

16.12.2016
Ref: NEFU 2016/283
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An invertebrate survey of Therfield Heath SSSI

Project Specification: "Invertebrate assemblage survey (early successional F111 & F112). Therfield Heath is one of the largest extent of chalk grassland in the East of England, notified (amongst other things) for its invertebrate assemblage & Chalkhill Blue butterfly. While the Butterfly Conservation regularly monitor the Chalkhill Blue population, no recent survey has been done on the other invert taxa. A targeted survey is needed to inform management and site condition.

Depending on surveyor's availability, two options are possible:

- 1/ a full survey (1 or 2 days field work in early June + identification + report writing)
- 2/ a one day field visit with management recommendations for the invertebrate assemblage"

Invertebrates mentioned on the citation: 'The grassland supports a diverse insect fauna, including the chalk hill blue butterfly *Lysandra coridon*.'

Reportable Invertebrate Features: Butterflies which have experienced substantial declines - *Lysandra coridon*, Chalkhill Blue. Invertebrate assemblage F111 bare sand & chalk. Invertebrate assemblage F112 open short sward

Introduction: During the spring of 2016 an assessment of past key invertebrate records at this site was made by the author using a list of historical records supplied by Sonja Kaupe. The assessment was focused upon a single issue and looked at the important role of scrub within the mosaic of habitats at the site. The outcome of the report suggested a more up to date invertebrate survey take place to examine the situation post-1990 (when Colin Plant undertook the last major site

survey (Plant, 1990)). Time for such a survey was bid for to the Field Unit and this report is the outcome of that bid.

Therfield Heath (Fig 1) (centred on TL337400) contains some of the richest chalk grassland in England as well as some beech woodland and scrub. It is regionally important for its vegetation and for populations of the Chalk-hill Blue butterfly *Polyommatus coridon* (ex. *Lysandra coridon*). A golf course sits within part of it, as does a sport club with rugby pitch, horse gallops, as well a lot of public access for recreation and dog walking.

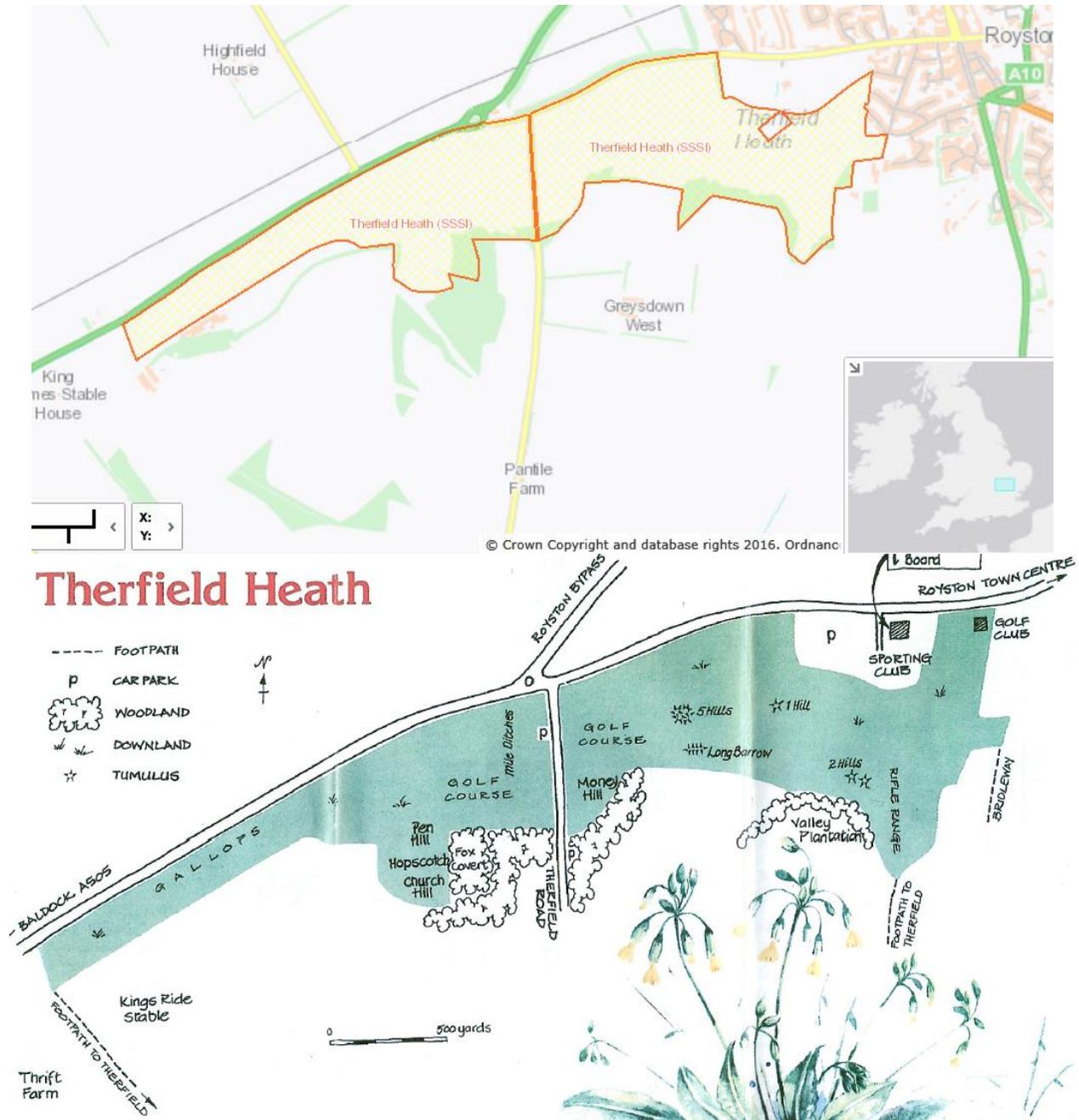


Fig.1 Therfield Heath SSSI map and illustration

Methodology: Invertebrates were surveyed during the summer period over four visits beginning on the 12th July and ending on the 15th August 2016. The first visit was curtailed due to the appallingly bad weather, though thankfully the remaining visits were carried out in generally good conditions. Sweep netting and stalking (80%), direct sampling from the ground (5%), tree and scrub beating (5%), grass litter sifting (5%), and vacuum sampling (5%) were the methods employed to sample invertebrates.

The author was accompanied on site by Sonja Kaupe on the 12th and 27th July, and the 15th August. We were also joined by Vicky Gilson on the final date.

Butterfly Conservation very kindly supplied transect counts of the Chalk-hill Blue, the only reportable invertebrate species at the site.

All specimens were stored within 70% alcohol until the end of the field season.

Results: A total of 228 records of 164 species were recorded during the 2016 survey with a taxonomic output as illustrated in Fig 2. (Pantheon was able to analyse 96% of these records). Flies, true bugs, and beetles were the three largest groups sampled. The only moths sampled were dayflying ones.

Taxonomic output		
insect - true fly (Diptera)	35	21%
insect - true bug (Hemiptera)	34	20%
insect - beetle (Coleoptera)	29	17%
insect - butterfly	17	10%
insect - hymenopteran	10	6%
spider (Araneae)	9	5%
insect - moth	7	4%
mollusc	5	3%
harvestman (Opiliones)	5	3%
insect - orthopteran	4	2%
crustacean	1	0%

Fig 2 – Taxonomic output from Pantheon

Several species of conservation importance were found at the site, including Red Data Book (Shirt, 1987) species as well as several species new to Vice County (VC) 20 (Hertfordshire). These are either listed in Fig 3 (below) or noted within the species notes following Fig 3.

