# Woodland S. Trees

# Headlines

- Using our standard methods, 14.8% or 5,454ha of Sheffield is classed as woodland. Data gathered during the recent iTree project suggest even greater coverage of 5,946ha or 16.2%, substantially higher than the national figure of 10%. Total tree cover for the Sheffield district, calculated by iTree, is 18.4%.
- 23.5% of Sheffield's lowland woodland is categorised as ancient semi-natural woodland (ASNW) or plantations on ancient woodland sites (PAWS). This covers 3.5% of the Sheffield district and is higher than the figure of 2.3% for the UK.
- Sheffield's woodlands are a valuable recreational resource. Ninety-four percent of people have access to a large woodland (20ha) within 4km of their residence and nearly half of Sheffield's population has access to a 2ha woodland within 500m.
- Over half of Sheffield's woodlands are covered by designations such as Local Wildlife Sites (LWSs) and 63% of land with LWS designation is woodland. Most sites are improving; over 70% of woodland habitat within LWSs is in positive conservation management. Over 92% of ancient woodland is covered by a site designation.
- Compared to UK trends, bird species considered in the UK Biodiversity Indicator 'C5b: woodland birds' are doing well, particularly woodland generalists, indicating the good health of Sheffield's woodlands.
- Threats to woodlands in Sheffield include habitat fragmentation, damage from recreation and spread of invasive species from gardens. Continued improvements in woodland management, including the input of local groups, can help tackle this.

## Introduction

Sheffield is considered to be the most wooded city in Britain and one of the most wooded cities in Europe with a total tree cover of 18.4%<sup>1,2</sup>. Trees and woodlands provide vital habitat for wildlife as well as a range of benefits to local people including health, recreation and economic benefits. Sheffield has a rich variety of woodland, urban street trees and veteran parkland trees that form an integral part of the city's green heritage, contribute to flood prevention and provide a suite of ecosystem services<sup>3</sup>. Historically, Sheffield's trees and woodlands have played an important part in shaping the city's rich industrial heritage, but today, Sheffield's woodlands serve primarily as sites for recreation with timber production mostly restricted to rural regions. Forty-five percent of local people have access to woodland greater than 2ha within 500m of their home whilst 94% have access to a 20ha wood within 4km of their home<sup>4</sup>.

Statistics for woodland cover across the region are varied, both due to changes over time (woodland clearance and habitat succession) and differences in methods used to calculate coverage. For example, figures from the National Forest Inventory in 2002 and 2014 calculate a coverage of 7.4% (11,551ha) and 10.1% (15,727ha) respectively for South Yorkshire<sup>5,6</sup>. Here, the most recent figures calculated from the National Forest Inventory (2014) presented by the Woodland Trust or the most recent figures are used where possible<sup>6</sup>. In some cases additional recent data collected using iTree eco methodology for Sheffield City Council has been presented<sup>3</sup>.

## What woodland types does Sheffield have?

Figure 1 shows the composition of Sheffield's woodland habitats (as calculated by our standard methods outlined in the appendix, i.e. excluding iTree plot data). How these broad habitat types are distributed across the district is also mapped (Figure 2). Sheffield's diverse spectrum of woodland habitats range from ancient broad-leaved woodland to coniferous woodland and new plantations. Silver birch, sessile oak, sycamore, hawthorn and ash are the five most common species. The majority of Sheffield's woodlands (70%) are composed of native broadleaved species; primarily oak, ash and beech. A more comprehensive description of woodland habitat types found in Sheffield can be found in the Woodland Habitat Action Plan<sup>7</sup>.

Recent calculations from iTree plot data, using different methods, suggest an even greater coverage of 5,946ha, which equates to 16.2%.





## Priority Habitat Inventory: woodland habitats

Sheffield features five of the eight woodland habitats, mapped on Natural England's Priority Habitat Inventory (PHI), that fall within the broad habitat type of broadleaved, mixed and yew woodland (Figure 3).

**Wood-pasture** and **parkland** – defined as mosaic habitats of grazed grasslands with trees of often considerable age – is scattered across the district with the majority of wood-pasture forming small parcels to the west. Historically, Sheffield supported some of the largest deer parks in South Yorkshire, which typically contained open pasture and mature tree standings. Most notable was Sheffield Park, first documented in 1332. This covered over 1,000ha by the 1600s, radiating from Manor Lodge, and was renowned for containing some of the largest oak and walnut trees in the country. However, by the eighteenth century, many medieval deer parks either changed function to country house landscaping or were lost as parks altogether, either reverting to woodland or converted to farmland. Today, the two largest sections of wood pasture mapped on the PHI fall within the Dark Peak alongside Howden Reservoir and to the west of Wigtwizzle. Both areas support a number of ancient and notable trees as identified by the Ancient Tree Inventory, several of which are highlighted on the next page.



Small patches of **upland oakwood**, consisting of both pendunculate and sessile varieties, are present in Sheffield but are restricted to the Peak District and Pennine areas where they are exclusively concentrated around upland tributaries and associated slopes. Wyming Brook and Fox Hagg feature the largest areas around Rivelin Reservoir. A stretch extends from Howden Dam and a third is clustered around the upland stretches of Ewden Brook.

