

# CROWN FARM NATURE RESERVE CHESHIRE

A baseline invertebrate survey for the Tanyptera  
Project

2019 - 2021



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Appendix 1 Species data in separate spreadsheet file

## **1. PROJECT SPECIFICATION**

The Tanyptera Project commissioned Nigel Jones to undertake an invertebrate survey of the Cheshire Wildlife Trust Nature Reserve – Crown Farm Quarry. The project was required specifically to:

- i.** Survey Crown Farm Nature Reserve monthly in favourable weather conditions during the main 2019 invertebrate season and early 2020 season.
- ii.** Deploy pitfall traps – to be emptied and re-charged fortnightly
- iii.** Identify and report on any current management practises that could have a detrimental effect on the status of any Nationally Rare, Scarce or Threatened invertebrate species found or any key invertebrate habitat, and any opportunities to improve / secure habitat quality and populations of scarce invertebrates in the future.
- iv.** Submit a final report containing all findings and suggestions for further study / future surveillance and monitoring by 30 April 2020.

## **2. CROWN FARM QUARRY NATURE RESERVE**

Crown Farm Nature Reserve is a 17 hectare partly restored sand quarry, which forms a post extraction/restoration phase of the larger active Cheshire Sands quarry in Oakmere. The site is a new nature reserve and is currently undergoing restorative management as Cheshire Wildlife Trust look to enhance biodiversity.

The reserve features a range of habitats and niches including: recreated flower rich grassland, sparsely vegetated exposed soils, recently planted broadleaved woodland, natural regenerated mainly birch/alder woodland, open water, and sandy substrates ranging from very well drained soils to damp shore line and ephemerally damp/wet soils.

## **3. METHOD**

Five survey days were undertaken, approximately monthly between April – August:

10 May 2019 – sunny conditions throughout;

3 July 2019\* – sunny conditions with spells of cloud cover;

30 July 2019 – sunny conditions until 14:30, with cloud cover and medium-warm temperatures after 14:30;

23 August 2019 – mainly warm, sunny conditions throughout;

14 April 2021 – cool overcast conditions with around 1.5 hours of sunny spells.

\*Unusually wet weather throughout much of June delayed that month's visit until early July. However the fauna collected on 3 July was quite typical of a mid June suite of Diptera and aculeate Hymenoptera species.

On each of the 2019 survey days, the following techniques were employed:

- Search and aerial netting of insects on flowers, leaves and tree foliage;
- Sweep-netting over and through ground vegetation, over flower heads, over sparsely vegetated ground and over tree foliage;
- Pan-trapping: Up to fifty pans were set out at seven (varying) stations around the site. These were located in various situations with the aim of sampling from the shore line of pools, areas of bare and sparsely vegetated sand, flower rich areas and beneath trees.

In addition pitfall traps were set out at four stations, with three pitfalls in each location.

Fig. 1 shows the locations of the pitfall stations. The OS grid references for the pitfall stations were:

**1:** SJ 5729 7031; **2:** SJ 5724 7042; **3:** SJ 5710 7036; **4:** SJ 5700 7013.



Figure 1. Locations of pitfall traps.

Pitfall samples were collected by SWT personnel on the following dates:

14 May (pitfalls set out), 4 June, 5 July, 25 July, 23 August, 5 September.

The pitfalls were charged with a 50/50 mixture of monopropylene glycol and water.

## 4. RESULTS

With a number of specimens remaining to be determined accurately, 510 species were recorded including 284 Diptera species, 105 aculeate Hymenoptera species and 87 Coleoptera species. The Coleoptera species determined to date are overwhelmingly those from pitfall samples.

### Species with conservation statuses

31 species with designated conservation statuses were recorded. Table 2 summarises the species and comments on their current informally reviewed status. Some species were last reviewed as long ago as 1991. The current informal status is an attempt to update these statuses with regard to improved knowledge of or changes to species distributions. The Hymenoptera informal statuses are those given by Archer (2007 & 2011). Table 2 details the habitat preferences and biology of these species. The statuses for Coleoptera are those given in Telfer (2016). Diptera statuses are from a variety of reviews: LIST THEM

