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The Diptera of Lancashire and Cheshire: Muscoidea, Part I

by

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DipteristsForum

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Summary

This report provides a new regional checklist for the Diptera families Muscidae and Fannidae. Together with the families Anthomyiidae and Scathophagidae these constitute the superfamily Muscoidea. Overall statistics on recording activity are given by decade and hectad. Checklists are presented for each of the three Watsonian vice-counties 58, 59, and 60 detailing for each species the number of occurrences and the year of earliest and most recent record. A combined checklist showing distribution by the three vice-counties is also included, covering a total of 241 species, amounting to 68% of the current British checklist. Biodiversity metrics have been used to compare the pre-1970 and post-1970 data both in terms of the overall number of species and significant declines or increases in individual species. The Appendix reviews the national and regional conservation status of species is also discussed.

Introduction

This report is the fifth in a series of reviews of the diptera records for Lancashire and Cheshire. Previous reviews have covered craneflies and winter gnats (Brighton, 2017a), soldierflies and allies (Brighton, 2017b), the family Sepsidae (Brighton, 2017c) and most recently that part of the superfamily Empidoidea formerly regarded as the single family Empididae (Brighton, 2019a). As explained in those earlier reviews, these reports provide updates of sections of the pioneering publication of Kidd and Brindle (1959), and in the case of the Sepsidae an addition. A Part 2 to cover the Schizophora was planned (Kidd, 1971) but never appeared. The present contribution is also an addition to the 1959 scope.

As previously, the geographical range of this review is the Watsonian vice-counties 58, 59 and 60, referred to as Cheshire, South Lancashire and North Lancashire respectively.

Taxonomic Scope and Identification

Up to the 1950s, the house-fly family Muscidae included the Anthomyiidae and Fanniidae (lesser house-flies), as well as the present Muscidae. The subfamily Anthomyiinae was taken out of the Muscidae by Hennig in the 1950s but the RES identification key (d'Assis Fonseca, 1968) retained the Fanniinae as a sub-family of Muscidae. With a total of 355 British species in January 2020 (Chandler, 2020), this combination remains a manageable group for this latest regional review. Fonseca (1968) still provides the main identification resource for the British Fanniidae, but for the Muscidae most species are covered by the keys and species descriptions in Gregor *et al* (2002). There have been many taxonomic changes in the Muscidae which have rendered many of the names used by Fonseca obsolete, and in some cases erroneous. Most British muscid species are covered by the keys and descriptions in Gregor *et al* (2002), and Barták *et al.* (2016) have produced a key to the European Fanniidae. The Dipterists Forum is planning an identification workshop on Muscidae in February 2022, and draft keys are already available for most genera.

Sources of data and methodology

The sources of data are the same as for the Empidoidea (Brighton, 2019a), except that there is no national recording scheme. Data was downloaded from the National Biodiversity Network on 10 October 2020. This includes all records, whether classed as verified or unverified by the contributing organisations. Further data for 2020 was obtained from IRECORD and direct from the small number of frequent diptera recorders.

In addition, data has been transcribed from the collections of record cards at Manchester Museum maintained by Harry Britten and Alan Brindle (Logunov, 2010). It was possible to interpret the names used on the cards using the synonyms listed

by Chandler (2020) but a few ambiguities remain. Of course, misidentification is a possible problem with these records, as indeed it is with more recent unverified records. However, many of the cards contain references to verification by Collin or Fonseca (eg "*teste* Collin" or "*t.* Collin"). No attempt has been made to trace and check original specimens in the course of compiling this report. The review of the regional status of species in the Appendix notes significant uncertainties.

The record cards for the family Muscidae were used by Peter Skidmore (1963) in an account of the genera *Helina*, *Mydaea* and *Phaonia* in Lancashire and Cheshire. His article includes some additional records. Skidmore went on to publish a study of the biology and larval morphology of the world-wide Muscidae (Skidmore, 1985), which remains a key reference (Marshall, 2012). Skidmore also led a Dipterists Forum workshop on the family in 2002, the unpublished notes of which provide a useful introduction.

The overall proportions of data from the various sources were very similar to that from the previous reviews, including considerable duplication of records. Major overlaps in datasets were removed, eg where a local records centre has uploaded data to the NBN Gateway. Duplication arising from multiple entries of data on different occasions can be more difficult to detect and rectify, but have been largely eliminated by a significant modification of the previous methodology.

This involved sorting the individual records by species, year, month of the year and hectad and then using a simple spreadsheet function to keep only one occurrence of each species for each combination of year, month and hectad. As well as removing duplicate records, this also has the effect of reducing the amount of data from recent surveys where multiple 100m squares may have been recorded in a single site visit. This provides numbers which are more comparable to those derived from pre-1970 recording which mostly have a 1-km spatial resolution at best. These numbers of "occurrences" are intermediate between the numbers of records and numbers of hectads reported for each species in the previous reviews (Brighton 2017a-c, 2019a). These numbers have also been used in the tables of spatial coverage (Tables 2a-c) and the county lists (Tables 3a-c). They are considered an improvement on both previous measures in reducing the dominance of recent records and providing a much better indication of abundance than simple counts of presence in hectads over the whole time range.

Overview of combined dataset

Figure 1 shows the comparison of the original numbers of records and the numbers of occurrences throughout the recording period, while Table 1 lists the numbers of the latter for each vice-county by decade. The process of aggregating records into occurrences defined by species, year, month and hectad in fact has a greater effect for the post-1970 records than for those before 1970. As in the previous reviews, 1970 has been taken as a good division for looking at long-term changes in the fauna, not only because it marks the half-way point in the overall period over which the vast majority of the data has been gathered, but also because it is the date of the last update of the county lists (Kidd, 1971). Table 1 also shows that the 1970s and 80s marked a nadir in recording effort. Harry Britten made the major contribution between 1920 and 1950, mainly in Cheshire and what is now Greater Manchester. In the 1950s and 1960s, Alan Brindle and Peter Skidmore contributed a rather smaller peak of recording in VC59. The post-1990 surge in recording was spear-headed by Bill Hardwick in collaboration with Steve McWilliam (Hardwick, 1999), again heavily biased towards VC58. Over the last decade, Rob Zloch and the present author have been largely responsible for starting to redress this imbalance, while continuing a similar effort in Cheshire.

The influence of these recorders is seen in the geographical plots of numbers of occurrences over the whole time period in Tables 2a-c. The most heavily recorded hectads are the "home ranges" of the principal collectors, but a number of areas of particular entomological interest show up: the

Goyt Valley (SK07), Delamere Forest (SJ57) and Wirral coast (SJ28) in VC58; the Sefton coast (SD20, SD30 and SD31) and the north-western coast (SD46 and SD47) in Lancashire.

Figure 2 shows the distributions of the number of species by month for the individual large genera *Coenosia*, *Fannia*, *Helina* and *Phaonia.* The overall species numbers for the whole group are also included, scaled down by a factor of ten. This shows *Fannia* and *Phaonia* species starting to appear in early spring with the build-up of *Coenosia* and *Helina* a month or so behind. The overall diversity reaches a peak in June, though the range of *Coenosia* is largest in July. There is a progressive decline in species richness thereafter apart from a secondary August peak of *Phaonia*.

Vice-county and Regional Checklists

Tables 3a-c present the summarised data for each of the three vice-counties. The species are listed in alphabetical order, as the division into subfamilies has been changed extensively from that of Fonseca (1968) and remains fluid (Chandler, 2020). Also of course this simplifies the processing of the data in standard spreadsheet software.

The combined regional checklist appears in Table 4 in ranked order of overall number of occurrences. The total number of species listed for Lancashire and Cheshire is 241 with 217, 196 and 125 in VC58, VC59 and VC60 respectively (see Table 5). These figures are undoubtedly influenced by the differing amounts of recording in the three vice-counties. This arises from the extremely uneven nature of the species abundance distribution, which is also characteristic of other collections of diptera records (Brighton, 2019a,b). In the case of the regional data for Fanniidae and Muscidae, we have the top 20 species providing 40.4% of the occurrences, while at the other end of the scale 2% of the records cover the 71 scarcest species, 29.5% of the total.

In previous reports in this series, an assessment of changes in the fauna between the pre-1970 and post-1970 periods has been made on the basis of earliest or latest years of a record, ie a simple comparison of the species lists in the two half-centuries. This is clearly subject to considerable uncertainty as the numbers are dominated by the significant proportion of species observed only a few times, so a revised procedure has been adopted in this review. This is based on comparing the observed numbers for each species in the two periods with those expected from a pro-rata distribution from the overall distribution. Let the numbers of pre- and post-1970 occurrences be denoted by $N_1 = 1869$ and $N_2 = 5856$. If O is the observed total number for a particular species then the expected numbers are $E_1 = ON_1/(N_1 + N_2)$ and $E_2 = ON_2/(N_1 + N_2)$. Then the χ^2 statistic for the deviation of the observed numbers O_1 and O_2 from expectation is

$$\chi^2 = \frac{(O_1 - E_1)^2}{E_1} + \frac{(O_2 - E_2)^2}{E_2}$$

For one degree of freedom, the significant levels of this statistic are 5.02 at the 95% level and 7.88% at the 99% level. For $O \leq 5$, the binomial distribution with $p = 1869/7725 = 0.2419$ is used directly. Table 4 indicates which species show increases or decreases above these thresholds. 32 species show a significant increase but 53 have been recorded well below the expected level since 1970 (Table 5). Also noted is the conservation status of each species according to Falk and Pont (2017).

Diversity Measures

The excess of apparent declines since 1970 over the number of increases might suggest a deterioration in the biodiversity. Clearly this runs counter to the overall increase in recorded species, but the overall increase in recording also needs to be accounted for. While species richness may be the same, an increase in common species and decrease in the relative abundance of rarer ones would constitute a decrease in evenness of the distribution. This has been examined using the methods outlined by Brighton (2020).

Figure 3 shows the separate Whitaker plots for the pre- and post-1970 data. There is a fair though not remarkable degree of match with the continuous curve representing the probability distribution underlying Fisher's log series. The numbers of

singletons are rather less than predicted: 35 versus 53 for the pre-1970 data and 34 versus 44 for the later period. This is a sign of an approach to the asymptotic number of species to be found. The respective values of Fisher's α are 56.2±2.4 and 45.7±1.4 indicating a decline in the muscid diversity. This is seen in the steeper downward slope of the post-1970 curve.

The two sets of data have also been compared using the non-parametric methods of Chao *et al.* (2014) using the on-line iNEXT software (Hsieh *et al.* 2016). Figures 4a-c show the main results, including 95% confidence limits calculated using 50 bootstraps. The species accumulation curves confirm that for comparable levels of recording the pre-1970 data imply a greater species richness, as well as a more even distribution as seen in the empirical Hill numbers profile of Fig 4b. The rarefaction curves indicate that with the same number of occurrences as the historic data, the modern data would give only 176 species compared to the 194 recorded before 1970. With larger samples the curves converge and eventually cross over. The asymptotic estimates of true species richness using the "Chao1" estimator, essentially the Hill number of order 0 in Fig 4c, are 216±10 for the pre-1970 data and 257±16 for the later period.

Discussion

This review of records of Muscidae and Fanniidae for Lancashire and Cheshire from all the currently available sources reveals a similar pattern of recording effort as for the Diptera groups studied previously (Brighton 2017a-c, 2019a). This applies to both the geographical distribution reflecting the locations of dominant recorders, and the historical pattern over a period of over a century. The greater number of records in the past half century may be attributed to greater specialisation amongst recorders and better resources for identification, as well as the use of computerised data systems to store data in greater detail and quantity.

Two important modifications have been made to the methodology of the previous reports. First, instead of presenting numbers of raw records, the data have been aggregated to give a measure over hectads and months. This both largely eliminates duplicated records and also makes the pre- and post-1970 data more consistent by reducing numbers of common species which might be recorded in multiple 100m squares during a single site visit, in contrast to the historic practice of giving a simple place-name. Previous reports also listed the number of hectads over which each species had been recorded in all time, but this is judged to give little additional value compared to the new occurrence measure.

The second innovation has been the use of biodiversity measurement methods to compare the historic and modern data. Our previous method of simply comparing species lists before and after 1970 took no account of the differing overall amounts of data. The similarity in the overall species-abundance distributions seen in Figure 3 suggests that the sampling methods in the two time periods are indeed generally consistent.

The results of the comparison of the species accumulation curves do not give a clear indication of a change in overall biodiversity amongst the Muscidae and Fanniidae in the region. There has been extensive publicity for studies finding that severe declines in insect abundance have occurred in recent decades, though wider reviews suggest that the picture is not necessarily so clear-cut (Didham *et al*., 2020). The method adopted here for comparing diversity between the two time periods is completely different form the approach of looking at trends for single species and so avoids many of the potential pitfalls discussed by Didham *et al.* Of course, our method is not without its potential biases, the most obvious of which is that diversity is not the same as abundance. However, it seems plausible that large declines in abundance would also result in a reduction in diversity of species, with rarest becoming undetectable or even regionally extinct. The steeper diversity curves for the modern period may indicate a slight effect of this nature. On the other hand, the pre-1970 results may also be influenced by a bias towards rarer species, as is

natural in gathering specimens for museum collections (Petersen and Meier, 2003), and also by differences in the geographical coverage and range of habitats sampled. There is some indication that the pre-1970 recording of smaller species may have been less intensive: whereas the genera *Coenosia* and *Fannia* provide 10.8% and 17.0% of the post-1970 records, they amount to only 5.6% and 8.8% respectively in the earlier period. As another example, *Schoenomyza littoralis* is a common and particularly distinctive small muscid, which is almost completely absent from the pre-1970 records. A more significant shortfall in the early records for smaller species was found for the Empididae and Hybotidae (Brighton, 2019a), where the proportion of very small species is much greater.

The Appendix reviews the regional status of the species in the checklist, highlighting significant increases and declines in numbers and assessing the reliability of records of the rarer species. As it has not been possible to undertake any direct verification of records, identifications have generally been given the benefit of the doubt. A few records have been rejected as entirely implausible and not associated with a recognised dipterist (e.g. *Phaonia pullata*, *Pyrellia rapax*). Of course, even records by experienced dipterists may have been misidentified or mistranscribed. Some names which must be erroneous have been left on the list (e.g. *Thricops genarum*) on the grounds that an experienced dipterists may misidentify an unfamiliar rare species, but is unlikely to misidentify a common species as a rare one – this will have no significant impact on the biodiversity statistics as the actual names are not taken into account.

Although no overall trend in the regional fauna can be discerned there are several recurrent themes. The recording of species from wasp and bird nests may have fallen into disfavour since the mid-century. Fonseca (1968) highlighted bird nests as a particularly fruitful source of scarce *Fannia* species. There are several primarily coastal species which have been recorded along the Weaver valley. This area of the salt extraction industry seems to have been largely by-passed by the pre-1970 recorders. Several common species breeding in cow-dung show large declines in the numbers of records, possibly resulting from the use of modern veterinary products such as ivermectin. Some species may have increased as a result of an expansion of range from the south. The genera *Spilogona* and *Thricops* contain many species which are common in Scotland but may be decreasing in our area. Other changes in species abundance cannot be related to differing recording patterns or the influence of climate change and may be the result of actual long-term fluctuations in population. *Helina depuncta* and *Phaonia tuguriorum* seem to have become generally much commoner, while for other species the dearth of pre-1970 records seems to be a regional phenomenon, as with *Coenosia tigrina* and *Fannia serena*.