Taxon	Status
<i>Aporus unicolor</i> – a spider-hunting wasp	Notable A
<i>Arachnospila minutula</i> – a spider-hunting wasp	Notable B
<i>Cerceris quinquefasciata</i> – a solitary wasp	RDB3
<i>Hedychrum niemelai</i> – a ruby-tailed wasp	RDB3
<i>Coenonympha pamphilus</i> – Small Heath	Section 41 of the NERC Act
<i>Drymus latus</i> – a ground bug	Notable B
<i>Helicella itala</i> – Heath Snail	Least Concern (LC)
<i>Hippodamia variegata</i> - Adonis Ladybird	Notable B
<i>Leptarthus vitripennis</i> – a robberfly	Nationally Rare (NR)
<i>Pherbellia griseola</i> – a snail-killing fly	Notable
<i>Polyommatus (Lysandra) coridon</i> – Chalkhill Blue	Near Threatened (NT)
<i>Sapromyza zetterstedti</i> – a lauxanid fly	Notable
<i>Scotopteryx chenopodiata</i> – Shaded Broad-bar	Section 41 of the NERC Act
<i>Zabrachia tenella</i> – a soldierfly	Nationally Rare (NR)

Fig 3 – Species of importance found at Therfield Heath in the 2016 survey

Aporus unicolor is an uncommon spider-hunting wasp. The majority of modern records are coastal, with a suggestion of a decline inland which may be correlated to the widespread loss of inland habitat for the wasp's spider prey (the purse web spider *Atypus affinis*). On the coast, the habitat is typically cliffs and landslips, whilst inland, well-grazed downlands and heathlands are the usual haunt of both spider and wasp. In all these locations, south-facing slopes and banks in sunny locations are important (www.bwars.com). The NBN Gateway map for this species (see Appendix II) suggests this species is a new record for VC20.

Arachnospila minutula – a spider-hunting wasp which occurs in a variety of open, sparsely vegetated situations such as chalk downland, heathland and coastal sites (www.bwars.com). Though not uncommon in the south-east it appears to be another new species to VC20.

Cerceris quinquefasciata – a weevil-feeding solitary wasp. Although widely distributed in southern England (especially in the south-east), this is a rare species. The majority of records are old, the most recent including individuals collected in Kent, Essex, Suffolk, Norfolk and Oxfordshire. This again appears to be a new species to Hertfordshire VC20.

Hedychrum niemelai – a ruby-tailed wasp that is found in open sandy or chalk localities: lowland heaths, coastal dunes, cliffs with sandy deposits, and other disturbed locations, for example sandpits, footpaths etc (www.bwars.com). It parasitizes the previous species and other *Cerceris* wasps. Once more this species appears to be new to VC20.

Coenonympha pamphilus – Small Heath. A fairly common butterfly of a wide variety of rough grassland locations that is noted as a S41 species due to declines of about 30% since the 1970's. Agricultural improvement of grassland and other habitat loss is one of the key drivers of the decline (www.butterfly-conservation.org)

Drymus latus – a scarce species of ground bug mainly confined to the south-east of England with a scatter of records north to Yorkshire. The host plants are unclear; it has been recorded from a variety of habitats on both chalk and acid soils (www.britishbugs.org.uk)

Helicella itala, the Heath Snail like the other xerophilous helicids is found in all kinds of dry, open habitats such as calcareous grassland and dunes. It can disappear rapidly from a site with abandonment and the cessation of grazing (Byrne et al. 2009). It is known to be declining in Britain (www.iucn.org).

Hippodamia variegata - Adonis Ladybird. A widespread species associated with warm, sunny, sandy or chalk soils, often encountered wandering around the ground on tracks and bare ground.

Leptarthus vitripennis – a robberfly. There are few records nationally of this fly which is associated with tall chalk grassland. It is known from Box Hill in Surrey, from the North Downs and the southern end of the Chilterns (Stubbs & Drake, 2001). It is perhaps not too surprising to find it at Therfield Heath given the amount of tall grassland and the geology of the site. A new species to VC 20.

Pherbellia griseola – a snail-killing fly usually associated with fens and likely to be a stray from a local wetland site. Larvae are associated with freshwater snails. Appears to be a new species to VC20.

Polyommatus (Lysandra) coridon – Chalkhill Blue. The butterfly is confined to calcareous grassland in southern England where larvae feed upon Horseshoe Vetch and has declined in some areas during recent decades. Please see the standalone section on this species on pages 9 - 11.

Sapromyza zetterstedti – a small yellow lauxanid fly about which little is understood of its ecology. Pantheon suggests it is associated with trees / scrub within the ecological guilds section of the software. Records are widespread through the UK but not common and a new species to VC20.

Scotopteryx chenopodiata – Shaded Broad-bar. This moth frequents a wide range of open grassy places, including calcareous grassland, hedgerows, heathland, sand dunes and woodland rides. It was added to the UK BAP and then the S41 list based upon a rapid decline (61% over 25 years 1968-2002) assessed using Rothamsted trap data. (Fox et al, 2013)

Zabrachia tenella – a soldierfly sometimes called the Pine Black, this species is associated with pine trees where larvae live under the bark in old bark beetle burrows (Stubbs & Drake, 2001). Although this appears to be another new species to VC20 it is of no real site significance.

The list was then analysed using ISIS and Pantheon software to examine whether the invertebrate assemblages matched those noted as reportable features and to look at ecological guilds and habitat information. .

SAT code	SAT name	No. spp.	Condition	Percentage of national species pool	Related BAT rarity score
F112	open short sward	10		5	167
F001	scrub edge	5		3	
F111	bare sand & chalk	4		1	167
F002	rich flower resource	2		1	
A212	bark & sapwood decay	2		0	
F003	scrub-heath & moorland	1		0	

BAT code	BAT name	Representation (1-100)	Rarity score	Condition	BAT species richness	IEC
F2	grassland & scrub matrix	50	127		108	
F1	unshaded early successional mosaic	13	167	fav	27	
A1	arboreal canopy	7			15	
W3	permanent wet mire	2			5	
F3	shaded field & ground layer	2			4	
A2	wood decay	1			2	0
W1	flowing water	0			1	

Fig 4 – ISIS analysis of 2016 records

Figure 4 shows that the survey work carried out enabled the F1 unshaded early successional mosaic Broad Assemblage Type to be shown as favourable but the two Specific Assemblage Types noted as reportable features (F111 & F112) were not. This is for two reasons. The F112 assemblage will have been under-recorded due to the late seasonal bias of the survey work missing key species of high fidelity to these habitat types that fly earlier in the spring and summer. However with the addition of records of aculeate hymenoptera (bees, wasps, and ants) and mollusca recorded at the site between 1996 and 2016 the F112 open short sward SAT reaches favourable condition (Figure 6) and I would suggest this is correct given the quality of the habitat of open short sward, particularly at Church Hill and elsewhere on the site.

Despite the addition of these extra records the F111 bare sand and chalk SAT does not reach favourable condition and I would suggest that it is possibly misapplied due to the sward lengths of dominance of grassland over bare ground at the site (Figure 5). The F111 SAT is primarily associated with sandy heaths with a significant areas of bare ground or areas of chalk with a lot of bare ground. For the F111 SAT to be deemed favourable there needs to be far more areas of south-facing bare ground than currently exists, and this probably currently related to tracks across the site and some areas of south-facing bare ground close to Money Hill.



