Bees and Wasps of

Radley Ash Disposal Site

Results from sampling 2018

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Data Routes:
Earth Trust
Friends of Radley Lakes
TVERC
BWARS Data Base

Shotover Wildlife

Summary

Radley Ash Disposal Site in Oxfordshire was visited on four warm days in 2018 and sampled for aculeate Hymenoptera. All sampled bees and wasps were identified and the results compared with previous similar surveys of 2006 (author) and 2011 (Bioscan). In this survey 55 species of bee and 32 species of wasp were recorded, bringing the total number of species recorded since 2006 (in the immediate environs of the site) to 85 bees and 73 wasps. Principal results are: a new species of cuckoo bee to Britain, *Stelis odontopyga*; three species with fewer than 5 records in Oxfordshire *Lasioglossum zonulum*, *Nomada flavopicta* and *Chrysis gracillima*; and the remarkable abundance of the mining bee *Lasioglossum puncticole,* which hitherto was thought to be rare in Oxfordshire. Recommendations for aculeate conservation are given, including a suggested reappraisal of the management of Common Ragwort *Jacobeae vulgaris*.

Site Description

The survey area – Radley Ash Disposal Site (Radley ADS) – comprises three decommissioned gravel pits within an extensive gravel extraction complex near Abingdon, Oxfordshire, and which are now filled in and managed for wildlife diversity. From south-west to north-east they are: Pit H & I (SU523971), Pit G (SU524977) and Pit J & P (SU525980) and together cover about 250 hectares. Once exhausted of gravel, the three pits were used for the disposal of power-station ash until they were full (arriving as pumped slurry,) and when this ceased in 2006/7 some areas were flushed with river water and others were capped with local clay (Lucy Duerdoth, Earth Trust, pers.comm., 2019). This environmental mediation work ceased in 2010. Since then some areas have been left undisturbed for 8 – 12 years and the stabilising ash has succeeded naturally with colonising species. Other areas have been planted with trees or seeded as meadow or pasture. The whole area is now actively managed for wildlife diversity.

The site is now a mixture of large shallow ponds, marshy ground, natural scrub, managed meadow and plantation. Pits H/I and J/P are flat and level; Pit G has some micro-topography with a bisecting bund and banking. Almost all of the pits are surrounded by hard un-metalled access roads which in places are higher than the ash-fill surface creating a marginal banking.

Suitability for bees and wasps

Bees and wasps are creatures that are dependent on more than one partial habitat. Like birds, they have move between different habitats for nesting, feeding and foraging, and often these required habitats are neither similar nor close by. As a general feeding site for bees and wasps Radley ADS is excellent in providing sugars – in the form of nectar and honeydew – from the rich diversity of flora. There is also a reasonable abundance of various important nectar species such

as Bramble *Rubus fruticosus*, Wild Carrot *Daucus carota*, Common Fleabane *Pulicaria dysenterica*, Common Bird's-foot Trefoil *Lotus corniculatus* and willows *Salix* spp. (Abingdon Naturalists Society flora survey, David Guyoncourt, pers. comm., 2018).

For the aculeates that nest in the ground, such as mining bees and digger wasps, the dried ash substrate will fail to attract some species, yet in common with London ash disposal sites (Mike Edwards, pers. comm., 2018) some species seem to do well on this material (see *Lasioglossum puncticolle* below). Nevertheless, the ash substrate and the sparsely vegetated poor soils – including those along the network of roads and banks – provide a good diversity of ground-nesting opportunities. Given the surrounding gravel workings and exposed sandy soils of the wider area, it is very likely that some of the larger ground-nesting aculeates will be 'commuting' into the survey area to take advantage of the diversity of flora and invertebrate prey.