Falk and Pont (2017) repeatedly refer to the difficulty in identifying any specific habitat requirements for nationally designated species, for many of which the few records are very widely scattered. So the appearance of many of these species in the region is not a surprise. There does not seem any point in adding such species to the regional priority list. However, there are a few species associated with specific microhabitats or specific localities which do merit consideration for targeted surveys (see Box on next page).

The number of species on our regional list of Muscidae and Fanniidae equates to 68% of the national total. The comparable figures for groups previously reviewed were 75% for the craneflies (Brighton, 2017a), 58% for soldierflies and allies (Brighton, 2017b), 69% for the Sepsidae (Brighton 2017c) and 62% for the Empididae and allies (Brighton 2019a). The Cumbria list of Muscidae and Fanniidae contains 156 species from 1095 records (Hewitt, 2014). Reference to the species accumulation curve for our regional post-1970 data (Fig. 4a) gives an estimated 154 species at the same level of recording. The checklists for the 5 vice-counties of Yorkshire contain 247 species overall (Grayson, 2015), but numbers of records are not listed. Thus overall the numbers of muscid

Regional Priority List

The Tanyptera Project (2020) has issued the following selection criteria for designation of priority invertebrate species in Lancashire and Cheshire:

A) **Nationally Rare** (GB Rarity Status) or **Threatened** (all GB IUCN categories excl. DD, LC, RE) species according to the most recent review of the taxon group with reliable records in the Tanpytera Project region since 1980 based on LERC data, regional expert review and some National Scheme data.
B) At the discretion of regional experts, **Nationally Scarce** (GB Rarity Status) species according to the most recent review of the taxon group with reliable records in the Tanpytera project region since 1980 according to LERC data, regional expert review and some national scheme data. These selections will usually be those in well documented decline nationally.
C) **Nationally Rare**, **Scarce** or **Threatened** species not yet recorded within the project region according to LERC data but perceived by regional experts to have reasonable potential of occurring.
D) At the discretion of national / regional / county recorders, species without a GB rarity or GB IUCN threat status but known / thought to be in rapid decline. These selections will usually only fall within taxon groups that have not had status reviews nationally for over 25 years.

Exclusions
E) At the discretion of the Tanyptera Regional Entomologist and Tanyptera Project Steering Group, any qualifying species that has received significant surveying effort within the past decade or will be receiving such attention in the near future, e.g. Northern Dune Tiger Beetle (*Cicindela hybrida*).
F) At the discretion of the Tanyptera Regional Entomologist and Tanyptera Steering Group, any qualifying species that is perceived to no longer warrant a GB Rarity Status of Nationally Rare status based on new distribution information and/or advice from national/local experts. Usually these species will have expanded their range markedly in recent years and will fall within taxon groups that have not been reviewed nationally for over 25 years.

At present the only member of the Fanniidae and Muscidae on this list is *Hydrotaea velutina*. The review of the species in the Appendix recommends the addition of the following four species in view of their specific habitat associations and the decline in the numbers of recorded occurrences.

- *Achanthiptera rohrelliformis*
- *Fannia vesparia*
- *Phaonia fusca*
- *Phaonia zugmayeriae*

and fanniid species recorded are consistent with those in other taxanomic groups and neighbouring regions.

Acknowledgments

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FIGURES

Fig. 1. Numbers of records and occurrences in the pre-1970 and post-1970 datasets. The number of records is the quantity of raw data. These records have been aggregated into "occurrences" defined by hectad, year and month to remove duplications and reduce the dominance of common species in the post-1970 data.

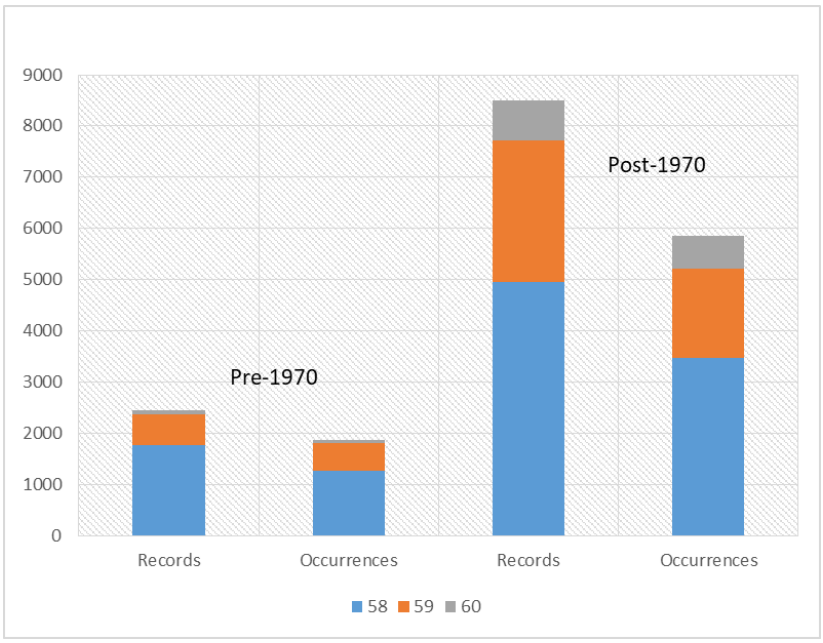


Fig. 2. Recorded species richness by month for all Muscidae and Fanniidae (×0.1) and the four largest genera

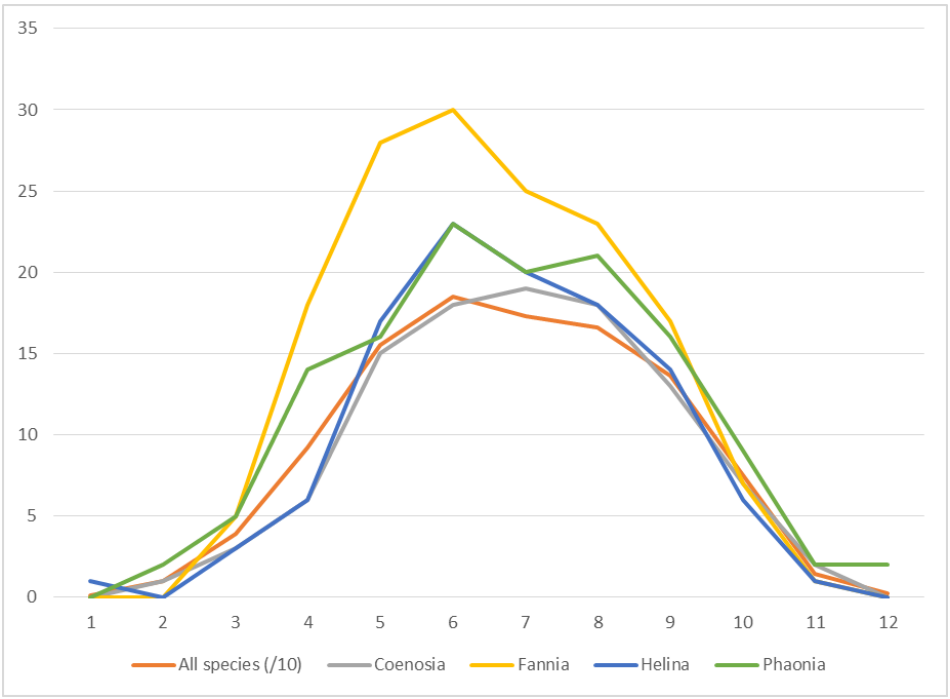


Fig. 3. Whittaker plots (number of occurrences versus species rank) for the pre- and post-1970 data, with the respective curves corresponding to the probability distribution for Fisher's log series

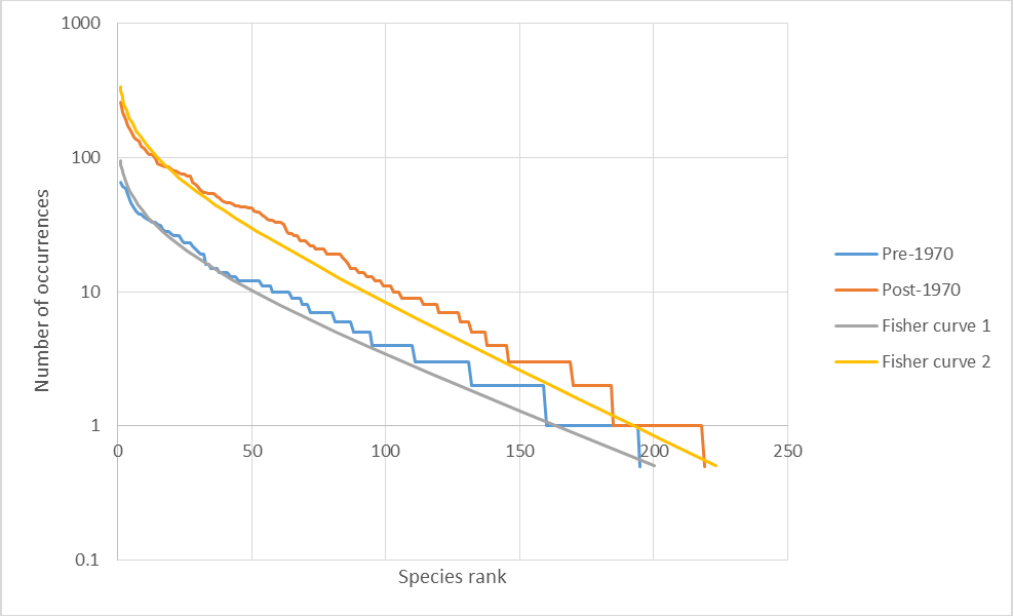
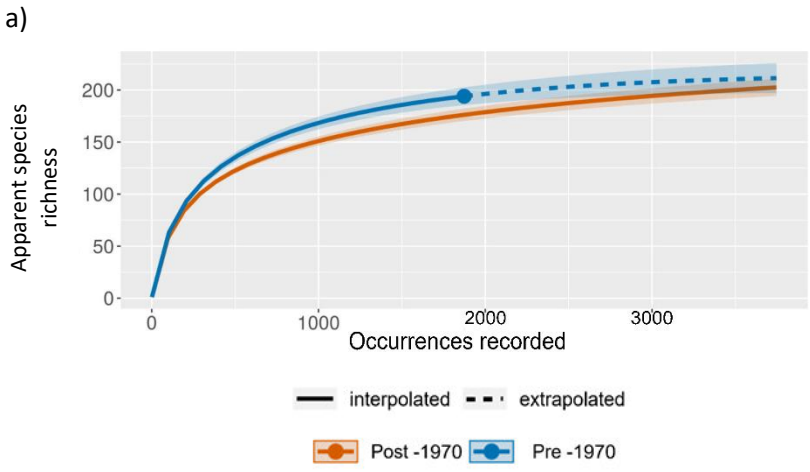
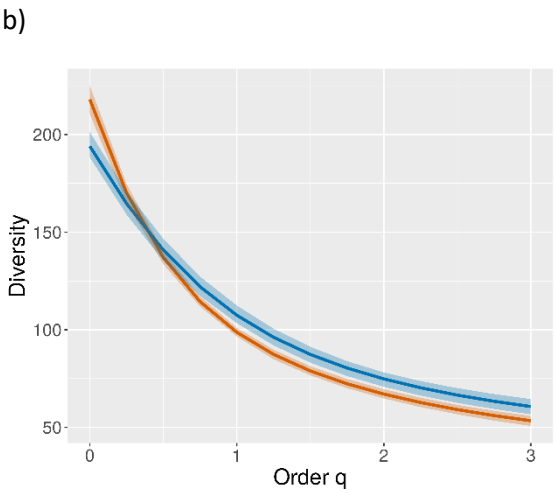
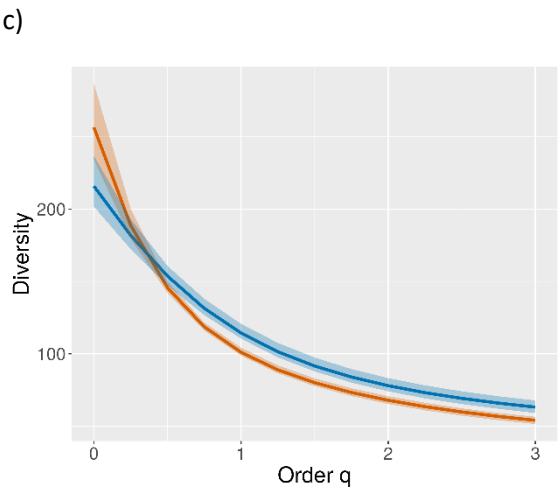


Fig. 4. iNEXT results for the pre- and post-1970 data: a) species accumulation curves; b) empirical Hill number profiles; c) asymptotic Hill number profiles.







TABLES

Table 1. Numbers of occurrences of Muscidae and Fanniidae by decade and vice-county

VC	Pre-1910	1910s	1920s	1930s	1940s	1950s	1960s
58	9	88	179	190	549	65	178
59	0	15	114	104	101	172	38
60	4	6	14	21	2	21	9
Totals	**13**	**109**	**307**	**315**	**652**	**258**	**225**

VC	1970s	1980s	1990s	2000s	2010s	2020s	Total
58	73	97	1097	838	1350	23	4736
59	3	6	274	101	1127	229	2284
60	0	3	81	12	485	48	706
Totals	**76**	**106**	**1452**	**951**	**2962**	**300**	**7726**

Table 2a. Number of occurrences per hectad in VC58 - Muscidae and Fanniidae

	SJ2_	SJ3_	SJ4_	SJ5_	SJ6_	SJ7_	SJ8_	S_9_	S_0_	S_1_
S__0								0	0	12
S__9	12	5				32	27	72	35	
34	130	16	3	343	42	235	373	131	2	
S__7	12	92	81	425	480	107	65	39	155	
S__6		11	62	323	889	55	85	4	0	
SJ_5		22	48	86	76	64	1			
SJ_4			0	31	20	0				

Table 2b. Number of occurrences per hectad in VC59 - Muscidae and Fanniidae

	SD2_	S_3_	S_4_	S_5_	S_6_	S_7_	S_8_	S_9_	SK0_
SD_4						17	22	0	
SD_3					7	35	31	4	
SD_2		1	2	68	12	11	2	0	
SD_1	174	115	81	41	137	15	18	6	
SD_0	160	52	22	40	25	20	22	57	
SJ_9		9	45	50	633	79	105	19	
SJ_8		1	58	74	15		1		

Table 2c. Number of occurrences per hectad in VC60 - Muscidae and Fanniidae

	SD2_	SD3_	SD4_	SD5_	6	SD7_	SD8_
SD_7			165	33	6		
SD_6			172	58	2		
SD_5			42	47	3		
SD_4		20	21	27	12		
SD_3		12	4	44	27		
SD_2		6					

Table 3a. Checklist of Muscidae and Fanniidae for VC58 (Cheshire)

