



# Cheshire Wildlife Trust

---

## Heteroptera and Diptera surveys in the Delamere Forest, 2013-2017

by

**Phil Brighton**

32, Wadeson Way, Croft, Warrington WA3 7JS

helophilus@hotmail.co.uk

on behalf of

Cheshire Wildlife Trust

Version 1.0

October 2017

---

## Abstract

This report provides the results of a series of heteroptera and diptera surveys carried out in the Delamere Forest itself and some of the satellite woodland and bogs. A full list is given of the 460 species recorded and their distribution across the surveyed area. This species list is interpreted in terms of habitat assemblages using the PANTHEON software recently made available by the Biological Records Centre. This showed a strong representation of wet woodland species in the sample. The national assemblages of peatland and decaying wood species were much less well represented but included a higher proportion of rare or scarce species. Of particular note was the find in 3 new locations of the hoverfly *Orthonevra intermedia*: Delamere remains the only known British location for this species following the original discovery in 2003. The Red Databook crane fly *Idioptera linnei* was found at Abbots Moss for the first time since 1969, only the second record in the Delamere area since then. Both these species should benefit from the restoration of the Delamere mossland.

---

## Introduction

In 2003, at an early stage of the Delamere Lost Mosses project Martin Drake was commissioned to carry out an extensive survey of terrestrial invertebrates across the Delamere area<sup>1</sup>. The bulk of the records from this survey were of beetles (Coleoptera) and true flies (Diptera), but other orders were also covered. The methods used were sweep-netting, pitfall trapping and direct observation on walks in 27 of the very numerous peat basins in the main block of Delamere forest. An additional 4 peat bodies in the surrounding area (Thieves Moss and Leech Mere in SJ5669, Gull Moss in SJ6068, and Sherratt's Rough in SJ6169) were also surveyed.

This report presents results from my own voluntary and amateur surveys of heteroptera and diptera in this area over the past five seasons. The earlier stages of this work have been described in two earlier reports<sup>2,3</sup>. Comparison of the results with those of Ref 1 gave confidence that these surveys could make a significant additional contribution to knowledge of the Forest's invertebrate fauna. Further surveys have been carried out in the succeeding two years, covering additional areas and also extending the range of fly families covered. These surveys have not been limited to the peat basins surveyed in Ref 1.

The method of sampling based on sweep-netting of vegetation supplemented by direct visual observations (and capture if required for identification) remains as described in Ref 2. For the purposes of presenting the results, the area covered has been divided into eight parts. The following table lists these and the main specific sites within these visited during the surveys:

Abbots Moss area	Shemmy Moss, South Bog, Whitegate Way
East	Finney's Basin, Harthill Moss
Hatchmere area	Blain's Moss, Norley Moss, Hatchmere wood
North	Alvanley Basin, Bainsbridge, Doolittle, Ham Pool
Primrosehill	Harrow Hill, Tirley Hollow, Urchin's Kitchen
South	Blakemere, Hunger Hill, Linmer
South-west	Black Lake, Great, Midgel, Hockenhull, Little Midgel
West	Harrison's, New Pale, Whitemoor Valleys

Table 1 towards the end of this report lists the dates of visits and areas visited as well as the number of records obtained. As in the earlier reports, a "record" denotes the presence of a species in a specific 100m square (ie six-figure grid reference) on a specific date. Owing to the size and complexity of the forest, many of the surveys were also explorations with samples being taken along a lengthy itinerary. Where areas of particularly distinctive and productive habitat have been found repeat visits have been made. The maximum number of records in one day was 164, but the number was much lower on other occasions if other activities were being carried out on the day, if it

was early or late in the season with fewer species to be found, or if bad weather curtailed proceedings.

Further summarising this information according to the months in which records were obtained gives the following overview:

Area	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Abbots Moss area			17		11	63		91
East							61	61
Hatchmere area		31	58	123		118	168	498
North		19	99	12	35	96	17	278
Primrosehill	23							23
South			33	3		96	23	155
South-west			58	155		120		333
West		8		1	129	159		297
<b>Total number of records</b>	<b>23</b>	<b>58</b>	<b>265</b>	<b>294</b>	<b>175</b>	<b>652</b>	<b>269</b>	<b>1736</b>

This table\* shows that particular attention has been paid to the CWT reserve comprising Norley Moss and the Hatchmere wood, both because of the easy access but also the different character of the wet woodland there from the rest of the Delamere Forest. "Hatchmere" was also frequently visited by earlier dipterists (see Ref 2) giving the possibility of finding longer-term changes in the fauna, though this aspect is not explored in the current report. The bias to recording in August has not been intentional: indeed May and June are generally regarded as the peak months for diptera diversity.

It should be noted that some of the records in this report are yet to be verified by the local recording centres or national recording schemes.

## Species recorded

Tables 2-7 list the species recorded for each of the areas defined above. The grouping of the data largely follows those explained in the two previous reports<sup>2,3</sup>, except that the calyptrate fly families are now listed separately: this is because the scope of species covered has been increased thanks to the acquisition of recent identification keys for most of these families.

The right-hand column in Tables 2-7 indicates species not recorded in the 2003 survey by Martin Drake. Species recorded in 2003 but not in the 2013-17 surveys are not listed. The following table compares the coverage of the two sets of data in terms of species groups.

Group	Drake (2003)	Current Surveys	Not recorded by Drake (2003)	Combined total
Terrestrial heteroptera	9	60	53	62
Craneflies	75	74	28	103
Hoverflies	38	47	17	55
Empidoidea	120	85	23	143
Calyptrates	33	109	90	123
Other diptera	161	85	30	191
<b>Total no. of species</b>	<b>437</b>	<b>460</b>	<b>242</b>	<b>677</b>

\* The total number of records is 3 greater than in Table 1 because 3 ad-hoc records from digital photographers were added (1 of *Phalacrocera replicata* and 2 of *Tanyptera atrata*).

As noted above, the current surveys have produced 1736 records of species by 6-figure grid location and day. The 2003 data are reported in terms of the detection or not of each species at the 31 individual peat basins over the survey period from 2-18 July. On this basis the total number of diptera and heteroptera records was 2,206. Many of the smaller basins fit well within a 100m square. The largest, Linmer North is approximately 300m across, but Ref 1 notes that the core swamp occupied a small part. Thus there is a rough equivalence can be claimed in the numbers of records in the two surveys.

There are however numerous differences. The present survey has not been restricted to the close proximity of the peat basins, but has aimed to cover as large a range of habitats as possible including bracken areas, wayside vegetation and wet woodlands in order to explore the overall biodiversity of the site. This may account for the larger numbers of species of heteroptera and calyptrates found in the present surveys. The 2003 report indicates that all the specimens gathered during a fixed period of sweeping at each location were retained and identified, while in the current surveys specimens were selected from the net in order to limit overload during identification. As a result the 2003 survey achieved considerably longer species lists for groups with many smaller species such as the Empidoidea and the Ephydriidae (shore-flies). A further difference between the surveys is that the present series were not restricted to a few weeks of the season, so covering species with early and late flight periods.

Thus the two surveys can be considered roughly equivalent in coverage though they represent differently biased samples from the invertebrate fauna of the Delamere area. It seems unlikely that the habitat management carried out since 2003 will have greatly changed the range of species present, though of course it should encourage an increase in abundance of the bog specialist species.

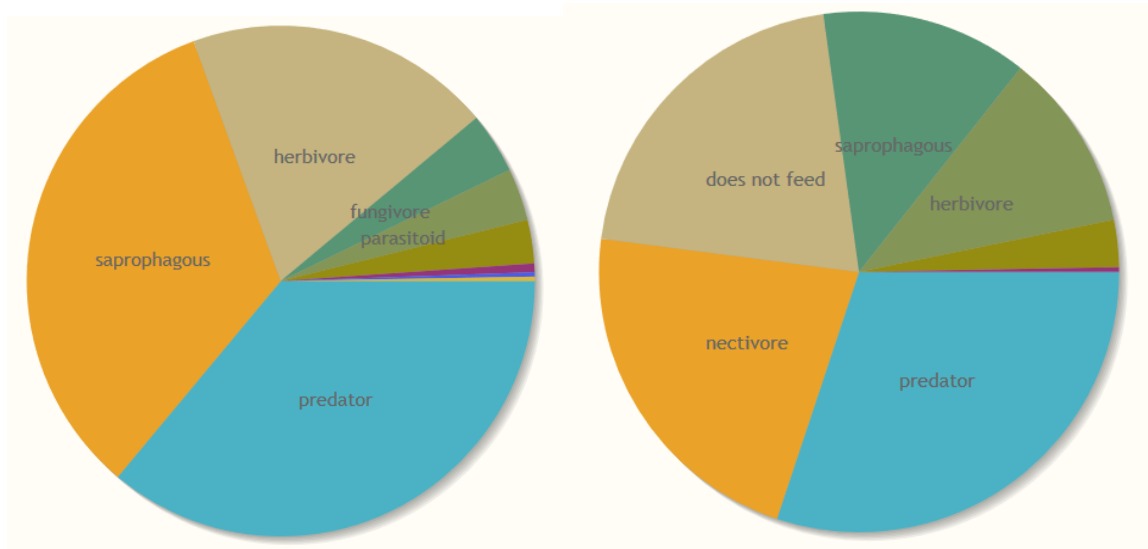
## PANTHEON analysis

The species list from the current surveys has been run through the PANTHEON software which became available on the BRC website during 2017. This software is based on a database linking species to their larval and adult food “guilds”, to their characteristic habitats, and to other associated species such as the hosts of parasitic flies. It also flags up species with a conservation designation and for certain special habitats gives a score representing how specific the species is to that habitat. It should be noted however that it currently contains data for only 3047 fly species whereas the total number on the British list is over 7000.

