order:

- Some old grasslands have been destroyed while others have been over-grazed or neglected, resulting in scrub invasion. Rabbits have slowed this process in places. All of the best sites have lost plant species.
- The larger standing water bodies have become eutrophic (nutrient-rich), contributing to the loss of some aquatic and riparian plants.
- Loss of mature elms (*Ulmus* species) to Dutch Elm Disease in the 1970s changed the appearance of the margins of Swithland Reservoir (Gamble 2001) and other parts of the Forest too.
- Buddon Wood has been greatly reduced in size and quality by quarrying.
- Quarry companies have carried out some valuable habitat creation work.
- Farming practices have changed substantially, resulting in massive declines of some farmland birds.
- Both the Chimney Sweeper *Odezia atrata* and the Forester *Adscita statices* moths have declined because of the loss of old grassland (Gamble 1986).
- Several of the largest heath-grassland remnants have been subject to substantial restoration work.
- Several breeding bird species have been lost, viz: Redstart, Snipe, Whinchat and Wood Warbler.
- Buzzard and Raven have returned as breeding species.
- The Peregrine started to nest for the first time.
- Butterfly populations have changed quite considerably with, for example, the Brimstone *Gonepteryx rhamni* becoming common and the Gatekeeper *Pyronia tithonus*, Speckled Wood *Pararge aegeria* and Ringlet *Aphantopus hyperantus* colonizing the area. At the same time the Wall *Lasiommata megera* has been largely lost.
- Several dragonfly species, including the Migrant Hawker *Aeshna mixta*, Broad-bodied Chaser *Libellula depressa* and Ruddy Darter *Sympetrum sanguineum* have spread north and colonized the Forest after the early 1980s (Gamble 1986), probably as a result of a warmer climate.
- A number of plant species have been lost, e.g. the Green-winged Orchid *Anacamptis (Orchis) morio.*
- A number of non-native aquatic and riparian plants have established themselves, e.g. New Zealand Pygmyweed *Crassula helmsii* and Indian Balsam *Impatiens glandulifera.*
- The RIGS initiative has been launched, leading to wider recognition of geological sites and improved access and interpretation.
- The Forest's nature reserves have fared better than most other key sites in terms of habitat quality and there are more of them: Charley Woods and Lea Meadows (LRWT), Morley Quarry and Pignut Spinney Marsh

(Charnwood Borough Council), Billa Barra Hill and Hill Hole (Hinckley and Bosworth Borough Council). Funding for nature reserve management has increased and the membership of the LRWT has increased 10-fold.

Buddon Wood Quarry 2005 (photo: Michael Jeeves)

8. Review of recommendations in the 1975 report

The 1975 report gave recommendations on the future of nature conservation in Charnwood Forest. Fig. 15 summarizes these and assesses how effectively they have been implemented.

Fig. 15 Progress in implementation of recommendations in 1975 report

1975 recommendation	Progress by 2008
General comments	
1. Public authorities, landowners and others should protect special areas of value to wildlife.	Partly achieved; the best sites have been identified and there are grants available to assist with land management, but many sites are still in poor condition.
2. All (biological?) SSSIs should be managed as nature reserves by LRWT or LCC.	Partly achieved; only a small amount of additional SSSI land has been brought into nature reserve or country park management since 1975.
3. All management in the Forest should consider the geological interest of the area.	Partly achieved; the geological interest of a number of sites has been catered for by landowners.
Quarrying	
4. Quarry extensions should be limited to areas where there will be minimal impact on wildlife.	Largely achieved.
5. A long-term plan for mineral extraction should be produced that includes after-use, geological interests and potential for wildlife conservation.	Not achieved.
Agriculture	
6. Maintain the traditional agricultural pattern of small fields with mixed farming.	Partly achieved; there has been localized loss of hedgerows and walls to create large fields while mixed farming on individual farms has become a thing of the past.
7. Carry out in-depth study with the industry and seek to improve damaging farming methods.	Not achieved.
8. Resist major drainage improvements.	Partly achieved; most of the Forest streams have avoided major engineering work.
Forestry	
9. Wildlife conservation should play a very strong part in the future management of the best woodlands by attempting to restore the native deciduous woodland.	Partly achieved; there has been some restoration of planted ancient woodland, e.g. Outwoods and Poultney Wood.

10. Prevent further loss of deciduous woodland.	Achieved.
Recreation	
11. The Forest should not become the focus for future recreation plans.	Partly achieved; visitor facilities have increased, but not overwhelmingly.
12. Restore damaged areas.	Uncertain.
13. Adopt special measures in public areas to protect places of exceptional wildlife interest.	Partly achieved; there are a few refuges for wildlife in public areas, but not enough.
14. Do not increase the recreational use of the reservoirs.	Achieved.
15. Restrain sporting development.	Achieved.
16. There should be close liaison between the Bradgate Park Trust and naturalists.	Partly achieved; LRWT and others have good relations with the Bradgate Park Trust.
Aerial pollution	
17. New pollution sources should not be established immediately to the south-west or west of the area.	Partly achieved; road traffic has increased enormously, but air quality from industrial pollution has improved.
Road improvements and road verges	
18. Maintain the wildlife interest of road verges.	Not achieved.
Public services	
19. The removal or lopping of trees should be minimized.	Partly achieved; pressure from health and safety concerns has increased.
Research and education	
20. Carry out further ecological survey work.	Partly achieved; most of the area has been re-surveyed in order to identify the best sites.
21. Carry out experiments on habitat creation methods.	Partly achieved; there have been a number of projects in and close to quaries.
22. Establish new educational nature reserves.	Not achieved.
23. Produce advisory guides for educational parties to find features away from the main pressure zones.	Not achieved.

Few recommendations have been entirely achieved and there has been no co-ordinated attempt to deal with this. The main recommendations of the 1975 report that stand out because of slow or no progress are:

- 2 – only all or part of two of the 21 Forest SSSIs are now nature reserves, the same situation as in 1975.

- 5 – no plan to address nature conservation and mineral extraction has been produced, other than Leicestershire County Council Mineral Plans.
- 7 – no study in co-operation with the farming industry has been undertaken.
- 9 – while some restoration of planted ancient woodlands has taken place, there remains much to do.
- 11 – recreation remains a threat to nature conservation through, for example, open access to areas as a consequence of the Countryside and Rights of Way Act 2000, damage to geological features and growth in the numbers of people living around the area.
- 22 & 23 – no educational nature reserves have been established in the Forest.

Ancient oak in Bradgate Park (photo: Derek Lott)

9. Current threats

The threats to wildlife habitats are many and varied, but the main ones relevant to Charnwood Forest are listed below:

- Habitat destruction
- Habitat fragmentation (not mentioned in the 1975 report)
- Climate change (not mentioned in the 1975 report)

Other threats, some localized, include:

- Unsympathetic rebuilding of drystone walls
- Cleaning of walls and gravestones
- Damage by fire
- Trampling of plant communities by people and animals (this can also be beneficial in some circumstances)
- Point source pollution
- Removal of trees for safety and tidiness reasons
- Invasion by a few vigorous alien species such as Sycamore, Rhododendron and Harlequin Ladybird, and possible spread of non-native crayfish
- Livestock diseases, making cattle grazing more difficult
- Conifer plantations on ancient woodland sites
- Neglect and loss of expertise of traditional tree management techniques (e.g. pollarding)
- Damaged trees and roots from soil compaction and erosion caused by excessive trampling by livestock and people and compounded by physiological stress due to drought
- Inflexibility of the Site of Special Scientific Interest system, which does not allow for sites to change
- Inappropriate management such as over-grazing and excessive use of herbicides
- Neglect due to cessation of traditional management practices
- Nutrient enrichment (eutrophication)
- Recreational use, including disturbance by dog walkers
- Land drainage
- Increased sediment in streams from soil erosion as a result of ploughing and drainage of arable land
- Switch from hay making to silage production and conversion to high production grasslands through applications of fertilisers and herbicides
- Indiscriminate tree planting also leading to over-shading of rock habitats
- Use of quarries for landfill

Cademan Moor – heath-grassland being invaded by scrub after cessation of grazing Feb 2009 (photo: Michael Jeeves)

High Sharpley – another heath-grassland heavily invaded with secondary birch woodland Feb 2009 (photo: Michael Jeeves)

10. Existing nature conservation initiatives

- **Sites of Special Scientific Interest**
  The 21 SSSIs in Charnwood Forest are legally protected and it is the role of the government agency Natural England to ensure that they are all in 'favourable condition'.

- **Nature Reserves**
  These are defined here as places where nature takes priority over other activities. The Leicestershire and Rutland Wildlife Trust manages six nature reserves in the Forest: Blacksmith's Field, Charley Woods, Charnwood Lodge, Lea Meadows, Rocky Plantation and Ulvercroft. Rocky Plantation and part of Ulverscroft are owned by the National Trust and leased to LRWT. The total area of these nature reserves is 293.9 ha. There are four Local Nature Reserves present: Morley Quarry and Pignut Spinney Marsh (both managed by Charnwood Borough Council), Billa Barra Hill and Hill Hole (both managed by Hinckley and Bosworth Borough Council).

Grazing of traditional cattle breeds restored to the Warren Hills, Charnwood Lodge Nature Reserve, 2007 (photo: Michael Jeeves)

- **Country Parks**
  These sites are defined here as places where people are the priority, but wildlife is a management objective too. The Bradgate Park Trust manages Bradgate Park and Swithland Woods, a very large Country Park extending over about 250ha, while Leicestershire County Council manages the smaller, but still substantial, Beacon Hill Country Park. Other local authority lands in the Forest effectively managed as Country Parks include The Outwoods (Charnwood Borough Council), Jubilee Woods (Leicestershire County Council), Billa Barra Hill and Hill Hole (Hinckley and Bosworth Borough Council).

- **Biodiversity Action Plans**
  Four BAPs cover all or part of the area: the Leicester Leicestershire and Rutland BAP, Charnwood BAP, The National Forest BAP and the Severn Trent Water BAP.

- **Local Wildlife Sites**
  LWS are non-statutory sites and are identified by ecologists from a number of organisations. The LRWT provides free advice to LWS owners and managers. LWS do receive some protection in Local Authority development plans.

