SYNTEGRA CONSULTING

Former Mepal Outdoor Centre, A142 Ireton's Way, Ely, Cambridgeshire

Terrestrial Invertebrate Survey Report

September 2020

Ref: 19-6364

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Revision	-
Date	30/09/2020
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Note

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Validity of Data

The findings of the site survey are valid for a period of 24 months from the date of the survey. If approved works have not commenced by this date, then an updated site survey could be required to inform any changes to the habitats present on site in order to inform any updated mitigation and or precautionary measures required on site.

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The methodology adopted and the sources of information used by SC in providing its services are outlined in this report. The work described in this report was undertaken in **July to September 2020** and is based on the conditions encountered and the information available during the said period of time. The scope of this report and the services are accordingly factually limited by these circumstances.

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Forecast cost estimates do not include such costs associated with any negotiations, appeals or other non- technical actions associated with the agreement on measures to meet the requirements of the authorities, nor are potential business loss and interruption costs considered that may be incurred as part of any technical measures.

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1. Introduction And Methodology

1.1 The survey was undertaken by the author, Peter Harvey, an experienced specialist with many years' experience in invertebrate survey, open habitat mosaic landscapes and the Priority Habitat Open Mosaic Habitats on Previously Developed Land.

1.2 The author is Essex County Recorder for spiders and other Arachnida, Hymenoptera, woodlice and moths, and undertook a review of the county's centipedes and millipedes in 2000. He has been National Organiser of the Spider Recording Scheme since 1999, Newsletter Editor for the Bees, Wasps and Ants Society from 1998 to 2012, and is a Past President of the Essex Field Club, a natural history organisation founded in 1880 which included Charles Darwin and Alfred Russel Wallace as founder members.

1.3 Historically the Mepal Outdoor Centre site was a former gravel pit and then was used as an outdoor centre, is now council land and has been left for 10 years plus with no management. The two pits on either side of the A142 are designated as County Wildlife Site No 7034 in the East Cambridgeshire District County Wildlife Site Register (Anon, 2010) on the basis of the pondweeds present in the water bodies. The terrestrial invertebrate survey was of land at the western Mepal Outdoor Centre pit, where the principal area of terrestrial habitat was present at the southern end of the pit and where evidence of mining bees had been noted.

1.4 Field survey was undertaken on 20 May, 11 July and 18 August 2020 in reasonable weather conditions. This provides a reasonable level of survey to establish a provisional value of the invertebrate fauna present.

1.5 Active invertebrate survey is a sampling exercise of those species adult at the time of the visits, and cannot be comprehensive. It is only practical to undertake survey on specific sample areas selected for their structural habitat and their potential value to the range of invertebrates of nature conservation significance which might be present. Sampling took place at many points in different parts of the site area, concentrating on the main terrestrial habitat area at the southern end of the site.

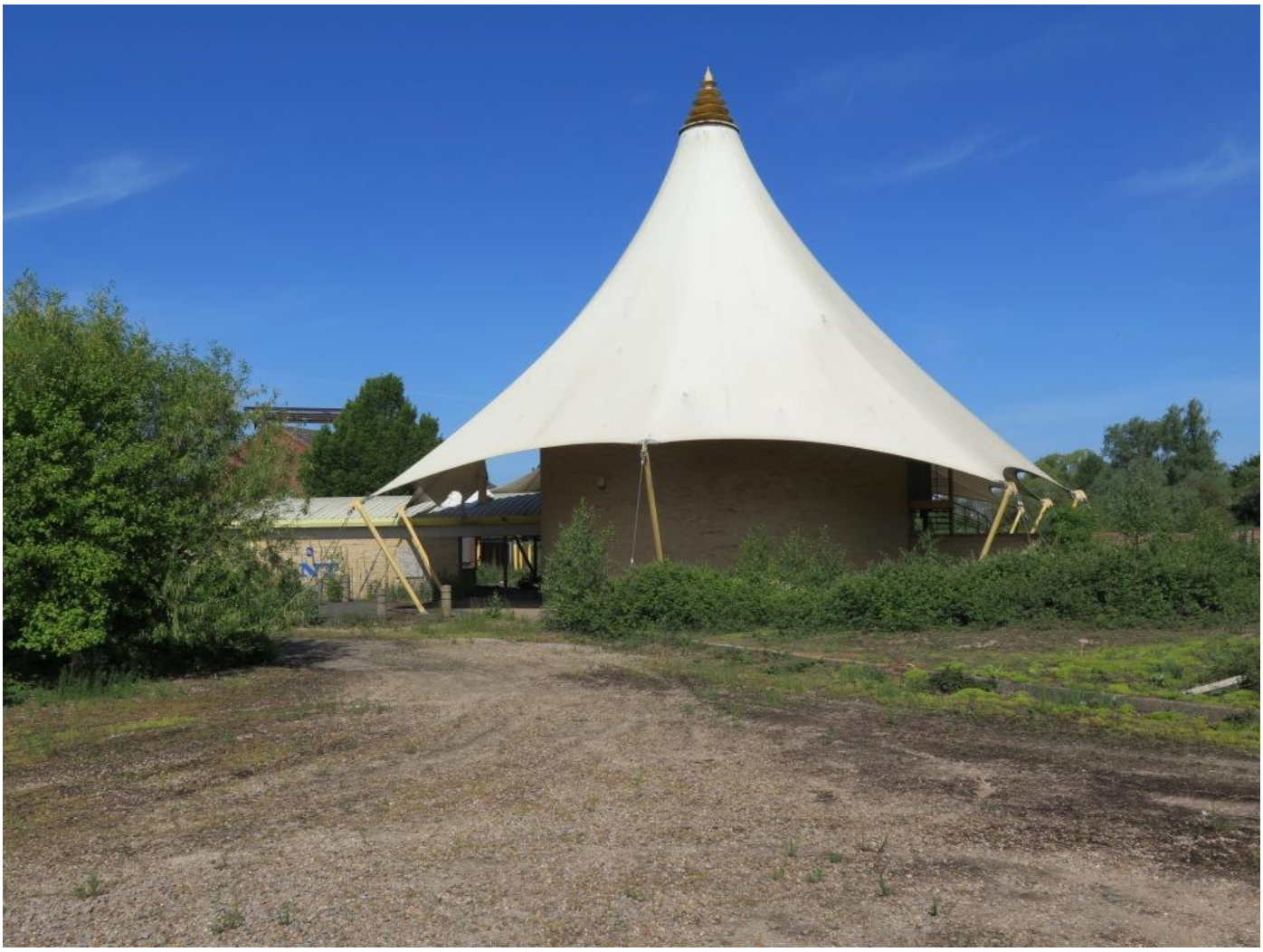
1.6 Active survey work of the different structural habitats entailed the following standard field techniques:

- direct observation
- sweep netting
- beating
- hand netting
- turning over stones and pieces of debris
- 'grubbing around' at the base of vegetation and grass roots.

1.7 Habitat assessment was undertaken whilst undertaking survey, identifying habitats and areas valuable for invertebrates. These are discussed in Section 3.

1.8 Material was identified by the author apart from the following: the national specialists David Gibbs identified many of the flies other than most of the hoverflies and Larger Brachycera, Mark Telfer identified most of the Coleoptera and Dr Peter Kirby identified a good proportion of the Heteroptera and most of the Homoptera material.

Derelict Buildings at the Mepal Outdoor Centre Site



2. Summary with Recommendations

2.1 Within the Mepal Gravel Pits County Wildlife Site, the western pit evidently provides virtually all the high quality open habitat mosaic with Breck-like characteristics and invertebrate fauna.

2.2 The Breck grasslands of East Anglia support particularly interesting invertebrate communities (Kirby, 2001) and the richness and diversity is higher than that of other heathland areas of the UK. This is because of the acid/chalk variation in grassland habitats, the availability of bare ground, and the semi-continental climate that experiences greater extremes of temperature and is drier than anywhere else in the country. The author undertook a large data gathering and analysis exercise in 2004 on the invertebrates of Red Lodge Heath in relation to other sites in the Breckland Natural Area for English Nature (Suffolk Team) (Harvey, 2004) and one of the results of this was the recognition that the fringe areas around the main Breckland may be more important than core areas.

2.3 The most important invertebrate habitats at the former Mepal Outdoor Centre are south of the main buildings, with the old car parking areas, sand areas and sand mounds with plentiful stork's-bill *Erodium*, viper's bugloss *Echium vulgare* and forget-me-not *Myosotis* supporting Breck specialities, plus the shelving wetland sandy edge with Phragmites & Typha and marsh vegetation at the southern end of the lake and the

plentiful supply of standing dead wood in open sunny situations. Wild teasel *Dipsacus fullonum* (a plant in the scabious family) provide a valuable forage and phytogenous resource for a number of scarce species.

2.4 The open habitat 'rich flower resource' and 'bare sand & chalk' Species Assemblage Types are both in favourable SSSI condition, and these data result from just 3 survey days. It is judged that the open habitat mosaic at the southern end of the site, shelving lake edge at the southern end of the lake and the plentiful dead wood resource should qualify the site as a County Wildlife Site on the invertebrate data alone.

2.5 The mature oak just north of the main buildings and the larger wetland carr edge areas to the lake on the eastern side towards the southern end of the lake provide other valuable habitats. The narrow wetland edges, steep banks and the north-east corner of the site are the least interesting.

2.6 Invertebrate populations cannot survive on very small areas of habitat unless part of a wider landscape where a population can be sustained. Most of the surrounding habitat appears to be arable and does not provide a high quality wider landscape. This means the constraints from an invertebrate point of view are entirely about major loss of habitat and there is little meaningful mitigation which would resolve this if there is any major loss of these open habitat areas.

2.7 Any development at the site should focus on the existing footprint of the derelict buildings and retain the important invertebrate habitat areas and features. Management of these should involve occasional periodic disturbance on a rotational basis, to control the loss of open habitats to succession and to maintain friable sandy exposures. Rabbit activity and burrowing provides a free management resource to expose new loose sandy areas valuable for ground nesting aculeate Hymenoptera (bees, wasps and ants) and other ground nesting species and rabbit grazing helps maintain the valuable open habitat mosaic. Rabbit grazing is very good for invertebrates (Kirby, 1992, 2001) and Key (2000) highlights the importance of bare ground..

2.8 Aerial photographs indicate what appear to be active extraction sites in the area to the south-west (North Fen) and north-east (Block Fen area). If development of the site would result in the loss of any substantial area of the high quality open habitat mosaic habitat, then useful mitigation would be impractical. As a last resort potential compensation could be for these large currently active extraction areas of sands and gravels to be left to vegetate naturally and then managed by sporadic disturbance for Breckland specialities and for the water bodies to have a lot of shelving edges, rather than 'restoration' to agriculture or planting with trees and scrub species, which would both be very destructive to their value. This would result in a long term gain for the invertebrate fauna of the region at landscape level, and would be a very positive conservation outcome for these areas regardless of the future of the Mepal Gravel Pits County Wildlife Site.

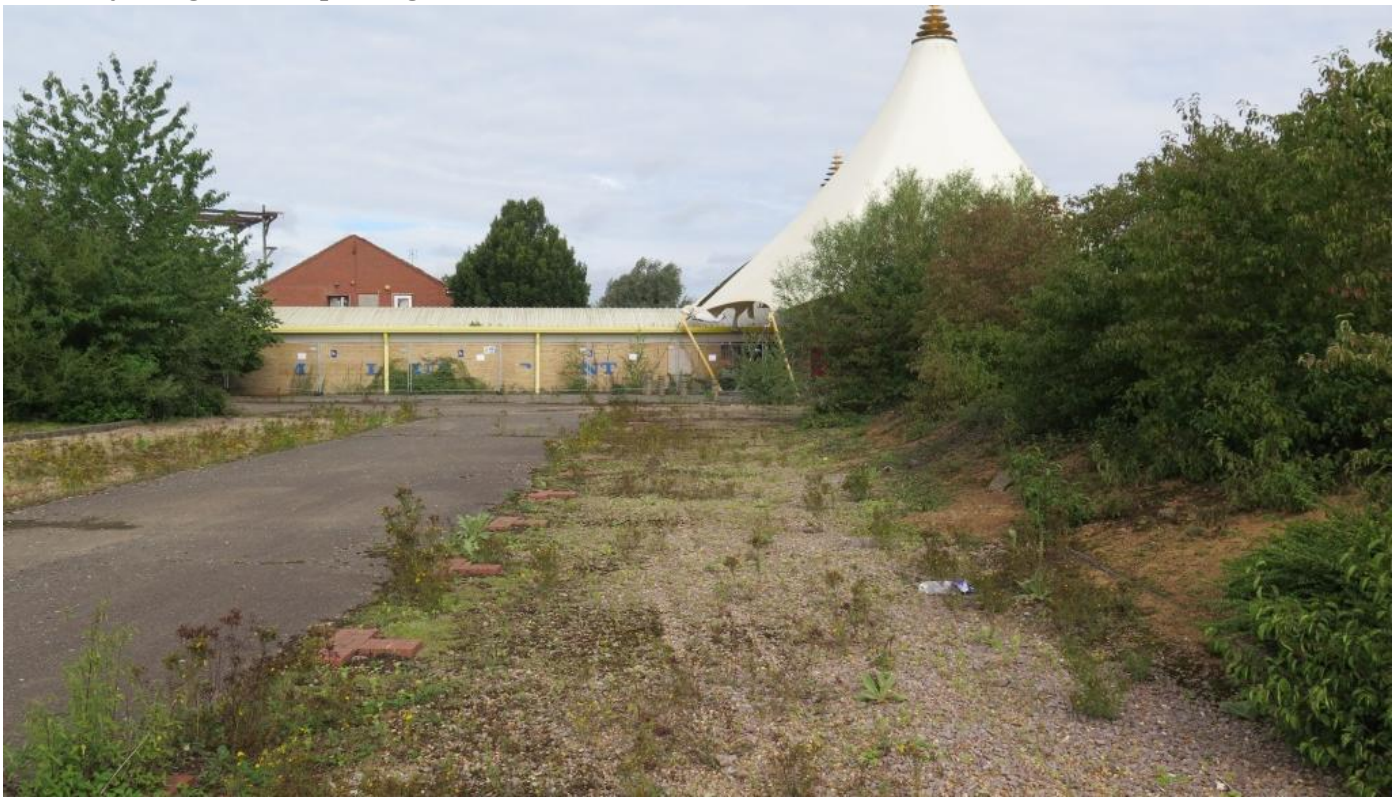
3. Invertebrate Habitat Areas

3.1 On the northern side of the main entrance is a small area of sandy ground with abundant Viper's bugloss *Echium vulgare*. The Nationally Scarce weevil *Mogulones geographicus*, a distinctive Breck speciality, was numerous here. It was also found at other locations where the plant grows in any quantity at the southern end of the site.

Viper's bugloss *Echium vulgare area* supporting abundant *Mogulones geographicus* weevils

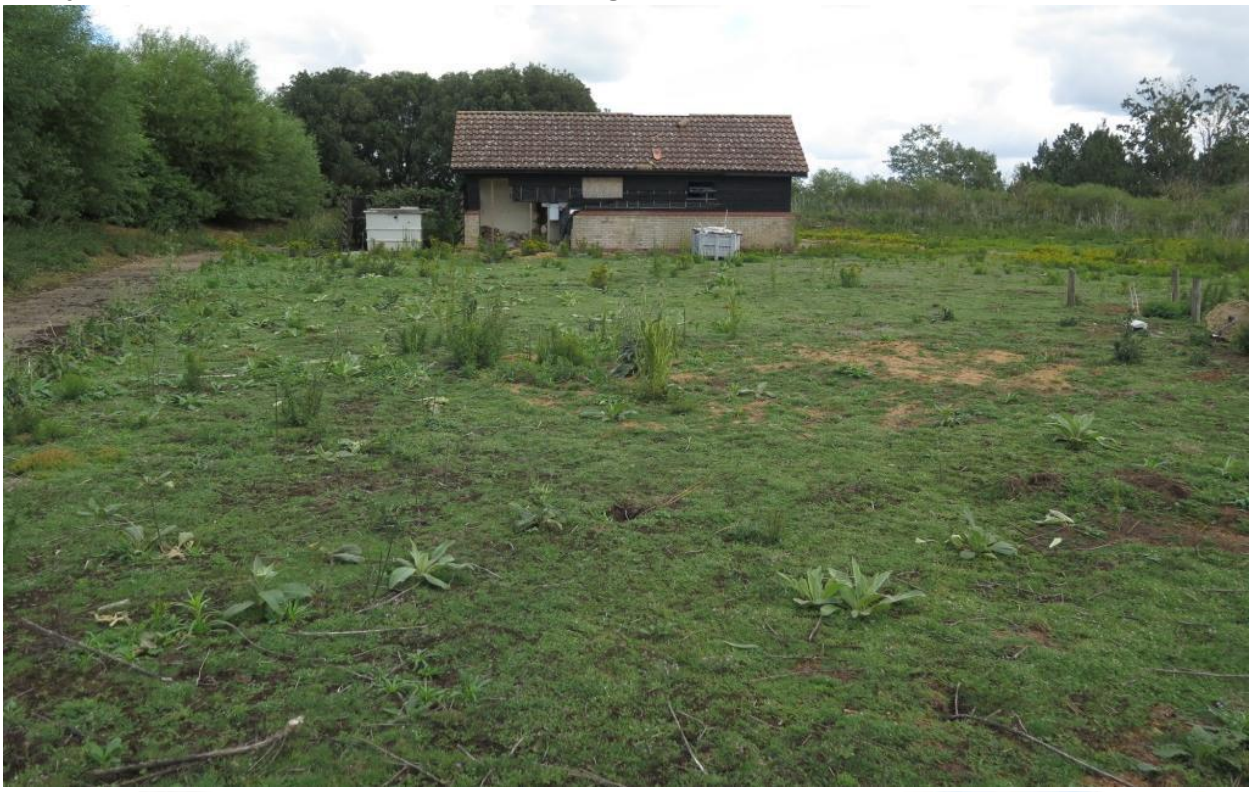
3.2 St John's wort *Hypericum* and *Erodium spp*. occur in good quantities on the sandy ground at the southern side of the main entrance and on the old stony and gravel car parking areas. As well as valuable forage resources, these support beetles such as *Cryptocephalus moraei* and the Nationally Scarce leather bug *Arenocoris fallenii*. The sparsely vegetated ground provides high quality resource for a whole suite of species which favour this habitat, such as the tiny jumping spider *Talavera aequipes* and the crabonid wasp *Dryudella pinguis*. Biting stonecrop *Sedum acre* growing in this area support the Red Data Book (RDB3) ground-dwelling bug *Chlamydatus evanescens* and yellow Asteraceae provides an important forage resource.