For aerial-nesting aculeates the distribution of their partial habitats is a little different to that of soil-nesters. Most importantly at Radley ADS the calcareous soil supports an abundance of snails to the advantage of bees that nest in vacated snail shells, including *Osmia spinulosa* and *Stelis odontopyga* (see below). Other species will be served by the hollow-stemmed plants that are growing in the restored ash: bramble, docks *Rumex* spp. and some Apiaceae. However, it is probable that a significant proportion of aerial nesters will be using the surrounding hedgerows and mature woodland where there is dead wood and additional hollow-stemmed plants. As with the soil-nesters, some larger stem-nesters are likely to 'commute' into the survey area to take advantage of the diversity of flora and invertebrate prey.

Surveys

For the 2018 survey aculeate specimens were caught for identification using yellow-pan water traps and hand netting, with approximately equal emphasis on all areas on all visits. Visits were made on 5th April, 5th May, 27th June and 5th September. In some instances when the weather was suitable, pans were set out on the previous day for a 30 hour 'two day' sample.

The 2006 survey was conducted by the author in the 'brownfield' area that adjoins Radley ADS to the west (Wright, 2006), and used similar methods to the 2018 survey. The 2011 survey was conducted by ecologists of Bioscan(UK) Ltd by installing Malaise traps to sample in Pits G and H/I from June to September (Bioscan, 2001).

Results

In this survey, 87species of aculeate Hymenoptera were recorded in 2018, and comprises 48 solitary bees, 7 bumblebees, 29 solitary wasps and 3 social wasps (Table 1.). Twenty-nine of the recorded species are 'cuckoos' in the nests of other aculeates. For both bees and wasps the proportion of 'cuckoos' to hosts in this survey (an indicator of habitat quality) was the same – 31% - and is very high (albeit a relatively small sample). Of the host species associated with the 'cuckoos' recorded in 2018, all but one have been recorded in recent surveys. The exception is *Sphecodes pellucidus* for which *Andrena barbilabris* is the only confirmed host; however, *S. pullucidus* is widespread in southern Britain and various other minings bees have been cited as possible hosts.

The results of the 2018 survey raise the total number of species recorded since 2006 in the immediate vicinity of Radley ADS from 136 to 158 species. The survey has also raised the overall proportion of 'cuckoo' species to hosts from 24% to 27%, which is high when compared with other sites nationally and a further indicator of the increased maturity of the site and its aculeate fauna.

Significant aculeate species

A female of the solitary cuckoo bee ***Stelis odontopyga*** was caught in a yellow-pan water trap on the eastern edge of Pit G (at SU52529781) on 27th June 2018. The pan was placed on the track side in close proximity to flowering Bramble and Wild Carrot.

The species has been declared new to Britain by the circumstances of its appearance over the past two years (Edwards *et al*., 2019). On 29th June 2018 the species was also recorded in Kent, and a further specimen had been caught at the same Kent site in June of the previous year (2017) but had been misidentified. In Europe, where *Stelis odontopyga* is widely distributed, it is typically not known to occur in abundance and so may have been spreading throughout southern Britain for a while before being detected.

Stelis odontopyga flies from June to August and is a 'cuckoo' of the mason bee *Osmia spinulosa* – which nests in empty snail shells. *Osmia spinulosa* was found in all three survey areas as well as in the two previous surveys (see Table 2); it is also common in Oxfordshire, especially in limestone areas where snails are more abundant. The pollen requirement of *Osmia spinulosa* is restricted to Asteraceae (Else and Edwards, 2018) and therefore flowers of this plant family are also the required source of food for *Stelis odontopyga*. Both species will visit a wide variety of flowers for nectar – see also Recommendations (discussion).

Lake G was found to have a surprising and unusual abundance of the nationally-scarce mining bee ***Lasioglossum puncticolle***. Its typical range is restricted to the south-east of England with sporadic records from around Oxfordshire and the south-midlands. There are only four previous records in Oxfordshire, including Lake G in 2011 (Bioscan, 2011), and yet in this survey it was the most abundant solitary bee. *Lasioglossum puncticolle* is known to occur in ash disposal sites (Mike Edwards, pers. comm., 2018) and is associated with clay pits and the clay of soft-rock coastal cliffs (Else and Edwards, 2018); at Lake G the species may be taking advantage of the exposures of recently-disturbed clay or other clay-rich substrates. This bee uses a range of flowers for pollen including *Ranuculus* spp., thistles and yellow Asteraceae.