- **Regionally Important Geological Sites**
  RIGS are non-statutory sites and are identified by geologists from a number of organisations. Opportunities for access, interpretation and research are sought and a new walkers' map and guide to the rocks and landscape of Charnwood Forest has recently been published (Ambrose *et al* 2007). RIGS receive some protection in Local Authority development plans.

- **The National Forest**
  The National Forest was launched in the early 1990s. It is run by The National Forest Company, which administers grant schemes, including the recently launched Changing Landscapes Scheme.

National Forest planting near Cademan Wood Feb 2009 (photo: Michael Jeeves)

- **English Woodland Grant Scheme**
  EWGS is administered by the Forestry Commission, which also regulates the felling of trees.

- **Agri-environment schemes**
  Now administered by Natural England, the Countryside Stewardship Scheme has closed to new entrants and has been replaced by the Environmental Stewardship Scheme.

- **Leicestershire and Rutland Farming and Wildlife Advisory Group**
  FWAG provides advice to farmers on land management.

- **Shire Grants Scheme**
  This is administered by Leicestershire County Council.

- **Quarry restoration schemes**
  The Trust has worked with Leicestershire County Council planning officers and Lafarge Aggregates (at Mountsorrel) and Aggregate Industries (at Bardon) to create new wildlife habitats on former quarries and surrounding land. Charnwood Borough Council has undertaken similar work at Morley Quarry.

Broad Hill, Mountsorrel – former granite quarry and landfill site being restored to heath-grassland (centre), with preserved geological exposure on the right, Feb 2009 (photo: Michael Jeeves)

Naturally regenerating woodland on new landform adjacent to Mountsorrel (Buddon Wood) quarry 2006 (photo: Michael Jeeves)

- **Aggregates Levy Scheme**
  Funding, which is particularly relevant to Charnwood Forest with its numerous quarries, has been administered by a number of organisations.

- **Community Heritage Initiative**
  The CHI has provided support and funding for local groups, but closed in November 2008.

11. New long-term objectives for nature conservation in Charnwood Forest

Taking into account the current knowledge of wildlife and geology in Charnwood Forest and the threats to it, as outlined in earlier sections of this plan, the main objectives for nature conservation in the area are now considered to be:

- **To maintain geological and geomorphological features**
  The geology of Charnwood Forest is its most important nature conservation feature. Existing sites must be protected while opportunities for the study and conservation of new ones sought, especially in active quarries.

- **To enhance* the best wildlife sites**
  Conserving the best sites for wildlife has been the traditional approach to biological nature conservation and it remains the most important aim today. A variety of means to achieve this should be used, including legal protection of SSSIs, establishing a network of non-statutory Local Wildlife Sites and, very importantly, ensuring continued support for nature reserves (see example of SSSI habitat restoration in photo of Bardon Hill on p53).

  *By 'enhance' the Trust means that the nature conservation qualities of the habitats will be intensified.

- **To create new habitats and improve habitat connectivity and complexity**
  To address the loss and isolation of good wildlife sites efforts should be made to link and buffer those that remain through habitat creation (see example in photo of Charley Woods NR on p52). These new habitats will be different to the old ones such as unimproved grasslands and ancient woodland due to factors such as soil disturbance, high fertility and lack of continuity. A decision needs to be made as to whether they will be 'open' (grass/rock), 'closed' (woodland, scrub or wood pasture) or 'wet' (permanent open water or seasonally wet), but nothing more precise. Habitat complexity is important too. Light management will then be the key to success.

- **To allow changes to occur through the dynamism of nature, including climate change**
  Landscapes and the habitats and species that occur in them inevitably change over time. This occurs because of a variety of factors such as climate, succession, erosion, fashionable management and evolution. Resisting these changes can be futile, contrary to the concept of nature conservation and damaging to wildlife. A balance needs to be found that will, where possible, conserve important features such as old meadows, but allow others to change into something else. For example, where grazing is impracticable it may have to be accepted

that maintaining an open habitat with a short sward is not possible. Furthermore, small isolated habitats are unlikely to survive without species losses and the predicted rapid changes in climate in the twenty first century make it even more imperative that this principle is accepted (see example in photo of Charnwood Lodge on p53). Nature conservation should be an explicit objective over as large a proportion of the land surface as possible to allow dynamic processes to maintain wildlife.

- **To enable people to experience nature in a sustainable way**
  Charnwood Forest covers a relatively small area, but has a very distinctive and attractive landscape. It is surrounded by large settlements and it is not surprising that substantial numbers of people visit it, concentrating in well-established Country Parks such as Bradgate and Beacon Hill. With projected increased growth in housing, visitor numbers are likely to increase, putting further pressure on the natural environment. People will therefore need to be guided so that wildlife and geology do not suffer. There is also a significant opportunity here to inform people about the special nature of Charnwood Forest and help them to enjoy and learn from it. Nature reserves, however, must remain as places where nature takes priority over recreation and new locations should be sought for the latter, especially that part of The National Forest outside of Charnwood Forest.

The support of landowners will be crucial in the delivery of much of the above.

Former pasture being allowed to develop into woodland to link two existing woods at Charley Woods Nature Reserve in 2005 (photo: Michael Jeeves)

Wet heath at Charnwood Lodge in 2008, an example of a small fragile habitat that may not survive a warmer, drier climate and will probably develop into something different in time (photo: Andrew Lear)

Hebridean sheep grazing a felled conifer plantation being restored to heathland at Bardon Hill in 2008 (photo: Neill Talbot)

12. Action plan 2009-2014

The actions below are for LRWT to work on, but the support of other organisations and individuals will be welcome and necessary in some cases. Further resources will be required to undertake some actions.

12.1 Policy and legislation

- Review quarry restoration plans and look for opportunities for habitat creation and geology
- Lobby local authorities to ensure that Charnwood Forest's nature conservation importance is protected within Local Development Frameworks
- Respond to planning applications as appropriate
- Lobby local authorities to ensure that further recreational development is located in surrounding areas
- Review available funding streams and identify gaps
- Investigate World Heriage Site/Geopark status possibilities

12.2 Site and species safeguard and management

- Work with others to ensure that SSSIs and Local Wildlife Sites are maintained in as good a condition as possible, but accept that their nature will change
- Maintain and enhance nature reserves
- Look for opportunities for habitat creation, especially to link existing good sites and to improve habitat complexity
- Investigate means of restoring planted ancient woodlands
- Promote construction of eco-bridges to facilitate movement of wildlife over M1
- Encourage improved management of hedgerows and dry stone walls
- Identify opportunities for nature reserve acquisition

12.3 Advisory

- Provide SSSI, LWS and RIGS owners/managers with information and advice
- Promote Environmental Stewardship Higher Level Scheme, National Forest Changing Landscapes Scheme and other grant schemes
- Encourage the extention of advice to farmers on soil protection from Blackbrook Reservoir catchment to the rest of Charnwood Forest
- Provide householders and Parish Councils with advice and information
- Target landowners with potential habitat de-fragmentation/habitat creation projects

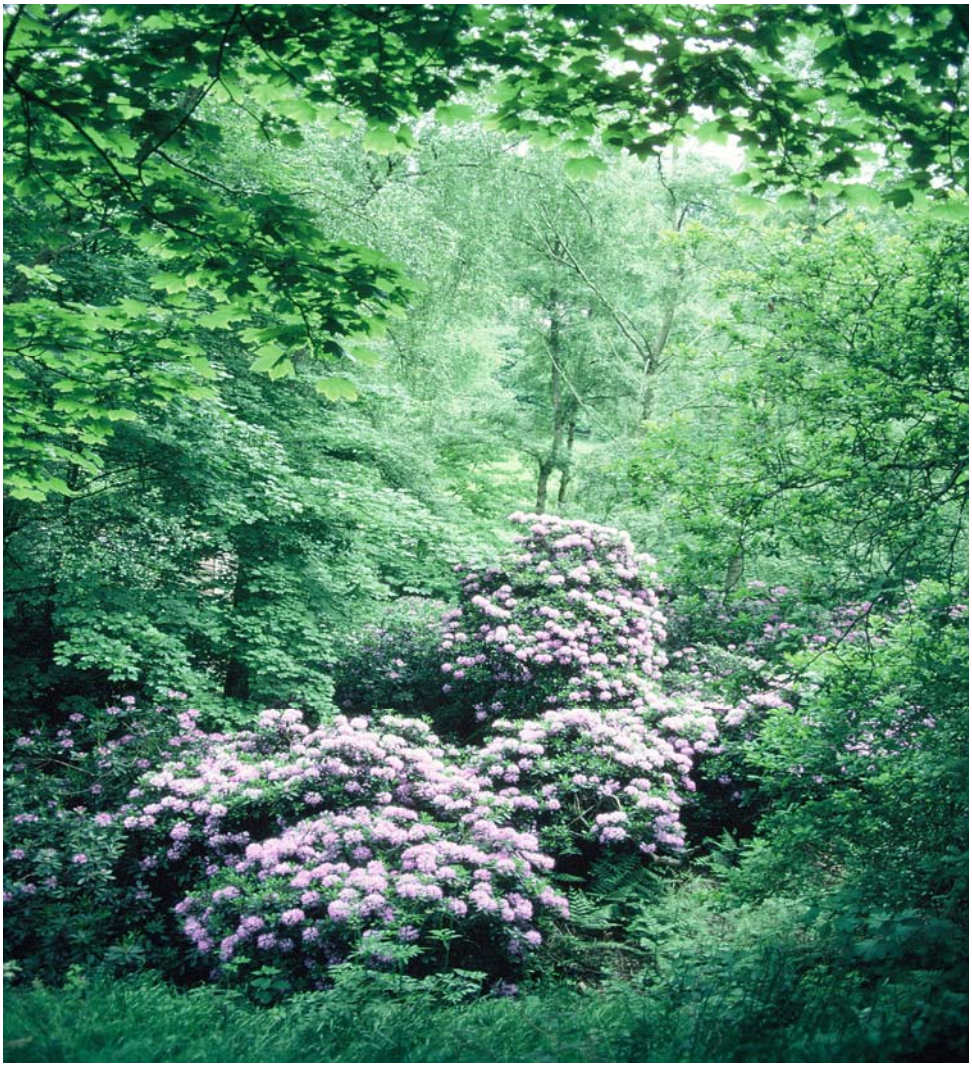
12.4 Research, survey and monitoring

- Carry out further survey work as required
- Identify and monitor all Local Wildlife Sites
- Identify opportunities for habitat de-fragmentation projects
- Monitor the impact of climate change
- Undertake long-term monitoring of nature reserves