Some **wet woodland** also persists in the district. Most notably this is concentrated within Blacka Moor Nature Reserve, but also occurs along the River Sheaf within Beauchief, with a smaller section also noted to border Oaking Clough, off Rivelin Brook, within the Dark Peak boundary. Here wet woodland is more commonly associated with the successional fens and bogs typical of the region. Wet woodlands here are mostly composed of three tree species: alder (*Alnus glutinosa*), birch (*Betula* sp.) and willow (*Salix* sp.).

**Traditional orchards** feature as a very scarce priority habitat across Sheffield, with only 13 sites identified by Natural England. Several old orchards persist within the urbanised Gleadless Valley, with further examples present at Woodhouse and Beighton, which also support the locally rare wild daffodil<sup>8</sup>. Other small orchards are found to the north-west. Currently, most of these sites are not recognised or managed as traditional orchards and thus are considered to be threatened. However, several projects, such as Grow Wild, have worked to plant a number of new orchards using locally grafted trees, extending the number and geographical spread of orchards.

Finally, two small pockets of PHI **lowland mixed deciduous woodland** lie to the south-east corner of Sheffield: Birley Wood and Twelve Acre Wood through to Cadman Wood within Moss Valley Woodlands; a designated Site of Special Scientific Interest (SSSI). Typical of the habitat, these small woods have defined boundaries and are lowlying. The site is particularly important for invertebrates such as the declining white-letter hairstreak butterfly.



## Ancient and notable trees

The Sheffield Nature Conservation Strategy of 1991<sup>1</sup> identified a lack of veteran trees over 200 years of age, and called for increased identification, maintenance and protection of specimens. As of September 2017, the Woodland Trust's Ancient Tree Inventory<sup>9</sup> has now catalogued three ancient trees ( $\bullet$ ), 13 veteran trees ( $\bullet$ ) and 17 notable trees ( $\bullet$ ) within Sheffield, mostly within wood pasture and parkland. In addition, surveys by Yorkshire Water for the Sheffield Lakeland Partnership Project mapped nine veteran trees ( $\bullet$ ) and 40 notable trees ( $\bullet$ )<sup>10</sup>. All of these mapped trees are shown below, with highlights, but there are undoubtedly more across the district.

The definition of a tree as an ancient specimen depends on the species, but such trees are recognised for their cultural significance, biodiversity value or notable appearance. These ancient and veteran trees provide essential habitats for hole-nesting birds, particularly ground-feeding green woodpecker due to the availability of surrounding grasslands, as well as for priority bat species. Ancient trees also feature a significant amount of deadwood which in turn supports a range of specialist invertebrates, lichens and fungi. The majority of these trees are concentrated around the south-west of the city around Beauchief, Endcliffe and Bents Green. The Porter Valley supports mostly veteran beech and oak, with the latter also noted in the Gleadless Valley. These ancient and veteran trees are undoubtedly some of the oldest living organisms in Sheffield.



## Ancient woodland

Sheffield has a wealth of ancient woodland, defined as woodland existing since 1600 or earlier and cleared only for underwood or timber production<sup>12</sup>. Ancient woodland is a rare and irreplaceable priority habitat which supports more UK biodiversity priority species than any other habitat. At least 37 known and named ancient woods in Sheffield have had their age verified. An additional 20 named ancient semi-natural woodlands (ASNW) or plantations on ancient woodland sites (PAWS) on the Ancient Woodland Inventory are over 2ha in size. This list is clearly not exhaustive; together with smaller parcels and unnamed woods identified by Natural England and Professor Mel Jones, the total is nearer 100<sup>18</sup>. Ascertaining the exact number of ancient woods is difficult; many have changed names over the centuries or have remained unnamed, whilst some have become fragmented into smaller woodland parcels.

	Sheffield	South Yorkshire <sup>F</sup>	UK <sup>9</sup>
Total ancient woodland land cover	3.5%	3.0%	2.3%
ASNW	2.3%	-	1.4%
PAWS	1.1%	-	0.9%

Table 1: percentage coverage (all habitats) of ancient woodland within the Sheffield district, South Yorkshire and UK respectively.

#### Figures

A significant proportion of Sheffield's lowland woodland – 23.5% – is categorised as ancient woodland. This covers 3.5% of the Sheffield district, substantially higher than a figure of 2.3% for the UK<sup>6</sup>. ASNW sites represent the most valuable habitat with a predominance of native species and seminatural characteristics, whilst PAWS represent prior areas of ancient woodland that have been felled of native trees and replanted, mostly with non-native coniferous species. A breakdown of figures, both regional and national, are given in Table 1. Sheffield not only has a higher percentage coverage of ancient woodland than the UK, but more of this is represented by ASNW – the most biodiverse and ecologically valuable.