Table 8 lists those species from the present surveys which are flagged up in PANTHEON as having a national conservation designation and/or a score reflecting their fidelity to certain special habitats. The PANTHEON data for other species can be viewed on the BRC website. Various statistics can be generated and they combine to give an overall picture of the Delamere environment, as follows. First, Figure 1 overleaf shows the breakdown of the species list by feeding guild. In both cases predators are the largest category. Larvae feeding on decaying matter are the next largest category, while for adults the non-feeding and nectar-feeding species contribute very similar proportions. The first of these two groups is all the craneflies, while nectar-feeding species include Muscidae (houseflies), Syrphidae (hoverflies) and other smaller fly families. That the latter are so well represented is surprising given that flowers with nectar are largely confined to sides of tracks and paths in the Forest. However bramble and heather will also provide feeding opportunities in their

season. Areas of bramble were largely avoided during both sets of surveys, because of the difficulty of sweep netting.

**Figure 1:** proportion of species by feeding guild as larvae (left) and adults (right)



The Table below contains results from PANTHEON showing the number of species associated with each habitat represented in the data. As some species have multiple associations, some habitats appearing on the Table are clearly irrelevant. The figure for representation is the number of species recorded as a proportion of the total number in the PANTHEON database for that habitat. The guidance states that 10-20% may indicate good quality while 21% or more certainly suggests a good proportion of characteristic species. These figures are reached for shaded woodland floor and wet woodland in our sample, but not for peatland.

Broad biotope	Habitat	No. of species	% representation	No. of designated species	SQI
tree-associated	shaded woodland floor	161	14	7	117
open habitats	tall sward & scrub	86	3		100
wetland	peatland	81	7	10	150
wetland	running water	60	6	7	137
wetland	wet woodland	55	20	5	130
tree-associated	wet woodland	54	21	5	130
wetland	marshland	43	5		100
tree-associated	decaying wood	22	2	3	145
tree-associated	arboreal	20	2		100
open habitats	short sward & bare ground	10	<1		100
open habitats	upland	3	2		100
coastal	saltmarsh	1	<1		100
coastal	brackish pools & ditches	1	<1		100

Each species is assigned a species quality score (SQS) according to their conservation status. Non-designated species score 1 while the SQS increases from 4 to 32 as one progresses from the

nationally scarce or notable to the rarest categories such as critically endangered. The SQI is 100 times the sum of the scores divided by the number of species, so that 100 indicates a lack of any designated species. On this measure the peatland habitat scores highest because of the high number of associated species with a designation. Decaying wood also shows up better on this measure: although the 22 species found are only 2% of the national total there are three species with a designation.

Table 8 also shows a “habitat score” for species associated with certain specific assemblage types (SATs – see PANTHEON website for further explanation). Here A denotes species confined to a specific habitat while b, c etc denote progressively weaker association – see further below in the discussion of species of particular note from the survey.

## Species of note

This section provides comments on the species contributing to the characteristic habitats identified by the PANTHEON analysis above, as listed in Table 8.

### Terrestrial Heteroptera

The terrestrial bugs in the sub-order Heteroptera are mainly associated with warm dry environments, and so it is not surprising that few register as characteristic in this survey. The most frequently encountered in the surveys were the predatory common flower bug *Anthocoris nemorum* and the green capsid bug *Lygocoris pabulinus* which can both be found virtually anywhere. *Bryocoris pteridis* and *Monalocoris filicis* are small mirid bugs feeding on bracken and other ferns.

The only bug species appearing in Table 8 is *Cymus glandicolor* though that is because of a loose association with calcareous grassland, which is not relevant here. *Lamprolax picea* is worth mentioning as it is a sphagnum specialist with few other Cheshire records. *Gastrodes abietum* is known as the spruce cone bug and this appears to be the first find in Cheshire, though it is more frequent in southern England.

### Craneflies

Craneflies (families Cyndrotomidae, Limoniidae, Pediciidae, Ptychopteridae and Tipulidae) are the best represented group in Table 8, reflecting their reputation as good environmental indicators. These species are variously associated with acid mires and various types of seepage. There are also species with some association with coarse woody debris (CWD), a term used specifically to refer to larger bores of wood deposited in streams or water bodies.



Particularly pleasing is the find at Abbots Moss of *Idioptera linnei* with its nationally rare status (and SQS of 16). This attractive species with its banded wings was the subject of extensive surveys by Pete Boardman across Shropshire and Cheshire in the mid-2000s, when it turned up at Wybunbury Moss and Little Budworth Common. The only previous Delamere records in the last 50 years are from Hatchmere in 1990 and Abbots Moss in 1969. The 2017 find (pictured left) was from the edge of a pool on the edge of the South Bog, where two males were found by sweep-netting (one was released). This species has always been elusive and confined to a few areas of North Wales and *Northern* England, where it is found in sphagnum pools.

Another scarce acid mire species *Erioptera nielsenii* was found in the Hockenhull basin: the scatter of previous records has been from the area around Abbots Moss. The woodland seepage species *Dicranomyia lucida* is new to Delamere, found by a stream near the western edge of the Forest, and recorded in Cheshire only once before.

Valuable additions to the data are the two records of the attractive wasp-mimic *Tanyptera atrata* from digital photographs sent in by other observers. The male with its comb-like antennae is seen on the fingertip of a rubber glove in the photograph on the right. The larvae develop in decaying wood, but the adults seem to be elusive, apparently appearing briefly around early June.



### Hoverflies

Ref 3 reported the find of a female of the small nearly all-black hoverfly *Orthonevra intermedia* on the wet heath at the west end of Blakemere on 20 August 2015. Delamere remains the only location for this species in Britain, found during Martin Drake's 2003 survey and formally reported in Ref 4. The last two seasons have yielded further records in new areas of the Forest: one male at Harrison's on 6<sup>th</sup> July 2016 and two males and two females at Black Lake on 7<sup>th</sup> June 2017, a surprisingly early date. This spread of records across most of the Forest apart from the Eastern sector 14 years after the initial discovery certainly suggest that the species is well established and benefitting from the restoration of its bog habitat.

Martin Drake<sup>1</sup> remarked on the small range of hoverflies found, which as discussed above may be associated with a relative lack of nectaring plants, on which many of the adults depend. However, Table 8 shows that several species have larvae dependent on the characteristic Delamere habitats. A particularly unusual find associated with coarse woody debris is *Xylota florum* with only a few previous Cheshire records, and apparently in decline nationally.

### Empidoidea

This superfamily includes the Dolichopodidae, known as the long-legged flies (though not nearly as long-legged as the crane-flies), and the "dance-flies", formerly all in the family Empididae. The English name of the latter derives from the dancing and swarming behaviour of many species. They are mainly predatory on other insects, often with a long and menacing proboscis. This family has now been split, with a fair proportion of the British genera now being placed in Hybotidae and the two much smaller families Brachystomatidae (represented by three species in Table 5) and Atelestidae.

Like the crane-flies, the Dolichopodidae are recognised as particularly useful as indicators of habitat quality. They can occur in large numbers but being small with many similar species, the scarcer ones are prone to be overlooked. Undoubtedly the 2003 survey was more thorough for this group, as Martin Drake is the national expert for this family.

Perhaps the most noteworthy find in this group from the present surveys is the hybotid fly *Leptozepe borealis*. I found two females at Hockenhull on 18 May 2017. Martin Drake recorded it from three different locations, Alvanley, Limner North and Harthill so it is widespread in the Forest. Like *Orthonevra intermedia* it seems to be a relict from wide-spread boggy conditions following the end of the Ice Age. The NBN Atlas has only 4 records nationally, from Staffordshire and Yorkshire.