- Survey and monitor target species and groups/communities

12.5 Communications and publicity

- Produce and distribute a newsletter for residents, including landowners
- Promote dry stone walling
- Promote the value of old trees
- Raise awareness of the value to wildlife of rocks and built structure habitats such as grave stones, old walls, bridges etc.
- Organise/co-ordinate events and guided walks programmes
- Produce self-guided walks leaflets
- Investigate new ways for people to experience nature
- Promote links between nature conservation and cultural heritage
- Publish a book on the wildlife of Charnwood Forest
- Produce a leaflet on nature conservation in Charnwood Forest



Rhododendron and Sycamore at Blackbrook Reservoir in 1995 (photo: Michael Jeeves)

13. Acknowledgements

Michael Jeeves wrote the main text and edited the plan. Dr Roy Clements contributed the section on geology. The Conservation Committee of the Leicestershire and Rutland Wildlife Trust discussed the first draft and Dr Keith Ambrose, Dr John Carney, Katie Field, Graham Finch, Dr Anthony Fletcher, Peter Gamble, Andrew Heaton, Richard Iliffe, Tony Lockley & Lesley Eddleston (Leicestershire County Council), Dr Derek Lott, Ian Merrill, Ivan Pedley, Adrian Russell, Anthony Squires, Neill Talbot and Stephen Woodward provided valuable additional comments, assistance and information. Photographs are acknowledged individually in the text. Any errors are the authors'.

The Precambrian fossil *Charnia masoni*, estimated to be around 560 million years old, found in Charnwood Forest in 1957 (photo: British Geological Survey)

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Appendix

Gazeteer of key sites of ecological importance in Charnwood Forest

Note that there are many more sites of interest than those listed. The grid references given are for the centre of the sites. An asterisk indicates that there is no recent record of a species and the species information given is inevitably only as good as that was available at the time of collation. Time available to prepare the gazetteer was short and the information included on many groups is incomplete. Nevertheless, the gazetteer should be a useful reference source and it might stimulate naturalists to improve on it.

Most of the vascular plant information has been compiled by Michael Jeeves, with the help of Peter Gamble. Derek Lott contributed most of the invertebrate information, but the moth data is from McPhail & Morris (1997), supplemented by information from Graham Finch.

HG – Horwood & Noel (1933)
PE – Primavesi & Evans (1988)
SSSI – Site of Special Scientific Interest
LWS – Local Wildlife Site
RIGS – Regionally Important Geological/Geomorphological Site
NNR - National Nature Reserve
LNR – Local Nature Reserve

Altar Stones, The & Blacksmith's Field Markfield SK 484108
Heath-grassland with *Galium saxatile, Nardus stricta, Potentilla erecta* and *Vaccinium myrtillus*, around hill top Precambrian rock outcrops and gorse scrub; 4 ha; LRWT nature reserve, LWS and RIGS.

Notable flora: *Blechnum spicant, Vaccinium myrtillus.*

Notable fauna: spiders.

Other notable taxa: lichens.

Bardon Hill Bardon SK 459133
At 278m (912 feet), the summit, of Precambrian rocks, is the highest point in Leicestershire. Two SSSIs, Bardon Hill (heathland and woodland) and Bardon Hill Quarry (geology), form part of the site.

It seems likely that the Hill was once largely open, heath-grassland (otherwise described as heathland or moorland), but the 1st Ed OS map shows it surrounded by woodland. Although part could be ancient, most of the woodland (*Quercus petraea* was stated to be locally abundant in HG) may have been planted or part naturally

regenerated. In the twentieth century substantial areas of the Hill were quarried and partly restored. Habitats present now include cliffs, overburden mounds, mixed woodland and a small area of heath-grassland on the top. According to HG there was formerly a species-rich wetland area near the base of the Hill, on the south side.

Notable flora: **Blechnum spicant, *Carex laevigata, Ceratocapnos claviculata, *Cirsium dissectum, *Erica tetralix, *Gymnadenia conopsea, *Genista anglica, *Hydrocotyle vulgaris, *Lathyrus palustris, *Limosella aquatica, *Lycopodium clavatum, *Oreopteris limbosperma, *Salix repens, *Ulex gallii, Vaccinium myrtillus, *Viola palustris.*

Notable fauna: spiders, migrating birds, *Caenopsis fissirostris (*a nationally scarce weevil).

Beacon Hill Woodhouse SK 509148
A Country Park managed by Leicestershire County Council since 1946 and part of the Beacon Hill, Hangingstone and Outwoods SSSI; the site, including the Broombriggs estate, covers 135ha. The highest point, the 'Beacon', stands at 248m O.D. There are important outcrops of Precambrian rocks, bracken-dominated areas, heath-grassland, ponds, small wet flushes and secondary birch-oak and plantation woodland present. The eastern flank has been drained. The remains of a Bronze Age hill fort have been found on the south-eastern side.

During the twentieth century woodland (some planted, some naturally regenerated) and bracken came to dominate much of the site and together with drainage work, contributed to the loss of many of its notable plants. In the late 1990s and 2000s areas of bracken and woodland have been cleared and grazing by hardy sheep, cattle and alpacas introduced.

The "Frying Pan Pond" holds an interesting aquatic invertebrate fauna despite apparently unsympathetic works carried out to encircle it with a wall. Frank's Pit also holds several notable plant species.

Notable flora: *Aira caryophyllea, A. praecox, *Anagallis tenella, Blechnum spicant, Calluna vulgaris, Carex binervis, Carex pilulifera, *Danthonia decumbens, *Erica cinerea, *Erica tetralix, Hydrocotyle vulgaris, *Hypericum elodes, *H. humifusum, *H. maculatum, *H. pulchrum, Juncus squarrosus, *Luronium natans, *Lycopodium clavatum, *Moenchia erecta, *Montia fontana, *Oreopteris limbosperma, Potamogeton polygonifolius, *Salix repens, *Scutellaria minor, *Solidago virgaurea, Vaccinium myrtillus, Viola palustris.*

Notable fauna: Tree Pipit, *Stictonectes lepidus* (a nationally scarce water beetle), *Didea fasciata* (a nationally scarce hoverfly); Striped Wainscot, Barred Hook-tip, Barred Umber, Lunar Thorn (LRDB moths), also Gallium Carpet, Black Arches, Angle-striped Sallow, Birds Wing.

Benscliffe Wood Newtown Linford SK 515125
Ancient woodland; 42ha; a small part is a SSSI for its lichen communities. A former *Quercus petraea* wood on Precambrian rocks, it has largely been clear-felled and planted with conifers.

Notable flora: **Epipactis helleborine, *Hypericum humifusum, *Lythrum portula, *Oreopteris limbosperma, *Vaccinium myrtillus.*

Other notable taxa: lichens.

Billa Barra Hill Markfield SK 466114
Heath-grassland, scrub and woodland; LNR managed by Hinckley and Bosworth Borough Council.

Blackbrook Reservoir Loughborough (Shepshed)/Charley SK 458174
Fed by the Black Brook, Blackbrook Reservoir stands at an altitude of 120m O.D. and covers 38.6ha. The present reservoir was completed in 1906 to provide the main water supply for the Borough of Loughborough and is on the site of a previous reservoir, constructed between 1791 and 1794, to feed the Charnwood Forest Canal. Unfortunately, the original dam was an ill-conceived earth structure that failed on 20th February 1799, the resulting deluge causing considerable damage all the way down to Dishley Mill. Although the dam was repaired, it was dismantled and the reservoir was abandoned in 1804.

Blackbrook Reservoir is surrounded by trees and an SSSI for its 'unusual marginal plant community unique to the English Midlands and reminiscent of that found in a few sites in northern England'. The water was once considered to be mesotrophic, derived from acid base-poor Precambrian rocks and more fertile base-rich Triassic and glacial deposits. The Nationally Scarce rush *Juncus filiformis,* now much reduced in quantity and possibly extinct, occurred here at its most southern locality in Britain.

Since the late 1960s many of the characteristic marginal plants appear to have been lost and it is suspected that the trophic status of the reservoir has been changed by nutrient-rich water and silt flowing into it. Scrub encroachment and reduced draw-down may also have contributed to the changes in the flora. *Crassula helmsii* was noted as locally frequent as early as 1984.

Notable flora: *Alopecurus aequalis, *Apium inundatum, *Baldellia ranunculoides, *Carex rostrata, Carex vesicaria, *Drosera rotundifolia, *Eleocharis multicaulis, *Eleogiton fluitans, *Genista tintoria, *Hydrocotyle vulgaris, *Juncus filiformis, Littorella uniflora, *Lycopodium clavatum, *Moenchia erecta, *Persicaria minor, *Ranunculus omiophyllus, Rumex maritimus.*

'Blackbrook Wood' Loughborough (Shepshed) SK 459189
Ancient woodland; 2.6ha. Located alongside the Black Brook, not apparently named on maps. Peterken Valley Alderwood type.

Notable flora: **Chrysosplenium alternifolium, Melica uniflora*.

Blakeshay Wood Newtown Linford SK 514114
Ancient woodland; 43ha. Probably once a *Quercus petraea* wood, now a conifer plantation.

Notable flora: *Agrimonia procera, *Epipactis helleborine, *Galium odoratum, *Lysimachia nemorum, *Orchis mascula, *Veronica montana.*

Botcheston Bog Desford (Ratby) SK 485047
This site is situated at an altitude of 91m O.D., consists of marsh, mesotrophic grassland and alder woodland, with a stream along the southern boundary. It is a SSSI covering 3.19ha (7.99 acres). The mineral soil is Alluvium over Mercia Mudstone, although a thin peat deposit has formed with pH 6.95.

A habitat study was published in HG, showing that a remarkable assemblage of local rarities were present in the marsh, including *Anagallis tenella, Gymnadenia conopsea,* and *Carex pulicaris* (all abundant) and *Epipactis palustris* (frequent). Another study, carried out between 1975-77 and published in PE reported that most of the rare species were still present, but generally less frequent than formerly. The site appears to have deteriorated since then and very few of the rarities are thought to remain.

