Commissioned by
FPCR
Environment & Design
Addlepool Business Centre
Clyst St George
Exeter
EX3 0NR

PANSHANGER AIRFIELD HERTFORDSHIRE

INVERTEBRATE SURVEY

REPORT

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Prepared by

Colin Plant Associates (UK)
Consultant Entomologists
14 West Road
Bishops Stortford
Hertfordshire
CM23 3QP

01279-507697
cpauk1@ntlworld.com

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Field survey for this project has been undertaken by

Marcel Ashby
Tristan Bantock
Colin W. Plant

Identification of samples has been undertaken by many parties, prominent amongst which are

Marcel Ashby
Tristan Bantock
Norman F. Hall*
Edward Milner*
Colin W. Plant
Derek ("Del") Smith*

*denotes an external expert.

1 INTRODUCTION

1.1 Introductory comments

1.1.1 **Colin Plant Associates (UK)** were commissioned by **FPCR** to undertake a survey of invertebrate species at Panshanger Airfield, Hertfordshire ("the site") during 2014.

1.1.2 The site lies on the eastern edge of Welwyn Garden City on a plateau of sands and gravels of the Thanet & Lambeth Group. To the north, the ground drops steeply downwards into the valley of the River Mimram, cutting through a thin lens of Upper Chalk at the lower slopes, beyond the site boundary.

1.1.3 The plateau has been in use as an airfield since at least as long ago as World War II when it famously hosted "cardboard" aircraft in a bid to convince Nazi Germany that the RAF had a significantly greater number of planes than in reality. At that date it occupied a significantly larger area of the plateau, especially to the south where residential properties are now present.

1.1.4 In terms of land use history, therefore, the airfield has been covered by managed grassland for at least the last seventy years and this improved grassland habitat forms the bulk of the area surveyed for terrestrial invertebrates in 2014. However, the northern area of the airfield is currently dominated by scrub woodland which forms a physical boundary along the northern edge of the plateau; this is likely to reduce the flow of winds from northerly compass points across an otherwise level, open and entirely exposed site.

1.1.5 At the interface between grassland and scrub in this northern area there are a few less well-vegetated areas, including some former taxiways that are evidently surfaced with "tarmac". It is likely that several other areas here, where the vegetation is perceived, visibly to grow significantly lower than it does on the main site, hide a tarmac or similar substrate beneath the vegetation.

1.1.6 Areas of buildings and recently created hard-standing in the south, as well as some associated grassy areas subjected to regular mowing, are excluded from the 2014 survey.

1.2 Invertebrate sampling methodology

1.2.1 Site visits were made on a number of dates throughout the year 2014 as follows:

Date of visit	Main activity
13th May	daytime, active sampling
19th May – 20th May	overnight moth recording
30th May – 1st June	overnight moth recording
19th – 20th June	overnight moth recording
24th June	daytime, active sampling
15th – 16th July	overnight moth recording
23rd July	daytime, active sampling
19th August	daytime, active sampling; setting pitfalls traps
19th – 20th August	overnight moth recording
15th – 16th September	overnight moth recording
6th September	daytime, active sampling; collecting pitfall traps

1.2.2 Terrestrial invertebrate sampling was undertaken by direct observation and by the following active sampling methods:

- **Sweep-netting.** A stout hand-held net is moved vigorously through vegetation to dislodge resting insects. The technique may be used semi-quantitatively by timing the number of sweeps through vegetation of a similar type and counting selected groups of species.

- **Beating trees and bushes.** A cloth tray, held on a folding frame, is positioned below branches of trees or bushes and these are sharply tapped with a stick to dislodge insects. Black or white trays are used depending upon which group of invertebrates has been targetted for search. Insects are collected from the tray using a pooter – a mouth-operated suction device.

- **Suction Sampling** consists of using a converted leaf blower to collect samples from grass and other longer ground vegetation. The sample is then everted into a net bag and the invertebrates removed with a pooter. The advantage of suction sampling is that it catches species, which do not fly readily or which live in deep vegetation. It is particularly productive for Coleoptera, some Diptera and Arachnida.

1.2.3 In addition, we established a transect of pitfall traps across representative areas of grassland habitat.

- **Pitfall trapping.** Vending-machine cups or similar are placed in the ground with the rim flush with, or slightly below, the surface. A fluid is added, comprising super-saturated sodium chloride with a little detergent to reduce surface tension. Traps may be covered or uncovered and are typically left in position for a month at a time. Holes made in the sides of the cups a couple of centimetres below the rim permit flood or rain water to drain without the traps over-flowing and the catch becoming lost. Invertebrates simply fall into the traps.

1.2.4 We also undertook overnight moth surveys on several dates, as listed above, using both mercury vapour traps and actinic lamps.

MV light-trapping. Mercury-vapour (mv) light bulbs are used to attract nocturnal insects - especially moths. These bulbs emit ultra-violet light at a wavelength which causes moths to be attracted but the wavelength used is harmless to humans. The bulbs are mounted over catching chambers filled with cardboard egg-trays and moths entering the chambers settle on these trays and may be examined. Bulbs were powered from portable generators. Light trapping is the single most effective method of recording moths. It is also valuable for recording some other nocturnal insect groups.

Actinic light trapping. Small size actinic traps, operated from 12 volt burglar-alarm batteries were left running from early evening to the following morning. These units are discrete because, whilst still having an output in the safe zone of the UV range, their light output in the visible part of the spectrum is reduced; thus, they can be tucked away in undergrowth at the side of a track without passers-by noticing them. For the same reasons of light emission, they attract moths and other insects from a much shorter distance and so the resultant catch is usually more representative of the habitat selected, in comparison with that in mercury vapour traps which attract flying species from a much wider area of the countryside.

1.3 Survey constraints

1.3.1 Knowledge of any relevant constraints placed upon invertebrate survey work is crucial to the proper interpretation of data obtained

1.3.2 However, we enjoyed easy access to all areas the site and we were able to select dates with appropriate weather conditions. Accordingly, we are not aware of any limiting factors that would impact negatively upon this report.

2 RESULTS OF TERRESTRIAL INVERTEBRATE SAMPLING

2.1 Overview

2.1.1 A full list of all recorded invertebrate species is presented as Appendix 1. A total of 699 terrestrial species is listed.

2.1.2 The list is annotated with formal National Status codes where these are better than "nationally common"; these status codes are explained in Appendix 2.

2.1.3 The list is also annotated with the primary ecological associations of each species, where known. This allows species associated with differing primary habitat affinities to be immediately discerned.

2.2 Species of conservation interest

2.2.1 Several categories of invertebrates are of raised significance in an ecological assessment. These categories are explained in Appendix 2 and the corresponding species are now examined.

Legally Protected Species

2.2.2 No invertebrate species that are afforded direct legal protection under any UK or European criminal legislation were encountered during the survey; none are likely to have been overlooked at this site.

UK Biodiversity Action Plan (UK BAP) Priority Species/Section 41 Species

2.2.3 UK BAP priority species were those that were identified as being the most threatened and requiring conservation action under the UK Biodiversity Action Plan (UK BAP). The original list of UK BAP priority species was created between 1995 and 1999. In 2007, however, a revised list was produced, following a 2-year review of the priority species and habitats lists. Following the review, the list of UK BAP priority species increased from less than 600 to 1150. In total, 123 species no longer met the criteria for selection, and were therefore de-listed.

2.2.4 As a result of devolution, and new country-level and international drivers and requirements, much of the work previously carried out by the UK BAP is now focussed at a country-level rather than a UK-level, and the UK BAP has recently (July 2012) been succeeded by the *UK Post-2010 Biodiversity Framework*. The full list of priority invertebrate species can be viewed at *http://jncc.defra.gov.uk/page-5169*.

2.2.5 The UK list of priority species remains an important reference source and has been used to help draw up statutory lists of priorities in England, Scotland, Wales and Northern Ireland. For England and Wales these statutory lists are presented in *The Natural Environment & Rural Communities Act, 2006*: Section 41. *List of Species of Principal Importance for Conservation of Biological Diversity in England* and Section 42: *List of Species of Principal Importance for Conservation of Biological Diversity in Wales*.

2.2.6 One such *Species of Principal Importance* is recorded in the present survey:

The Small Heath Butterfly *Coenonympha pamphilus* is a grassland species that has declined in recent years and which is formally regarded as being "Near Threatened". It was added to the UK BAP list at the end of 2007 though there are disagreements over the need for this action, and has been automatically included in Section 41 of the NERC Act. It appears to have declined more at inland sites than it has in coastal areas, though it remains present throughout at lower density than before. The presence of large numbers, indicating a thriving population, at an inland site is potentially more important than a similar discovery in a coastal locality.

2.2.7 It is of relevance to the present survey report that the original list of UK Biodiversity Action Plan Priority Species *of moths* was divided into two sections. In the first, a total of 81 species are afforded the status of UK BAP Priority Species; none of these is recorded in the surveyed area nor is any likely to be present.

2.2.8 However, the second section is a list of 69 species that have declined in population strength by a significant amount in the past 25 years. These were defined as "not yet rare" and were flagged as UK BAP species "**for research only**". It is unfortunate that this list has been incorporated into the current priority listing process and that these species are now therefore of statutory interest. Some bodies now specifically recommend that these species are excluded from an appraisal of Section 41 and Section 42 species (see, for example, Gwent Wildlife Trust, 2009) and this is a view with which we fully agree.

2.2.9 At Panshanger Airfield we have recorded 23 such "Research Only" moth species. These are listed in tabular format together with their larval (caterpillar) foodplants below. The Hertfordshire status is based on Plant (2008) – see references – updated where necessary with unpublished data from the county database.