## Calyptrates

The calyptrates constitute a grouping of the most highly evolved diptera, mostly typically fly-like and bristly such as houseflies (Muscidae) and blowflies (Calliphoridae). The present surveys have been able to add a relatively large number of species thanks to the recent availability of new or revised keys to all except a few very small families. It is not clear why more from this group were not recorded in the 2003 survey, but it may be because habitat associations are less well-known and so they are of less relevance for habitat evaluation.

For many of the species there is no information available in PANTHEON, and only the following three register on Table 8 as contributors to increased habitat scores.

- The nominally rare *Lispocephala brachialis* is a smallish grey and orange muscid, which I found at Blains and Blakemere Mosses. There are indications that it is not now as rare as previously thought. Indeed this year I found the species in my own Warrington garden, possibly linked to presence of the liverwort *Marchantia* which PANTHEON lists as an association.
- The family Scathophagidae includes the dungflies of the genus *Scathophaga* but also many species with plant-eating (phytophagous larvae). The scarce nationally *Cordilura rufimana* has clear associations with *Carex* species on acid mires, and also occurs on the Manchester Mosses.
- *Norellia spinipes* is normally found near the larval food-plant which is daffodils. In the present survey it was swept from the access track to Norley Moss which runs past a garden. This species was first found in Britain in the 1960s but has since been found over an increasingly wide area, including my own garden in Warrington and two other such locations in Cheshire.

The Tachinidae is the family of parasitic flies with 266 British species and so similar in size to the Syrphidae (hoverflies). Most species are encountered as isolated individuals and the present surveys with only 9 species include the only two recorded in Ref 1. Possibly the paucity of tachinids reflects a low abundance of the lepidopterous hosts of most species.

Of those which were found, *Medina collaris* is known to attack the heather leaf beetle *Lochmaea suturalis* and *Myxenoristops stolidus* is a parasite of sawflies. *Cinochira atra* and the large and distinctive *Phasia hemiptera* depend on heteropteran hosts. The latter with its purple-tinged wings was photographed (right) on wayside hogweed near Barnsbridge.



No species from the family Anthomyiidae were recorded in the 2003 survey. This may be because comprehensive identification keys had yet to be produced for what was regarded as a difficult family of mainly greyish and blackish flies. However with 245 species many of which have strong plant associations either as phytophagous larvae or as nectaring adults, this family is probably as significant contributor to the diptera fauna as the hoverflies. I have myself been recording the family only for the past two seasons so many more species are probably yet to be found than the 27 listed in Table 6. The genus *Chirosia* is prominent with 5 species, a high proportion of the British total of 12. Their larvae feed on ferns, including bracken for certain species, so they are part of a distinct element of the Delamere ecology.

## Other diptera

The remaining species recorded, as listed in Table 7, come from a wide variety of families and are only linked by being covered by being relatively easy to identify. In the 2003 survey this group



included the greatest number of species, with several families beyond the scope of the present surveys. Of the nationally scarce species noted in Table 8, *Sapromyza albiceps* (Lauxaniidae) was found at 9 locations in 2003. I started recorded this family only in the middle of this year, and recorded this smallish yellow species only at Black Lake.

The nationally scarce *Themira germanica* is an addition to the list for Delamere and for Cheshire. It rather resembles a small black ant. It is a member of the small family Sepsidae, which generally breed in animal dung\*. There are five common species of the genus *Sepsis* and these are some of the most commonly encountered flies on the Delamere peat basins, several species often being found together.

Amongst all these other diptera, the soldierflies and allies are the most commonly recorded and many are believed to be good indicators of habitat quality. In that respect, the results are fairly disappointing, the highlight being the soldier fly *Beris fuscipes* found in several locations in both the 2003 and present surveys. This is species was not flagged up by PANTHEON, but according to other sources it is nationally notable or scarce.

## Discussion

The above represents an initial exploration of the use of the PANTHEON database to analyse diptera data in the Lancashire and Cheshire region. The software has only become available this year, and there appear to be no published examples of its application to the heteroptera and diptera fauna of specific sites. The significance of the results above is therefore uncertain at present. It is intended in the near future to carry out similar analysis for the Manchester Mosses where a similar level of surveying have been carried out over the last 5 years<sup>5</sup>, and comparison of the results may shed more light on whether the surveys and analysis are producing a realistic assessment of the sites.

While PANTHEON is based on measures of national rarity, it is also of interest to consider the Delamere area in the regional context of Lancashire and Cheshire. Ref 1 identified many species as “local”, but stated that this term is “not rigidly defined, but loosely means species confined to a particular habitat type (usually associated with better quality examples of that habitat), a particular geographic area, or species that are too widespread to warrant Nationally Scarce (Notable) status but are nevertheless infrequently encountered”: no reference to any national or regional listing of local species was given, however. Such information is available in the 1959 account of the Diptera of Lancashire and Cheshire by Kidd and Brindle<sup>6</sup>, though there too the precise basis of the term “local” is unclear. Furthermore, that publication covered only about half of the species in the order – the projected Part 2 never appeared – and the information remains in printed form only. However, a start has been made on updating the regional checklist by compiling the data accumulated in local record centres, the NBN and other sources. So far this has been carried out for the soldierflies and allies<sup>7</sup> and for the Sepsidae family<sup>8</sup>: these lists include the numbers of records for species.

Nevertheless the PANTHEON assessment of the species list has given some interesting indications of the value of the Delamere area for the heteroptera and diptera fauna. Although the peat basins have yielded the largest quality score, wet woodland species are the best represented group. Decaying wood species were rather few, but those that were present had the second largest quality score. In terms of adult feeding resources, it was surprising that nectar-feeding species were the second largest category, as flower-rich areas are scarce in the Forest: if habitat management can

---

\* The association of this species with Anatidae (ducks, geese and swans) in PANTHEON presumably refers to the dung of these birds.

increase such areas, this could be beneficial for the other habitats where the larvae of these species occur.

The PANTHEON scores are however heavily dependent on the number of scarce or rare species. Even when these have been recorded they are often represented by only one or two specimens. This seems to be the inherent in the extremely small samples in terms of time and space that even the present surveys represent. It is hoped that a method of taking account of the full range of species present and comparing the numbers of records at the site with those across the whole region can be developed.

## Acknowledgements

Thanks are due to Katie Piercey of Cheshire Wildlife Trust for allowing access to the reserves, to Martin Drake for supplying a copy of his report, and to the observers who have contributed additional photographic records.

**Table 1:** dates of survey visits, areas visited and number of records obtained (ie species present in a 100m square).

	07/05/2013	16/06/2013	19/08/2013	16/05/2014	04/08/2014	01/09/2014	09/04/2015	11/08/2015	20/08/2015	29/09/2015	14/03/2016	20/05/2016	15/06/2016	06/07/2016	24/08/2016	21/09/2016	18/05/2017	07/06/2017	25/07/2017	04/08/2017	Grand Total	
<b>Abbots Moss area</b>	17														63				11		91	
<b>East</b>						37				24												61
<b>Hatchmere area</b>			53	57	65		31			90			123			78						497
<b>North</b>		10		47	15		18	1	80			52		35		17			2			277
<b>Primrosehill</b>											23											23
<b>South</b>		3			40	23				35		32									21	156
<b>South-west</b>		1								23							58	154		97		333
<b>West</b>		1					8	159						129								297
<b>Grand Total</b>	<b>17</b>	<b>15</b>	<b>53</b>	<b>104</b>	<b>120</b>	<b>60</b>	<b>57</b>	<b>160</b>	<b>138</b>	<b>114</b>	<b>23</b>	<b>84</b>	<b>123</b>	<b>164</b>	<b>63</b>	<b>95</b>	<b>58</b>	<b>156</b>	<b>11</b>	<b>118</b>	<b>1733</b>	