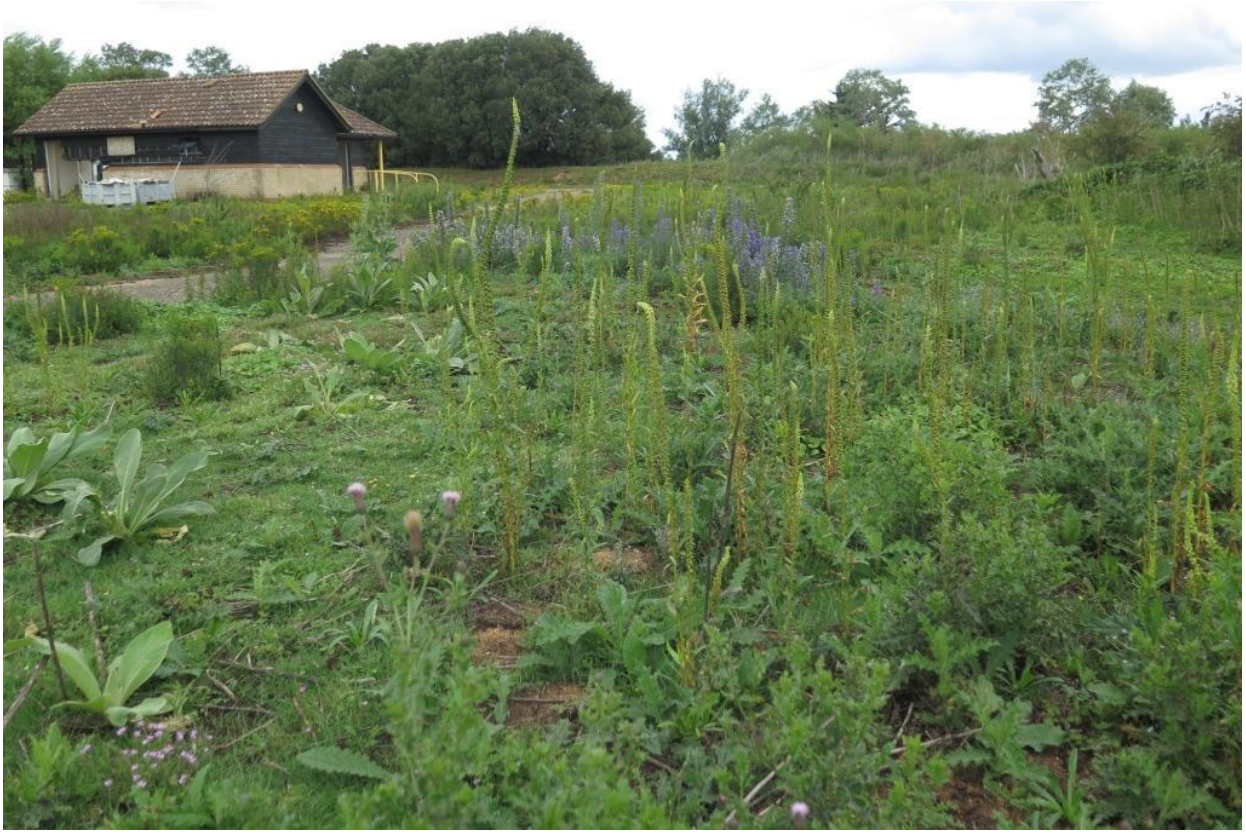
Old stony and gravel car parking area



3.3 St John's wort *Hypericum, Erodium spp.,* field forget-me-not *Myosotis arvensis*, stonecrop *Sedum* and the valuable forage resource weld *Reseda luteola* occur in good quantities on the sand area beyond the old car parking areas around the southern derelict building, and these also provide excellent invertebrate habitat for these and other notable species. The lygaeid bug *Graptopeltus lynceus* usually found on viper's bugloss was also found associated with the forget-me-not in this area, which was also where the rare parasitic fly (RDBK) *Eliozeta pellucens* was found. Open areas of the sand bank separating this area from the old car parking areas also provides valuable habitat.

Sandy area around the southern derelict building



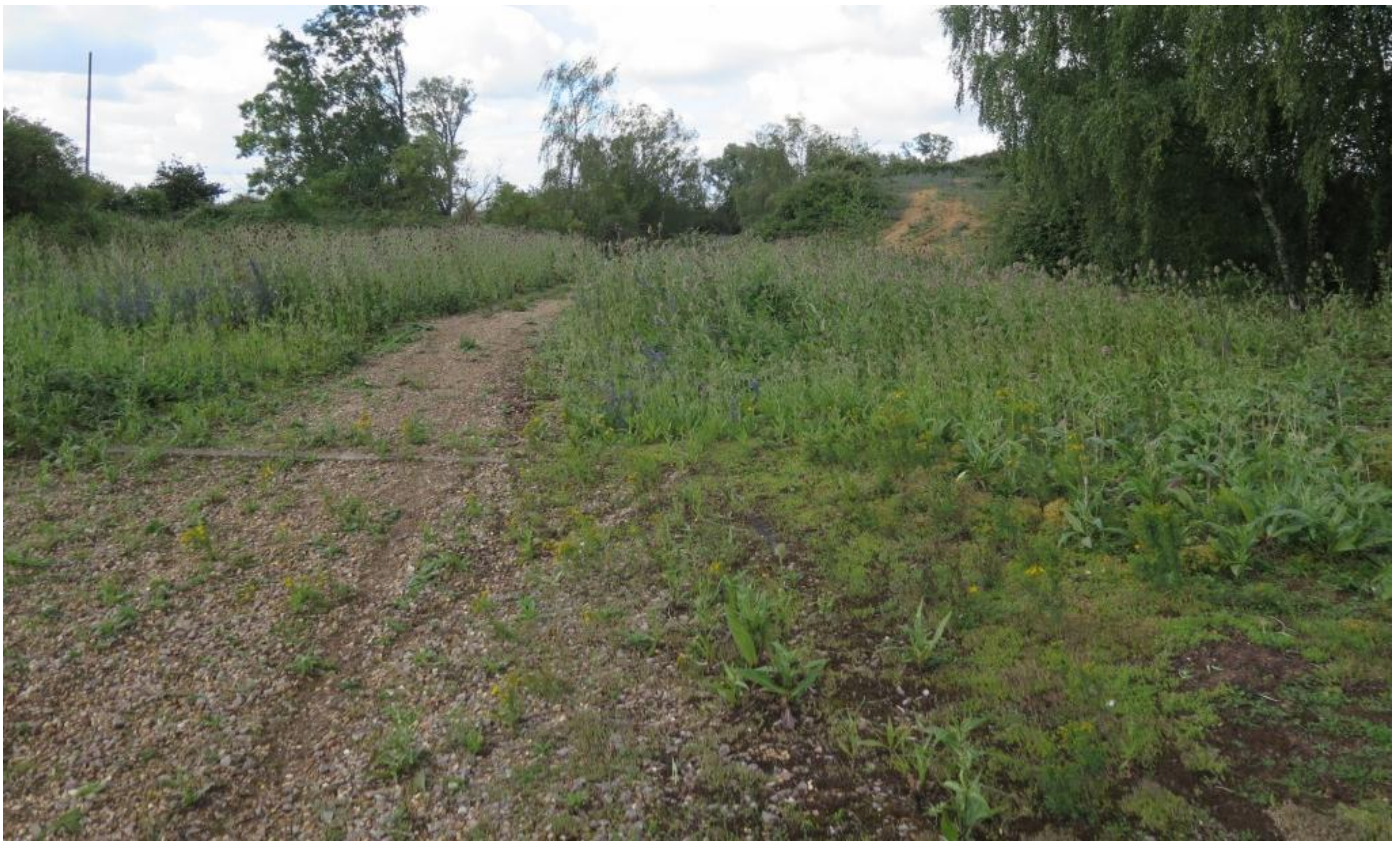


3.4 The banks of the sand mound opposite the main entrance provide important nesting habitat for ground nesting aculeate Hymenoptera (solitary bees and wasps) as well as forage resources such as provided by yellow

Asteraceae flowers. Rabbit activity exposes and maintains loose sand that the ground nesting species will use. They tend to produce a mosaic of small close-grazed lawns surrounded by taller, often tussocky vegetation. The bare and disturbed ground is valuable in its own right and provides opportunity for the germination and growth of annual plants.

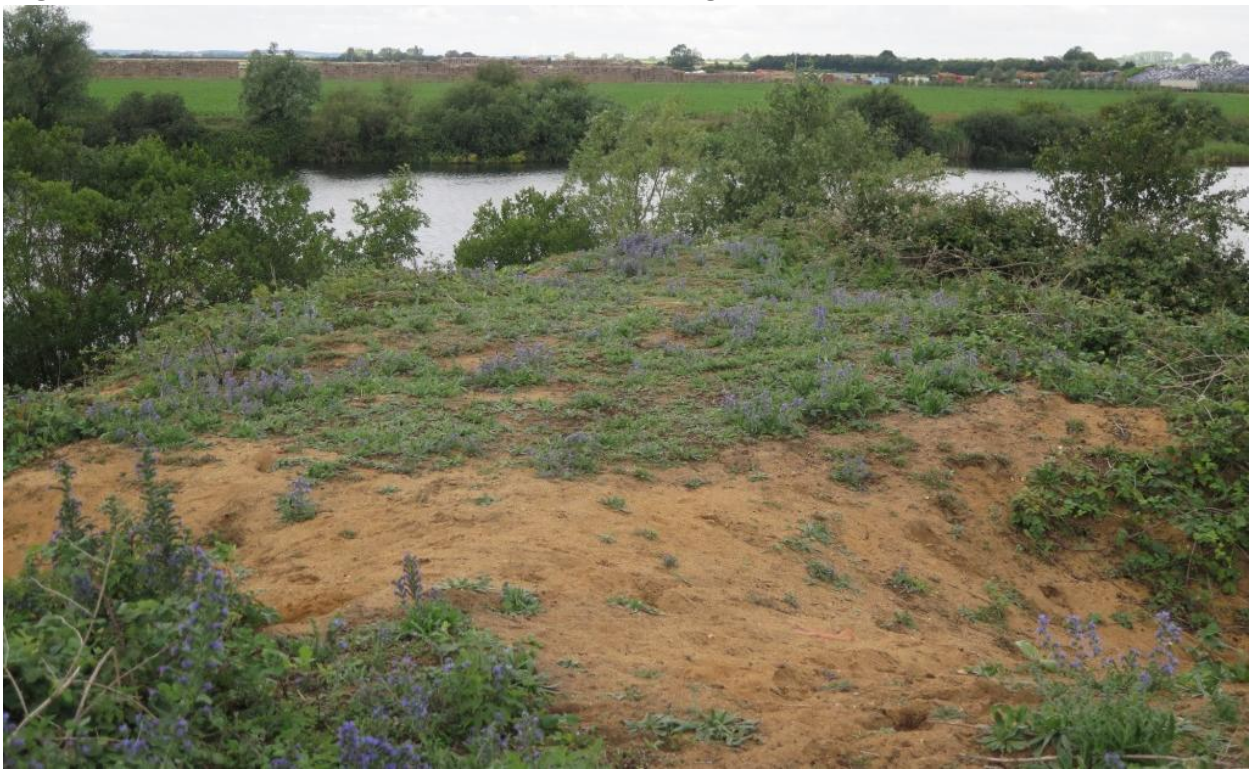
Sand mound opposite main entrance

3.5 Beyond the sand mound to south and towards the lake, another sand mound rises and overlooks the lake. Wild teasel grows towards this mound in quantity and provides a valuable forage resource but also the foodplant for the Notable B long-horned moth *Nemophora cupriacella*, more often associated with downland and scabious.



3.6 The sand mound provides valuable forage and phytogenous resources, for example in the form of viper's bugloss, stork's bill and white bryony *Bryonia dioica*, a resource also found sporadically elsewhere at the southern end of the site.

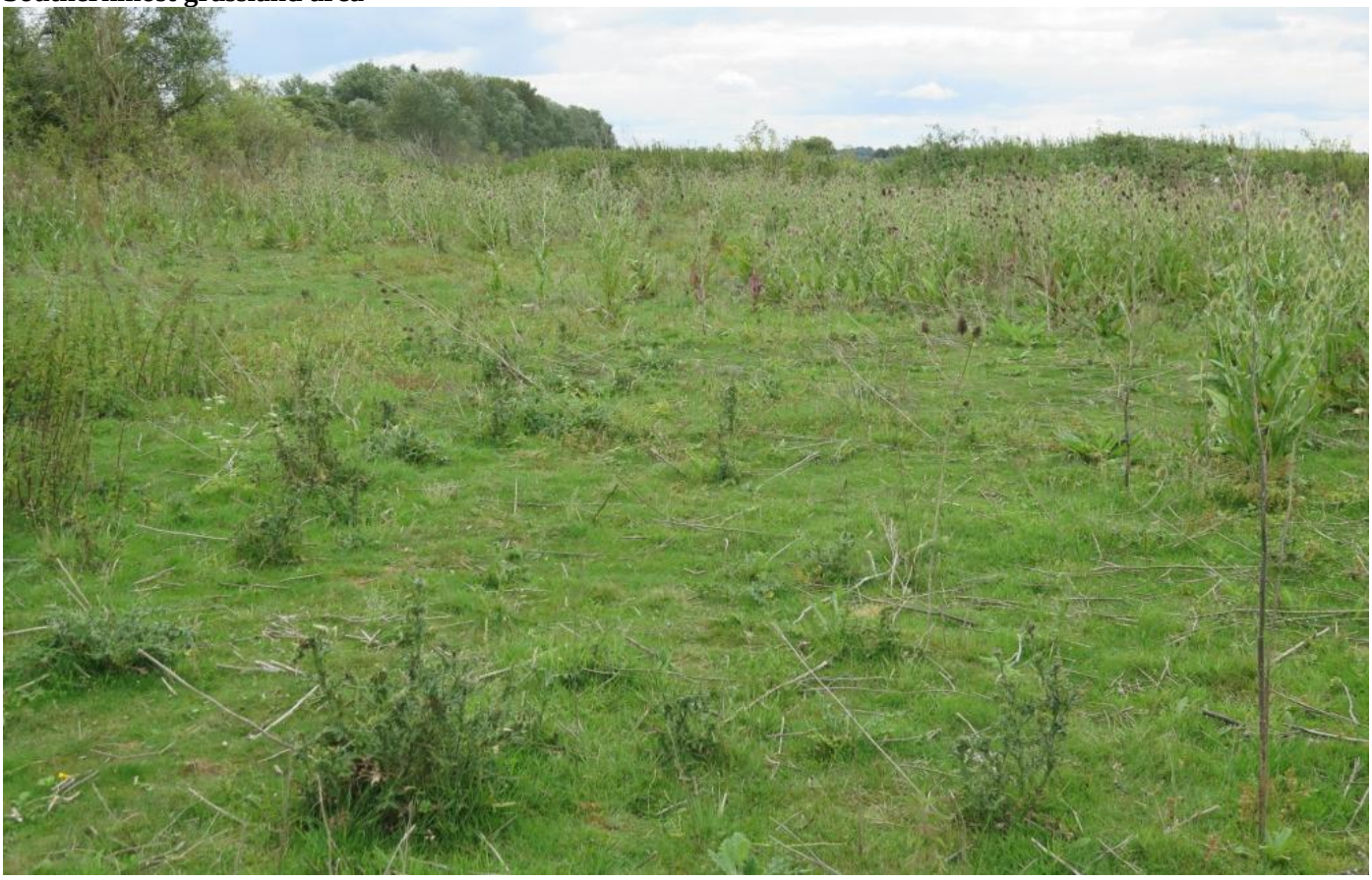
High sand mound with *Echium* and *Erodium* overlooking lake at southern end of site



3.7 A few areas with ploughman's-spikenard *Inula conyzae* occur at a number of locations and can provide valuable phytogenous resources to certain invertebrate species. Occasional creeping thistle *Cirsium arvense* and spear thistle *Cirsium vulgare* also important forage resources at later in the season.