Species	Number of Occurrences in VC58	Earliest Year	Latest Year
Achanthiptera rohrelliformis	7	1890	1943
Azelia aterrima	1	1945	1945
Azelia cilipes	69	1928	2019
Azelia nebulosa	81	1914	2019
Azelia trigonica	1	2012	2012
Azelia triquetra	32	1921	2019
Azelia zetterstedtii	46	1919	2019
Coenosia agromyzina	25	1998	2018
Coenosia albicornis	26	1919	2012
Coenosia antennata	1	2016	2016
Coenosia atra	1	2017	2017
Coenosia bilineella	4	1921	2018
Coenosia femoralis	7	2012	2019
Coenosia infantula	7	1928	2019
Coenosia intermedia	16	1931	2018
Coenosia karli	1	1936	1936
Coenosia lacteipennis	3	1990	2018
Coenosia means	2	1947	2012
Coenosia mollicula	2	2015	2016
Coenosia pedella	6	1979	2019
Coenosia perpusilla	6	1997	2004
Coenosia pumila	11	1979	2019
Coenosia ruficornis	2	1936	2017
Coenosia rufipalpis	39	1919	2018
Coenosia testacea	80	1927	2019
Coenosia tigrina	153	1913	2020
Coenosia verralli	4	2017	2019
Drymeia hamata	11	1913	2020
Drymeia vicana	10	1923	2019
Eudasyphora cyanella	147	1913	2019
Eudasyphora cyanicolor	4	1931	2017
Fannia aequilineata	4	1936	2013
Fannia armata	38	1934	2019
Fannia atra	3	1944	2004
Fannia canicularis	35	1889	2019
Fannia carbonaria	3	1954	1960
Fannia collini	1	2018	2018
Fannia coracina	13	1942	2018
Fannia corvina	1	1996	1996
Fannia difficilis	5	1932	1943
Fannia fuscula	19	1999	2019
Fannia genualis	15	1999	2019
Fannia immutica	1	2006	2006

Species	Number of Occurrences in VC58	Earliest Year	Latest Year
Fannia incisurata	2	1928	1947
Fannia lepida	25	1945	2018
Fannia lucidula	1	1941	1941
Fannia lustrator	29	1931	2018
Fannia manicata	17	1930	2016
Fannia minutipalpis	2	2006	2017
Fannia mollissima	51	1932	2018
Fannia monilis	2	1944	2006
Fannia norvegica	1	2000	2000
Fannia pallitibia	23	1941	2018
Fannia parva	27	1989	2018
Fannia pauli	1	2012	2012
Fannia polychaeta	49	1920	2020
Fannia postica	19	1940	2020
Fannia rondanii	28	1920	2020
Fannia scalaris	8	1914	2006
Fannia serena	146	1917	2019
Fannia similis	61	1989	2020
Fannia sociella	38	1921	2019
Fannia subpubescens	1	1999	1999
Fannia subsimilis	33	1996	2018
Fannia umbrosa	7	2004	2020
Fannia verrallii	2	1942	1944
Fannia vesparia	6	1890	1999
Graphomya maculata	64	1917	2019
Graphomya minor	5	1934	2018
Gymnodia humilis	16	1930	2016
Haematobia irritans	6	1944	2018
Haematobosca stimulans	18	1914	1999
Hebecnema fumosa	1	2016	2016
Hebecnema nigra	49	1915	2019
Hebecnema nigricolor	47	1942	2019
Hebecnema umbratica	108	1915	2020
Hebecnema vespertina	85	1943	2019
Helina allotalla	3	1913	2017
Helina atricolor	2	1943	2011
Helina calceata	8	1961	2012
Helina celsa	3	1999	2019
Helina confinis	6	1927	2016
Helina consimilis	1	1933	1933
Helina depuncta	73	1924	2019
Helina evecta	56	1912	2016
Helina fratercula	1	1935	1935
Helina impuncta	102	1921	2019

Species	Number of Occurrences in VC58	Earliest Year	Latest Year
Helina intermedia	1	2019	2019
Helina lasiophthalma	20	1996	2019
Helina latitarsis	2	2006	2006
Helina maculipennis	2	1943	1979
Helina obscurata	24	1917	2018
Helina pertusa	5	1963	2006
Helina protuberans	1	2018	2018
Helina pubescens	4	1917	1976
Helina pubiseta	2	1999	2019
Helina quadrum	36	1929	2019
Helina reversio	103	1913	2019
Helina setiventris	36	1917	2019
Helina sexmaculata	2	1934	1944
Helina subvittata	4	1915	2016
Helina trivittata	8	1936	1999
Hydrotaea albipuncta	36	1930	2019
Hydrotaea armipes	25	1924	2017
Hydrotaea cinerea	6	1996	2020
Hydrotaea cyrtoneurina	39	1989	2019
Hydrotaea dentipes	96	1913	2018
Hydrotaea diabolus	20	1928	2018
Hydrotaea floccosa	2	1944	2001
Hydrotaea ignava	12	1917	2016
Hydrotaea irritans	85	1890	2020
Hydrotaea meridionalis	1	1973	1973
Hydrotaea meteorica	10	1944	2019
Hydrotaea militaris	9	1929	2018
Hydrotaea nidicola	1	1934	1934
Hydrotaea palaestrica	2	1917	1996
Hydrotaea similis	13	1924	2018
Limnophora exuta	6	1931	2016
Limnophora maculosa	21	1933	2019
Limnophora olympiae	2	1940	1942
Limnophora riparia	17	1933	2019
Limnophora tigrina	15	1990	2019
Limnophora triangula	37	1945	2019
Limnospila albifrons	2	2012	2017
Lispe litorea	3	1931	1998
Lispe loewi	1	1999	1999
Lispe pygmaea	1	2016	2016
Lispe tentaculata	7	1934	2018
Lispocephala alma	13	1941	2019
Lispocephala brachialis	2	2014	2015
Lispocephala erythrocera	32	1996	2019

Species	Number of Occurrences in VC58	Earliest Year	Latest Year
Lispocephala falculata	1	2014	2014
Lispocephala spuria	4	1936	1960
Lispocephala verna	1	2012	2012
Lophosceles cinereiventris	9	1943	2016
Lophosceles mutatus	6	1925	2001
Macrorchis meditata	11	1931	2018
Mesembrina meridiana	172	1912	2020
Morellia aenescens	30	1917	2018
Morellia hortorum	47	1915	2019
Morellia simplex	48	1918	2019
Musca autumnalis	23	1900	2020
Musca domestica	33	1894	2017
Muscina levida	69	1918	2020
Muscina prolapsa	17	1918	2016
Muscina stabulans	18	1889	2019
Mydaea affinis	1	2001	2001
Mydaea ancilla	23	1962	2019
Mydaea anicula	7	1954	2018
Mydaea corni	34	1914	2016
Mydaea deserta	2	1942	1944
Mydaea detrita	17	1929	2017
Mydaea humeralis	4	1942	2018
Mydaea nebulosa	10	1917	2012
Mydaea orthonevra	5	1913	2020
Mydaea setifemur	6	1944	2016
Mydaea urbana	51	1915	2019
Myospila meditabunda	57	1913	2020
Neomyia cornicina	44	1912	2019
Neomyia viridescens	7	1945	2017
Orchisia costata	1	2001	2001
Phaonia angelicae	60	1909	2020
Phaonia atriceps	7	1963	2019
Phaonia bitincta	1	1978	1991
Phaonia canescens	3	1963	1995
Phaonia cincta	1	1963	1963
Phaonia errans	81	1915	2019
Phaonia erronea	8	1913	2019
Phaonia falleni	6	1927	2018
Phaonia fuscata	28	1963	2018
Phaonia gobertii	10	1929	2018
Phaonia halterata	21	1934	2018
Phaonia incana	50	1913	2019
Phaonia laeta	3	1960	1963
Phaonia magnicornis	1	1969	1969

Species	Number of Occurrences in VC58	Earliest Year	Latest Year
Phaonia mystica	1	2001	2001
Phaonia pallida	40	1918	2020
Phaonia palpata	33	1943	2020
Phaonia perdita	14	1964	2019
Phaonia pratensis	3	1960	2011
Phaonia rufipalpis	7	1915	2004
Phaonia rufiventris	55	1913	2018
Phaonia serva	41	1920	2019
Phaonia subventa	89	1940	2019
Phaonia trimaculata	3	1914	1926
Phaonia tuguriorum	88	1916	2020
Phaonia valida	16	1911	2018
Phaonia villana	2	1941	2013
Phaonia zugmayeriae	7	1943	1963
Piezura pardalina	2	2006	2015
Polietes domitor	40	1915	2018
Polietes hirticrus	10	1922	1999
Polietes lardarius	96	1934	2019
Polietes meridionalis	3	2017	2019
Potamia littoralis	7	1912	2016
Pseudocoenosia abnormis	7	1920	2020
Pseudocoenosia solitaria	9	1963	2019
Schoenomyza litorella	42	1936	2019
Spanochaeta dorsalis	5	1999	2020
Spilogona aerea	3	1936	2017
Spilogona contractifrons	13	1918	1999
Spilogona denigrata	7	1913	2019
Spilogona falleni	4	1927	2019
Spilogona marina	2	1936	2017
Spilogona meadei	4	1945	2004
Spilogona pacifica	11	1921	2019
Spilogona scutulata	2	1962	2017
Spilogona setigera	1	1900	1915
Spilogona surda	2	1998	2012
Spilogona veterrima	4	1960	1996
Stomoxys calcitrans	38	1920	2019
Thricops cunctans	1	1943	1943
Thricops diaphanus	23	1915	2017
Thricops semicinereus	4	1927	2001
Thricops simplex	12	1929	2012
Thricops sudeticus	4	1929	2019
Villeneuvia aestuum	1	1979	1979

Table 3b. Checklist of Muscidae and Fanniiidae for VC59 (South Lancashire)

Species	No of occurrences in VC59	Earliest Year	Latest Year
Achanthiptera rohrelliformis	8	1921	2000
Azelia cilipes	21	1922	2020
Azelia nebulosa	11	1921	2020
Azelia trigonica	2	2015	2020
Azelia triquetra	8	1935	2020
Azelia zetterstedtii	8	1924	2019
Coenosia agromyzina	5	1994	2019
Coenosia albicornis	10	1922	1999
Coenosia antennata	2	2017	2019
Coenosia bilineella	1	2016	2016
Coenosia femoralis	8	1928	2018
Coenosia humilis	3	1926	2018
Coenosia infantula	3	2018	2019
Coenosia intermedia	14	1918	2020
Coenosia lacteipennis	10	1931	2019
Coenosia means	2	2017	2018
Coenosia minutalis	6	1955	2019
Coenosia mollicula	11	1951	2020
Coenosia pedella	11	1955	2019
Coenosia perpusilla	2	2017	2018
Coenosia pulicaria	4	1942	1962
Coenosia pumila	27	1928	2020
Coenosia pygmaea	2	1955	1959
Coenosia ruficornis	2	2018	2018
Coenosia rufipalpis	19	1927	2019
Coenosia testacea	35	1923	2020
Coenosia tigrina	87	1925	2020
Coenosia verralli	12	1955	2019
Drymeia hamata	16	1923	2018
Eudasyphora cyanella	32	1937	2020
Eudasyphora cyanicolor	4	1999	2018
Fannia armata	27	1934	2020
Fannia atra	1	2015	2015
Fannia atripes	1	2017	2017
Fannia canicularis	28	1914	2020
Fannia carbonaria	1	2015	2015
Fannia coracina	7	1934	2020
Fannia difficilis	1	1943	1943
Fannia fuscula	16	1959	2020
Fannia genualis	7	1999	2020
Fannia immutica	1	1999	1999
Fannia incisurata	5	1925	1959

Species	No of occurrences in VC59	Earliest Year	Latest Year
Fannia latipalpis	1	2019	2019
Fannia lepida	1	2016	2016
Fannia lustrator	20	1950	2020
Fannia manicata	5	1922	2019
Fannia metallipennis	1	2015	2015
Fannia minutipalpis	3	2015	2020
Fannia mollissima	21	1990	2020
Fannia monilis	5	1923	2020
Fannia nigra	1	2020	2020
Fannia pallitibia	11	1999	2020
Fannia parva	7	1999	2018
Fannia pauli	1	1997	1997
Fannia polychaeta	9	1997	2020
Fannia postica	15	1959	2020
Fannia rondanii	12	1935	2020
Fannia scalaris	8	1923	2020
Fannia serena	54	1943	2020
Fannia similis	21	1944	2020
Fannia sociella	19	1924	2020
Fannia speciosa	1	2018	2018
Fannia subsimilis	9	1999	2020
Fannia umbrosa	6	1999	2020
Fannia verrallii	1	1942	1942
Fannia vesparia	1	1923	1923
Fannia vespertilionis	3	1955	1962
Graphomya maculata	36	1925	2020
Graphomya minor	1	2016	2016
Gymnodia humilis	7	1932	2019
Haematobosca stimulans	9	1920	2019
Hebecnema fumosa	7	2016	2020
Hebecnema nigra	28	1935	2020
hebecnema nigricolor	3	2014	2018
Hebecnema umbratica	9	1935	2020
Hebecnema vespertina	48	1935	2020
Helina abdominalis	2	1997	1997
Helina allotalla	5	2014	2016
Helina calceata	1	1942	1942
Helina confinis	7	1942	2018
Helina depuncta	48	1959	2020
Helina evecta	38	1922	2020
Helina impuncta	56	1918	2020
Helina intermedia	2	2020	2020
Helina lasiophthalma	12	1997	2019

Species	No of occurrences in VC59	Earliest Year	Latest Year
Helina latitarsis	1	2000	2000
Helina maculipennis	3	1934	2020
Helina obscurata	5	1928	2019
Helina parcepilosa	2	2016	2019
Helina pertusa	1	2018	2018
Helina protuberans	12	1924	2019
Helina pubiseta	2	1959	2017
Helina quadrum	14	1930	2020
Helina reversio	57	1923	2020
Helina setiventris	14	1936	2020
Helina sexmaculata	2	1924	2018
Helina subvittata	5	1918	1959
Helina trivittata	5	1936	1999
Hydrotaea albipuncta	9	1930	2018
Hydrotaea armipes	15	1926	2020
Hydrotaea cinerea	1	2015	2015
Hydrotaea cyrtoneurina	1	2015	2015
Hydrotaea dentipes	29	1920	2020
Hydrotaea diabolus	7	1943	2018
Hydrotaea floccosa	3	1934	2016
Hydrotaea ignava	4	1931	1958
Hydrotaea irritans	36	1924	2020
Hydrotaea meridionalis	1	2015	2015
Hydrotaea meteorica	6	1959	2020
Hydrotaea militaris	2	2018	2020
Hydrotaea palaestrica	2	1937	1959
Hydrotaea parva	2	2017	2020
Hydrotaea similis	4	1930	1937
Limnophora exuta	2	1930	1935
Limnophora maculosa	20	1921	2020
Limnophora nigripes	3	2018	2019
Limnophora olympiae	2	1934	1939
Limnophora riparia	5	1929	1982
Limnophora scrupulosa	2	1924	1931
Limnophora tigrina	7	1924	2018
Limnophora triangula	16	1999	2020
Limnospila albifrons	1	2019	2019
Lispe pygmaea	13	1928	2020
Lispe tentaculata	9	1928	2020
Lispe uliginosa	2	1954	1964
Lispocephala alma	5	2014	2017
Lispocephala brachialis	1	2017	2017
Lispocephala erythrocera	43	1959	2020