**Table 2:** count of records for individual heteroptera species by area

Recording group/species	Abbots Moss area	East	Hatchmere area	North	Primrosehill	South	South-west	West	Total	Not found by Drake (2003)
<b>PLANT BUGS &amp; ALLIES</b>										
<i>Anthocoris confusus</i>			1					1	2	✓
<i>Anthocoris nemoralis</i>				1					1	✓
<i>Anthocoris nemorum</i>	2	2	12	9	2	5	6	7	45	
<i>Apolygus spinolae</i>	1					1	1		3	✓
<i>Atractotomus magnicornis</i>								1	1	✓
<i>Blepharidopterus angulatus</i>			1			1		2	4	✓
<i>Bryocoris pteridis</i>	1		4	1			3	1	10	✓
<i>Closterotomus norwegicus</i>				1					1	✓
<i>Cyllecoris histrionius</i>			1				1		2	✓
<i>Cymus glandicolor</i>	1		1				2		4	✓
<i>Cymus melanocephalus</i>	1		3	1		3	2	1	11	✓
<i>Cyrtorhinus caricis</i>	1					2	1		4	✓
<i>Deraeocoris lutescens</i>			1						1	✓
<i>Dicyphus globulifer</i>								1	1	✓
<i>Dicyphus pallicornis</i>							1		1	✓
<i>Dicyphus stachydis</i>			1					1	2	✓
<i>Gastrodes abietum</i>							1		1	✓
<i>Heterotoma planicornis</i>			1						1	✓
<i>Kleidocerys ericae</i>	1								1	✓
<i>Kleidocerys resedae</i>	1		4	1		1	1	1	9	✓
<i>Lamproplax picea</i>				1					1	✓
<i>Leptopterna ferrugata</i>			1						1	
<i>Liocoris tripustulatus</i>		1		2			1		4	✓
<i>Lygocoris pabulinus</i>		2	2	5		2	2	5	18	✓
<i>Lygocoris rugicollis</i>			1						1	✓
<i>Lygus rugulipennis</i>			1						1	✓
<i>Malacocoris chlorizans</i>			1						1	✓
<i>Mecomma ambulans</i>								2	2	✓
<i>Monalocoris filicis</i>			5	3		1	3	4	16	✓
<i>Nabis ericetorum</i>	1		2						3	✓
<i>Nabis limbatus</i>			3	3		2	1	2	11	
<i>Nabis rugosus</i>	1								1	✓
<i>Neolygus contaminatus</i>		1	3				4	1	9	✓
<i>Notostira elongata</i>			1						1	✓
<i>Orius vicinus</i>	2								2	✓
<i>Orthops campestris</i>								1	1	✓
<i>Orthotylus ericetorum</i>			6						6	✓

Recording group/species	Abbots Moss area		Hatchmere area		Primrosehill	South	South-west	West	Total	Not found by Drake (2003)
	East		North							
<i>Orthotylus marginalis</i>								1	1	✓
<i>Phylus melanocephalus</i>			1				1		2	✓
<i>Pithanus maerkelii</i>								1	1	✓
<i>Plagiognathus arbustorum</i>			1	3		1		1	6	✓
<i>Psallus montanus</i>							3		3	✓
<i>Psallus perrisi</i>							1		1	✓
<i>Scolopostethus affinis</i>			1						1	✓
<i>Scolopostethus decoratus</i>	1	1	1						3	✓
<i>Scolopostethus thomsoni</i>		1		1			1	1	4	✓
<i>Stenodema calcarata</i>	1		6	1		1	1	1	11	
<i>Stenodema holsata</i>		1	8			1	1		11	
<i>Stenodema laevigata</i>	1	1		2			1		5	
<i>Stenotus binotatus</i>								1	1	✓
<i>Trapezonotus desertus</i>								1	1	✓
<i>Trigonotylus ruficornis</i>								1	1	✓
<b>SHIELDBUGS &amp; ALLIES</b>										
<i>Acanthosoma haemorrhoidale</i>						1			1	✓
<i>Dolycoris baccarum</i>						1			1	✓
<i>Elasmotethus interstinctus</i>		2	3	1					6	✓
<i>Elasmucha grisea</i>			2						2	✓
<i>Palomena prasina</i>			1	1		1		1	4	✓
<i>Picromerus bidens</i>			2						2	✓
<i>Troilus luridus</i>			1						1	✓
<b>WATER BUGS</b>										
<i>Saldula saltatoria</i>	1		3	1					5	
<b>Total number of records</b>	<b>17</b>	<b>12</b>	<b>86</b>	<b>38</b>	<b>2</b>	<b>24</b>	<b>39</b>	<b>40</b>	<b>258</b>	
<b>Number of species</b>	<b>15</b>	<b>9</b>	<b>34</b>	<b>18</b>	<b>1</b>	<b>15</b>	<b>22</b>	<b>24</b>	<b>60</b>	<b>53</b>

**Table 3:** count of records for individual cranefly species by area

Species	Abbots Moss area		Hatchmere area		Primrosehill	South	South-west	West	Grand Total	Not found by Drake(2003)
	East		North							
<i>Achrolimonia decemmaculata</i>			1	2		1			4	
<i>Austrolimnophila ochracea</i>			4	3		1	5	2	15	
<i>Cheilotrichia cinerascens</i>	1		2				1		4	

Species	Abbots Moss area		Hatchmere area		Primrosehill	South	South-west	West	Grand Total	Not found by ✓ Drake(2003)
	East			North						
<i>Cylindrotoma distinctissima</i>			1	2					3	
<i>Dicranomyia chorea</i>				2			1		3	
<i>Dicranomyia distendens</i>			1						1	
<i>Dicranomyia fusca</i>			2					4	6	
<i>Dicranomyia lucida</i>								1	1	✓
<i>Dicranomyia modesta</i>			8	1		1			10	
<i>Dicranomyia morio</i>			1			1			2	
<i>Dicranophragma nemorale</i>			1					1	2	
<i>Dicranota bimaculata</i>	1							1	2	
<i>Dolichopeza albipes</i>	1		2	2					5	
<i>Epiphragma ocellare</i>			2						2	✓
<i>Erioconopa trivialis</i>	1		1	1		1			4	
<i>Erioptera fuscipennis</i>	1		1	4		1			7	
<i>Erioptera lutea</i>	2		1	1					4	
<i>Erioptera nielseni</i>							1		1	✓
<i>Euphylidorea aperta</i>							2		2	
<i>Euphylidorea meigenii</i>	1		2			1	2		6	
<i>Helius flavus</i>			1						1	
<i>Helius longirostris</i>			1			1			2	
<i>Idioptera linnei</i>	1								1	✓
<i>Ilisiaoccoecata</i>							1		1	✓
<i>Limonia flavipes</i>						1			1	✓
<i>Limonia macrostigma</i>			5						5	
<i>Limonia nubeculosa</i>	1	1	8	5		1	4	1	21	
<i>Limonia phragmitidis</i>				1			1		2	✓
<i>Metalimnobia quadrinotata</i>			1						1	✓
<i>Molophilus appendiculatus</i>			2					1	3	
<i>Molophilus bifidus</i>								1	1	
<i>Molophilus bihamatus</i>			1						1	✓
<i>Molophilus flavus</i>	1								1	✓
<i>Molophilus griseus</i>	2			3		1	3		9	
<i>Molophilus medius</i>			2						2	
<i>Molophilus occultus</i>			1						1	
<i>Molophilus ochraceus</i>				1					1	
<i>Molophilus serpentiger</i>			3						3	✓
<i>Neolimonia dumetorum</i>			1	1			2		4	
<i>Ormosia depilata</i>			1						1	✓
<i>Paradelphomyia dalei</i>	1							1	2	✓
<i>Paradelphomyia senilis</i>			3					2	5	

Species	Abbots Moss area	East	Hatchmere area	North	Primrosehill	South	South-west	West	Grand Total	Not found by Drake(2003)
<i>Pedicia rivosa</i>			1						1	✓
<i>Phalacrocera replicata</i>				1			1		2	
<i>Phylidorea ferruginea</i>		1	4	1				1	7	
<i>Phylidorea fulvonervosa</i>			4				1	1	6	
<i>Phylidorea squalens</i>	1		3			2	2		8	
<i>Pilaria discicollis</i>			3						3	
<i>Prionocera turcica</i>	1		2	2		6	4	1	16	
<i>Pseudolimmophila lucorum</i>			1						1	
<i>Pseudolimmophila sepium</i>			2						2	
<i>Ptychoptera lacustris</i>			2					1	3	
<i>Ptychoptera minuta</i>		1	2	1					4	
<i>Rhipidia maculata</i>			2	1					3	
<i>Rhypholophus varius</i>		1	3	1					5	✓
<i>Symplecta stictica</i>			1				1		2	
<i>Tanyptera atrata</i>			1			1			2	✓
<i>Tipula alpium</i>			1				1	2	4	✓
<i>Tipula confusa</i>		1	1						2	✓
<i>Tipula fulvipennis</i>			2					1	3	
<i>Tipula lateralis</i>			1						1	
<i>Tipula luna</i>			1						1	✓
<i>Tipula luteipennis</i>			5						5	✓
<i>Tipula melanoceros</i>			3						3	✓
<i>Tipula oleracea</i>			1	1				1	3	✓
<i>Tipula paludosa</i>			1	1					2	
<i>Tipula pruinosa</i>								1	1	✓
<i>Tipula rufina</i>							1		1	✓
<i>Tipula variicornis</i>			1				1		2	
<i>Tipula yerburyi</i>								1	1	
<i>Trichocera regelationis</i>					1				1	✓
<i>Tricyphona immaculata</i>	3	2	3	1					9	✓
<i>Ula mollissima</i>				2			1		3	✓
<i>Ula sylvatica</i>			1	1			1		3	
<b>Totals</b>	<b>10</b>	<b>16</b>	<b>112</b>	<b>42</b>	<b>1</b>	<b>20</b>	<b>37</b>	<b>25</b>	<b>263</b>	
<b>Number of species</b>	<b>8</b>	<b>13</b>	<b>54</b>	<b>25</b>	<b>1</b>	<b>14</b>	<b>21</b>	<b>19</b>	<b>74</b>	<b>28</b>