#### Locations

Two distinct areas of ASNW are prominent within the district (Figure 4). The most extensive lies in the south-western region around Ecclesall and Beauchief and includes Ecclesall Woods – Sheffield's largest connected patch of ancient woodland. A second expanse of ancient woodland is focussed around Wharncliffe, Grenoside and Wheata, although the eastern section of this region is mostly replanted conifer woodland. However, a substantial and relatively well-connected area of ASNW stretches between Oughtibridge and Middlewood. Other notable areas include Chapeltown, Shiregreen and Chancet Wood, although these areas are more fragmented.





## Case study: Ecclesall Woods. John Gilpin, Woodlands Officer, SCC

Ecclesall Woods, between Dore and Millhouses, is the jewel in the crown of Sheffield's many ancient woodlands. The largest ancient woodland in South Yorkshire, it has a recorded history going back 700 years. It is also an important archaeological site with over 300 charcoal pits (which provided fuel for the early iron industry in Sheffield) and 100 'Q-pits' dating from the 17<sup>th</sup> century (large circular depressions which were used to produce fuel for lead smelting)<sup>13</sup>. Some of the archaeology is very old with field systems dating back to Roman times or earlier. Other key historical features include two Grade II listed monuments – the Wood-Collier's Memorial and an arched stone bridge, plus several Neolithic carved cup-and-ring stones, one of which is a Historic England Scheduled Monument. Overall, the woodland is of regional importance for this heritage. In the Middle Ages the woods formed part of a deer park, set up in 1319 by Sir Ralph de Ecclesall<sup>14</sup>.

Because it has been woodland for so long, Ecclesall Woods supports in impressive display of spring flowers strongly associated with ancient woodlands, including bluebell and wood anemone, which in turn support a diverse range of insects and birds. These ancient woodland indicator species are not found in other newer woodlands and, once lost, are virtually impossible to recreate. The importance of the site is recognised by several designations including Local Nature Reserve (LNR) and Local Wildlife Site (LWS) and the award of a Green Flag. The wood's heritage and wildlife are very much loved – over 400,000 visits are made to the woodland each year – but can be easily lost. There is a good network of signposted, generally surfaced paths and bridleways across the site – although we recognise some can get muddy in winter.



## Status of woodland habitat within protected areas

A total of 3,028ha of Sheffield's woodlands – or 55% of the habitat – falls within designated and locally protected sites (Table 2). Of this, 2,678ha (49%) is covered by LWSs. Other designated sites, particularly Special Protected Areas (SPAs) and Special Areas of Conservation (SACs), are mostly moorland and upland habitats and therefore protect a small proportion of woodland. Even so, small areas of upland oakwood are covered by these sites and are therefore protected at a European level. There is overlap between designated sites and therefore some regions of woodland have multiple designations. Importantly, ancient woodland is well covered by designated areas, with 91% of sites on the Ancient Woodland Inventory, including 92% of Sheffield's ASNW, covered by either LWS or LNR status (see Designated Sites chapter).

LWSs are assessed in terms of their management status, whilst Sites of Special Scientific Interest (SSSIs) are graded by condition. Figure 5 shows the condition and status of woodland habitats within these sites, respectively. Key woodland sites that are in positive management include the three largest LWS woodlands – Greno Woods, Ecclesall Woods and Wharncliffe Woods. These sites alone make up 15% (418ha) of all woodland falling within LWSs. Ladies Spring Wood SSSI is also in positive management. Substantial woodland sites that are not currently in positive management include Parkin Wood and Coumes Vale Wood.



Table 2 (above): percentage of Sheffield's woodlands that are covered by designated site status. The majority of protected woodland falls within LWSs.



Figure 5: management status of woodland habitat within LWSs by proportion and area size (left) and condition of woodland sites within SSSI units (right). Only sites containing woodland patches larger than 0.5ha were considered to remove sites where woodland is unlikely to significantly inform the management plan.

## Woodland species highlights

#### Wood ants

The northern wood ant *Formica lugubris,* which occurs predominantly in northern England and Wales and throughout Scotland, occurs in a number of the woodlands in Sheffield and can reach high densities in suitable habitat. Although the ants' presence is usually noticed through the distinct nest mounds on the ground, wood ants forage primarily in trees, where they are important predators on many species of invertebrates but also tend and protect aphids, from which they obtain sugary 'honeydew'. Because of the high densities at which the ants can occur, their effects as predators can be considerable, and they can have ecosystem effects (including local nutrient cycling) by moving materials to clear trails and create nests<sup>15</sup>. In addition there are various invertebrate species (myrmecophiles) – such as some beetles – that live in, or are associated with, wood ant nests<sup>16</sup>. The ants' need for suitable trees to forage in, and suitable temperatures for nests, means that habitat management should include the creation or maintenance of sunny areas such as glades or open tracks, and felling should leave sufficient mature trees to provide foraging sites<sup>17</sup>. The longevity of nests, and short dispersal distances of queen ants, means that wood ants may be slow to colonise new habitat, even when it is suitable.

#### **Diverse fungi**

Fungi are everywhere and are critical to ecosystem functioning. They are particularly numerous in more undisturbed areas that have low levels of pollution and human inputs: e.g. Longshaw Estate, nearby Sheffield, has over 1,000 recorded species.