Species	No of occurrences in VC59	Earliest Year	Latest Year
Lispocephala rubricornis	3	2017	2019
Lispocephala verna	1	1959	1959
Lophosceles cinereiventris	4	1925	2020
Macrorchis meditata	4	1932	1999
Mesembrina meridiana	60	1915	2020
Morellia aenescens	59	1920	2020
Morellia hortorum	24	1917	2020
Morellia simplex	33	1917	2020
Musca autumnalis	11	1941	2020
Musca domestica	39	1920	2020
Muscina levida	39	1922	2020
Muscina prolapsa	25	1922	2020
Muscina stabulans	8	1917	2020
Mydaea ancilla	7	1955	2016
Mydaea anicula	1	2016	2016
Mydaea corni	8	1925	2020
Mydaea detrita	2	1962	2000
Mydaea humeralis	10	1937	2020
Mydaea orthonevra	4	1924	2019
Mydaea setifemur	3	2015	2018
Mydaea urbana	9	1951	2020
Myospila meditabunda	19	1912	2019
Neomyia cornicina	10	1920	2020
Neomyia viridescens	6	2013	2019
Phaonia angelicae	34	1927	2019
Phaonia atriceps	2	2020	2020
Phaonia errans	49	1920	2020
Phaonia falleni	1	1999	1999
Phaonia gobertii	4	1930	1963
Phaonia halterata	8	2016	2020
Phaonia incana	25	1912	2020
Phaonia laeta	1	1961	1961
Phaonia magnicornis	3	1954	1964
Phaonia pallida	17	1926	2020
Phaonia palpata	26	1927	2020
Phaonia perdita	3	1946	1960
Phaonia rufipalpis	8	1932	2020
Phaonia rufiventris	16	1912	2018
Phaonia serva	13	1934	2020
Phaonia subventa	36	1959	2020
Phaonia trimaculata	3	1946	1959
Phaonia tuguriorum	72	1927	2020
Phaonia valida	7	1946	2019

Species	No of occurrences in VC59	Earliest Year	Latest Year
Phaonia villana	1	1954	1954
Piezura pardalina	1	2014	2014
Polietes domitor	17	1920	2020
Polietes hirticrus	4	1920	1964
Polietes lardarius	16	1950	2020
Polietes meridionalis	2	2016	2016
Potamia littoralis	3	1999	2015
Pseudocoenosia abnormis	3	2015	2018
Pseudocoenosia solitaria	13	1959	2020
Schoenomyza litorella	35	1989	2020
Spanochaeta dorsalis	3	2018	2019
Spilogona aerea	2	2017	2017
Spilogona contractifrons	2	1935	1946
Spilogona denigrata	6	1931	2018
Spilogona falleni	1	2015	2015
Spilogona marina	6	2017	2019
Spilogona pacifica	8	1928	2018
Spilogona solitariana	2	1935	1937
Spilogona surda	2	1943	1944
Spilogona veterrima	1	2018	2018
Stomoxys calcitrans	16	1920	2020
Thricops diaphanus	7	1923	2016
Thricops genarum	1	1929	1929
Thricops semicinereus	2	1950	2017
Thricops sudeticus	1	1957	1957

Table 3c. Number of occurrences per hectad in VC60 - Muscidae and Fanniidae

Species	No of occurrences in VC60	Earliest Year	Latest Year
Azelia cilipes	2	2017	2017
Azelia nebulosa	3	1915	2019
Coenosia agromyzina	3	1999	2020
Coenosia albicornis	2	1934	2016
Coenosia bilineella	1	1999	1999
Coenosia femoralis	6	2016	2020
Coenosia intermedia	1	2018	2018
Coenosia means	4	2018	2020
Coenosia mollicula	2	1933	1999
Coenosia pedella	3	1999	2016
Coenosia perpusilla	1	2017	2017
Coenosia pumila	2	2020	2020
Coenosia rufipalpis	1	2018	2018
Coenosia testacea	2	1999	2016
Coenosia tigrina	37	1930	2020
Drymeia hamata	5	1934	2020
Eudasyphora cyanella	19	1999	2020
Eudasyphora cyanicolor	13	1934	2019
Fannia armata	10	2016	2020
Fannia canicularis	7	2014	2019
Fannia coracina	4	1934	2020
Fannia fuscula	5	1999	2020
Fannia lepida	2	2017	2019
Fannia lucidula	1	2018	2018
Fannia lustrator	13	1999	2020
Fannia manicata	3	1957	2017
Fannia mollissima	3	2016	2019
Fannia monilis	2	2019	2019
Fannia pallitibia	1	2016	2016
Fannia parva	2	1999	2015
Fannia pauli	1	1999	1999
Fannia postica	5	1999	2020
Fannia rondanii	7	2016	2020
Fannia scalaris	4	2014	2016
Fannia serena	27	1999	2020
Fannia similis	4	1999	2018
Fannia sociella	5	2017	2020
Fannia subsimilis	1	2017	2017
Fannia umbrosa	2	1946	2018
Graphomya maculata	11	1999	2020
Haematobosca stimulans	4	1999	2019
Hebecnema nigra	2	1999	2019

Species	No of occurrences in VC60	Earliest Year	Latest Year
Hebecnema nigricolor	1	1923	1923
Hebecnema umbratica	13	1934	2019
Hebecnema vespertina	11	1999	2019
Helina confinis	2	1924	1929
Helina consimilis	1	2016	2016
Helina depuncta	10	1954	2018
Helina evecta	14	1875	2020
Helina fratercula	1	2018	2018
Helina impuncta	9	1999	2017
Helina obscurata	4	1999	2019
Helina protuberans	1	1924	1924
Helina quadrum	2	2011	2016
Helina reversio	9	1929	2019
Helina setiventris	7	1961	2019
Helina trivittata	1	1999	1999
Hydrotaea aenescens	1	2016	2016
Hydrotaea albipuncta	1	1961	1961
Hydrotaea armipes	1	2019	2019
Hydrotaea cyrtoneurina	4	2016	2020
Hydrotaea dentipes	9	1934	2019
Hydrotaea diabolus	4	2016	2017
Hydrotaea ignava	1	1934	1934
Hydrotaea irritans	22	1950	2020
Hydrotaea militaris	12	1999	2020
Hydrotaea similis	4	1923	2018
Hydrotaea velutina	6	1924	2019
Limnophora maculosa	13	1933	2018
Limnophora riparia	1	1930	1930
Limnophora triangula	3	1999	2018
Lispe caesia	1	1933	1933
Lispe litorea	3	1953	2018
Lispe pygmaea	1	2018	2018
Lispe tentaculata	7	1896	2018
Lispocephala alma	1	2017	2017
Lispocephala erythrocera	3	1989	2019
Lispocephala verna	1	2020	2020
Macrorchis meditata	3	2016	2018
Mesembrina meridiana	27	1875	2020
Morellia aenescens	9	1999	2019
Morellia hortorum	18	1961	2018
Morellia simplex	6	1930	2017
Musca autumnalis	6	1980	2020
Musca domestica	10	1916	2019

Species	No of occurrences in VC60	Earliest Year	Latest Year
Muscina levida	11	1925	2019
Muscina prolapsa	12	1999	2019
Muscina stabulans	4	1916	2019
Mydaea anicula	1	2011	2011
Mydaea maculiventris	1	2016	2016
Mydaea nebulosa	1	1999	1999
Mydaea setifemur	2	2011	2017
Mydaea urbana	11	1999	2020
Myospila meditabunda	8	1926	2020
Neomyia cornicina	9	1916	2020
Neomyia viridescens	8	2008	2020
Phaonia angelicae	15	1923	2018
Phaonia atriceps	3	1999	2018
Phaonia errans	10	1957	2018
Phaonia fusca	3	1890	1963
Phaonia gobertii	1	2016	2016
Phaonia halterata	1	2019	2019
Phaonia incana	8	2015	2019
Phaonia pallida	8	1954	2019
Phaonia palpata	7	1961	2020
Phaonia pratensis	1	1999	1999
Phaonia rufiventris	3	2016	2020
Phaonia serva	5	2014	2019
Phaonia subventa	7	2015	2019
Phaonia tuguriorum	27	1916	2020
Phaonia valida	1	1999	1999
Phaonia zugmayeriae	1	1999	1999
Polietes domitor	2	2016	2017
Polietes lardarius	9	1992	2020
Polietes meridionalis	3	2016	2018
Pseudocoenosia solitaria	1	2017	2017
Schoenomyza litorella	3	2008	2018
Spilogona aerea	1	1999	1999
Spilogona denigrata	5	1923	2020
Spilogona marina	1	2018	2018
Spilogona meadei	1	1999	1999
Stomoxys calcitrans	6	1934	2019
Thricops diaphanus	1	2017	2017
Thricops semicinereus	6	1950	2020
Thricops simplex	1	2016	2016

Table 4: overall regional checklist

The species are listed in order of decreasing number of occurrences for the whole region. The second column gives the cumulative percentage of these numbers.

Occurrence of a species in each vice-county is denoted by ✓. Significant changes in the numbers fro m the pre-1970 to post-1970 periods are denoted by ↗ for increases and ↘ for increase: a single symbol denotes $p < 0.05$ and a double symbol denotes $p < 0.01$. The conservation statuses are from Falk and Pont (2017): pNS = provisionally nationally scarce; pNT = provisionally near threatened; DD = data deficient.

Rank	Cum. %	Species	58	59	60	Number	Pre/post 1970 change	Conservation Status
1	3.6%	*Coenosia tigrina*	✓	✓	✓	277	↗↗	
2	6.9%	*Mesembrina meridiana*	✓	✓	✓	259		
3	9.9%	*Fannia serena*	✓	✓	✓	227	↗↗	
4	12.4%	*Eudasyphora cyanella*	✓	✓	✓	198		
5	14.9%	*Phaonia tuguriorum*	✓	✓	✓	187	↗↗	
6	17.0%	*Helina reversio*	✓	✓	✓	169	↗	
7	19.2%	*Helina impuncta*	✓	✓	✓	167		
8	21.1%	*Hebecnema vespertina*	✓	✓	✓	144	↗↗	
9	22.9%	*Hydrotaea irritans*	✓	✓	✓	143	↘↘	
10	24.7%	*Phaonia errans*	✓	✓	✓	140		
11	26.5%	*Hydrotaea dentipes*	✓	✓	✓	134	↘↘	
12	28.2%	*Phaonia subventa*	✓	✓	✓	132	↗↗	
13	29.9%	*Helina depuncta*	✓	✓	✓	131	↗↗	
14	31.6%	*Hebecnema umbratica*	✓	✓	✓	130		
15	33.1%	*Polietes lardarius*	✓	✓	✓	121		
16	34.7%	*Muscina levida*	✓	✓	✓	119	↗↗	
17	36.2%	*Coenosia testacea*	✓	✓	✓	117	↗↗	
18	37.6%	*Graphomya maculata*	✓	✓	✓	111		
19	39.0%	*Phaonia angelicae*	✓	✓	✓	109		
20	40.4%	*Helina evecta*	✓	✓	✓	108		
21	41.7%	*Morellia aenescens*	✓	✓	✓	98	↗↗	
22	42.9%	*Azelia nebulosa*	✓	✓	✓	95	↗	
23	44.1%	*Azelia cilipes*	✓	✓	✓	92	↗	
24	45.3%	*Morellia hortorum*	✓	✓	✓	89	↘↘	
25	46.4%	*Morellia simplex*	✓	✓	✓	87	↘↘	
26	47.5%	*Fannia similis*	✓	✓	✓	86	↗↗	
27	48.6%	*Myospila meditabunda*	✓	✓	✓	84	↘↘	
28	49.7%	*Phaonia incana*	✓	✓	✓	83		
29	50.7%	*Musca domestica*	✓	✓	✓	82		
30	51.8%	*Schoenomyza litorella*	✓	✓	✓	80	↗↗	
31	52.8%	*Hebecnema nigra*	✓	✓	✓	79		
32	53.8%	*Lispocephala erythrocera*	✓	✓	✓	78	↗↗	
33	54.8%	*Fannia mollissima*	✓	✓	✓	75	↗↗	
34	55.7%	*Fannia armata*	✓	✓	✓	75		
35	56.7%	*Phaonia rufiventris*	✓	✓	✓	74		
36	57.6%	*Mydaea urbana*	✓	✓	✓	71	↘↘	
37	58.5%	*Fannia canicularis*	✓	✓	✓	70	↘↘	

Rank	Cum. %	Species	58	59	60	Number	Pre/post 1970 change	Conservation Status
38	59.4%	*Phaonia palpata*	✓	✓	✓	66	↗↗	
39	60.2%	*Phaonia pallida*	✓	✓	✓	65		
40	61.0%	*Neomyia cornicina*	✓	✓	✓	63	↘↘	
41	61.8%	*Fannia lustrator*	✓	✓	✓	62	↗	
42	62.6%	*Fannia sociella*	✓	✓	✓	62	↗	
43	63.4%	*Stomoxys calcitrans*	✓	✓	✓	60	↘↘	
44	64.2%	*Phaonia serva*	✓	✓	✓	59		
45	64.9%	*Coenosia rufipalpis*	✓	✓	✓	59		
46	65.7%	*Polietes domitor*	✓	✓	✓	59	↘↘	
47	66.5%	*Fannia polychaeta*	✓	✓		58	↗↗	
48	67.2%	*Helina setiventris*	✓	✓	✓	57		
49	67.9%	*Limnophora triangula*	✓	✓	✓	56	↗↗	
50	68.6%	*Muscina prolapsa*	✓	✓	✓	54		
51	69.3%	*Limnophora maculosa*	✓	✓	✓	54		
52	70.0%	*Azelia zetterstedtii*	✓	✓		54		
53	70.7%	*Helina quadrum*	✓	✓	✓	52		
54	71.3%	*Hebecnema nigricolor*	✓	✓	✓	51	↗	
55	72.0%	*Fannia rondanii*	✓	✓	✓	47		
56	72.5%	*Hydrotaea albipuncta*	✓	✓	✓	46	↘↘	
57	73.1%	*Hydrotaea cyrtoneurina*	✓	✓	✓	44	↗↗	
58	73.7%	*Fannia subsimilis*	✓	✓	✓	43	↗↗	
59	74.2%	*Mydaea corni*	✓	✓		42	↘↘	
60	74.7%	*Hydrotaea armipes*	✓	✓	✓	41	↘↘	
61	75.3%	*Coenosia pumila*	✓	✓	✓	40	↗↗	
62	75.8%	*Fannia fuscula*	✓	✓	✓	40	↗↗	
63	76.3%	*Azelia triquetra*	✓	✓		40		
64	76.8%	*Musca autumnalis*	✓	✓	✓	40	↘	
65	77.3%	*Fannia postica*	✓	✓	✓	39	↗	
66	77.8%	*Coenosia albicornis*	✓	✓	✓	38	↘↘	
67	78.3%	*Fannia parva*	✓	✓	✓	36	↗↗	
68	78.7%	*Fannia pallitibia*	✓	✓	✓	35	↗↗	
69	79.2%	*Coenosia agromyzina*	✓	✓	✓	33	↗↗	
70	79.6%	*Helina obscurata*	✓	✓	✓	33		
71	80.0%	*Helina lasiophthalma*	✓	✓		32	↗↗	
72	80.4%	*Drymeia hamata*	✓	✓	✓	32	↘↘	
73	80.8%	*Coenosia intermedia*	✓	✓	✓	31		
74	81.2%	*Hydrotaea diabolus*	✓	✓	✓	31		
75	81.6%	*Haematobosca stimulans*	✓	✓	✓	31	↘↘	
76	82.0%	*Thricops diaphanus*	✓	✓	✓	31	↘↘	
77	82.4%	*Phaonia halterata*	✓	✓	✓	30		
78	82.8%	*Mydaea ancilla*	✓	✓		30		
79	83.2%	*Muscina stabulans*	✓	✓	✓	30	↘↘	
80	83.5%	*Fannia lepida*	✓	✓	✓	28		
81	83.9%	*Phaonia fuscata*	✓			28		