Species	English name	Caterpillar foodplant	Hertfordshire status
Acronicta psi	Grey Dagger	deciduous trees and bushes	widespread and common
Agrochola litura	Brown-spot Pinion	deciduous trees and shrubs and herbaceous plants (requires both)	widespread and common
Agrochola lychnidis	Beaded Chestnut	deciduous trees and shrubs and herbaceous plants (requires both)	local but common where found
Allophyes oxyacanthae	Green Brindled Crescent	rosaceous trees and shrubs	widespread and common
Amphipyra tragopoginis	Mouse Moth	deciduous trees and bushes	widespread and common
Apamea anceps	Large Nutmeg	grasses, especially *Poa annua* and *Dactylis glomerata*	widespread and common
Apamea remissa	Dusky Brocade	grasses	widespread and common
Callistege mi	Mother Shipton	coarse grasses, including reeds	local but common where found
Caradrina morpheus	Mottled Rustic	herbaceous plants	widespread and common
Diarsia rubi	Small Square-spot	herbaceous plants	recent declines have reversed, now widespread and common
Ennomos fuscantaria	Dusky Thorn	ash	potentially declining; potential threatened by Ash die-back disease
Hepialus humuli	Ghost Moth	roots of grasses and herbaceous plants	Very local. Threatened by loss of suitable grassland

Species	English name	Caterpillar foodplant	Hertfordshire status
Hoplodrina blanda	Rustic	herbaceous plants	widespread and common
Hydraecia micacea	Rosy Rustic	herbaceous plants, especially docks, feeding in the rootstock	widespread and common
Melanchra persicariae	Dot Moth	herbaceous plants	local but common where found
Mesoligia literosa	Rosy Minor	grasses, feeding in the stem and roots	local but common where found
Mythimna comma	Shoulder-striped Wainscot	grasses	local but common where found
Scotopteryx chenopodiata	Shaded Broad-bar	vetches and clovers	widespread and common
Spilosoma lubricipeda	White Ermine	herbaceous plants	widespread and common
Spilosoma lutea	Buff Ermine	herbaceous plants and also trees and shrubs	widespread and common
Tholera decimalis	Feathered Gothic	grasses	widespread and common
Timandra comae	Blood-vein	Polygonaceae	widespread and common
Tyria jacobaeae	Cinnabar	Ragworts	widespread and common

Red Data Book Species

2.2.10 Two of the species recorded are listed in the *British Red Data Books* (Shirt, 1987; Bratton, 1991) or have been elevated by subsequent formal reviews to the status of Endangered:

2.2.11 Of these, one is formally listed as Near Threatened (formerly Nationally Rare) category

The plant bug *Lygus pratensis* has apparently always been a polyphagous species in Europe, found in weedy places, but in Britain is has long been regarded as an indicator of quality ancient woodland. In the last few years, however, this bug has been widely recorded away from woodland in the south of England. It is unclear is the scattered old colonies have expanded or if there has been a wave of immigration from the continent, but either way the Red Data Book status is currently unwarranted.

2.2.12 The other is placed in the indeterminate category (RDB K):

The picture-winged fly *Tephritis divisa* was recorded new to Britain from Sussex in August 2004, swept off bristly ox-tongue It can be easily misidentified as the more common *Tephritis cometa*. It is a native of southern Europe. The larvae develop in the flower heads of *Picris echioides* and possibly other species of *Picris*. It appears to be spreading.

Nationally Scarce Species

2.2.11 A total of 16 species recorded during the survey are designated as "Nationally Scarce".

2.2.12 Of these, two feature in the former category of Nationally Notable Na, as follows:

The Long-winged Cone-head (*Conocephalus discolor*) is a cricket with a distinctive high-pitched "song" that was formerly restricted to coastal habitats in the south of England. In recent years it has spread around the coast, including the Thames Estuary in particular, and is also found at some inland sites. It seems to have become fairly prevalent on a number of open mosaic habitats on previously developed land, especially where these also contain damp ditches.

The flea beetle *Longitarsus parvulus* is a member of the leaf-beetle tribe and is entirely vegetarian in habit. It appears to feed on a wide range of plant species and has become fairly widespread throughout much of south-east of England in recent years. It is now a familiar site on post-industrial habitat mosaics. Although perhaps no longer deserving its Nationally Scarce status in its own right, it does nevertheless serve as an indicator of open habitat mosaics and as such is of value in site assessment.

2.2.13 Fourteen of the Nationally Scarce species recorded feature in the former Nationally Notable Nb category (see Appendix 2). The primary ecological associations of these are summarised in the following Table.

Species	English name	Main ecological associations
Agrilus laticornis	a jewel beetle	larvae develop in sickly oak trees
Athysanus argentarius	a plant hopper	in a variety of grassland habitats
Catapion pubescens	a seed weevil	small, yellow-flowered species of *Trifolium*
Eupithecia dodoneata	Oak-tree Pug	Hawthorn (eating the sepals) and oak
Eupithecia subumbrata	Shaded Pug	herbaceous plants
Hylaeus signatus	a yellow-faced bee	requires pollen from *Reseda* - nests in hollow plant stems
Lasioglossum malachurum	a solitary bee	ground nesting species – excavates tunnel in soils with a clay component
Metrioptera roeselii	Roesel's Bush-cricket	long grassland
Podagrica fuscicornis		mallow (*Malva* species)
Ptilodon cucullina	Maple Prominent	Field Maple, very rarely on Sycamore
Stenus contumax	a rove beetle	damp habitats, especially grassland
Tychius pusillus	a true weevil	Lesser Yellow Trefoil (*Trifolium dubium*) and perhaps other clovers
Opomyza punctata	a picture-winged fly	larvae feed internally in grass stems
Actia lamia	a parasitic fly	parasite of *Epiblema* moths (Tortricidae)

Nationally Local Species

2.2.15 Forty-three of the recorded species are listed formally as Nationally Local (see Appendix 2). These are listed below with their primary associations:

Species	Ecological associations
Anaceratagallia ribauti	on the ground amongst grasses in dry places
Anomoia purmunda	Larva feeds in the flesh of hawthorn berries
Anthocomus rufus	fens and marshes - a false soldier beetle
Aphthona euphorbiae	widely polyphagous
Apolygus lucorum	low plants
Archarius pyrrhoceras	oak - causing leaf galls
Cassida vibex	knapweed, thistles etc
Chorthippus albomarginatus	grasslands
Cordylepherus viridis	a common grassland species
Coremacera marginata	dry habitats, especially grasslands
Cryptocephalus fulvus	possibly on sheep's-sorrel,
Cryptocephalus pusillus	trees, especially birch, often sallow
Eilema depressa	lichens and algae on trees
Erigone dentipalpis	ubiquitous species
Graphocraerus ventralis	a grassland species of southern distribution
Hylaeus annularis	nests in hollow plant stems, such as docks, etc
Idaea rusticata	withered leaves of ivy, clematis, *Alyssum saxatile*,
Kosswigianella exigua	short grasses on well-drained substrates
Lampyris noctiluca	predatory on snails amongst long grass
Melanargia galathea	tall calcareous grassland
Mordellistena variegata	unknown ecology
Myelois circumvoluta	caterpillar feeds inside the stems of thistles
Neoscona adianta	rough grassland and heathland.
Notiophilus substriatus	open, dry habitats especially with minimal vegetation
Oedemera lurida	a common grassland species
Otiorhynchus ovatus	amongst the roots of various plants in dry places
Pilophorus perplexus	predatory on deciduous trees
Pipiza fenestrata	edge habitats, especially scrub
Plagodis dolabraria	oak, birch and Salix are recorded
Psylliodes chrysocephala	various Cruciferae
Psylliodes cuprea	various Cruciferae
Rhamphus oxyacanthae	larva mines in leaves of hawthorn
Scellus notatus	predatory species in woodland and scrub
Sicus ferrugineus	parasitic fly on bumble bees
Sphenella marginata	ragwort species, in late summer and autumn
Taeniapion urticarium	nettles - larvae feed inside stem nodes
Tegenaria agrestis	low vegetation
Tephritis cometa	larvae gall the flowers of creeping thistle
Tetragnatha montana	trees and bushes
Trox scaber	in old nests of owls and raptors in older trees
Urophora quadrifasciata	larva galls the flowers of *Centaurea nigra*
Vespa crabro	woodland species
Xanthogramma pedisequum	larvae feed in ants nests

3 DISCUSSION

3.1 Introductory comments

3.1.1 The scarce species encountered may be analysed as follows:

Category	Number
NERC Act, 2006, Section 41	1
Section 41 research only moths	23
National Red Data Book	2
Nationally Scarce	16
Nationally Local	43
Sub-total of scarce species	**85**
Common species	614
All species	**699**
Scarce species as percentage of total	**12%**

3.1.2 The overall percentage of "rarities" is not especially high. In addition, the species listed as having a formal conservation interest do not, necessarily, all still warrant the status that was applied to them – often as long ago as the 1980s. Overall, Panshanger Airfield is not a site blessed with an outstanding community of rare invertebrate species.

3.1.3 However, rarity is only a small part of ecological interest; the overall invertebrate community structure of a site is of far greater relevance to wider ecological value. This community structure will include a number of different assemblages of invertebrates, each reflecting different habitat features and each with an overall species diversity that reflects the quality and condition of that particular habitat feature. A statistical analysis of these aspects is now possible, using the *Invertebrate Species-habitats Information System.*

3.2 Invertebrate Species-habitats Information System

3.2.1 The Invertebrate Species-habitats Information System (ISIS) is a tool introduced by Natural England and is used by them to undertake common standards monitoring (i.e. to monitor the condition of invertebrate assemblages), score them based on the invertebrate assemblage types present (similar to how the NVC is used to assess plant communities) and evaluate their conservation value *within context*.

3.2.2 The ISIS assemblage types are defined by lists of characteristic species that are generally found together in nature. Broad assemblage types (BATs) are a comprehensive series of assemblage types that are characterised by more widespread species. Specific assemblage types (SATs) are characterised by ecologically restricted or stenotopic species of intrinsic nature conservation value.

3.2.3 Using the Isis analysis, the *Broad Assemblage Types* represented in the species inventory at Panshanger Airfield are as follows:

BAT code	BAT name	Representation (1-100)	Rarity score	Condition	BAT species richness
F2	grassland & scrub matrix	17	121		198
A1	arboreal canopy	9	111		103
F1	unshaded early successional mosaic	4	133		51
A2	wood decay	2	132		25
F3	shaded field & ground layer	1	123		13
W3	permanent wet mire	1	127		11
W2	mineral marsh & open water	0	100		2

3.2.4 Using the same analysis, the *Specific Assemblage Types* represented in the species inventory at Panshanger Airfield are as follows:

SAT code	SAT name	No. spp.	Condition	Percentage of national species pool	Related BAT rarity score
A215	epiphyte fauna	2		10	132
F002	rich flower resource	18	fav	7	
F001	scrub edge	11	fav	6	
F112	open short sward	7		3	133
A212	bark & sapwood decay	17		3	132
F003	scrub-heath & moorland	6		2	
A213	fungal fruiting bodies	1		1	132
W314	reedfen and pools	1		1	127
A211	heartwood decay	1		1	132

3.3 Conclusions

3.3.1 The ISIS analysis, somewhat unsurprisingly, identifies the assemblage of invertebrates associated with the "grassland and scrub matrix" as being dominant. Essentially, this reflects the edge habitat, or transitional zone made between the scrub and the grassland in the north of the site. Interestingly, however, in spite of the lengthy species list this habitat is not determined by ISIS as being in "favourable" condition. This means that it falls short of the ideal minimum required as a management objective for similar habitat on a SSSI.

3.3.2 Other Broad Assemblages of invertebrates reflect the tree canopy on the northern edge and the areas of unshaded early successional mosaic – represented by the areas having, or presumed to have, a tarmac or similar surface beneath the surface vegetation.

3.3.3 A consideration of the rather more focussed *Specific Assemblage Types* of invertebrates, on the other hand, shows that those associated with both the rich flower resource and the scrub edge are indeed in favourable condition.

3.3.4 What this does, overall, is confirm the experience-based opinion of the senior surveyor that the grassland is relatively poor as an invertebrate habitat whilst the scrub, and especially the interface zone between scrub and grassland, is of far greater significance.

3.3.5 Detailed recommendations and mitigation proposals do not form a part of this present project. However, it is clear that any development should endeavour to avoid the scrub area completely. Whilst the grassland may be relatively poor for terrestrial invertebrates, it is nevertheless desirable to maintain a buffer zone of grassland along the south-facing scrub edge.

