



Springs and Seepages of Wessex
Blackdown Hills Invertebrate Survey

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Contents

Summary	4
1. Introduction	5
2. Location	5
3. Methodology	5
3.1. <i>Aquatic survey method</i>	5
3.2. <i>Terrestrial survey method</i>	5
3.3. <i>Recording of environmental variables</i>	6
3.4. <i>Identification</i>	6
3.5. <i>Assessment</i>	6
4. Selection of survey sites	6
5. Previous data	7
5.1. <i>Blackdown hills</i>	7
5.2. <i>Wider Wessex area</i>	7
6. Results and assessment	8
6.1. <i>Species assessment</i>	8
6.2. <i>Ashculm Turbary</i>	11
6.3. <i>Blackdown and Sampford Commons</i>	11
6.4. <i>Deadman</i>	12
6.5. <i>Hense Moor</i>	13
6.6. <i>Ringdown</i>	13
6.7. <i>Ruttersleigh</i>	14
6.8. <i>Southey and Gotleigh Moors</i>	14
7. Conclusions	15
8. Acknowledgements	15
9. References	15
Appendix 1: Aquatic invertebrates recorded from Blackdown Hills springs and seepages: August 2010 and May 2011	18
Appendix 2: Details of the aquatic invertebrate sample sites in the Blackdown Hills: August 2010 and May 2011	19
Appendix 3: Details of the terrestrial invertebrates recorded from Blackdown Hills springs and seepages: August 2010 and May 2011	19
Appendix 4: Details of the Red Data Book and Nationally Scarce species recorded in 2010 and 2011	19

Summary

This is the report for the first area to be surveyed in the five year, Wessex Water funded project run by Buglife – The Invertebrate Conservation Trust. The Blackdown Hills were selected by Wessex Water as the area to cover first and this report provides the results of survey work conducted there in August 2010 and May 2011. Survey methodology was discussed between Buglife and the surveyor and three-minute kick sampling was selected along with preservation of the bulk samples in the field and later processing by washing, sieving and sorting. Sweep netting for terrestrial invertebrates was also undertaken at each site for a period of twenty minutes and insects were selectively removed with a pooter (aspirator) and preserved in alcohol for later identification.

Aquatic macro-invertebrates and terrestrial invertebrates were sampled from sixteen locations on seven sites. A total of 180 aquatic invertebrates (plus 17 terrestrial invertebrates) were recorded on the aquatic surveys and 431 terrestrial invertebrates were recorded by sweep netting. These include one UK Biodiversity Action Plan (BAP) species (the crane fly *Lipsothrix nervosa*), one possible Red Data Book horse-fly, one Vulnerable water beetle, three Lower Risk (Nationally Scarce) Diptera and twenty Nationally Scarce Coleoptera and Diptera species. An empid fly (*Kowarzia madicola*) not on the British list but known to the surveyor from the UK was also recorded. The species of high nature conservation value are discussed for each of the seven sites. Details of the ecology, distribution and status of the species of high nature conservation value are included. Location maps showing the sample sites are also enclosed. The site with the greatest number of species of high nature conservation value is Ashculm Turbary with one UK BAP species, one Lower Risk and eight Nationally Scarce species recorded.

Reference is made to previous invertebrate surveys conducted in the Blackdown Hills and wider Wessex area which are known to the author. Various physical and chemical parameters were measured in the field and have been presented in a format that may assist in further analysis of the sites. Advance has also been made in obtaining details on other spring and seepage sites in Wessex and a second report is in preparation giving the results of survey work conducted on coastal sites to the east of Lyme Regis in 2011.

1. Introduction

This report details the results of the first year of invertebrate surveys carried out as part of a five year, Wessex Water funded project run by Buglife – The Invertebrate Conservation Trust. The surveyor was commissioned by Buglife to undertake the work. The Blackdown Hills were selected by Wessex Water as the area to cover first and this report provides the results of survey work conducted there in August 2010 and May 2011. Survey methodology was discussed between Buglife and the surveyor and three-minute kick sampling was selected along with preservation of the bulk samples in the field and later processing by washing, sieving and sorting. Sweep netting for terrestrial invertebrates was also undertaken at each site for a period of twenty minutes and insects were selectively removed with a pooter (aspirator). A total of 16 sites were sampled on seven sites.

A second report is in preparation giving the results of survey work conducted on coastal sites to the east of Lyme Regis in 2011.

2. Location

All the sites surveyed in 2010 were located within the Blackdown Hills on the Devon / Somerset border. Grid references were obtained using a Garmin eTrex global positioning system. Site photographs were not included in this report but will be in subsequent reports. For these sites, photographs can be found in the accompanying bryophyte report.

3. Methodology

3.1. Aquatic survey method

The samples were collected with a standard pond net (supplied by EFE Field Equipment, Totnes) and represent 3-minute kick samples taken in the channels. Ideally, the material was processed by washing and sieving in the field but where sufficient water was not available in the field to do this, the samples were preserved and this was conducted later. Each sample was initially washed using a coarse (1cm) sieve and 500-micron sieve first to remove any twigs, leaves, seeds, large stones, etc. The coarse material retained by the 1cm sieve was retained along with the 500-micron fraction. With the exception of Blackdown and Sampford Commons where the samples were sorted in the field, the samples were preserved using 10% formalin. In August 2010 the low species richness observed in the Blackdown samples and the difficulty of sorting black peaty samples in the field convinced the surveyor to preserve the samples and sort them more carefully at a later date. The preserved samples were later examined in the laboratory by placing small amounts of material into gridded petri-dishes and adding water. These petri-dishes were then examined carefully under a stereomicroscope. Each light fraction typically used 40-50 petri-dishes this way with the smaller elutriated fractions using 10-20 petri-dishes. The coarse fraction (>1cm in size) was examined in a white tray for large invertebrates such as large cased caddis and large aquatic snails. Aquatic invertebrates were removed from the fractions and counted at the same time. For particularly abundant taxa, sub-sampling was used to estimate the total number of specimens (i.e. individuals were counted from 20-25% of the dishes and multiplied up).

Originally, use of a small surber sampler was considered for sampling but the lack of or low flows, very shallow water and lack of channels at most of the sites made the use of these impractical. Small surber samplers were used, for example, by Kutty (2006) but in watercourses with more channelised flow, more head of water and greater flow. Drift nets and the collection and examination of chironomid exuviae were also considered but given time constraints imposed these were methods were rejected.