Rank	Cum. %	Species	58	59	60	Number	Pre/post 1970 change	Conservation Status
82	84.2%	*Fannia manicata*	✓	✓	✓	25	↘↘	
83	84.5%	*Fannia coracina*	✓	✓	✓	24		
84	84.9%	*Phaonia valida*	✓	✓	✓	24		
85	85.2%	*Pseudocoenosia solitaria*	✓	✓	✓	23		
86	85.5%	*Hydrotaea militaris*	✓	✓	✓	23		
87	85.7%	*Lispe tentaculata*	✓	✓	✓	23		
88	86.0%	*Gymnodia humilis*	✓	✓		23		
89	86.3%	*Limnophora riparia*	✓	✓	✓	23	↘	
90	86.6%	*Fannia genualis*	✓	✓		22	↗	
91	86.9%	*Limnophora tigrina*	✓	✓		22		
92	87.2%	*Coenosia femoralis*	✓	✓	✓	21		
93	87.5%	*Neomyia viridescens*	✓	✓	✓	21		
94	87.7%	*Eudasyphora cyanicolor*	✓	✓	✓	21		
95	88.0%	*Hydrotaea similis*	✓	✓	✓	21	↘↘	
96	88.3%	*Coenosia pedella*	✓	✓	✓	20		
97	88.5%	*Fannia scalaris*	✓	✓	✓	20	↘	
98	88.8%	*Lispocephala alma*	✓	✓	✓	19		
99	89.0%	*Spilogona pacifica*	✓	✓		19	↘↘	
100	89.3%	*Mydaea detrita*	✓	✓		19	↘↘	
101	89.5%	*Macrorchis meditata*	✓	✓	✓	18		
102	89.7%	*Spilogona denigrata*	✓	✓	✓	18		
103	89.9%	*Phaonia perdita*	✓	✓		17		
104	90.2%	*Hydrotaea ignava*	✓	✓	✓	17	↘↘	
105	90.4%	*Coenosia verralli*	✓	✓		16		pNS
106	90.6%	*Hydrotaea meteorica*	✓	✓		16		
107	90.8%	*Fannia umbrosa*	✓	✓	✓	15		
108	91.0%	*Coenosia mollicula*	✓	✓	✓	15		
109	91.2%	*Helina confinis*	✓	✓	✓	15		
110	91.4%	*Lispe pygmaea*	✓	✓	✓	15		
111	91.5%	*Achanthiptera rohrelliformis*	✓	✓		15	↘↘	pNS
112	91.7%	*Phaonia gobertii*	✓	✓	✓	15	↘↘	
113	91.9%	*Phaonia rufipalpis*	✓	✓		15	↘↘	
114	92.1%	*Spilogona contractifrons*	✓	✓		15	↘↘	
115	92.3%	*Helina trivittata*	✓	✓	✓	14		
116	92.5%	*Mydaea humeralis*	✓	✓		14		
117	92.7%	*Helina protuberans*	✓	✓	✓	14	↘	pNS
118	92.9%	*Polietes hirticrus*	✓	✓		14	↘↘	
119	93.0%	*Coenosia lacteipennis*	✓	✓		13		
120	93.2%	*Lophosceles cinereiventris*	✓	✓		13		
121	93.4%	*Thricops simplex*	✓		✓	13	↘	
122	93.5%	*Phaonia atriceps*	✓	✓	✓	12		
123	93.7%	*Thricops semicinereus*	✓	✓	✓	12		
124	93.8%	*Mydaea setifemur*	✓	✓	✓	11		
125	94.0%	*Mydaea nebulosa*	✓		✓	11	↘↘	

Rank	Cum. %	Species	58	59	60	Number	Pre/post 1970 change	Conservation Status
126	94.1%	*Coenosia infantula*	✓	✓		10		
127	94.2%	*Pseudocoenosia abnormis*	✓	✓		10		
128	94.3%	*Drymeia vicana*	✓			10		
129	94.5%	*Potamia littoralis*	✓	✓		10		
130	94.6%	*Coenosia perpusilla*	✓	✓	✓	9		pNS
131	94.7%	*Spilogona marina*	✓	✓	✓	9		
132	94.8%	*Mydaea anicula*	✓	✓	✓	9		pNS
133	94.9%	*Helina calceata*	✓	✓		9		pNS
134	95.1%	*Mydaea orthonevra*	✓	✓		9		
135	95.2%	*Fannia monilis*	✓	✓	✓	9		
136	95.3%	*Helina subvittata*	✓	✓		9	↘↘	pNS
137	95.4%	*Hebecnema fumosa*	✓	✓		8		pNS
138	95.5%	*Polietes meridionalis*	✓	✓	✓	8		
139	95.6%	*Spanochaeta dorsalis*	✓	✓		8		
140	95.7%	*Coenosia means*	✓	✓	✓	8		
141	95.8%	*Helina allotalla*	✓	✓		8		
142	95.9%	*Phaonia erronea*	✓			8		
143	96.0%	*Limnophora exuta*	✓	✓		8	↘	pNS
144	96.1%	*Phaonia zugmayeriae*	✓		✓	8	↘↘	pNS
145	96.2%	*Hydrotaea cinerea*	✓	✓		7		pNS
146	96.3%	*Phaonia falleni*	✓	✓		7		pNS
147	96.4%	*Fannia vesparia*	✓	✓		7	↘↘	pNS
148	96.5%	*Fannia incisurata*	✓	✓		7	↘↘	
149	96.6%	*Coenosia bilineella*	✓	✓	✓	6		
150	96.6%	*Hydrotaea velutina*			✓	6		pNT
151	96.7%	*Haematobia irritans*	✓			6		
152	96.8%	*Lispe litorea*	✓		✓	6		
153	96.9%	*Spilogona aerea*	✓	✓	✓	6		
154	96.9%	*Coenosia minutalis*		✓		6		pNS
155	97.0%	*Graphomya minor*	✓	✓		6		
156	97.1%	*Helina pertusa*	✓	✓		6		
157	97.2%	*Lophosceles mutatus*	✓			6	↘↘	
158	97.3%	*Fannia difficilis*	✓	✓		6	↘↘	
159	97.3%	*Phaonia trimaculata*	✓	✓		6	↘↘	
160	97.4%	*Fannia minutipalpis*	✓	✓		5		pNS
161	97.5%	*Spilogona meadei*	✓		✓	5		
162	97.5%	*Spilogona veterrima*	✓	✓		5		pNS
163	97.6%	*Hydrotaea floccosa*	✓	✓		5		
164	97.7%	*Helina maculipennis*	✓	✓		5		
165	97.7%	*Spilogona falleni*	✓	✓		5		
166	97.8%	*Thricops sudeticus*	✓	✓		5	↘	pNS
167	97.8%	*Coenosia ruficornis*	✓	✓		4		
168	97.9%	*Fannia aequilineata*	✓			4		pNS
169	97.9%	*Helina pubiseta*	✓	✓		4		

Rank	Cum. %	Species	58	59	60	Number	Pre/post 1970 change	Conservation Status
170	98.0%	*Fannia atra*	✓	✓		4		pNS
171	98.0%	*Helina pubescens*	✓			4		pNT
172	98.1%	*Phaonia pratensis*	✓		✓	4		pNS
173	98.1%	*Spilogona surda*	✓	✓		4		
174	98.2%	*Fannia carbonaria*	✓	✓		4	↘	pNS
175	98.3%	*Helina sexmaculata*	✓	✓		4	↘	
176	98.3%	*Hydrotaea palaestrica*	✓	✓		4	↘	
177	98.4%	*Coenosia pulicaria*		✓		4	↘↘	pNS
178	98.4%	*Limnophora olympiae*	✓	✓		4	↘↘	
179	98.5%	*Lispocephala spuria*	✓			4	↘↘	pNS
180	98.5%	*Phaonia laeta*	✓	✓		4	↘↘	pNS
181	98.6%	*Phaonia magnicornis*	✓	✓		4	↘↘	pNS
182	98.6%	*Azelia trigonica*	✓	✓		3		pNS
183	98.6%	*Coenosia antennata*	✓	✓		3		
184	98.7%	*Fannia pauli*	✓	✓	✓	3		pNS
185	98.7%	*Helina celsa*	✓			3		
186	98.8%	*Helina intermedia*	✓	✓		3		pNT
187	98.8%	*Helina latitarsis*	✓	✓		3		
188	98.8%	*Limnophora nigripes*		✓		3		pNT
189	98.9%	*Limnospila albifrons*	✓	✓		3		pNS
190	98.9%	*Lispocephala brachialis*	✓	✓		3		pNT
191	99.0%	*Lispocephala rubricornis*		✓		3		pNS
192	99.0%	*Piezura pardalina*	✓	✓		3		
193	99.0%	*Lispocephala verna*	✓	✓	✓	3		pNS
194	99.1%	*Phaonia fusca*			✓	3		pNT
195	99.1%	*Coenosia humilis*		✓		3		
196	99.1%	*Phaonia canescens*	✓			3		pNT
197	99.2%	*Phaonia villana*	✓	✓		3		pNS
198	99.2%	*Fannia verrallii*	✓	✓		3	↘	pNS
199	99.3%	*Fannia vespertilionis*		✓		3	↘	pNT
200	99.3%	*Fannia immutica*	✓	✓		2		pNS
201	99.3%	*Helina abdominalis*		✓		2		pNS
202	99.3%	*Helina parcepilosa*		✓		2		pNT
203	99.4%	*Hydrotaea meridionalis*	✓	✓		2		pNS
204	99.4%	*Hydrotaea parva*		✓		2		pNS
205	99.4%	*Fannia lucidula*	✓		✓	2		pNS
206	99.4%	*Helina atricolor*	✓			2		
207	99.5%	*Helina consimilis*	✓		✓	2		pNS
208	99.5%	*Helina fratercula*	✓		✓	2		
209	99.5%	*Spilogona scutulata*	✓			2		pNT
210	99.5%	*Coenosia pygmaea*		✓		2		pNT
211	99.6%	*Limnophora scrupulosa*		✓		2		pNS
212	99.6%	*Lispe uliginosa*		✓		2		pNS
213	99.6%	*Mydaea deserta*	✓			2		pNS

Rank	Cum. %	Species	58	59	60	Number	Pre/post 1970 change	Conservation Status
214	99.7%	*Spilogona solitariana*		✓		2		
215	99.7%	*Coenosia atra*	✓			1		pNS
216	99.7%	*Fannia atripes*		✓		1		pNT
217	99.7%	*Fannia collini*	✓			1		DD
218	99.7%	*Fannia corvina*	✓			1		
219	99.7%	*Fannia latipalpis*		✓		1		DD
220	99.7%	*Fannia metallipennis*		✓		1		pNS
221	99.7%	*Fannia nigra*		✓		1		pNS
222	99.8%	*Fannia norvegica*	✓			1		pNS
223	99.8%	*Fannia speciosa*		✓		1		pNS
224	99.8%	*Fannia subpubescens*	✓			1		pNS
225	99.8%	*Hydrotaea aenescens*			✓	1		
226	99.8%	*Lispe loewi*	✓			1		pNS
227	99.8%	*Lispocephala falculata*	✓			1		pNS
228	99.8%	*Mydaea affinis*	✓			1		pNS
229	99.8%	*Mydaea maculiventris*			✓	1		pNS
230	99.9%	*Orchisia costata*	✓			1		pNT
231	99.9%	*Phaonia bitincta*	✓			1		pNT
232	99.9%	*Phaonia mystica*	✓			1		pNS
233	99.9%	*Villeneuvia aestuum*	✓			1		pNS
234	99.9%	*Azelia aterrima*	✓			1		
235	99.9%	*Coenosia karli*	✓			1		pNS
236	99.9%	*Hydrotaea nidicola*	✓			1		DD
237	99.9%	*Lispe caesia*			✓	1		pNS
238	100.0%	*Phaonia cincta*	✓			1		pNS
239	100.0%	*Spilogona setigera*	✓			1		pNT
240	100.0%	*Thricops cunctans*	✓			1		
241	100.0%	*Thricops genarum*		✓		1		DD

Table 5. Summary statistics for numbers of species

	VC58	VC59	VC60	L&C	UK
Numbers of species	217	196	125	241	355
of which					
Recorded before 1970	166	133	41	194	
Recorded after 1970	195	168	119	218	
Significant increases		32			
Significant decreases		53			
Conservation designation		75			160
pNationally Threatened		15			40

Appendix: notes on regional status of species

This Appendix discusses those species for which there are five or fewer records, those which have a national conservation designation according to Falk and Pont (2017), and those showing a significant increase or decrease since 1970. Some other species where there are particular issues in identification are also included. The information is arranged in order of genus, in view of the uncertainty in the higher divisions of family Muscidae.

In addition, Fonseca (1968) provides notes on distribution and frequency for almost all of the species. For the commoner species he used terms such as "generally distributed" or "locally frequent", but specific lists of counties or even sites and dates are given for scarce and rare species. These provide another useful cross-check on the pre-1970 regional data. The basis of this information is not stated, but there is generally a good correlation between mentions of Lancashire and Cheshire and the data extracted from the Manchester Museum record cards.

Achanthiptera

Achanthiptera rohrelliformis

A. rohrelliformis is one of the most distinctive muscids both in its overall slim, orange appearance and in its biology. According to Marshall (2012), it has its own subfamily in which it is the only species world-wide. It develops in the nests of social Vespidae. It was regarded by Fonseca as uncommon, and the data show only 3 occurrences since 1970, all on the Sefton coast, compared to 12 before this date, a very significant decline regionally. Falk and Pont (2017) state that it has a liking for sand dunes, though usually found in woodland. It is recommended that this be added to the regional priority list, as particularly suitable for drawing to the attention of digital photographers.

Azelia

The *Azelia* species are slim blackish flies, at the smaller end of the size spectrum within the Muscidae. The two commonest species *cilipes* and *nebulosa* have conspicuous long hairs on the hind tibiae, and show significant increases in recorded numbers since 1970. They have also been recorded significantly more often in the region than predicted from the NBN statistics. The only species with a conservation designation designation is *trigonica* which is described by Falk and Pont (2017) as widespread but sparse throughout the country. It has

Azelia nebulosa

been recorded by three separate experienced recorders at widely separated locations in VC58 and 59. Our single record of *aterrima* was by Harry Britten in the Goyt Valley in 1945. Fonseca (1968) described this species as uncommon and recorded from Lancashire, but not Cheshire or Derbyshire, so a check on Museum specimens would be desirable to clarify the regional status of this species.