Species	Status	Current informal status or notes
<b>HYMENOPTERA</b>		
<i>Andrena humilis</i>	Nb (1991)	Widespread. A local species of sandy sites.
<i>Andrena nigriceps</i>	Nb (1991)	<b>Scarce</b>
<i>Hedychridium cupreum</i>	Nb (1991)	<b>Scarce</b>
<i>Colletes fodiens</i>	EN (European)	<b>Vulnerable in Europe</b> (Nieto <i>et al.</i> 2015) widespread but local in sandy districts of England and Wales.
<i>Diodontus insidiosus</i>	RDB 3 (1991)	<b>Scarce</b>
<i>Gorytes laticinctus</i>	RDB 3 (1991)	Rare, but in very recent years this species has dramatically increased its range.
<i>Nysson dimidiatus</i>	Nb (1991)	<b>Scarce</b>
<i>Nysson trimaculatus</i>	Nb (1991)	Widespread
<i>Philanthus triangulum</i>	RDB 2 (1991)	Widespread
<i>Lasioglossum quadrinotatum</i>	Na (1991)	<b>Scarce</b>
<i>Sphecodes crassus</i>	Nb (1991)	<b>Scarce</b>
<i>Sphecodes reticulatus</i>	Na (1991)	Widespread
<i>Priocnemis schioedtei</i>	Nb (1991)	Universal
<i>Dolichovespula saxonica</i>	RDB K (1991)	Now widespread in England and Wales
<b>COLEOPTERA</b>		
<i>Amara fulva</i>	Vulnerable	Regarded as Vulnerable and declining, which could expose it to an increased extinction risk.
<i>Amara praetermissa</i>	NS	Nationally Scarce
<i>Carabus monilis</i>	IUCN status: Endangered. UK Status NS and Section 41 Priority Species	Has undergone a “massive decline” There are records from only 11 hectads nationally during 2003-14 (Telfer, 2016).
<i>Dyschirius politus</i>	NS	Widespread but very local in England, coastal Wales and Scotland.
<i>Sibinia primita</i>	Nb (1991)	Now fairly widespread, but local.
<b>DIPTERA</b>		

<i>Acartophthalmus bicolor</i>	pNS	
<i>Lasiopogon cinctus</i>	NS	
<i>Fannia nigra</i>	pNS	
<i>Coenosia atra</i>	pNS	
<i>Limnophora nigripes</i>	pNT	
<i>Conisternum decipiens</i>	Notable (1991)	A scarce southern species (Ball, 2020)
<i>Pherbellia griseola</i>	Notable (1991)	Very local (Ball, 2017)
<i>Meigenia majuscula</i>	RDB 2 (1991)	Ten UK records (Tachinid Recording Scheme)
<i>Sarcophaga subulata</i>	pNS	About twenty post-1960 UK records.
<i>Acanthiophilus helianthi</i>	Notable (1991)	Local, mainly in southern England
<i>Campiglossa malaris</i>	RDB 1 (1991)	Widespread and local in southern Britain

Table 2 – species with conservation designations recorded at Crown Farm.

**Notation:** NS – Nationally Scarce; pNS – Provisionally Nationally Scarce; Notable, Na Nb – Nationally Notable (designations from Falk (1991a and 1991b)); RDB1, RDB2 and RDB3 – Red Data Book 1, 2, 3, RDBK - Insufficiently Known (designations from Falk (1991a and 1991b)).

Habitat and biology of species with nature conservation statuses:

Species	Habitat and biology notes
<b>HYMENOPTERA</b> – notes are from <a href="http://www.bwars.com">www.bwars.com</a> [accessed 8 February 2020].	
<i>Andrena humilis</i>	Most often associated with sandy soils. It seems to restrict all flower visits to yellow-flowered Asteraceae.
<i>Andrena nigriceps</i>	Associated with flowery grasslands on lighter soils. Regarded as polylectic but most often associated with knapweed flowers.
<i>Hedychridium cupreum</i>	Found in open sandy situations. A parasitoid on the mature larvae, or a cleptoparasite on the food stores of the wasp <i>Dryudella pinguis</i> .
<i>Colletes fodiens</i>	Sandy districts. Oligolectic on the pollen of flowers in the family Asteraceae. Especially found at ragwort ( <i>Senecio jacobaea</i> ).
<i>Diodontus insidiosus</i>	Open sandy situations, especially heathland and sandpits on Tertiary deposits. Biology unknown, but probably preys on aphids.
<i>Gorytes laticinctus</i>	Nesting occurs in light soils. Prey is auchenorhynchus bugs such as <i>Philaenus spumarius</i> , <i>Cercopis</i> spp. and <i>Aphrophora alni</i> .
<i>Nysson dimidiatus</i>	The host <i>Harpactus tumidus</i> favours sparsely-vegetated or short-cropped areas on dry sandy or clayey soils fully exposed to the sun.
<i>Nysson trimaculatus</i>	A variety of open habitats on light soils. A cleptoparasite of <i>Gorytes quadrifasciatus</i> and <i>G. bicinctus</i> .
<i>Philanthus triangulum</i>	Sandy districts. Preys mainly on honeybees, but occasionally other bees such as <i>Andrena</i> and <i>Bombus</i> .
<i>Lasioglossum quadrinotatum</i>	Heaths, calcareous grassland and in open woodland. Flower preference is poorly understood.
<i>Sphecodes crassus</i>	Heathland, calcareous grassland, disturbed locations such as quarries. A cleptoparasite of mining bees of the genus <i>Lasioglossum</i> .
<i>Sphecodes reticulatus</i>	Light soils, including sandy heath, soft rock cliffs, sandpits. Biology unknown but hosts may include <i>Lasioglossum</i> and <i>Andrena</i> species.
<i>Priocnemis schioedtei</i>	Usually in open situations on sandy soils. Hunts spiders, probably of the family Clubionidae, but also Gnaphosidae, Salticidae and Lycosidae.
<i>Dolichovespula saxonica</i>	A social wasp, nesting in a wide variety of situations.
<b>COLEOPTERA</b>	
<i>Amara fulva</i>	This is a habitat-specialist of relatively small, relatively isolated, early-