3.3.6 In particular, the unshaded nature of this transitional habitat zone should be maintained. In order to achieve this, the buffer strip ought to be a minimum of 15 metres in width so that inserted structures do not cast shadow on the low vegetation of bushes.

3.3.7 This protocol would automatically include the areas of unshaded early successional mosaic habitat, which would therefore also be retained.

4 REFERENCES USED IN THE CREATION OF THIS REPORT AND ITS APPENDICES

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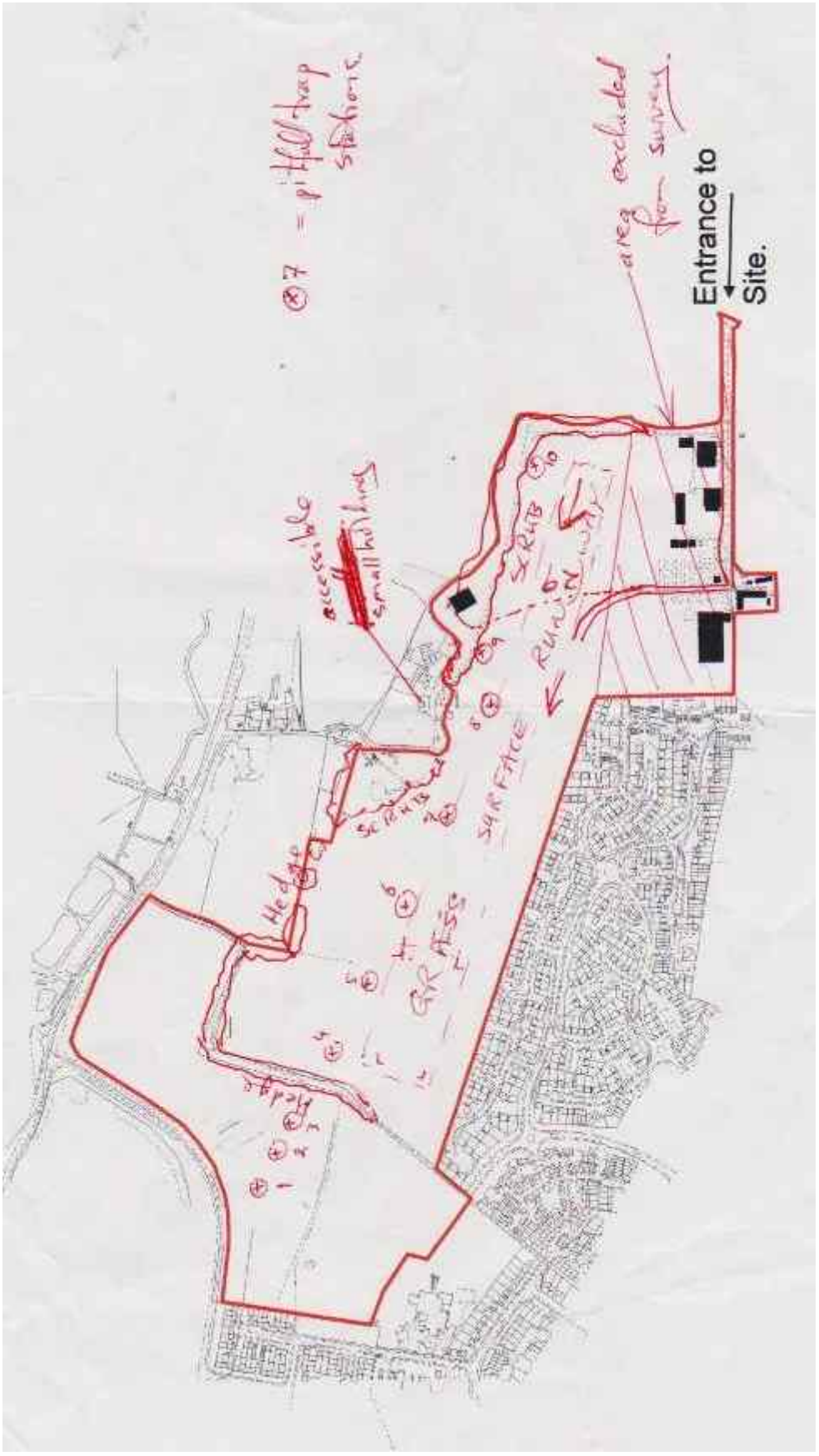
APPENDICES

MAP 1. The area surveyed in 2014



APPENDIX 1: TERRESTRIAL INVERTEBRATE SPECIES RECORDED

National status codes are explained in Appendix 2.

Group / species	English name if available	National status	Ecological associations
ARACHNIDA: ARANEAE	**SPIDERS**		
Agelenidae			
Agelena labyrinthica			spins a sheet-web amongst grasses
Tegenaria agrestis		Local	low vegetation
Araneidae			
Araneus diadematus			ubiquitous
Araneus quadratus			rough grassland
Neoscona adianta		Local	rough grassland and heathland.
Linyphiidae	**money spiders**		
Erigone dentipalpis		Local	ubiquitous species
Lepthyphantes tenuis			ubiquitous - often in grassland, but also a pioneer species
Linyphia triangularis			almost ubiquitous
Meioneta rurestris			one of the commonest grassland spiders
Microneta viaria			woodland, scrub and hedgerows
Oedothorax fuscus			ubiquitous in grassland habitats, including lawns
Oedothorax retusus			ubiquitous money spider
Tiso vagans			amongst detritus in grasslands, woodlands, gardens and other habitats
Liocranidae			
Phrurolithus festivus			under stones, amongst litter etc in open habitats
Lycosidae			
Alopecosa pulverulenta			open habitats, including grasslands and old quarries
Pardosa pullata			many habitats, but often amongst grass tussocks
Philodromidae			
Philodromus dispar			wooded habitats, overwintering in leaf litter under hedges etc
Tibellus oblongus			prefers taller herbage, in either wet or dry habitats
Pisauridae			
Pisaura mirabilis			more or less ubiquitous, but likes tall vegetation
Tetragnathidae			
Metellina mengei			more or less ubiquitous
Pachygnatha degeeri			low vegetation
Tetragnatha montana		Local	trees and bushes
Thomisidae			
Misumena vatia			edge habitat species - between grassland and scrub
Zoridae			
Zora spinimana			grassland
ARACHNIDA: ACARI	**GALL MITES**		
Eriophyidae			
Aceria crataegi			causes galls on leaves of hawthorn
Aceria macrorhynchus			makes galls on Sycamore leaves
Eriophyes prunospinosae			causes galls on leaves of blackthorn
ARACHNIDA: OPILIONES	**HARVESTMEN**		

Group / species	English name if available	National status	Ecological associations
Phalangiidae			
Paroligolophus agrestis			under stones and other objects
Phalangium opilio			under stones or other objects
COLEOPTERA	**BEETLES**		
Apionidae	**seed weevils**		
Apion cruentatum			*Rumex*, especially *Rumex acetosella*
Apion haematodes			in the rootstock of *Rumex acetosella*
Catapion pubescens		NS(Nb)	small, yellow-flowered species of *Trifolium* (clovers)
Perapion curtirostre			*Rumex*, *Acetosa* and *Acetosella* species
Perapion marchicum			dock plants; widespread but rather local
Protapion nigritarse			feeds on a wide variety of low plants and bushes
Taeniapion urticarium		Local	nettles - larvae feed inside stem nodes
Buprestidae			
Agrilus laticornis		NS(Nb)	larvae develop in sickly oak trees
Byturidae			
Byturus tomentosus	the raspberry beetle		Brambles and raspberries
Cantharidae	**soldier beetles**		
Cantharis cryptica			tall vegetation, especially at the woodland/grassland interface
Cantharis rustica			lowland grassland - but always in association with scrub
Rhagonycha fulva			tall, rank vegetation in lowland areas
Rhagonycha lignosa			an arboreal species
Rhagonycha limbata			dry grasslands
Carabidae	**ground beetles**		
Amara aenea			Phytophagous species of gardens and other open, dry and sunny habitats
Amara communis			phytophagous species of open sites, hiding under leaf rosettes, stones, etc
Amara familiaris			Phytophagous species of gardens and other open, dry and sunny habitats
Amara similata			phytophagous on ruderal vegetation, especially on waste ground
Calathus fuscipes			widespread and common species of dry open ground
Calathus melanocephalus			dry grasslands, dry ruderal sites and similar
Demetrias atricapillus			amongst leaf litter and in grasslands
Harpalus affinis			a species typically of dry grasslands
Harpalus rufipes			ubiquitous
Metabletus foveatus			dry, sandy sites with good drainage
NebriA brevicollis			ubiquitous late summer and autumn species
Notiophilus biguttatus			most open ground habitats
Notiophilus substriatus		Local	open, usually dry habitats especially if there is minimal vegetation
Pterostichus strenuus			most habitats that are not too dry
Pterostichus madidus			ubiquitous
Syntomus foveatus			prefers sparsely-vegetated sandy soils (heaths & coastal dunes)
Trechus obtusus			in most non-wooded habitats in the autumn
Trechus quadristriatus			ubiquitous in most open habitats during autumn

Group / species	English name if available	National status	Ecological associations
Cerambycidae	**longhorn beetles**		
Clytus arietis			in dead wood - usually birch or willow, adults at flowers
Grammoptera ruficornis			larvae in twigs and small branches; adults at flowers
Pogonocherus hispidus			feeds in timber of broad-leaved woody plants, with apple holly & ivy noted
Tetrops praeustus			feed on a wide variety of deciduous trees and mature bushes
Chrysomelidae	**leaf beetles**		
Altica lythri			Associated with various willow-herbs (Onagraceae)
Aphthona euphorbiae		Local	widely polyphagous
Cassida vibex		Local	knapweed, thistles etc
Chaetocnema hortensis			feeds on various grasses
Cryptocephalus fulvus		Local	possibly on sheep's-sorrel, but adults are found on a variety of flowers
Cryptocephalus pusillus		Local	trees, especially birch, often sallow
Lochmaea crataegi			Hawthorn - larvae mine the berries. Occasionally on Blackthorn or Rowan
Longitarsus flavicornis			ragworts
Longitarsus luridus			widely polyphagous
Longitarsus parvulus		NS(Na)	feeds on many plant species
Longitarsus succineus			Associated with Asteraceae - including Mugwort, Coltsfoot and others
Neocrepidodera ferruginea			polyphagous
Neocrepidodera transversa			polyphagous
Oulema melanopa			feeds on grasses - very common
Oulema rufocyanea			feeds on grasses - very common
Phaedon tumidulus			Widespread on various Apiaceae (= Umbelliferae)
Phyllotreta atra			various Brassicaceae
Phyllotreta undulata			various Brassicaceae
Podagrica fuscicornis		NS(Nb)	mallow (*Malva* species)
Psylliodes chrysocephala		Local	various Cruciferae
Psylliodes cuprea		Local	various Cruciferae
Sphaeroderma rubidum			feeds on thistles and other Asteraceae
Ciidae			
Cis boleti			fungi - in both brackets and caps
Coccinellidae	**ladybirds**		
Adalia bipunctata	2-spot ladybird		predatory on other insects
Adalia decempunctata	10-spot ladybird		predatory on other insects
Coccinella septempunctata	7-spot ladybird		predatory on other insects
Halyzia sedecimguttata	Orange ladybird		predatory on other insects
Harmonia axyridis	Harlequin ladybird		a recent colonist in Britain
Psyllobora vigintiduopunctata	22-spot ladybird		feeds on mildews
Rhyzobius litura			predatory on other insects
Subcoccinella vigintiquattuorpunctata	24-spot ladybird		predatory on other insects
Tytthaspis sedecimpunctata	16-spot ladybird		predatory on other insects
Cryptophagidae			
Atomaria atricapilla			associated with grass tussocks
Curculionidae	**true weevils**		
Anthonomus rubi			flowers of brambles and raspberries
Archarius pyrrhoceras		Local	oak - causing leaf galls
Barypeithes araneiformis			ubiquitous amongst moss, litter, etc.