Coenosia

This is a large genus with 36 British species. The genus is described by Marshall (2012) as a cosmopolitan group of small predaceous flies common on low foliage. He specifically mentions the familiar *tigrina*, as abundant in rural and urban areas throughout North America and Europe. It is now our most frequently recorded muscid, but it is curious how few pre-1970 records we have (only 20 out of the total 277). Fonseca (1968) listed it as generally distributed and very common.

Coenosia tigrina

C. tigrina is much larger than most members of the genus and the abdomen is marked with conspicuous spots so that it is potentially recordable from photographs (eg Hocking, 2011). Three other species (*agromyzina*, *pumila* and *testacea*) show very significant increases in the post-1970 records, though very common or common according to Fonseca. On the other hand, *albicornis* has only 15 recent records compared to 23 from before 1970. This indicates that there may indeed have been real population fluctuations over the last hundred years, rather than an under-recording of this genus for some reason.

Turning to the rarer species, *antennata* was classified by Fonseca as "frequent but local", but not recorded in Lancashire or Cheshire. Our three records in recent years, by two recorders, are all from sites on the coast, as are most of the locations listed by Fonseca.

C. atra is distinctive with its shiny all-black so I am confident in my record from Ness Gardens in 2017. Falk and Pont (2017) state that this species is widely scattered in southern and central England and has increased over the last two decades, so our record may be indicative of a northwards extension in range.

C. humilis is described by Fonseca (1968) as fairly frequent and was recorded from Lancashire, but there are only 32 NBN records nationally and so the low total of regional records is not significant. Perhaps there has been a real decline in abundance.

The nationally scarce *karli* is another coastal species, but our only record is by Harry Britten at Neston on the Dee estuary in 1936. This should turn up again with further surveying of the coastal dunes and salt-marshes: there have been 31 records nationally since 1990 according to the NBN Atlas.

C. minutalis is another nationally scarce sand-dune species but our 6 records show a good continuity between the pre- and post-1970 periods. All our records are from the Sefton coast.

Falk and Pont (2017) state that *perpusilla* is widespread but sparse in Scotland with a few records further south, with a habitat probably at or just above the tree-line. This means that the six records from lowland Cheshire between 1997 and 2004 are probably misidentifications: the relevant specimens may become available for verification in the future. The remaining three records are my own from upland sites on the Smithills estate and Longridge fell and were identified using the new draft keys from the Dipterists Forum. Numerous specimens both male and female were collected, so I have high confidence in these records.

C. pulicaria is one of only two of our scarce *Coenosia* species showing a significant decline, all four records being from before 1970 on the Sefton coast. Its presence in Lancashire is endorsed by Falk and Pont, who also list a wide range of habitats including coastal dunes, heaths and upland tundra. Fonseca (1968) lists no Cheshire or Lancashire locations, but Falk and Pont state that many of his records are based on misidentified material.

Falk and Pont (2017) give *pygmaea* the more stringent status of pNT. It is another widespread species, mainly coastal and with only 9 records since 1960. The NBN has several more records but only 2 of them are later than 2005. Neither Fonseca nor Falk and Pont give Lancashire as a location. Our source for the 1955 record on the Sefton coast is Alan Brindle, and the anonymous 1959 record may be a mis-transcribed duplicate of this. The new draft key suggests that the females are virtually indistinguishable from *C. verralli* which also has a 1955 record from Alan Brindle. Possibly future examination of museum material will clarify the regional status of this species. It could be potentially turn up in further dune surveys, but this is not judged to warrant inclusion on the priority species list.

C. ruficornis has not been recorded locally any more frequently than many of the officially scarce species, but the numbers do not differ significantly from the expectation from NBN data. Fonseca (1968) has it as frequent and occurring in both Lancashire and Cheshire, but only one pre-1970 record has come to light, from Harry Britten at Neston on the Dee estuary in 1936. The NBN map shows it to be mainly coastal, as are the 3 post-1970 records, all from myself.

C. verralli is yet another scarce coastal species. It is recorded from Lancashire by Falk and Pont (2017) and has proved quite frequent in recent coastal surveys both on the Wirral and the Sefton coast. All these recent records have been of females: the possibility of confusion with *C. pygmaea* has been noted above.

Drymeia

D. brumalis is a nationally scarce upland species (Falk and Pont, 2017) so our sole record from Runcorn in 1999 must surely be wrong. It has been removed from the list and data analysis.

Although described by Fonseca (1968) as generally distributed and common, *D. hamata* appears to have suffered a severe decline with only 9 post-1970 records compared to 23 from the earlier period. It is rather distinctive in having a long hinged proboscis, and Fonseca notes that it is commonly found on flowers such

as ragwort. In the 1940s, Harry Britten found it in Manchester suburbs such as Didsbury and Stretford, but recent records are mostly from upland moors and coastal areas.

Our records of *D. vicana* are all from south of the Mersey.

Eudasyphora

Eudasyphora cyanella

The two British species of this genus are recorded as breeding in dung like many other Muscidae (Skidmore, 2010). Their numbers have remained steady and spread over all three vice-counties. The much scarcer *E. cyanicolor.* Skidmore (1962) described it as "striking and very beautiful" in reporting it as new to VC60, though Harry Britten had recorded it from a rare visit to Warton Crag in 1934.

Fannia

This is by far our most speciose genus as it is nationally with Chandler (2020) listing 59 species. The family Fanniidae of "little house-flies" contains only two other British species, in genus *Piezura.* Marshall (2012) describes the *Fannia* larvae as having feathery lateral processes that are probably an adaptation to life in liquefying organic matter, but also mentions drier habitats such as bird nests for some species. Fonseca (1968) emphasises the latter as a fruitful source of the rarer species, as well as bat droppings. While the identification of males through the key can be checked using Fonseca's genitalia figures, females can be more problematic so that records of rarer species without males must often be considered unreliable.

F. aequilineata is regarded as a mainly southern species, particularly associated with dead trees and rotten wood, but has now been recorded as far north as Lanarkshire and Northern Ireland from traps on old wood and dead trees (Alexander, 2020). The Harry Britten cards contain a record for *F. lineata* from an owl's nest on Alderley Edge in 1936: this is a recognised misidentification of *F. aequilineata* (Falk and Pont, 2017, Chandler, 2020).

Falk and Pont (2017) report records of *F. atra* from 20 vice-counties including Lancashire and Cheshire, and also further North as far as Sutherland.

The record of the "near-threatened" *F. atripes* is based on a single female, but Falk and Pont (2017) do list locations from Somerset in the South to Sutherland in the North. Our Lancashire record is from my garden in 2017, and the identification is confirmed by the strongly dilated palpi.

F. canicularis is the eponymous little house-fly, described by Marshall (2012) as synanthropic and found all over the world, but it registers a significant decline in the occurrence statistics. This no doubt reflects the generally greater hygiene in modern living conditions in Britain. I have found it more often away from housing, in contrast to *Musca domestica* which I have never caught outside.

While Falk and Pont (2017) register the presence of *F. carbonaria* in Cheshire, they also state that earlier records of this species are unreliable because of subsequent changes in taxonomic knowledge of this group. Our data do not include the sex of the only post-1970 regional record, so this record must remain uncertain unless further information can be obtained.

The record of *F. collini* in Cheshire is of a male from the Dipterists Forum 2018 field meeting. Falk and Pont found only 4 records and gave it a status of "Data Deficient". As for most other *Fannia* species there is no information about specific habitat requirements.

F. corvina is not included in the review by Falk and Pont (2017) but was described by Fonseca (1968) as southern and uncommon. The NBN Atlas shows has 48 records extending as far north as Shropshire and South Yorkshire so the report from Cheshire in 1996 is plausible.

F. difficilis was reported by Fonseca (1968) as frequent and occurring in Cheshire at one extreme of its range, so the absence of records since 1943 may mark a real decline. The Harry Britten cards report that a male was reared from a blue tit's nest collected by A. W. Boyd, one of Cheshire's greatest naturalists (Norman, 2013).

F. fuscula is one of the larger and more distinctive fanniids, described by Fonseca as generally distributed and fairly common, so the existence of only 1 pre-1970 record is noteworthy. That record was in 1959 at Freshfield or Ainsdale but details are lacking. It has been recorded there several times in recent years, but also in many quite different locations and habitats.

Another species with a definite increase since 1970, indeed not recorded before that, is *Fannia genualis*. Fonseca considered this fairly common in the south, so this seems a case of northwards range expansion including VC60 by 1999.

Falk and Pont (2017) state that *F. immutica* has a late flight period, being particularly associated with various fruiting fungi. Both of our records are from the month of June, rendering them suspect.

F. incisurata has not been recorded in the region since 1959 though Fonseca recorded it as frequent and widely distributed from Durham to the south coast. It is not included in Falk and Pont (2017), but there are only 20 records on the NBN Atlas, with only 2 since 1980. Thus this species appears to have suffered a large decline nationally.

F. latipalpis was classed as Data Deficient by Falk and Pont (2017) on the basis of only four national records, two from sand-dunes in Devon and Glamorgan and two from a garden in Colchester, 13 days apart. This does not seem strong evidence for Falk and Pont's suggestion that it is particularly associated with sand dunes. Our only record of a female 2019 in VC59 was not far inland but clearly must be regarded as uncertain without corroboration.

The taxonomic history of *F. lucidula* is rather chequered as it was misidentified as *F. glaucescens* in earlier literature (Chandler, 2020), under which name it appears as a nationally scarce, mainly coastal species in Falk and Pont (2017). Furthermore, the true *F. glaucescens* is now regarded as synonymous with the common *F. armata.* The 1941 record of *F. lucidula* from the Goyt Valley appears only in the LRC data and cannot be related to anything in the Harry Britten cards, but the recent VC60 record is of a male from a coastal location. (*F. armata* itself is our third most frequently recorded Fanniid with no significant change from the pre-1970 period.)

F. lustrator is a large and distinctive species with an increase in relative occurrence since 1970 which probably represents an expansion in range. It was described by Fonseca (1968) as merely frequent, whereas the equally distinctive *F. manicata* was generally distributed and very common. In our region, the fortunes of these two species have been interchanged.


Fannia lustrator

F. metallipennis and *F. minutipalpis* are two more nationally scarce species with no particular known habitat requirements. The sole regional record of the former requires confirmation, but with half-a-dozen records of the latter, including a male, the latter is on a firmer footing. As the name suggests, the palps of *F. minutipalpis* are very small, making it fairly distinctive even in the female.

Three of our four most frequent species currently are *F. mollissima*, *F. serena* and *F. similis.* These all show apparently large rises in frequency over the pre-1970 period, despite being noted as generally distributed and common or very common by Fonseca (1968).


Fannia mollissima

There is a similar pattern with several other species further down the list in Table 4 such as *F. polychaeta*, *F. parva*, *F. postica* and *F. subsimilis.* These are typical small blackish *Fannia* species, which might have presented more difficulty in identification in the past, though males of *F. mollissima* are distinguished even to the naked eye by the brush of very long hairs under the tip of the abdomen. A real increase in abundance all these species seems implausible. *F. armata* and *F. rondanii* are similar common dark species with no significant change in frequency since 1970. *F. pallitibia* has pale legs unlike most other black-bodied Fanniidae, and has also greatly increased in our records since 1970.

The nationally scarce *F. nigra* and *F. norvegica* are both species that we have recorded only from a single female and therefore requiring corroboration. My specimen of the former has all the characters given in Fonseca's key. We are on firmer ground with three records of the scarce *F. pauli* from two experienced dipterists.

F. scalaris is dubbed the Latrine Fly by Marshall (2012) and shares the world-wide synanthropic distribution of *F. canicularis.* Like that species our regional data shows a significant post-1970 decline in relative numbers.

According to Fonseca (1968), the nationally scarce *F. speciosa* is characterised by extensive yellow coloration of the abdomen and tibiae. These characteristics are not apparent in our single record from Burnley in 2018 on IRECORD, where the identification is attributed to a nationally recognised dipterists as "likely".

We have *F. subpubescens*, also pNS in Falk and Pont (2017), from a single 1999 record of a male in a wood near Warrington. Fonseca (1968) reported the species as "frequent but apparently local".

All three regional records of the nationally scarce *F. verrallii* are from the 1940s, but Lancashire and Cheshire are not amongst the locations listed by Fonseca (1968) and Falk and Pont (2017).

F. vesparia is a scavenger in social wasp nests. It was reported as new to science by Newstead (1891) from Ince on the Mersey Estuary, being named by R.H. Meade. Newstead, then the curator at Chester Museum, made a comprehensive study involving the insertion of sticks of potassium cyanide overnight after which the wasp nests could be safely removed for examination of the invertebrate inhabitants. Fly larvae were apparently unharmed and could be bred out. As well as *F. vesparia*, *F. canicularis*, *Achanthiptera rohrelliformis* and *Muscina stabulans* were recorded by this means. Like *A. rohrelliformis*, *F. vesparia* is a nationally scarce species with a very significant decline in the region. It is recommended for inclusion in the Tanyptera Priority Species list, particularly as it was first described from Cheshire.

Given pNT status by Falk and Pont (2017), *F. vespertilionis* is particularly associated with the roosts of bats of the family Vespertilionidae. Our three regional records are all from the Sefton coast in the 1950s, a location accepted by Falk and Pont. These records may all relate to a single observation by Alan Brindle, so the statistical significance of the post-1970 decline may have been overstated.

Graphomya

The two British *Graphomya* species are amongst the most distinctive muscids with their black and light grey patterns, enhanced by orange patches on the abdomen of the males. The pre- and post-1970 recording rates are not significantly different.

Gymnodia

G. humilis is a small inconspicuous species Fonseca (1968) considered frequent and generally distributed. The number of regional records up to the present are consistent with this assessment.

Haematobia and *Haematobosca*

Haematobia irritans and *Haematobosca stimulans* are two of three British muscids with blood-sucking adults which attack mammals and lay eggs in cow-dung. (The third is *Stomoxys calcitrans.*) *H. irritans* is stated to cluster around the horns of cattle, rarely leaving them (Fonseca, 1968) which may account for the apparent low level of occurrence. There has been a significant decline in occurrences of *H. stimulans* since 1970. This been seen in some of the other cow-dung breeders.

Hebecnema

All five species of this small genus of rather unprepossessing muscids have been recorded in the region. *H. vespertina* is now the commonest, showing a

very significant increase on the pre-1970 rate of recording. Fonseca (1968) applied this name erroneously to *H. nigra*, but this does not explain the change, as that species was no more frequently recorded than *H. affinis* in the old records, the latter being synonymised with the true *H. vespertina* only in 1984 (Chandler, 2020). *H. nigricolor* has also increased. With only 8 records, the absence of the nationally scarce *H. fumosa* in the pre-1970 records is not statistically significant. Fonseca (1968) describes it as southern and uncommon, so it may have extended its range. Falk and Pont (2017) and the NBN Atlas show that our records remain the northernmost.

Helina


Helina evecta

This is one of the four largest genera in the muscids (see Fig 2), with larvae that are carnivores of other larvae in various types of decaying matter.

The two records of the nationally scarce *H. abdominalis* probably relate to a single specimen from the Sefton coast. It is not exclusively coastal in distribution (Falk and Pont, 2017) and is distinctive in having a largely reddish-yellow abdomen.

H. atricolor is a common upland species according to Fonseca (1968), but the NBN Atlas has only 14 records. It is not listed by Falk and Pont (2017). We have a 1943 record from the Goyt Valley and a 2011 one from a hollow lime at Tatton Park, attributed to the National Trust by the NBN Atlas.