**Table 4:** count of records for individual hoverfly species by area

Species	Abbots Moss area	East	Hatchmere area	North	Primrosehill	South	South-west	West	Total	Not found by Drake(2003)
<i>Baccha elongata</i>			1	1		1			3	
<i>Chalcosyrphus nemorum</i>				3			1		4	
<i>Cheilosia albitarsis</i>			1	1		1		1	4	✓
<i>Cheilosia bergenstammi</i>						2			2	✓
<i>Cheilosia illustrata</i>				1				3	4	
<i>Cheilosia pagana</i>						1			1	✓
<i>Cheilosia scutellata</i>								1	1	✓
<i>Chrysogaster solstitialis</i>							2	5	7	
<i>Chrysogaster virescens</i>			2	1			1		4	
<i>Dasysyrphus tricinctus</i>						1			1	✓
<i>Episyrphus balteatus</i>	1		4	2		2		3	12	
<i>Eristalis arbustorum</i>				1				1	2	
<i>Eristalis nemorum</i>				1					1	✓
<i>Eristalis pertinax</i>	4		5	3		4	1	4	21	
<i>Eristalis tenax</i>			2	1		2		1	6	
<i>Eupeodes corollae</i>			1						1	
<i>Eupeodes latifasciatus</i>			1						1	✓
<i>Eupeodes luniger</i>			1					1	2	✓
<i>Helophilus hybridus</i>							2		2	
<i>Helophilus pendulus</i>	1		2	2		1	1	1	8	
<i>Lejogaster metallina</i>								1	1	✓
<i>Leucozona glauca</i>				1				3	4	
<i>Leucozona laternaria</i>								1	1	✓
<i>Melanogaster hirtella</i>							2		2	✓
<i>Melanostoma mellinum</i>	1		4			1			6	
<i>Melanostoma scalare</i>	2	1	3	1		3	2	1	13	
<i>Myathropa florea</i>								1	1	
<i>Neoascia tenur</i>			2			1	1		4	
<i>Orthonevra intermedia</i>						1	1	1	3	
<i>Platycheirus albimanus</i>	2		1	1		2	5	1	12	
<i>Platycheirus clypeatus</i>	1		3			2	1	2	9	
<i>Platycheirus fulviventris</i>			1						1	✓
<i>Platycheirus granditarsus</i>	1		1						2	
<i>Platycheirus occultus</i>			1			2	1	1	5	
<i>Platycheirus scutatus agg.</i>			1				1		2	
<i>Sericomyia lappona</i>							2		2	
<i>Sericomyia silentis</i>	1		1	1		4		1	8	
<i>Sphaerophoria philanthus</i>			2						2	✓



Species	Abbots Moss area	East	Hatchmere area	North	Primrosehill	South	South-west	West	Total	Not found by Drake(2003)
<i>Sphegina clunipes</i>				2		1	1	2	6	
<i>Syritta pipiens</i>			1			2	1	2	6	
<i>Syrphus ribesii</i>			1			1	2	2	6	
<i>Syrphus vitripennis</i>							1	1	2	✓
<i>Tropidia scita</i>			1						1	✓
<i>Volucella pellucens</i>			1					1	2	
<i>Xylota florum</i>				1					1	✓
<i>Xylota segnis</i>			2	3				1	6	
<i>Xylota sylvarum</i>								1	1	✓
<b>Grand Total</b>	<b>14</b>	<b>1</b>	<b>46</b>	<b>27</b>	<b>0</b>	<b>35</b>	<b>29</b>	<b>44</b>	<b>196</b>	
<b>Number of species</b>	<b>9</b>	<b>1</b>	<b>26</b>	<b>18</b>	<b>0</b>	<b>20</b>	<b>19</b>	<b>27</b>	<b>47</b>	<b>17</b>

**Table 5:** count of records for individual Empidoidea species by area

Family/Species	Abbots Moss area	East	Hatchmere area	North	Primrosehill	South	South-west	West	Grand Total	Not found by Drake (2003)
<b>BRACHYSTOMATIDAE</b>										
<i>Gloma fuscipennis</i>								2	2	✓
<i>Heleodromia immaculata</i>					1				1	
<i>Trichopeza longicornis</i>					3		1	2	5	11
<b>DOLICHOPODIDAE</b>										
<i>Achalcus cinereus</i>				1					1	✓
<i>Anepsiomyia flaviventris</i>				3				3	6	
<i>Argyra argentina/perplexa</i>		1		2				1	4	
<i>Campsicnemus curvipes</i>			1	12	3		2	1	5	24
<i>Campsicnemus loripes</i>			1	7	2			1	2	13
<i>Campsicnemus scambus</i>			2	18	4		1	3	3	31
<i>Chrysotus femoratus/neglectus</i>								1	1	2
<i>Chrysotus gramineus</i>								3	2	5
<i>Dolichopus discifer</i>		1		1	3		2	3	2	12
<i>Dolichopus griseipennis</i>								2	2	
<i>Dolichopus latilimbatus</i>								1	1	
<i>Dolichopus lepidus</i>				2			2		4	
<i>Dolichopus picipes</i>				1					1	✓
<i>Dolichopus plumipes</i>						1		3	4	

Family/Species	Abbots Moss area		Hatchmere area		Primrosehill	South	South-west	West	Grand Total	Not found by Drake (2003)
	East		North							
<i>Dolichopus popularis</i>								1	1	
<i>Dolichopus simplex</i>			1						1	
<i>Dolichopus ungulatus</i>			1				1	2	4	
<i>Hercostomus aerosus</i>			8	10		3	10	10	41	
<i>Hercostomus brevicornis</i>						1		6	7	
<i>Hercostomus cupreus</i>			5	7		3	8	1	24	
<i>Hercostomus metallicus</i>			7	2		2	4		15	
<i>Medetera impigra</i>				1					1	✓
<i>Medetera truncorum</i>		1							1	✓
<i>Poecilobothrus nobilitatus</i>				1				1	2	
<i>Rhaphium appendiculatum</i>							1		1	
<i>Rhaphium caliginosum</i>			1						1	✓
<i>Rhaphium crassipes</i>			1						1	✓
<i>Rhaphium monotrichum</i>			1						1	
<i>Sciapus platypterus</i>							2	2	4	
<i>Sybistroma obscurellum</i>	1			1			1	3	6	
<i>Sympycnus desoutteri</i>	2	1		3			3		9	
<i>Syntormon denticulatum</i>				1					1	
<i>Syntormon pallipes</i>			4	1		1		1	7	
<i>Xanthochlorus galbanus</i>	1								1	
<b>EMPIDIDAE</b>										
<i>Chelifera precatória</i>							1	1	2	
<i>Chelipoda albisetá</i>			1	1					2	
<i>Dolichocephala guttata</i>	1		1	1			2		5	
<i>Dolichocephala oblongoguttata</i>				1					1	
<i>Empis aestiva</i>								1	1	
<i>Empis chioptera</i>							1		1	✓
<i>Empis nigripes</i>							1		1	✓
<i>Empis praevia</i>			2	3		2	7		14	
<i>Empis tessellata</i>			1	1					2	✓
<i>Hilara chorica</i>				1				1	2	
<i>Hilara cornicula</i>							1		1	
<i>Hilara fulvibarba</i>			1						1	✓
<i>Hilara intermedia</i>				1					1	
<i>Hilara interstincta</i>							1	1	2	
<i>Hilara litorea</i>								2	2	
<i>Hilara lurida</i>							1		1	✓
<i>Hilara manicata</i>	1			1				3	5	
<i>Hilara maura</i>			1	1			1		3	✓