Group / species	English name if available	National status	Ecological associations
Hypera plantaginis			Lotus species, in grasslands, verges, post-industrial sites and elsewhere
Mecinus pascuorum			feeds on flowers of *Plantago lanceolata* (Ribwort Plantain)
Nedyus quadrimaculatus			nettles - feeding on the flowers
Orchestes quercus			larvae mine the leaves of oak trees
Otiorhynchus ovatus		Local	amongst the roots of various plants in dry places
Otiorhynchus singularis			feeds on a variety of plant roots
Pachyrhinus lethierryi			Cupressaceous trees - discovered new to Britain in 2006
Phyllobius pomaceus			Nettles
Phyllobius pyri			Larvae develop in the ground an adults feed on a variety of herbage and tree leaves
Polydrusus pterygomalis			polyphagous on broad-leaved trees, especially oak and hazel
Rhamphus oxyacanthae		Local	larva mines in leaves of hawthorn
Rhamphus pulicarius			larva mines leaves of apple, birch and other trees
Rhinoncus castor			Dock plants
Rhinusa antirrhini			feeds in the flowers of toadflax
Sitona lineatus			various legumes
Trichosirocalus troglodytes			Plantains, usually in grassy places
Tychius picirostris			various Leguminosae
Tychius pusillus		NS(Nb)	Lesser Yellow Trefoil (*Trifolium dubium*) and perhaps other clovers
Elateridae	**click beetles**		
Agriotes acuminatus			larvae feed on grass roots
Agriotes lineatus			larvae feed on grass roots, often in damp areas
Agriotes sputator			larvae feed on grass roots
Aplotarsus (Selatosomus) incanus			larvae feed on grass roots
Hemicrepidus hirtus			grassland, woodland rides, etc. The larvae feed in decaying wood and in soil
Kibunea minuta			a species of dry grasslands
Lampyridae			
Lampyris noctiluca	Glow Worm	Local	predatory on snails amongst long grass
Latridiidae			
Cartodere bifasciatus			litter, compost, tussocks etc - more or less ubiquitous
Cartodere nodifer			leaf litter, vegetable detritus - more or less ubiquitous
Corticaria impressa			amongst plant litter
Corticaria pubescens			amongst plant litter
Cortinicara gibbosa			amongst plant litter
Leiodidae			
Nargus velox			feeds on decaying vegetable matter
Malachiidae	**malachite beetles**		
Anthocomus rufus		Local	fens and marshes - a false soldier beetle
Cordylepherus viridis		Local	a common grassland species
Malachius bipustulatus			grasslands
Mordellidae			
Mordellistena variegata		Local	unknown ecology
Nitidulidae	**pollen beetles**		

Group / species	English name if available	National status	Ecological associations
Epuraea unicolor			
Meligethes aeneus			various flowers
Oedemeridae			
Oedemera lurida		Local	a common grassland species
Oedemera nobilis			a common grassland species
Phalacridae			
Stilbus testaceus			dry grasses, hay etc
Pyrochroidae			
Pyrochroa serraticornis	Cardinal beetle		Larvae predatory under loose tree bark
Rhynchitidae			
Tatianaerhynchites aequatus			rosaceous shrubs - the larvae feeding in the fruits
Scolytidae			
Scolytus scolytus	elm bark beetle		under elm bark
Scraptiidae			
Anaspis frontalis			larvae in twigs of oak and other trees; adults at hawthorn blossom
Anaspis maculata			larvae in dead branches and twigs
Anaspis pulicaria			larvae probably in plant stems or twigs of trees
Anaspis regimbarti			larvae feed in large girth oak branches and decaying oak trunks
Silphidae	**sexton beetles**		
Necrodes littoralis			carrion
Nicrophorus humator			carrion
Nicrophorus investigator			carrion
Silpha tristis			associated with carrion
Staphylinidae	**rove beetles**		
Anotylus sculpturatus			grass tussocks, litter, dung etc
Anthobium atrocephalum			amongst plant debris
Atheta hepatica			a detritus-feeding rove beetle
Lathrobium brunnipes			grass tussocks, litter, dung etc
Mocyta fungi			a detritus-feeding rove beetle
Mycetoporus lepidus			amongst low vegetation and litter
Ocypus ater			carrion, dung, etc
Ocypus olens	Devil's Coach-horse beetle		carrion
Philonthus carbonarius			ubiquitous - in moss, litter, carrion, dung etc
Quedius persimilis			moss and litter
Quedius semiobscurus			ecology unclear - usually on drier soils in open situations
Sepedophilus marshami			leaf mould, grass litter etc - very common
Stenus brunnipes			leaf litter, flood debris, tussocks etc
Stenus clavicornis			disturbed grasslands
Stenus contumax		NS(Nb)	damp habitats
Tachinus rufipes			amongst grass litter, in tussocks, etc
Tachyporus hypnorum			leaf litter, grass tussocks and similar micro-habitats
Tachyporus nitidulus			leaf litter, grass tussocks and similar micro-habitats
Xantholinus linearis			leaf litter, grass tussocks and similar micro-habitats
Xantholinus longiventris			leaf litter, grass tussocks and similar micro-habitats - very common
Tenebrionidae			
Tenebrio mollitor	the mealworm		synanthropic species

Group / species	English name if available	National status	Ecological associations
Trogidae			
Trox scaber		Local	lives in dry, old nests of owls and birds of prey in older trees
CRUSTACEA: ISOPODA	**WOODLICE**		
Armadillidiidae			
Armadillidium vulgare			under stones etc
Philosciidae			
Philoscia muscorum			under stones etc
Platyarthridae			
Platyarthrus hoffmanseggi			lives inside the nests of ants, usually *Lasius niger*
Porcellionidae			
Porcellio scaber			under stones etc
DERMAPTERA	**EARWIGS**		
Forficulidae			
Forficula auricularia	common earwig		generalist species
DIPTERA	**TRUE FLIES**		
Agromyzidae			
Chromatomyia horticola			mines the leaves of many plant species
Liriomyza amoena			mines leaves of elder
Asilidae	**robber flies**		
Dioctria baumhaueri			predatory - mainly in edge habitats
Leptogaster cylindrica			grassland predator
Machimus atricapillus			grassland predator
Bibionidae			
Bibio johannis			grassland
Dilophus febrilis			feeds in the roots of various plants
Cecidomyiidae	**gall midges**		
Dasineura crataegi			forms galls on hawthorn
Dasineura fraxinea			larva causes galls on Ash leaves
Iteomyia caprea			larva causes gall in sallow leaves
Iteomyia major			larva causes gall in Salix leaves
Putoniella marsupialis			forms galls on blackthorn
Conopidae	**parasitic flies**		
Conops flavipes			parasitic fly on various species of bee
Sicus ferrugineus		Local	parasitic fly on bumble bees
Culicidae			
Culex pipiens	common mosquito		freshwater to breed; adult bites birds and mammals including humans
Dolichopodidae	**dance flies**		
Chrysotus gramineus			very common predatory grassland species
Scellus notatus		Local	predatory species in woodland and scrub, the adults predatory
Empididae	**assassin flies**		
Empis livida			predatory on other flies
Empis tesselata			predatory on other flies
Limoniidae	**craneflies (part)**		
Limonia tripunctata			lowland deciduous woodland, the larvae developing in the soil/litter
Rhipidia duplicata			various habitats, including woodland and grassland, the larvae feeding in animal dung
Lonchopteridae			
Lonchoptera bifurcata			a more or less ubiquitous species in edge habitats
Lonchoptera lutea			ubiquitous species in edge habitats,

Group / species	English name if available	National status	Ecological associations
			saprophagous larvae
Opomyzidae			
Geomyza balachowskyi			larvae feed inside the stems of grasses
Geomyza tripunctata			larvae feed inside the stems of grasses
Opomyza florum			larvae feed internally inside grass stems
Opomyza germinationis			larvae feed inside the stems of grasses
Opomyza punctata		NS(N)	larvae feed internally in grass stems
Rhagionidae	**snipe flies**		
Rhagio lineola			woodland and scrub - especially at the edges
Rhagio scolopaceus			woodland edge and other wooded areas - in clearings and at edges
Sciomyzidae	**snail-killing flies**		
Coremacera marginata		Local	dry habitats, especially grasslands
Sepsidae			
Nemopoda nitidula			shade-loving species, larvae in dung and carrion
Stratiomyidae	**soldier flies**		
Beris chalybata			associated with the scrub/grassland interface
Beris vallata			saprophagous larvae
Chloromyia formosa			ubiquitous
Chorisops tibialis			saprophagous larvae
Microchrysa polita			larvae require decomposing organic matter
Pachygaster atra			woodland edge & scrubland species - larvae under dead bark of trees
Pachygaster leachii			woodland edge & scrubland species - larvae under dead bark of trees
Sargus bipunctatus			associated with the scrub/grassland interface
Sargus iridatus			larvae feed in rotting vegetation and similar material
Syrphidae	**hoverflies**		
Baccha elongata			shaded woodland
Cheilosia albitarsis			larvae feed in the roots of Ranunculus repens
Cheilosia bergenstammi			larvae feed in the stems and roots of ragwort on dry chalky or sandy sites or in ruderal areas
Cheilosia pagana			larvae are thought to feed in the roots of Anthriscus sylvestris
Cheilosia proxima			larvae feed in the roots of Cirsium species of thistle, especially Cirsium palustre
Chrysotoxum bicinctum			grassland species -associated with ants' nests
Chrysotoxum cautum			grassland species -associated with ants' nests
Epistrophe eligans			mainly at edge habitats
Episyrphus balteatus			ubiquitous species, partly immigrant, and a predator of aphids
Eristalis arbustorum			Larvae require damp habitats but adults are more or less ubiquitous
Eristalis intricarius			larvae feed in wet organic matter, especially in margins of water bodies
Eristalis pertinax			Larvae require damp habitats but adults are more or less ubiquitous
Eristalis tenax			Larvae require damp habitats but adults

