

Pollinator Survey Report
Smestow Valley Local Nature Reserve



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Introduction

The Smestow Valley is a wide corridor of various habitats, including woodland, scrubland, grassland and wetland, located in Wolverhampton, which is centred around a former railway, the Staffordshire and Worcestershire canal and the Smestow brook (Trueman, Poulton and Reade, 2013). In 1998, approximately 51.05 hectares of the Smestow valley, were designated as a local nature reserve (Grid reference: SO891999). The habitats within this site vary between woodlands, meadows and pools of standing water and support a diversity of wildlife species, including 170 species of birds, mammals such as Badgers and Daubentons Bats, and the notable amphibian species, the Great Crested Newt. However, less attention has been focussed on surveying the insect fauna of the nature reserve, although previous surveys have been undertaken within the site historically and records of these species are currently held in the Birmingham and Black Country Wildlife Trusts EcoRecord database. The heterogeneity of habitats found within the reserve, such as the presence of wet areas and meadows interspersed with areas of sandy bare ground, indicate that the site may support a number of bee, wasp and hoverfly species. These three taxa are the key pollinators of wild plants in England, and they play a critical role in the functioning of healthy ecosystems. In order to update current knowledge of the pollinator fauna found living within Smestow Valley LNR, the city of Wolverhampton council commissioned two surveys of the site in spring and summer of 2025, through funding acquired through the national lottery heritage fund. These surveys formed part of a wider project to explore, enhance, protect and promote the wildlife of Smestow Valley LNR, a site which forms part of the internationally recognised, UNESCO Black Country Global Geopark (Worton, Prosser and Larwood, 2021).

Methods

There are approximately 270 species of bees (Falk, 2015), 250 species of wasps (Yeo and Corbett, 1995) and 280 species of hoverflies (Ball and Morris, 2024) within Britain. Many of these species are useful indicators of habitat type and quality. Surveys targeting these groups were carried out by Aaron Bhambra and Bailey Carswell Morris from the University of Birmingham, using direct hand searching techniques with long handled sweep nets, to carefully capture flying insects from flowers and bare earth areas. Pan traps were also placed in well lit, sunny areas around the site during each survey, to capture any insects not caught through sweep netting. Both surveys were carried out in dry weather conditions, in sunny weather or in partial cloud. An initial site visit was undertaken on the 4th of March 2025, to scope out areas to survey and the surveys themselves took place between 11:00am and 15:00pm on the 28th of June and 14th of August 2025.

Results

In total, 30 species of bee, wasp and hoverfly were recorded from the site from two sampling days. This included 10 species of bee, 6 species of wasp and 14 species of hoverfly, recorded from a total of 47 specimens.

Bees

The majority of species were collected from sandy bare earth areas found within the grassland habitats on site and from the old sandstone quarry located within the woodland. The site supports bees in the genera *Andrena*, *Bombus*, *Lasiglossum*, *Megachile*, *Osmia* and *Sphecodes*. The majority of species found within the site were ground nesting mining bees, with both early spring emerging *Andrena* species (*Andrena dorsata* and *Andrena minutula*), as well as late spring emerging *Lasiglossum* species (*Lasiglossum calceatum* and *Lasiglossum leucopus*).

Additionally, aerial nesting species which utilise pre-existing cavities in wood and mortar to build their nests, were also found on site. These species (*Megachile centuncularis*, *Megachile ligniseca* and *Megachile willughbiella*) are often referred to as leafcutter bees, for their unique nesting behaviour, which involves rolling up leaf segments to create chambers for their larvae to develop in. Additionally, another aerial nesting species in the family Megachilidae, which nest in mortar, as opposed to leaves (*Osmia leaiana*) was also recorded on site. The only bumblebee species recorded during these surveys, was the red-tailed bumblebee (*Bombus lapidarius*), a species which tends to nest above ground in England. It is likely that the common and widespread 'big 8' species of bumblebees are living on site, but as these species are active at different times of the year, or in different weather conditions, some of them may have been missed when sampling.