Fig. 5 – flower rich grassland sward at Therfield Common (Vicky Gilson)

Despite the F111 SAT not being shown as in favourable condition the inclusion of this extra data highlights two other SATs that potentially could replace it. With these extra records the F001 scrub edge resource and the F002 flower rich resource SATs are both shown as favourable condition. The F001 scrub edge SAT showing favourable condition status echoes the report supplied to Sonja Kaupe early in 2016 written by the author based upon historical invertebrate records of interest and suggests scrub edge (though limited as it is) is a key feature at the site. It is not surprising that the F002 flower rich resource SAT reaches favourable condition as there are some very flower rich sections of grassland (again as illustrated in Fig. 5) that offer habitat to a large range of both common and uncommon invertebrate life.

SAT code	SAT name	No. spp.	Condition	Percentage of national species pool	Related BAT rarity score
F002	rich flower resource	38	fav	16	
F112	open short sward	21	fav	11	160
F001	scrub edge	15	fav	8	
F111	bare sand & chalk	8		2	160
A212	bark & sapwood decay	7		1	
A211	heartwood decay	1		1	
F003	scrub-heath & moorland	1		0	

BAT code	BAT name	Representation (1-100)	Rarity score	Condition	BAT species richness	IEC
F2	grassland & scrub matrix	33	128		164	
F1	unshaded early successional mosaic	18	160	fav	86	
A1	arboreal canopy	10	154		51	
W2	mineral marsh & open water	3			15	
W3	permanent wet mire	2			11	
A2	wood decay	2			9	1
F3	shaded field & ground layer	1			7	

Fig 6 – ISIS analysis of records from 2016 plus aculeate hymenoptera and mollusca records since 1996.

Pantheon shows that the majority of species found with a conservation status as listed in Fig 3 were from open habitats with tall sward and scrub, and short sward and bare ground areas (see Fig 7). The key figures here are the “% rep” (4th column along) which will replace the ISIS BAT figure in invertebrate assessments over the next few years once a benchmarking process has taken place.

Broad biotope	Specific biotope	Count	% rep	No of species with a Conservation status
open habitats	tall sward & scrub	89	3	7
open habitats	short sward & bare ground	26	1	7
tree-associated	arboreal	12	<1	0
tree-associated	Shaded woodland floor	8	<1	1
wetland	peatland	4	<1	1
wetland	running water	2	<1	0
tree-associated	decaying wood	2	<1	1
wetland	marshland	1	<1	0

Fig 7 – Biotopes and their importance for species with a conservation status at the site

Generally the higher the % rep figure the better the assemblage within that habitat.

Pantheon displays the species list in terms of their ecological guilds (Fig 8) which shows that a high percentage of invertebrates recorded at the site are nectivores (flower feeders) or herbivores (plant feeders as adults and herbivores and predators (feeding upon other invertebrates) as larvae. Saprophagous and phytosaprophagous species are those that feed upon decaying organic matter and decaying plant matter respectively. Coprophagous species (just one recorded in this survey) feed upon dung.

Stage	Ecological Guild	Count	% return
adult	nectivore	48	29
adult	herbivore	47	29
adult	predator	29	17
adult	saprophagous	9	5
adult	phytosaprophagous	5	3
adult	does not feed	3	1
larva	herbivore	81	50
larva	predator	37	22
larva	saprophagous	11	6
larva	parasitoid	8	4
larva	nectivore	4	2
larva	coprophagous	1	0

Fig 8 – Ecological Guilds of the species recorded during the 2016 survey

The ecological guild information shows the flower resource is very important at the site and gives another supporting piece of evidence to the F002 SAT being adopted.

Chalk-hill Blue - Andrew Wood kindly supplied figures for Chalk-hill Blue transects from 2016, though unfortunately the usual transect walker (Alan Beale) was indisposed due to illness for much of the year and so figures are incomplete (Fig 9). Fig 10 illustrates annual transect records from 2007 to 2016 and shows the variability of the population in response to annual climatic conditions and to improved site management in recent years.

Chalk-hill Blue requires access to vigorous growth of Horseshoe Vetch *Hippocrepis comosa* which is the only larval foodplant for the butterfly. This butterfly, in common with most other species of “blue” are associated with ant species, in this case *Lasius flavus* Yellow Meadow Ant, which are attracted to secretions from the butterfly pupae which in turn offer some protection from

predators. The species prefers a short, sparse vegetation, with patches of bare disturbed chalk soils.

Transect Name / Week	14	15	16	17	18	19	20	21	Total
Base of Church Hill	0	24	103	n/w	n/w	n/w	n/w	n/w	127
Church Hill	n/w	14	141	n/w	n/w	n/w	76	n/w	231
Lankester Hill	n/w	0	0	8	n/w	n/w	2	n/w	10
Top of Rifle Range	n/w	6	58	95	n/w	n/w	n/w	n/w	159
Rifle Range	n/w	11	55	78	n/w	n/w	n/w	1	145
Total 672									

Fig 9 – Chalk-hill Blue transect results 2016

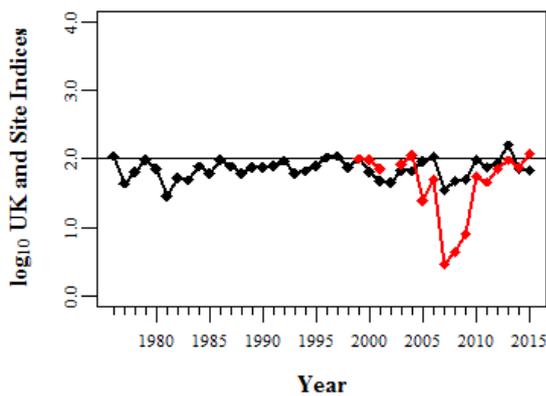
Date	Church Hill	Base of Church Hill	Rifle Range	Top of Rifle Range	Lankester Hill	Total	Notes
2016	231	127	145	159	10	672	Poorly recorded in 2016 so fall is probably real but is not at the level the raw figures show
2015	667	696	410	544	188	2505	
2014	480	463	860	2187	97	4087	
2013	550	441	1759	3572	300	6622	This was a huge year at all sites, leading to dispersion across the county
2012	480	274	659	1386	97	2896	
2011	269	110	396	1098	152	2025	
2010	343	82	365	781	129	1700	
2009	42	22	151	157	28	400	
2008	27	16	45	116	11	215	
2007	14	12	35	184	20	265	

Fig 10 – Annual transect counts of the Chalk-hill Blue at Therfield Heath 2007-2016

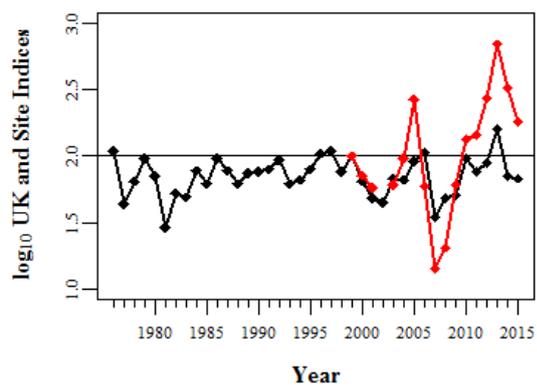
Although Fig 10 shows a large decline during 2016, the aforementioned lack of missing peak transect weeks over-emphasize this but it is likely that the figure would have been somewhere around the 1500 mark if mean assumptions are used to fill in the gaps missed.

Certainly from our observations in late July at Church Hill there were more Chalk-hill Blue butterflies than could readily be counted flying in the sunshine, which is something of a rare sight anywhere these days I suspect.