Notable flora: **Anagallis tenella, *Carex dioica, *Carex hostiana, *Carex pallescens, *Carex pulicaris, *Carex rostrata, *Danthonia decumbens, *Epipactis palustris, Eriophorum angustifolium, *Gymnadenia conopsea, *Hydrocotyle vulgaris, *Isolepis setacea, *Menyanthes trifoliata, *Oenanthe fistulosa, *Parnassia palustris, *Pedicularis palustris, *Triglochin palustris, Valeriana dioica, *Veronica anagallis-aquatica, *Veronica scutellata.*

Bradgate Park Newtown Linford SK 5310
SSSI and Country Park extending over 332ha (830 acres); habitats include heath-grassland (acid grassland and mire), ancient trees, fast-flowing stream (River Lin), rock outcrops, ponds, plantation woodland and dry stone walls. Much of the park is covered in *Pteridium aquilinum,* while *Calluna vulgaris* is rare and *Erica tetralix* is frequent in localized wet areas.

The park is on undulating ground with altitude varying between 82m and 212m O.D. There are craggy outcrops of Precambrian rocks with Mercia Mudstone forming the geology in the lower lying areas. The soils are peaty in the valleys and pH has been measured at 4.3 and 3.5. Higher up, where the soils are thin and free-draining, pH has been measured at 3.5.

Notable flora: **Anagallis tenella, Atropa belladonna, *Botrychium lunaria, Callitriche intermedia, Carex echinata, Carex muricata ssp lamprocarpa, Carex pallescens, *Carex pilulifera, *Cerastium semidecandrum, Cynoglossum officinale, Danthonia decumbens, Erica tetralix, Erophila verna ssp. spathulata, Euphrasia anglica, *Gentianella campestris, Hydrocotyle vulgaris, Hyoscyamus niger, Juncus squarrosus, Lythrum portula, *Moenchia erecta, Montia fontana, Myosotis secunda, Oreopteris limbosperma, *Polygala serpyllifolia, Potamogeton friesii, *Potamogeton polygonifolius, Ranunculus fluitans, R. hederaceous, R. omiophyllos, Salix repens, Scutellaria minor, Trifolium micranthum, Trifolium striatum.*

Notable fauna: Brown Trout, White-clawed Crayfish, spiders, *Plectophloeus nitidus* (a red data book list 1 “endangered” wood decay beetle) and many nationally scarce beetles; important invertebrate assemblages of wood decay (associated with the ancient oaks) and flowing water (associated with the River Lin) characterised by a

high proportion of rare species; species-rich invertebrate assemblage associated with dung.

Other notable taxa: lichens.

Brand, The Woodhouse SK 537131
Country house and estate with heath-grassland, woodland and disused slate quarries. The last contain a rich fern flora and are part of Swithland Wood and The Brand SSSI. The site is said to be unique in the British Isles, with three subspecies of *D. affin*is (ssp *affinis, cambrensis* and *borreri*, and all combinations of their hybrid with *D. filix-mas*, recorded in 1988 (BSBI News No 50 Dec 1988). On a visit in 2006 by K. Trewren a planted specimen of *Osmunda regalis* thought to be at least 1000 years old was recorded (unpub report to Natural England).

Notable flora: ferns, *Ulex gallii, Umbilicus rupestris.*

Notable fauna: Glow-worm.

Brazil Wood Swithland SK 558136
Ancient woodland and part of the Buddon Wood and Swithland Reservoir SSSI; 2.5ha. It was reduced in size slightly by the creation of the reservoir and is now surrounded by water, but joined to the mainland by a railway line. The wood is of the Birch-Sessile Oak Peterken type and has a high-forest structure with abundant *Quercus petraea. Betula pendula* is occasional and *Salix cinerea* and *Alnus glutionosa* are frequent on the edge of the water. *Rubus fruticosa* is abundant beneath the trees. The field layer is species-poor, with much *Pteridium aquilinum*. *Deschampsia flexuosa* and *Luzula sylvatica* are locally abundant.

Notable flora: **Campanula trachelium, Carex pilulifera, *Hypericum pulchrum, Luzula sylvatica, *Lysimachia nemorum, *Melica uniflora, Quercus petraea.*

Notable fauna: site of Heronry.

Broad Hill Mountsorrel SK 573147
Disused granite quarry, filled with household waste and capped 2000s, but some rock outcrops left exposed. Heath-grassland now being established by Lafarge Aggregates. Forms the Main Quarry, Mountsorrel geological SSSI, extending over 14.2ha.

Buddon Brook Meadows Quorndon SK 556157
Damp mesotrophic grassland. Several ponds support a diverse aquatic invertebrate fauna.

Notable flora: *Alchemilla filicaulis, Saxifraga granulata.*

Notable fauna: *Ctenicera pectinicornis* (a nationally scarce click beetle associated with herb-rich meadows).

Buddon Wood Quorn SK 562150
Ancient woodland on granodiorite, formerly very large and diverse, but about three quarters has been lost to quarrying since the mid 1970s; current size ca 32ha; part of the Buddon Wood and Swithland Reservoir SSSI.

Until the Second World War the wood, which was once managed under a coppice regime, contained abundant *Quercus petraea,* while *Tilia cordata* was locally frequent. The site was then clear-felled and allowed to naturally regenerate. *Betula pendula* became abundant before quarrying started. *Quercus petraea* and *Tilia cordata* are still locally frequent in the woodland that remains, as is *Quercus robur, Alnus glutionosa, Ulmus glabra, Populus tremula* and *Acer pseudoplatanus.* Peterken Lowland Birch-Sessile Oak woodland is the main stand type that remains, although six others have been identified. The shrub layer is fairly open, with locally frequent *Corylus avellana* and *Ilex aquifolium. Rubus fruticosus* is abundant.

The field layer is not as rich as it once was and *Pteridium aquifolium* is locally abundant. In the nineteenth century the wood had an outstanding beetle fauna, which attracted collectors from all over the country.

Notable flora: **Campanula patula, *Equisetum sylvaticum, Filago minima, *Frangula alnus, *Hypericum maculatum, H. humifusum, H. pulchrum, *Lycopodium clavatum, Melampyrum pratense, *Paris quadrifolia, Potentilla argentea, Quercus petraea, Solidago virgaurea, Tilia cordata, Vaccinium myrtillus.*

Notable fauna: many nationally scarce beetles*;* important invertebrate assemblages of wood decay and arboreal canopy characterised by a high proportion of rare species; species-rich invertebrate assemblage associated with scrub-heath and moorland; Satyr Pug, Angle-striped Sallow, Orange Underwing (LRDB moths).

Burleigh Wood Loughborough SK 508177
Ancient woodland; 9.6ha. The wood is developing a high-forest structure, although coppicing was re-introduced in the early 1990s. In that part on higher ground, on Pre-cambrian rocks, *Quercus petraea* is the dominant tree, with an understorey of *Corylus avellana*. The remainder of the site, on Mercia Mudstone, has a canopy of *Quercus robur* and *Fraxinus excelsior,* with a shrub layer containing *Corylus avellana* and *Acer campestre*. Some large coppice stools are present. The ground flora is fairly rich, with abundant *Hyacynthoides non-scripta*. Amongst the other species that occur in quantity are *Milium effusum, Pteridium aquilinum* and *Anemone nemorosa.*

Notable flora: *Carex pendula, Luzula pilosa, Luzula sylvatica, Lysimachia nemorum, Melica uniflora, Quercus petraea, Sanicula europaea.*

Burrow Wood Charley SK 477145
Ancient woodland and part of LRWT *Charley Woods* nature reserve, on Pre-cambrian rocks; 11.14ha. The wood is dominated by well-grown *Quercus robur,* with *Acer pseudoplatanus* and *Betula pendula* locally frequent. There are a few *Alnus glutinosa* along a small stream gulley. The shrub layer is sparse, with occasional large specimens of *Ilex aquifolium* and *Corylus avellana*. *Rubus fruticosus* is frequent. The species-poor field layer contains extensive colonies of *Hyacynthoides non-scripta* and *Pteridium aquilinum.*

Notable flora: *Blechnum spicant, Carex laevigata, Ceratocapnos claviculata, Polygonatum multiflorum, Quercus petraea.*

Cademan Moor Coalville SK 439169
Heath-grassland, long un-grazed and now covered in naturally regenerating trees, mainly *Quercus robur.* Part of the Grace Dieu and High Sharpley SSSI.

Notable flora: *Pedicularis sylvatica, Ranunculus omiophyllos.*

Notable fauna: Orange Underwing.

Cademan Wood Coalville (Whitwick) SK 438169
This woodland, which is part of the Grace Dieu and High Sharpley SSSI, is probably of secondary origin. It is situated on Precambrian rocks at 197m O.D., on a hill top with rock outcrops. *Betula pendula* is the dominant tree with *Quercus robur* and *Sorbus aucuparia. Vaccinium myrtillus* is present in the sparse shrub layer.

Castle Hill Mountsorrel SK 582149
Siliceous grassland on hill top Common Land with outcrops of granite around a War Memorial and small, old quarries; 70m O.D.; the grassland is now rank in places due to the cessation of grazing, while other areas are mown.

Notable flora: *Allium vineale, Ornithopus perpusillus, Potentilla argentea, Spergularia rubra, Trifolium striatum, Trifolium subterraneum, *Viola tricolor.*

Cat Hill Wood Charley SK 475152
Secondary woodland, planted trees, rock outcrops and small areas of grassland; part of LRWT *Charley Woods* nature reserve.

Notable flora: *Ceratocapnos claviculata, Hypericum maculatum.*

Other notable taxa: lichens.

Charley Woods Charley SK 476148
LRWT nature reserve, containing *Burrow Wood* and *Cat Hill Wood.*

Charnwood Forest Golf Course Woodhouse SK 522152
Heath-grassland, scrub and rock outcrops along Hangingstone Hills; part of Beacon Hill, Hangingstone and Outwoods SSSI. There are large colonies of *Calluna vulgaris.* Several ponds support a diverse aquatic invertebrate fauna.

Charnwood Lodge Charley SK 467153
Owned by LRWT, this is at 193.5ha one of the largest nature reserves in the Midlands. Most of it is a SSSI and part of that is a NNR. There are substantial outcrops of Precambrian rocks on the hill tops, with Mercia Mudstone occupying the lower ground. 172-248m O.D.