One kleptoparasitic species, the Bare Saddled Blood Bee (*Sphecodes ephippius*), was also found in the reserve. Kleptoparasites in the genus *Sphecodes* are brood parasites of bees in the family Halictidae. A female blood bee will seek out a nest site of a *Lasiglossum* species and will sneak inside to lay her own eggs and kill the host's eggs. Her larvae will consume the food source collected by the host bee and will pupate inside of the host's nest. These species are not considered key pollinators of wildflowers, lacking pollen collecting apparatus as a result of their parasitic lifestyle. However, they are important indicators of habitat type and their presence at a site, will infer the

presence of other bee species in the area, which are the hosts of *Sphecodes* bees. Potential hosts of *Sphecodes ephippius* at Smestow Valley LNR could be *Halictus tumulorum*, *Lasiglossum leucozonium* and *Lasiglossum lativentre* (Else and Edwards, 2018) however, these species were not recorded during our surveys. None of the bee species recorded during these surveys have a threatened conservation status in Britain.

Hoverflies

Hoverflies were the most species rich group sampled during our surveys, which may not be surprising give then extensive areas of wet habitat found within and surrounding the LNR. Many hoverflies in Britain have aquatic larval stages and so benefit from areas of ephemeral wet habitat, as well as standing pools, ponds and other areas of water to pupate within (Ball and Morris, 2024) . Species with aquatic larval stages found at Smestow LNR, included *Eristalis intricaria*, *Eristalis tenax*, *Syritta pipiens* and *Myathropa florea*. These species survive on the detritus found within stagnant, oxygen depleted waters. Many adult individuals from these species can be found within woodland edges, hovering in shady areas of the site.

The grassland areas yielded the greatest richness of species, including species in the largest genus of Hoverflies in the UK, *Cheilosia* (*Cheilosia illustrata* and *Cheilosia impressa*). These are species associated with wet habitats which often feed from buttercups and other plants which flower between May and August. Other grassland associated species included the common and widespread species *Episyrphus balteatus*, *Melanostoma scalare*, *Eupeodes luniger*, *Sphaerophoria scripta* and the woodland associated species *Syrphus ribesii*.

Interestingly, the site recorded three species of *Chrysotoxum*, (*Chrysotoxum bicinctum*, *Chrysotoxum elegans* and *Chrysotoxum festivum*), a genus of hoverflies with brightly coloured banding on their abdomens and dumpy antennae, which mimic social wasps. These species develop inside the nest of ants, feeding on root aphid colonies and maybe an indication of abundant ant activity on site. None of the hoverfly species recorded were considered to have a threatened conservation status in Britain.

Wasps

Wasps were the least species rich group sampled during these surveys. The majority of wasp species in Britain, like bees, are solitary and do not live in social colonies. All species collected during these surveys were solitary, however it is likely that the Common social wasp, *Vespa vulgaris*, is living within the reserve.

Ground nesting species were well represented on site, with the majority of recorded species showing a strong preference for sandy, bare ground habitat. These species included digger wasps in the genus *Astata* (*Astata boops*), which predate on the nymphal stages of shield bugs, as well as species in the genus *Crossocerus* (*Crossocerus ovalis* and *Crossocerus varus*), which predate on a range of small dipteran (fly) species.

Another species recorded on site, included the spider hunting wasp *Anoplius nigerrimus*, which was found in the bare ground areas in one of the reserves sandy grasslands. These wasps catch and paralyse small spiders, which they then drag back to their nests to feed to their larvae. They will nest in a range of areas, including in bramble stems, empty cavities and under stones (Yeo and Corbett, 1995). The beetle killing wasp, *Tiphia femorata*, was also recorded on site. These wasps hunt beetles in the *Scarabaeidae*, predating on their larvae.

The most interesting record collected during these surveys, was of the wasp species *Lestiphorus bicinctus* (Plate 1 & 2). This is a distinctive species associated with sunny areas with light soils and is often found in heathlands and rough grasslands, feeding on bugs (Hemiptera). This wasp is nationally scarce in Britain and is considered to be an elusive species. Its true distribution maybe obscured by lack of recorder attention on solitary wasps within Britain generally, however, this is a first record for Birmingham and the Black country, with Smestow Valley currently being the only site in the area, known to host this species.