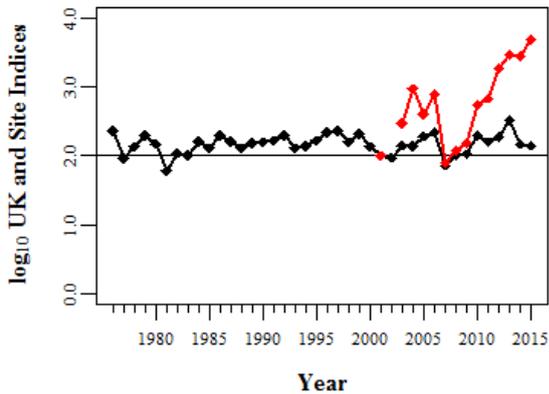
The UK Butterfly Monitoring Scheme (UK BMS) provides long term data of transect counts and each of the Therfield transects are illustrated (Figs 11). The individual transect trend is shown (in red) against the UK trend (black) and a judgement is made (by UK BMS) as to whether the population is declining, stable, or increasing. The transects for Church Hill and Rifle Range are noted as stable and those for the Base of Church Hill, Lankester Hill and Top of Rifle Range are noted as increasing.



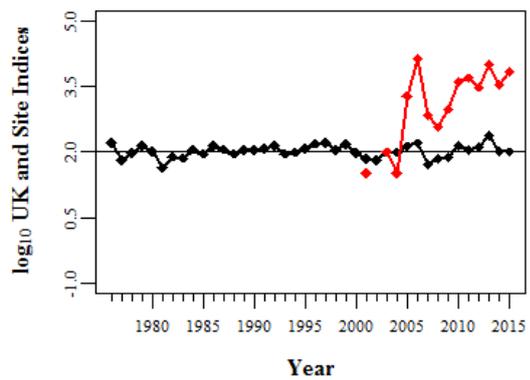
Therfield Heath – Church Hill



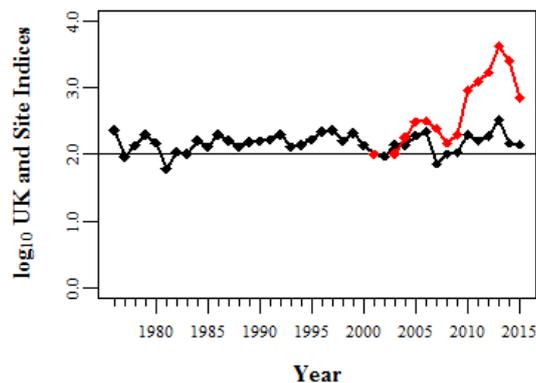
Therfield Hill – Rifle Range



Therfield Heath – Base of Church Hill



Therfield Heath – Lankester Hill



Therfield Hill – Top of Rifle Range

Fig 11 – UK BMS trend figures for the Chalk-hill Blue transects at Therfield

This is very encouraging and illustrates that habitat management for the butterfly is working well.

All records made during this survey were added onto iRecord where they are freely available to access by County Recorders, Recording Schemes as well as members of the public via the NBN Gateway.

Summary and recommendations: Work carried out during 2016 has shown the importance of Therfield Heath for its invertebrate fauna.

A desktop analysis of historical data during the spring of 2016 showed the mosaic of grassland and scrub to be an important feature and that some scrub (between 5% and 10%) should be retained at the site, though as an edge feature.

Survey work during the summer of 2016 found the grassland to be in favourable condition at the F1 BAT level. Further additional records of hymenoptera and molluscs recorded at the site over the period 1996-2016 enabled the F112 SAT target to be reached and additional SATs representing rich flower resource (F002) and scrub edge (F001) were shown to be in favourable condition, with recommendations that these should be adopted into the FCT.

The F111 SAT threshold for bare sand and chalk was not reached, which is probably due to the dominance of taller swards and lack of bare ground. It is recommended this assemblage is replaced with F001 and F002.

Several significant records including a number of new species to Hertfordshire (VC20) were recorded.

The Chalk-hill Blue monitoring carried out by Butterfly Conservation was summarised and trends that illustrate the population to be stable on two transects and increasing on three transects were shown.

References:

Fox, R., Parsons, M.S., Chapman, J.W., Woiod, I.P., Warren, M.S. & Brooks, D.R. (2013) The State of Britain's Larger Moths 2013. Butterfly Conservation and Rothamsted Research, Wareham, Dorset, UK.

Shirt, D.B. 1987. British Red Data Books: 2 Insects. Nature Conservancy Council, Peterborough. 362 Red Data Books:

Stubbs, A.E. & Drake, M. 2001. British Soldierflies and their allies. BENHS, Dinton Pastures Country Park.

Websites

British Bugs. www.britishbugs.org.uk

Butterfly Conservation – www.butterfly-conservation.org

BWARS – www.bwars.org

IUCN Red list - <http://www.iucnredlist.org>

Acknowledgements: Many thanks to Sonja Kaupe for accompanying me at the site, supplying historical data, and liaising with the site managers and the Butterfly Conservation transect recorders. Thanks to Vicky Gilson for helping with fieldwork, and Mark Gurney for weevil identification. Thanks to Ian Cheeseborough for identifying the aculeate hymenoptera, Keith Fowler for the hemiptera and Nigel Cane-Honeysett for the spiders and harvestman. Thanks to Andrew Woods for supplying Butterfly Conservation transect counts and lists.

Appendix

Appendix I – 2016 records

Species	Taxon group	Grid ref	Date
<i>Adelphocoris lineolatus</i>	insect - true bug (Hemiptera)	TL332396	15/08/2016
<i>Aelia acuminata</i>	insect - true bug (Hemiptera)	TL348400	15/08/2016
<i>Aelia acuminata</i>	insect - true bug (Hemiptera)	TL33233961	27/07/2016
<i>Agapeta zoegana</i>	insect - moth	TL348400	15/08/2016
<i>Agelena labyrinthica</i>	spider (Araneae)	TL348400	14/07/2016
<i>Aglais urticae</i>	insect - butterfly	TL348400	15/08/2016
<i>Aglais urticae</i>	insect - butterfly	TL33233961	14/07/2016
<i>Aglais urticae</i>	insect - butterfly	TL336402	14/07/2016
<i>Amphimallon solstitiale</i>	insect - beetle (Coleoptera)	TL332396	27/07/2016
<i>Anthocoris nemorum</i>	insect - true bug (Hemiptera)	TL332396	14/07/2016
<i>Anthonomus pedicularius</i>	insect - beetle (Coleoptera)	TL340402	14/07/2016
<i>Aphantopus hyperantus</i>	insect - butterfly	TL33233961	12/07/2016
<i>Aphrodes makarovi</i>	insect - true bug (Hemiptera)	TL332396	14/07/2016
<i>Aphrophora alni</i>	insect - true bug (Hemiptera)	TL348400	15/08/2016
<i>Aphrophora alni</i>	insect - true bug (Hemiptera)	TL33233961	27/07/2016
<i>Aporus unicolor</i>	insect - hymenopteran	TL337401	27/07/2016
<i>Arachnospila minutula</i>	insect - hymenopteran	TL337401	27/07/2016
<i>Araneus diadematus</i>	spider (Araneae)	TL33233961	27/07/2016
<i>Araneus quadratus</i>	spider (Araneae)	TL348400	15/08/2016
<i>Araniella opisthographa</i>	spider (Araneae)	TL348400	14/07/2016
<i>Argynnis aglaja</i>	insect - butterfly	TL33233961	14/07/2016
<i>Argynnis aglaja</i>	insect - butterfly	TL33233961	27/07/2016
<i>Argynnis aglaja</i>	insect - butterfly	TL336402	14/07/2016
<i>Aricia agestis</i>	insect - butterfly	TL348400	15/08/2016
<i>Arion ater</i>	mollusc	TL33233961	27/07/2016
<i>Armadillidium vulgare</i>	crustacean	TL340402	14/07/2016
<i>Athous haemorrhoidalis</i>	insect - beetle (Coleoptera)	TL340402	14/07/2016
<i>Autographa gamma</i>	insect - moth	TL348400	15/08/2016
<i>Autographa gamma</i>	insect - moth	TL33233961	27/07/2016
<i>Bombus lapidarius</i>	insect - hymenopteran	TL33233961	27/07/2016
<i>Bombus lapidarius</i>	insect - hymenopteran	TL336402	14/07/2016