Fungi can be split into three categories, based on their lifestyle. Parasitic fungi derive their food from other living organisms, whether they be plants, other fungi or animals. The scarlet caterpillar fungus (Cordyceps militaris) occurs on mossy woodland edges and open grasslands, where it infests the underground pupae of moths and butterflies. Saprophytic fungi, such as the unmistakeable stinkhorn (Phallus impudicus) which grows on rotten wood, break down dead organic material and play a vital role in the cycling of nutrients. The third category of fungi live in a symbiotic association on the roots of plants: by enveloping the plant's roots, these so-called mycorrhizal fungi increase the root surface area and thus the ability of the plant to absorb water and nutrients. In exchange, the fungi take sugars from the plant's roots, so both species benefit. Many woodland fungi such as the fly agaric (Amanita muscaria) live symbiotically on tree roots, in this case on the roots of birch.



#### Plant life

Ancient woodlands often have a rich ground flora due in part to centuries of coppicing activity that allowed light through to the woodland floor. Ancient woodland indicator (AWI) species are slow colonisers that often spread vegetatively and as such are rarely found in newer woodland. if you can count 10 AWI species in a woodland, there is a good chance it is ancient. In Sheffield, ancient woodlands are characterised by 48 key species including vast carpets of bluebell and wood anemone, yellow archangel, yellow pimpernel, wood sorrel, wild strawberry, dog's mercury, greater stitchwort and sanicle<sup>18</sup>. Rarer are plants such as common cow wheat (found in Greno Woods) and, to the east of Sheffield, small-leaved lime and spindle. Wetter areas may have ramsons, wood horsetail or opposite-leaved golden saxifrage, along with remote sedge or pendulous sedge. Even some grasses are AWIs - wood melick and wood millet being the most frequently occurring.

## Case study: Deer of the Sheffield district Professor Ian D. Rotherham, Sheffield Hallam University

In terms of deer populations, the Sheffield region has been in a state of dramatic flux since the later 1970s. Prior to this time numbers were very low and restricted to park herds of red and fallow deer plus one major population of feral reds around the former medieval deer park at Wharncliffe.

Prior to this, and since the demise of most regional deer parks around the 1500s, few deer remained locally, but well-established herds of both fallow and red deer were present around Sherwood and the Dukeries. Additionally, a population of black (melanistic) fallow deer existed in the south-east Peak District and around Matlock, originating from a medieval park herd at Stanton-in-the Peak. Occasionally red deer escaped from the park herd at Chatsworth, appearing on the moors or nearby farmland, but were invariably shot. In Sheffield there were no deer except for feral reds from Wharncliffe which wandered down the River Don at least as far as Kelham Island.

By the 1980s, this situation was changing as the feral reds grew in number and were joined by a second population on the Eastern Moors. The area was purchased by the Peak District National Park Authority for public benefit and conservation and so the Chatsworth escapees were able to establish in an area of sanctuary. Numbers were supplemented by deliberate releases from captive stock owned by a landowner in Dore Village. At the same time, there were increasing records of roe deer and occasional muntjac around the district margins. Both these species occurred mostly to the east of the region. However, a process of major colonisation was underway and the feral red herds were expanding dramatically. There is a substantial literature associated with observations of these changes, and the South Yorkshire Biodiversity Research Group has a long-running 'citizen science' project to record and monitor the populations.



There is currently no fully up-to-date account of deer species in the region as records continue to come in, but there is little support for research into the impacts and trends. Discussions with the Deer Initiative confirm that this is a problem across the UK with no support for monitoring or recording. However, there is information on the general locations of key species.

Red deer are now well-established to the west and south-west of Sheffield with a population centred on Big Moor but now ranging in all directions from there. In the west and north-west, the populations are joining with the long-standing feral herds around Wharncliffe and Bitholmes with individuals now recorded from Rivelin and Strines. Roe deer have colonised Sheffield originally from the east and north-east, but now also from the southwest. By the 1980s, records were coming in from rural locations around the city. The population is now wellestablished into the heart of the urban catchment, with regular sightings for example, in Crookes, Nether Edge, and Sharrow.

Muntjac was first recorded in Sheffield in the early 1990s with individuals holding territories in the Moss Valley fringe. Since then, there has been a progressive movement into the city with records now from urban areas including Woodseats, Heeley, Gleadless, Norton, Nether Edge, Sharrrow, Parkwood Springs and Queen's Road. Fallow deer have continued to expand around Darley Dale and Matlock, and in the Sherwood region. However, fallow is a slow coloniser and has yet to appear in Sheffield. Records and rumours of sika deer have proved to be unfounded, though future colonisation from the north-west Pennines populations remains a possibility.