Family/Species	Abbots Moss area	East	Hatchmere area	North	Primrosehill	South	South-west	West	Grand Total	Not found by Drake (2003)
<i>Hilara nigrina</i>								4	4	
<i>Hilara nigrohirta</i>							1		1	✓
<i>Hilara obscura/flavipes</i>	1								1	
<i>Hilara rejecta</i>								2	2	
<i>Phyllodromia melanocephala</i>			2					3	5	
<i>Rhamphomyia anomalipennis</i>				1					1	✓
<i>Rhamphomyia erythrophthalma</i>			2	1		1			4	✓
<i>Rhamphomyia flava</i>								1	1	
<i>Rhamphomyia longipes</i>			1						1	✓
<i>Rhamphomyia nigripennis</i>			1	1					2	
<i>Rhamphomyia tibiella</i>				4					4	✓
<i>Rhamphomyia umbripennis</i>			1	1		2	4		8	✓
<b>HYBOTIDAE</b>										
<i>Bicellaria intermedia</i>			1	1			4	3	9	
<i>Bicellaria nigra</i>				1				1	2	
<i>Bicellaria vana</i>			2				5		7	
<i>Ethyneura inermis</i>							1		1	✓
<i>Hybos culiciformis</i>	3	1	6	6		2	4	8	30	
<i>Hybos femoratus</i>		1	2	2				5	10	
<i>Leptopeza borealis</i>							1		1	
<i>Ocydromia glabricula</i>	3		8	3			2	4	20	
<i>Oedalea stigmatella</i>							2		2	✓
<i>Platypalpus ciliaris</i>			2					2	4	
<i>Platypalpus longicornis</i>			1	1		1	2		5	
<i>Platypalpus longiseta</i>				1					1	
<i>Platypalpus minutus</i>								1	1	
<i>Platypalpus pallidiventris</i>			2				1	3	6	
<i>Platypalpus pectoralis</i>				1					1	
<i>Tachypeza nubila</i>				1					1	
<i>Trichina elongata</i>							1		1	✓
<i>Trichinomyia flavipes</i>			2						2	✓
<b>Grand Total</b>	<b>15</b>	<b>8</b>	<b>115</b>	<b>81</b>	<b>0</b>	<b>26</b>	<b>91</b>	<b>102</b>	<b>438</b>	
<b>Number of species</b>	10	7	37	40	0	15	37	39	85	23

**Table 6:** count of records for individual calyprate fly species by area

Family/Species	Abbots Moss area	East	Hatchmere area	North	Primrosehill	South	South-west	West	Grand Total	Not found by Drake (2003)
<b>ANTHOMYIIDAE</b>										
<i>Alliopsis silvestris</i>			3						3	✓
<i>Anthomyia cannabina</i>							1		1	✓
<i>Anthomyia liturata</i>			1						1	✓
<i>Anthomyia procellaris</i>			1						1	✓
<i>Botanophila discreta</i>								1	1	✓
<i>Botanophila fugax</i>			1			1	2		4	✓
<i>Botanophila striolata</i>				1					1	✓
<i>Chirosia albitarsis</i>						2	1		3	✓
<i>Chirosia crassiseta</i>				1			1		2	✓
<i>Chirosia flavipennis</i>							2	2	4	✓
<i>Chirosia grossicauda</i>				3		1	2		6	✓
<i>Chirosia histricina</i>							5		5	✓
<i>Delia florilega</i>	1		1				2		4	✓
<i>Delia platura</i>	1		1				3	1	6	✓
<i>Egle ciliata</i>					1				1	✓
<i>Eustalomyia histrio</i>							1		1	✓
<i>Hylemya urbica</i>	1								1	✓
<i>Hylemya vagans</i>			4	1			1		6	✓
<i>Hylemya variata</i>								1	1	✓
<i>Hylemyza partita</i>							1		1	✓
<i>Lasiomma latipenne</i>			1						1	✓
<i>Lasiomma seminitidum</i>					3				3	✓
<i>Paradelia intersecta</i>					5				5	✓
<i>Pegomya geniculata</i>			1	1					2	✓
<i>Pegoplata aestiva</i>				1				1	2	✓
<i>Pegoplata infirma</i>							1		1	✓
<i>Zaphne caudata</i>			1						1	✓
<b>CALLIPHORIDAE</b>										
<i>Bellardia vulgaris</i>							1		1	✓
<i>Calliphora vomitoria</i>			1					1	2	✓
<i>Lucilia ampullacea</i>							1		1	✓
<i>Lucilia caesar</i>				1		1			2	
<i>Melanomya nana</i>				2			2		4	✓
<i>Pollenia pediculata</i>			2				1		3	
<b>FANNIIDAE</b>										
<i>Fannia fuscula</i>			1						1	✓
<i>Fannia lustrator</i>							1		1	✓
<i>Fannia mollissima</i>							1	1	2	✓

Family/Species	Abbots Moss area		Hatchmere area	North	Primrosehill	South	South-west	West	Grand Total	Not found by Drake (2003)
	East									
<i>Fannia pallitibia</i>			2						2	✓
<i>Fannia parva</i>	1		1						2	✓
<i>Fannia polychaeta</i>				1			3		4	
<i>Fannia postica</i>							1		1	✓
<i>Fannia rondanii</i>							1		1	✓
<i>Fannia serena</i>			1	1			4	1	7	
<i>Fannia similis</i>								1	1	✓
<i>Fannia subsimilis</i>				1					1	
<i>Fannia umbrosa</i>							1		1	✓
MUSCIDAE										
<i>Azelia cilipes</i>			2	1			1		4	✓
<i>Azelia nebulosa</i>							1		1	✓
<i>Azelia triquetra</i>							1		1	✓
<i>Brontaea humilis</i>							1		1	✓
<i>Coenosia femoralis</i>							1		1	✓
<i>Coenosia rufipalpis</i>			2					2	4	✓
<i>Coenosia testacea</i>		1							1	✓
<i>Coenosia tigrina</i>	1			1			2		4	✓
<i>Eudasyphora cyanella</i>			1	1					2	
<i>Graphomya maculata</i>								1	1	✓
<i>Hebecnema nigra</i>				1	2		1		4	✓
<i>Hebecnema nigricolor</i>			1			2		1	4	✓
<i>Hebecnema umbratica</i>								2	2	✓
<i>Hebecnema vespertina</i>		1							1	✓
<i>Helina depuncta</i>			2	2		1	2		7	✓
<i>Helina evecta</i>				1	1				2	✓
<i>Helina impuncta</i>			2				1		3	✓
<i>Helina reversio</i>			1				1		2	✓
<i>Hydrotaea albipuncta</i>				1			1		2	✓
<i>Hydrotaea cyrtoneurina</i>				1					1	✓
<i>Hydrotaea irritans</i>	1	1		2		1		1	6	✓
<i>Hydrotaea militaris</i>			1				4	1	6	✓
<i>Lispocephala brachialis</i>			1			1			2	✓
<i>Lispocephala erythrocerata</i>		1	4				2	1	8	✓
<i>Mesembrina meridiana</i>				1					1	✓
<i>Morellia simplex</i>			1				1		2	
<i>Muscina levida</i>			1				1		2	✓
<i>Mydaea ancilla</i>							1	1	2	✓
<i>Mydaea electa</i>							1		1	✓
<i>Mydaea urbana</i>							1		1	✓

Family/Species	Abbots Moss area		Hatchmere area	North	Primrosehill	South	South-west	West	Grand Total	Not found by Drake (2003)
	East									
<i>Myospila mediatubunda</i>						1			1	✓
<i>Phaonia angelicae</i>				1			3	1	5	✓
<i>Phaonia errans</i>							1		1	✓
<i>Phaonia fuscata</i>				1					1	✓
<i>Phaonia pallida</i>			1						1	✓
<i>Phaonia palpata</i>				1			2	1	4	✓
<i>Phaonia rufiventris</i>	2						2		4	✓
<i>Phaonia subventa</i>				1			1		2	✓
<i>Phaonia tuguriorum</i>			2			1			3	✓
<i>Pseudocoenosia abnormis</i>								1	1	✓
<i>Pseudocoenosia solitaria</i>			1			2			3	✓
<i>Schoenomyza litorella</i>							1		1	✓
SARCOPHAGIDAE										
<i>Sarcophaga carnaria</i>							1		1	
<i>Sarcophaga variegata</i>							1		1	
SCATHOPHAGIDAE										
<i>Cleigastra apicalis</i>				1		1			2	
<i>Cordilura albipes</i>				1		1	1		3	
<i>Cordilura ciliata</i>	1		2						3	
<i>Cordilura pudica</i>			1						1	
<i>Cordilura rufimana</i>	2						1		3	
<i>Norellia spinipes</i>			1						1	✓
<i>Norellisoma spinimanum</i>						1			1	
<i>Pogonata barbata</i>							1		1	✓
<i>Scathophaga furcata</i>			2	1			3		6	
<i>Scathophaga inquinata</i>			1	2		1			4	✓
<i>Scathophaga stercoraria</i>	1	1	3	9		4	8	3	29	
TACHINIDAE										
<i>Cinochira atra</i>								1	1	✓
<i>Dexiosoma caninum</i>			1						1	
<i>Medina collaris</i>			1						1	✓
<i>Myxexoristops stolidus</i>							1		1	✓
<i>Pales pavidata</i>			1			1			2	✓
<i>Phasia hemiptera</i>				1					1	✓
<i>Siphona geniculata</i>		1	1						2	
<i>Tachina ursina</i>				1					1	✓
<i>Voria ruralis</i>			1						1	✓
<b>Totals</b>	<b>9</b>	<b>9</b>	<b>61</b>	<b>46</b>	<b>12</b>	<b>23</b>	<b>91</b>	<b>27</b>	<b>278</b>	
<b>Number of species</b>	<b>8</b>	<b>8</b>	<b>42</b>	<b>32</b>	<b>5</b>	<b>17</b>	<b>56</b>	<b>22</b>	<b>109</b>	<b>90</b>