<i>Bombus pascuorum</i>	insect - hymenopteran	TL33233961	27/07/2016
<i>Calocoris roseomaculatus</i>	insect - true bug (Hemiptera)	TL332396	15/08/2016
<i>Camptogramma bilineata</i>	insect - moth	TL33233961	12/07/2016
<i>Camptogramma bilineata</i>	insect - moth	TL33233961	27/07/2016
<i>Capsus ater</i>	insect - true bug (Hemiptera)	TL340402	14/07/2016
<i>Cassida flaveola</i>	insect - beetle (Coleoptera)	TL332396	15/08/2016
<i>Cassida vibex</i>	insect - beetle (Coleoptera)	TL332396	15/08/2016
<i>Cerceris quinquefasciata</i>	insect - hymenopteran	TL337401	27/07/2016
<i>Chelifera preclatoria</i>	insect - true fly (Diptera)	TL332396	27/07/2016
<i>Chloromyia formosa</i>	insect - true fly (Diptera)	TL33233961	14/07/2016
<i>Chloromyia formosa</i>	insect - true fly (Diptera)	TL33233961	12/07/2016
<i>Chorthippus brunneus</i>	insect - orthopteran	TL340402	14/07/2016
<i>Coccinella septempunctata</i>	insect - beetle (Coleoptera)	TL348400	15/08/2016
<i>Coccinella septempunctata</i>	insect - beetle (Coleoptera)	TL33233961	14/07/2016
<i>Coccinella septempunctata</i>	insect - beetle (Coleoptera)	TL336402	14/07/2016
<i>Coenonympha pamphilus</i>	insect - butterfly	TL348400	15/08/2016
<i>Coenonympha pamphilus</i>	insect - butterfly	TL33233961	27/07/2016
<i>Coremacera marginata</i>	insect - true fly (Diptera)	TL332396	27/07/2016
<i>Coremacera marginata</i>	insect - true fly (Diptera)	TL340402	14/07/2016
<i>Corizus hyoscyami</i>	insect - true bug (Hemiptera)	TL348400	15/08/2016
<i>Cornu aspersum</i>	mollusc	TL33233961	12/07/2016
<i>Cryptocephalus fulvus</i>	insect - beetle (Coleoptera)	TL332396	15/08/2016
<i>Cryptocephalus fulvus</i>	insect - beetle (Coleoptera)	TL332396	27/07/2016
<i>Deraeocoris flavilinea</i>	insect - true bug (Hemiptera)	TL332396	27/07/2016
<i>Deraeocoris flavilinea</i>	insect - true bug (Hemiptera)	TL332396	14/07/2016
<i>Dicranopalpus ramosus</i>	harvestman (Opiliones)	TL348400	15/08/2016
<i>Dilophus febrilis</i>	insect - true fly (Diptera)	TL332396	15/08/2016
<i>Dorytomus taeniatus</i>	insect - beetle (Coleoptera)	TL340402	14/07/2016
<i>Drymus latus</i>	insect - true bug (Hemiptera)	TL332396	15/08/2016
<i>Enoplognatha latimana</i>	spider (Araneae)	TL348400	14/07/2016
<i>Enoplognatha ovata ss</i>	spider (Araneae)	TL348400	15/08/2016
<i>Enoplognatha ovata ss</i>	spider (Araneae)	TL348400	14/07/2016
<i>Episyrphus balteatus</i>	insect - true fly (Diptera)	TL33233961	14/07/2016
<i>Episyrphus balteatus</i>	insect - true fly (Diptera)	TL33233961	12/07/2016
<i>Episyrphus balteatus</i>	insect - true fly (Diptera)	TL33233961	27/07/2016

<i>Episyrphus balteatus</i>	insect - true fly (Diptera)	TL336402	14/07/2016
<i>Eremobia ochroleuca</i>	insect - moth	TL33233961	27/07/2016
<i>Eristalis pertinax</i>	insect - true fly (Diptera)	TL33233961	27/07/2016
<i>Eristalis tenax</i>	insect - true fly (Diptera)	TL33233961	27/07/2016
<i>Euproctis chrysorrhoea</i>	insect - moth	TL33233961	27/07/2016
<i>Eurithia anthophila</i>	insect - true fly (Diptera)	TL340402	14/07/2016
<i>Eurygaster testudinaria</i>	insect - true bug (Hemiptera)	TL332396	27/07/2016
<i>Forficula auricularia</i>	insect - earwig (Dermaptera)	TL33233961	12/07/2016
<i>Forficula auricularia</i>	insect - earwig (Dermaptera)	TL33233961	27/07/2016
<i>Gonepteryx rhamni</i>	insect - butterfly	TL348400	15/08/2016
<i>Gonepteryx rhamni</i>	insect - butterfly	TL33233961	27/07/2016
<i>Harmonia axyridis</i>	insect - beetle (Coleoptera)	TL348400	15/08/2016
<i>Harmonia axyridis</i>	insect - beetle (Coleoptera)	TL33233961	12/07/2016
<i>Hedychrum niemelai</i>	insect - hymenopteran	TL348400	27/07/2016
<i>Helicella itala</i>	mollusc	TL340402	14/07/2016
<i>Helina evecta</i>	insect - true fly (Diptera)	TL340402	14/07/2016
<i>Herina lugubris</i>	insect - true fly (Diptera)	TL332396	27/07/2016
<i>Heterotoma planicornis</i>	insect - true bug (Hemiptera)	TL332396	15/08/2016
<i>Heterotoma planicornis</i>	insect - true bug (Hemiptera)	TL340402	14/07/2016
<i>Hippodamia variegata</i>	insect - beetle (Coleoptera)	TL33233961	14/07/2016
<i>Hippodamia variegata</i>	insect - beetle (Coleoptera)	TL336402	14/07/2016
<i>Holotrichapion ononis</i>	insect - beetle (Coleoptera)	TL340402	14/07/2016
<i>Hoplitis spinulosa</i>	insect - hymenopteran	TL337401	27/07/2016
<i>Hyledelphax elegantula</i>	insect - true bug (Hemiptera)	TL332396	14/07/2016
<i>Javesella pellucida</i>	insect - true bug (Hemiptera)	TL332396	14/07/2016
<i>Lagria hirta</i>	insect - beetle (Coleoptera)	TL33233961	12/07/2016
<i>Lagria hirta</i>	insect - beetle (Coleoptera)	TL33233961	27/07/2016
<i>Lasioglossum morio</i>	insect - hymenopteran	TL337401	27/07/2016
<i>Leptarthrus brevirostris</i>	insect - true fly (Diptera)	TL340402	14/07/2016
<i>Leptarthrus vitripennis</i>	insect - true fly (Diptera)	TL332396	27/07/2016
<i>Leptogaster cylindrica</i>	insect - true fly (Diptera)	TL340402	14/07/2016
<i>Leptophyes punctatissima</i>	insect - orthopteran	TL340402	14/07/2016
<i>Leptopterna dolabrata</i>	insect - true bug (Hemiptera)	TL340402	14/07/2016
<i>Leptopterna ferrugata</i>	insect - true bug	TL340402	14/07/2016