Chrysis gracillima is a ruby-tail 'cuckoo' wasp and appears in the Red Data Book of scarce and threatened aculeates, and is given the status RDB2 'Vulnerable'. Its range in the UK is restricted to the south-east of England and there are very few recent records nationally, but it was recorded at near Henley (Oxfordshire) in 1999. *Chrysis gracillima* is a brood parasite of small aculeates, and although no close associations have been identified, *Trypoxylon clavicerum* (recorded at Radley ADS in 2006) has been suggested as a possible host. *Chrysis gracillima* is known to nectar at flowers of Wild Carrot but the nectar/honeydew requirements for *Trypoxylon spp.* are not known. The nesting requirement for *Trypoxylon* spp. is small pre-existing holes in dead wood and hollow plant stems.

Cerceris quinquifasciata is a large digger wasp and is listed as rare (RDB3) in Britain, yet has been associated with the sandy areas and quarries of Oxfordshire for many decades; it has been recorded in small numbers in all recent surveys at Radley.

The mining bee ***Lasioglossum zonulum*** and 'cuckoo' bee ***Nomada flavopicta*** are both widespread and frequent in southern Britain but there have been very few records in Oxfordshire.

Recommendations (actions)

It is recommended that some of the plantation trees (and other tall vegetation wherever relevant) be removed from the road and track margins so that a significant proportion of the tracks retain

the character of an open sun-lit linear feature with ample sun-lit bare ground and are prevented from becoming shady glades.

It is recommended that the policy for the management of Common Ragwort is objectively reviewed such that there is an ecologically justified balance between (a) its critical importance for the resident invertebrates and (b) any requirement for it to be removed – either wholly or partially. It is recommended that there is no attempt to eradicate Ragwort from the whole site.

Recommendations (discussion)

For the conservation of bees and wasps at Radley ADS it is necessary to consider the partial habitats that sustain the existing fauna, how they might be enhanced and how they could decline without some intervention. As has been well demonstrated by the arrival of *Stelis odontopyga* – new to Britain in this survey – such conservation also raises the likelihood of further increases in invertebrate diversity through newly colonising species.

Track-side trees

For species that nest above ground the provision of nesting opportunities is good, with hollow-stemmed plants and empty snail shells probably in sufficient abundance, as well as the hedgerow and adjoining mature woodland with a variety of nesting cavities. However, the provision for soil-nesting species is more precarious, for as the vegetation of the site matures the amount of sun-lit bare or thinly vegetated soil will decrease. Currently (and probably for some time into the future), the tracks around the site contribute a significant component of sun-lit bare ground, as well as some of the steeper bund sides, and these will lose their value for ground nesting bees and wasps if allowed to become shaded by the increasing height of tall vegetation; hence the recommendation to anticipate this progression. This will also maintain the abundance and diversity of the track-side ground flora that is so important for pollen and nectar. In a few places trees have been planted close to the foot of sun-lit banks and are already beginning to reduce the insolation of prime bare-soil nesting habitat.

Common Ragwort

Although the overall flora diversity at Radley ADS is impressive, the number of species that occur in abundance is rather more limited. This is often the case on a brownfield where pioneers and competitors adjust to the new environment – over years for some plants and over decades in others. Of the smaller number of plant species that grow in abundance, still fewer will be sources of pollen and nectar, and at times it is possible for almost all of the local pollen to be supplied by a single species of plant. The important consideration for bee diversity is knowing which plants provide the required pollen at the right time of year and for how long. Yellow and purple Asteraceae are critical in this respect. (The nectar supply is less critical as both bees and wasps have a wider choice of flora for this.)