3.2. Terrestrial survey method

Sweep netting for terrestrial invertebrates was also undertaken at each site over bare ground, through low vegetation and through fringing scrub or low tree branches for a period of twenty minutes and insects were selectively removed with a pooter (aspirator). A 40cm diameter net

supplied by Marris House Nets, Bournemouth and mounted on a metre long angling pole was used. Material was placed in alcohol in the evening for later examination.

3.3. *Recording of environmental variables*

Conductivity, pH, total dissolved solids and water temperature were measured using a Hannah HI98130 portable meter whilst turbidity was measured using a turbidity tube. Dissolved oxygen was measured in May 2011 using a Hannah HI9142 Dissolved Oxygen meter. Other variables were estimated or measured with a meter rule.

3.4. *Identification*

All aquatic macroinvertebrates have, in general, been identified to species level. For immature specimens and females not separable to species, identification has been left at the appropriate level. As usual, nematodes, oligochaetes, ostracods and copepods have not been identified further. Water beetle larvae and Diptera larvae have been identified to the most appropriate level.

Frequent taxonomic groups not identified in the sweep net samples included Opiliones (harvestmen), Araneae (spiders), Neuroptera (lacewings), Auchenorrhyncha, Miridae, Lygaeidae, Scirtidae (adults), Ceratopogonidae, Culicidae, Mycetophiloidea, Psychodidae, Phoridae, selected Pipunculidae (females of most genera, *Chalarus* spp, *Eudorylas* spp) Agromyzidae, Drosophilidae, Sphaeroceridae, Calliphoridae, Anthomyiidae, Muscidae and Symphyta (sawflies). Terrestrial Coleoptera were relatively poorly represented in the sweep net samples. These were left because time was not available to identify everything and some taxonomic groups had to be rejected. Some of these groups are taxonomically difficult and the time taken to identify them could not be justified. Some adult Scirtidae were identified and it was intended that all male Psychodidae would be identified but time constraints meant that this was not possible. All unidentified material will be retained indefinitely by the surveyor.

3.5. *Assessment*

UK BAP species have been checked against the list at www.ukbap.org.uk. Rarity statuses such as Red Data Book, Nationally Scarce (previously Notable) and Local have been developed and heavily used by Natural England, the Joint Nature Conservation Committee and associated organisations and are defined in Appendix 3. Since 1995, International Union for Conservation of Nature and Natural Resources (IUCN) categories has been adopted by the Joint Nature Conservation Committee as the new standard for Red Lists in Britain. JNCC aims to work towards assessing the status of all native species against standard criteria based on the internationally accepted guidelines developed by the IUCN (see IUCN, 2001, 2003). Only a few taxonomic groups have been given IUCN codes but these include the water beetles (Foster 2010) and Diptera belonging to the Empidoidea (Falk and Crossley 2005).

4. **Selection of survey sites**

The selection of the survey sites was done by contacting relevant local organisations in particular Natural England, Devon Wildlife Trust, Forestry Commission and Wessex Water. Several additional sites were recommended but for various reasons could not be surveyed. However, for completeness and in case these are seen as suitable for survey in the future they are listed here:

Otterhead; Similar seepages to Ruttersleigh and has had no agricultural input or other management for around 20 years. Owned by Wessex Water and open to the public. Wessex Water also has at least one another similar site in the Blackdown Hills (Ellen McDouall pers. comm.).

Stockland Turbaries; Recommended by Siobhan Murphy (Natural England). These are not SSSIs but they support very good spring-line mires. They includes include Bucehayes Common (ST213050) and Quantock Common (ST223049). They are owned by Stockland Parish Council who gave permission to undertake a survey.

A large number of sites for sampling outside the Blackdown Hills, but within the Wessex area for surveying in further years have been recommended by Wessex Water / Buglife. Mendip District Council have provided a list of a large number of Country Wildlife Sites several of which include tufa deposits or springs and which could be used to select sites in subsequent years.

5. Previous data

5.1. Blackdown hills

Dr Martin Drake undertook terrestrial invertebrate survey work on the Blackdown Hills in 1988 on behalf of the Nature Conservancy Council and identified the material along with the present surveyor. The sites included four of the sites covered in the present survey namely Blackdown Common, Deadman SSSI, Ringdown Common and Southey and Gotleigh Moors SSSI. Details of the Diptera species of nature conservation interest recorded were published in Drake and Godfrey (1989). These include a number of the species recorded in the present survey including the crane fly *Tipula yerburyi* and the snail killing fly *Psacadina verbekei*.

David Boyce undertook an invertebrate survey of Ashculm Turbary in 2006 (Boyce 2006). This surveyor recorded four Nationally Scarce water beetles and one Nationally Scarce spider on two visits in July and September. Boyce (ibid) mentions that marsh fritillary, pearl bordered fritillary and silver-studded blue formerly occurred at Ashculm Turbary. Two of the water beetles recorded by Boyce (ibid) namely *Laccobius atratus* and *Chaetarthria seminulum* were recorded on the present survey.

Ellen Douall (Wessex Water) sent a copy of a habitat survey report on non-operational land at Mount Fancy Farm (Ruttersleigh SSSI) undertaken in October 2008 (Douall 2008). The survey mentions the fact that butterflies are well recorded in the area, and that there are a relatively large number of old trees with plenty of standing and fallen dead wood which might support specialist invertebrates. The report recommends that surveys for invertebrates other than the well recorded Lepidoptera should be undertaken but includes no further references to invertebrates.

5.2. Wider Wessex area

Somerset Environmental Records Centre (SERC) undertook a baseline survey of tufa springs in Somerset for the Environment Agency between 1997 and 2001. Eight sites were detailed for detailed survey including invertebrates. SERC have provided the surveyor with a copy of the baseline report which includes major tufa sites, grid references and site status. Aquatic invertebrate data is available but has yet to be followed up.

Freshwater biologists based at the Centre for Ecology and Hydrology (CEH) at Dorchester have undertaken a number of studies on small spring-fed streams in Dorset for example, Armitage and Blackburn (1998) and Kneebone et al (2002). Samples were collected by standard 3-minute kick-sampling followed by preservation in the field and were assessed using RIVPACS software.