## Case study: True Bluebells Adele Harrison, Sheffield Hallam University

In spring 2016, Sheffield & Rotherham Wildlife Trust (SRWT) launched their 'True Bluebells' project as part of Nature Counts, which aimed to highlight and tackle the issue of hybridisation of British bluebells (*Hyacinthoides non-scripta*) with non-native Spanish hybrids (*Hyacinthoides hispanica*). A master's project was developed with Sheffield Hallam University to provide a snapshot of the state and distribution of native and non-native varieties across the Sheffield district so that future efforts could be applied to help conserve local British bluebells.

Data were collected by walking transects through 36 woodland sites, stopping every 50 metres to observe the abundance of native or non-native bluebells if present, with similar methods to a previous study in Scotland<sup>19</sup>. Across the 36 woodland sites surveyed, 87% of records were of native bluebells. Of the 36 sites surveyed during primary data collection, 25 included only native bluebells, while three included only non-native bluebells (Figure 6). These three sites – Sunnybank nature reserve, Jaunty Park and Ponderosa – are all centrally located within urban areas. Both species were found in eight (22%) of the sites present, confirming the threat of hybridisation, and subsequent potential loss of the native population, in these sites. Again, all of these sites are located within more urban and suburban areas.

The study also looked at the proximity of bluebells to anthropogenic (human-related) habitats. Away from gardens, British bluebells were the dominant type (Figure 7). However, when proximity to gardens was reduced to 25m, there was no significant difference between the number of native bluebell and non-native bluebell records. This indicates that the gardens are a primary source of non-native bluebells, through spread, garden encroachment and the dumping of garden waste.

It was observed during the site visits that non-native bluebells were often on the outskirts of woodlands but not in the centre. These records were usually found close to obvious patches of dumped garden waste, gardens, or evidence of fly tipping. There were other instances of non-native bluebells away from these sources; these were thought to be a result of deliberate planting.

In addition to threats from hybridisation, local bluebells may also be at threat from lack of woodland management. Sorby Natural History Society member Bob Croxton has been monitoring the decline of ground flora in local woodlands. He has noted that since 2000 bramble has been carpeting many local woods. This is now so serious in some woods that soon plants such as bluebell could become rare. The spread of bramble (which could be due to climate change, lack of management or maturation of a woodland) could be restricting access to the ground for declining woodland birds such as tawny owl and woodcock.





Figure 7 (above): woodlands with records of only native bluebells (**blue**), non-native bluebells (**purple**) and both species (**turquoise**); map credit 3

Below: evidence of bramble encroachment on local native bluebell woodlands over time.



## Case study: Birch catkin galls: fluctuation in numbers over the years Margaret Redfern, British Plant Gall Society

Semudobia species are gall midges (Diptera: Cecidomyiidae) that cause galls (an abnormal growth caused by an insect, fungus or bacteria) in the female catkins of birch trees (*Betula pendula* and *Betula pubescens*). The galls are tiny and distort the birch fruits, with individual seeds killed and replaced with a gall midge larva (Figure 8). There are three species in Britain, each causing a distinctive gall that can be recognised with a hand lens. They are generally common in England wherever the birches occur.

Numbers on neighbouring trees vary and they are not found in every catkin on a tree – there may be no galls on some trees, other trees may have just a few of one species only, while yet others have a hundred galls or more in one catkin, perhaps including all three species. The following year the pattern on the same trees may be different. This fluctuating pattern in abundance is common in insects and most likely in other animals too, and in birch catkin galls can be studied by monitoring the same trees over several years. It would be Interesting to try and discover why numbers fluctuate; a complicated question and one that could occupy investigators for years!

Figure 8 (right): an ungalled fruit, fruits galled by Semudobia betulae and S. tarda, and a catkin stalk galled by S. skuhravae.



Figure 9 (below): number of Semudobia galls and number of survivors.



I have been monitoring these galls for five years (since 2011) from the same five trees of *Betula pendula* in a local wood – although the same exercise could be done anywhere where the trees and the galls are present. Female catkins have been collected when ripe but before they have fallen, i.e. in September each year. Ten catkins were collected from each tree, the catkins were dissected and their galls identified and counted, and each one was put into a gelatine capsule with a label and kept for about six months, partly in the fridge to simulate the cold of winter. In late spring and early summer the following year, parasitoids emerge and can be identified. The number of galls and surivors over time is shown in Figure 9.

There are many unknowns about *Semudobia* galls. In the future it would be interesting to pursue more on the detailed distribution of the three species in long-term studies (10 years+). Worthwhile pursuits would be: studies of fluctuation in the numbers of each species on individual trees and at different sites; investigations into why numbers fluctuate by identifying specific causes of mortality; plus the effects of climate change on the phenology of trees, e.g. whether flowering time influences the egg-laying behaviour of the gall midges. The monitoring of *Semudobia* galls will continue in the future with the aim of discovering the most important mortality factors affecting these populations.