**Table 7:** count of records for individual fly species not covered above, by area

Recording group or family/species	Abbots Moss area	East	Hatchmere area	North	Primrosehill	South	South-west	West	Grand Total	Not found by Drake (2003)
<b>ANISOPODIDAE</b>										
<i>Sylvicola cinctus</i>			2	1		1	1	1	6	
<i>Sylvicola punctatus</i>			2	1		1		1	5	
<b>ASTEIIDAE</b>										
<i>Asteia amoena</i>							1		1	✓
<b>BIBIONIDAE</b>										
<i>Bibio lanigerus</i>	1			1					2	✓
<i>Dilophus febrilis</i>	1					1	1		3	✓
<b>CAMPICHOETIDAE</b>										
<i>Campichoeta obscuripennis</i>	1								1	✓
<b>CLUSIIDAE</b>										
<i>Clusiodes albimana</i>	1								1	✓
<b>CONOPIIDAE ETC.</b>										
<i>Conops quadrifasciatus</i>						1			1	✓
<i>Lonchoptera bifurcata</i>	1	1	2	2					6	
<i>Lonchoptera lutea</i>	2	4	9	7	1	1	1	4	29	
<i>Palloptera scutellata</i>		1		3				1	5	✓
<i>Palloptera trimacula</i>								1	1	✓
<i>Palloptera umbellatarum</i>			1						1	
<i>Seioptera vibrans</i>								1	1	
<i>Sicus ferrugineus</i>	2					1			3	✓
<b>DIASTATIDAE</b>										
<i>Diastata adusta</i>							2	1	3	
<i>Diastata fuscata</i>			1						1	
<b>DROSOPHILIDAE</b>										
<i>Scaptomyza flava</i>						1			1	
<b>DRYOMYZIDAE</b>										
<i>Neuroctena anilis</i>		1	2	2			1	1	7	
<b>EPHYDRIDAE</b>										
<i>Ilythea spilota</i>			1						1	
<i>Limnellia quadrata</i>			1						1	✓
<i>Notiphila maculata</i>								1	1	
<i>Parydra coarctata</i>	1		1						2	
<i>Parydra littoralis</i>			3						3	
<b>FUNGUS GNATS</b>										
<i>Platyura marginata</i>							1		1	✓
<i>Sciara hemerobioides</i>			1						1	✓

Recording group or family/species	Abbots Moss area	East	Hatchmere area	North	Primrosehill	South	South-west	West	Grand Total	Not found by Drake (2003)
HELEOMYZIDAE										
<i>Suillia affinis</i>	1								1	
<i>Suillia atricornis</i>							1		1	
<i>Suillia bicolor</i>			1						1	
<i>Suillia fuscicornis</i>	1								1	
<i>Suillia humilis</i>	1								1	✓
<i>Suillia notata</i>		1							1	✓
<i>Suillia ustulata</i>			1						1	✓
<i>Suillia variegata</i>			1	3					4	
LAUXANIIDAE										
<i>Meiosimyza rorida</i>						1	1		2	
<i>Minettia fasciata</i>							1		1	✓
<i>Peplomyza litura</i>	1						2		3	✓
<i>Sapromyza albiceps</i>							1		1	
<i>Sapromyza sexpunctata</i>							1		1	
<i>Tricholauxania praeusta</i>							1		1	
OPETIIDAE										
<i>Opetia nigra</i>				4			2		6	
OPOMYZIDAE										
<i>Geomyza tripunctata</i>	1		1	1	1				4	
<i>Opomyza florum</i>		2	9	5		3	3	3	25	
<i>Opomyza germinationis</i>	2	1	3	2		1	2	5	16	
<i>Opomyza petrei</i>								2	2	
SCIOMYZIDAE										
<i>Hydromya dorsalis</i>			1						1	✓
<i>Pherbina coryleti</i>			1						1	
<i>Renocera pallida</i>			2					1	3	
<i>Tetanocera elata</i>			2						2	
<i>Tetanocera ferruginea</i>			2						2	
SEPSIDAE										
<i>Nemopoda nitidula</i>				1			1	2	4	
<i>Sepsis cynipsea</i>	2	1	6	2		1	4	5	21	
<i>Sepsis flavimana</i>								1	1	
<i>Sepsis fulgens</i>		1	4	2	1	3	2	6	19	
<i>Sepsis orthocnemis</i>	2		4		1	2	2	3	14	
<i>Sepsis punctum</i>			2	1				3	6	
<i>Sepsis violacea</i>			1		1	2	1	1	6	
<i>Themira germanica</i>								1	1	✓
<i>Themira minor</i>							1		1	✓
SOLDIERFLIES AND ALLIES										



Recording group or family/species	Abbots Moss area	East	Hatchmere area	North	Primrosehill	South	South-west	West	Grand Total	Not found by Drake (2003)
<i>Beris chalybata</i>	1			2		1			4	✓
<i>Beris fuscipes</i>				1		1		1	3	
<i>Chorisops tibialis</i>								1	1	
<i>Chrysopilus cristatus</i>								1	1	
<i>Dioctria baumhaueri</i>							1		1	✓
<i>Haematopota pluvialis</i>						1	1	1	3	
<i>Microchrysa polita</i>							1		1	✓
<i>Rhagio lineola</i>	1		2			1	2	4	10	
<i>Rhagio scolopaceus</i>								1	1	
<i>Sargus iridatus</i>			1				1		2	
SPHAEROCERIDAE										
<i>Copromyza equina</i>							2	1	3	✓
<i>Copromyza nigrina</i>			1					1	2	
<i>Crumomyia fimetaria</i>			1						1	✓
<i>Leptocera fontinalis</i>	1		2		1			1	5	
<i>Lotophila atra</i>					2				2	
<i>Opacifrons coxata</i>							1		1	
<i>Opacifrons humida</i>	1	1					1		3	
<i>Rachispoda lutosa</i>			1						1	
STILT & STALK FLY										
<i>Calobata petronella</i>			1				1		2	
<i>Chamaepsila humeralis</i>				1					1	✓
<i>Loxocera albisetia</i>	1	1				1	1		4	
TEPHRITIDAE										
<i>Chaetostomella cylindrica</i>								1	1	✓
<i>Tephritis formosa</i>			1						1	✓
<i>Tephritis neesii</i>			1			2			3	✓
<i>Terellia tussilaginis</i>				1					1	✓
<i>Xyphosia miliaria</i>				1				1	2	
<b>Grand Total</b>	<b>26</b>	<b>15</b>	<b>78</b>	<b>44</b>	<b>8</b>	<b>27</b>	<b>46</b>	<b>59</b>	<b>303</b>	
<b>Number of species</b>	21	11	37	21	7	20	33	32	85	30

**Table 8:** species with a conservation status and/or habitat specificity score according to PANTHEON

Species	Family	Conservation status	Habitat	Habitat score	Associations
<i>Sylvicola cinctus</i>	Anisopodidae		shaded woodland floor	coarse woody debris: c	
<i>Phalacrocerca replicata</i>	Cylindrotomidae	Notable	peatland	acid mire: C, grazing marsh - salinity: 0, grazing marsh - status: 3	
<i>Achalcus cinereus</i>	Dolichopodidae	NS	peatland		Arthropoda
<i>Dolichopus lepidus</i>	Dolichopodidae	NS	peatland	acid mire: C	Arthropoda
<i>Hercostomus aerosus</i>	Dolichopodidae		peatland	acid mire: C	Arthropoda
<i>Hercostomus brevicornis</i>	Dolichopodidae	NS	peatland; shaded woodland floor; wet woodland		Arthropoda
<i>Medetera impigra</i>	Dolichopodidae	NS	decaying wood		Fagales
<i>Xanthochlorus galbanus</i>	Dolichopodidae	NS			
<i>Chelifera precatorea</i>	Empididae		running water	coarse woody debris: e, ERS (Diptera): 3	Arthropoda
<i>Ethyneura inermis</i>	Hybotidae	(LR);NS	decaying wood		Fagus
<i>Leptopeza borealis</i>	Hybotidae	NR;NT			
<i>Sapromyza albiceps</i>	Lauxaniidae	Notable	shaded woodland floor		
<i>Achyrolimonia decemmaculata</i>	Limoniidae		decaying wood	coarse woody debris: c	Fagales
<i>Austrolimnophila ochracea</i>	Limoniidae		decaying wood; shaded woodland floor	coarse woody debris: c	Acer, Quercus
<i>Dicranomyia chorea</i>	Limoniidae		running water; shaded woodland floor; tall sward & scrub	coarse woody debris: c	
<i>Dicranomyia distendens</i>	Limoniidae	Notable	peatland; running water	acid mire: B, seepage (acid- neutral): A	Sphagnum
<i>Dicranomyia fusca</i>	Limoniidae		running water; shaded woodland floor; wet woodland	coarse woody debris: c, seepage (woodland): B	Fagales