	successional, and often ephemeral, habitat patches.
<i>Amara praetermissa</i>	Dry, well drained and often disturbed habitats, including grassland, dunes and brownfield sites.
<i>Carabus monilis</i>	Cultivated fields, grasslands and scrub. This is a flightless species which disperses on foot.
<i>Dyschirius politus</i>	In saltmarshes on bare sand, very occasionally inland in sandpits.
<i>Sibinia primita</i>	On coastal cliffs, dunes, sandpits and disturbed ground in general. Appears to be associated mainly with <i>Sagina</i> .
<b>DIPTERA</b>	
<i>Acartophthalmus bicolor</i>	Most frequently recorded in woodland. Biology poorly understood but appears to be associated with fungi and decaying organic matter (Falk <i>et al.</i> 2016).
<i>Lasiopogon cinctus</i>	Dry, sandy soils on dunes and heaths, usually in the proximity of trees.
<i>Fannia nigra</i>	Broad-leaved woodland. Biology unknown, but <i>Fannia</i> are associated with decaying organic matter (Falk & Pont 2017).
<i>Coenosia atra</i>	Marshy areas on heaths, rush <i>Juncus</i> and sedge <i>Carex</i> fens and dune slacks (Falk & Pont 2017).
<i>Limnophora nigripes</i>	On sand and gravel banks around lakes and alongside rivers (Falk & Pont 2017).
<i>Conisternum decipiens</i>	Mostly recorded from damp places including coastal marsh, vegetation around ponds, long vegetation in fen (especially <i>Carex</i> beds) and carr woodland (Ball, 2020).
<i>Pherbellia griseola</i>	Temporary and permanent marshes and swamps and around standing water with fluctuating levels. Larvae feed upon freshwater snails.
<i>Meigenia majuscula</i>	Coastal grassland and downland. A parasitoid of leaf beetles - Chrysomelidae.
<i>Sarcophaga subulata</i>	Calcareous grassland, sandy heaths, and broad-leaved woodland. Has been reared in mainland Europe from the gypsy moth <i>Lymantria dispar</i> ) and in England from the Kentish snail <i>Monacha cantiana</i> .
<i>Acanthiophilus helianthi</i>	Associated with the capitula of knapweed - <i>Centaurea nigra</i>
<i>Campiglossa malaris</i>	Associated with ragwort - <i>Jacobaea vulgaris</i>

### Arachnida - Spiders

Richard Gallon kindly identified the Arachnida from pitfall traps and highlighted the following species which are associated with dry habitats:

*Arctosa perita*

*Drassyllus pusillus* (only the second 10km square for this species in VC58).

*Phrurolithus festivus* (only the 4th 10km square for this species in VC58).

*Asagena phalerata* (only the second 10km square for this species in VC58).

*Pelecopsis parallela*

*Talavera aequipes* (only the 3rd 10km square for this species in VC58).

*Cheiracanthium virescens* (**Nationally Scarce** - new 10km square record).

*Zelotes latreillei* (only the 4th 10km square for this species in VC58).