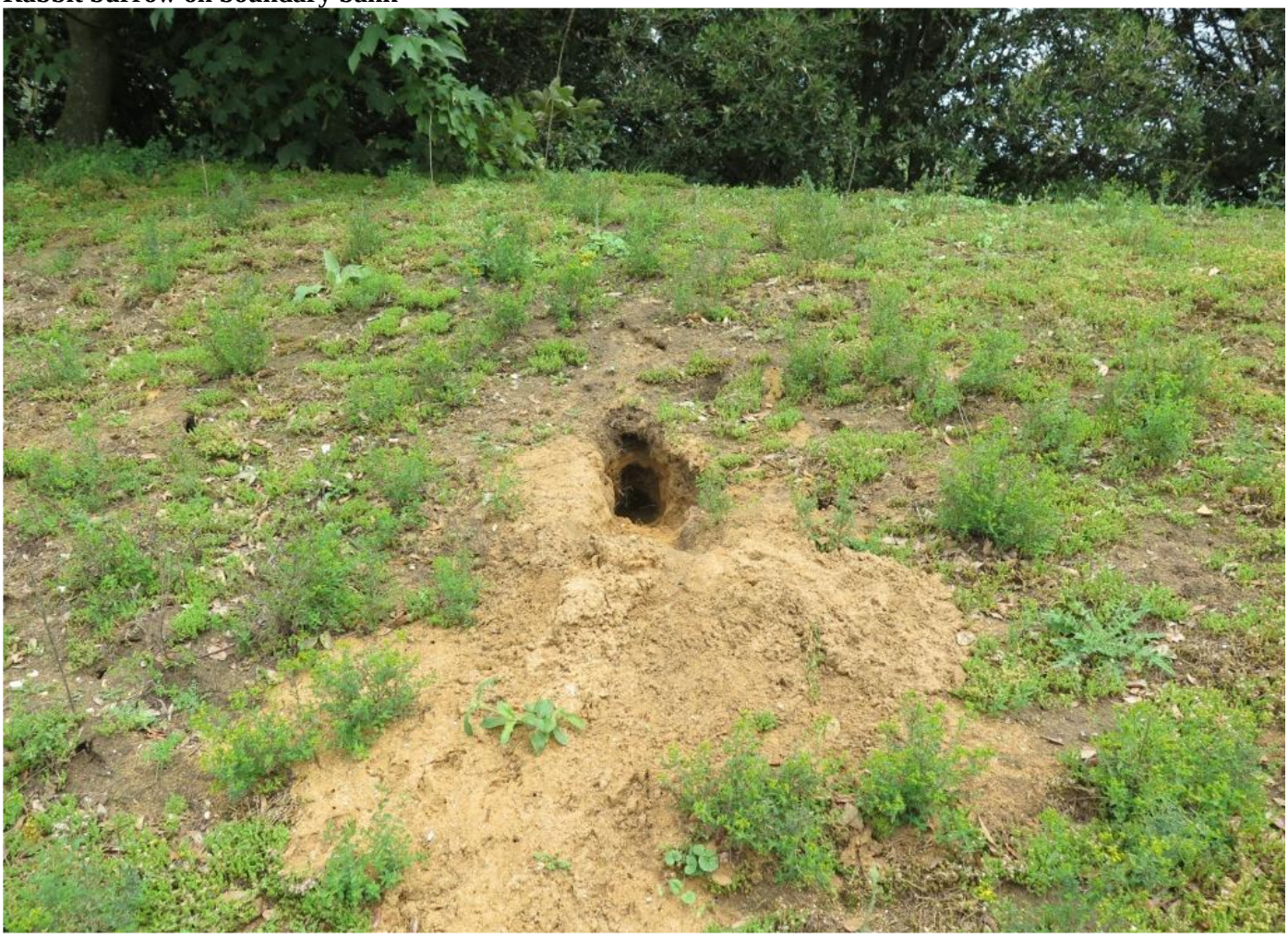
3.8 The southernmost grassland area is probably least interesting area of the southern open habitat mosaic, although it does provide forage and phytogenous resources with some teasel, field and spear thistle, an area of germander speedwell *Veronica chamaedrys*, white deadnettle *Lamium album* and a little mallow *Malva*.

Southernmost grassland area



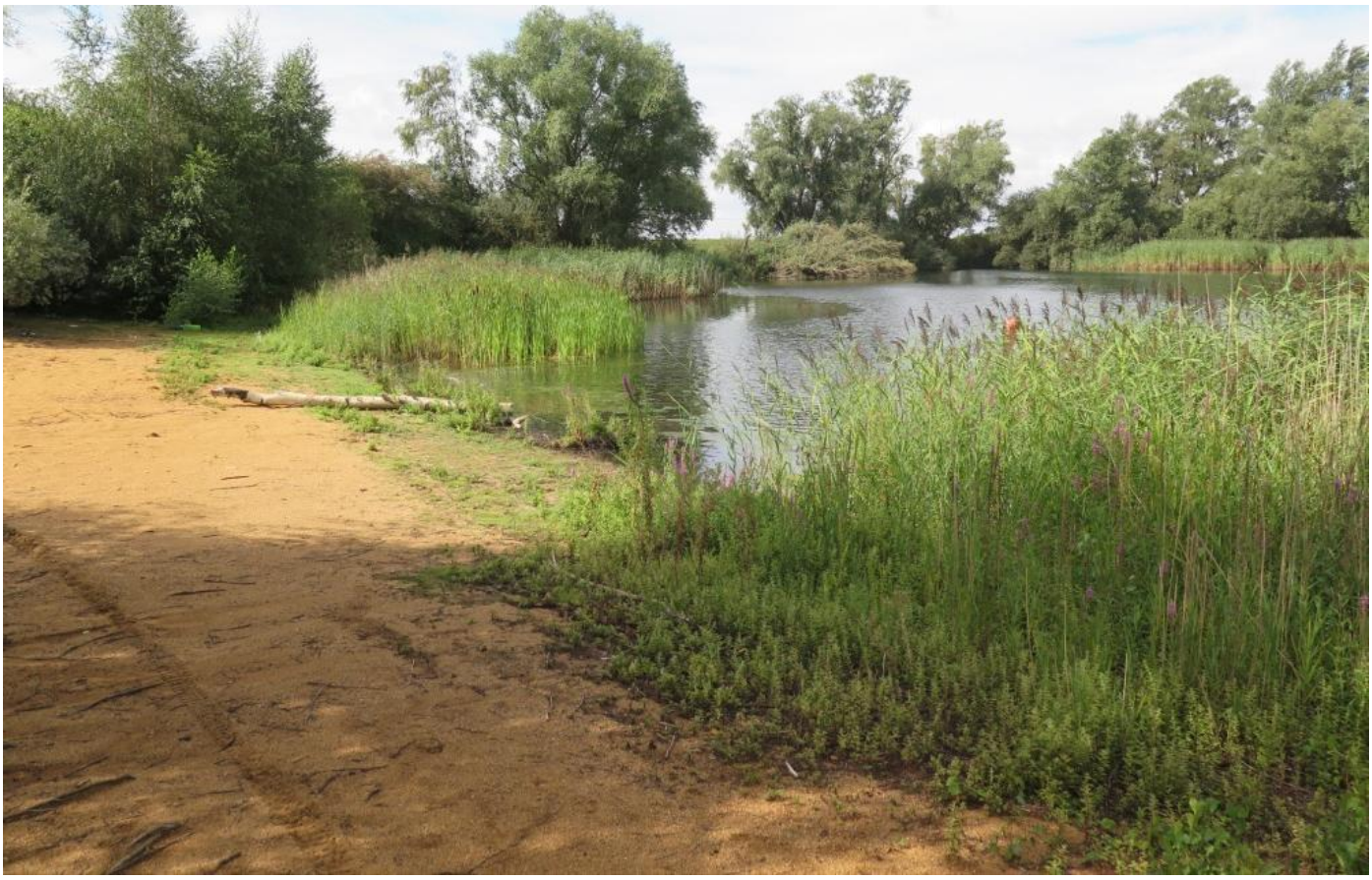
3.9 The sandy boundary bank inside the hedgerow scrub that runs south along the A134 from the main entrance is notable for the number of nesting bee-wolf *Philanthus triangulum* wasps which return with honey bee prey captured within the southern area of the site.

Rabbit burrow on boundary bank



3.10 The southern edge of lake with shelving sand edge, common reed Phragmites areas, some bulrush *Typha,* mint *Mentha*, purple-loosestrife *Lythrum salicaria* and lot of gypsywort *Lycopus europeaus* provides the best wetland habitat at the site.

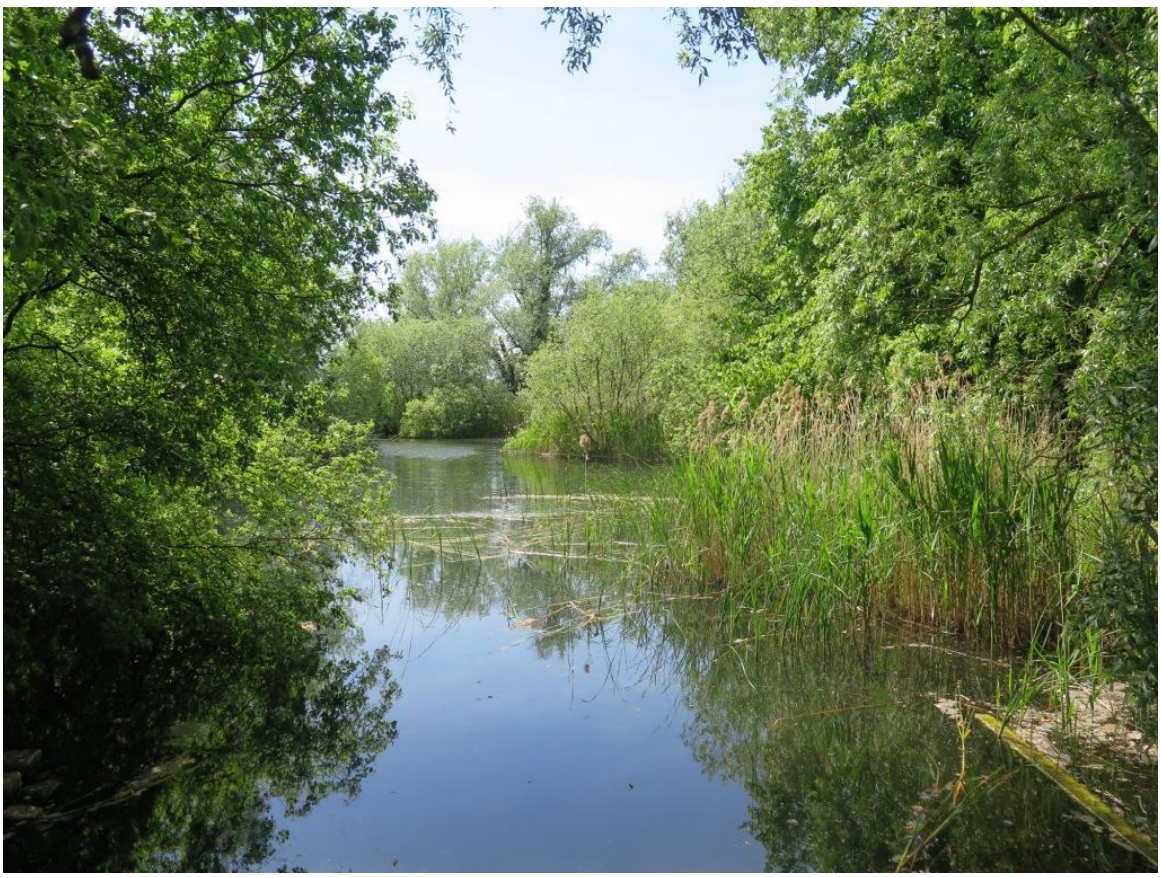
Southern shelving wetland fringe habitat



3.11 The steep banks dominated by mature willow and scrub and the narrow intermittent fringe of marginal vegetation present along the majority of the remainder of the shore do not provide a valuable wetland habitat, although the better areas are towards the southern and eastern end where they are more extensive and provide some carr.

A useful common reed fringe on the eastern side of the lake towards the northern end

A useful carr area on the eastern side of the lake west of the derelict buildings



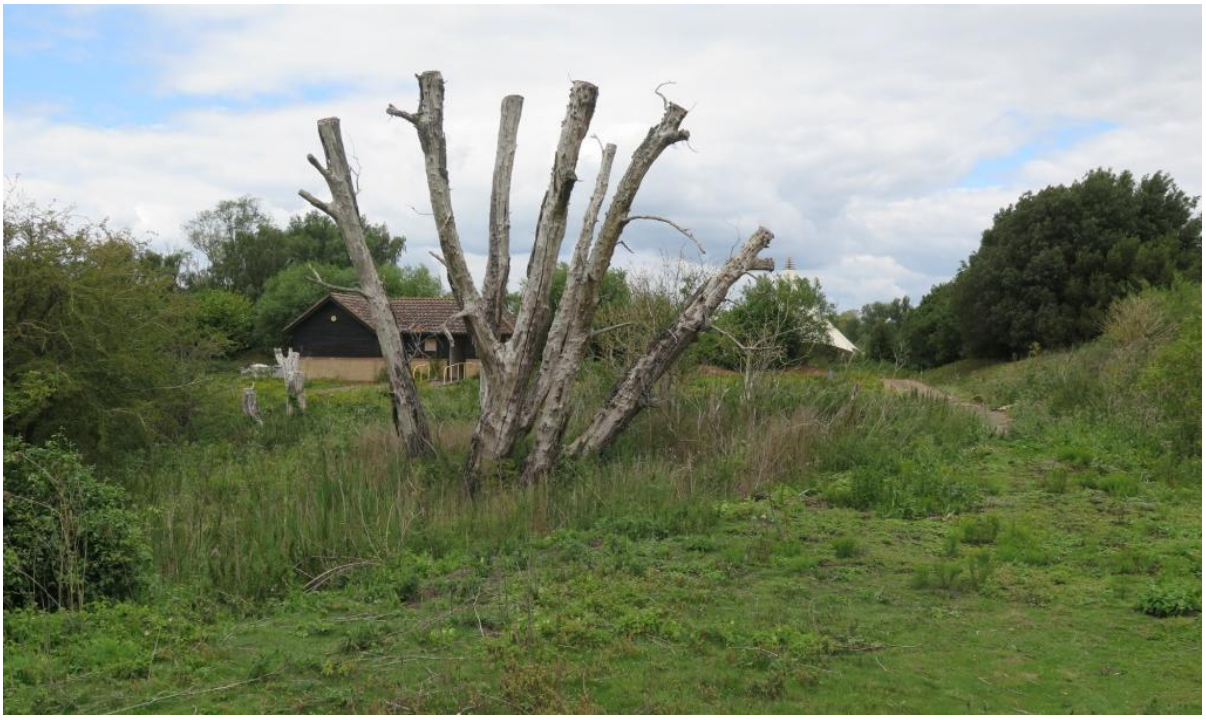
3.12 The mature oak *Quercus robur* just north of the old building area provides a valuable resource which supports a good number of the typical invertebrates associated with oak.

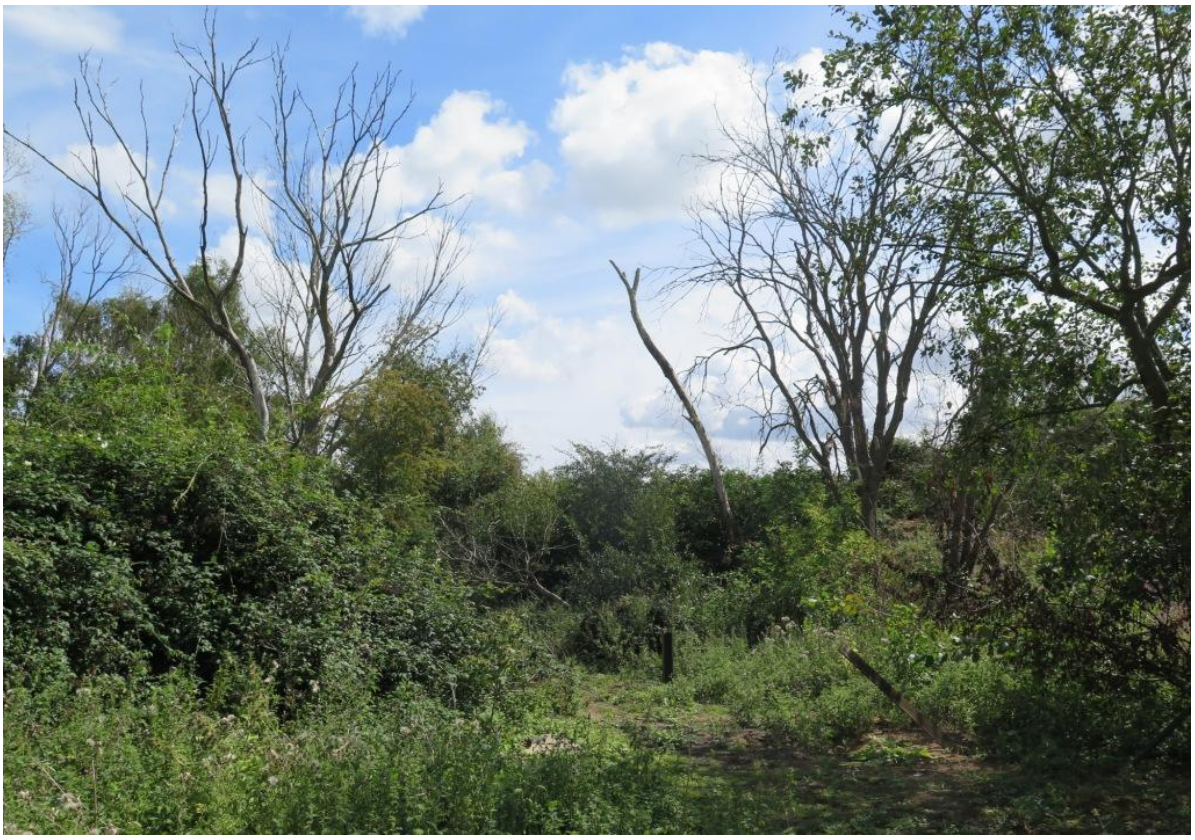
3.13 The open area here north of the oak provides a large area of ground ivy *Glechoma hederacea*, a useful resource for some invertebrate species including Nationally Scarce Ground-ivy Jewel Beetle *Trachys scrobiculatus* which was not found during this survey.