The current surveyor has undertaken aquatic macro-invertebrate surveys of small spring-fed streams in the Mendips in the Whatley-Frome area for a commercial client in order to assess the impacts of quarrying activities on streams and springs. Sampling involved 3-minute kick sampling and assessment using BMWP, ASPT and in more recent reports, Lotic Invertebrate Index for Flow Evaluation (LIFE). Several Red Data Book and Nationally Scarce invertebrates have been recorded including the caseless caddis *Rhyacophila septentrionalis* and *Tinodes unicolor*, the water beetle *Hydraena nigrita*, the riffle beetle *Riolus subviolaceus*, and the soldier flies *Oxycera morrisii* and *O. pardalina* which indicate a high nature conservation value of the sites for aquatic invertebrates.

Dr Martin Drake has also undertaken aquatic macro-invertebrate surveys on many of the same small, often spring-fed streams in the Mendip Hills for the same purpose his results are available in the report by Hafren Water (2005). The method was standard 3-minute kick sampling and the results were assessed using BMWP, ASPT, the Community Conservation Index (CCI) of Chadd and Extence (2004) and detrended correspondence analysis (DECORANA). Several Nationally

Scarce species were recorded including those listed above and the white-clawed crayfish *Austropotamobius pallipes*. The baseline invertebrate survey of Mells River springs by Winder (1995) which is mentioned in Hafren Water (2005) is not available to the current surveyor.

6. Results and assessment

Survey Data	Weather Conditions
13th August 2010	Not noted but dry and suitable for sweep netting.
14th August 2010	Rain in morning: soil and vegetation wet but these gradually dried out during the morning. Sunny intervals.
15th August 2010	Cold, overcast and autumnal at start. Breeze in more open areas and high humidity at first site. In afternoon there was 100% cloud cover, high humidity and it was cool for the time of year. Warm and muggy later in afternoon.
16th August 2010	Hot and sunny
9th May 2011	Strong wind at times and sunny with 30% cloud at first site.
10th May 2011	Sunny but cool at first site.
11th May 2011	Cool with ground wet at first site.

Table 1: Weather conditions on the survey dates.

6.1. Species assessment

A total of 180 aquatic invertebrate species have been recorded in August 2010 and May 2011 along with 17 terrestrial invertebrates accidentally taken in the pond net (Appendix 1). A total of 431 terrestrial species were recorded by sweep netting (Appendix 3). Physical, chemical and other details including key vegetation of the sample locations are provided in Appendix 2. One UK BAP crane fly, one Near Threatened water beetle, one possible Red Data Book horse-fly larva, three Lower Risk (Nationally Scarce) and twenty Nationally Scarce species were recorded. An empid fly not on the British list but recorded from the UK for several years by the surveyor were also recorded. These are listed below in table 2.

UK Biodiversity Action Plan		
<i>Lipsothrix nervosa</i>	Limoniidae	Diptera
Near Threatened		
<i>Hydroporus longicornis</i>	Dytiscidae	Coleoptera
Red Data Book K		
<i>Tabanus miki?</i>	Tabanidae	Diptera
Lower Risk (Nationally Scarce)		
<i>Dixa maculata</i>	Dixidae	Diptera
<i>Ptychoptera longicauda</i>	Ptychopteridae	Diptera
<i>Tachytrechus consobrinus</i>	Dolichopodidae	Diptera

Nationally Scarce		
<i>Agabus melanarius</i>	Dytiscidae	Coleoptera
<i>Chaetarthria seminulum</i>	Hydrophilidae	Coleoptera
<i>Laccobius atratus</i>	Hydrophilidae	Coleoptera
<i>Elodes pseudominuta</i>	Scirtidae	Coleoptera
<i>Tipula pseudovariipennis</i>	Tipulidae	Diptera
<i>Tipula yerburyi</i>	Tipulidae	Diptera
<i>Dactylolabis transversa</i>	Limoniidae	Diptera
<i>Pilaria scutellata</i>	Limoniidae	Diptera
<i>Scleroprocta sorocula</i>	Limoniidae	Diptera
<i>Diogma glabrata</i>	Cylindrotomidae	Diptera
<i>Spania nigra</i>	Rhagionidae	Diptera
<i>Orthonevra brevicornis</i>	Syrphidae	Diptera
<i>Sphegina verecunda</i>	Syrphidae	Diptera
<i>Xylota florum</i>	Syrphidae	Diptera
<i>Sapromyza basalis</i>	Lauxaniidae	Diptera
<i>Sapromyza zetterstedti</i>	Lauxaniidae	Diptera
<i>Psacadina verbekei</i>	Sciomyzidae	Diptera
<i>Tetanocera punctifrons</i>	Sciomyzidae	Diptera
<i>Elachiptera pubescens</i>	Chloropidae	Diptera
<i>Meonura minutissima</i>	Carnidae	Diptera

Table 2: Rare or local species recorded.

Details of the ecology, status and distribution of these species are provided in Appendix 4.

Kowarzia madicola (Diptera, Empididae) was also recorded. This empid is not on the British list but has been recorded from several sites by the surveyor.

The occurrence of the Red Data Book and Nationally Scarce species throughout the sample sites are summarised in Table 3.

Species	Blackdown & Sampford	Hense Moor	Rutters-leigh	Deadman	Ashculm Turbary	Ring-down	Southey & Gotleigh
<i>Lipsothrix nervosa</i>					+		
<i>Hydroporus longicornis</i>		+ ₋					
<i>Tabanus miki</i>						+	
<i>Dixa maculata</i>		+	+				
<i>Ptychoptera longicauda</i>						+	
<i>Tachytrechus consobrinus</i>					+		
<i>Agabus melanarius</i>		+		+	+	+	
<i>Chaetarthria seminulum</i>					+		
<i>Laccobius atratus</i>	+			+	+		
<i>Elodes pseudominuta</i>		+					
<i>Tipula pseudo-variipennis</i>			+				
<i>Tipula yerburyi</i>					+		
<i>Dactylolabis transversa</i>				+			
<i>Pilaria scutellata</i>			+		+		
<i>Scleroprocta sorocula</i>			+			+	
<i>Diogma glabrata</i>			+				
<i>Spania nigra</i>		+		+		+	
<i>Orthonevra brevicornis</i>		+					
<i>Sphegina verecunda</i>							+
<i>Xylota florum</i>					+		
<i>Sapromyza basalis</i>					+		
<i>Sapromyza zetterstedti</i>			+				
<i>Psacadina verbekei</i>				+			
<i>Tetanocera punctifrons</i>					+		
<i>Elachiptera pubescens</i>	+			+		+	
<i>Meonura minutissima</i>				+			
Total number of species	2	6	6	8	10	6	1

Table 3: Occurrence of UK BAP, IUCN, Red Data Book and Nationally Scarce invertebrates throughout the sample sites in 2010 and 2011.