At Radley ADS the pollen provision is currently adequate, but is to some extent vulnerable – both seasonally and in the long term. In the spring, the remarkable abundance of Colt's-foot *Tussilago farara* (Asteraceae) is a key asset, and even though there are a few alternatives at this time of year (e.g. Willows, Dandelion, Ground Ivy) this pollen source would seem secure for several years to come; although eventually it will reduce under competitive succession. Later in the year – from July – the site is well served by thistles (Asteraceae), knapweeds, (Asteraceae) and Flea-bane *Pulicaria dysenterica* (Asteraceae), and Lamiaceae species such as mints, basil and marjoram. However, in June the pollen supply for bees is more limited and an important source at this time is Common Ragwort (see Tables 1 and 2). Although Common Cat's-ear *Hypochaeris radicata* also flowers in June, as does Bristly Oxtongue *Picris echioides* and various other yellow Astercaeae such as hawkbits *Leontodon* spp., it is important to appreciate that the majority of these June-flowering Asteraceae are poor competitors, taking advantage as pioneers of a young maturing habitat. With natural succession, and without conservation measures, many of these will become

out-competed and scarce, leaving only competitor perennials – such as Ragwort – to uphold the early summer pollen supply for bees.

The newly discovered rare bee at this site, *Stelis ondontopyga*, is known specifically to visit Ragwort for nectar as well as other yellow Asteraceae (Edwards *et al.*, 2019), and its host bee, *Osmia spinulosa*, will also collect pollen from Common Ragwort. Both of these bee species will be effected by conservation management depending upon whether the pollen options in June-July are maintained, enhanced or allowed to decline.

Many other invertebrates use Ragwort for their biological cycles. One species of mason bee recorded at Radley ADS, *Hoplitis claviventris,* which is closely related to *Osmia spinulosa,* will nest in the stems of Ragwort.

The importance of Ragwort at Radley ADS is clear; for bees, widespread active depletion would significantly compromise the mid-summer pollen provision, as well as weaken the future pollen supply as other current providers of pollen decline with natural succession.

Conclusions

Over recent years Radley ADS have proved to be a most important site for wildlife diversity. This survey has brought the site to national attention through the discovery of a new bee to Britain; it being one of only two sites where the bee is known to have colonised, having expanded its range from its continental origins. Numerous other scarce bees and wasps have arrived and colonised, and with this growing diversity Radley ADS is clearly a regionally significant site.

The high proportion of bees and wasps that are brood parasites of other Hymenopteran species (27%) indicates a robust hymenopteran ecology of species interactions. This can also be taken as an indicator of the health of the invertebrate ecology over all. For example, casual observations of scarce beetles such as Green Tiger Beetle *Cicindela campestris* and Adonis Ladybird *Hippodamia variegata* suggest an invertebrate ecology that is currently thriving.

As a maturing brownfield site, Radley ADS is still changing and its current position as a significant wildlife site can be enhanced, or lost, depending upon the future effects of succession and conservation interventions.

References

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Table 1
Species recorded, 2018