Skidmore (1963) described *H. calceata* as a lover of sandy ground, but Falk and Pont (2017) cast doubt on this as a definite habitat association. It is a member of a group of species which the keys place close to the common and variable *H. reversio*: the recent unpublished Dipterists Forum keys notes difficulties with the characters previously used to separate the females (eg by Gregor *et al*, 2002), the other species being *H. intermedia, parcepilosa* and *quadrum.* Skidmore notes the last of these often occurring together with *H. calceata.*

We have three separate observations of *H. celsa*, from two independent recorders. There are only 24 records on the NBN Atlas nationally, though Fonseca (1968) considered the species widely distributed with males locally frequent.

The nationally scarce *H. consimilis* was found by Harry Britten in Cheshire in 1933 but did not turn up again until 2016 in VC60. Falk and Pont (2017) do not indicate any particular habitat requirements.

H. depuncta is now almost as frequently recorded as the similar *H. impuncta*, but was considered much scarcer by Skidmore (1963) and as only “fairly common” by Fonseca (1968), who rated *impuncta* as generally distributed and very common.


Helina impuncta

The story for *H. fratercula* is very similar to that for *H. consimilis*, though not included by Falk and Pont (2017). Skidmore (1963) regarded Harry Britten’s 1935 record as coming from the Derbyshire side of the Goyt Valley. He recorded it himself nearby in VC57 in 1962 in great abundance amongst bracken. The 55 NBN Atlas records are concentrated in Wales.

Our three records of the near-threatened *H. intermedia* are problematic as they are all females found at two inland locations by myself. The uncertainties in identification have been mentioned under *H. calceata* above. Falk and Pont (2017) cite just 4 UK localities of which three are coastal. Interestingly this species is on the Yorkshire vice-county lists of Grayson (2015), albeit queried.

H. lasiophthalma has registered a very significant increase, not having been recorded before 1970. Fonseca (1968) has it as fairly common and widely distributed in England and Wales. It remains unknown in Scotland according to the NBN Atlas, so it is probably spreading northwards.

Although rated by Fonseca as widely distributed from Cumberland and Durham southwards and fairly common, *H. latitarsis* has been recorded only three times in our region, by two independent observers in 2000 and 2006.

H. maculipennis is reasonably distinctive with strong wing markings as its name suggests. Our five records are well scattered in time and space, including one from Hilbre Island in 1979.

H. parcepilosa has already been mentioned above as one of the difficult group of species rather similar to *H. reversio.* The short pre-alar bristles seem to distinguish it from the others, and our only two records are from the coastal dune environment favoured by this near-threatened species (Falk and Pont, 2017, Harris and Gloaguen, 2019). We do not yet have a specimen of the male for confirmation.

Skidmore (1963) considered the nationally scarce *H. protuberans* one of our most striking muscids, its silvery-grey colour blending in with the sand-dunes where it is normally found. The significant decline in occurrences may be more apparent than real as it has been easy to find on the Sefton coast in recent years. I have also found it at Red Rocks, whereas Skidmore had no record from the Wirral.

The pre-1970 VC58 records of the pNT *H. pubescens* correspond to locations listed by Falk and Pont (2017). They were in the Delamere area and Pettypool. Skidmore (1963) noted a possible coastal association, and indeed the third Cheshire location is on the Wirral.

Although *H. pubiseta* was regarded by Fonseca (1968) as common, this upland species has remained scarce in our region. Two of our four records may be suspect as they are from low level locations.

H. quadrum and *H. reversio* are stalwarts of the regional muscid population, but, as discussed above, similar species noted above such as *H. calceata*, *intermedia* and *parcepilosa* may have been overlooked as a result.

Although there are only 11 NBN Atlas records of *H. sexmaculata*, Fonseca classed this species as fairly frequent and recorded from Lancashire and Cheshire. He refers to an observation of the larvae preying on the larder beetle *Dermestes lardarius.* Skidmore (1963) regarded the species as rare in our region, but also more commonly taken indoors than other species. It has an attractive grey and black pattern. Our only post-1970 record is my own, from our conservatory.

Skidmore (1963) and Fonseca (1968) accepted Lancashire and Cheshire as locations for the nationally scarce *H. subvittata*, but Falk and Pont (2017) cast doubt on lowland records, following a later publication by Skidmore. Perhaps it is less tolerant of warmer conditions and has retreated to the uplands like some of the *Spilogona* and *Thricops* species discussed below.

Hydrotaea


Hydrotaea similis

Marshall (2012) described this genus as cosmopolitan with several species which can appear instantly on a sweaty scratch or wound. Certainly *Hydrotaea irritans* fits this description, but together with 5 other of our commonest species it has had a significantly lower recording rate in the post-1970 period. Perhaps modern hygiene practices have had an effect. Against this trend *H. cyrtoneurina* is now our third commonest species, first recorded in the region in 1989 and mainly found in Cheshire. This might have suggested a northwards expansion, had Fonseca (1968) not listed records from three Scottish counties.

H. aenescens is an American subtropical species whose introduction to the UK seems to be the result of its use as anglers' bait and which probably mostly breeds in rubbish and refuse tips (Pont *et al.* 2007). It is a shiny blue-black species whose yellow palpi distinguish it from other *Hydrotaea.* Pont *el al.* mention a record from Haydock in VC59 which does not appear in our data sources. We have a more recent record from VC60 from Heysham nature reserve adjacent to the power station. It has also now been recorded in Scotland in recent years (Horsfield, 2017).

While *H. floccosa* and *H. palaestrica* are scarce regionally with 5 or fewer occurrences, these numbers

are not significantly different from those expected from the national statistics.

Turning to the scarce and threatened species included in Falk and Pont (2017), identification of *H. cinerea* requires comparison with specimens of *H. irritans* so it is fortunate that there is usually an ample supply of the latter.

H. meridionalis is another nationally scarce species which is widely scattered with no definite habitat association (Falk and Pont, 2017). Details of the Cheshire record are incomplete, and verification of the recent Lancashire record would be desirable.

The data-deficient *H. nidicola* has been recorded from only three British locations including Gatley in VC58, well within the Manchester conurbation. It was reared from a rook's nest collected by C. R. Brown in 1934, who appears ten times in the Harry Britten record cards mostly in connection with nests yielding Anthomyiids.

The two records of *H. parva* are my own from VC59. This small species has a characteristic arrangement of the acrostichal bristles which with its small size distinguishes it from other *Hydrotaea.* Fonseca's (1968) listing of "Flockburgh" in Cheshire as a site is an error for Flookburgh in VC69 as stated on the Harry Britten record card.

Finally, the near-threatened *H. velutina* breaks the pattern of elusive scarce but widely scattered species by being repeatedly found around the Morecambe area, including VC60 records in 1924, 1999 and four successive seasons from 2016. Falk and Pont (2017) state that it was not found in surveys in that area during the 1980s, but their fears that the species was at risk from veterinary residues in cow dung seem to have been over-pessimistic. The species is currently the only muscid on the regional priority list (Tanyptera Project, 2020).

Limnophora

Several *Limnophora* species have larvae living in or very near streams where they are predators on aquatic larvae including those of black-flies (Simuliidae) (Marshall, 2012). Possibly deterioration in water quality accounts for the significant decrease in records of *L. exuta*, *L. riparia* and *L. scrupulosa* in the last fifty-year period. However, though *L. olympiae* is not designated as aquatic by Fonseca (1968), it shows the most significant decline, albeit from only 4 occurrences to none after 1970.

The three records of *L. nigripes* are from Birkdale, which is in reasonable accord with Falk and Pont's statement that it favours sand and gravel banks around lakes and alongside rivers: they also mention several coastal locations.

L. triangula is another curious example of a species which is common now and was generally distributed and very common according to Fonseca (1968), but barely registering in the pre-1970 records.

Limnospila

This genus has only a single British species. Fonseca (1968) found *L. albifrons* to be locally common at various coastal locations in southern England and Wales. Falk and Pont (2017) note that this scarce species has also been found at inland gravel workings. Our two VC58 records come from the Weaver Valley where the influence of the underlying salt deposits and associated industry is apparent in other elements of the diptera fauna such as soldierflies (Brighton, 2017b) and dolichopodids (Drake *et al.*, 2019). The VC59 record is from Hale Duck Decoy near the Mersey estuary.

Lispe

This genus consists of rather characterful flies with large spoon-shaped palps and strong marking son the abdomen and thorax. Not only the larvae but also the adults are predators on other insects on muddy still water margins. Marshall (2012, p401) provides a particularly graphic photograph. While three commoner species have comparable numbers of regional records before and after 1970, none of the nationally scarce species on our list (*L. caesia*, *L. loewi* and *L. uliginosa*) have been recorded since 1999. Fonseca (1968) gives Newbridge near Winsford as a Cheshire location for *L. loewi* but this does not appear in the Harry Britten cards or on the NBN Atlas. As with the previous genus, this is a primarily coastal species (Falk and Pont, 2017) illustrating the salt influence in mid Cheshire.

Lispocephala

This is a genus closely allied to *Coenosia* and described as cosmopolitan by Marshall (2012), who states that

most of the 150 species are endemic to Hawaii where some are highly specialised predators of endemic *Drosophila* species. Our regional list contains 7 of the current nine British species (Chandler, 2020). Falk and Pont (2017) assign a conservation status to 6 of these species, all having an association with streams or other wet habitats.

While the relatively common *L. alma* has remained at a similar level of occurrence before and after 1970, *L. brachialis* has evidently experienced a fairly recent nationwide boom since Falk and Pont classified it as provisionally near-threatened (Paston, 2012, Horsfield, 2013, Macdonald, 2016). Fonseca's report of a Lancashire record refers to Watbarrow Point on Lake Windermere in VC69. While Falk and Pont (2017) assessed the habitat as broad-leaved woodland alongside shaded streams, I have found this rather distinctive fly with its orange abdomen on a green wheelie bin distant from any such location.

L. erythrocera was regarded by Fonseca (1968) as locally common, but unknown in Lancashire or Cheshire. The single pre-1970 record is from the Sefton coast in 1959. It has now been found in a wide range of habitats in VC58 and VC59, though only 3 out of the 78 occurrences are from VC60, suggesting that it has spread from the south. Fonseca did have Scottish records but it remains rare in the Highlands (Macdonald, 2016).

L. falculata was described by Collin only in 1963, having previously been confused with the much commoner *L. alma.* Our single specimen from the Runcorn area is a male, giving confidence in its identity. This too seems to have spread from the south, as it now also present in Scotland (Macdonald, 2016).

The extensively orange-yellow coloration and coastal habitat of *L. rubricornis* set it apart from the other British members of the genus. It has been recorded in recent years from both Birkdale (twice) and Cabin Hill on the Sefton coast, suggesting a well-established population.

L. spuria was recorded as a new unnamed species in the Manchester Museum records cards, and received the name of *L. serena* from Collin (1951), who acknowledged Harry Britten as bringing it to his attention from three Cheshire locations. It was recognised as the same as Zetterstedt's *spuria* in Collin (1963). Although classed as nationally scarce by Falk and Pont (2017), it was the third commonest species recorded in the Highlands by Macdonald (2016).

Finally, the nationally scarce *L. verna* has been recorded on one occasion from each of the three vice-counties, though from widely separated and differing habitats. The VC60 record was from Leck Fell at the extreme north-eastern tip of the region. It has also been recorded recently not far from there in the adjacent vice-county of Westmoreland.

Lophosceles

This is a small genus of not very distinctive muscids with just two British species. Though classed as generally distributed and common by Fonseca (1968), *L. cinereiventris* has turned up rather infrequently in the region with no significant difference before and after 1970. The "frequent but local" *L. mutatus* was not recorded from Lancashire and Cheshire by Fonseca, and the single post-1970 record marks a very significant decrease.

Macrorchis

M, meditata is one of the many muscid species which turn up infrequently in a wide range of places, without being scarce enough for a conservation designation: Fonseca (1968) calls this member of the Coenosiinae subfamily "frequent but local".

Mesembrina


Mesembrina meridiana

M. meridiana is certainly the most photogenic of the family Muscidae, which may explain its position as the most frequently recorded member of the family on the NBN Atlas. However the rate of regional recording since 1970 is not significantly greater than earlier and our number of records is significantly less than would be expected from the national statistics.

Morellia

Marshall indicates that members of this genus as close relatives of the housefly genus *Musca* have larvae which are microbial grazers in dung. All three British species are reasonably common, but in ourn region there has been a reversal in their relative fortunes from before 1970 to the present. *M. aenescens* has become far more abundant, and it is a permanent presence on


Morellia simplex

flowers such as fleabane in our garden. For Skidmore (1962) it was very much scarcer than the other two species, with only two Lancashire records. In the national statistics, *M. aenescens* still comes third behind *M. simplex* and *M. hortorum,* though these show significant post-1970 declines regionally.

Musca

M. domestica has retained the full name bestowed on it by Linnaeus in 1758, which must be true of very few other Diptera. Marshall (2012) gives a blood-curdling description of its habits, rating it as one of the most deadly of animals throughout the world, along with other members of the genus. The Manchester Museum record cards make special of a female being captured outside on 3 March 1921 by Harry Britten junior in Platt Fields, Manchester. I have never found it myself outside, though one appears in the house several times each year. The modern records show a fair number of unfamiliar recorder's names and it may be doubtful that such records represent an accurate identification.


Musca autumnalis

M. autumnalis appears to be much more of an outdoor beast with us, though Marshall includes it in his hall of infamy, as the "now widespread Face Fly", a reference presumably to its occurrence in North America.

Muscina

This is another genus of concern for public health (Marshall, 2012). As with *Morellia* there is a curious pattern where a less frequent species before 1970 has become much more common, while *M. stabulans* shows a strong decline. Fonseca (1968) notes that all three common British species have bene bred from nests of *Vespula vulgaris* (see also Newstead, 1891).

Mydaea

This genus is described by Marshall (2012) as enormous and widely distributed, with larvae mostly developing in dung, tree holes and fungi, where they pursue a predatory lifestyle (Falk and Pont, 2017). Our regional list contains 12 of the 13 species currently on the British list (Chandler, 2020), but taxonomic changes introduce some uncertainty. Skidmore (1963) discusses eight species, amongst which *M. urbana* and *M. corni* were common or fairly common. These two remain our most highly ranked species, though the relative reporting rates are significantly lower since 1970.

M. ancilla has been recorded in greater numbers since 1970, though not significantly so. A single Cheshire record of the nationally scarce *M. anicula* is given by Skidmore (1963), and several recorders have reported it since.

Our data appear to show *M. detrita* being recorded much less frequently since 1970. Chandler (2020) has this as the current name of *M. electa* which Skidmore noted as occurring just outside VC58, this synonymy having been established by Pont (2011). Chandler also gives the name *M. detrita* as a recognised misidentification of *M. orthonevra*, a species stated to be fairly frequent by Fonseca (1968). It would appear that this must be Skidmore's *M. detrita* in accordance with Pont's discussion of the usage of this name. The apparent decline in *M. detrita* and increase in *M. orthonevra* may be simply the result of this confusion. Skidmore called the species rare.