Some general comments about taxa may be worthwhile. The general lack of aquatic (and terrestrial) molluscs almost certainly reflects acidic nature of most of the sites. The keeled skimmer *Orthetrum caerulescens* was frequent on many of the sites and was perhaps the most frequent dragonfly recorded. Most of the specimens of the tachinid genus *Exorista* from the survey need to be re-examined but *Exorista fasciata* appears to be the species present in most, possibly all, cases.

6.2. Ashculm Turbary

Ashculm Turbary is important for its wet heathland communities. The western boundary coincides with the springline occurring at the junction of the Upper Greensand with the overlying Clay-with-flints. An invertebrate survey of this site concentrating on Coleoptera was undertaken in 2006 by David Boyce (Boyce 2006).

One UK BAP species was recorded on the present survey and Ashculm Turbary was the also best site for Nationally Scarce species on the survey with eight species recorded and one Lower Risk (Nationally Scarce) species. These are briefly discussed here. A singleton of the UK BAP crane fly *Lipsothrix nervosa* was recorded in the woodland at Ashculm Turbary in early May 2012. According to UK Biodiversity Group (1999) it is much localised and for the most part occurs as small populations. It is not, however, endemic to the UK as suggested in UK Biodiversity Group (1999) – recent records from mainland Europe have been published. It is associated with wet, rotting twigs and branches in seepages in deciduous woodland. It is thought to require continuous shade and a constant supply of rotting timber.

The Lower Risk *Tachytrechus consobrinus* is widespread in Britain. Precise habitat information on this species is sparse, but records which do contain detail refer to *Sphagnum*/peat bogs, seepages on peat and an acid hillside with *Salix* scrub. Some recorded sites are bogs in the New Forest. The early stages are unknown but they are assumed to be semi-aquatic.

The diving beetle *Agabus melanarius* occurs in pools in part shade, often those that are spring-fed and on hillsides at the edge of woodland. As well as Ashculm Turbary it was also recorded from three other sites and consequently it would appear to be relatively frequent in suitable areas within the Blackdown Hills. The minute water beetle *Chaetarthria seminulum* is usually found in shallow water with sand, mud or moss in cliff-face seepages, on the muddy banks of streams and in moss carpets in basin mires and valley mires. It was only recorded on the present survey from Ashculm Turbary. The related *Laccobius atratus* is typically associated with hillside flushes, watershed and valley mires. It was recorded on the survey from Ashculm Turbary, as well as two other main sites.

The crane fly *Tipula yerburyi* is a southern species which appears to be most frequent in southwest England where it typically occurs in wet, usually acid woods. It was recorded from acid woodland within Ashculm Turbary on the survey. The smaller crane fly *Pilaria scutellata* is widespread throughout Britain. This species tends to be associated with semi-bare humic mud or peat, usually in open sites but sometimes in carr. It was also recorded from Ruttersleigh on the present survey. The hoverfly, *Xylota florum*, normally occurs in woodland by water or in moist valleys and was recorded from Ashculm Turbary along with the Nationally Scarce lauxaniid fly *Sapromyza basalis* which appears to be associated with damp broadleaved woodland. The snail-killing fly *Tetanocera punctifrons* uses a range of wetlands including fens, damp heaths, mires and riversides where its larvae parasitize aquatic snails.

A number of additional uncommon species were also recorded such as the small empid *Drapetis arcuata* and the distinctive hoverfly *Arctophila superabiens*.

Larvae of the biting midge family *Atrichopogon* in low numbers and these closely resemble the illustrations for *Atrichopogon alveolatus* in Nielsen (1951). However, this species only appears to have been described as larvae and is still only known from Denmark (Soós and Papp 1988). Ideally, larvae of this species need to be reared and the adults compared with the adults of other species. It will probably be the case that *alveolatus* is a synonym of a species already on the British list.

6.3. Blackdown and Sampford Commons

Blackdown and Sampford Commons have the best and most extensive surviving examples of heathland, carr woodland and marshy grassland habitats that have developed on acidic soils overlying the Greensand and Keuper Marls within the Blackdown Hills. Drake and Godfrey (1989) provide records of scarce Diptera recorded from this site.

Two Nationally Scarce species were recorded from Blackdown and Sampford Commons (Table 3). The water beetle *Laccobius atratus* is typically associated with hillside flushes, watershed and valley mires. It was recorded on the survey from all three sample locations on Blackdown and Sampford Commons and also from two other main sites. The chloropid fly *Elachiptera pubescens* is often regarded as essentially a coastal species but it also occurs on damp heathland, gravel pits and in marshes.

The water beetle *Helochares lividus* may be worth mentioning because it formerly had Notable status but was downgraded by Foster (2004). This species was found at Blackdown sample site 3.

Blackdown & Sampford 1 represents hillside flushes which clearly had more species than the spring-fed mire at Blackdown & Sampford 2 or the eutrophicated Blackdown & Sampford 3 (the reasons for the nutrient enrichment were unclear but the vegetation and algae clearly indicated this).

6.4. Deadman

Deadman is one of the best remaining examples of mixed valley mire in Somerset. It contains a rich mosaic of wet heath, bog pools and birch/willow carr grading into acid marshy grassland. Ground water issues from numerous springs within the Greensand producing a locally raised water table and bog communities have developed at these points. Drake and Godfrey (1989) provide records of scarce Diptera recorded from this site.

The occurrence of Nationally Scarce species throughout the sample sites are summarised in Table 3. Deadman is second best site for rare and uncommon species with eight Nationally Scarce species recorded in 2010 and 2011. These are briefly discussed below.

The diving beetle *Agabus melanarius* occurs in pools in part shade, often those that are spring-fed and on hillsides at the edge of woodland. It was recorded on the survey from Ashculm Turbary as well as three other sites and consequently it would appear to be relatively frequent in suitable areas within the Blackdown Hills. The related *Laccobius atratus* is typically associated with hillside flushes, watershed and valley mires. It was recorded on the survey from all three sample locations on Blackdown and Sampford Commons and from two other sites.

The crane fly *Dactylolabis transversa* is a northern and western species in the UK. This species uses a range of habitats containing non-limestone rocks, especially in moist, sheltered valley woods. The larvae develop amongst damp moss and ferns on damp rocks. Another Nationally Scarce crane fly, *Pilaria scutellata*, was recorded from Deadman along with two other sites. The small snipe-fly *Spania nigra* has been recorded widely throughout Britain but it is local. It inhabits damp broadleaved woods, meadows and coastal landslips. The larvae have been found in the liverwort *Pellia*. This distinctive species was recorded from two other sites on the present survey and there are numerous old records for the New Forest.