Species * - added by this survey Species mentioned in the text	Bee/Wasp type	pollen/prey dependency (r) – includes Ragwort	Nectar flora (r) – includes Ragwort	Lake G	Lake H/I	Lake J/P
SOLITARY BEES						
Andrena bicolor	soil nesting	polylectic	generalist (r)	13		
*Andrena cineraria**	soil nesting	polylectic	generalist	2	5	3
Andrena dorsata	soil nesting	polylectic	generalist (r)	6		
Andrena flavipes	soil nesting	polylectic (r)	generalist (r)	20	2	3
*Andrena fulva**	soil nesting	polylectic	generalist			1
Andrena haemorrhoa	soil nesting	polylectic	generalist	2		
Andrena minutula	soil nesting	polylectic	generalist (r)	18		1
Andrena nigroaenea	soil nesting	polylectic	generalist (r)	1		
Andrena nitida	soil nesting	polylectic	generalist	16	2	1
*Andrena scotica**	soil nesting	polylectic	generalist (r)	1		
*Andrena tibialis**	soil nesting	polylectic	generalist	1		
*Chelostoma campanularum**	aerial nesting	polylectic	generalist		1	
*Colletes hederae**	soil nesting	*Hedera helix*	generalist	1		
Halictus tumulorum	soil nesting	polylectic	generalist (r)	18	7	4
*Hoplitis claviventris**	aerial nesting (r)	polylectic	generalist	1		
Hylaeus brevicornis	aerial nesting	polylectic	generalist (r)		1	
Hylaeus communis	aerial nesting	polylectic	generalist	1	1	
Hylaeus confuses	aerial nesting	polylectic	generalist		1	
Hylaeus cornutus	aerial nesting	polylectic	generalist	3		
Hylaeus dilitatus	aerial nesting	polylectic	generalist	4	5	1
Lasioglossum calceatum	soil nesting	polylectic	generalist (r)	5	1	3
Lasioglossum fulvicorne	soil nesting	polylectic	generalist (r)	10	2	3
Lasioglossum leucozonium	soil nesting	polylectic	generalist	2	5	
Lasioglossum malachurum	soil nesting	polylectic	generalist	33	2	
Lasioglossum minutissimum	soil nesting	polylectic	generalist	7		1
Lasioglossum morio	soil nesting	polylectic	generalist	9	2	10
Lasioglossum pauxillum	soil nesting	polylectic	generalist	11	3	2
Lasioglossum punctatissimum	soil nesting	polylectic	generalist (r)	1		
Lasioglossum puncticolle	soil nesting	polylectic	generalist	81	6	4
Lasioglossum villosulum	soil nesting	polylectic	generalist (r)			1
*Lasioglossum zonulum**	soil nesting	polylectic	generalist (r)	3	1	
Nomada fabriciana	cuckoo	various	generalist (r)	8		
Nomada flava	cuckoo	*A. scotica*	generalist			1
Nomada flavoguttata	cuckoo	*A. minutula*	generalist	6	1	
*Nomada flavopicta**	cuckoo	*Melitta sp.*	generalist (r)			1
Nomada goodeniana	cuckoo	*A. nigroaenea*	generalist (r)			1
*Nomada lathburiana**	cuckoo	*A. cineraria*	generalist			1
Osmia bicolor	shell nesting	polylectic	generalist	15	9	3
*Osmia bicornis**	aerial nesting	polylectic	generalist			1
*Osmia leaiana**	aerial nesting	Asteraceae	generalist (r)			1
Osmia spinulosa	shell nesting	Asteraceae	generalist (r)	9	4	2
Sphecodes crassus	cuckoo	*L. parvulum*	-	1		
Sphecodes ephippius	cuckoo	*L. calceatum*	generalist		1	
Sphecodes monilicornis	cuckoo	*L. calceatum*	generalist (r)	1		1
Sphecodes niger	cuckoo	*L. morio*	generalist			8
*Sphecodes pellucidus**	cuckoo	*Andrena barbilabris*	generalist	1	2	1
*Stelis odontopyga**	cuckoo	*O. spinulosa*	generalist (r)	1		