*Micaria micans*

## 5. DISCUSSION

Tables 1 and 2 detail a significant range of scarce species associated with sandy soils, bare and sparsely vegetated soils, indicating that Crown Farm Nature Reserve has significant value for its range of sandy habitat associated invertebrate species. Among the species listed in Table 1 some particularly noteworthy species are:

- The mining bee *Lasioglossum quadrinotatum* of which 29 specimens were noted in compartments 2, 3, 4, 5a, 5b, 11a and 11b, indicating that this scarce bee is well established at the site.
- The mining bee *Colletes fodiens* which although reasonably widespread and frequent in Britain, is regarded as vulnerable to extinction in Europe.
- The solitary wasp *Diodontus insidiosus* which is very scarce outside its south east England stronghold.
- The cuckoo-wasp *Hedychridium cupreum* which is very scarce in England and Wales, and is almost exclusively coastal in the west of its range.
- The ground-beetle *Carabus monilis* which has undergone a dramatic decline in Britain and has very limited dispersal ability. It is thus regarded as vulnerable to extinction in Britain, and worthy of protection at any sites it occurs at.
- The Muscid fly *Limnophora nigripes* for which there are only eight post 1960 records in the UK.
- The parasitoid-fly *Meigenia majuscula* with only ten UK records.
- The Flesh fly *Sarcophaga subulata* with around 20 post-1960 records.

### Species assemblages

The list of species recorded from Crown Farm in 2019 was added to the Pantheon online database (Webb *et al.* 2020) and analysed to provide an indication of the species assemblages, and their condition, present on site. Two significant assemblages were identified – a rich flower resource assemblage and a bare sand and chalk assemblage, with the site being assessed as in *favourable condition* for these two invertebrate species assemblage types.

The rich flower resource assemblage, largely associated with mining bees that will be nesting in the sandy soils of Crown Farm, is a strong assemblage with 19% (46/219 species) representation of the national species assemblage. The species are listed in Table 3 below:

*Andrena angustior*

*Andrena bicolor*

*Andrena chrysoceles*

*Bombus hypnorum*

*Bombus lapidarius*

*Bombus pascuorum*

*Lasioglossum lativentre*

*Lasioglossum leucopus*

*Lasioglossum leucozonium*

<i>Andrena cineraria</i>	<i>Bombus sylvestris</i>	<i>Lasioglossum minutissimum</i>
<i>Andrena clarkella</i>		
<i>Andrena dorsata</i>	<i>Bombus terrestris</i>	<i>Lasioglossum morio</i>
<i>Andrena flavipes</i>	<i>Bombus vestalis</i>	<i>Lasioglossum nitidiusculum</i>
<i>Andrena haemorrhoea</i>	<i>Epeolus cruciger</i>	<i>Lasioglossum parvulum</i>
<i>Andrena humilis</i>	<i>Nomada fabriciana</i>	<i>Lasioglossum punctatissimum</i>
<i>Andrena minutula</i>	<i>Nomada flava</i>	<i>Lasioglossum quadrinotatum</i>
<i>Andrena nigriceps</i>	<i>Nomada goodeniana</i>	<i>Lasioglossum smeathmanellum</i>
<i>Andrena nigroaenea</i>	<i>Nomada marshamella</i>	<i>Lasioglossum villosulum</i>
<i>Andrena nitida</i>	<i>Nomada ruficornis</i>	<i>Megachile centuncularis</i>
<i>Andrena scotica</i>	<i>Colletes fodiens</i>	<i>Megachile maritima</i>
<i>Andrena subopaca</i>	<i>Colletes succinctus</i>	<i>Megachile willughbiella</i>
<i>Andrena wilkella</i>	<i>Halictus tumulorum</i>	
<i>Bombus hortorum</i>	<i>Lasioglossum cupromicans</i>	

Table 3 Rich flower resource species assemblage of Crown Farm Quarry. Note: An additional species would be from the *Bombus lucorum* aggregate involving three species that cannot be reliably separated.

The bare sand and chalk assemblage contains Coleoptera, Diptera, Heteroptera and aculeate Hymenoptera species that are strongly associated with short sward & bare ground habitat, with 6% (25/453 species) representation of the national species assemblage. The species are listed in Table 4 below:

<i>Amara eurynota</i>	<i>Corizus hyoscyami</i>	<i>Mellinus arvensis</i>
<i>Amara fulva</i>	<i>Hedychridium ardens</i>	<i>Lasioglossum parvulum</i>
<i>Philopodon plagiatum</i>	<i>Hedychridium cupreum</i>	<i>Sphecodes pellucidus</i>
<i>Dysmachus trigonus</i>	<i>Colletes fodiens</i>	<i>Megachile maritima</i>
<i>Lasiopogon cinctus</i>	<i>Colletes succinctus</i>	<i>Anoplius infuscatus</i>
<i>Machimus cingulatus</i>	<i>Crabro cribrarius</i>	<i>Arachnospila trivialis</i>
<i>Senotainia conica</i>	<i>Crossocerus wesmaeli</i>	<i>Pompilus cinereus</i>
<i>Thereva bipunctata</i>	<i>Diodontus insidiosus</i>	
<i>Trixoscelis obscurella</i>	<i>Dryudella pinguis</i>	

Table 4 Bare sand and chalk species assemblage of Crown Farm Quarry.