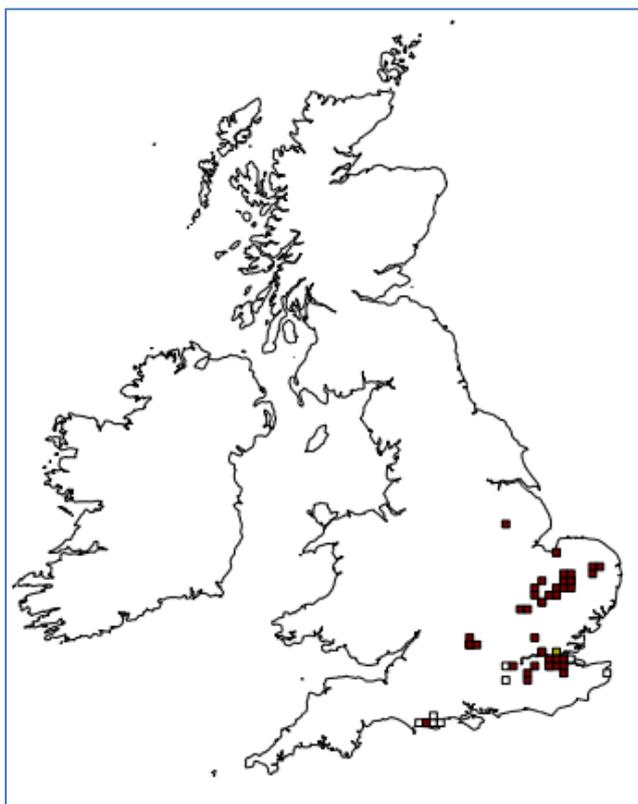
	(Hemiptera)		
<i>Limnia paludicola</i>	insect - true fly (Diptera)	TL332396	15/08/2016
<i>Limnia unguicornis</i>	insect - true fly (Diptera)	TL332396	27/07/2016
<i>Limnia unguicornis</i>	insect - true fly (Diptera)	TL340402	14/07/2016
<i>Lindenius albilabris</i>	insect - hymenopteran	TL337401	27/07/2016
<i>Machimus atricapillus</i>	insect - true fly (Diptera)	TL340402	14/07/2016
<i>Malachius bipustulatus</i>	insect - beetle (Coleoptera)	TL340402	14/07/2016
<i>Maniola jurtina</i>	insect - butterfly	TL33233961	14/07/2016
<i>Maniola jurtina</i>	insect - butterfly	TL33233961	12/07/2016
<i>Maniola jurtina</i>	insect - butterfly	TL33233961	27/07/2016
<i>Maniola jurtina</i>	insect - butterfly	TL336402	14/07/2016
<i>Marasmarcha lunaedactyla</i>	insect - moth	TL33233961	12/07/2016
<i>Mecinus pascuorum</i>	insect - beetle (Coleoptera)	TL340402	14/07/2016
<i>Meconema thalassinum</i>	insect - orthopteran	TL33233961	12/07/2016
<i>Medetera truncorum</i>	insect - true fly (Diptera)	TL332396	27/07/2016
<i>Megophthalmus scanicus</i>	insect - true bug (Hemiptera)	TL332396	15/08/2016
<i>Meiosimyza decempunctata</i>	insect - true fly (Diptera)	TL332396	15/08/2016
<i>Melanargia galathea</i>	insect - butterfly	TL33233961	14/07/2016
<i>Melanargia galathea</i>	insect - butterfly	TL33233961	12/07/2016
<i>Melanargia galathea</i>	insect - butterfly	TL33233961	27/07/2016
<i>Melanargia galathea</i>	insect - butterfly	TL336402	14/07/2016
<i>Melanostoma scalare</i>	insect - true fly (Diptera)	TL348400	15/08/2016
<i>Melanostoma scalare</i>	insect - true fly (Diptera)	TL332396	15/08/2016
<i>Melanostoma scalare</i>	insect - true fly (Diptera)	TL332396	27/07/2016
<i>Melanostoma scalare</i>	insect - true fly (Diptera)	TL340402	14/07/2016
<i>Meromyza femorata</i>	insect - true fly (Diptera)	TL332396	27/07/2016
<i>Meromyza femorata</i>	insect - true fly (Diptera)	TL340402	14/07/2016
<i>Metrioptera roeselii</i>	insect - orthopteran	TL340402	14/07/2016
<i>Microlestes maurus</i>	insect - beetle (Coleoptera)	TL340402	14/07/2016
<i>Minettia fasciata</i>	insect - true fly (Diptera)	TL340402	14/07/2016
<i>Mocydia crocea</i>	insect - true bug (Hemiptera)	TL332396	27/07/2016
<i>Monacha cantiana</i>	mollusc	TL340402	14/07/2016
<i>Nabis flavomarginatus</i>	insect - true bug (Hemiptera)	TL332396	15/08/2016
<i>Nabis limbatus</i>	insect - true bug (Hemiptera)	TL332396	15/08/2016
<i>Neocoenorrhinus aequatus</i>	insect - beetle (Coleoptera)	TL340402	14/07/2016
<i>Neophilaenus lineatus</i>	insect - true bug (Hemiptera)	TL332396	15/08/2016
<i>Neophilaenus lineatus</i>	insect - true bug (Hemiptera)	TL332396	14/07/2016

<i>Neoscona adianta</i>	spider (Araneae)	TL348400	14/07/2016
<i>Neottiglossa pusilla</i>	insect - true bug (Hemiptera)	TL332396	27/07/2016
<i>Neottiglossa pusilla</i>	insect - true bug (Hemiptera)	TL340402	14/07/2016
<i>Nephrotoma flavescens</i>	insect - true fly (Diptera)	TL332396	27/07/2016
<i>Notiophilus biguttatus</i>	insect - beetle (Coleoptera)	TL332396	15/08/2016
<i>Oedemera nobilis</i>	insect - beetle (Coleoptera)	TL332396	27/07/2016
<i>Oedemera nobilis</i>	insect - beetle (Coleoptera)	TL340402	14/07/2016
<i>Oligolophus tridens</i>	harvestman (Opiliones)	TL348400	14/07/2016
<i>Oncopsis flavicollis</i>	insect - true bug (Hemiptera)	TL332396	27/07/2016
<i>Oncopsis subangulata</i>	insect - true bug (Hemiptera)	TL332396	14/07/2016
<i>Oncopsis subangulata</i>	insect - true bug (Hemiptera)	TL332396	27/07/2016
<i>Oncotylus viridiflavus</i>	insect - true bug (Hemiptera)	TL332396	15/08/2016
<i>Opilio canestrinii</i>	harvestman (Opiliones)	TL348400	14/07/2016
<i>Opomyza germinationis</i>	insect - true fly (Diptera)	TL340402	14/07/2016
<i>Orthops kalmii</i>	insect - true bug (Hemiptera)	TL332396	27/07/2016
<i>Orthops kalmii</i>	insect - true bug (Hemiptera)	TL332396	15/08/2016
<i>Oulema melanopus</i>	insect - beetle (Coleoptera)	TL348400	15/08/2016
<i>Pachygaster leachii</i>	insect - true fly (Diptera)	TL332396	27/07/2016
<i>Pachygaster leachii</i>	insect - true fly (Diptera)	TL340402	14/07/2016
<i>Palomena prasina</i>	insect - true bug (Hemiptera)	TL33233961	27/07/2016
<i>Paradromius linearis</i>	insect - beetle (Coleoptera)	TL340402	14/07/2016
<i>Pentatoma rufipes</i>	insect - true bug (Hemiptera)	TL33233961	12/07/2016
<i>Phalangium opilio</i>	harvestman (Opiliones)	TL348400	14/07/2016
<i>Pherbellia griseola</i>	insect - true fly (Diptera)	TL332396	27/07/2016
<i>Pherbellia griseola</i>	insect - true fly (Diptera)	TL340402	14/07/2016
<i>Philaenus spumarius</i>	insect - true bug (Hemiptera)	TL348400	15/08/2016
<i>Philaenus spumarius</i>	insect - true bug (Hemiptera)	TL332396	27/07/2016
<i>Philaenus spumarius</i>	insect - true bug (Hemiptera)	TL340402	14/07/2016
<i>Philodromus cespitum</i>	spider (Araneae)	TL348400	14/07/2016
<i>Phyllobius virideaeris</i>	insect - beetle (Coleoptera)	TL332396	15/08/2016
<i>Phyllobius viridicollis</i>	insect - beetle (Coleoptera)	TL340402	14/07/2016