BUMBLEBEES						
Bombus hortorum	social	polylectic	generalist		1	1
*Bombus hypnorum**	social	polylectic	generalist	1	1	
Bombus lapidaries	social	polylectic	generalist (r)	1	1	1
Bombus pascuorum	social	polylectic	generalist	1	1	1
Bombus pratorum	social	polylectic	generalist			1
Bombus ruderarius	social	polylectic	generalist (r)		1	
Bombus terrestris	social	polylectic	generalist (r)	1	1	1
Bombus vestalis	social cuckoo	*B. terrestris*	generalist (r)			1
SOLITARY WASPS						
Anoplius nigerrimus	spider hunting	spiders	Umbel	6	2	
Arachnospila anceps	spider hunting	spiders	-	1		
Cerceris quinquefasciata	soil nesting	beetles	bramble thistle		1	
Cerceris rybyensis	soil nesting	solitary bees	Umbel		2	
Chrysis angustula	cuckoo	potter wasps	-		1	
*Chrysis gracillima**	cuckoo	*Trypoxylon sp.*	Umbel	1		
*Crossocerus varus**	soil nesting	flies	Umbel	1		
Diodontus luperus	soil nesting	hemiptera	Umbel			1
Ectemnius continuus	aerial nesting	flies	Umbel	1		
Gymnomerus laevipes	potter	beetle larvae	generalist	2	1	2
Harpactus tumidus	soil nesting	hemiptera	Umbel			1
Hedychridium ardens	cuckoo	*Tachysphex sp.*	generalist		1	3
*Hedychrum niemelai**	cuckoo	*C. arenaria*	claries etc	1	1	1
Mellinus arvensis	soil nesting	flies	-	1		
*Microdynerus exilis**	potter	beetle larvae	generalist			1
Nysson trimaculatus	cuckoo	*G. trimaculatus*	-	2	2	1
Odynerus melanocephalus	potter	beetle larvae	Umbel	1		
Oxybelus uniglumis	soil nesting	flies	generalist			1
Passaloecus singularis	aerial nesting	hemiptera	-	1		
Priocnemis exaltata	spider hunting	spiders	Umbel	2		
*Priocnemis fennica**	spider hunting	spiders	Umbel	1	3	1
*Priocnemis perturbator**	spider hunting	spiders	generalist	1		
Pseudomalus auratus	cuckoo	wasps	Umbel	1		
Tachysphex pompiliformis	soil nesting	nymphs	Umbel			2
Tiphia femorata	soil nesting	beetle larvae	generalist (r)	3		4
*Tiphia minuta**	soil nesting	beetles	Umbel	1		1
Trichrysis cyanea	cuckoo	*Trypoxylon sp.*	Umbel			1
Trypoxylon attenuatum	aerial nesting	spiders	-	3	1	1
Trypoxylon medium	aerial nesting	spiders	-	1	1	
SOCIAL WASPS						
Vespa crabro	social	invertebrates	generalist			1
Vespula germanica	social	invertebrates	generalist	1		
Vespula vulgaris	social	invertebrates	generalist	1	1	