Group / species	English name if available	National status	Ecological associations
			are more or less ubiquitous
Eupeodes corollae			Grassland
Eupeodes luniger			Grassland
Helophilus pendulus			Larvae require damp habitats but adults are more or less ubiquitous
Leucozona lucorum			larvae feed on ground layer aphids
Melangyna labiatarum			aphid predator
Melanostoma mellinum			Grassland
Melanostoma scalare			Grassland
Myathropa florea			larvae are semi-aquatic
Neoascia podagrica			edge-habitat species
Paragus haemorrhous			bare or sparsely vegetated, dry sandy ground
Pipiza fenestrata		Local	Edge habitats
Pipizella viduata			Larvae feed on root aphids on Umbelliferae
Platycheirus albimanus			ubiquitous - larvae prey on aphids
Platycheirus clypeatus			Damp habitats
Platycheirus scutatus			an edge-habitat species
Scaeva pyrastri			immigrant from overseas - feeds on aphids
Sphaerophoria scripta			Grassland - larvae prey on aphids
Syritta pipiens			larvae in decaying vegetation; adults at flowers
Syrphus ribesii			larvae are aphid predators on trees and bushes
Syrphus vitripennis			larvae are aphid predators on trees and bushes
Volucella bombylans			inquiline in nests of bumble bees
Volucella pellucens			inquiline in nests of social wasps/hornet
Xanthogramma pedisequum		Local	larvae feed in ants nests
Xylota segnis			Damp, dead wood
Tabanidae	**horseflies**		
Chrysops caecutiens			damp habitats, rarely far from damp woodland
Haematopota pluvialis			damp habitats - adult females are blood sucking horseflies
Tachinidae	**parasitic flies**		
Actia lamia		N	parasite of Epiblema moths (Tortricidae)
Eriothrix rufomaculata			larva parasitises moth larvae
Lydella grisescens			Parasite of moth caterpillars
Pales pavida			Parasite of moth caterpillars
Phania funesta			probably a parasite on shield bugs (Legnotus limbosus recorded, but only in Europe)
Phryxe vulgaris			larvae are parasites of moth caterpillars
Tachina fera			parasitic on larvae of noctuid moths
Tephritidae	picture-winged flies		
Anomoia purmunda		Local	Larva feeds in the flesh of hawthorn berries
Euleia heraclei			larvae feed in the seed heads of white-flowering Umbelliferae
Sphenella marginata		Local	on various ragwort species, in late summer and autumn
Tephritis cometa		Local	larvae gall the flowers of creeping thistle
Tephritis divisa		RDB K	a recent arrival (2004) - larvae develop in flower-heads of *Picris echioides*

Group / species	English name if available	National status	Ecological associations
Tephritis vespertina			larvae gall the flowers of *Hypochaeris* species
Urophora cardui			larvae gall the flowers of thistles
Urophora quadrifasciata		Local	larva galls the flowers of *Centaurea nigra*
Xyphosia miliaria			larvae gall the flowers of thistles - ubiquitous
Tipulidae	**craneflies (part)**		
Nephrotoma appendiculata			spring species of open grassland
Nephrotoma flavescens			grassland, dunes and other habitats
Nephrotoma flavipalpis			hedges and other wooded edge habitats
Nephrotoma quadrifaria			common in woodlands, also in hedgerows, scrub and similar
Savtshenkia obsoleta			rough grassland and field margins in the autumn
Savtshenkia pagana			more or less ubiquitous
Tipula oleracea			ubiquitous, larvae feeding on roots of grasses
Tipula paludosa			ubiquitous, larvae feeding on roots of grasses
HETEROPTERA	**TRUE BUGS**		
Acanthosomatidae			
Acanthosoma haemorrhoidale	hawthorn shield bug		hawthorn
Elasmostethus interstinctus	birch shield bug		birch
Elasmucha grisea			birch, occasionally alder
Anthocoridae			
Anthocoris confusus			trees and shrubs
Anthocoris nemoralis			trees and shrubs
Anthocoris nemorum			low vegetation
Orius vicina			predatory amongst low growing vegetation
Coreidae			
Coreus marginatus			Develops on a variety of Polygonaceae in open habitats
Coriomeris denticulatus			various legumes
Lygaeidae	**ground bugs**		
Drymus brunneus			amongst litter or moss in damp or shaded places
Heterogaster urticae			nettles
Kleidocerys resedae			trees and shrubs generally
Nysius ericae			in ruderal habitats
Scolopostethus thomsoni			usually on nettles
Miridae	**leaf bugs**		
Adelphocoris lineolatus			leguminous plants
Apolygus lucorum		Local	low plants
Atractotomus mali			hawthorn, apple and other trees
Capsus ater			Grassland
Closterostomus norvegicus			polyphagous
Deraeocoris lutescens			predatory amongst trees and bushes
Deraeocoris ruber			nettles, brambles and similar rough vegetation
Dicyphus epilobii			Epilobium hirsutum
Harpocera thoracica			Oaks -solitary and in woods
Heterotoma planicornis			edge habitats - especially in association with nettles
Leptoterna dolabrata			found in a wide range of grassland habitats
Lopus decolor			open grasslands, especially dry calcareous ones but also colonises ruderal sites

Group / species	English name if available	National status	Ecological associations
Lygus pratensis		R RDB3	was an ancient woodland species but has now spread to other habitats
Megacoelum infusum			predatory species on oak foliage
Monalocris filicis			bracken - feeding on the sporangia
Neolygus contaminatus			birch - less commonly on alder or other trees
Notostira elongata			grasslands
Orthops campestris			flowers and seed heads of Umbelliferae - including wild carrot
Phylus melanocephalus			restricted to oak trees
Phytocoris tiliae			predatory on trunks and branches of deciduous trees
Phytocoris varipes			dry, open grasslands are preferred. Partly vegetarian and partly a predator
Pilophorus perplexus		Local	predatory on deciduous trees
Plagiognathus arbustorum			polyphagous, but usually associated with stinging nettles
Plagiognathus chrysanthemi			polyphagous
Psallus falleni			birch tree foliage
Stenodema laevigata			grasslands
Stenotus binotatus			grasslands
Nabidae	**damsel bugs**		
Himacerus apterus			a tree-dwelling species
Himacerus mirmicoides			ground dwelling predator of dry, open areas
Nabis flavomarginatus			predatory species
Nabis limbatus			marshy places
Pentatomidae	**shield bugs**		
Aelia acuminata			Thistles
Eurydema oleracea			feeds on cruciferous plants
Eysarcoris venutissimus			probably polyphagous
Palomena prasina			trees and shrubs
Pentatoma rufipes	The Forest Bug		tree-dwelling predator that often flies far from woodland
Podops inuncta	The Turtle Bug		dry places, especially ruderal sites.
Troilus luridus			a predator on broad leaved trees and occasionally on pines
Rhopalidae			
Myrmis miriformis			grasslands - a grass feeding species
Tingidae			
Acalyptus parvula			amongst moss in dry situations
Physatocheila dumetorum	a lacebug		hawthorn
HOMOPTERA: AUCHENORHYNCHA	**HOPPERS**		
Aphrophoridae	**froghoppers**		
Aphrophora alni			larvae feed under froth on a wide range of trees and shrubs
Neophilaenus campestris			dry, open grassland
Neophilaenus lineatus			grasslands
Philaenus spumarius	spittle-bug		larvae feed under froth on a wide range of herbaceous plants
Cicadellidae	**leaf hoppers**		
Alebra albostriella			oak
Anaceratagallia ribauti		Local	on the ground amongst grasses in dry places - common in the south-east
Anoscopus serratulae			associated with grasses in grasslands and

Group / species	English name if available	National status	Ecological associations
			ruderal habitats
Aphrodes makarovi			on nettles, thistles and other plants in grasslands
Arboridia ribauti			arboreal species, mainly on oaks
Arthaldeus pascuellus			grasses
Athysanus argentarius		NS(Nb)	in a variety of grassland habitats, usually near the coast
Doratula stylata			open grassland, sandy or calcareous
Edwardsiana crataegi			associated with hawthorns
Eupelix cuspidata			grasses - in dry places
Eurhadina pulchella			oaks and sometimes other trees
Euscelis incisus			grasses
Graphocraerus ventralis		Local	a grassland species of southern distribution
Iassus lanio			usually on oak, occasionally on other trees
Mocydia crocea			grasses
Oncopsis tristis			associated with birches
Populicerus confusus			various trees and bushes
Psammotettix confinis			grasses, including on post-industrial sites
Rhopalopyx adumbrata			
Rhytistylus proceps			grasses on well-drained calcareous solis
Typhlocyba quercus			associated with oak trees
Zygina angusta			on various trees - overwinters in conifers
Zyginidia scutellaris			grasses
Cixiidae			
Cixius nervosus			most frequent in woodlands
Delphacidae			
Hyledelphax elegantulus			open, dry grassland with Deschampsia cespitosa in the sward
Javesella pellucida			grasses in a range of habitats
Kosswigianella exigua		Local	short grasses on well-drained substrates
HEMIPTERA: PSYLLOIDEA	**PLANT LICE**		
Psyllidae			
Psyllopsis fraxini			galls the leaves of Ash trees
Triozidae			
Trioza urticae			stinging nettle
HYMENOPTERA: ACULEATA	**BEES, WASPS AND ANTS**		
Apidae	bees		
Andrena bicolor			open woodland and grassland - nests in the ground
Apis mellifera	honey bee		flowers in general
Bombus lapidarius	red-tailed bumble bee		ubiquitous
Bombus lucorum	white-tailed bumble bee		ubiquitous
Bombus pascuorum	common carder bee		ubiquitous
Bombus pratorum	a bumble bee		ubiquitous
Bombus sylvestris	a cuckoo bee		nest parasite of *Bombus pratorum*
Bombus terrestris	buff-tailed bumble bee		ubiquitous
Halictus tumulorum			ground-nesting solitary bee in a range of habitats
Hylaeus annularis	a yellow-faced bee	Local	nests in hollow plant stems, such as docks, etc
Hylaeus communis	a yellow-faced bee		nests inside dead stems of bramble, dock etc
Hylaeus signatus	a yellow-faced bee	NS(Nb)	requires pollen from Reseda - nests in hollow plant stems