The drier hillsides are largely covered by *Pteridium aquilinum* but there are substantial areas of heathland, heath-grassland or moorland vegetation (the terms are difficult to separate here). *Vaccinium myrtillus, Calluna vulgaris, Ulex europaeus, U. gallii, Deschampsia flexuosa, Molinia caerulea, Nardus stricta, Potentilla erecta, Agrostis capillaris* and *Galium saxatile* are some of the characteristic species present. Less common dry heath species include *Danthonia decumbens, Genista anglica* and *Carex binervis*.

Wet heath habitat also occurs, but is of limited extent. *Molinia caerulea* and *Erica tetralix* are locally frequent. Associated species include *Salix repens, Anagallis tenella, Scutellaria minor, Oreopteris limbosperma* and several species of *Sphagnum* mosses.

Several ponds and a small reservoir support a range of typical wetland plant species. Other habitats include a stream with *Viola palustris* and an extensive network of dry stone walls. Substantial areas of plantation and secondary woodland are also present on the reserve. These contain good colonies of *Ceratocapnos claviculata*.

Notable flora: *Agrostis canina, *Anagallis tenella, Blechnum spicant, *Botrychium lunaria, Carex binervis, Carex echinata, Carex pilulifera, Carex viridula ssp oedocarpa, Danthonia decumbens, *Empetrum nigrum, Erica tetralix, *Eriophorum angustifolium, Euphrasia anglica, Genista anglica, Hydrocotyle vulgaris, Isolepis setacea, Juncus squarrosus, Lythrum portula, Montia fontana, Myosotis secunda, Ophioglossum vulgatum, Oreopteris limbosperma, Polygala serpyllifolia, Potamogeton berchtoldii, Potamogeton obtusifolius, Ranunculus omiophyllos, Salix repens, *Scleranthus annuus, Scutellaria minor, Spergularia rubra, Ulex gallii, Veronica scutellata, Viola palustris;* bryophytes.

Notable fauna: Tree Pipit, Woodcock; spiders; Green Hairstreak butterfly; six nationally scarce beetles; species-rich invertebrate assemblage associated with scrub-heath and moorland; Satyr Pug, Ling Pug, Glaucous Shears, Golden-rod Brindle, Oak Lutestring, July Belle (LRDB moths), also Grey Chi, Orange Footman, Beautiful Snout.

Other notable taxa: lichens, fungi.

Cliff Hill Quarry Markfield SK 475106
Hard rock quarry and geological SSSI covering 29.69ha for its Precambrian exposures and overlying Mercia Mudstone containing complex mineralisation. Older workings of botanical interest, including in the 1960s a flourishing population of *Eriophorum angustifolium*, were destroyed by reworking during the 1970s (PE).

Coalville Meadows Coalville (Whitwick) SK 447151
Old mesotrophic to acid grassland; 6.2ha; SSSI. It is long-ungrazed and now only parts are mown for hay.

Notable flora: *Cirsium dissectum, Salix repens, *Serratula tinctoria.*

Copt Oak Farm Grassland Ulverscroft SK 486128
Mesotrophic grassland.

Copt Oak Wood Ulverscroft SK 484130
Ancient woodland; habitat study in HG includes **Quercus petraea* (dominant), **Oreopteris limbosperma, *Viola palustris.*

Cropston Reservoir Newtown Linford/Thurcaston SK 546110
The reservoir, which with its grounds covers about 55ha, was completed in 1870 and was formed by the damming of the River Lin. It is situated at 84m O.D., and is part of the Bradgate Park and Cropston Reservoir SSSI.

The inflow end has much willow scrub and scattered willows also occur around the reservoir margins. Areas of small stones of Precambian origin, sand and mud are exposed at times of draw-down and the water itself is said to be mesotrophic. A narrow strip of rough grassland surrounds the reservoir, the boundary of which is marked by dry stone walls.

The main interest of the site lies in the plant communities of the draw-down zone. Here *Littorella uniflora* is locally abundant and other species recorded include *Juncus compressus, Lythrum portula, Persicaria minor* and *Rumex maritimus.* There is little well-developed marginal tall-herb and aquatic vegetation.

The European species *Inula britannica* was first recorded in Britain at this site in 1894.

Notable flora: *Alopecurus aequalis, Carex rostrata, Carex vesicaria, Eleocharis acicularis, Hydrocotyle vulgaris, Juncus compressus, Littorella uniflora, Lythrum portula, Montia fontana, *Persicaria minor, Potamogeton gramineus, Ranunculus lingua, Rumex maritimus, Spergularia rubra, Veronica scutellata.*

Notable fauna: *Bembidion fumigatum and Dochmonota clancula* (nationally scarce beetles associated with marshes).

Dimmingsdale Meadows Newtown Linford SK 538100
Part of Bradgate Park and Cropston Reservoir SSSI and Bradgate Park Estate; 12.6 ha.

Frog Hole Groby SK 518083
Once as rich a marsh as any in the county, now overgrown by trees. Species recorded included *Epipactis palustris, Menyanthes trifoliata* and *Parnassia palustris.* The marsh was situated very close to Groby Pool.

Grace Dieu Brook
One of the three major water-courses draining Charnwood. All three originally left the Charnwood plateau through fast-flowing stretches flowing through small ravines, but only the Grace Dieu Brook at Whitwick now retains such a stretch (the Black Brook was submerged within the reservoir and the River Lin was modified to develop a series of silt traps for Cropston Reservoir downstream).

Notable fauna: *Lesteva hanseni and Ochthephilus andalusiacus* (nationally scarce rove beetles associated with fast-flowing streams)

Grace Dieu Wood Belton SK 434176
One of the most diverse ancient woodlands in Leicestershire and Rutland; part of the Grace Dieu and High Sharpley SSSI; 42ha; 89-125m O.D. The topography is varied, with outcrops of Precambrian rocks and free-draining acid soils, and swampy ground on lower ground alongside the Grace Dieu Brook.

Seven different Peterken stand types have been recorded, including Lowland Birch-Sessile Oak, Acid Valley Alder and Wet Valley Alder woodland. The range of tree and shrub species present is very varied, including both native *Quercus* species, *Ulmus glabra, Viburnum opulus, Frangula alnus* and *Prunus padus,* which may be native here. The field layer is varied too. Dry, rocky areas are characterized by *Deschampsia flexuosa, Hyacynthoides non-scripta, Holcus mollis* and *Pteridium aquilinum.* Wet places have a much richer flora, with abundant *Anemone nemorosa,* as well as other species such as *Lysimachia nemorum, Caltha palustris, Valeriana officinalis, Chrysosplenium oppositifolium, Equisetum sylvaticum* and *Carex laevigata.*

Notable flora: *Campanula trachelium, Carex laevigata, *Crepis paludosa, Equisetum hyemale, *E. sylvaticum, *Frangula alnus, *Lathraea squamaria, *Paris quadrifolia, Prunus padus, Quercus petraea, Viola palustris.*

Notable fauna: *Chrysolina oricalcia* (a nationally scarce leaf beetle) plus four nationally scarce wood decay beetle species.

Groby Fish Ponds Groby SK 530079
Ponds of uncertain origin.

Notable fauna: dragonflies.

Groby Pool Groby SK 521082
Containing (now) eutrophic open water, swamp, marsh, heath-grassland, mesotrophic grassland and wet woodland, this site has a range of habitats unique in Leicestershire and Rutland. Most are within the Groby Pool and Woods SSSI covering 29.39ha. Groby Pool has also had more notable species recorded from it than any other site in the counties. It is, however, much less botanically-rich than formerly.

Described as 'an ancient piece of water' in HG and 'the largest natural water body in Leicestershire' in Crocker (1981), the origins of Groby Pool are uncertain. John Martin, formerly Keeper of Geology with the Leicestershire Museums Service, believed that the present lake is a nineteenth century artificial water body, probably based on a medieval fishpond and valley-bottom marsh (note in LERC file dated 17/2/1986). The Victorians probably constructed it for a combination of amenity and water supply.

The Pool is probably situated on Triassic mudstone over Swithland Slate, at 96m O.D., and now covers about 13ha, although its size has varied over time. It is fringed with stands of tall-herb vegetation including *Phragmites australis* and, on the western side, wet woodland dominated by *Alnus glutinosa*. In the centre of the Pool is a man-made island and the lake is reportedly only about one metre deep over much of its area.

Along the north-east shore are outcrops of granite surrounded by siliceous (heath) grassland, part now heavily trampled by people and grazed short by wildfowl, the faeces of which are abundant, the rest rank and unmanaged. Plants that used to be found here such as *Allium vineale, Ornithopus perpusillus, Potentilla argentea* and *Trifolium striatum* no longer appear to be present. To the north-west is pasture land with wet places where species such as *Anagallis tenella, Carex echinata* and *Scutellaria minor* have been recorded. Species such as *Damasonium alisma, Oenanthe aquatica* and *Sparganium natans* have been noted from the Pool itself, which was once probably more mesotrophic in nature. The wet alder woodland is still a fine example of this type of vegetation, with *Eupatorium cannabinum* etc.

Frog Hole was a rich marsh close to the Pool, now destroyed.

Notable flora: **Aira praecox, Alchemilla filicaulis, *A. xanthochlora, *Alisma lanceolatum, *Allium vineale, Anagallis tenella, *Aphanes inexpectata, *Baldellia ranunculoides, *Bidens cernua, Callitriche truncata, Carex caryophyllea, *C. diandra, *C. echinata, *C. hostiana, *C. pallescens, *C. pseudocyperus, *C. pulicaris, *C. rostrata, *C. x subgracilis, *C. vesicaria, *C. viridula ssp oedocarpa, *Cerastium semidecandrum, *Chrysosplenium alternifolium, *Dactylorhiza incarnata, *Damasonium alisma, *Dianthus deltoides, Dryopteris x complexa, *Eleocharis acicularis, *Epipactis palustris, *Eriophorum angustifolium, *E. latifolium, Eupatorium cannabinum, *Gymnadenia conopsea, *Hippuris vulgaris, *Hydrocotyle vulgaris, Isolepis setacea, *Juncus compressus, *Koeleria macrantha, *Littorella uniflora, Lysimachia nemorum, *Mentha x verticillata, *Menyanthes trifoliata, *Moenchia erecta, *Montia fontana, *Oenanthe aquatica, *O. fistulosa, *O. silaifolia, *Ornithopus perpusillus, *Paris quadrifolia, *Parnassia palustris, *Pedicularis spalustris, *Persicaria minor, Potamogeton berchtoldii, *P. lucens, P. pusillus, *Ranunculus circinatus, *R. lingua, *Rorippa x anceps, *Rumex maritimus, *Scutellaria minor, *Sparganium natans, *Stellaria palustris, *Trifolium striatum, Triglochin palustre, Typha angustifolia, *Utricularia vulgaris, Valeriana dioica, *Veronica scutellata.* Perhaps only 13 out of 69 of these may still be present. Many have gone since the 1970s, while others succumbed 100 years ago or so.