The snail-killing fly *Psacadina verbekei* uses a range of wetlands including fens, damp heaths, mires and riversides where its larvae parasitize aquatic snails. The chloropid *Elachiptera pubescens* is often regarded as essentially a coastal species but it also occurs on damp heathland, gravel pits and in marshes. The habitat requirements of the minute carniid *Meonura minutissima* are unclear but include chalk grassland, moorland and woodland.

A snail belonging to the family Vertiginidae was recorded from the site but it was in poor condition and could not be identified possibly not just because of the pH of the sample site but because the formaldehyde preservative may have dissolved the periostracum (outer shell layer) and other parts of the shell. Whorl-snails belonging to the genus *Vertigo* are often of high nature conservation value and they include several UK Biodiversity Action Plan (BAP) species.

Larvae of the biting midge family *Atrichopogon* were recorded from Deadman in low numbers and these closely resemble the illustrations for *Atrichopogon alveolatus* and *A. polydactylus* in Nielsen (1951). However, these species only appear to have been described as larvae and are still only

known from Denmark (Soós and Papp 1988). As mentioned above, the larvae need to be reared and the adults compared with adults of other species and it will probably be the case that both *alveolatus* and *polydactylus* are synonyms of species already on the British list.

6.5. Hense Moor

Hense Moor includes some of the best remaining examples of lowland mixed valley bog in Devon. Around the valley, groundwater emerges from the Greensand and several streams arise in and flow through the site. Hense Moor is joint third best site for rare and uncommon species with six Nationally Scarce species (Table 3).

One Near Threatened water beetle, one Lower Risk meniscus midge and three Nationally Scarce species were recorded from Hense Moor (Table 3). The Near Threatened *Hydroporus longicornis* is confined to habitats associated with seepages on a peaty substratum, usually associated with base-poor water. In the south of its range in Britain, it is found in shaded habitats, but it occurs in more exposed habitats in the north and west, particularly in upland mires. Within England, lowland Wales and lowland Scotland, the habitat is under threat, being easily lost through drainage and because of increased groundwater usage. *H. longicornis* is confined to natural habitats of this type, and has never been found in severely modified or recreated habitats.

The Lower Risk meniscus midge *Dixa maculata* is mainly recorded from northern and western Britain and the larvae live in shallow, stony streams usually in hilly areas. It was recorded on the survey as larvae and adults from Hense Moor.

The diving beetle *Agabus melanarius* occurs in pools in part shade, often those that are spring-fed and on hillsides at the edge of woodland. It was recorded on the survey from Ashculm Turbary, Deadman, Hense Moor and Ringdown and consequently would appear to be relatively frequent in suitable areas within the Blackdown Hills.

The marsh beetle *Elodes pseudominuta* is listed as Nationally Scarce (neither Red List nor Near Threatened) in Foster (2010). Unfortunately, the names of most scirtids have changed in recent years and there may still be some confusion over species. Because of this, information on the ecology, status and distribution of this particular species is difficult to ascertain from the literature. The larvae of scirtids including *Elodes* species are however aquatic, the adults are terrestrial and both are typically found in wet places such as marshes, fens, riversides, etc.

The meniscus midge *Dixa maculata* is mainly recorded from northern and western Britain and the larvae live in shallow, stony streams usually in hilly areas. It was recorded on the survey as larvae and adults from Hense Moor and as larvae from Ruttersleigh. The hoverfly *Orthonevra brevicornis* is widespread but scarce in England and may be more frequent towards the south and east. The larvae is aquatic, living in accumulations of decaying vegetation, especially in mesotrophic or base-rich seepages in fens, meadows and occasionally woods. The distinctive small snipe-fly *Spania nigra* was also recorded.

6.6. Ringdown

This site is located on a valley side in the Blackdown Hills where outcrops of Cretaceous Upper Greensand and underlying Triassic Keuper marls occur. A seepage line at the base of the Upper Greensand ensures that the area is always very wet and the Greensand aquifer results in the groundwater being highly acidic. Drake and Godfrey (1989) provide records of scarce Diptera recorded from this site.

The occurrence of Red Data Book and Nationally Scarce species throughout the sample sites are summarised in Table 3. Ringdown is joint third best site for rare and uncommon species with six Nationally Scarce species.

Possible larvae of the Red Data Book horse-fly *Tabanus miki* were recorded from Ringdown. Identification of the larvae needs to be double-checked and may still be regarded as provisional unless adults can be recorded from the site. The habitat would appear to be ideal for tabanids with

blocks of woodland interspersed with flushed marshy ground and a herd of cattle present (which could be a source of blood meals). This horsefly has a patchy distribution throughout southern England and the Midlands and appears to be associated with woodlands. Further surveys possibly involving Malaise traps would be required to confirm the presence of this species on the site.

The diving beetle *Agabus melanarius* occurs in pools in part shade, often those that are spring-fed and on hillsides at the edge of woodland. It was recorded on the survey from Ashculm Turbary, Deadman, Hense Moor and Ringdown and consequently would appear to be relatively frequent in suitable areas within the Blackdown Hills.

Ptychoptera longicauda is a relative of craneflies and has a clumped distribution in southern England. The habitat of this species is woodland streams with silted areas and at least half the recorded sites are thought to be calcareous. It was only recorded on the survey from Ringdown. The small cranefly *Scleroprocta sorocula* was recorded from this site and Ruttersleigh. This widespread species is associated with wet woodlands. The early stages are unknown but related species feed in fungi. The small snipe-fly *Spania nigra*, recorded at two other sites, was also recorded here. The chloropid *Elachiptera pubescens* is often regarded as essentially a coastal species but it also occurs on damp heathland, gravel pits and in marshes.

There are only three British records of the scatopsid *Rhexosa subnitens* according to Freeman and Lane (1985) and consequently the record from Ringdown in this report is important. Members of this family have not been given rarity statuses because their ecology and status is poorly known and they are almost certainly under-recorded.

6.7. Ruttersleigh

This site comprises a mosaic of broadleaved woodland, scrub, bracken, mires and unimproved grassland. The site is located on the north facing slope of the Blackdown Hills and there are a number of springs and seepage lines within the site associated with the Jurassic shales / Cretaceous Upper Greensand boundary and many streams arise within it, all of which drain to the north. Douall (2008) provides a habitat survey report on non-operational land at Mount Fancy Farm (Ruttersleigh SSSI). Ruttersleigh is joint third best site for rare and uncommon species with six Nationally Scarce species (Table 3).