Skidmore also stated that his *M. detrita* had been called *M. affinis* by some earlier recorders, and did not identify any genuine records of that nationally scarce species. However, Fonseca (1968) did include Lancashire and Cheshire amongst his locations for *M. affinis.* Our single remaining record from Cheshire in 2001 requires verification or corroboration.

The presence of *M. nebulosa* in Lancashire and Cheshire was acknowledged by Fonseca (1968) but is not mentioned by Skidmore (1963). Most of our pre-1970 records stem from the RECORD data, which are based on the Liverpool Museum collection (Brighton 2017b).


Mydaea setifemur

Following bomb damage in the early years of World War this collection was replenished by Harry Britten. This transfer seems to have occurred before compilation of the Manchester record cards from the collection there. This species now seems rather scarce in the region. *M. setifemur* is also omitted from Skidmore's account, though RECORD attributes a record from Pettypool in 1963 to him.

The two records of *M. deserta* from the 1940s are also absent from the Manchester record cards and from Skidmore (1963). I am inclined to think that there has been a transcription error in the RECORD data, but this name has been left unchanged in the checklist pending further investigation.

Falk and Pont (2017) regard the nationally scarce *M. maculiventris* as a mainly southern species of old broad-leaved woodland, but our single record is from Leighton Moss in VC60 in 2016.

Myospila

M. meditabunda is a common cow-dung species has been significantly less frequently recorded since 1970. This well be an effect of the use of veterinary pharmaceuticals such as ivermectin (Sutton *et al.* 2014).

Neomyia


Neomyia cornicina

Our two species of *Neomyia* are unusual amongst the Muscidae is having a bright green metallic coloration, so that they could be mistaken for *Lucilia* green-bottles by the causal observer. The apparent decrease in *N. cornicina* and increase in the scarcer *N. viridescens* could be partly the result of Fonseca (1968) and others applying the former name to the latter species. These are cow-dung species (Skidmore, 2010) so ivermectin may also be a factor.

Orchisia

As a small member of the Coenosiinae with only 6 records on the NBN Atlas, the northernmost being in Montgomeryshire, the near-threatened *O. costata* would seem to be one of the least likely species to be found in our region. However, Fonseca's (1968) key suggests that it is rather distinctive with its wings being conspicuously and broadly darkened along front margin. Our 2001 record is by an experienced dipterist from Hartford in Cheshire. Falk and Pont (2017) indicate that it is primarily coastal species, but this location is within the Weaver "salt-scape", where many other coastal species have been recorded, as noted above.

Phaonia

This genus has 44 British species, of which 30 are on our regional list. Skidmore (1963) covers 20 of these species and also *Potamia littoralis* under its old name of *Dendrophaonia querceti*. Like *Helina* this genus produces predatory larvae in a wide range of decaying matter. The adults are superficially similar with *Phaonia* being distinguishable by a strong posterodorsal bristle near the apex of the hind tibia.


Phaonia angelicae

P. bitincta is a near-threatened species with records widely scattered in southern England with larvae developing in elm sap (Falk and Pont, 2017). It is very similar to *P. rufiventris* and *P. subventa* which are not always easy to separate, and Falk and Pont state that even some of the more recent records may be misidentifications, as indeed may be our only record in VC58.

There is much more confidence in the two Cheshire records of *P. canescens* from old trees at Toft Hall near

Knutsford and Dunham Massey, which are mentioned by name in Falk and Pont (2017). The first was evidently found by Peter Skidmore shortly after publication of his 1963 paper.

The scarce *P. cincta* was also obtained by Skidmore at Dunham Massey in 1963, though mention of Lancashire as a location by Falk and Pont is not supported by our data.

P. falleni has continued to turn up in Cheshire, and once in VC59, since Harry Britten's first two records reported by Skidmore (1963), but Falk and Pont (2017) do not list the county as a location. This nationally scarce species has a liking for wetter habitats.

The near-threatened *P. fusca* was found to be abundant at Silverdale in July and August 1963 by Peter Skidmore according to the Manchester Museum record card. It is described as an estuarine species by Fonseca (1968) and Falk and Pont (2017). It had also been recorded at Silverdale in 1891 by R.H. Meade, but post-1970 records are lacking. It is recommended that this be added to the Tanyptera priority list.

Although described by Fonseca as fairly common and distributed over all three vice-counties of the region, *P. gobertii* is now rarer by a very significant margin. Skidmore (1963) discusses finds of the larvae in some detail. He considered it the commonest of his Group 5 species which included *P. halterata*. The latter has been recorded much more frequently since 1970.

Skidmore (1963) considered the rare *P. laeta* to be particularly associated with rotten birch, but Falk and Pont (2017) give a much wider range of development sites. We have no post-1970 records.

P. magnicornis has a general association with wetter microhabitats (Falk and Pont 2017), and ha snot been recorded in the region in the last fifty years.

The nationally scarce *P. mystica* is described as widespread and uncommon throughout Britain by Falk and Pont. Our single record in VC58 fits in with this picture, but has not been verified. Skidmore (1963) and Fonseca (1968) used this name for *P. villana.*

P. palpata shows a very large increase in the post-1970 reporting rate. Skidmore (1963) considered it widely scattered and not very common, and Fonseca (1968) described it as generally distributed and fairly common, which may amount to the same thing. The number of regional records is significantly higher than expected from the national statistics.

The nationally scarce *P. pratensis* was reported from a hollow lime at Tatton Park by Alexander (2011), but our three earlier records are sketchy, without recorders' names.

Falk and Pont (2017) give only three locations in Scotland for the data-deficient *P. pullata.* They mention a possible fourth record from Pembrokeshire which requires confirmation. So our 1994 record from VC58 from Sound Common in 1994 with an unknown recorder's name is very doubtful, and has been removed from the checklist.

P. rufipalpis was not very common according to Skidmore (1963), and it has been very much scarcer in the region since 1970.

Skidmore (1963) gives a lengthy description of the various media in which the larvae of *P. subventa* had been found. These were often fungi where the prey could be fungus gnats of family Mycetophildiae or *Pegomya* species from the Anthomyiidae. It was the commonest of the British *Phaonia* species with an orange or yellow abdomen, and has become much more dominant since 1970 according to our data. Skidmore describes it as a denizen of deep shade but I have often found it in a suburban garden, including in the conservatory.

P. trimaculata was first recorded in Britain from Northenden in the Manchester suburbs in 1914 by J.T. Wadsworth, and again at the same location in 1916 and 1926. It was found in various vegetable crops attacking pests such as the larvae of the cabbage root-fly, *Delia radicum*. The only other records have come from the Sefton coast, well before 1970.

P. tuguriorum has shown the most dramatic increase in frequency, having been widespread but not common according to Skidmore (1963). The regional numbers are significantly higher than expected from the national statistics, in which the species is also the most frequent *Phaonia.*

Falk and Pont (2017) state that the nationally scarce *P. villana* favours ash-woods on calcareous soil. There is a

2013 record from the National Trust from “red-rotten” oak on the Lyme Park estate.

Our final species in this genus is *P. zugmayeriae* was considered one of our most interesting flies by Skidmore (1963). He notes the striking yellow humeri and the co-occurrence of the species with the somewhat similar *Mydaea corni* in butterbur beds, an observation specifically mentioned by Fonseca (1968). Skidmore found it in the Etherow Valley and Higher Poynton, but our only post-1970 record is from VC60 with scanty details on the NBN Atlas. This nationally scarce is considered an appropriate addition to the regional priority list (Tanyptera Project, 2020).

Piezura

This is the only British genus in Fanniidae apart from *Fannia* with only two British species of which *P. graminicola* is the less frequent, though there is confusion in the records as this name was applied by Fonseca (1968) to the commoner *P. pardalina.* He records the latter from Lancashire, but the only record in our data is very recent. It is assumed that our three records are the commoner species, but it is clearly regionally scarce. That the larvae develop in fungi (Marshall, 2012) may somehow account for the low rate of recording, as has been found for other fungicolous diptera such as the Platypezidae (Chandler, 2020a).

Polietes

We have no species with a national conservation designation from this genus of rather large and stout muscids. Although *P. domitor* and *P. hirticrus* show a very significant drop in occurrences from before 1970 to after, the overall numbers are well above those expected from the national statistics. *P. hirticrus* has a northern distribution according to Fonseca (1968) and so may be receding from our region.

Polietes domitor

A taxonomic complication arose when it was discovered that many old specimens of *P. lardarius* were to be attributed to the Mediterranean *P. meridionalis*, previously known mainly from the Mediterranean area (Pont and Falk, 2013). Both species have been recorded in the region in recent years in all three vice-counties. Although Pont and Falk give numerous characters to separate the species, I have found that this is not always easy in practice.

Potamia

There are two British species in this genus, which was formerly called *Dendrophaonia. P. littoralis* has had a complete name change from the former *D. querceti.* Some of the old records resulted from bird nest collecting by A.W. Boyd in the 1930s.

Pseudocoenosia

The rate of reporting of regional records of both *P. abnormis* and *P. solitaria* are not significantly different from the national average.

Pyrellia

P. rapax is a southern species deemed by Falk and Pont (2017) to have declined almost to extinction as a result of the loss of habitat of unimproved grazing meadows or marshes. We have record from 1895 in Bolton stemming from Nottingham Museum. That this is the only record from that source makes it all the more implausible. The species has been removed from the checklist.

Schoenomyza

S. littoralis is a small member of the Coenosiinae, rendered very distinctive by the colour of the face, a bright orange in the male and a pale primrose yellow in the female. It can be abundant in waterside locations. It was recorded only once before 1970, by Harry Britten at Sinderland near Manchester. This seems to point a general tendency to focus on larger species in this period, as seen in the data for other genera of small species such as *Coenosia,* and also in the Hybotidae (Brighton, 2019a). Fonseca (1968) stated that this species was common and recorded throughout England and Wales.

Spanochaeta

Like *Schoenomyza*, this is a genus in the Coenosiinae with a single British species. *S. dorsalis* is a widespread but not common species of marshland in southern Britain (Fonseca, 1968). Our 8 records since 1999 represent a significant range expansion. The NBN Atlas shows a northern limit in Cumbria apart from a single location on the north-west tip of Scotland.

Spilogona

This genus was described by Fonseca (1968) as “somewhat difficult” and referred to Collin’s (1930)

figures of the male genitalia for 47 species from Britain, Greenland and Sweden. Collin himself described the genus as "particularly difficult". The genus is very numerous in species in Northern regions (Collin, 1930) and Fonseca (1968) refers to most of the British species as mainly known from Scotland, in some cases only from high altitudes. Gregor *et al* (2002) give descriptions and details for many of our species, but a more recent British key is not yet available. Chandler (2020) has 23 names in the current checklist, and 13 of those appear on our regional list. Of these 13, 3 have only pre-1970 records.

None of our species is particularly common, the most frequent being *S. pacifica* at the 100th place in the overall ranking. Fonseca rates it as common and widely distributed down to the south coast. Although the regional post-1970 reporting rate shows a very significant drop, records are still forthcoming from the lowland areas. The dark wings of *S. denigrata* make it rather distinctive, and it too is recorded in our lowlands, while being particularly numerous on the Smithills Estate above Bolton.

Fonseca (1968) found *S. contractifrons* to be abundant in Scotland, present in Lancashire and Cheshire and scarce in the south. Our data show a very large drop in records in the post-1970 period, so this species may be in a northwards retreat.

Fonseca's characterisation of *S. aerea* and *S. marina* as frequent and coastal describes our regional data across all three vice-counties well.

The range of sites listed for the near-threatened *S. litorea* by Falk and Pont (2017) do not include any in our region, but do include Yorkshire and Glamorgan as well as several Scottish locations. However, most, if not all, of our records probably refer to *S. falleni* which is the correct name for the species named by Fonseca as *S. litorea*. He includes Cheshire in the range of this species. *S. litorea* has been removed from the regional checklist.

S. meadei, *S. solitariana* and *S. surda* are all relatively frequent species with our region in their range according to Fonseca (1968).

Our recent record of *S. scutulata* from Red Rocks on the Wirral is consistent with Falk and Pont's description of the habitats of this near-threatened species. They have a 1963 record from VC60 which does not appear in our data. Our earlier Cheshire record from the Manchester Museum cards is credited to Peter Skidmore in 1962 from a site that appears to read Elmscroft Wood. This cannot be located. The record card also renames the entry as *S. veterrima* on the authority of Collin. Falk and Pont (2017) do list records of this species from Lancashire and Cheshire, but most of our records do not fit their description of the habitat as estuarine sites. *S. scutulata* and *S. veterrima* are rather similar, especially the females (Fonseca, 1968).

Finally, our pre-1920 record of the large and conspicuous *S. setigera* must be erroneous as both Fonseca (1968) and Falk and Pont (2017) list only Scottish localities for this near-threatened species.

Stomoxys


Stomoxys calcitrans

The biting housefly *S. calcitrans*, also called the stable fly by Marshall (2001), is another cow-dung breeder which shows a very significant reduction in occurrences recorded after 1970. As with several other muscid species, this may be linked to veterinary residues (Sutton *et al*, 2014). This species is armed with a strong proboscis with which both sexes feed on blood from mammals including humans. McAlister (2020) has a graphic photograph of the head of this species.

Thricops

As with *Spilogona*, species in this genus are generally most abundant in Scotland. Only 6 of the 16 British species have been recorded in Lancashire and Cheshire, and two of those are questionable.


Thricops diaphanus

T. diaphanus was said to be common and generally distributed by Fonseca (1968). As one of the few all-yellow muscids (Marshall, 2012) it should attract attention, but there is a very large shortfall in the numbers recorded since 1970 compared to the earlier

period. Numbers of *T. semicinereus* and *T. simplex* have held up somewhat better.

The occurrence of the nationally scarce *T. sudeticus* in Lancashire and Cheshire is accepted by Falk and Pont (2017). Some of the earlier records lack convincing detail, and so the reported strong post-1970 decline is not really significant.

The name *T. cunctans* appears on one Cheshire LRC record by Murgatroyd in the Goyt Valley in 1943. There are no records of any *Thricops* corresponding to this in the Manchester Museum card index, so this may be a specimen previously removed to Liverpool. Fonseca (1968) did not use the name *T. cunctans* (Meigen, 1826) but does use *T. hirsutulus* (Zetterstedt, 1838) and *T. innocuus* (Zetterstedt, 1838) for distinct species. In Chandler (2020), however, *T. hirsutulus* is made a synonym of *T. innocuus* on the basis of Pont (2011), but with a note that it had previously been considered a synonym of *T. cunctans.* I assume that Fonseca's *T. hirsutulus* can be interpreted as *T. cunctans.* He does not in fact record either *T. hirsutulus* or *T. innocuus* from Cheshire, but notes the former as frequent on high ground in Westmoreland and Yorkshire.

T. genarum was recorded by Harry Britten from Nelson in VC59 in 1929, but Fonseca (1968) stated that no authentic British records could be traced. It was eventually recorded from a locality high in the Scottish mountains in 1992 and is classed as a boreo-montane species (Falk and Pont, 2017). While this identification is therefore almost certainly wrong, the record has been retained on our regional checklist as apparently distinct from any other *Thricops* species in the region.

Villeneuvia

This genus was formerly included within *Spilogona.* This nationally scarce species is said to be widespread around the British coastline, usually on wet sand. Hence our 1979 record from Hilbre Island is entirely plausible.