### Accessing the Pantheon Analysis online

To access the dataset and view the full analysis for Crown Farm in Pantheon go to:

**[www.brc.ac.uk/pantheon/](http://www.brc.ac.uk/pantheon/)** and follow the links from the home page:

> Explore

> Explore all samples

> Then enter the ID number for the Crown Farm dataset: **7537919**

> press tab or return

> click on “view” to see the full analysis for Crown Farm.

## **6. HABITAT MANAGEMENT OPPORTUNITIES**

Crown Farm has an important invertebrate fauna associated with sunlit, sparsely vegetated sandy soils with a strongly complementary rich flower resource. The sparsely vegetated resource includes dry sandy slopes with developing vegetation, bare and very sparsely vegetated sand, and sparsely vegetated damp sand around pool edges. Areas of flower rich grassland and developing heathland provide a vital nectar resource for many of the ground nesting bees as well as other flower feeding insects. These highly complementary resources should be maintained in a balance that ensures both resources are available in quantity. Methods for maintaining this balance of key resources could include:

- Limiting tree planting as areas planted with trees will eliminate both bare soil and flower rich resources through over-shading.
- Introduce grazing in order to arrest successional processes that will also destroy the early successional sparsely vegetated soil and flower rich grassland resource.
- If grazing cannot be introduced, consider regularly creating new areas of disturbed and exposed soils, so that this resource is always available and is constantly renewed. Areas subjected to sun such as east and south facing slopes, and open areas that are not over-shaded, will provide the best situations for this type of high impact management.
- To enhance the fauna of ground-nesting bees and other early season insects, consider planting or allowing to regenerate goat willow (or similar willow), blackthorn and hawthorn. These trees can provide a significant early season pollen and nectar resource between March – May. Willows should include male trees which are important for several willow specialist ground nesting bees.

### **Acknowledgements**

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### **References**

ARCHER, M. 2007.

ARCHER, M. 2011.

BALL, S. 2020 <http://scathophagidae.myspecies.info/taxonomy/term/28/descriptions>

FALK, S.J., ISMAY, J.W. & CHANDLER, P.J. 2016. *A Provisional Assessment of the Status of Acalypterae flies in the UK*. Natural England Commissioned Reports, Number 217.

FALK, S.J. 1991

FALK, S.J. 1991

FALK, S.J., & PONT, A.C. 2017. *A Provisional Assessment of the Status of Calypterate flies in the UK*. Natural England. Commissioned Reports, Number 234.

NIETO, A., STUART P.M. ROBERTS, JAMES KEMP, PIERRE RASMONT, MICHAEL KUHLMANN, MARIANA GARCÍA CRIADO, JACOBUS C. BIESMEIJER, PETR BOGUSCH, HOLGER H. DATHE, PILAR DE LA RÚA, THIBAUT DE MEULEMEESTER, MANUEL DEHON, ALEXANDRE DEWULF, FRANCISCO JAVIER ORTIZ-SÁNCHEZ, PATRICK LHOMME, ALAIN PAULY, SIMON G. POTTS, CHRISTOPHE PRAZ, MARINO QUARANTA, VLADIMIR G. RADCHENKO, ERWIN SCHEUCHL, JAN SMIT, JAKUB STRAKA, MICHAEL TERZO, BOGDAN TOMOZII, JEMMA WINDOW AND DENIS MICHEZ. 2015. *European red List of Bees*. IUCN Global Species Programme

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.

WEBB, J., HEAVER, D., LOTT, D., DEAN, H.J., VAN BREDA, J., CURSON, J., HARVEY, M.C., GURNEY, M., ROY, D.B., VAN BREDA, A., DRAKE, M., ALEXANDER, K.N.A. AND FOSTER, G. (2018). Pantheon - database version 3.7.6 [online] Available at: <http://www.brc.ac.uk/pantheon/> [Accessed 10 February 2020].