Table 1. Pantheon Species List of Smestow Valley

Species	Insect	Family	Order	Habitat
<i>Andrena dorsata</i>	Bee	Andrenidae	Hymenoptera	short sward & bare ground
<i>Andrena minutula</i>	Bee	Andrenidae	Hymenoptera	short sward & bare ground
<i>Bombus lapidarius</i>	Bee	Apidae	Hymenoptera	tall sward & scrub
<i>Lasioglossum calceatum</i>	Bee	Halictidae	Hymenoptera	short sward & bare ground
<i>Lasioglossum leucoporus</i>	Bee	Halictidae	Hymenoptera	short sward & bare ground
<i>Megachile centuncularis</i>	Bee	Megachilidae	Hymenoptera	decaying wood
<i>Megachile ligniseca</i>	Bee	Megachilidae	Hymenoptera	decaying wood
<i>Megachile willughbiella</i>	Bee	Megachilidae	Hymenoptera	decaying wood
<i>Osmia leiana</i>	Bee	Megachilidae	Hymenoptera	decaying wood
<i>Sphecodes ephippius</i>	Bee	Halictidae	Hymenoptera	short sward & bare ground
<i>Cheilosia illustrata</i>	Hoverfly	Syrphidae	Diptera	tall sward & scrub
<i>Cheilosia impressa</i>	Hoverfly	Syrphidae	Diptera	shaded woodland floor
<i>Chrysotoxum bicinctum</i>	Hoverfly	Syrphidae	Diptera	tall sward & scrub
<i>Chrysotoxum elegans</i>	Hoverfly	Syrphidae	Diptera	tall sward & scrub
<i>Chrysotoxum festivum</i>	Hoverfly	Syrphidae	Diptera	short sward & bare ground; tall sward & scrub
<i>Episyrphus balteatus</i>	Hoverfly	Syrphidae	Diptera	tall sward & scrub
<i>Eristalis intricaria</i>	Hoverfly	Syrphidae	Diptera	acid & sedge peats
<i>Eristalis tenax</i>	Hoverfly	Syrphidae	Diptera	rich flower resource
<i>Eupeodes luniger</i>	Hoverfly	Syrphidae	Diptera	short sward & bare ground; tall sward & scrub
<i>Melanostoma scalare</i>	Hoverfly	Syrphidae	Diptera	tall sward & scrub
<i>Myathropa florea</i>	Hoverfly	Syrphidae	Diptera	decaying wood
<i>Sphaerophoria scripta</i>	Hoverfly	Syrphidae	Diptera	tall sward & scrub
<i>Syritta pipiens</i>	Hoverfly	Syrphidae	Diptera	tall sward & scrub
<i>Syrphus ribesii</i>	Hoverfly	Syrphidae	Diptera	tall sward & scrub
<i>Anoplius nigerrimus</i>	Wasp	Pompilidae	Hymenoptera	short sward & bare ground
<i>Astata boops</i>	Wasp	Crabronidae	Hymenoptera	short sward & bare ground
<i>Crossocerus ovalis</i>	Wasp	Crabronidae	Hymenoptera	short sward & bare ground; tall sward & scrub
<i>Crossocerus varus</i>	Wasp	Crabronidae	Hymenoptera	short sward & bare ground; tall sward & scrub
<i>Lestiphorus bicinctus</i>	Wasp	Crabronidae	Hymenoptera	short sward & bare ground
<i>Tiphia femorata</i>	Wasp	Tiphidae	Hymenoptera	short sward & bare ground

Pantheon is a tool developed by Natural England and the UK Centre for Ecology and Hydrology, used to analyse invertebrate assemblages in England (Heaver et al, 2017). This tool is useful for understanding which habitat types are of the greatest importance to insects, within a sampled area. According to Pantheon, areas of short sward with exposed bare ground are important habitats at Smestow valley for supporting species of bees and wasps. Decaying wood and areas of tall sward and scrubby habitat are also important habitats on site for both Diptera and Hymenoptera.