Table 2

Species recorded in the 2006/2011 surveys and not re-found in 2018

Species Species mentioned in the text	Bee/Wasp type	pollen/prey dependency (r) = includes Ragwort	Nectar flora (r) = includes Ragwort	Wright 2006	Bioscan 2011
SOLITARY BEES					
Andrena apicata	soil nesting	polylectic	generalist	#	
Andrena chrysosceles	soil nesting	polylectic	generalist	#	
Andrena clarkella	soil nesting	*Salix sp.*	Asteraceae	#	
Andrena fucata	soil nesting	polylectic	generalist	#	
Andrena labialis	soil nesting	polylectic	generalist	#	#
Andrena ovatula	soil nesting	polylectic	generalist (r)		#
Andrena praecox	soil nesting	*Salix sp.*	restricted	#	
Andrena subopaca	soil nesting	polylectic	generalist	#	
Andrena wilkella	soil nesting	polylectic	generalist (r)	#	
Anthophora plumipes	soil nesting	polylectic	generalist	#	
Hylaeus hyalinatus	aerial nesting	polylectic	generalist	#	
Lasioglossum albipes	soil nesting	polylectic	generalist (r)		#
Lasioglossum lativentre	soil nesting	polylectic	generalist	#	#
Lasioglossum leucopus	soil nesting	polylectic	generalist (r)	#	
Lasioglossum parvulum	soil nesting	polylectic	generalist (r)	#	
Lasioglossum smeathmanellum	soil nesting	polylectic	generalist (r)	#	
Megachile ligniseca	aerial nesting	polylectic	generalist (r)	#	
Megachile versicolor	aerial nesting	polylectic	generalist	#	#
Melitta leporine	soil nesting	clovers	generalist (r)		#
Mellita tricincta	soil nesting	Red Bartsia	Red Bartsia		#
Nomada ferruginata	cuckoo	*A. praecox*	generalist	#	
Nomada fucata	cuckoo	*A. flavipes*	generalist (r)	#	#
Sphecodes hyalinatus	cuckoo	*L. fulvicorne*	generalist	#	
Sphecodes longulus	cuckoo	*L. minutissimum*	generalist (r)	#	
Sphecodes puncticeps	cuckoo	*L. villosulum*	generalist	#	
Sphecodes reticulatus	cuckoo	?	generalist		#
Stelis ornatula	cuckoo	*H. claviventris*	generalist (r)	#	
BUMBLEBEES					
Bombus barbutellus	social cuckoo	*B. hortorum*	generalist	#	
Bombus campestris	social cuckoo	*B. pascuorum*	generalist	#	
Bombus lucorum s.l.	social	polylectic	generalist	#	#
SOLITARY WASPS					
Ammophila sabulosa	soil nesting	larvae	-	#	
Ancistrocerus gazella	potter	larvae	generalist	#	
Ancistrocerus trifasciatus	potter	larvae	generalist		#
Anoplius caviventris	spider hunting	spiders	generalist	#	
Anoplius infuscatus	spider hunting	spiders	Umbel	#	#
Arachnospila minutula	spider hunting	spiders	Umbel	#	
Argogorytes mystaceus	aerial nesting	hemiptera	Umbel	#	
Caliadurgus fasciatellus	spider hunting	spiders	-	#	
Cerceris arenaria	soil nesting	beetles	bramble thistle		#
Chrysis rutiliventris	cuckoo	wasps	generalist		#
Crabro cribrarius	soil nesting	flies	Umbel	#	
Crossocerus elongatulus	aerial nesting	flies	Umbel	#	
Crossocerus ovalis	soil nesting	flies	Umbel		#
Didineis lunicornis	soil nesting	hemiptera	Umbel		#
Dolichovespula media	social	invertebrates	generalist		#

Dolichovespula saxonica	social	invertebrates	generalist	#	
Ectemnius lituratus	aerial nesting	flies	Umbel	#	
Ectemnius sexcinctus	aerial nesting	flies	Umbel	#	
Entomognathus brevis	soil nesting	beetle larvae	Umbel	#	#
Episyron rufipes	spider hunting	spiders	Umbel	#	
Evagetes crassicornis	spider hunting	spiders	generalist	#	
Gorytes quadrifasciatus	soil nesting	hemiptera	Umbel		#
Lindenius albilabris	soil nesting	hemiptera	oxeye	#	
Mimumesa unicolor	soil nesting	-	Umbel		#
Myrmosa atra	cuckoo	hymenoptera	Umbel		#
Nysson dimidiatus	cuckoo	*H. tumidus*	Umbel	#	
Odynerus spinipes	potter	beetle larvae	generalist	#	
Pemphredon inornata	aerial nesting	hemiptera	-	#	#
Pemphredon lethifer	aerial nesting	hemiptera	-	#	#
Pemphredon lugubris	aerial nesting	hemiptera	-	#	#
Pemphredon morio	aerial nesting	hemiptera	-	#	
Philanthus triangulum	soil nesting	bees	generalist (r)	#	
Priocnemis agilis	spider hunting	spiders	Umbel	#	
Priocnemis parvula	spider hunting	spiders	Umbel	#	
Psenulus pallipes	aerial nesting	hemiptera	generalist		#
Rhopalum coarctatum	aerial nesting	flies	Umbel	#	
Spilomena troglodytes	aerial nesting	thrips	-		#
Stigmus solskyi	aerial nesting	hemiptera	-	#	
Symmorphus gracilis	potter	beetle larvae	Umbel		#
Trypoxylon clavicerum	aerial nesting	spiders	-	#	
Trypoxylon figulus s.l.	aerial nesting	spiders	-	#	