Species	Family	Conservation status	Habitat	Habitat score	Associations
<i>Dicranomyia lucida</i>	Limoniidae	Notable	running water; shaded woodland floor; wet woodland	seepage (woodland): A	Fagales
<i>Epiphragma ocellare</i>	Limoniidae		decaying wood	coarse woody debris: c	Fagales
<i>Erioptera nielseni</i>	Limoniidae	Notable	peatland; running water	acid mire: A, seepage (acid-neutral): A	
<i>Euphylidorea meigenii</i>	Limoniidae		peatland	acid mire: B	
<i>Helius longirostris</i>	Limoniidae		marshland	coarse woody debris: e	
<i>Idioptera linnei</i>	Limoniidae	RDB 1	peatland	acid mire: A	
<i>Limonia flavipes</i>	Limoniidae		shaded woodland floor	coarse woody debris: c	
<i>Limonia macrostigma</i>	Limoniidae		running water; shaded woodland floor; wet woodland	coarse woody debris: c	Fagales
<i>Limonia nubeculosa</i>	Limoniidae		decaying wood; shaded woodland floor	coarse woody debris: c	Fungi
<i>Limonia phragmitidis</i>	Limoniidae		shaded woodland floor	coarse woody debris: c	Fungi
<i>Molophilus appendiculatus</i>	Limoniidae		running water; shaded woodland floor; wet woodland	coarse woody debris: e	Fagales
<i>Molophilus bifidus</i>	Limoniidae		running water; shaded woodland floor; wet woodland	seepage (woodland): B	Fagales
<i>Molophilus bihamatus</i>	Limoniidae	Notable	running water; shaded woodland floor; wet woodland		Fagales
<i>Molophilus medius</i>	Limoniidae		running water; shaded woodland floor; wet woodland	coarse woody debris: e	Fagales
<i>Molophilus occultus</i>	Limoniidae		peatland; shaded woodland floor; wet woodland	acid mire: C, seepage (acid-neutral): C	Fagales
<i>Neolimonia dumetorum</i>	Limoniidae		decaying wood	coarse woody debris: d	Alnus, Betula, Quercus
<i>Paradelphomyia dalei</i>	Limoniidae		running water; shaded woodland floor; wet woodland	seepage (woodland): C	Fagales

Species	Family	Conservation status	Habitat	Habitat score	Associations
<i>Paradelphomyia senilis</i>	Limoniidae		running water; shaded woodland floor; wet woodland	seepage (woodland): A	Fagales
<i>Phylidorea ferruginea</i>	Limoniidae		marshland; peatland	coarse woody debris: d	
<i>Phylidorea squalens</i>	Limoniidae		peatland	acid mire: B	
<i>Rhipidia maculata</i>	Limoniidae		decaying wood; shaded woodland floor	coarse woody debris: d	Acer, Betula, Quercus
<i>Rhypholophus varius</i>	Limoniidae		shaded woodland floor	coarse woody debris: c	
<i>Symplecta stictica</i>	Limoniidae		brackish pools & ditches, peatland, saltmarsh	coarse woody debris: c	
<i>Cymus glandicolor</i>	Lygaeidae		marshland	calcareous grassland: Low	Carex
<i>Lispocephala brachialis</i>	Muscidae	RDB 3	running water; shaded woodland floor; wet woodland		Arthropoda, Marchantiophyta
<i>Dicranota bimaculata</i>	Pediciidae		running water	coarse woody debris: e	
<i>Tricyphona immaculata</i>	Pediciidae		marshland; peatland	acid mire: C, coarse woody debris: d/e	
<i>Ptychoptera lacustris</i>	Ptychopteridae		running water; shaded woodland floor; wet woodland	seepage (woodland): C	Fagales
<i>Chrysopilus cristatus</i>	Rhagionidae		peatland; shaded woodland floor; wet woodland	coarse woody debris: c	Fagales
<i>Cordilura rufimana</i>	Scathophagidae	Notable	peatland	acid mire: C	Carex
<i>Norellia spinipes</i>	Scathophagidae	Notable	shaded woodland floor		Narcissus
<i>Themira germanica</i>	Sepsidae	Notable	peatland		Anatidae
<i>Chrysogaster solstitialis</i>	Syrphidae		peatland; running water; shaded woodland floor; wet woodland	seepage (woodland): A	Fagales, Quercus
<i>Chrysogaster virescens</i>	Syrphidae		peatland; running water; shaded woodland floor; wet woodland	acid mire: C, seepage (acid-neutral): B, seepage (woodland): B	Fagales

Species	Family	Conservation status	Habitat	Habitat score	Associations
<i>Lejogaster metallina</i>	Syrphidae		peatland; running water; shaded woodland floor; wet woodland	seepage (acid-neutral): B	Fagales
<i>Melanogaster hirtella</i>	Syrphidae		marshland; peatland	seepage (calcareous): B	Typha
<i>Orhonevra intermedia</i>	Syrphidae	DD;NS			
<i>Sericomyia lappona</i>	Syrphidae			seepage (acid-neutral): C	
<i>Sericomyia silentis</i>	Syrphidae		peatland	seepage (acid-neutral): C	
<i>Sphegina clunipes</i>	Syrphidae		decaying wood	coarse woody debris: a/b	Fagales
<i>Xylota florum</i>	Syrphidae		decaying wood	coarse woody debris: a/b	Fagales
<i>Xylota segnis</i>	Syrphidae		decaying wood	coarse woody debris: c	Fagales
<i>Dolichozepea albipes</i>	Tipulidae		running water	seepage (acid-neutral): C, seepage (woodland): C	
<i>Prionocera turcica</i>	Tipulidae		marshland; peatland	acid mire: C	
<i>Tanyptera atrata</i>	Tipulidae	Notable	decaying wood		Alnus, Betula
<i>Tipula fulvipennis</i>	Tipulidae		running water; shaded woodland floor; wet woodland	seepage (woodland): C	Fagales
<i>Tipula lateralis</i>	Tipulidae		running water	seepage (calcareous): B, seepage (soft rock cliff): B, seepage (woodland): B	
<i>Tipula luteipennis</i>	Tipulidae		marshland; peatland; running water	seepage (woodland): C	
<i>Tipula melanoceros</i>	Tipulidae		peatland	acid mire: A	Juncus
<i>Tipula oleracea</i>	Tipulidae		peatland	coarse woody debris: d	
<i>Tipula yerburyi</i>	Tipulidae	Notable	running water	acid mire: C, seepage (woodland): C	

## REFERENCES

---

1. C. M. Drake, *The Lost Meres & Mosses of Delamere: Terrestrial Invertebrate Appraisal of Stage Two Basins, Delamere Forest, Cheshire*, Report for Colin Hayes, Ecology-First, Dec 2003.
2. P. Brighton, *Bug and Fly Recording in the Delamere Forest*, report for Cheshire Wildlife Trust, Version 1.0, Dec 2014.
3. P. Brighton, *Bug and Fly Recording in the Delamere Forest – 2015 Update*, report for Cheshire Wildlife Trust, Version 1.0, Jan 2016.
4. C. M. Drake, "*Orthonevra intermedia* Lundbeck, 1916 (Diptera, Syrphidae) new to Britain", *Dipterists Digest (Second Series)*, **13**(2006)87-91.
5. P. Brighton, *Bug and Fly recording on the Manchester Mosses – 2015 update*, report for Cheshire and Lancashire Wildlife Trusts, Version 1.0, Jan 2016.
6. L. N. Kidd & A. Brindle, *The Diptera of Lancashire and Cheshire*, Part 1, Lancashire and Cheshire Fauna Committee, 1959.
7. P. Brighton, *The Diptera of Lancashire and Cheshire: Soldierflies and Allies*, unpublished report, Draft 1.0, Jan 2017.
8. P. Brighton, *The Diptera of Lancashire and Cheshire: Sepsidae (Acalypratae: Sciomyzoidea)*, unpublished report, Draft 1.0, Feb 2017.