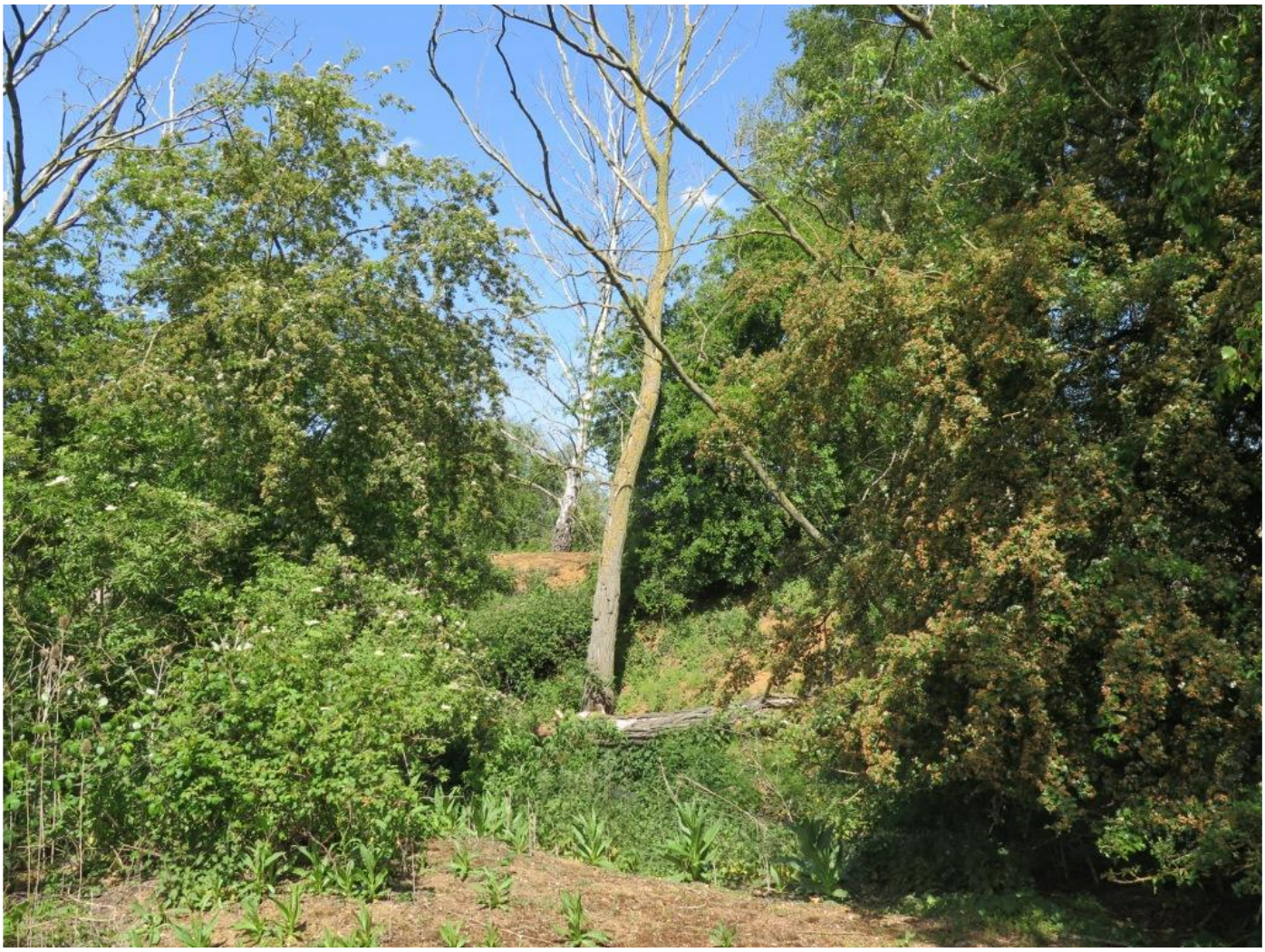
Large area of ground ivy north of the oak and derelict buildings

3.14 The quantity of standing dead wood in open sunny situations at various points in the southern end of the site provide an important invertebrate resource for saproxylic (dead wood) species.

Standing deadwood at the southern end of the site







4. Species Survey Results

4.1 The survey recorded a total of 369 taxa, a high number for 3 days survey and the land area concerned.

4.2 A summary of the Pantheon conservation status of the species recorded is given in Table 1. There have been an increasing number of new national status reviews published, with a good number of statuses being downgraded or in other cases upgraded, so statuses assigned by Pantheon are generally used (*see Section 5 and Appendices 1 & 2), but there are known errors (e.g. *Hylaeus dilatatus* is not RDB3) and the best way of assessing a species' up-to-date national significance is better given by the SQI taxon score, where in the Appendix 3 survey list a Pantheon SQI score of 4 is equivalent to Nationally Scarce and a score of 8 Nationally Rare.

4.3 A population of the Section 41 Priority Species 5-banded Digger Wasp *Cerceris quinquefasciata* was recorded at the site. This species is currently subject to a Shifting Sands Back from the Brink project in the Brecks, where it can used as an "index" of habitat improvement for aculeate Hymenoptera (bees, wasps and ants) in general.

4.4 The moth Cinnabar *Tyria jacobaeae* is a Section 41 Priority Species - research only, added to the UKBAP priority list in the 2007 review on the basis of evidence of major decline although it is still widespread and frequent in suitable habitat. It is one of a number of butterflies and moths proposed for research action only (Butterfly Conservation, 2007) and the situation is complicated by the fact that its larval food plant, common ragwort *Jacobaea vulgaris* (=*Senecio jacobaea*), is subject to "The Ragwort Control Act 2003" and an associated DEFRA code of practice, which seeks to control the plant where there is a threat to the health and welfare of animals. No other Section 41 species were recorded

4.5 As well as species with national status significance, the Nationally Scarce comb-footed spider *Cryptachaea riparia* is new to Cambridgeshire, the Nationally Rare tumbling flower beetle *Mordellistena pseudoparvula* and Nationally Scarce mining bee *Andrena fulvago* are likely to be new to Cambridgeshire, and the orb web spider *Larinioides patagiatus*, which was present in good numbers during the survey, is the third Cambridgeshire site and the first county records since 1985 and 1928. The (Notable B) longhorn moth *Nemophora cupriacella* appears to be new to Cambridgeshire, and was here associated with Teasel rather than scabious and dry grassy areas and downland. Other species are of county significance such as the empid fly *Rhamphomyia obscura*, a species with a north-western distribution, the ground-dwelling RDB3 mirid bug *Chlamydatus evanescens*, a species feeding on stonecrops with a northern and western distribution, and the chloropid fly *Incertella nigrifrons*, normally associated with saline habitats, but which fits specimens confirmed by the chloropid expert J. Ismay (Dave Gibbs, pers.comm.).

4.6 Notes on all these and other species of nature conservation interest are given in section 6, and a list of the species recorded during the survey is provided in Appendix 3, with status information based on statuses used in Pantheon, an analytical tool developed by Natural England and the Centre for Ecology & Hydrology to assist invertebrate nature conservation in England.

5. Analysis

5.1 Species Quality Analysis

5.2 It has become increasingly difficult to directly compare surveys through Species Quality Indices comparisons, since there have been an increasing number of new national status reviews published, with a good number of statuses being downgraded or in other cases upgraded. Instead the analytical tool Pantheon has been used. Pantheon is an analytical tool developed by Natural England and the Centre for Ecology & Hydrology to assist invertebrate nature conservation in England (database version 3.7.6, Webb et al. 2018). This information can then be used to assign quality to sites, assist in management decisions and augment other ecological study. The Pantheon results for the survey were generated from database version 3.7.6 on 15/09/2020.

5.3 Pantheon has been developed from ISIS, which was born from a requirement for Natural England to undertake monitoring of notified invertebrate assemblages recognised in a SSSI citation. The information can be used to determine site quality by revealing whether the species list is indicative of good quality habitat, inform on species ecology and assist in management decisions by revealing the key ecological resources.

5.4 Assemblages which qualify as in favourable condition are ones which exceed threshold scores whereby assemblages qualify as nationally important.

5.5 5.5 A summary of the results is given in tables 1 & 2. The national status abbreviations are summarised in Appendix 1 and the scoring systems used in Pantheon are given in Appendix 2.

Table 1 – Summary of Results - Pantheon Habitat Scores

Number of species	368
Number of species with habitat scores	336
Rarity score (sqi)	133
Conservation statuses	
GB conservation status (old & new)	3 [Na]; 2 [Nb]; 1 [RDB 2]; 2 [RDB 3]; 1 NA; 6 Nb; 1 New to Britain; 1 NR; 11 NS; 2 pNS; 2 RDB 3
GB red list	2 (LR); 2 DD; 135 LC; 2 NA; 3 pLC
Section 41 priority species	1 Section 41 Priority Species
Section 41 priority species - research	1 Section 41 Priority Species - research only
Scores	
Calcareous grassland	3 High, 7 Moderate, 11 Low
Coarse woody debris	1 facultative xylophages
Grazing marsh - salinity	5 Freshwater species tolerant of only mildly brackish water
Grazing marsh - status	1.6
Iec	1
Iec (older version)	1
Peat bog spiders	1 indicator species
Seepage (calcareous)	1 seepage obligates, 1 seepage specialists, 1 seepage associates

Seepage (soft rock cliff)	1 seepage obligates, 1 seepage specialists, 1 seepage associates
Seepage (woodland)	1 seepage specialists
Soft rock cliff	3 Grade 3

5.6 Two Specific Assemblage Types (SATs) are identified in favourable (SSSI) condition, rich flower resource and bare sand & chalk. Even with the limited level of survey undertaken at the site, the open short sward (8 of 13 species) and scrub edge (8 of 11 species) SATs comprise a high component of the invertebrate fauna, and bark & sapwood decay (7 of 19 species) and scrub-heath & moorland (3 of 9 species) are well represented. These are all associated with open habitats or in the case of the bark & sapwood decay, tree associated. These habitats are nearly all provided by the southern end of the site

5.7 These results are provided in table 2.

Table 2: ISIS Specific assemblage types

Broad biotype and Habitat	SAT	No of species	% representation	SQI	Conservation status	Species with conservation status	Code	Reported condition
open habitats	rich flower resource	22	9	114	2 [Ma]; 1 [Nb]; 1 RDB 3	4	B02	Favourable
open habitats, short sward & bare ground	bare sand & chalk	20	5	305	1 RDB 3, 1 [RDB 3], 1 Section 41 Priority Species, 3 Nb, 3 NS, 1 pNS	9	B11	Favourable
open habitats, short sward & bare ground	open short sward	8	4				B12	(8 of 13 species)
open habitats	scrub edge	8	4	1	1 [Na]	1	B01	(8 of 11 species)
tree-associated decaying wood	bark & sapwood decay	7	1				A22	(7 of 19 species)
open habitats	scrub heath & moorland	3	<1		2 NS, 1 [RDB 3]	3	B03	(3 of 9 species)
wetland, peatland	reed fen & pools	1	<1				W34	(1 of 11 species)
tree-associated decaying wood	epiphyte fauna	1	5				A21	(1 of 3 species)
coastal, saltmarsh	saltmarsh & transitional brackish marsh	1	<1				M31	(1 of 9 species)
wetland, mireland	open water or disturbed mineral sediments	1	2				W21	(1 of 6 species)
tree-associated decaying wood	heartwood decay	1	<1				A21	(1 of 6 species)

5.8 The Breckland nature of the open mosaic habitat is exemplified by the populations present south of the main buildings at the southern end of the site of the Nationally Scarce coreid bug *Arenocoris fallenii* and Nationally Scarce ground bug *Megalonotus praetextatus* both associated with stork's-bill *Erodium*, the Nationally Scarce ground bug *Graptopeltus lynceus* associated with viper's bugloss *Echium* and sometimes forget-me-not *Myosotis*, the Nationally Scarce weevil *Mogulones geographicus* associated with *Echium*, the Priority Species

5-banded Digger Wasp *Cerceris quinquefasciata*, the crabronid wasp *Dryudella pinguis* and the stiletto fly *Thereva bipunctata*.

5.9 In addition, the value of the dead wood is exemplified for example by the long-horn beetle *Leptura quadrifasciata*.

6. Notes on Species of Nature Conservation Interest

Conservation status abbreviations are explained in Appendices 1 and 2. Entries in square or round brackets refer to previous statuses which have been downgraded and superceded by new IUCN national status reviews published relatively recently.

Arachnida: Araneae (spiders)

Araneidae, *Larinioides patagiatus*, NS
The species is widely scattered in Britain and only widespread in south-eastern England north of the Thames. It is mostly found near the Thames and coast. The spider was present in good numbers during the survey, a third Cambridgeshire site and the first county records since 1985 and 1928. It spins its orb webs on shrubs and trees, sometimes producing the silken retreat under loose bark. The spider is often found in much drier sites than other *Larinioides* species.

Cheiracanthiidae, *Cheiracanthium virescens,* NS
The species has a scattered distribution in Britain as far north as central Scotland, but is widespread only in parts of southern and eastern England. The spider occurs under stones, or low vegetation such as heather, in dry, sandy or sparsely vegetated areas in open habitats such as heathland, waste-ground and dunes. It generally remains in a silk cell during the day and the egg-sac is also hidden away under a stone.

Mimetidae, *Ero aphana,* NS
Since 1974 the species has been recorded from a number of sites in Dorset. It has also been found at Cranes Moor in the New Forest and probably at two other sites in Hampshire, as well as at Chobham Common, Surrey (Harvey *et al*. 2002). It was found on dry heathland in the building and mature phases, with some patches of bare stony ground and *Ulex europaeus* and *Pinus sylvestris* present, but nowadays turns up in places away from southern heathlands including various habitats including gardens and appears to be spreading after an original colonisation into southern England or due to climate change.

Philodromidae, *Philodromus albidus*
The species is confined to the southern half of England. It is usually found in broad-leaved or mixed woodland on the lower branches of broad-leaved trees such as oak at the edge of clearings or rides. It is also found in old hedgerows and green lanes, with the majority of records from trees or bushes at the edge of clearings or in hedgerows. It has increased in frequency in recent years and has been demoted in a national status review (Harvey *et al*. 2017). The majority of records are from trees or bushes at the edge of clearings or in hedgerows. Lack of management resulting in the closure of open woodland and the loss of old hedgerows are almost certainly detrimental to this species. Spray drift from the use of pesticides on crops is likely to affect the survival of this spider, as well as many other invertebrates, where arable fields are adjacent to woodland or hedgerows. Management should retain open surroundings by rotational cutting of woodland ride vegetation, periodic control of scrub and tree invasion and light grazing in woodland pasture. The retention of wide field edges and headlands should be encouraged to help maintain a diverse invertebrate fauna and reduce the effects of spray drift on old trees in hedgerows and at the edge of woodland (Harvey *et al*. 2002).

Philodromidae, *Philodromus praedatus*, [Notable/Nb]
The species is usually found in broad-leaved or mixed woodland on the lower branches of broad-leaved trees such as oak at the edge of clearings or rides. It is also found in old hedgerows and green lanes. Previously difficult to identify, it has been widely recorded in recent years and has been demoted in status in Harvey *et al*. (2017). The majority of records are from mature oak trees in open woodland habitat, at the edge of clearings or in hedgerows. This type of habitat is threatened by lack of management resulting in the closure of open woodland, the loss of old trees and the use of pesticides on crops where old oak trees occur in land converted to arable or old hedgerows are adjacent to arable fields (Harvey *et al*. 2002).

Salticidae, *Talavera aequipes,* Local
This tiny jumping spider is a local spider of sparsely vegetated ground. It is very local and only occurs where bare ground and sparsely vegetated ground forms a substantial component of the habitat.

Theridiidae, *Cryptachaea riparia,* NS
The species is generally rare and very local but may be fairly numerous at some sites. It is almost confined to the south of England, East Anglia and South Wales. In Essex there are only records from only three sites in the north of the county. The spider is found among roots on overhanging banks or beneath low vegetation, mainly on heathland but also along rides in commercial forests. It spins a web with long sticky threads that are fixed to the ground, where they catch crawling insects. Ants form a large proportion of the prey caught. A retreat is built at the top of the web, which consists of a long silken tube covered with debris.