Notable fauna: wildfowl, Heronry, *Prionocera subserricornis* (a nationally red data book cranefly) plus two further nationally scarce craneflies; an important invertebrate assemblage of permanent wet mire characterised by a high proportion of rare species; Southern Wainscot, Mere Wainscot, Orange Underwing, Brown-veined Wainscot (LRDB moths).

Groby Quarry Groby SK 524085
Granite quarry in what was once part of *Sheet Hedges Wood*, with cliffs, scrub, pools and bare ground. Mrs E. Hesselgreaves recorded 300+ species, many of them garden

escapes, during the 1970s-1990s and published notes of these in the Botanical Society of the British Isles Newsletter.

Notable flora: *Filago vulgaris, Hypericum maculatum* and several *Salix* hybrids.

Groby Rifle Range Groby SK 524078
Disused granite quarry, also known as *Dowry Quarry Rifle Range*.

Notable flora: *Allium vineale, *Chenopodium bonus-henricus, Potentilla argentea, *Scleranthus annuus, Trifolium striatum.*

Gun Hill Charley SK 452169
Rocky outcrop south-west of *Blackbrook Reservoir*, now dominated by secondary birch woodland; part of Grace Dieu and High Sharpley SSSI.

Notable flora: **Ranunculus omiophyllos, *Viola palustris.*

Hangingstone Hills Woodhouse SK522152
See *Charnwood Forest Golf Course.*

Herbert's Meadow Ulverscroft SK 492134
Mesotrophic grassland; part of LRWT *Ulverscroft Nature Reserve*; part of Ulverscroft Valley SSSI; 2.77ha (1.8ha grassland, remainder scrub); 167-175m O.D., SW aspect; pH 5.5-7.6 in 1972; mainly on Mercia Mudstone, with a small area of Boulder Clay in the north-west.

The site is a remarkable mosaic of wet/dry, acidic/basic types and is the most species-rich grassland remaining in Leicestershire and Rutland.

Notable flora: **Anagallis tenella, Carex caryophyllea, C. echinata, C. pallescens, C. pulicaria, C. x sooi, Dactylorhiza maculata ssp ericetorum, *Eriophorum angustifolium, Gymnadenia conopsea, Isolepis setacea, *Orchis morio, *Pedicularis sylvatica, Scirpus sylvatica, Serratula tinctoria, Triglochin palustris, Valeriana dioica, Veronica scutellata.*

Notable fauna: *Pteromicra leucopeza* (a red data book list 2 "vulnerable" sciomyzid fly); Forester (LRDB moth), also Small Yellow Underwing, Chimney Sweeper.

High Sharpley Coalville SK 447171
Hill top with outcrops of Precambrian rocks, now covered by secondary birch woodland, on former heath-grassland; 198m (650 ft) O.D.; 12.7ha; part of the Grace Dieu and High Sharpley SSSI.

Notable flora: **Erica tetralix, *Hydrocotyle vulgaris, *Juncus squarrosus, Molinia caerulea, *Ranunculus omiophyllus, Ulex gallii, Vaccinium myrtillus, *V. vitis-idaea, *Viola palustris.*

Notable fauna: spiders, four nationally scarce species of beetles; a species-rich invertebrate assemblage characteristic of scrub-heath and moorland; Lead Belle, Neglected Rustic, Glaucous Shears, July Belle, The Amulet (LRDB moths).

Hill Hole Markfield SK 485103
Also known as Markfield Quarry, this is a disused granite quarry, with some deep water surrounded by rock, heath-grassland and scrub, with some steep slopes. The quarry, which closed in the 1920s, is now a LNR and RIGS. The heath-grassland contains *Rumex acetosella, Campanula rotundifolia, Lotus corniculatus, Pilosella officinarum* and *Deschampsia flexuosa.* There are scattered clumps of *Ulex europaeus* and *Cytisus scoparius,* with some stands of *Pteridium aquilinum.*

Notable flora: *Trifolium striatum, Ulex gallii.*

Notable fauna: *Nomada integra* (a nationally scarce nomad bee) and *Orthochaetes setiger* (a nationally scarce weevil).

Other notable taxa: lichens.

Hobby Hall Meadow Markfield SK 476121
Mesotrophic grassland (hay meadow), with *Conopodium majus, Helictotrichon pubescens, Lathyrus linifolius, Sanguisorba officinalis, Stachys officinalis.*

Notable plants: *Alchemilla filicaulis.*

Holly Hayes Wood Coalville (Whitwick) SK 443154
Woodland; 14.2ha; 175-195m O.D. Located alongside the Grace Dieu Brook, on Mercia Mudstone, field evidence indicates that a large part of the wood may have developed on heathland, while the rest appears old. *Quercus robur* is frequent, as is *Betula pendula*. Other trees present include *Sorbus aucuparia, Acer pseudoplatanus, Alnus glutinosa* and *Fagus sylvatica.* The shrub layer contains abundant *Ilex aquifolium,* with occasional *Rubus fruticosus* and *Corylus avellana* is rare. *Lonicera periclymenum* occurs as a frequent climber and *Hedera helix* is locally so. The field layer is dominated by abundant *Hyacynthoides non-scripta*, with other species such as *Oxalis acetosella, Pteridium aquilinum* and *Galium saxatile. Anemone nemorosa, Sanicula europaea* and *Adoxa moschatellina* are found by the stream.

Notable flora: *Blechnum spicant, Lysimachia nemorum, Polystichum setiferum.*

Holywell Wood Loughborough (Garendon) SK 507182
Ancient woodland; 7.3ha; 65m O.D. Standing on Mercia Mudstone and alluvium, this is a small, varied wood with a rich flora. There are no mature standards, but a few large coppice stools remain, especially of *Fraxinus excelsior*. The canopy also contains *Betula pendula, Quercus robur, Quercus petraea, Acer speudoplatanus* and *Alnus glutinosa*. The field layer contains *Holcus mollis* and *Luzula pilosa* on drier ground and *Chrysosplenium oppositifolium* and *Carex pendula* in wetter places.

Notable flora: *Carex pendula, Dryoteris carthusiana, *Hypericum pulchrum, Luzula pilosa, L. sylvatica, Lysimachia nemorum, *Melampyrum pratense, *Paris quadrifolia, *Platanthera chlorantha, *Polypodium vulgare, Quercus petraea.*

Hookhill Wood Loughborough (Shepshed) SK 455192
Ancient woodland; 9.2ha; 80-90m O.D. Formerly known as Belton Low-wood and Belton Wood, it stands on Mercia Mudstone. The wood contains many well-grown *Quercus robur,* while *Fraxinus excelsior* becomes increasingly frequent towards the bottom of the wood, which is situated on a south-east facing slope. Specimens of *Ulmus glabra* are scattered throughout and the shrub layer includes abundant *Corylus avellana* and frequent *Ilex aquifolium* and *Rubus fruticosus.* The ground flora is generally species-poor, but is richest along the south-east edge. *Hyacynthoides non-scripta* is abundant and *Anemone nemorosa, Stellaria holostea* and *Oxalis acetosella* are amongst other species present in quantity. *Allium ursinum* is rare.

Notable flora: *Luzula forsteri* (recorded here in 1791), *Melica uniflora.*

Ives Head Loughborough (Shepshed) SK 477170
Outcrop of Precambrian rock, with heath-grassland vegetation dominated by *Pteridium aquilinum.*

John's Lee Wood Ulverscroft SK 507105
Plantation woodland, possibly ancient.

Jubilee Wood Loughborough SK 511169
Woodland, adjacent to the Outwoods; 16ha; part of the Beacon Hill, Hangingstone and Outwoods SSSI; managed by Leicestershire County Council. The north section is a good example of wet woodland.

Notable plants: **Paris quadrifolia.*

Lady Hay Wood Groby SK 516085
Ancient woodland; 7ha; 100-115m O.D. Lying close to Groby Pool, the wood has some outcrops of diorite within it. A high forest structure is developing and *Quercus robur* is the most frequent canopy tree. *Quercus petraea* is also present, as is *Betula pendula, Sorbus aucuparia, Acer pseudoplatanus, Populus tremula* and *Fraxinus excelsior.* The shrub layer contains frequent *Corylus avellana,* with thickets of *Prunus spinosa* and *Crataegus monogyna, Ilex aquifolium* and *Sambucus nigra* occasional. *Hyacynthoides non-scripta, Holcus mollis* and *Pteridium aquilinum* dominate the ground flora. Wet places contain *Caltha palustris, Galium palustre* and *Valeriana officinalis.*

Notable flora: *Carex pendula, Luzula sylvatica, Melica uniflora, Quercus petraea, Ranunculus lingua.*

Lawn Wood Groby SK 506094
Plantation woodland containing flooded gravel pits, possibly on site of former ancient woodland.

Lea Meadows Newtown Linford/Ulverscroft SK 506114
Species-rich mesotrophic grassland and marsh, bisected by River Lin; 12ha; part of Ulverscroft Valley SSSI; LRWT nature reserve.

Notable flora: *Achillea ptarmica, Agrimonia procera, Agrostis canina, Aira praecox, Alchemilla filicaulis, Anagallis tenella, Cardamine amara, Carex caryophyllea, C. echinata, C. hostiana, C. viridula ssp oedocarpa, C. pallescens, *C. pulicaris, Dactylorhiza maculata ssp ericetorum, Danthonia decumbens, Elymus caninus, Isolepis setacea, Lathyrus linifolius, Luzula multiflora, Lysimachia nemorum, Molinia caerulea, Nardus stricta, *Pedicularis sylvatica, *Salix aurita, Scirpus sylvaticus, Serratula tinctoria, Silaum silaus, Triglochin palustris, Valeriana dioica, Veronica scutellata.*

Notable fauna: *Ctenicera pectinicornis* (a nationally scarce click beetle associated with herb-rich meadows); important flowing water invertebrate assemblage characterised by a high proportion of rare species (associated with River Lin); Forester, Barred Umber, Dog's Tooth (LRDB moths), also Feathered Gothic, Birds Wing, Chimney Sweeper.