Birch in sunlight © Paul Hobson

## **Ownership and management**

Sheffield City Council (SCC) owns and manages just over 60% of all woodlands in the district, covering 1,615ha and containing most of the 2.7 million trees in public ownership. Local groups often support this management. Many large woodlands fall within LWSs and LNRs and are managed by conservation organisations and public bodies. LNRs include the SCC-managed Great and Little Roe Wood, Woolley Wood and Wheata Wood, along with SSSI-designated Ladies Spring Wood. Both Ecclesall Woods and Wheata Woods have Green Flag status. Of the 175 sites under SCC management, 70 (650ha) are ASNW and there is 126ha of PAWS. SCC have an aim to restore PAWS at Gillifield Wood, Upper Porter Clough, Rough Standhills, Bowden Housteads and Tinsley Park to traditional broadleaved woodland. Approximately 40% of trees are privately owned and found in a range of environments from large suburban gardens through to small farm woodlands and large coniferous forests.

Management and protection of woodlands has improved since the 1990s. In 2000 a five-year Heritage Lottery Funded project 'Fuelling the Revolution: The Woods that Founded the Steel Country' (managed by the South Yorkshire Forest Partnership) began to restore 35 woodlands across South Yorkshire, including 23 in Sheffield. Improvements included: silvicultural work; access for all including boundary and access controls; and education and interpretation. In addition, both ecological and historical surveys were carried out in all the woodlands listed.

Trees, woodland and forest managed by SCC are covered under the forthcoming Sheffield Trees and Woodland Strategy 2018-2033<sup>3</sup> and the SCC Corporate Tree Risk Management Strategy<sup>20</sup>. SCC and SRWT hold Forest Stewardship Council (FSC) accreditation and manage their woodlands according to certification requirements of the United Kingdom Woodland Assurance Standard (UKWAS). Approximately 700 trees which are dead, decaying or dying are removed by SCC Parks & Countryside Tree Team each year. The Countryside Stewardship provides grants for woodland management and woodland management plans. A single site within Sheffield (in the Rivelin Valley) is managed within a Peak District National Park Authority Conservation Scheme agreement.

Over 100,000 new trees have been planted through the Community Forestry programme on Council owned land, detailed within the Trees in Towns II survey<sup>21</sup> in this programme SCC aims to plant two trees for every one removed and has an annual target of 7,000 new trees<sup>3</sup>. SRWT is working with elm expert Dr David Herling and local tree champion Paul Selby to bring disease-resistant elms back to Sheffield. Eight varieties of resistant elms were be planted in trial plots at Greno Woods (a SRWT nature reserve) in early 2018. This is part of a UK-wide project with the aim of identifying which clones perform best in a range of environments and so informing which varieties become available for restocking the nation's landscapes.

#### Management of street trees

Sheffield has approximately 36,000 mapped and recorded street trees. Street trees need ongoing management, maintenance and a rolling programme of replacement. Traditionally, Sheffield's street trees were managed by SCC, but in recent years had suffered a period of under-investment. In 2012, Amey took on the management (replacement and maintenance) of street trees as part of the PFI 'Streets Ahead' contract on behalf of SCC. The 25-year contract focused much of the resurfacing work in the first five years (the core investment period) so any required tree works were carried out on these streets at the same time. Streets Ahead (Amey with all decisions approved by SCC) only replace trees when they fall into one of the following categories: 'dead'; 'dying'; 'dangerous'; 'diseased'; 'damaging' (to pavements or roads); or 'discriminatory' (potentially causing issues for people using wheelchairs, mobility scooters or pushchairs)<sup>22</sup>. Approximately 6,000 have been replaced to date. The residents of Sheffield are generally accepting of trees in the first four categories, however some residents and campaigners have argued that significant numbers of mature healthy trees are being felled under the latter two categories, where 'engineering solutions' could have been applied to upgrade pavements and roads whilst retaining trees. The Council counters this by saying that wherever possible trees are retained but there is no funding available for solutions outside the contract so replacement is carried out in these cases. The result is a loss, over the short to medium term, of the benefits that mature street trees provide. The issue continues to prove to be controversial and highlights the importance of trees to people's daily lives.



## Case study: Transforming the Burbage Valley Ted Talbot, Countryside Manager, National Trust (NT)

The Burbage Valley (SSSI) lies on the eastern side of the Peak District in Sheffield and is owned by SCC but is now leased to the Eastern Moors Partnership (EMP). It is part of the wider landscape of the Sheffield Moors Partnership (SMP) and was included in the Dark Peak Nature Improvement Area (NIA) to deliver "bigger, better, more and joined up" landscape-scale projects (see Moorlands chapter for more on the EMP and SMP).

An established conifer plantation of 34ha lies within the centre of the Burbage Valley which was planted between 1968 and 1971. At that time there was less emphasis on the conservation of landscape and nature than there is today, and the plantation was laid out to represent a map of Great Britain from the air. The 'Great Britain Plantation' principally contained Lodgepole pine with Scots pine and Japanese larch, none of which had grown well on the poor acidic soils. When the woodland was planted, no consideration was given to access and managing the woodland. Therefore, management had been poor, with little or no thinning leading to trees blowing down. For this reason, despite the trees being mature, the value in the timber was so poor and the cost of extraction and site restoration so high that there was no viable economic solution for taking this site forward without additional funding. Both the valley and woodland are well used recreationally for walking, climbing and geography trips. However, the plantation was also subject to anti-social behaviour, leading to warnings from the Fire Brigade that the risks from fire were becoming too great. It was clear that action had to be taken.