Thomisidae, *Ozyptila sanctuaria,* Local
The species is local and generally scarce, but the spider is commoner in the south where it may be frequent in suitable habitat. It is widespread but generally scattered from the Isle of Man, North Wales and central England southwards. It occurs in open situations where it can be swept from herbage and undergrowth or found under stones and at the base of vegetation. It has been recorded from chalk and acid grassland, sea walls, lichen heath, roadside verges, old sand and chalk pits and under-cliffs. It is also occasionally found on heathland, but never commonly. Management should maintain open habitats and structural habitat mosaic using rotational management involving disturbance or low levels of grazing.

Coleoptera (beetles)

Cerambycidae, *Leptura quadrifasciata,* Local, The larvae of this long-horned beetle feed for 2-4 years in dead wood of various broadleaved trees, especially birch. It is fairly widespread throughout Britain, but likely to be very scarce in the county.

Chrysomelidae, *Longitarsus parvulus,* [Notable/Na]
Longitarsus parvulus is a very local flea beetle. Old records indicate that this species was formerly widespread in southern England, with scattered records north to Cumberland, but Hyman & Parsons (1992) state that it has recently been recorded from only four vice-counties, all in south-eastern England. It occurs in chalk grassland and probably field margins and disturbed ground. The beetle has been recorded feeding on Perennial Flax Linum perenne, but is possibly polyphagous. Grazing, cutting or some other disturbance, such as rotovation, on a rotational basis, may be needed to maintain open conditions.

Coccinellidae, *Hippodamia variegata,* [Notable/Nb]
The Adonis ladybird is scarce and restricted mainly to dry sandy places, in particular to heathlands and the coast. It is widespread with scattered records around southern Britain but is only frequent in the Thames area, in South

Wales and in Staffordshire. The ladybird is a characteristic component of open dry warm habitats in the London region.

Curculionidae, *Acalyptus carpini,* Notable/Nb
This weevil is locally common in East Anglia but otherwise scattered and very local in central southern England and South Wales. Host plants include various species of willows Salix species. The beetles usually occur in small numbers and rarely more than a few on any single tree (UK beetles www.ukbeetles.co.uk).

Curculionidae, *Mogulones geographicus,* Notable/Nb
This large distinctively marked weevil has a main centre of population in Britain in the Brecks, feeding on the host plant Viper's bugloss. It was numerous on stands of the plant at the site in July near the entrance and on nearby sand areas and mounds. The larvae bore in the root; it also hibernates there, then pupates in the soil.

Curculionidae, *Polydrusus impressifrons,* New to Britain 2014
This European weevil was reported new to Britain by Cole & Storey (2014). It occurs on wilow and poplar. It has been imported and established in the United States.

Hydrophilidae, *Helochares lividus,* [Notable/Nb]
This is a widely distributed greenish-brown water beetle in England and Wales, but it is found mainly in the south-east. It occurs in ponds inland as well as in dykes on the coastal levels.

Mordellidae, *Mordellistena pseudoparvula,* NR
Although there are only a few widely scattered records, it is suggested that the species may actually be quite widely distributed in East Anglia and south-east England, since it is difficult to find even in sites where it is known to occur (Hodge, 1999). It has been recorded from a few localities in E Sussex, W Kent, Surrey, S Essex and W Suffolk. The earliest known record is from 1939, though there may be earlier specimens standing as *parvula*. The beetle has been reared from spear thistle *Cirsium vulgare* and creeping thistle *C. arvense*.

Scarabaeidae, *Hoplia philanthus,* Local
The small red brown chafer *Hoplia philanthus* is local in southern England, becoming much rarer in the north. Essex records are scattered and few. It is found mainly in sandy places. The larvae develop at plant roots, the adults are found on flowers.

Diptera (flies)

Chloropidae, *Meromyza* sp. near *depressa*, pNS
Records are mainly for the southern East Anglian coast in saltmarsh and coastal levels. A relatively recent addition to the British list, with nine known post-1960 sites in Falk et al. (2016). The wide extent of occurrence indicates Nationally Scarce. The British population represents a distinct species, although it is clearly similar to the continental M. depressa Fedoseeva. The larvae probably develop in grasses. The species was found near the shelving wetland edge at the southern end of the lake.

Hybotidae, *Drapetis arcuata,* Local [Notable]
this is a small predacious fly recorded from southern and eastern England. It has been reared from debris from a hollow horse chestnut (Recorder species account).

Lauxaniidae, *Homoneura interstincta*
British material identified as *Homoneura interstincta* (Fallén) was re-identified as *Homoneura mediospinosa* Merz by Merz (2003), but more recently D. Gibbs has found *H. interstincta* in Britain. It has since been recorded from single sites in Kent and Middlesex. Material has also been examined from Hampshire, Middlesex, Oxfordshire, Oxfordshire and Herefordshire. The status of these two species will require re-assessment in due course (Falk *et al*., 2016).

Muscidae, *Coenosia atra,* pNS
Coenosia atra is a small fly with records widely scattered in Wales and England north to Nottinghamshire, also Perthshire in Scotland. It is found in fens, marshy areas on heaths and in dune slacks. Its biology is unknown.

Pipunculidae, *Tomosvaryella palliditarsis,* [Notable]
Tomosvaryella palliditarsis (Collin) was accorded Notable status in Falk (1991) but is considered not to merit inclusion in Falk & Chandler (2005). They state there are records for at least 40 sites, although six of them are in the New Forest (where it is locally common) and it is local elsewhere with 31 post 1960 sites. It is widely distributed in England and is recorded from Glamorgan, Radnorshire, Carmarthenshire and Montgomeryshire in Wales, but there is only one old Scottish record (Nethy Bridge, Elgin, 1907).

Sarcophagidae, *Miltogramma germari,* pNS [RDB3]
Miltogramma germari is a flesh fly found in dunes, sandy heaths and chalk downland. The larvae are believed to feed on the food stores of mining bees and the adults are likely to occur in habitat which supports good colonies of such bees.

Stratiomyidae, *Chorisops nagatomii,* [Notable/N]
Chorisops nagatomii was added to the British list in 1979 following the realization that there were two species confused under *C. tibialis*. Whilst *C. nagatomii* would seem to be the scarcer species it is now known from widespread localities in southern England and Wales (Stubbs & Drake 2001).

Stratiomyidae, *Oxycera morrisii,* [Notable/N]
Stubbs & Drake (2001) state that although this is a scarce species, it is locally common at sparsely vegetated open seepages on coastal landslips, about seepages associated with springs, and more rarely in marshes. Although the taxon has been recorded from less than 100 hectads, Drake (2017) moderates the status as recorded in >90 hectads since 1990, moving beyond NS invoking the criterion where it is described as widespread or is apparently widespread, and the hectad count is close to a category boundary. The species was found near the shelving wetland edge at the southern end of the lake.

Syrphidae, *Triglyphus primus,* NS

Triglymus primus is rather scarce and local in south-east Britain from around Dorset and Wiltshire eastwards, and north to about a line between the Mersey and the Humber. The larvae are aphidophagous, and appear to be specific to the galls induced by *Cryptosiphum artimisae* on Artemisia vulgaris. Adults are elusive, but tend to be found visiting flowers such as white umbels or resting on sunny foliage in the sorts of places that *Artemisia* grows. These include urban waste ground, abandoned quarries and disused railway lines, but also semi-natural grassland with an element of disturbance (Ball & Morris, 2000).

Tabanidae, *Chrysops viduatus,* Local

The Square-spot Deerfly *Chrysops viduatus* is widespread but localised in the southern half of Britain becoming rarer in the north. It is widespread in the remaining fens of East Anglia, especially in association with carr. The fly can be found in a variety of habitats but most frequently in wet grasslands, mires, at water margins and in wet woods. The

larvae have been found in moist sand near water (Stubbs & Drake (2001). The species was found near the shelving wetland edge at the southern end of the lake.

Tachinidae, *Eliozeta pellucens*

This parasitic fly was added to the British list in 2015.

Therevidae, *Thereva bipunctata,* Local

This small stiletto fly is widely distributed on coastal dunes on the east coast. It also occurs inland although this is rather unusual, notable in the Breck district of East Anglia and on some heaths and commons (Stubbs & Drake 2001).

Hemiptera (true bugs)

Coreidae, *Arenocoris fallenii,* NS

This leatherbug is local in coastal sand dunes between Norfolk and south Wales but also in the East Anglian brecks and increasingly inland in recent years, in gravel pits and sandy habitats. It is accorded Nationally Scarce NS status in Bantock (2016). It was found associated with *Erodium* growing on the old car parking areas and sandy ground south of the main buildings at the site.

The leatherbug *Arenocoris fallenii*

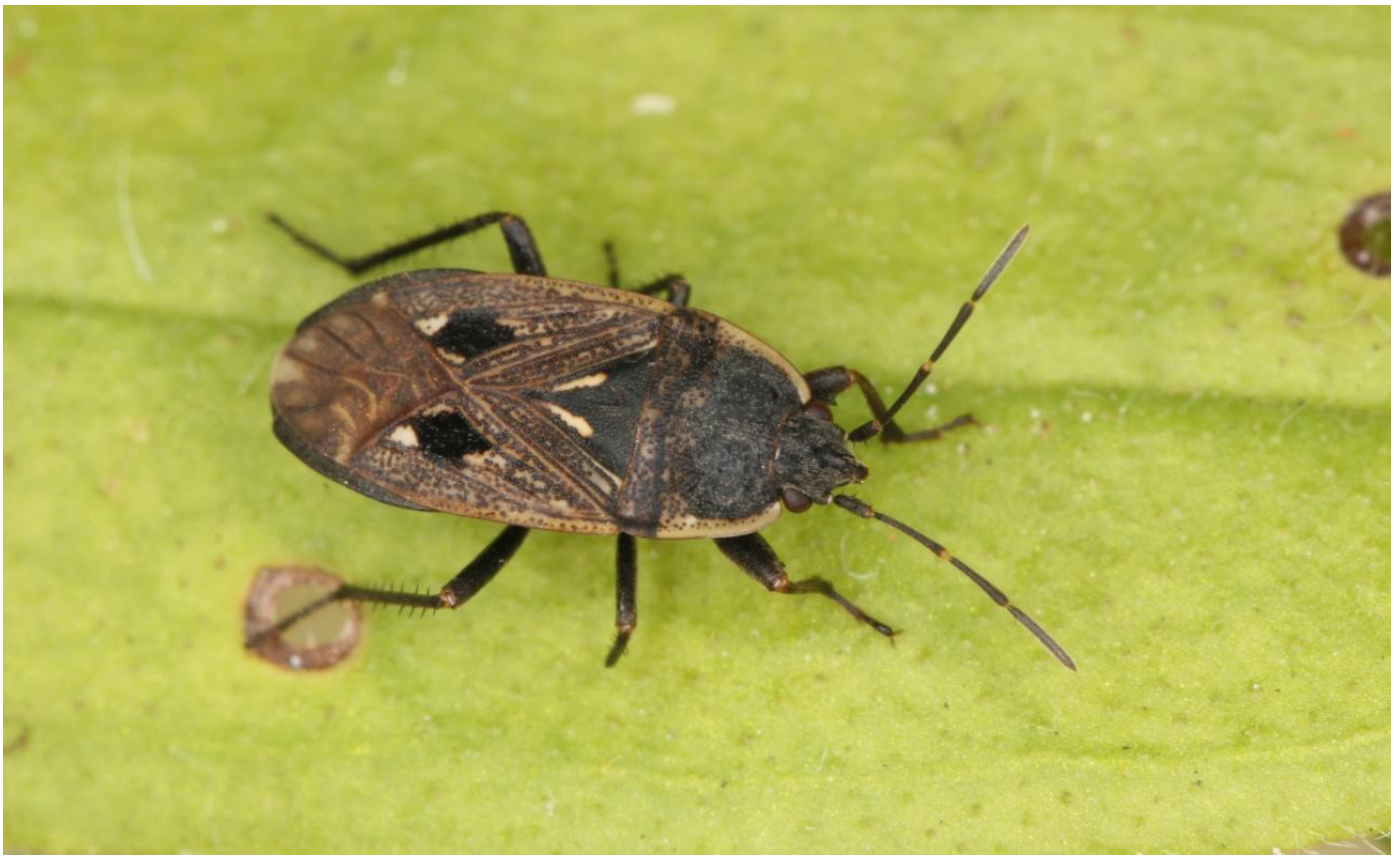
Cydnidae, *Sehirus luctuosus,* Local

There are few Essex records for this shieldbug, but it has been known in the county for a long time. This tends to be rather the pattern for the species: it has a wide distribution in southern counties, but doesn't seem to be recorded very frequently in any given county. It occurs in small patches of moderately forget-me-not-rich ground amongst taller vegetation or in relative isolation. The species often seems to be absent from places where there are large expanses of apparently suitable habitat, and when it occurs in such places seems to be in small colonies in apparently random patches of the site. It seems to be happy on naturally sandy, gravelly, chalky or limestoney ground, in gravel pits, quarries and the drier bits of clay pits, partially vegetated gravelled tracks, the edges of car parks, south-facing hedgebanks, random mounds of soil or spoil, weedy arable field margins, and almost anywhere there's a reasonable amount of rabbit activity, but to be very unpredictable in its occurrence in any of these (P. Kirby, pers. comm.). It was found associated with forget-me-not growing on the sand ground at the southern end of the site.

Lygaeidae, *Graptopeltus lynceus,* Notable/Nb

This bug is recorded from southern England, particularly the south-east. It is associated with Boraginaceae, particularly Viper's-bugloss *Echium vulgare*. It is found in dry, open, sunny situations, most often on sand. It was also found associated with forget-me-not on the sandy ground at the southern end of the site.

The groundbug ***Graptopeltus lynceus***



Lygaeidae, *Megalonotus praetextatus,* Notable/Nb

A ground-dwelling bug, usually coastal, found on well-drained, often sandy ground. Though recorded from the county by Harwood (1903) and in Massee (1955), it went unrecorded from the county for many years until there were multiple records from East Tilbury in 1997. The species may be increasing, in common with many ground-dwelling thermophiles (Kirby, in Essex Red Data list).

Miridae, *Chlamydatus evanescens,* RDB3

A ground-dwelling bug of northern and western distribution, feeding on stonecrops. Known records are too few to enable its precise habitat requirements to be determined.

Miridae, *Dicyphus tamaninii,* New to Britain 2008

This species was added to the British list by Mark Telfer, who found it at two sites in London (VC 16 & 18) during 2013 (Telfer, 2015). Two earlier London records by Pete Kirby have also come to light (2008 and 2012, both in VC17). *D. tamaninii* is primarily predatory and is frequently used as a biological control agent on greenhouse crops, suggesting horticultural produce as a possible pathway of introduction. Many British specimens have been found in open, ruderal situations and were associated with a variety of herbaceous plants, including Great Willowherb, Black Nightshade, Tomato, Bittersweet, Goosefoot, Dock and Knotgrass (Bantock, 2016). During the current survey it was swept from vegetation growing on shelving wetland edge at the southern end of the lake, probably from Great Willowherb.

Miridae, *Lygus pratensis,* [RDB3]

Although on the continent *L. pratensis* has apparently always been a polyphagous species found in weedy places, and there had been the occasional British record definitely not connected with old woodland, in Britain it had previously been considered a rare woodland ride and edge bug. In the last few years however, the bug has been widely recorded in the south-east, Hampshire to Kent to Essex to Berkshire and is now widespread in much of southern England. The scattered old colonies may have spread, or there may have been a secondary wave of continental immigration.

Rhopalidae, *Rhopalus parumpunctatus,* NS

Rhopalus parumpunctatus is largely confined to the south and east of England and Wales. It is a species of dry sandy habitats, particularly heaths, dunes, and the East Anglian Breckland. Within its range and habitats, it can be quite common. In Surrey the distribution closely follows heaths of west Surrey, but it has also been found on the chalk of the North Downs on three occasions, where it was swept from St John's-wort (Hawkins, 2003).

Hymenoptera: Aculeata (bees, wasps and ants)

Andrenidae, *Andrena fulvago,* Notable/Na

Andrena fulvago is a Nationally Scarce (Notable A) mining bee that occurs in flower-rich grasslands, with a close association to yellow composites. From the BWARS (Bees, Wasps & Ants Recording Society) website map this appears to be a new county record. It was found in the southern open habitat areas of the site.

Colletidae, *Hylaeus signatus,* Notable/Nb

This bee is mainly recorded from southern England, with about 30 known post-1970 sites known to Falk (1991a), over half in Kent. In Essex the bee is mainly found near the Thames in post-industrial habitats and disused mineral extraction sites where Weld Reseda luteola or Mignonette Reseda lutea occur. There is a close association with *Reseda*, from which the bee collects pollen to provision its cells. Falk (at a lecture in 2003) stated that in Warwickshire the species does not occur in isolated parts of the county even where good stands of *Reseda* occur – indicating the importance of a continuity of habitat mosaic and the nature conservation losses that occur when fragmentation becomes excessive. Nests have been recorded from dead woody stems of bramble and rose, in hard clay banks and occasionally in the mortar of masonry.