One Lower Risk and five Nationally Scarce species were recorded from Ruttersleigh (Table 3). The Lower Risk meniscus midge *Dixa maculata* was also recorded from Hense Moor and was discussed above. The cranefly *Tipula pseudovariipennis* is a local, mainly southern cranefly mainly known from broadleaved woodlands on chalk but with a few records from localities on sandy soils. Another cranefly *Diogma glabrata* which is widespread in damp woodlands, generally in calcareous lowland areas was recorded. A third Nationally Scarce cranefly *Scleroprocta sorocula* was also recorded from Ringdown and was mentioned under that site. The Nationally Scarce lauxaniid fly *Sapromyza zetterstedti* which may be associated with conifers was recorded.

A number of additional uncommon species were recorded such as the snail-killing fly *Pteromicra angustipennis*.

Larvae of the biting midge family *Atrichopogon* were recorded in low numbers as was the case at a number of other sites and these closely resemble the illustrations for *Atrichopogon alveolatus* in Nielsen (1951). The significance of this species was mentioned above for Ashculm Turbary.

6.8. Southey and Gotleigh Moors

Southey and Gotleigh Moors is one of the richest mosaics of valley mire, acid-marsh grassland and alder-birch carr to be found in the Blackdown Hills. The site contains a large and diverse, moderately acid, flush and bog complex. Drake and Godfrey (1989) provide records of scarce Diptera recorded from this site.

One Nationally Scarce species were recorded from Southey and Gotleigh Moors (Table 3). The slender hoverfly *Sphegina verecunda* is generally associated with woodland streams and damp

woodlands and probably deserves to be downgraded from Nationally Scarce in the surveyor's opinion. It was recorded from Southey and Gotleigh Moors.

7. Conclusions

The results of an invertebrate survey on seepages and springs within the Blackdown Hills in August 2010 and May 2011 are presented. Aquatic macro-invertebrates and terrestrial invertebrates were sampled from sixteen locations on seven sites. A total of 180 aquatic invertebrates and 431 terrestrial invertebrates were recorded. A small number of additional terrestrial species that were accidentally collected in the pond net have also been identified and recorded. The records include one UK BAP crane-fly (*Lipsothrix nervosa*), one possible Red Data Book horse-fly, one Vulnerable water beetle (*Hydroporus longicornis*), three Lower Risk Diptera and 20 Nationally Scarce Coleoptera or Diptera. Details of the ecology, distribution and status of the RDB and NS species are included in the report and the occurrence of these species throughout the sample sites is discussed. The site with the greatest number of species of high nature conservation importance is Ashculm Turbary with ten species of high nature conservation value recorded. The aquatic invertebrate samples from August 2010 were assessed using BMWP, ASPT and the number of scoring taxa. The majority of sites had 'good' or 'moderate' biological water quality with only two 'poor' sites (Blackdown & Sampford 2 & 3) and one 'very good' site (Deadman 11). The low BMWP scores at some sites no doubt largely reflects the acidic nature of most of the sites and the fact that acid sites generally have low species richness and low abundance amongst aquatic invertebrates.

Reference is made to previous invertebrate surveys conducted in the Blackdown Hills and wider Wessex area which are known to the author. Various physical and chemical parameters were measured in the field and have been presented in a format that may assist in further analysis of the sites. Survey of a second area within the Wessex area (east of Lyme Regis) has now been completed and this in the process of being reported.

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Appendix 1: Aquatic invertebrates recorded from Blackdown Hills springs and seepages: August 2010 and May 2011.

Red Data Book and Nationally Scarce species have been emboldened in the spreadsheet.

Appendix 2: Details of the aquatic invertebrate sample sites in the Blackdown Hills: August 2010 and May 2011.

Appendix 3: Details of the terrestrial invertebrates recorded from Blackdown Hills springs and seepages: August 2010 and May 2011.

Nationally Scarce species have been emboldened in the spreadsheet.

Appendix 4: Details of the Red Data Book and Nationally Scarce species recorded in 2010 and 2011

UK Biodiversity Action Plan

Lipsothrix nervosa Limoniidae Diptera

This crane fly has a wide distribution which includes southern England, the south Midlands and South Wales. According to UK Biodiversity Group (1999) it is much localised and for the most part occurs as small populations. It is not endemic to the UK as suggested in UK Biodiversity Group (1999). It is associated with wet, rotting twigs and branches in seepages in deciduous woodland. It is thought to require continuous shade and a constant supply of rotting timber.

Near Threatened

Hydroporus longicornis Dytiscidae Coleoptera

Records since 1980 for this small black water beetle are for Cornwall, Devon, Somerset, Dorset, Hants, Sussex, Kent, Bucks, Norfolk, Derbyshire, Yorks, Lancs, Westmorland, Cumberland and Northumberland. It has also been recorded from six Welsh counties and over fifteen Scottish counties.

This species is confined to habitats associated with seepages on a peaty substratum, usually associated with base-poor water. In the south of its range in Britain, e.g. on Ashdown Forest and at Burnham Beeches, it is found in shaded habitats, but it occurs in more exposed habitats in the north and west, particularly in upland mires. In Wales, it occurs in several valley mires, including some associated with former pingo systems. Within England, lowland Wales and lowland Scotland, the habitat is under threat, being easily lost through drainage and because of increased groundwater usage. *H. longicornis* is confined to natural habitats of this type, and has never been found in severely modified or recreated habitats. This species therefore remains of great value as a habitat indicator, particularly where it occurs in isolated sites in England and on low ground elsewhere.

The isolation of many English colonies places them at great risk of extinction, particularly if climatic change increases the probability of drought in areas where groundwater is in demand. Elsewhere, the greatest risk lies in drainage and modification of seepage areas, particularly in association with pasture improvement and afforestation. The site where *H. longicornis* was first discovered in East Sussex, based on a single spring, was destroyed by drainage before the site could be scheduled. *H. longicornis* is found in many SSSIs and NNRs throughout Britain. Managers of such sites should be aware of the special importance of maintaining seepage areas, particularly in valley and watershed mires.