A plan was made by SCC's Woodlands team to fell and remove the existing conifer plantation and restore the site to habitat types that are more consistent and sympathetic to the surroundings, such as native woodland and



Above: the plantation was still known by many as the 'Great Britain plantation', although the 'West Country' spur was never planted because of unexploded WWII ordnance left from previous use of the valley by the Ministry of Defence. Bullet marks can also be seen on many tank-sized boulders that are enjoyed by climbers. heathland. A small area of conifers was to remain until the broadleaved woodland was established (in 20-30 years). Clear-felling over 20ha of woodland, and producing 8,000 tonnes of timber, was a significant project for all involved. Following baseline surveys by SCC, funding through the NIA enabled this work to begin in 2015 and involved NT and SCC staff as well as specialist contractors, volunteers and input from Natural England and the Forestry Commission. Helicopters were even required for some of the works to protect vulnerable species. The sensitivity of the area in a much-visited part of the National Park also required good communication with site users and the public. Thankfully the public response to the work was positive, which demonstrated the effectiveness of the NIA partnership and its broad stakeholder base.

On reflection, it is with a sense of relief and pride that this complex, landscape-scale conservation project went so well. Watching the wildlife return to the site and nature respond to the changes delivered will be fascinating, and by benchmarking against the baseline ecological surveys should, in time, demonstrate that this sort of carefully planned intervention really does work.

> Below: the Burbage Plantation from the south looking north. Forest access work just starting: 20 August 2014.

# UK Biodiversity Indicator Focus: Birds of the wider countryside: C5b. Woodland birds

Sheffield's woodland birds generally appear to be relatively stable, or in a favourable state. Of the twelve species included in the woodland generalist indicator (Figure 10; left), a third (n=8) show no change in occupancy, with a fifth of species (n=3) showing an increase<sup>23,24</sup>. Of the 23 species included in the specialist group (Figure 10; right), 15 (65%) had increased in occupancy between 1975-80 and 2003-08, one species showed no change and seven species (30%) showed a decline. The major winners and losers are given in more detail below.

Comparing these figures to national trends (although it is important to note that national analyses consider abundance, and a total of 37 species are included), the picture appears optimistic for Sheffield, with a higher proportion showing local improvements.



Figure 10: trends of woodland bird specialists (left) and generalists (right) included as part of the UK biodiversity indicator C5: birds of the wider countryside, measured as a change in the number of tetrads occupied between 1975-80 and 2003-07<sup>23,24</sup>.

All data © Sheffield Bird Study Group

## Which species are doing well?



335% increase

Widespread,

94% occupancy

#### Blackcap 20% increase 259 total tetrads 86% occupancy

## What are the reasons?

#### **Climate change**

Sheffield formed the northern boundary of some species' distributions in the 1970s, such as the nuthatch. Shifts in seasons has brought them further north.

#### Habitat restoration

Reclamation of woodland habitat, natural succession and replanting of native species has improved habitat availability for species such as blackcap.

#### Management

Increasing standing dead wood and woodland thinning has increased food sources and breeding sites for species such as pied flycatcher.

Images © Mark Hamblin/2020VISION, Neil Aldridge, Stefan Johansson, Janet Packham, Tom Marshall, Margaret Holland, Ben Hall/2020VISION, Jon Hawkins

#### Which species are not doing well?

#### What are the reasons?

Lesser redpoll 64% decrease Large declines to the east

#### Willow tit 47% decrease Lost from central Sheffield



#### **Climate change**

Climate change has negatively affected spotted flycatcher which struggles to adapt to changing seasons.

#### Habitat modification

Fragmentation and loss of habitat. Maturation of conifer and birch woodlands, coupled with removal of scrubland through residential development, has impacted lesser redpoll and willow tit.

#### Management

Browsing of woodland by deer has impacted willow tit by removing the shrub layer.





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## Case study: Greno Woods fungi survey Steve Clements, Brian Mitchell, Sally Chadwick & John Leach

Greno Woods is one of the most significant recent acquisitions by Sheffield & Rotherham Wildlife Trust and is notably lacking in useful data about its fungi. Our aim was to carry out a highly detailed and comprehensive team survey for all kinds of fungi and to look at habitat and management factors which seemed relevant to fungi.

We used the same 10m circle unit of recording as in our grassland surveys, following the British Mycological Society's guidelines for responsible scientific collection. An evidence base of 5,340 field, studio and microscope photographs was assembled. From 26 full-day surveys from March-November 2017 we accrued 3,389 records of fungi of which 2,692 fell within the area of woodland prioritised by the Wildlife Trust. Data on fungal abundance were also recorded.

A total of 456 species were identified in the locality, of which 405 were in the priority area. Thirty-three nationally or locally rare species, including five Red Data species, were noted. We analysed 502 10m circles for correlation of fungal diversity with habitat factors. The three most significant factors, in order of importance, were: unspoiled path edges; dead wood such as 'habitat heaps', logs and stumps; and tree species. Oak is prioritised by the SRWT but our survey showed the additional importance of beech, sweet chestnut and conifer for fungal diversity.