Crabronidae, *Cerceris quinquefasciata,* RDB3 UKBAP Priority Species

The 5-banded Digger Wasp *Cerceris quinquefasciata* is a medium-sized yellow and black wasp which nests gregariously in areas of bare sand in places exposed to the sun. It provisions its nest with adult weevils, and may occur in numbers at favourable sites. It is a national Biodiversity Action Plan species which has been subject to research into its autoecology. It is included in English Nature's Species Recovery Program because of a severe decline in its modern distribution. This is thought to be due to the loss of open areas of sandy ground for nesting and flower-rich sandy grasslands for foraging (Action Plan in UK BAP, Tranche 2 volume IV – invertebrates). The species is currently subject to a Shifting Sands Back from the Brink project in the Brecks, where it can used as an "index" of habitat improvement for aculeate Hymenoptera (bees, wasps and ants) in general.

Although the wasp has historically been recorded from 49 ten km squares in southern and eastern England, it has been found in rather few ten km squares since 1980, largely in south-eastern England with one isolated occurrence in Oxfordshire. The main national metapopulation currently appears to be in the East Thames Corridor, but other important centres survive in the Colchester, Ipswich and Breck areas. Many or most sites where the wasp is currently known or has recently been recorded are threatened or have already been lost to development, this affecting most of the sites in the East Thames Corridor and the Colchester and Ipswich area. It appears crucial to make serious attempts to safeguard these core areas of population (Harvey, 2001b).

Although the wasp appears to collect common and widespread weevils as prey to provision its larvae, the species is associated with sporadically disturbed land (including brown field land and 'waste ground') and the relatively unmanaged parts of heath edge or other sandy habitats. The restricted distribution of the wasp is probably partly climatic, but also reliant on an abundant prey supply associated with grasslands and scrub containing a diverse flower-rich vegetation with areas of bare ground and uncut stems, seeds, flower heads and fruit heads that support the weevil prey species (Harvey, 2001b; Harvey, 2002b). The wasp is host to the Red Data Book cleptoparasitic ruby tailed wasp *Hedychrum niemelai*. The UK Biodiversity Action Plan for the 5-banded Tailed Digger Wasp *Cerceris quinquefasciata* states "Consider notifying sites supporting viable populations of *Cerceris quinquefasciata* as SSSIs, where this is necessary to secure their long-term protection and appropriate management" and "Where possible, ensure that all occupied and nearby potential habitat is appropriately managed by 2008, for example through SSSI or agri-environment scheme management agreements"; "Ensure that habitat requirements of *Cerceris quinquefasciata* are taken into account in relevant development policies, plans and proposals".

Crabronidae, *Dryudella pinguis,* very local

This very local ground nesting crabonid wasp favours sparsely vegetated sandy ground where it can find its prey of shieldbug and groundbug nymphs.It was found in the old car parling areas south of the main buildings at the site.

Crabronidae, *Lestiphorus bicinctus,* Notable/Nb

Lestiphorus bicinctus is a digger wasp with records confined to southern counties of England. In Essex most records are near the Thames. It is apparently associated with bushy places on reasonably light soils mainly in heaths, dunes and soft-rock cliffs. The ecology is rather poorly known. Nesting is likely to occur in light soil in warm, sunny situations. It is unclear whether bare soil or vegetated situations are preferred for this. The prey consists of auchenorrynchous bugs of the families Cicadellidae and Cercopidae (Richards 1980). The decline of traditional land use and the effects of myxomatosis on rabbit populations has led to succession which may have left many other sites unsuitable for this species. Overgrazing and excessive clearance of bushy places could also be damaging (Falk, 1991b).

Crabronidae, *Philanthus triangulum,* [RDB2]

Less than 30 years ago this wasp was considered to be one of the great aculeate rarities in Britain, with colonies only in sandy habitats on the Isle of Wight and Suffolk. It has since undergone an expansion in range, with the wasp now locally common in a steadily increasing number of sites (Edwards, 1997) as far north as Yorkshire (Archer, 2002). In view of the expansion in range and the probability that this is climate driven, its status will be revised. A large nesting population was present at the site, especially along the bank running south from the main entrance.

Formicidae, *Lasius brunneus,* Notable/Na

This ant has an inland distribution in southern England, in the Thames Valley and the Severn Vale (Alexander & Taylor, 1997) but it has been expanding its range in recent years. The ant is widespread in suitable habitat in south western Essex as far north as Hatfield Forest. It is a tree-dwelling ant, typically nesting in old oak trees in parkland, but is also sometimes found in hedgerows.

Halictidae, *Lasioglossum pauxillum,* [Notable/Na]

The bee is recorded from southern England, and Falk (1991b) describes it as an extremely local species with post-1970 records known for about twenty sites, mostly in Kent and Sussex but also sparingly in S. Hampshire and S. Essex. Recent years have seen the species become much more frequent, and it is much more frequently encountered.

Pompilidae, *Auplopus carbonarius,* Notable/Nb

Auplopus carbonarius is a scarce spider-hunting wasp confined to southern England. Recorded prey includes *Clubiona*, *Philodromus* and *Agelena*. Nests are constructed under stones, in old stumps or in old shells and are made of cells of clay taken from damp areas. This spider hunting wasp tends to inhabit woodland, especially that with streams and marshy areas which provide wet mud and clay for nesting materials. The nests are built in cavities in a great variety of situations and stocked most frequently with spiders in the family Clubionidae (Edwards, 1997).

Vespidae, *Dolichovespula media,* Notable/Na

This social tree wasp was first found in Britain in 1980 in E. Sussex, but has subsequently been widely recorded in southern England.

Lepidoptera (butterflies and moths)

Erebidae, *Tyria jacobaeae,* UKBAP (Research)

The Cinnabar moth *Tyria jacobaeae* was added to the UKBAP priority list in the 2007 review on the basis of evidence of major decline. It is one of a number of moths added as a 'Research' brief (Butterfly Conservation, 2007), but this is not clear in the published UKBAP information. Cinnabar is widespread and frequent in suitable habitat in Essex, but the situation is complicated by the fact that its larval food plant, Common Ragwort *Jacobaea vulgaris*, is subject to "The Ragwort Control Act 2003" and an associated DEFRA code of practice, which seeks to control it where there is a threat to the health and welfare of animals.

Adelidae, *Nemophora cupriacella,* Nationally Scarce B

This is a very local moth, occurring mainly in the south of England, and more scarcely in parts of northern England, Wales and Ireland. It inhabits dry grassy areas and downland, and flies during the daytime, mainly in July. The larvae feed on scabious and wild teasel (Sterling & Parsons (2012), initially on the seeds, later building a case and feeding on fallen and lower leaves. At Mepal, the foodplant must be teasel.

7. References

Agassiz, D.J.L.; Beavan, S.D.; Heckford, R.J. (2013). *Checklist of the Lepidoptera of the British Isles*.

Alexander, K.N.A. (2014) *A review of the scarce and threatened beetles of Great Britain*. *Buprestidae, Cantharidae, Cleridae, Dasytidae, Drilidae, Lampyridae, Lycidae, Lymexylidae, Malachiidae, Phloiophilidae and Trogossitidae*. Species Status No.16. Natural England Commissioned Report NECR134.

Alexander, K.N.A., Dodd, S. & Denton, J.S. (2014) *A review of the scarce and threatened beetles of Great Britain. The darkling beetles and their allies Aderidae, Anthicidae, Colydiidae, Melandryidae, Meloidae, Mordellidae, Mycetophagidae, Mycteridae, Oedemeridae, Pyrochroidae, Pythidae, Ripiphoridae, Salpingidae, Scraptiidae, Tenebrionidae & Tetratomidae (Tenebrionoidea less Ciidae)*. Species Status No.18. Natural England Commissioned Report NECR148.

Anon (2010) *East Cambridgeshire District County Wildlife Sites. Supplementary Planning Document June 2010*. The Wildlife Trust for Bedfordshire, Cambridgeshire, Northamptonshire & Peterborough Ltd and East Cambridgeshire District Council.

Ball, S.G. & Morris, R.K.A. 2014. *A review of the scarce and threatened flies of Great Britain. Part 6: Syrphidae*. Species Status 9: 1-130 Joint Nature Conservation Committee, Peterborough.

Bradley, J.D. (2000) *Checklist of Lepidoptera recorded from the British Isles.* Second edition (revised).

Bratton, J.H. (Ed.) 1991. *British Red Data Books: 3. Invertebrates other than insects*. JNCC.

Chandler, P.J. 2017. A *review of the status of the Lonchopteridae, Platypezidae and Opetiidae flies of Great Britain*. Natural England Commissioned Reports, Number246.

Clemons, L. (2004) A provisional atlas of the Tephritidae (Diptera) of Britiain and Ireland version 2. Bulletin of the Dipterists Forum 57.

Cook, A.A. (2015) A review of the Hemiptera of Great Britain: The Aquatic and Semi-aquatic Bugs. Dipsocoromorpha, Gerromorpha, Leptopodomorpha & Nepomorpha. Species Status No.24. Natural England Commissioned Report NECR188.

Dawson, I.K., Harvey, P.R., Merrett, P. & Russell-Smith, A.R. in prep. *A review of the scarce and threatened spiders (Arachnida: Araneae) of Great Britain*.

Drake, C.M. (2017) A review of the status of Larger Brachycera flies of Great Britain - Species Status No.29. Natural England Commissioned Reports, Number 192.

Edwards, R. (1997) Provisional atlas of the aculeate Hymenoptera of Britain and Ireland Part 1. Biological Records Centre, Huntingdon.

Falk, S. (1991a) *A review of the scarce and threatened flies of Great Britain (part1).* Research & Survey in Nature Conservation, number **39**. NCC.

Falk, S. (1991b) *A review of the scarce and threatened bees, wasps and ants of Great Britain (part 1).* Research & Survey in Nature Conservation, number **35**. NCC.

Falk, S.J. & Chandler, P.J. 2005. *A review of the scarce and threatened flies of Great Britain. Part 2: Nematocera and Aschiza not dealt with by Falk (1991)*. Species Status 2: 1-189. Joint Nature Conservation Committee, Peterborough.

Falk, S.J. & Crossley, R. 2005. *A review of the scarce and threatened flies of Great Britain. Part 3: Empidoidea*. Species Status 3: 1-134. Joint Nature Conservation Committee, Peterborough.

Falk, S.J., Ismay, J.W. & Chandler, P.J. 2016. *A Provisional Assessment of the Status of Acalyptratae flies in the UK*. Natural England Commissioned Reports, Number 217.

Falk, S.J, & Pont, A.C. 2017. *A Provisional Assessment of the Status of Calypterate flies in the UK*. Natural England. Commissioned Reports, Number234

Harvey, P.R. (2004) The invertebrates of Red Lodge Heath in relation to other sites in the Breckland Natural Area: aculeate Hymenoptera and Coleoptera. Report for English Nature (Suffolk Team) Under contract number NB/Q/3/04-05.

Harvey, P.R., Nellist, D.R. & Telfer, M.G. (eds) 2002. *Provisional atlas of British spiders (Arachnida, Araneae),Volumes 1 & 2*. Huntingdon: Biological Records Centre.

Harvey, P., Davidson, M., Dawson, I., Fowles, A., Hitchcock, G., Lee, P., Merrett, P., Russell-Smith, A., Smith, H. (2017) *A review of the scarce and threatened spiders (Araneae) of Great Britain: Species Status No. 22*. NRW Evidence Report No: 11, 101pp, Natural Resources Wales, Bangor.

Hodge (2005) Hodge, Peter. A review of wildlife recording in East & West Sussex in 2005. ADASTRA 2005, published by the Sussex Biodiversity Record Centre.)

Hubble, D.S. (2014) *A review of the scarce and threatened beetles of Great Britain. The leaf beetles and their allies Chrysomelidae, Megalopodidae and Orsodacnidae*. Species Status No.19. Natural England Commissioned Report NECR161.

Hyman, P. S. & Parsons, M. S. (1992) *A review of the scarce and threatened Coleoptera of Great Britain Part 1.* UK Nature Conservation, number **3**. JNCC.

Hyman, P. S. & Parsons, M. S. (1994) *A review of the scarce and threatened Coleoptera of Great Britain Part 2.* UK Nature Conservation, number **12**. JNCC.

Key, R. (2000) Bare ground and the conservation of invertebrates. *British Wildlife* **11** (3): 183-191.

Kirby, P. (1992) *A review of the scarce and threatened Hemiptera of Great Britain*. UK Nature Conservation, number **2**. JNCC.

Kirby, P. (1992, republished 2001) *Habitat management for invertebrates: a practical handbook*. RSPB/JNCC.

Lott, D. (2008) *Synopsis of ISIS 2009 and its use in Common Standards Monitoring*. ISIS development report.

Merrett, P. (1990) *A Review of the Nationally Notable Spiders of Great Britain*. NCC.

Morgan (1984) *Cuckoo-wasps Hymenoptera, Chrysididae*. Handbooks for the Identification of British Insects, Vol. 6, Part 5. Royal Entomological Society of London.

Parsons, M.S. (1993) *A review of the scarce and threatened pyralid moths of Great Britain*. UK Nature Conservation, number **11**. JNCC.

Roberts, M.J. (1995) *Spiders of Britain & Northern Europe*. London: HarperCollins.

Shirt, D.B. (ed.) (1987) British Red Data Books: 2. Insects. NCC.

Sterling, P. & Parsons, P. (2012) Field Guide to the Micromoths of Great Britain and Ireland. British Wildlife Publishing.

Telfer, M.G. (2016) *A review of the beetles of Great Britain: Ground Beetles (Carabidae)*. Species Status No.25. Natural England Commissioned Reports, Number 189.

White, I.M. (1988) Tephritid flies (Diptera: Tephritidae). *Handbooks for the Identification of British Insects* Vol. 10, Part 5a. RES, London.

Wilson, R. (2015) *Philodromus buxi* and *Anyphaena sabina*: two new species records for the UK. SRS News No. 81: In Newsl. Br. arachnol. Soc. **132**:17-19.

8. Appendix 1: National Status Definitions

Red Data Book species

National Red Data Book species are those falling within the Status categories defined in the *British Red Data Books* (Bratton, 1991; Shirt, 1987). These are internationally recognised species listed in the various *Red Data Books* published by, or under the auspices of, the International Union for the Conservation of Nature (IUCN). Species included may not be informally removed or transferred between categories. **Nationally Endangered (RDB1)** taxa are those considered to be in danger of extinction and whose survival is unlikely if the causal factors continue operating. These include species known from only a single locality since 1970, species restricted to habitats which are especially vulnerable, species which have shown a rapid and continuous decline in the last twenty years and are now estimated to exist in five or fewer ten km squares and species believed extinct but which would need protection if re-discovered. **Nationally Vulnerable (RDB2)** taxa are those that are believed likely to move into the Endangered category in the near future if the causal factors causing their decline continue operating. This includes species declining throughout their range, species in vulnerable habitats and species whose populations are low. **Nationally Rare (RDB3)** taxa are those with small populations that are not at present Endangered or Vulnerable, but are at risk. This includes species known or estimated to exist in only 15 or fewer post 1970 ten km squares. **Insuffiently Known (RDBK)** taxa are those suspected of falling into categories 1-3, but about which there is insufficient information to be certain.

In an increasing number of invertebrate groups and families in Diptera (flies) and Coleoptera (beetles) new status reviews have been published (e.g. Alexander, 2014; Alexander, *et al*. 2014; Ball & Morris, 2014; Falk & Crossley, 2005; Falk & Chandler, 2005; Falk *et al*. 2016; Falk & Pont, 2017). A brief outline of the revised IUCN criteria and their application, as summarised in these reviews, is given below.

REGIONALLY EXTINCT (RE). A taxon is *Extinct* when there is no reasonable doubt that the last individual has died.

CRITICALLY ENDANGERED (CR). A taxon is *Critically Endangered* when it is facing an extremely high risk of extinction in the wild in the immediate future, as detailed by any of the criteria A to E. *

ENDANGERED (EN). A taxon is *Endangered* when it is not *Critically Endangered* but is facing a very high risk of extinction in the wild in the near future, as defined by any of the criteria A to E. *

VULNERABLE (VU). A taxon is *Vulnerable* when it is not *Critically Endangered* or *Endangered* but is facing a high risk of extinction in the wild in the medium term future, as defined by any of the criteria

A to D. *

NEAR THREATENED (NT)

A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for, or is likely to qualify for, a threatened category in the near future.

LEAST CONCERN (LC)

A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.

DATA DEFICIENT (DD)

A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore

not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that a threatened classification is

appropriate.

NOT EVALUATED (NE)

A taxon is Not Evaluated when it is has not yet been evaluated against the criteria.

NOT APPLICABLE (NA)

A taxon may be Not Applicable (NA) when it occurs in a region but is not included in the regional assessment. A taxon may be NA because it is not a wild population or not within its natural range in the region, or because it is a vagrant to the region. This category is used for species where the evidence suggests that the species concerned are not long-term natives, either as a result of accidental importation through trade

and travel, or of recent colonisation (or attempted colonisation) in response to the changing conditions available in Britain as a result of human activity and/or climate change.