Red Data Book K

Tabanus miki? Tabanidae Diptera

The main source of authentic specimens of this horse-fly is the New Forest but it has also been taken in recent decades from Norfolk, Northamptonshire, Surrey, Wiltshire and Glamorganshire according to Stubbs and Drake (2001). It appears to have a wide distribution in southern and midland woodlands. The early stages are unknown and larval development sites could include marshy areas by pools or streams, in damp rotting wood or leaf litter. The adults have been recorded in July and August.

Lower Risk (Nationally Scarce)

Dixa maculata Dixidae Diptera

Records of this meniscus midge are scattered widely in the northern and western parts of England (eleven recorded counties) with one record for Suffolk and Wales. There are about 20 known post 1960 sites according to Falk and Chandler (2005). The larvae live in shallow, stony streams usually in hilly areas. The adults have been recorded from January to October.

Ptychoptera longicauda Ptychopteridae Diptera

This relative of craneflies has a clumped distribution in southern England with clusters in Hampshire and Kent. The largest number of records is associated with calcareous areas in the Cotswolds and the southern part of the Welsh border (Falk and Chandler 2005). The habitat of this species comprises wooded streams with silted areas. At least half the sites are thought to have a calcareous influence. The larvae of this genus are aquatic, developing in muddy sediment in shallow water at the margins of springs and streams. The adults have been recorded from late June to early September.

Tachytrechus consobrinus Dolichopodidae Diptera

Records of this species are widely scattered in England (Devon, Somerset, Dorset, Isle of Wight, Hampshire, Berkshire, Warwickshire, and Yorkshire), Wales (two counties) and Scotland (five counties). Precise habitat information on this species is sparse, but records which do contain detail refer to sphagnum/peat bogs, seepages on peat and an acid hillside with *Salix* scrub. Some recorded sites are bogs in the New Forest. The early stages are unknown but they are assumed to be semi-aquatic. The adults have been recorded from May to August.

Nationally Scarce

Agabus melanarius Dytiscidae Coleoptera

Recent published records are for Devon, Somerset, Hampshire, Sussex, Kent, Hampshire, Surrey, Worcestershire, Staffordshire, Cheshire, Derbyshire, South and North Yorkshire, Cumberland, Durham, Northumberland, and Argyll.

This medium-sized black water beetle occurs in pools in part shade, often spring-fed and on the sides of hills at the edge of woodland. It has also been found in overgrown peat cutting areas on the edges of raised bogs. Typically it is found between rotting leaves at the pool edges. It can tolerate the disturbance associated with deer-rutting and occasional vehicular use in ruts. This species has been intercepted in flight. Based on mark and recapture work, a German researcher concluded that, despite its ability to fly, *A. melanarius* was more static than the hydrophilid *Hydrobius fuscipes* occupying the same habitats in the Black Forest. The same researcher also linked its distribution with high levels of humates. Adult occurrences in Britain, appear to indicate breeding in the spring by overwintered adults. In ponds in the Weald, larvae occur in the summer.

Despite the occurrence of this species in many areas of relict woodland and forest in Europe, it is capable of colonising re-afforested areas wherever the natural drainage system has been left sufficiently intact to produce spring-fed pools and vehicle ruts.

Chaetarthria seminulum Hydrophilidae Coleoptera

There are recent records for Somerset, Sussex, Kent, Suffolk, Norfolk, Northamptonshire, Gloucester, Leicestershire, Derbyshire, West Yorkshire, Westmorland, Cumberland, four Welsh counties and at least eight Scottish counties and several Scottish islands.

This small water beetle lives in shallow water with sand, mud or moss. It may be found in cliff-face seepages, on muddy banks of streams and in moss carpets in basin mires and in mesotrophic and base-rich valley mires. It is usually associated with exposed conditions in lowlands. It is often caught in pitfall traps in wet areas but is not easily taken with the pond net, being most easily detected when it floats to the surface after disturbance. Adults are regarded as nocturnal, staying in their burrows during the day. The bimodal occurrence of adults, with the main peak in April and May, indicates overwintering as adults which breed in the spring. The larvae have been found in July. Larvae do not appear to be able to swim, and are possibly non-aquatic, crawling at the water margins where they feed on small invertebrates.

Laccobius atratus Hydrophilidae Coleoptera

Recent published records are for Somerset, Dorset, Wiltshire, Sussex, Surrey, North Yorkshire, Westmorland, Northumberland, four Welsh counties and two Scottish counties. Some questionable records for eastern England may refer to an as yet unrecognised taxon. This small water beetle is associated with hillside flushes, watershed and valley mires. There is no evidence of contraction in range but at least one valley mire in East Sussex was destroyed before it could be scheduled.

Elodes pseudominuta Scirtidae Diptera

This marsh beetle is listed as Nationally Scarce (neither Red List or Near Threatened) in Foster (2010). According to Duff (2008) this is the species formerly known as *minuta* sensu auctt. partim non (Linnaeus, 1767). No species under the name *minuta* or *pseudominuta* are given Notable or Red Data Book status in Hyman and Parsons (1992). Unfortunately, the names of most scirtids have changed in recent years and there may still be some confusion over species. Because of this, information on the ecology, status and distribution of this species is withheld. The larvae of scirtids including *Elodes* species are however aquatic and the adults are terrestrial and they are typically found in wet places such as marshes, fens, riversides, etc.

Tipula pseudovariipennis Tipulidae Diptera

This is a local, mainly southern crane-fly. Falk (1991) stated that there were at least eight modern sites and Stubbs (1992) gives about twenty 10km records but states that most, if not all, the Scottish, north England and north Midland records may be erroneous. The current record would be one of the most westerly in England and given the lack of chalk or sandy soils might be worth re-checking assuming the specimen has been retained. This species has mainly been recorded from broadleaved woods on chalk, although there are a few records from localities on sandy soils. The early stages are unknown. The adults have been recorded in May and June.

Tipula yerburyi Tipulidae Diptera

This crane-fly is a southern species which appears to be relatively frequent in south-west England. It usually occurs in wet, usually acid woods and in southern England; there is a preference for sallow carr on heathland. The early stages are unknown but the larvae possibly live in wet soil. The adults have been recorded from May to July.

Dactylolabis transversa Limoniidae Diptera

This is a northern and western species with records for Wales (three counties), England (six counties) and Scotland (two counties). This species uses a range of habitats containing non-limestone rocks, especially in moist, sheltered valley woods. The larvae develop amongst damp moss and ferns on damp rocks. The adults have been recorded from May and July.