Lea Wood Ulverscroft SK 502115
Planted ancient woodland.

Notable fauna: Frosted Green (LRDB moth).

Lin, River SK 41, 50, 51
Fast-flowing stream in Charnwood Forest, rising in the Ulverscroft valley and running through Bradgate Park into Cropston Reservoir.

Notable flora: *Ranunculus fluitans, R. hederaceus.*

Notable fauna: *Enicocerus exsculptus, Hydraena nigrita, Limnebius nitida, Ochthebius bicolon* (all nationally scarce water beetles) and *Ptenidium brenskei* (nationally scarce riparian shingle beetle); important flowing water invertebrate assemblage characterised by a high proportion of rare species; White-clawed Crayfish, Brook Lamprey, Siskin, Redpoll.

Longcliffe Golf Course Loughborough (Shepshed/Nanpantan) SK 495173
Golf course with heath-grassland.

Notable flora: *Erica tetralix.*

Markfield Cutting Markfield SK 485109
Grassland and scrub on banks alongside dual carriageway A511 (A50).

Notable flora: *Dactylorhiza praetermissa, Ophrys apifera.*

Martinshaw Wood Ratby/Groby SK 510072
Planted ancient woodland; 106ha; owned by Woodland Trust. Formerly an oak wood, this is one of the largest ancient woodlands in Leicestershire and Rutland, standing on Mercia Mudstone. It was cleared and planted with conifers in the twentieth century.

Notable flora: *Agrostis canina, Blechnum spicant, *Callitriche hamulata* (in a marl pit), **Carex pallescens, C. pilulifera, *Convallaria majalis* (introduced), *Danthonia decumbens, Dryopteris carthusiana, D. x deweveri, Epipactis helleborine, *Hieracium calcariola, *H. perpropinquum, Hypericum pulchrum, Luzula sylvatica, Lysimachia nemorum, Lythrum portula, *Melica uniflora, *Montia fontana, Orchis mascula, Oreopteris limbosperma, Salix aurita,* S. x capreola,* and a number of *Rubus* species.

Notable fauna: *Xylota tarda* (a nationally scarce wood-decay fly), *Hallomenus binotatus* (a nationally scarce wood-decay beetle) and *Proteinus crenulatus* (a nationally scarce rove beetle associated with rotting fungi); Small Green Emerald, Satyr Pug, Mere Wainscot, Maiden's Blush, Barred Umber, August Thorn, Confused (LRDB moths).

Morley Quarry Loughborough (Shepshed) SK 476179
Small disused Precambrian rock quarry, worked 1870s-1960s, with adjacent heathland creation area; LNR managed by Charnwood Borough Council.

Notable flora: *Filago vulgaris, Hypericum maculatum, *Ornithopus perpusillus.*

Notable fauna: Silvery Arches, The Amulet (LRDB moths).

Mountsorrel Common Mountsorrel SK 569146
Heath-grassland and scrub around granite outcrops.

Notable plants: *Allium vineale, Geranium lucidum, Ornithopus perpusillus, Potentilla argentea.*

Mucklin Wood Woodhouse SK 537164
Ancient woodland, mostly felled and replanted around the war years.

Nanpantan Reservoir Loughborough SK 507171
Small reservoir with open water and some riparian vegetation.

Nunkley Hill Quarry Rothley SK 569142
'Calcifuge flora around quarry margin' (PE); *Sedum telephium* recorded in HG and *Gnaphalium sylvaticum* in PE.

Old Rise Rocks Bardon SK 468123
Rock outcrop and old heath-grassland.

Other notable taxa: lichens.

Outwoods Loughborough (Nanpantan) SK514163
Ancient woodland, much affected by planting with conifers, broadleaves and *Rhododendron*; part of Beacon Hill, Hangingstone and Outwoods SSSI; 66ha; owned by Charnwood Borough Council.

Notable flora: *Blechnum spicant, Cardamine amara, Carex pallescens, C. pilulifera, *Frangula alnus,, Hypericum pulchrum, *Luzula pilosa, L. sylvatica, Lysimachia nemorum, L. vulgaris, Melampyrum pratense, Melica uniflora, *Orchis mascula, *Orobanche rapum-genistae, Quercus petraea, Ulex gallii.*

Notable fauna: Barred Umber, Lunar Thorn, Oak Nycteoline (LRDB moths).

Pignut Spinney Marsh Loughborough SK 524176
Unimproved marshy grassland; 1.7ha; LNR managed by Charnwood Borough Council.

Polebrook Wood Bagworth SK 481067
Ancient woodland; 2.4ha; 145m O.D; owned by Woodland Trust. This is a small wood on Mercia Mudstone containing abundant *Quercus robur*. There are few other canopy trees, although *Fraxinus excelsior* and *Populus tremula* are locally frequent. The shrub layer is more varied, with frequent *Corylus avellana, Ilex aquifolium* and *Rubus fruticosus. Lonicera periclymenum* and *Hedera helix* are frequent climbers. *Hyacynthoides non-scripta* dominates the field layer.

Notable flora: *Dryopteris carthusiana, Luzula pilosa.*

Poultney Wood Ulverscroft SK 495130
Planted ancient woodland; part SSSI; part of LRWT *Ulverscroft Nature Reserve*.

Notable plants: *Carex laevigata, Hypericum pulchrum, Lysimachia nemorum, Oreopteris limbosperma.*

Puddledyke Thurcaston (Cropston) SK 547116
Water-filled borrowpit created during construction of Cropston Reservoir; part of Bradgate Park and Cropston Reservoir SSSI. The rare aquatic bryophyte *Ricciocarpos natans* may have been lost through the spread of *Crassula helmsii.*

Notable flora: *Potamogeton natans, Ranunculus lingua, *Ricciocarpos natans.*

Notable fauna: dragonflies (16 species); *Aloconota languida, Schistoglossa gemina and Dochmonota clancula* (nationally scarce rove beetles associated with marshes); Forester (LRBB moth).

Ratby Burroughs Ratby SK 494060
Ancient woodland; 9ha; 100-135m O.D.; part owned by Woodland Trust. The site was named as 'Bury Wood' on the 1st Ed. O.S. map and is situated on land that was within the Medieval 'Park of Burgh'. The park pale can still be seen along the western boundary of the present wood. It stands entirely on Mercia Mudstone.

The flora of the wood is not known to be especially rich. The canopy contains *Quercus robur, Betula pendula* and *Acer pseudoplatanus. Alnus glutinosa* lines a small stream. *Corylus avellana* is frequent in the shrub layer and the ground flora has frequent *Oxalis acetosella* and *Mercurialis perennis.* There are several glades dominated by *Pteridium aquilinum.*

Notable plants: **Calamagrostis canescens, *Melampyrum pratense.*

Ratchet Hill Coalville SK 446163
Heath-grassland, birch scrub and Precambrian rock outcrops. Good colonies of *Calluna vulgaris* and *Vaccinium myrtillus.*

Rocky Plantation Ulverscroft SK 493118
Mixed plantation; 3.4 ha; LRWT managed nature reserve owned by National Trust.

Notable plants: *Ceratocapnos claviculata.*

Roecliffe Manor Lawns Newtown Linford SK 533125
Old grassland on Precambrian rocks; SSSI; 1.28ha; notified for its fungi associated with old unimproved grassland.

Notable flora: *Danthonia decumbens, Polygala serpyllifolia.*

Other notable taxa: the provisional Red Data List fungi *Clavulinopsis umbrinella, Camarophyllopsis stropuncta, C. foetens, Hygrocybe calyptriformis, Entoloma bloxamii.*

Roecliffe Spinney Newtown Linford SK 532130
Wet woodland.

Notable flora: **Frangula alnus.*

Rothley Brook SK 40, 50, 51
A fast-flowing, often Alder-lined stream. Tributary of the River Soar.

Rowhele Wood Quorndon SK 564157
Woodland; part of Buddon Wood and Swithland Reservoir SSSI.

Notable flora: *Convallaria majalis.*

Sheet Hedges Wood Newtown Linford SK 529087
Ancient woodland; SSSI; 22.57ha; 80-115m O.D.; on Mercia Mudstone, that part (about half) on Syenite having been quarried away (see *Groby Quarry*).

Peterken Acid Pedunculate Oak-Hazel-Ash woodland dominates, but other stand types include Wet Ash-Maple, Valley Alderwood and Plateau Alder woodland. The area lost to quarrying was probably Sessile Oak woodland.

Acer pseudoplatanus is now abundant, with *Fraxinus excelsior* and *Corylus avellana* frequent. A substantial area of *Alnus glutinosa* woodland occurs on wet ground. Few maiden trees over about 50 years of age are present, but there are some giant coppice stools. The field layer is not now generally species-rich, despite the good list of notable plants recorded.

Notable flora: *Carex pendula, Dryopteris affinis, *D. carthusiana, Epipactis helleborine, E. purpurata, Eupatorium cannabinum, Lathraea squamaria, Luzula pilosa, L. sylvatica, Lysimachia nemorum, *Melampyrum pratense, *Melica uniflora, *Paris quadrifolia, Polystichum aculeatum, P. setiferum, Quercus petraea.*

Notable fauna: *Ptenidium gressneri* (a nationally scarce wood-decay beetle).

Stewards Hay (Spring) Groby SK 509088
Probable ancient woodland.

Notable flora: **Platanthera chlorantha* (HG).

Stinking Wood Markfield SK 498107
Ancient woodland, largely planted with conifers.

Notable flora: *Epipactis helleborine.*

Stoneywell Wood Ulverscroft SK 499120
Ancient woodland; part of Ulverscroft Valley SSSI; 19.2ha; 136-195m O.D.; on mainly Mercia Mudstone, but also Precambrian rocks and Boulder Clay.