Overview of Habitat Quality for Pollinators

Many greenspaces within Birmingham and the Black country have experienced habitat degradation over the past 25 years, largely as a result of a decline in the management of these sites. This is partly due to the cost of undertaking habitat interventions in these greenspaces and the difficulties in balancing habitat conservation efforts, with general site maintenance work, with limited funding and manpower. This lack of management has resulted in rapid changes to the habitat characteristics of many important sites within the area, where bare ground and grassland habitats have undergone a process of ecological succession, developing into scrub and woodland. This is likely to be the case at

Smestow Valley LNR, where areas of open habitat have become overgrown with woodland and scrub, which may have reduced the total surface area of bare ground within the site over time. As most bee and wasp species are ground nesting, this may have negatively impacted the ability of some species to find suitable nesting space. In addition to this, the growth of woodlands and the increase in nitrogen deposition recorded in the soils of urban greenspaces, may have resulted in a reduction in the species richness and diversity of wildflower species in these sites. This seemed apparent in Smestow valley LNR during surveys in 2025, where there was a distinct lack of wild flowering plant species in bloom throughout the nature reserve, particularly for yellow composite species. The majority of flowers in bloom, were from semi-natural meadows created as part of conservation efforts to improve biodiversity on site and may not necessarily be species which would naturally grow in this area without human interference. Although these meadows are florally species rich, they were not productive areas for finding a diversity of pollinating insects. The reasons for this, could be because different pollinator species have different tongue lengths in Britain and these differences determine which plants pollinators can feed from. Many of the plant species which form part of semi-artificial grassland seed mixes are dominated by wildflowers which are more suited to long tongued, generalist pollinator species. This is because these meadows are designed to cater to as wide a number of insect groups as possible. This can create situations whereby the dominant species found within these meadows are long tongued, generalist species, which are mainly social bees like bumblebees and the European honeybee and lepidopterans (Butterflies and Moths). Disturbed areas of soil, where hidden seed banks are allowed to develop into floral assemblages over time, may lead to the growth of a more appropriate assemblage of floral resources than managed grasslands, for local wild pollinator species. These disturbed areas may cater to the needs of pollinator species with varied morphologies and life history traits, such as solitary and specialist bees and species with short tongues.

In addition to this, the geology of Smestow LNR is unique, in that it formed over a Triassic bedrock of sedimentary sandstone (British Geological Society, 2024), which provides the ideal, free draining, sandy soils for a number of bee and wasp species to burrow into. Sites which have this geology within the region are some of our best greenspaces for pollinators and include lowland heaths, such as Sutton Park, Brownhills Common and Highgate Common, the latter site being nationally notable site for bees in Britain (Falk, 2010). The reason these sites are so attractive to a range of pollinating insects is partly due to the extensive areas of exposed sandy habitat found within them. However, at Smestow, the high coverage of semi-natural meadows growing over areas of sandy bare ground, may have reduced the space available for this habitat to be colonised by insects.

Furthermore, historically, Smestow valley LNR would have formed part of an extensive, medieval landscape of lowland heath, which would have stretched from south Staffordshire, southwards into Wolverhampton, Birmingham, Walsall and Sandwell, connecting with the heathlands of North Worcestershire in Bewdley, within the West Midlands region. This vast landscape has been fragmented as a result of urbanisation and many of the greenspaces which would have been classified as lowland heath, have lost their ericaceous vegetation and bare earth components over time. Smestow retains soils suitable for the creation of this habitat type in the region and may support relict populations of insects, which have an association with lowland heath on site. Any work to restore a heathy element to Smestow valley, could improve the quality of the site's habitat characteristics for pollinating insects. Species recorded during these initial surveys act as a baseline condition assessment for pollinators on site. Any work to improve habitats at Smestow LNR could follow up with additional survey work, to assess what impact the habitat interventions have had, on the species richness, diversity and abundance of pollinating insects living on site.