> In general, fungi are not present in great abundance at Greno Woods, and colonies tend to be small. This reflects our feeling that the woods have not been managed in a wildlife-friendly manner in the past. We determined that the care of path edges by discouraging trampling by dogs, plus provision of much greater volumes of dead wood and tolerance of a wide variety of tree species, would enhance the mycota of Greno Woods.

## **Key facts & figures**



#### Sheffield boasts a higher proportion of woodland than both England and South Yorkshire<sup>6</sup>

\*Figure taken from iTree 2017 plot data



An estimated 4.5 million trees are located within woodlands, streets and parks<sup>2</sup>. That's nearly eight trees per person.

Sheffield has better access to woodland than the national average. 45% of residents have access to a 2ha area of woodland within 500m of their home whilst 94% have access to a 20ha wood within 4km<sup>4</sup>.



21,800 tonnes of carbon are absorbed by the city's trees each year. That's 84 million car miles<sup>2</sup>.



Over two-thirds of Sheffield's woodland is broadleaved. This beats both national and county figures<sup>25</sup>

18.4% Mean tree cover within Sheffield, calculated by iTree, is 18.4%.

37%

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 Over a third of South Yorkshire's woodland is found within Sheffield, despite Sheffield only covering 24% of the county. Current data taken during iTree survey suggests 5,946ha or 37% of a total 15,737ha<sup>6</sup>.

2ha

45%

67%

K

Sheffield has 1,256ha of ancient woodland, of which 866ha (67%) is ancient semi-natural woodland (ASNW). The remaining sites are replanted (PAWS).

What is the threat?	What does it cause?	
Lack of, or changes in, woodland and tree management	Lack of resources for on-going management. Neglect of veteran trees leads to less standing deadwood and a reduced age structure of trees.	
Habitat fragmentation	Reduced habitat connectivity results in isolated populations of woodland species.	
Development of buildings and infrastructure	Loss of urban trees and large suburban gardens leads to reduced canopy cover in urban areas and reduced habitat connectivity for tree-dependent species.	
Invasive species	Rhododendron and Himalayan balsam over- shade the woodland floor leading to a reduction in diversity of woodland flora.	
Nutrient enrichment	Leads to an increase in brambles and pioneer species which reduces woodland flora diversity.	
Recreational demands and illegal motorcycling and off-road activity	Erosion of tracks and paths, endangerment to recreational users, noise pollution and disturbance to sensitive woodland species.	
Fly tipping, including waste from gardens	Introduction of invasive species into ancient woodlands (see bluebell case study), loss of boundary habitats, introduction of harmful litter for woodland species.	
Uncontrolled firewood collection; 'tidy' woods	Reduction of natural age structure of woodlands and resulting reduction in availability of deadwood microhabitats and related biodiversity in lichens, bryophytes and invertebrates.	
Plant pathogens including Chalara (ash) and Phytophythora (larch and oak)	Significant loss to affected tree species and a resulting reduction in biodiversity through the loss of large standing trees.	
Flood alleviation methods	Reduction in riparian vegetation and potential loss of habitat to hard defences.	

### Recommendations

- Develop targeted conservation plans for key indicator species or local species facing threats or in severe decline including butterflies and woodland birds such as tawny owl and woodcock.
- 2. Continue to deliver conservation actions that support the return and expansion of willow tit and pied flycatcher, including more standing deadwood and tree thinning.
- **3.** Develop a strategic plan for tackling invasive species in ancient woodlands such as rhododendron and Himalayan balsam.
- 4. Promote the value of LWSs associated with woodland habitats and the importance of their protection and ongoing management for wildlife to land managers, land owners, planners and developers.
- **5.** Focus efforts on improving the overall condition of key woodland LWSs currently in poor condition or not in positive management for wildlife.
- 6. Seek opportunities to improve connectivity between woodland blocks.
- **7.** Increase diversity in tree planting to promote greater woodland resilience against destructive pathogens and fungi.
- 8. Continue to work in partnership with the local community and police to reduce motorcycling and off-road activity in key woodlands in the north of Sheffield and ensure that wildlife is not detrimentally affected by increased recreation and disturbance at these woodland sites.
- 9. Undertake effective prosecution of fly-tippers and promote successful cases.
- **10.** Further improve our knowledge of woodland fungi and promote the use of habitat piles and lying deadwood.
- **11.** Further improve our knowledge of woodland butterflies by promoting and enabling local groups in monitoring butterfly populations, to better inform future conservation activities through the use of the woodland butterfly indicator.
- 12. Develop, through open partnership, a long-term citywide strategic plan that considers how Sheffield's urban street trees can be valued and managed appropriately to better contribute to improving people's health and wellbeing, reducing noise and air pollution, improving flood risk management, helping to mitigate for climate change, supporting biodiversity and encouraging community engagement and cohesion.