Pilaria scutellata Limoniidae Diptera

Records for this medium-sized cranefly are widely dispersed in England (nine counties), Scotland (five counties) and Wales (Anglesey). Records are particularly numerous for the Surrey heaths and North Kent marshes. There appear to be few records on the south coast of England but records are available for North Devon and Somerset. This species is associated with semi-bare humic mud or peat, usually in open sites but occasionally in carr. It tends to be associated with eutrophic sites on acid soils or poor fen. The larvae are semi-aquatic, probably developing in wet mud. The adults have been recorded from May to October.

Scleroprocta sorocula Limoniidae Diptera

Records for this cranefly are widely dispersed in England, Wales and Scotland. The National Biodiversity Network (NBN) Gateway has about fifteen 10km squares on the distribution map for this species. This species is associated with wet woodlands. The early stages are unknown but related species develop in fungi. The adults have been recorded in May and June.

Diogma glabrata Cylindrotomidae Diptera

Records for this cranefly are widely dispersed throughout England, Wales and Scotland. This species occurs in damp woodland, generally in calcareous lowland areas. The larvae usually develop in terrestrial mosses growing on stones, less often in wet mosses growing on soil. It is also possible that mosses on large trees and bodies of dead wood are used. The adults have been recorded from June to August.

Spania nigra Rhagionidae Diptera

This species is recorded widely throughout England, Wales and Scotland. This species is very widespread but local with a fair number of records from the Scottish Highlands and numerous old ones from the New Forest. It inhabits damp broadleaved woods, meadows and coastal landslips. The larvae have been found in the liverwort *Pellia*. The adults have been recorded from late May to early June.

Orthonevra brevicornis Syrphidae Diptera

This scarce hoverfly is widely distributed in England and may be more frequent towards the south and east. There are scattered records in Wales and Scotland. The larvae is aquatic, living in accumulations of decaying vegetation, especially in mesotrophic or base-rich seepages in fens, meadows and occasionally woods. The adults can be found in marshes and fens.

Sphagina verecunda Syrphidae Diptera

This narrow-waisted hoverfly generally occurs along woodland streams and throughout damp woodlands. The larvae of *Sphagina* spp have been found in semi-submerged logs in streams and in sap runs. This species is widely distributed as far north as Cumbria and Durham, but there are few records for Scotland. The adults have been recorded from May to October and peak in June. More information is available in Falk (1991).

Threats to this species include the clearance of broadleaved woodland sites especially the damper areas near streams and conversion to agriculture or intensive forestry. Other threats include the ditching of streams, drainage of moist areas in woods and the removal of dead wood.

Habitat management should aim to maintain damp areas in woodland, especially those near streams, in an undisturbed state with a lush vegetation and retain any dead wood.

Xylota florum Syrphidae Diptera

This hoverfly is thinly but widely scattered in England and Wales. It normally occurs in woodland by water or in moist valleys, the adults often perching on fallen trees or sunbathing on logs partly submerged in marshes. The larvae are associated with decaying wood and sap. The adults have been recorded from June to October.

Sapromyza basalis Lauxaniidae Diptera

This lauxaniid fly has been recorded from scattered localities in southern England (seven counties listed by Falk and Ismay in prep.) as well as one county in North Wales. Records predominate in the west. Most records apply to broadleaved woodland and there may be a preference for damp woods with a well developed ground layer of vegetation. The early stages are unknown but the larvae of this family are generally believed to develop in decaying vegetable matter including fallen leaves. The adults have been recorded from July to October,

Sapromyza zetterstedti Lauxaniidae Diptera

Records of this lauxaniid fly are widely scattered in England (eleven counties listed by Falk and Ismay in prep.), Wales (three counties) and Scotland (nine counties). This species is associated with woodland possibly only coniferous or mixed. This species was reared from the cone of a Douglas fir from a site in Argyllshire although it is not clear if this is the normal breeding site. The adults have been recorded from May to September and at Pembrey Forest, Carmarthenshire, it was taken on pine logs, further suggesting an association with conifers. This species is widespread but localised with a northerly bias. About fifteen post-1960 sites are known.

Psacadina verbekei Sciomyzidae Diptera

This species has been recorded widely throughout England as far north as Yorkshire and Wales. A range of wetlands is used including fens, damp heaths, riversides and dune slacks. Standing water is a requirement, though records seem to relate to both bog and base-rich conditions. The larvae develop as parasitoids of aquatic snails such as *Lymnaea* and appear to be adapted for life at the margins of aquatic environments. Adults have been recorded from early April to mid October. This is a widespread but very local species with about 25 known post-1960 sites.

Threats to this species include the drainage of wetlands for agriculture or intensive forestry; complete or extensive clearance of marginal vegetation from water edges such as through river improvement schemes and ditching of streams; pollution such as agricultural run-off; mismanagement of water levels and subsequent scrub invasion. Habitat management for this species should aim to prevent the drainage of sites and provide a range of vegetation types including ditches, ponds, and their marginal vegetation. Seasonally fluctuating water levels may be important. Avoid scrub invasion though isolated shrubs and areas of carr may be beneficial.

Tetanocera punctifrons Sciomyzidae Diptera

Records for this snail-killing fly are scattered widely throughout England (nine counties or vice-counties), Wales (two counties) and Scotland (three counties) according to Falk (1991). This species is widespread but local with about 20 post-1960 sites in 1991. This species occurs in wetlands, damp woodland, riverside situations, damp heathland and coastal marshes. The larvae develop as predators or parasitoids of aquatic gastropod molluscs. The adults have been recorded from June to August.

Elachiptera pubescens Chloropidae Diptera

This is essentially a coastal species of southern England according to Falk and Ismay (in prep.). The recorded habitats include coastal grazing marsh and to a lesser extent, damp heathland, gravel pits and marshland. There may be a requirement for *Phragmites* beds. The early stages are unknown; the larvae probably develop in decaying vegetable matter although they may invade grass and reed stems. This species is widespread but local in the south, although may be locally frequent on the South Essex marshes. There are about twenty post-1960 sites according to Falk and Ismay (in prep.).

Meonura minutissima Carnidae Diptera

Records of this minute carniid fly are scattered widely with nine records cited by Falk and Ismay (in prep.). There are at least four post-1960 sites but it is likely that this species, along with other carniids, are grossly under-recorded. The habitat preferences of this species are unclear but recorded habitats include chalk grassland, moorland and woodland. The larval biology is unknown; members of this genus have been reared from a range of situations including birds'

nests, animal dung, possibly carrion and the damaged puparium of another fly. The adults have been recorded from May to July.