Group / species	English name if available	National status	Ecological associations
Lasioglossum calceatum			nests in burrows on steep sandy banks
Lasioglossum malachurum		NS(Nb)	ground nesting species - prefers soils with a clay component
Lasioglossum smeathmanellum			excavates nest burrows in level ground
Megachile willughbiella	a leaf-cutter bee		nests in plant stems or other cavities
Nomada fabriciana	a nomad bee		nest parasite of *Andrena* bees - especially Andrena bicolor
Nomada flavoguttata	a nomad bee		nest parasite of small-sized *Andrena* species of bee
Chrysididae	**ruby-tailed wasps**		
Chrysis ignita			cleptoparasitic on eumenid wasps, expecially *Ancistrocerus* species
Trichrysis cyanea			parasite of sphecid wasps, especially Trypoxylon species
Eumenidae	**potter wasps**		
Ancistrocerus gazella			nests in broken plant stems and other hollows
Symmorphus bifasciatus			nests in hollow plant stems and preys on the larvae of chrysomelid leaf beetles
Formicidae	**ants**		
Lasius flavus	yellow ant		grassland. A high nest density indicates long term grassland continuity
Lasius niger	common black ant.		generalist species
Myrmica rubra	a red ant		ubiquitous
Temnothorax nylanderi			nests in hollow sticks, old beetle tunnels or other cavities
Sphecidae	**solitary wasps**		
Cerceris arenaria			predatory on weevils. Nests in deep burrow in the soil
Trypoxylon attenuatum			preys on spiders. Nests in plant stems, beetle tunnel or other cavities
Vespidae	**social wasps**		
Vespa crabro	Hornet	Local	woodland species
Vespula germanica			ubiquitous
Vespula vulgaris			ubiquitous
HYMENOPTERA: PARASITICA	**GALL WASPS**		
Cynipidae			
Andricus curvator			forms a gall on an oak leaf
Andricus fecundator			forms a gall on an oak leaf
Andricus kollari			forms the oak marble gall
Andricus quercuscalicis			forms galls in acorns on oaks
Diplolepis nervosa			forms sputnik galls on leaf of rose
Diplolepis rosae			forms pin cushion gall on wild rose
Neuroterus anthracinus			causes galls on oaks (formerly called *Andricus ostreus*)
Neuroterus quercusbaccarum			forms the hairy spangle gall on oak leaves
HYMENOPTERA: SYMPHYTA	**SAWFLIES**		
Cephidae			
Calameuta pallipes			a grassland sawfly
Cephus cultratus			larvae mine the stems of grasses
Tenthredinidae			
Aglaostigma aucupariae			larvae feed on bedstraws
Athalia liberta			ubiquitous sawfly species

Group / species	English name if available	National status	Ecological associations
Athalia rosae			phytophagous species
Cladius pectinicornis			larvae feed on rose and also on Sanguisorba officinalis
Dolerus niger			ubiquitous sawfly species
Hoplocampa crataegi			larvae mines the flesh of hawthorn berries
Nematus lucidus			associated with hawthorn and blackthorn
Nematus ribesii			ubiquitous sawfly species
Pontania proxima			makes galls on sallow
Profenusa pygmaea			larva mines the leaves of oak trees
Rhogogaster scalaris			predatory species
Tenthredo notha			widespread phytophagous species
Tenthredopsis nassata			larvae feed on grasses
LEPIDOPTERA	**BUTTERFLIES**		
Hesperiidae			
Ochlodes faunus	Large skipper		grassland
Thymelicus sylvestris	Small skipper		grassland
Lycaenidae			
Polyommatus icarus	Common blue		various legumes, especially Bird's-foot Trefoil
Quercusia quercus	Purple Hairstreak		oak trees - including isolated examples
Nymphalidae			
Aphantopus hyperantus	Ringlet		woodland edge and clearings, hedges and other edge habitats
Coenonympha pamphilus	Small Heath	NT	grassland
Inachis io	Peacock		nettles
Maniola jurtina	Meadow brown		grassland species
Melanargia galathea	Marbled White	Local	tall calcareous grassland
Pararge aegeria	Speckled wood		grasses in light woodland or scrub
Polygonia c-album	Comma		nettles
Pyronia tithonus	Gatekeeper		larvae feed on coarse grasses
Pieridae			
Anthocharis cardamines	Orange-tip		edge habitats are preferred
Gonepteryx rhamni	Brimstone		buckthorn
Pieris brassicae	Large white		various Cruciferae
Pieris napi	Green-veined white		ubiquitous
Pieris rapae	Small white		ubiquitous
LEPIDOPTERA	**MOTHS**		
Agonoxenidae			
Blastodacna hellerella			hawthorn - in the berries
Arctiidae			
Eilema complana	Scarce Footman		lichens - especially on trunks, fences etc
Eilema depressa	Buff Footman	Local	lichens and algae on trees
Eilema lurideola	Common Footman		lichens - especially on trunks, fences etc
Phragmatobia fuliginosa	Ruby Tiger		herbaceous plants
Spilosoma lubricipeda	White Ermine	BAP(R)	herbaceous plants
Spilosoma lutea	Buff Ermine	BAP(R)	herbaceous plants and also trees and shrubs
Tyria jacobaeae	Cinnabar	BAP(R)	Ragworts
Bucculatricidae			
Bucculatrix bechsteinella	= crataegi Zell.		caterpillar mines leaves of rosaceous trees, especially hawthorn
Choreutidae			
Anthophila fabriciana	Nettle-tap		nettles
Geometridae			
Biston betularia	Peppered Moth		deciduous trees and herbaceous plants
Cabera exanthemata	Common Wave		Salix species and aspen

Group / species	English name if available	National status	Ecological associations
Cabera pusaria	Common White Wave		deciduous trees
Campaea margaritata	Light Emerald		deciduous trees
Camptogramma bilineata	Yellow Shell		herbaceous plants
Chloroclysta siterata	Red-green Carpet		deciduous trees - especially oak and rowan
Chloroclysta truncata	Common Marbled Carpet		deciduous trees and herbaceous plants
Colostygia pectinataria	Green Carpet		bedstraws
Cosmorhoe ocellata	Purple Bar		bedstraws
Ectropis crepuscularia	Small Engrailed		deciduous trees
Electrophaes corylata	Broken-barred Carpet		deciduous trees
Ennomos alniaria	Canary-shouldered Thorn		deciduous trees
Ennomos fuscantaria	Dusky Thorn	BAP(R)	ash
Epirrhoe alternata	Common Carpet		bedstraws
Eupithecia abbreviata	Brindled Pug		oak and hawthorn are recorded as foodplants
Eupithecia absinthiata	Wormwood Pug		ragwort, yarrow, golden rod and other plants
Eupithecia assimilata	Currant Pug		currants and hops - riddling the leaves with holes
Eupithecia centaureata	Lime-speck Pug		various flowers
Eupithecia dodoneata	Oak-tree Pug	NS(Nb)	Hawthorn (eating the sepals) and oak
Eupithecia subfuscata	Grey Pug		trees and herbaceous plants
Eupithecia subumbrata	Shaded Pug	NS(Nb)	herbaceous plants
Eupithecia succenturiata	Bordered Pug		mugwort
Eupithecia vulgata	Common Pug		herbaceous plants
Hemithea aestivaria	Common Emerald		deciduous trees
Idaea aversata	Riband wave		herbaceous plants - especially bedstraws
Idaea biselata	Small Fan-footed Wave		dandelion, plantain, Polygonum etc
Idaea rusticata	Least Carpet	Local	withered leaves of ivy, clematis, Alyssum saxatile, etc
Idaea trigeminata	Treble Brown-spot		herbaceous plants
Lomaspilis marginata	Clouded Border		sallow, willow, poplar - rarely hazel
Lomographa temerata	Clouded Silver		rosaceous trees
Odontopera bidentata	Scalloped Hazel		deciduous and coniferous trees
Operophtera brumata	Winter Moth		deciduous trees and shrubs
Opisthograptis luteolata	Brimstone Moth		deciduous trees
Ourapteryx sambucaria	Swallow-tailed Moth		ivy and also deciduous trees
Pasiphila rectangulata	Green Pug		Prunus, Malus and Pyrus flowers
Peribatodes rhomboidaria	Willow Beauty		deciduous trees
Perizoma affinitata	Rivulet		Red Campion - in the seed capsules
Petrophora chlorosata	Brown Silver-line		bracken
Plagodis dolabraria	Scorched Wing	Local	oak, birch and Salix are recorded
Plemyria rubiginata	Blue-bordered Carpet		Alder, blackthorn and probably other tree species
Scopula floslactata	Cream Wave		low plants including dandelion, Polygonum and others
Scotopteryx chenopodiata	Shaded Broad-bar	BAP(R)	vetches and clovers
Selenia dentaria	Early Thorn		deciduous trees
Selenia tetralunaria	Purple Thorn		deciduous trees
Thera obeliscata	Grey Pine Carpet		scots pine, spruce
Timandra comae	Blood-vein	BAP(R)	Polygonaceae
Xanthorhoe fluctuata	Garden Carpet		Cruciferae
Xanthorhoe montanata	Silver-ground Carpet		herbaceous plants - especially bedstraws
Xanthorhoe quadrifasiata	Large Twin-spot Carpet		herbaceous plants - especially bedstraws
Xanthorhoe spadicearia	Red Twin-spot Carpet		herbaceous plants - especially bedstraws
Glyphipterigidae			

Group / species	English name if available	National status	Ecological associations
Glyphipterix simpliciella			on the seeds of Dactylis and Festuca species of grasses
Gracillariidae			
Acrocercops brongniardella			mines leaves of oak
Aspilapteryx tringipennella			Ribwort plantain
Caloptilia robustella			oak
Caloptilia syringella			caterpillar mines leaves of ash, hawthorn or lilac
Cameraria ohridella			larva mines the leaves of Horse Chestnut - a recent colonist in Britain, from Europe
Parornix anglicella			mines leaves of hawthorn
Hepialidae			
Hepialus humuli	Ghost Moth	BAP(R)	roots of grasses and herbaceous plants
Hepialus lupulinus	Common Swift		roots of grasses and herbaceous plants
Incurvariidae			
Nemophora metallica	(= scabiosella (Scop.))		
Lymantriidae			
Calliteara pudibunda	Pale Tussock		deciduous trees
Euproctis similis	Yellow-tail		deciduous trees and shrubs
Lyonetiidae			
Lyonetia clerkella			mines leaves of rosaceous bushes and trees, birch etc
Nepticulidae			
Stigmella aurella			mines leaves of bramble
Noctuidae			
Abrostola tripartita	Spectacle		nettles
Acronicta leporina	Miller		alder and birch, occasionally on oak, poplar or Salix species
Acronicta megacephala	Poplar Grey		poplars, especially Populus nigra
Acronicta psi	Grey Dagger	BAP(R)	deciduous trees and bushes
Acronicta tridens	Dark Dagger		rosaceous trees
Agrochola circellaris	Brick		wych elm, poplars, ash all recorded
Agrochola litura	Brown-spot Pinion	BAP(R)	deciduous trees and shrubs and herbaceous plants (requires both)
Agrochola lota	Red-line Quaker		sallow
Agrochola lychnidis	Beaded Chestnut	BAP(R)	deciduous trees and shrubs and herbaceous plants (requires both)
Agrochola macilenta	Yellow-line Quaker		deciduous trees and shrubs and herbaceous plants
Agrotis clavis	Heart and Club		polyphagous on various herbaceous plants
Agrotis exclamationis	Heart and Dart		herbaceous plants
Agrotis puta	Shuttle-shaped Dart		herbaceous plants
Agrotis segetum	Turnip Moth		roots of herbaceous plants
Allophyes oxyacanthae	Green Brindled Crescent	BAP(R)	rosaceous trees and shrubs
Amphipyra berbera	Svensson's Copper Uwing		Oak, Hornbeam and probably othertrees
Amphipyra tragopoginis	Mouse Moth	BAP(R)	deciduous trees and bushes
Apamea anceps	Large Nutmeg	BAP(R)	grasses, especially Poa annua and Dactylis glomerata
Apamea crenata	Clouded-bordered Brindle		grasses
Apamea epomidion	Clouded Brindle		grasses
Apamea lithoxylaea	Light Arches		grasses
Apamea monoglypha	Dark Arches		grasses
Apamea remissa	Dusky Brocade	BAP(R)	grasses
Apamea sordens	Rustic Shoulder-knot		grasses
Autographa gamma	Silver Y		nettles and other herbaceous plants - rarely surviving winter. Immigrants from Europe