NATIONALLY SCARCE (NS) species

The concept of Nationally Scarce (Notable) species was introduced by Ball (1986). They are species which are estimated to occur within the range of 16 to 100 ten-kilometre squares of the British National Grid system since 1970 and are subdivided as follows: **Notable/Na** refers to species estimated to occur within the range of 16 to 30 10-kilometre squares of the National Grid System. **Notable/Nb** refers to species estimated to occur within the range 31 to 100 10-kilometre squares of the National Grid System. Diptera (flies) and some Coleoptera (beetles) are not separated. Categorisations have been revised for various taxonomic groups including Araneae (spiders) in Merrett (1990), aculeate Hymenoptera in Falk (1991a), Coleoptera in Hyman & Parsons (1992, 1994), Diptera in Falk (1991b), Hemiptera in Kirby (1992) and Pyralidae (Lepidoptera) in Parsons (1993).

The concept of nationally scarce (Notable) species is unaltered in the new status reviews (e.g. Alexander (2014), Alexander *et al*. (2014), Falk, S.J. & Crossley, R., 2005; Falk, S.J. & Chandler, P., 2005, Hubble (2014), Telfer (2016), Harvey *et al*. 2017), but the status is now known as Nationally Scarce or NS.

9. Appendix 2: Scoring Systems Used in Pantheon

(from http://www.brc.ac.uk/pantheon/content/scoring-systems)

One of the principal aims of Pantheon is to help assess sample quality for nature conservation purposes. Absolute certainty over site quality cannot be properly resolved without a systematic and comparable survey of all sites throughout England. As one is not forthcoming in the foreseeable future, caution should be applied when interpreting results. Despite this, evaluation is possible with high quality survey data and site inventories, and, in particular, if there is comparable data from other sites to hand.

It should also be noted that:

- A long species list may indicate a rich site or a well-worked site; just because a site has a long list does not necessarily mean it is a rich site;
- Representation across taxonomic groups in biotopes, habitats and their nested resources is very variable (e.g. A list of moths sampled from a wetland will show a very different output from a list of beetles). Care should be taken with samples consisting of limited taxonomic groups;
- A list with a high proportion of rare species may indicate a site that supports an unusually high proportion of rare species (a high quality site) or a site that is quite average but has been well-worked or a site where nobody has made much effort to record the common species;
- A site may be important for invertebrates by virtue of a single rare species with a very restricted distribution (e.g. Tadpole shrimp, new forest burnet) though it may appear not to be a high quality site if looking at measures such as species richness, species quality indices, or number of species with a conservation status.

The scoring systems below make use of species richness, threat status, rarity and characteristic species for each broad biotope, habitat and resource. More work is required to refine these scores and produce benchmarks and site ranking. The four current scoring systems are described below.

1. Count – the number of species within each category

This is the simplest of all the scores. Low counts may mean that SQI scores (see section 4 below) are not reliable. High counts can be used to assign quality based purely on species richness.

2. Conservation Status – threat and rarity status from published reviews

The conservation status of species is complicated by the fact that there are two different systems in place – an 'old' system, that combines both threat and rarity, and a 'new' system that separates these. New reviews replace the old conservation status. The conservation status is also used to generate the Species Quality Indices (see section 4 below).

Sample quality can simply be derived from the overall number of species with a conservation status, and the number of species within each type of status.

Please note - some statuses are reported in square brackets. This is to indicate that these are considered out of date and should be used with caution.

The 'New' system is a two-pronged approach that separates rarity from threat. Threat is calculated using internationally recognised post-2001 IUCN criteria:

- EX - Extinct
- RE - Regionally Extinct
- CR - Critically Endangered
- CR(PE) - Critically Endangered (Possibly Extinct)
- EN - Endangered
- VU - Vulnerable
- NT - Near Threatened

- DD - Data Deficient
- LC - Least Concern
- NA - Not Assessed
- NE - Not Evaluated

Statuses marked with a p before the status indicate that these are provisional statuses.

Two groups of flies (Empidoidea and some Nematocera and Aschiza) were assessed using post-1994 IUCN criteria. The abbreviations for these are in brackets.

Rarity is calculated using the Great Britain Rarity Status:

- Nationally Rare - Those which have been recorded from between 1-15 British hectads (10 km x 10 km squares) within a given date class where there is reasonable confidence that exhaustive recording would not find them in more hectads.
- Nationally Scarce - Those which have been recorded from between 16-100 hectads within a given date class where there is reasonable confidence that exhaustive recording would not find them in more hectads.

Species can have a status in both the threat and rarity categories above (e.g. *Carabus intricatus* is both Near Threatened and Nationally rare).

The 'old' system - species having been evaluated using the pre-1994 criteria:

- Extinct - Listed as RDB App or Extinct
- RDB 1 - Endangered
- RDB 2 - Vulnerable
- RDB 3 - Rare
- RDB K - Insufficiently Known
- RDB I - Indeterminate
- Na - Notable A
- Nb - Notable B
- Notable - Notable or Nationally Scarce
- NR (marine) - Nationally Rare (marine species)
- NS (marine) - Nationally Scarce (marine species)
- Unknown - A few micromoths are listed as status Unknown
- None - Not rare or scarce
- Not reviewed - The taxon was not assessed for rarity in the review
- New to Britain - Recently added to the British list and not yet reviewed, but it is still rare as far as we know
- Not native - The taxon is thought not to be native

3. % representation (Percentage Representation)

For any given broad biotope, habitat or resource, % rep is calculated by:

 the number of species in that resource in the sample / the total number of species in that resource in the Pantheon database

E.g. if sample X had 30 saltmarsh species and Pantheon has 302 saltmarsh species in total, then the % representation = 30/302 = 10%.

High scores suggest that the sample includes a high proportion of characteristic species, which can be an indicator of quality. Scores of between 10-20% may indicate good quality; scores of 21%+ certainly suggest a good proportion of characteristic species. Caution should be applied when the total number of species coded to any given category is low (10 or less) or are coded to categories that do not necessarily indicate quality (e.g. ubiquitous, synanthropic).

4. SQI - Species Quality Indices

Quality indicators such as this have been used in the past on a number of assemblages (dead wood and riparian). Each species recorded from the sample are given a Species Quality Score (SQS) based on their conservation status (see table below). However, where there is robust recent information to show that the official status is no longer appropriate, the SQS assigns a rare or scarce status using the more recent information (see note below table). The source of this information is given in the Source of Rarity column.

The SQI is equal to the sum of all SQSs in any given resource, divided by the number of species. This score will then be multiplied by 100 to give a 3 figure value without decimal places (e.g.100 rather than a 1.00).

Any SQI score derived from a small number of species should be treated with caution. It is suggested that scores derived from 15 or less species should not be used.

Status and Description	Species Quality Score	Old reviews	New review IUCN Threat		New review rarity
Species that have no Great Britain Rarity Status. This includes widespread species, even if they are classed as IUCN threatened. NOTE 1	1	None, RDB 4, RDB - Endemic	LC, NE, NA, DD, NT, VU, EN, CR, CR(PE)	and	None, Introduced.
Species currently classed as Nationally Scarce but not threatened. NOTE 2	4	RDB I, RDB K, N, Na, Nb	NA, NE, LC, DD, NT	and	NS
Species currently classed as Nationally Rare but not threatened. NOTE 3	8	RDB 2, RDB 3	LC, NE, NA, DD, NT.	and	NR
Species currently classed as Nationally Rare or Scarce that are also considered IUCN Vulnerable. NOTE 4	8	*Not applicable*	VU	and	NS, NR
Species currently classed as Nationally Rare or Scarce that are also considered IUCN Endangered. NOTE 4	16	RDB 1, RDB - App	EN	and	NS, NR
Species currently classed as Nationally Rare or Scarce that are also considered IUCN Critically Endangered, Critically Endangered (Provisicnally Extinct), Regionally Extinct, Extinct in the Wild, or Extinct. NOTE 5	32	*Not applicable*	CR, CR(PE), RE, EW, EX	and	NS, NR, Extinct

Notes:

1. *In older reviews, species not classed as RDB - App, RDB 1-3, or notable. Includes RDB - Endemic unless included under another criterion.*
2. *This includes Nationally Scarce species that do not qualify under any of the other criteria. They may be classed as IUCN Least Concern, Near Threatened, or Data Deficient, Not Evaluated, or Not Assessed. In older reviews, species classed as Notable, Notable A, Notable B, Scarce, RDB I and RDB K.*
3. *This includes Nationally Rare species that do not qualify under any of the other criteria. They may be classed as IUCN Least Concern, Near Threatened, or Data Deficient, Not Evaluated, or Not Assessed. In older reviews, species classed as RDB 3*
4. *In older reviews, species classed as RDB 2*
5. *In older reviews, species classed as RDB 1.*

10. Appendix 3: List Of Species Recorded During Survey With Statuses

Order	Family	Taxon	Status	SQI Score
Arachnida: Araneae	Araneidae	Araniella cucurbitina sens. str.		1
Arachnida: Araneae	Araneidae	Araniella opisthographa		1
Arachnida: Araneae	Araneidae	Larinioides cornutus		1
Arachnida: Araneae	Araneidae	Larinioides patagiatus	NS	4
Arachnida: Araneae	Araneidae	Zygiella x-notata		1
Arachnida: Araneae	Miturgidae	Cheiracanthium virescens	NS	4
Arachnida: Araneae	Clubionidae	Clubiona brevipes		1
Arachnida: Araneae	Dictynidae	Dictyna uncinata		1
Arachnida: Araneae	Linyphiidae	Erigone dentipalpis		1
Arachnida: Araneae	Linyphiidae	Neriene montana		1
Arachnida: Araneae	Linyphiidae	Oedothorax gibbosus		1
Arachnida: Araneae	Linyphiidae	Tenuiphantes tenuis		1
Arachnida: Araneae	Lycosidae	Arctosa perita		1
Arachnida: Araneae	Lycosidae	Pardosa palustris		1
Arachnida: Araneae	Lycosidae	Pardosa prativaga		1
Arachnida: Araneae	Mimetidae	Ero aphana	NS	4
Arachnida: Araneae	Philodromidae	Philodromus albidus	(Nb)	1
Arachnida: Araneae	Philodromidae	Philodromus cespitum		1
Arachnida: Araneae	Philodromidae	Philodromus praedatus	(Nb)	1
Arachnida: Araneae	Corinnidae	Phrurolithus festivus		1
Arachnida: Araneae	Salticidae	Heliophanus flavipes		1
Arachnida: Araneae	Salticidae	Salticus scenicus		1
Arachnida: Araneae	Salticidae	Talavera aequipes		1
Arachnida: Araneae	Tetragnathidae	Tetragnatha extensa		1
Arachnida: Araneae	Tetragnathidae	Tetragnatha montana		1
Arachnida: Araneae	Tetragnathidae	Tetragnatha nigrita		1
Arachnida: Araneae	Tetragnathidae	Tetragnatha obtusa		1
Arachnida: Araneae	Theridiidae	Anelosimus vittatus		1
Arachnida: Araneae	Theridiidae	Cryptachaea riparia	NS	4
Arachnida: Araneae	Theridiidae	Enoplognatha latimana		1
Arachnida: Araneae	Theridiidae	Enoplognatha ovata sens. str.		1
Arachnida: Araneae	Theridiidae	Enoplognatha thoracica		1
Arachnida: Araneae	Theridiidae	Parasteatoda lunata		1
Arachnida: Araneae	Theridiidae	Phylloneta impressa		1
Arachnida: Araneae	Theridiidae	Theridion varians		1
Arachnida: Araneae	Thomisidae	Ozyptila sanctuaria		1
Arachnida: Araneae	Thomisidae	Xysticus cristatus		1
Arachnida: Araneae	Thomisidae	Xysticus ulmi		1
Arachnida: Opiliones	Phalangiidae	Dicranopalpus ramosus sens. str.		1
Arachnida: Opiliones	Phalangiidae	Opilio canestrinii		0
Arachnida: Opiliones	Phalangiidae	Opilio saxatilis		1
Arachnida: Opiliones	Phalangiidae	Paroligolophus agrestis		1
Arachnida: Opiliones	Phalangiidae	Phalangium opilio		1
Coleoptera	Anthicidae	Anthicus antherinus		1
Coleoptera	Anthicidae	Notoxus monoceros		1
Coleoptera	Anthicidae	Omonadus formicarius		1
Coleoptera	Apionidae	Betulapion simile		1
Coleoptera	Apionidae	Ceratapion carduorum		1
Coleoptera	Apionidae	Ceratapion gibbirostre		1
Coleoptera	Apionidae	Protapion fulvipes		1
Coleoptera	Apionidae	Protapion trifolii		1
Coleoptera	Byturidae	Byturus tomentosus		1
Coleoptera	Cantharidae	Cantharis livida		1
Coleoptera	Cantharidae	Cantharis rustica		1
Coleoptera	Cantharidae	Rhagonycha fulva		1
Coleoptera	Carabidae	Agonum fuliginosum		1
Coleoptera	Carabidae	Amara aenea		1

Coleoptera	Carabidae	Amara tibialis		1
Coleoptera	Carabidae	Bembidion quadrimaculatum		1
Coleoptera	Carabidae	Harpalus latus		1
Coleoptera	Carabidae	Pterostichus nigrita		1
Coleoptera	Carabidae	Syntomus foveatus		1
Coleoptera	Cerambycidae	Leptura quadrifasciata		1
Coleoptera	Chrysomelidae	Altica lythri		1
Coleoptera	Chrysomelidae	Bruchus rufimanus		1
Coleoptera	Chrysomelidae	Chrysolina hyperici		1
Coleoptera	Chrysomelidae	Crepidodera aurata		1
Coleoptera	Chrysomelidae	Cryptocephalus fulvus		1
Coleoptera	Chrysomelidae	Cryptocephalus moraei		1
Coleoptera	Chrysomelidae	Cryptocephalus pusillus		1
Coleoptera	Chrysomelidae	Longitarsus exoletus		1
Coleoptera	Chrysomelidae	Longitarsus parvulus	(Na)	1
Coleoptera	Chrysomelidae	Longitarsus tabidus	NS	4
Coleoptera	Chrysomelidae	Oulema melanopus sens. lat.		1
Coleoptera	Chrysomelidae	Oulema rufocyanea		1
Coleoptera	Chrysomelidae	Phyllotreta atra		1
Coleoptera	Chrysomelidae	Phyllotreta nigripes		1
Coleoptera	Chrysomelidae	Phyllotreta undulata		1
Coleoptera	Chrysomelidae	Phyllotreta vittula		1
Coleoptera	Chrysomelidae	Psylliodes chrysocephala		1
Coleoptera	Chrysomelidae	Sphaeroderma testaceum		1
Coleoptera	Coccinellidae	Adalia bipunctata		1
Coleoptera	Coccinellidae	Adalia decempunctata		1
Coleoptera	Coccinellidae	Calvia quattuordecimguttata		1
Coleoptera	Coccinellidae	Coccidula rufa		1
Coleoptera	Coccinellidae	Coccinella septempunctata		1
Coleoptera	Coccinellidae	Halyzia sedecimguttata		1
Coleoptera	Coccinellidae	Hippodamia variegata	[Nb]	1
Coleoptera	Coccinellidae	Propylea quattuordecimpunctata		1
Coleoptera	Coccinellidae	Rhyzobius litura		1
Coleoptera	Curculionidae	Acalyptus carpini	Nb	4
Coleoptera	Curculionidae	Ceutorhynchus pallidactylus		1
Coleoptera	Curculionidae	Ceutorhynchus picitarsis		1
Coleoptera	Curculionidae	Curculio glandium		1
Coleoptera	Curculionidae	Datonychus melanostictus		1
Coleoptera	Curculionidae	Mogulones asperifoliarum		1
Coleoptera	Curculionidae	Mogulones geographicus	Nb	4
Coleoptera	Curculionidae	Nedyus quadrimaculatus		1
Coleoptera	Curculionidae	Otiorhynchus ovatus		1
Coleoptera	Curculionidae	Polydrusus cervinus		1
Coleoptera	Curculionidae	Polydrusus impressifrons	(New to Britain 2014)	0
Coleoptera	Curculionidae	Sitona lineatus		1
Coleoptera	Dermestidae	Anthrenus verbasci		1
Coleoptera	Elateridae	Agriotes sputator		1
Coleoptera	Elateridae	Athous haemorrhoidalis		1
Coleoptera	Hydrophilidae	Coelostoma orbiculare		1
Coleoptera	Hydrophilidae	Helochares lividus	(Nb)	1
Coleoptera	Kateretidae	Brachypterus glaber		1
Coleoptera	Malachiidae	Cordylepherus viridis		1
Coleoptera	Malachiidae	Malachius bipustulatus		1
Coleoptera	Mordellidae	Mordellistena pseudoparvula	NR	8
Coleoptera	Nanophyidae	Nanophyes marmoratus		1
Coleoptera	Nitidulidae	Meligethes aeneus		0
Coleoptera	Nitidulidae	Meligethes nigrescens		0
Coleoptera	Nitidulidae	Meligethes planiusculus		0
Coleoptera	Oedemeridae	Oedemera lurida		1
Coleoptera	Oedemeridae	Oedemera nobilis		1