The wood contains Peterken lowland Hazel-Sessile Oak, Birch-Pedunculate Oak and Hazel-Pedunculate Oak stand types with a high forest structure. The shrub layer is sparse but *Rubus fruticosus* is a frequent under-shrub. The field layer is dominated by *Pteridium aquilinum, Holcus mollis* and *Hyacynthoides non-scripta.*

Notable flora: *Dryopteris affinis, D. carthusiana, Epipactis helleborine, Luzula sylvatica, Lysimachia nemorum, *Melampyrum pratense, Melica uniflora.*

Notable fauna: Small Rufous, Barred Umber, Lunar Thorn (LRDB moths), also Grey Chi, Black Arches, Orange Footman.

Swithland Churchyard Swithland SK 554128
Churchyard.

Notable flora: *Saxifraga granulata, Umbilicus rupestris.*

Swithland Reservoir Mountsorrel/Quorndon/Swithland/Woodhouse SK 560142
Public water supply completed in 1896; open water, wet woodland, swamp, draw-down habitats; part of the Buddon Wood and Swithland Reservoir SSSI; managed by Severn Trent Water.

The reservoir was created by the damming of the Buddon Brook in 1896, and is used as a public water supply by Severn Trent Water. It is situated at about 60m O.D. and covers about 90ha. The water level fluctuates, exposing muddy and stony shores when drawn down. The water is thought to be eutrophic.

A remarkable variety of habitats are present on the site. These include tall-herb fen, muddy and stony margins, open water, carr, woodland, grassland, rocks and walls.

Notable flora: *Aira praecox, Alopecurus aequalis, Butomus umbellatus, Ceterach officinarum, Eleocharis acicularis, Juncus compressus, Littorella uniflora, Montia fontana, Ornithopus perpusillus, Potamogeton berchtoldii, Ranunculus lingua, Rumex maritimus, Samolus valerandi.*

Notable fauna: wintering wildfowl, heronry; spiders; *Stratiomys potamida* (a nationally scarce soldier fly) plus six nationally scarce species of beetles; a species-rich invertebrate assemblage characteristic of litter-rich fluctuating marsh; Dotted Border Wave, Reddish Light Arches, Common Fan-foot, Orange Underwing, Lunar Thorn (LRDB moths), also Feathered Gothic.

Swithland Sidings Swithland SK 5613
Former sidings and goods yard for Great Central Railway, with scrub and ballast. Much of the site has been destroyed. It had good populations of vascular plants and moths.

Notable fauna: Reddish Light Arches (LRDB moth).

Swithland Wood Newtown Linford/Swithland SK 539125
Exceptional ancient woodland; part of Swithland Wood and The Brand SSSI; 59ha is owned by the Bradgate Park Trust, having been gifted to them by the Leicester Rotary Club in 1931; 62.5ha; 85-112m O.D.; on Precambrian rocks and Mercia Mudstone.

The tree communities are very varied and occur as a complex mosaic, with oak (*Quercus petraea, Q. robur* and hybrids) and lime associations on the well-drained acid soils and *Alnus glutinosa* in the stream valleys and marshy areas. They form a magnificent high-forest structure, with a generally fairly open shrub layer containing *Corylus avellana* and *Ilex aquifolium* as the most frequent species.

In the field layer *Luzula sylvatica* is abundant and *Pteridium aquilinum* locally so. Also present in quantity are *Anemone nemorosa, Ranunculus ficaria, Stellaria holostea, Oxalis acetosella* and *Hyacynthoides non-scripta. Deschampsia flexuosa* and *Holcus mollis* are frequent on drier ground, with *Caltha palustris, Carex pendula, Valeriana officinalis* and *V. dioica* in wet places.

Other habitats in the wood are old slate quarries and spoil heaps, a meadow and many tracks created by numerous human visitors.

Notable flora: **Achillea ptarmica, Agrostis canina, Aira praecox, *Alopecurus aequalis, Carex caryophyllea, C. pendula, C. pallescens, *Cerastium semidecandrum, Dactylorhiza maculata ssp ericetorum, Danthonia decumbens, Epipactis helleborine, Frangula alnus, Genista tinctoria, Hypericum humifusum, H. pulchrum, Lathyrus*

*linifolius, Luzula pilosa, Luzula sylvatica, Lysimachia nemorum, Melampyrum pratense, Melica uniflora, Molinia caerulea, Nardus stricta, Pedicularis sylvatica, Quercus petraea, Polystichum aculeatum, P. setiferum, *Solidago virgaurea, Teesdalia nudicaulis, Tilia cordata, Umbilicus rupestris, *Valeriana dioica, *Viola canina* (many of which were either in *Swithland Wood Meadow* or the slate pits in the wood).

Notable fauna: several nationally scarce wood-decay species of beetles plus *Hydraena nigrita* (a nationally scarce water beetle associated with the headwater streams) and *Limonia lucida* (a nationally scarce cranefly); a species-rich wood-decay invertebrate assemblage associated with bark and sapwood decay; Red Carpet, Square-spotted Clay, Northern Drab, Oak Lutestring, Orange Underwing, Maiden's Blush, August Thorn, The Amulet (LRDB moths).

Swithland Wood Meadow Swithland SK 538127
Very fine mesotrophic grassland, no longer grazed, but cut for hay; 1.9ha; part of Swithland Wood and The Brand SSSI; managed by Bradgate Park Trust.

Notable flora: *Carex caryophyllea, C. pallescens, Dactylorhiza maculata ssp ericetorum, Genista tinctoria, Pedicularis sylvatica, *Viola canina.*

Thornton Reservoir Bagworth (Thornton) SK 472075
Public water supply at 124m O.D., with standing open water, draw-down, swamp and woodland habitats; managed by Severn Trent Water, the reservoir was completed in 1853 by the damming of two streams that later become the *Rothley Brook*.

Notable flora: *Alopecurus aequalis, Butomus umbellatus, Juncus compressus, *Ranunculus sardous, Rumex maritimus.*

Ulverscroft Nature Reserve Ulverscroft SK 492126
Ancient woodland (Poultney Wood), secondary woodland, plantation, marsh, heath-grassland and unimproved mesotrophic grassland (*Herbert's Meadow*); 60ha; 160-245m O.D.; part of Ulverscroft Valley SSSI; LRWT nature reserve, part owned by National Trust.

This is a remarkably diverse site, situated on the steep north-east facing flank of the Ulverscroft valley. Heath-grassland containing *Calluna vulgaris, Vaccinium myrtillus* and *Ulex gallii* occurs on the top of the valley side, where there are outcrops of Precambrian rocks. Further down woodland, partly ancient (*Poultney Wood*) stands on Mercia Mudstone. This is mainly mixed plantation, with some old specimens of *Fagus sylvatica.* Large colonies of *Hyacynthoides non-scripta* are present, along with scarce species such as *Carex laevigata.* Through the valley bottom flows the Ulverscroft Brook (later the River Lin) and alongside this is a mosaic of *Alnus glutinosa* woodland and marsh. Adjacent is the real jewel of Ulverscroft NR, *Herbert's Meadow*, the most species-rich mesotrophic grassland in Leicestershire and Rutland.

Notable flora: *Agrostis canina, A. vinealis, *Anacamptis (Orchis) morio, *Anagallis tenella, Blechnum spicant, Carex bineris, C. echinata, C. hostiana, C. laevigata, C.*

*pallescens, C. pilulifera, C. pulicaris, C. viridula ssp oedocarpa, *Cirsium dissectum, Dactylorhiza maculata ssp ericetorum, Danthonia decumbens, *Eriophorum angustifolium, Eupatorium cannabinum, Gymnadenia conopsea, Hypericum humifusum, H. maculatum, Isolepis setacea, Juncus bulbosus, J. squarrosus, Lathyrus linifolius, Luzula pilosa, L. sylvatica, Lysimachia nemorum, Molinia caerulea, Montia fontana, Nardus stricta, Ophioglossum vulgatum, Oreopteris limbosperma, *Pedicularis sylvatica, Polygala serpyllifolia, Quercus petraea x robur, *Ranunculus omiophyllus, Rosa sherardii, Salix aurita, Scirpus sylvaticus, Serratula tinctoria, Triglochin palustre, Vaccinium myrtillus, Valeriana dioica, Veronica scutellata.*

Notable fauna: *Pteromicra leucopeza* (a red data book list 2 "vulnerable" sciomyzid fly); several nationally scarce species of beetles including *Hydraena nigrita* (a nationally scarce water beetle associated with the headwater streams) and *Paradelphomyia nielseni* (a nationally scarce cranefly); important flowing water invertebrate assemblage characterized by a high proportion of rare species; several species-rich invertebrate assemblages associated with bark and sapwood decay, scrub-heath and moorland, underground mammal nests; Small Autumnal, Square Spot, Common Fan-foot, Barred Hook-tip, Orange Underwing, Maiden's Blush, July Belle, Grass Rivulet, August Thorn (LRDB moths), also Feathered Gothic, Orange Footman.

Other notable taxa: fungi, lichens.

Ulverscroft Pond Ulverscroft SK 498128
Long-established lake with marginal wet woodland and other wetland habitats; part of Ulverscroft Valley SSSI.

Notable flora: *Callitriche truncata, Carex vesicaria, Dactylorhiza maculata* ssp *ericetorum, Elymus caninus, Lysimachia nemorum, Montia fontana, Primula vulgaris, Veronica anagallis-aquatica.*

White Horse Wood Loughborough (Shepshed) SK 468184
Ancient woodland, apparently formerly coppiced, situated almost entirely on glacial sand and gravel; 9ha; 95-110m O.D.

The woodland is mainly of the Peterken Acid Pedunculate Oak-Hazel-Ash and Lowland Hazel-Pedunculate Oak types. The canopy contains frequent *Betula pendula* and *Quercus robur*, with *Acer pseudoplatanus* locally abundant. Other trees, shrubs and woody climbers include *Fraxinus excelsior, Corylus avellana, Ilex aquifolium, Lonicera periclymenum* and *Sorbus aucuparia*. *Hyacynthoides non-scripta, Holcus mollis, Pteridium aquilinum* and *Stellaria holostea* are prominent in the field layer.

Notable flora: *Dryopteris affinis, Luzula sylvatica, Polygonatum multiflorum, Quercus petraea.*

Wood Brook
Small stream in Charnwood Forest, rising near West Beacon Farm and running through Loughborough.

Notable fauna: *Tinodes pallidulus* (a red data book list 1 “endangered” caddis-fly) and two nationally scarce species of soldier fly; important flowing water invertebrate assemblage characterized by a high proportion of rare species.