Group / species	English name if available	National status	Ecological associations
			are regular
Axylia putris	Flame		herbaceous plants
Callistege mi	Mother Shipton	BAP(R)	coarse grasses, including reeds
Caradrina morpheus	Mottled Rustic	BAP(R)	herbaceous plants
Catocala nupta	Red Underwing		sallows, willows and poplars
Cerapteryx graminis	Antler Moth		grasses, especially Narduus stricta and Festuca ovina
Charanyca trigrammica	Treble Lines		Plantago major and probably other low plants
Colocasia coryli	Nut-tree Tussock		deciduous trees and bushes
Conistra vaccinii	Chestnut		deciduous trees and shrubs and herbaceous plants
Cosmia trapezina	Dun-bar		deciduous trees
Cryphia algae	Tree-lichen Beauty		Lichens on trees. A recent colonist of southern England
Diachrysia chrysitis	Burnished Brass		nettles and other herbaceous plants
Diarsia brunnea	Purple Clay		deciduous trees and herbaceous plants generally
Diarsia rubi	Small Square-spot	BAP(R)	herbaceous plants
Hada plebeja	Shears		various Compositae
Hadena rivularis	Campion		Silene and Lychnis - in the seed capsules
Herminea grisealis	Small Fan-foot		trees and bushes, but also on nettles
Hoplodrina alsines	Uncertain		herbaceous plants
Hoplodrina ambigua	Vines Rustic		herbaceous plants - especially dandelions
Hoplodrina blanda	Rustic	BAP(R)	herbaceous plants
Hydraecia micacea	Rosy Rustic	BAP(R)	herbaceous plants, especially docks, feeding in the rootstock
Hypena proboscidalis	Snout		nettles
Lacanobia oleracea	Bright-line Brown-eye		herbaceous plants
Lacanobia thalassina	Pale-shouldered Brocade		deciduous trees, shrubs and herbaceous plants
Luperina testacea	Flounced Rustic		grasses
Melanchra persicariae	Dot Moth	BAP(R)	herbaceous plants
Mesapamea didyma	Lesser Common Rustic		grasses
Mesapamea secalis	Common Rustic		grasses
Mesoligia furuncula	Cloaked Minor		grasses
Mesoligia literosa	Rosy Minor	BAP(R)	grasses, feeding in the stem and roots
Mythimna comma	Shoulder-striped Wainscot	BAP(R)	grasses
Mythimna ferrago	Clay		grasses
Mythimna impura	Smoky Wainscot		grasses
Mythimna pallens	Common Wainscot		grasses
Noctua comes	Lesser Yellow Underwing		herbaceous plants
Noctua fimbriata	Broad-bordered Yellow Underwing		herbaceous plants
Noctua interjecta	Least Yellow Underwing		shrubs and herbaceous plants
Noctua janthe	Lesser Broad-bordered Yellow Underwing		herbaceous plants
Noctua pronuba	Large Yellow Underwing		herbaceous plants
Ochropleura plecta	Flame Shoulder		herbaceous plants
Oligia fasciuncula	Middle-barred Minor		grasses
Oligia latruncula	Tawny Marbled Minor		grasses
Oligia strigilis	Marbled Minor		grasses
Omphaloscelis lunosa	Lunar Underwing		grasses
Paradrina clavipalpis	Pale Mottled Willow		grasses
Phlogophora meticulosa	Angle Shades		herbaceous plants
Rivula sericealis	Straw Dot		grasses - especially Brachypodium species

Group / species	English name if available	National status	Ecological associations
Rusina ferruginea	Brown Rustic		herbaceous plants
Scoliopteryx libatrix	Herald		Salix species and Poplars, in the north also on Rowan.
Tholera decimalis	Feathered Gothic	BAP(R)	grasses
Xanthia aurago	Barred Sallow		maple, beech - buds, flowers and leaves
Xestia c-nigrum	Setaceous Hebrew Character		herbaceous plants
Xestia sexstrigata	Six-striped Rustic		herbaceous plants
Xestia triangulum	Double Square-spot		deciduous trees and shrubs
Xestia xanthographa	Square-spot Rustic		grasses and herbaceous plants then trees in the spring
Nolidae			
Nola cucullatella	Short-cloaked Moth		blackthorn and hawthorn
Notodontidae			
Drymonia dodonaea	Marbled Brown		oak
Notodonta ziczac	Pebble Prominent		poplars and sallows/willows
Phalera bucephala	Buff-tip		deciduous trees
Pterostoma palpina	Pale Prominent		poplars and sallows/willows
Ptilodon capucina	Coxcomb Prominent		deciduous trees
Ptilodon cucullina	Maple Prominent	NS(Nb)	field maple, very rarely on sycamore
Oecophoridae			
Carcina quercana	The Flat Cooper		deciduous trees and bushes
Pyralidae			
Agriphila straminella			grasses
Agriphila tristella			grasses
Aphomia sociella			inquiline in nests of bumble bees
Catoptria falsella			mosses - especially Tortula muralis
Catoptria pinella			grasses
Chrysoteuchia culmella			grasses
Crambus lathoniellus			grasses
Crambus pascuella			grasses
Crambus perlella			grasses
Dipleurina lacustrata			mosses on trunks, walls etc
Endotricha flammealis			trees and herbaceous plants - then on leaf litter
Eudonia mercurella			mosses on trunks, walls etc
Hypsopygia costalis			dry vegetable matter
Myelois circumvoluta		Local	caterpillar feeds inside the stems of thistles
Phlyctaenia coronata			elder, Viburnum, lilac, privet
Phycita roborella			oak
Phycitodes binaevella			feeds in the flower heads of creeping thistle
Pleuroptya ruralis			nettles
Pyrausta aurata			mints
Scoparia ambigualis			thought to feed amongst mosses
Scoparia pyralella			decaying plant material
Scoparia subfusca			Picris and Tussilago - feeding in the roots
Trachycera advenella			hawthorn, occasionally rowan
Udea ferrugalis			immigrant from overseas - also breeds on herbaceous plants but dies in winter
Sphingidae			
Deilephila elpenor	Elephant Hawk-moth		rosebay willow-herb
Deilephila porcellus	Small Elephant Hawk-moth		bedstraws
Laothoe populi	Poplar Hawk-moth		poplars and sallows/willows
Mimas tiliae	Lime Hawk-moth		lime. elm, alder - occasionally birch and

Group / species	English name if available	National status	Ecological associations
			oak
Thyatiridae			
Habrosyne pyritoides	Buff Arches		bramble, raspberry
Thyatira batis	Peach Blossom		bramble
Tischeriidae			
Emmetia marginea			mines leaves of bramble
Tischeria ekebladella			mines leaves of oak
Tortricidae			
Acleris ferrugana			oak
Acleris forsskaleana			maple, sycamore
Aethes smeathmanniana			Achillea, Centaurea and Anthemis
Agapeta hamana			thistles - in the roots
Archips crataegana			deciduous trees and shrubs
Archips podana			deciduous trees and shrubs
Archips xylosteana			deciduous trees and shrubs
Celypha lacunana			herbaceous plants
Celypha striana			dandelion - in the root
Clepsis consimilana			deciduous trees and shrubs
Clepsis spectrana			herbaceous plants - occasionally trees
Cnephasia asseclana			polyphagous, but especially on herbaceous plants
Cnephasia longana			herbaceous plants
Cnephasia stephensiana			herbaceous plants
Cochylis atricapitana			ragwort
Cochylis hybridella			caterpillar feeds on the seeds of Picris and Crepis plants
Epiblema cynosbatella			shoots of rose and bramble
Epiblema trimaculana			hawthorn
Epiblema uddmanniana			Rubus spp., mainly brambles
Epiphyas postvittana			deciduous trees
Eucosma cana			thistles and Centaurea nigra - in the flower head
Eucosma hohenwartiana			Centaurea and Serratula - in the flower head
Eulia ministrana			polyphagous on teees and shrubs
Hedya nubiferana			rosaceous trees
Hedya pruniana			Prunus, especially blackthorn
Lathronympha strigana			St John's-wort
Pandemis cerasana			deciduous trees and shrubs
Pandemis corylana			deciduous trees and shrubs
Pandemis heparana			deciduous trees and shrubs
Spilonota ocellana			trees, shrubs and herbaceous plants
Tortrix viridana	Green Oak Tortrix		oak
Zeiraphera isertana			oak
Yponomeutidae			
Argyresthia bonnetella			caterpillar feeds in the shoots of hawthorn
Argyresthia brockeella			birch and alder
Plutella xylostella			primary immigrant from overseas; temporary resident on Cruciferae
Prays fraxinella			feeds in buds, shoots and leaves of ash trees
Yponomeuta evonymella			Prunus padus - but also an immigrant from overseas
Yponomeuta padella			hawthorn and blackthorn - in the buds
Ypsolopha parenthesella			oak, hornbeam, birch, hazel and other trees
Zygaenidae			

Group / species	English name if available	National status	Ecological associations
Zygaena filipendulae	Six-spot Burnet		Lotus corniculatus
MECOPTERA	**SCORPION FLIES**		
Panorpidae			
Panorpa germanica			edge habitats
MYRIAPODA: CHILOPODA	**CENTIPEDES**		
Cryptopidae			
Cryptops hortensis			amongst litter - often synanthropic
Lithobiidae			
Lithobius forficatus			many habitats
MYRIAPODA: DIPLOPODA	**MILLIPEDES**		
Glomeridae			
Glomeris marginata	Pill Millipede		deciduous woodland, bare rock and other habitats, but avoids sand dunes and disturbed ground
Julidae			
Tachypodoiulus niger	a snake millipede		many habitats and often found climbing trees
NEUROPTERA	**LACEWINGS**		
Chrysopidae	**green lacewings**		
Chrysopa perla			aphid predator amongst herbage
Chrysoperla carnea			aphid predator of trees and bushes
Cunctochrysa albolineata			predatory on aphids in tree foliage
Nineta flava			thought to be associated with oak, feeding on aphids on the leaves
Coniopterygidae	**wax flies**		
Conwentzia pineticola			arboreal species associated with pine trees
Hemerobiidae	**brown lacewings**		
Hemerobius humulinus			trees and bushes, hedges, etc
Hemerobius lutescens			trees and bushes, hedges, etc
Micromus variegatus			probably a predator of root aphids
Wesmaelius subnebulosus			larvae are aphid predators on trees and bushes
ORTHOPTERA	**GRASSHOPPERS AND CRICKETS**		
Acrididae			
Chorthippus albomarginatus	Lesser marsh Grasshopper	Local	grasslands - has spread inland from coastal stations
Chorthippus brunneus	Field grasshopper		grassland
Chorthippus parallelus	Meadow grasshopper		grassland
Conocephalus discolor	Long-winged Cone-head	NS(Na)	coarse vegetation on the coast - recently it has colonised inland sites
Tettigoniidae			
Leptophyes punctatissima	Speckled Bush-cricket		rough herbage and scrub
Meconema thalassinum	Oak Bush-cricket		oak trees, especially when at the woodland edge
Metrioptera roeselii	Roesel's Bush-cricket	NS(Nb)	long grassland
PSOCOPTERA	**BARK LICE**		
Ectopsocidae			
Ectopsocus briggsi			on the leaves of trees
Ectopsocus petersi			associated with trees and bushes
Stenopsocidae			
Graphopsocus cruciatus			associated with broad-leaved trees