Management Recommendations

To improve the nature reserve for pollinating insects, I have compiled several management recommendations targeted towards improving the quality and extent of bare earth habitat, as well as the richness and diversity of wildflowers within the site.

Floral Enhancement

- Create scrapes to disturb seed banks either by hand or through mechanical means, by creating shallow depressions in the soil and by removing any grass which colonises the patch.
- Seed the scraped areas, with green hay from species rich meadows dominated by yellow composite wildflowers, from other nearby sites like Brownhills Common or Highgate Common.
- Clear areas of scrub from grassland habitats to reduce shade within the site, however, leave areas of Goat willow (*Salix caprea*), which is an important pollen source for early spring emerging bees.

Woodland thinning and removal

- Remove trees from the woodland which surrounds the old sand quarry on site, so that more light is able to fall on the surface of the quarry.

- Thin trees within the woodland to provide species living in the quarry, greater access to the nearby grasslands either side of the habitat.
- Leave any areas of standing, exposed dead wood, for any cavity nesting species to colonise.

Bare Earth Creation

- Create patches of sandy habitat through gentle scraping of the grassland areas of the site or by creating sandy footpaths as linear features extending over the grassland (Fig 1,2 & 3).
- Select a south facing grassland and create a patch by removing the top layer of vegetation to expose a layer of sandy soil.
- As Smestow is a very sandy site, this could be possible with volunteers, however, it is more effective to use machinery.
- Keep these patches free of scrub over the course of the season, for burrowing pollinators to colonise.

Heathland Creation

- Heathland is an internationally rare habitat type which is more threatened than tropical rainforest. England contains 20% of the world's total surface area of this habitat, which grows mainly in sandy soils in southern counties of the country (English Nature, 2006). Some areas of the West Midlands region are able to support the creation of lowland heath and Smestow Valley LNR, is one of those sites. The creation of a dwarf shrub heathland mosaic on site, could be highly beneficial for the wildlife of the reserve and would support the needs of pollinating insects.
- To do this, create scraped areas using machinery or volunteers and seed these areas with heather brash or heather seeds, collected from nearby lowland heaths (i.e. Penn or Highgate Common).
- Allow the heather to grow within these scrapes into mature heather plants.
- Management of these patches would involve removing scrubby habitat from overcrowding the heather plants, which will need to be carried out in spring (March) and autumn (September) each year.
- Some of these patches could also be seeded with wildflower seed collected as part of the purple horizons project in collaboration with the Birmingham and Black Country Wildlife Trust and could involve adding plant species like Tormentil (*Potentilla erecta*) or Cats ear (*Hypochaeris radicata*) to these areas.
- Given the sandy nature of Smestow, it is likely that all of the scraping could be achieved by a 3-tonne mini digger in a single day.
- It is a constant battle to keep heather from being overgrown with scrub, without the use of grazers. However, a dedicated team of volunteers can help heather plants reach maturity by removing scrub regularly.

Cavity Nesting Bee Box

- The presence of a number of aerial nesting bee and wasp species, which were associated with dead wood on site, could be improved by installing 'bee boxes' within the reserve.
- These can be made by hand by drilling into logs or can be purchased relatively cheaply.
- Boxes will need to be installed at least 1.5 metres off the ground, facing in a south westerly direction.
- Monitoring of these boxes could be carried out by students at the University of Wolverhampton or University of Birmingham.



Plate 1 and 2. *Lestiphorus bicinctus* UK Distribution (BWARS. 2025)



Fig1. Examples of sucessful bare earth/ heathland creation at Brownhills Common SSSI



Fig2. Examples of bare earth/ heathland creation at Barr Beacon LNR



Fig3. Examples of bare earth footpath creation at Barr Beacon LNR

Acknowledgements

Thank you to Jordan Ferguson, Catherine Perry and Claire Prince for arranging these surveys and for acquiring the funding to carry out targeted entomological work on site. Thanks also to Andy Purcell and Bailey Carswell Morris for supporting the collection and identification of specimens for this report.

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Front cover photo : An *Andrena* nesting in the old sandy quarry in Smestow Valley LNR (A Bhambra)