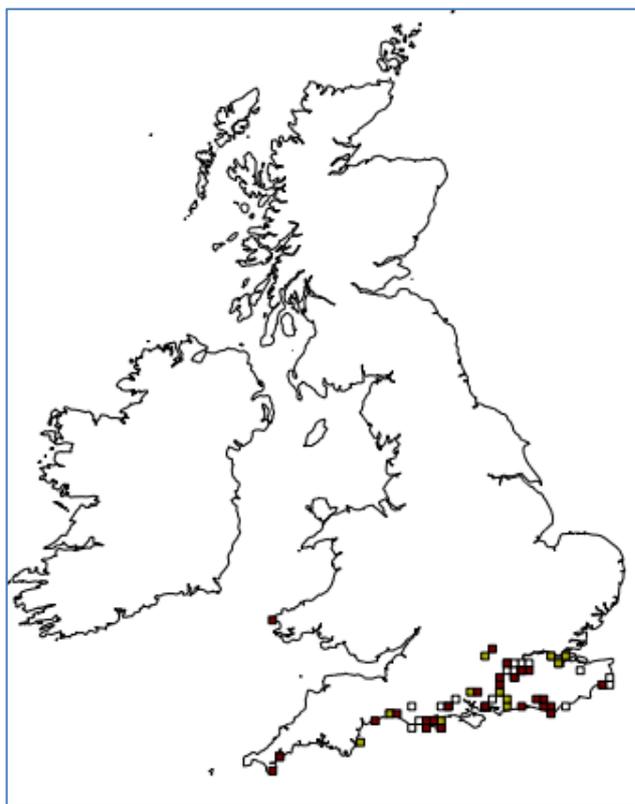
<i>Phytocoris varipes</i>	insect - true bug (Hemiptera)	TL332396	14/07/2016
<i>Pieris brassicae</i>	insect - butterfly	TL33233961	12/07/2016
<i>Pieris brassicae</i>	insect - butterfly	TL33233961	27/07/2016
<i>Pieris napi</i>	insect - butterfly	TL348400	15/08/2016
<i>Pieris rapae</i>	insect - butterfly	TL33233961	27/07/2016
<i>Plagiognathus chrysanthemi</i>	insect - true bug (Hemiptera)	TL332396	14/07/2016
<i>Platybunus triangularis</i>	harvestman (Opiliones)	TL348400	14/07/2016
<i>Polygonia c-album</i>	insect - butterfly	TL33233961	27/07/2016
<i>Polyommatus coridon</i>	insect - butterfly	TL348400	15/08/2016
<i>Polyommatus coridon</i>	insect - butterfly	TL33233961	12/07/2016
<i>Polyommatus coridon</i>	insect - butterfly	TL33233961	27/07/2016
<i>Polyommatus coridon</i>	insect - butterfly	TL336402	14/07/2016
<i>Polyommatus icarus</i>	insect - butterfly	TL348400	15/08/2016
<i>Propylea quattuordecimpunctata</i>	insect - beetle (Coleoptera)	TL33233961	27/07/2016
<i>Propylea quattuordecimpunctata</i>	insect - beetle (Coleoptera)	TL340402	14/07/2016
<i>Psyllobora vigintiduopunctata</i>	insect - beetle (Coleoptera)	TL33233961	12/07/2016
<i>Pterostichus madidus</i>	insect - beetle (Coleoptera)	TL332396	15/08/2016
<i>Pyrausta nigrata</i>	insect - moth	TL33233961	27/07/2016
<i>Pyronia tithonus</i>	insect - butterfly	TL33233961	14/07/2016
<i>Pyronia tithonus</i>	insect - butterfly	TL33233961	27/07/2016
<i>Pyronia tithonus</i>	insect - butterfly	TL336402	14/07/2016
<i>Rhagonycha fulva</i>	insect - beetle (Coleoptera)	TL33233961	27/07/2016
<i>Rhopalopyx adumbrata</i>	insect - true bug (Hemiptera)	TL332396	14/07/2016
<i>Sapromyza zetterstedti</i>	insect - true fly (Diptera)	TL332396	27/07/2016
<i>Scathophaga stercoraria</i>	insect - true fly (Diptera)	TL33233961	12/07/2016
<i>Scotopteryx chenopodiata</i>	insect - moth	TL348400	15/08/2016
<i>Scotopteryx chenopodiata</i>	insect - moth	TL33233961	27/07/2016
<i>Selimus vittatus</i>	spider (Araneae)	TL348400	14/07/2016
<i>Sepsis punctum</i>	insect - true fly (Diptera)	TL332396	15/08/2016
<i>Sermylassa halensis</i>	insect - beetle (Coleoptera)	TL332396	15/08/2016
<i>Sitona lineatus</i>	insect - beetle (Coleoptera)	TL332396	15/08/2016
<i>Sitona lineatus</i>	insect - beetle (Coleoptera)	TL340402	14/07/2016
<i>Sphaerophoria scripta</i>	insect - true fly (Diptera)	TL33233961	14/07/2016
<i>Sphaerophoria scripta</i>	insect - true fly (Diptera)	TL336402	14/07/2016
<i>Sphaerophoria scripta</i>	insect - true fly (Diptera)	TL332396	27/07/2016
<i>Stenodema laevigata</i>	insect - true bug (Hemiptera)	TL332396	27/07/2016

<i>Stenotus binotatus</i>	insect - true bug (Hemiptera)	TL332396	15/08/2016
<i>Stenotus binotatus</i>	insect - true bug (Hemiptera)	TL340402	14/07/2016
<i>Subcoccinella vigintiquattuor punctata</i>	insect - beetle (Coleoptera)	TL348400	15/08/2016
<i>Subcoccinella vigintiquattuor punctata</i>	insect - beetle (Coleoptera)	TL33233961	12/07/2016
<i>Subcoccinella vigintiquattuor punctata</i>	insect - beetle (Coleoptera)	TL33233961	27/07/2016
<i>Subcoccinella vigintiquattuor punctata</i>	insect - beetle (Coleoptera)	TL332396	27/07/2016
<i>Subcoccinella vigintiquattuor punctata</i>	insect - beetle (Coleoptera)	TL340402	14/07/2016
<i>Syrphus ribesii</i>	insect - true fly (Diptera)	TL340402	14/07/2016
<i>Tephritis neesii</i>	insect - true fly (Diptera)	TL332396	27/07/2016
<i>Terellia colon</i>	insect - true fly (Diptera)	TL332396	15/08/2016
<i>Thereva nobilitata</i>	insect - true fly (Diptera)	TL332396	27/07/2016
<i>Thymelicus lineola</i>	insect - butterfly	TL340402	14/07/2016
<i>Thymelicus sylvestris</i>	insect - butterfly	TL33233961	12/07/2016
<i>Trichohermes walkeri</i>	insect - true bug (Hemiptera)	TL332396	15/08/2016
<i>Tritomegas bicolor</i>	insect - true bug (Hemiptera)	TL332396	27/07/2016
<i>Trochulus striolatus</i>	mollusc	TL340402	14/07/2016
<i>Tytthaspis sedecimpunctata</i>	insect - beetle (Coleoptera)	TL340402	14/07/2016
<i>Urophora jaceana</i>	insect - true fly (Diptera)	TL332396	15/08/2016
<i>Urophora jaceana</i>	insect - true fly (Diptera)	TL340402	14/07/2016
<i>Vanessa atalanta</i>	insect - butterfly	TL348400	15/08/2016
<i>Vespula vulgaris</i>	insect - hymenopteran	TL33233961	27/07/2016
<i>Volucella bombylans</i>	insect - true fly (Diptera)	TL33233961	14/07/2016
<i>Volucella bombylans</i>	insect - true fly (Diptera)	TL336402	14/07/2016
<i>Zabrachia tenella</i>	insect - true fly (Diptera)	TL332396	27/07/2016
<i>Zygiella x-notata</i>	spider (Araneae)	TL348400	14/07/2016