APPENDIX 2: INVERTEBRATE STATUS CODES

Earlier published reviews of scarce and threatened invertebrates employed the Red Data Book criteria used in the British Insect Red Data Book (Shirt 1987) with the addition of the category RDBK (Insufficiently Known) after in 1983. In addition, the status category Nationally Notable (now termed Nationally Scarce) was used from 1991. The original criteria of the International Union for the Conservation of Nature (IUCN – now called the World Conservation Union) for assigning threat status used in these publications had the categories *Endangered*, *Vulnerable*, and *Rare*, which were defined rather loosely and without quantitative parameters. The application of these categories was largely a matter of subjective judgment, and it was not easy to apply them consistently within a taxonomic group or to make comparisons between groups of different organisms. The deficiencies of the old system were recognised internationally, and in the mid-1980s proposals were made to replace it with a new approach which could be more objectively and consistently applied. In 1989, the lUCN's Species Survival Commission Steering Committee requested that a new set of criteria be developed to provide an objective framework for the classification of species according to their extinction risk. The first, provisional, outline of the new system was published in 1991. This was followed by a series of revisions, and the final version adopted as the global standard by the IUCN Council in December 1994. The guidelines were recommended for use also at the national level. In 1995, the Joint Nature Conservation Committee (JNCC) endorsed their use as the new national standard for Great Britain, and subsequent British Red Data Books have used these revised IUCN criteria. These criteria are used in this present report and are as follows:

EXTINCT (EX) A species is *Extinct* when there is no reasonable doubt that the last individual has died.

EXTINCT IN THE WILD A species is *Extinct* in the wild when it is known to survive only in cultivation, in captivity or as a naturalised population (or populations) well outside the past range.

CRITICALLY ENDANGERED
A species is *Critically Endangered* when it is facing an extremely high risk of extinction in the wild in the immediate future, as defined by any of the following criteria:

A. Population reduction in the form of either of the following:

1. An observed, estimated, inferred or suspected reduction of at least 80% over the last 10 years or three generations, whichever is the longer, based on direct observation, an index of abundance appropriate for the species, a decline in area of occupancy, extent of occurrence and/or quality of habitat, actual or potential levels of exploitation or the effects of introduced species, hybridisation, pathogens, pollutants, competitors or parasites.
2. A reduction of at least 80%, projected or suspected to be met within the 10 years or three generations, whichever is the longer, based any of these parameters.

B. Extent of occurrence estimated to be less than 100 Km^2 or areas of occupancy estimated to be less than 10 Km^2 and estimates indicating any <u>two</u> of the following:

1. Severely fragmented or known to exist at only a single location.
2. Continuing decline, observed, inferred or projected, in any of the following: a. extent of occurrence b. area of occupancy c. area, extent and/or quality of habitat d. number of locations or sub-populations e. number of mature individuals
3. Extreme fluctuations in extent of occurrence, area of occupancy, number of locations or sub-populations or number of mature individuals.

C. Population estimated to number less than 250 mature individuals and either:

1. An estimated continuing decline of at least 25% within 3 years or one generation, whichever is longer or
2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals and population structure in the form of either severely fragmented *(i.e.* no sub-population estimated to contain more than 50 mature individuals) or all individuals are in a single sub-population

D. British population estimated to number less than 50 mature individuals.

E. Quantitative analysis showing the probability of extinction in the wild of at least 50% within 10 years or 3 generations, whichever is the longer.

ENDANGERED (Formerly RDB category 1)

A species is Endangered when it is not *Critically Endangered* but is facing a very high risk of extinction in the wild in the near future, as defined by any of the following criteria:

A. Population reduction in the form of either of the following:

1. An observed, estimated, inferred or suspected reduction of at least 50% over the last 10 years or three generations, whichever is the longer, based on direct observation, an index of abundance appropriate for the species, a decline in area of occupancy, extent of occurrence and/or quality of habitat, actual or potential levels of exploitation or the effects of introduced species, hybridisation, pathogens, pollutants, competitors or parasites.
2. A reduction of at least 50%, projected or suspected to be met within the 10 years or three generations, whichever is the longer, based any of these parameters.

B. Extent of occurrence estimated to be less than 5,000 Km^2 or areas of occupancy estimated to be less than 10 Km^2 and estimates indicating any <u>two</u> of the following:

1. Severely fragmented or known to exist at no more than five locations.
2. Continuing decline, observed, inferred or projected, in extent of occurrence, area of occupancy, area, extent and/or quality of habitat, number of locations or sub-populations or the number of mature individuals.

C. Population estimated to number less than 2500 mature individuals and either:

1. An estimated continuing decline of at least 20% within 5 years or 2 generations, whichever is longer or
2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals and population structure in the form of either severely fragmented *(i.e.* no sub-population estimated to contain more than 250 mature individuals) or all individuals are in a single sub-population

D. British population estimated to number less than 250 mature individuals.

E. Quantitative analysis showing the probability of extinction in the wild of at least 20% within 20 years or 5 generations, whichever is the longer..

VULNERABLE (Formerly RDB category 2)

A species is *Vulnerable* when it is not *Critically Endangered or Endangered but* is facing a high risk of extinction in the wild in the medium-term future, as defined by any of the following criteria (A to E):

A. Population reduction in the form of either of the following:

1. An observed, estimated, inferred or suspected reduction of at least 20% over the last 10 years or three generations, whichever is the longer, based on direct observation, an index of abundance appropriate for the species, a decline in area of occupancy, extent of occurrence and/or quality of habitat, actual or potential levels of exploitation or the effects of introduced species, hybridisation, pathogens, pollutants, competitors or parasites.
2. A reduction of at least 20%, projected or suspected to be met within the 10 years or three generations, whichever is the longer, based any of these parameters.

B. Extent of occurrence estimated to be less than 20,000 Km^2 or areas of occupancy estimated to be less than 20,000 Km^2 and estimates indicating any <u>two</u> of the following:

1. Severely fragmented or known to exist at no more than ten locations. Continuing decline, observed, inferred or projected, in extent of occurrence, area of occupancy, area, extent and/or quality of habitat, number of locations or sub-populations or the number of mature individuals.
2. Extreme fluctuations in extent of occurrence, area of occupancy, number of locations or sub-populations or number of mature individuals.

C. Population estimated to number less than 10,000 mature individuals and either:

1. An estimated continuing decline of at least 10% within 10 years or 3 generations, whichever is longer or
2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals and population structure in the form of either severely fragmented *(i.e.* no sub-population estimated to contain more than 1000 mature individuals) or all individuals are in a single sub-population

D. Population very small or restricted in the form of either of the following:

1. Population estimated to number less than 1,000 mature individuals.
2. Population is characterised by an acute restriction in its area of occupancy (typically less than 100 km) or in the number of locations (typically less than 5). Such a species would thus be prone to the effects of human activities (or stochastic events whose impact is increased by human activities) within a very short period of time in an unforeseeable future, and is thus capable of becoming *Critically Endangered* or even *Extinct* in a very short period.

E. Quantitative analysis showing the probability of extinction in the wild of at least 10% within 100 years.

LOWER RISK (Formerly RDB category 3)
A species is Lower Risk when it has been evaluated but does not satisfy the criteria for any of the categories *Critically Endangered, Endangered* or *Vulnerable*. Species included in the Lower Risk category can be separated into three sub-categories:

• **Conservation Dependent** species which are the focus of a continuing species -specific or habitat-specific conservation program targeted towards the species in question, the cessation of which would result in the species qualifying for one of the threatened categories above within a period of five years.

• **Near Threatened** Species which do not qualify for *Lower Risk (Conservation Dependent)*, but which are close to qualifying for *Vulnerable*.

• **Least Concern**
Species which do not qualify for *Lower Risk (Conservation Dependent)* or *Lower Risk (Near Threatened)*.

DATA DEFICIENT A species is *Data Deficient* when there is inadequate information to make a direct or indirect assessment of its risk of extinction based on its distribution and/or population status. A species in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. *Data Deficient* is therefore not a category of threat or Lower Risk.

LOWER RISK (NATIONALLY SCARCE – FORMERLY NATIONALLY NOTABLE)
Species which are not included within the IUCN threat categories and are estimated to occur less than 100 hectads of the Ordnance Survey national grid in Great Britain. It should be noted that Lower Risk (Nationally Scarce) is not a threat category, but rather an estimate of the extent of distribution of these species. Lower Risk species are subdivided as follows:

Na species estimated to occur within the range of 16 to 30 10-kilometre squares of the National Grid System.

Nb species estimated to occur within the range 31 to 100 10-kilometre squares of the National Grid System.

N Diptera (flies) not separated, falling into either category Na or Nb.

NATIONALLY LOCAL (L)
Species which, whilst fairly common, are evidently less widespread than truly common species, but also not qualifying as Nationally Notable having been recorded from over one hundred, but less than three hundred, ten-kilometre squares of the UK National Grid.

ASSOCIATED DEFINITIONS

Extent of occurrence
Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary which can be drawn to encompass all the known, inferred or projected sites of present occurrence of a species, excluding cases of vagrancy. This measure may exclude discontinuities or disjunctions within the overall distributions of species (e.g. large areas of obviously unsuitable habitat) (but see 'area of occupancy'). Extent of occurrence can often be measured by a minimum convex polygon (the smallest polygon in which no internal angle exceeds 180 degrees and which contains all the sites of occurrence).

Area of occupancy
Area of occupancy is defined as the area within its 'extent of occurrence' (see definition) which is occupied by a species, excluding cases of vagrancy. The measure reflects the fact that a species will not usually occur throughout the area of its extent of occurrence, which may, for example, contain unsuitable habitats. The area of occupancy is the smallest area essential at any stage to the survival of existing populations of a species *(e.g.* colonial nesting sites, feeding sites for migratory species). The size of the area of occupancy will be a function of the scale at which it is measured, and should be at a scale appropriate to relevant biological aspects of the species. The criteria include values in km^2, and thus to avoid errors in classification, the area of occupancy should be measured on grid squares (or equivalents) which are sufficiently small.