Coleoptera	Pyrochroidae	Pyrochroa serraticornis		1
Coleoptera	Rutelidae	Hoplia philanthus		1
Coleoptera	Scirtidae	Cyphon laevipennis		1
Coleoptera	Scirtidae	Scirtes hemisphaericus		1
Coleoptera	Scraptiidae	Anaspis fasciata		1
Coleoptera	Scraptiidae	Anaspis maculata		1
Coleoptera	Silphidae	Silpha laevigata		1
Coleoptera	Staphylinidae	Acrotona muscorum		1
Coleoptera	Staphylinidae	Aleochara bipustulata		1
Coleoptera	Staphylinidae	Ocypus olens		1
Coleoptera	Staphylinidae	Quedius cruentus		1
Coleoptera	Staphylinidae	Stenus juno		1
Coleoptera	Staphylinidae	Tachyporus hypnorum		1
Coleoptera	Tenebrionidae	Isomira murina		1
Dermaptera	Forficulidae	Forficula auricularia		1
Diptera	Agromyzidae	Agromyza reptans		0
Diptera	Anthomyiidae	Delia platura		0
Diptera	Anthomyzidae	Anthomyza collini		0
Diptera	Asilidae	Leptogaster cylindrica		1
Diptera	Bibionidae	Dilophus febrilis		1
Diptera	Bibionidae	Dilophus femoratus		1
Diptera	Calliphoridae	Lucilia silvarum		1
Diptera	Carnidae	Meoneura flavifacies		0
Diptera	Chamaemyiidae	Chamaemyia herbarum		1
Diptera	Chloropidae	Cryptonevra flavitarsis		1
Diptera	Chloropidae	Elachiptera sp. nr cornuta		0
Diptera	Chloropidae	Incertella ?nigrifrons		0
Diptera	Chloropidae	Oscinella frit		1
Diptera	Chloropidae	Oscinella vindicata		1
Diptera	Chloropidae	Thaumatomyia notata		1

Diptera	Dolichopodidae	Dolichopus latilimbatus		1
Diptera	Dolichopodidae	Dolichopus nubilus		1
Diptera	Dolichopodidae	Medetera saxatilis	DD	1
Diptera	Dolichopodidae	Medetera truncorum	DD	1
Diptera	Dolichopodidae	Sympycnus pulicarius		1
Diptera	Dolichopodidae	Xanthochlorus galbanus		1
Diptera	Dolichopodidae	Xanthochlorus ornatus		1
Diptera	Empididae	Empis caudatula		1
Diptera	Empididae	Hilara hirtipes		0
Diptera	Empididae	Rhamphomyia obscura	(LR);NS	4
Diptera	Ephydridae	Notiphila riparia		1
Diptera	Ephydridae	Paracoenia fumosa		1
Diptera	Fanniidae	Fannia canicularis		1
Diptera	Hybotidae	Drapetis arcuata	(Scarce)	1
Diptera	Hybotidae	Platypalpus annulatus		1
Diptera	Hybotidae	Platypalpus annulipes		1
Diptera	Hybotidae	Platypalpus australominutus		1
Diptera	Hybotidae	Platypalpus longiseta		1
Diptera	Hybotidae	Platypalpus pallidicornis		1
Diptera	Hybotidae	Platypalpus pallidiventris		1
Diptera	Lauxaniidae	Calliopum aeneum		1
Diptera	Lauxaniidae	Calliopum simillimum		1
Diptera	Lauxaniidae	Homoneura interstincta	New to Britain (RDB3)	8
Diptera	Lauxaniidae	Minettia fasciata (=rivosa)		1
Diptera	Lauxaniidae	Minettia tabidiventris		1
Diptera	Lauxaniidae	Minettia tubifer		0
Diptera	Lauxaniidae	Sapromyza quadripunctata		0
Diptera	Limoniidae	Molophilus griseus		1
Diptera	Lonchaeidae	Silba fumosa		1
Diptera	Lonchopteridae	Lonchoptera bifurcata		1

Diptera	Lonchopteridae	Lonchoptera lutea		1
Diptera	Milichiidae	Phyllomyza securicornis		0
Diptera	Muscidae	Coenosia atra	pNS	4
Diptera	Muscidae	Coenosia rufipalpis		1
Diptera	Muscidae	Coenosia testacea		1
Diptera	Muscidae	Coenosia tigrina		1
Diptera	Muscidae	Limnophora tigrina		1
Diptera	Muscidae	Schoenomyza litorella		1
Diptera	Opomyzidae	Opomyza florum		1
Diptera	Opomyzidae	Opomyza germinationis		1
Diptera	Pallopteridae	Palloptera anderssoni		0
Diptera	Pipunculidae	Cephalops straminipes	(LR);NS	4
Diptera	Pipunculidae	Tomosvaryella palliditarsis	(Scarce)	1
Diptera	Polleniidae	Pollenia rudis		1
Diptera	Psilidae	Chamaepsila rosae		1
Diptera	Ptychopteridae	Ptychoptera contaminata		1
Diptera	Rhinophoridae	Phyto melanocephala		0
Diptera	Sarcophagidae	Miltogramma germari	pNS (RDB3)	8
Diptera	Scathophagidae	Norellisoma spinimanum		1
Diptera	Sciomyzidae	Pherbellia cinerella		1
Diptera	Sciomyzidae	Tetanocera ferruginea		1
Diptera	Sepsidae	Sepsis fulgens		1
Diptera	Sepsidae	Sepsis thoracica		1
Diptera	Sepsidae	Sepsis violacea		1
Diptera	Sphaeroceridae	Coproica ferruginata		0
Diptera	Sphaeroceridae	Leptocera fontinalis		0
Diptera	Sphaeroceridae	Leptocera nigra		0
Diptera	Sphaeroceridae	Rachispoda limosa		0
Diptera	Stratiomyidae	Chloromyia formosa		1
Diptera	Stratiomyidae	Chorisops nagatomii	(Scarce)	4

Diptera	Stratiomyidae	Oxycera morrisii	(Scarce)	4
Diptera	Stratiomyidae	Oxycera trilineata		1
Diptera	Stratiomyidae	Pachygaster atra		1
Diptera	Stratiomyidae	Pachygaster leachii		1
Diptera	Syrphidae	Cheilosia proxima		1
Diptera	Syrphidae	Episyrphus balteatus		1
Diptera	Syrphidae	Eristalis tenax		1
Diptera	Syrphidae	Eumerus strigatus		1
Diptera	Syrphidae	Melanostoma mellinum		1
Diptera	Syrphidae	Melanostoma scalare		1
Diptera	Syrphidae	Meliscaeva auricollis		1
Diptera	Syrphidae	Neoascia podagrica		1
Diptera	Syrphidae	Neoascia tenur		1
Diptera	Syrphidae	Paragus haemorrhous		1
Diptera	Syrphidae	Platycheirus scutatus sens. lat.		0
Diptera	Syrphidae	Syritta pipiens		1
Diptera	Syrphidae	Syrphus ribesii		1
Diptera	Syrphidae	Triglyphus primus	NS	4
Diptera	Tabanidae	Chrysops viduatus		4
Diptera	Tachinidae	Eliozeta pellucens	(RDBK)	0
Diptera	Tachinidae	Phania funesta		0
Diptera	Tephritidae	Euleia heraclei		1
Diptera	Tephritidae	Tephritis formosa		1
Diptera	Tephritidae	Terellia tussilaginis		1
Diptera	Tephritidae	Xyphosia miliaria		1
Diptera	Therevidae	Thereva bipunctata		4
Diptera	Tipulidae	Nephrotoma flavescens		1
Diptera	Tipulidae	Tipula lateralis		1
Diptera	Trixoscelididae	Trixoscelis obscurella		1
Hemiptera	Acanthosomatidae	Elasmostethus interstinctus		1

Hemiptera	Acanthosomatidae	Elasmucha grisea		1
Hemiptera	Anthocoridae	Anthocoris nemoralis		1
Hemiptera	Anthocoridae	Orius niger		1
Hemiptera	Coreidae	Arenocoris falleni	NS	4
Hemiptera	Cydnidae	Sehirus luctuosus		1
Hemiptera	Lygaeidae	Graptopeltus lynceus	Nb	4
Hemiptera	Lygaeidae	Heterogaster urticae		1
Hemiptera	Lygaeidae	Kleidocerys resedae		1
Hemiptera	Lygaeidae	Megalonotus chiragra		1
Hemiptera	Lygaeidae	Megalonotus praetextatus	Nb	4
Hemiptera	Lygaeidae	Nysius huttoni		0
Hemiptera	Lygaeidae	Nysius senecionis		0
Hemiptera	Lygaeidae	Peritrechus lundii		1
Hemiptera	Lygaeidae	Stygnocoris fuligineus		1
Hemiptera	Lygaeidae	Trapezonotus desertus		1
Hemiptera	Miridae	Campyloneura virgula		1
Hemiptera	Miridae	Chlamydatus evanescens	RDB 3	8
Hemiptera	0	Closterotomus norwegicus		0
Hemiptera	Miridae	Cyllecoris histrionius		1
Hemiptera	Miridae	Deraeocoris lutescens		1
Hemiptera	Miridae	Deraeocoris ruber		1
Hemiptera	Miridae	Dicyphus epilobii		1
Hemiptera	Miridae	Dicyphus tamaninii		0
Hemiptera	Miridae	Dryophilocoris flavoquadrimaculatus		1
Hemiptera	Miridae	Harpocera thoracica		1
Hemiptera	Miridae	Lygocoris pabulinus		1
Hemiptera	Miridae	Lygus maritimus		1
Hemiptera	Miridae	Lygus pratensis	[RDB 3]	1
Hemiptera	Miridae	Lygus rugulipennis		1
Hemiptera	Miridae	Megacoelum infusum		1

Hemiptera	Miridae	Orthotylus marginalis		1
Hemiptera	Miridae	Orthotylus ochrotrichus		1
Hemiptera	Miridae	Phytocoris populi		1
Hemiptera	Miridae	Plagiognathus arbustorum		1
Hemiptera	Miridae	Plagiognathus chrysanthemi		1
Hemiptera	Miridae	Stenodema calcarata		1
Hemiptera	Nabidae	Himacerus apterus		1
Hemiptera	Nabidae	Himacerus mirmicoides		1
Hemiptera	Pentatomidae	Dolycoris baccarum		1
Hemiptera	Pentatomidae	Eurydema oleracea		1
Hemiptera	Pentatomidae	Palomena prasina		1
Hemiptera	Pentatomidae	Pentatoma rufipes		1
Hemiptera	Rhopalidae	Rhopalus parumpunctatus	NS	4
Hemiptera	Saldidae	Saldula pallipes	NS	4
Hemiptera	Saldidae	Saldula saltatoria		1
Hemiptera	Tingidae	Tingis cardui		1
Homoptera: Auchenorrhyncha	Aphrophoridae	Aphrophora alni		1
Homoptera: Auchenorrhyncha	Aphrophoridae	Neophilaenus campestris		1
Homoptera: Auchenorrhyncha	Aphrophoridae	Philaenus spumarius		1
Homoptera: Auchenorrhyncha	Cicadellidae	Acericerus ribauti		0
Homoptera: Auchenorrhyncha	Cicadellidae	Anaceratagallia ribauti		1
Homoptera: Auchenorrhyncha	Cicadellidae	Aphrodes makarovi		1
Homoptera: Auchenorrhyncha	Cicadellidae	Eupelix cuspidata		1
Homoptera: Auchenorrhyncha	Cicadellidae	Eupteryx thoulessi		1
Homoptera: Auchenorrhyncha	Cicadellidae	Eupteryx urticae		1
Homoptera: Auchenorrhyncha	Cicadellidae	Euscelis incisus		1
Homoptera: Auchenorrhyncha	Cicadellidae	Iassus lanio		1
Homoptera: Auchenorrhyncha	Cicadellidae	Idiocerus stigmaticalis		1
Homoptera: Auchenorrhyncha	Cicadellidae	Macropsis prasina		1
Homoptera: Auchenorrhyncha	Cicadellidae	Oncopsis flavicollis		1

Homoptera: Auchenorrhyncha	Cicadellidae	Populicerus confusus		1
Homoptera: Auchenorrhyncha	Cicadellidae	Zyginidia scutellaris		1
Homoptera: Auchenorrhyncha	Delphacidae	Javesella dubia		1
Homoptera: Auchenorrhyncha	Delphacidae	Javesella pellucida		1
Hymenoptera	Cephidae	Cephus spinipes		0
Hymenoptera	Cynipidae	Diplolepis rosae		0
Hymenoptera	Tenthredinidae	Athalia bicolor		0
Hymenoptera: Aculeata	Andrenidae	Andrena bicolor		1
Hymenoptera: Aculeata	Andrenidae	Andrena dorsata		1
Hymenoptera: Aculeata	Andrenidae	Andrena fulvago	[Na]	4
Hymenoptera: Aculeata	Andrenidae	Andrena minutula		1
Hymenoptera: Aculeata	Andrenidae	Andrena subopaca		1
Hymenoptera: Aculeata	Apidae	Bombus hortorum		1
Hymenoptera: Aculeata	Apidae	Bombus hypnorum		1
Hymenoptera: Aculeata	Apidae	Bombus lapidarius		1
Hymenoptera: Aculeata	Apidae	Bombus lucorum		1
Hymenoptera: Aculeata	Apidae	Bombus pascuorum		1
Hymenoptera: Aculeata	Apidae	Bombus terrestris		1
Hymenoptera: Aculeata	Bethylidae	Epyris niger		0
Hymenoptera: Aculeata	Megachilidae	Osmia spinulosa		1
Hymenoptera: Aculeata	Colletidae	Hylaeus dilatatus	*	1
Hymenoptera: Aculeata	Colletidae	Hylaeus communis		1
Hymenoptera: Aculeata	Colletidae	Hylaeus signatus	[Nb]	1
Hymenoptera: Aculeata	Crabronidae	Cerceris quinquefasciata	[RDB 3];Section 41 Priority Species	4
Hymenoptera: Aculeata	Crabronidae	Cerceris rybyensis		1
Hymenoptera: Aculeata	Crabronidae	Dryudella pinguis		4
Hymenoptera: Aculeata	Crabronidae	Lestiphorus bicinctus	Nb	4
Hymenoptera: Aculeata	Crabronidae	Mellinus arvensis		1
Hymenoptera: Aculeata	Crabronidae	Oxybelus uniglumis		1
Hymenoptera: Aculeata	Crabronidae	Philanthus triangulum	[RDB 2]	1
Hymenoptera: Aculeata	Formicidae	Formica fusca		1
Hymenoptera: Aculeata	Formicidae	Lasius brunneus	NA	4
Hymenoptera: Aculeata	Formicidae	Lasius niger sens. str.		1
Hymenoptera: Aculeata	Formicidae	Myrmica rubra		1
Hymenoptera: Aculeata	Formicidae	Myrmica scabrinodis		1
Hymenoptera: Aculeata	Halictidae	Halictus tumulorum		1
Hymenoptera: Aculeata	Halictidae	Lasioglossum leucopus		1
Hymenoptera: Aculeata	Halictidae	Lasioglossum leucozonium		1
Hymenoptera: Aculeata	Halictidae	Lasioglossum minutissimum		1
Hymenoptera: Aculeata	Halictidae	Lasioglossum morio		1
Hymenoptera: Aculeata	Halictidae	Lasioglossum pauxillum	[Na]	1
Hymenoptera: Aculeata	Megachilidae	Megachile ligniseca		1
Hymenoptera: Aculeata	Halictidae	Sphecodes geoffrellus		1
Hymenoptera: Aculeata	Halictidae	Sphecodes monilicornis		1
Hymenoptera: Aculeata	Halictidae	Sphecodes puncticeps		1
Hymenoptera: Aculeata	Pompilidae	Anoplius infuscatus		1
Hymenoptera: Aculeata	Pompilidae	Auplopus carbonarius	Nb	4
Hymenoptera: Aculeata	Pompilidae	Episyron rufipes		1
Hymenoptera: Aculeata	Pompilidae	Evagetes crassicornis		1
Hymenoptera: Aculeata	Sphecidae	Ammophila sabulosa		1
Hymenoptera: Aculeata	Vespidae	Dolichovespula media	[Na]	1
Isopoda	Armadillidiidae	Armadillidium vulgare		1
Isopoda	Philosciidae	Philoscia muscorum		1
Isopoda	Porcellionidae	Porcellio scaber		1
Lepidoptera	Adelidae	Nemophora cupriacella	(Nationally Scarce B)	4
Lepidoptera	Erebidae	Tyria jacobaeae	Section 41 Priority Species - research only	1
Lepidoptera	Lycaenidae	Aricia agestis		1
Lepidoptera	Nepticulidae	Ectoedemia heringella		4
Lepidoptera	Nymphalidae	Aglais io		1
Lepidoptera	Nymphalidae	Aphantopus hyperantus		1

Lepidoptera	Nymphalidae	Pyronia tithonus		1
Lepidoptera	Nymphalidae	Vanessa atalanta		1
Lepidoptera	Pieridae	Pieris brassicae		1
Lepidoptera	Pieridae	Pieris rapae		1
Myriapoda	Lithobiidae	Lithobius forficatus		1
Neuroptera	Panorpidae	Panorpa communis		1
Odonata	Coenagrionidae	Enallagma cyathigerum		1
Odonata	Coenagrionidae	Ischnura elegans		1
Orthoptera	Acrididae	Chorthippus brunneus		1
Orthoptera	Phaneropteridae	Leptophyes punctatissima		1
Orthoptera	Tetrigidae	Tetrix subulata		1
Orthoptera	Tetrigidae	Tetrix undulata		1

* Pantheon status of RDB3 is a known error resulting from confusion caused by the name change between this widespread but local taxon's former name of *Hylaeus annularis* and the former RDB3 *Hylaeus euryscapus* now known as *Hylaeus annularis*.