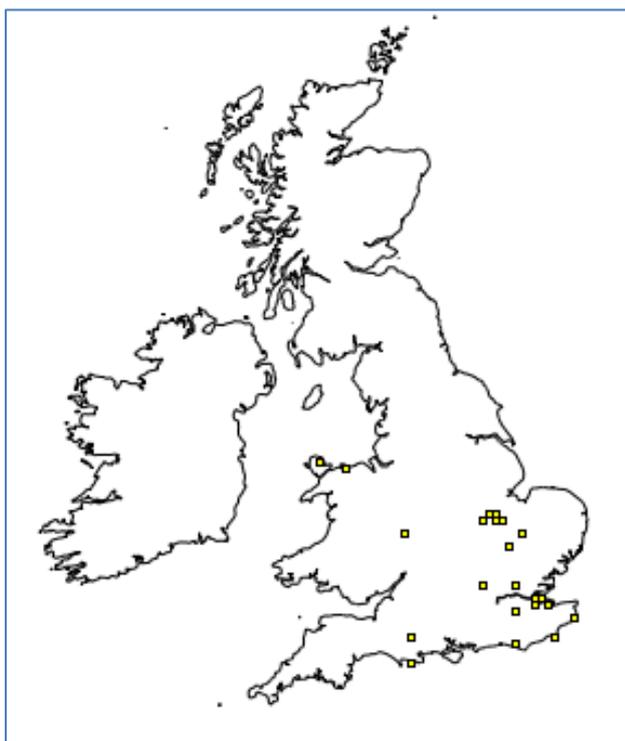
Appendix II – distribution maps of selected rare species (NBN Gateway)



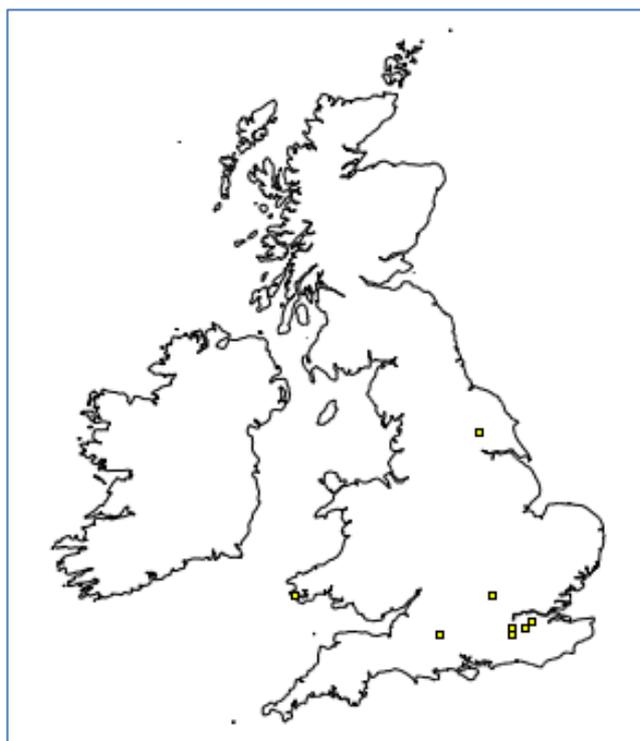
Cerceris quinquefasciata



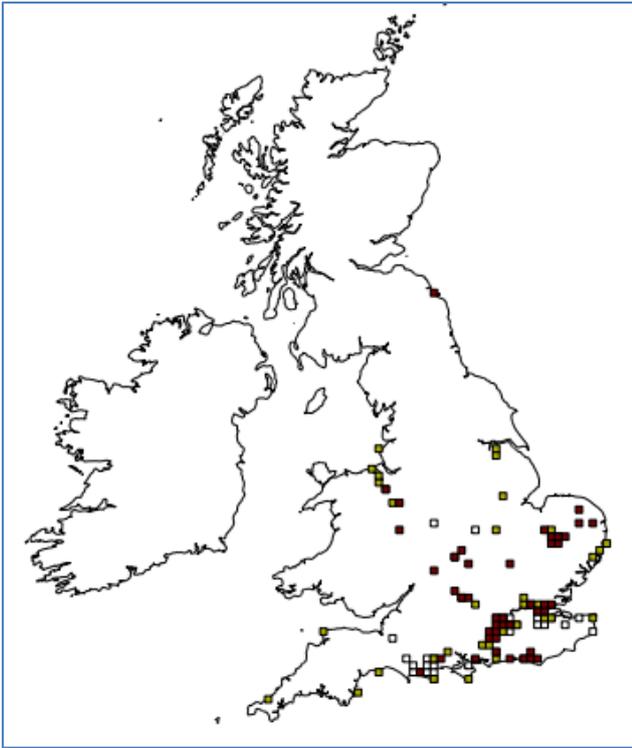
Aporus unicolor



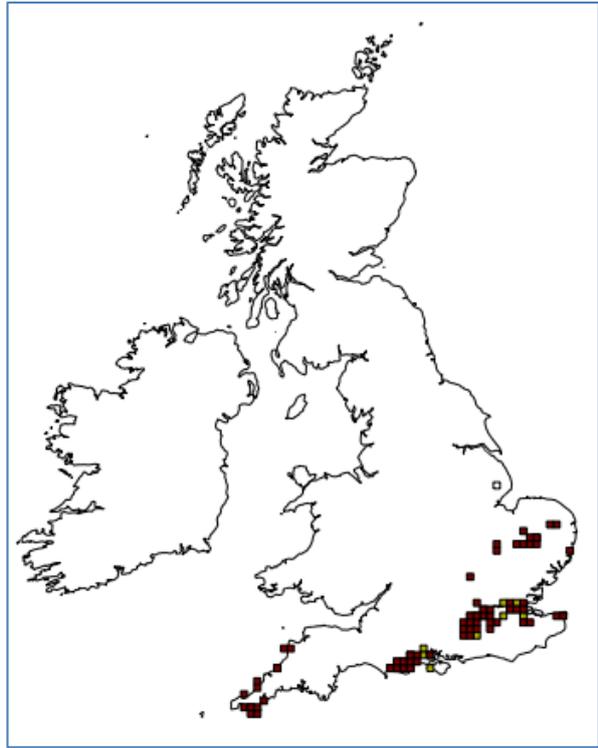
Drymus latus



Leptarthrus vitripennis



Arachnospila minutula



Hedychrum niemelai