Natural England Commissioned Report NECR192

A review of the status of Larger Brachycera flies of Great Britain

Acroceridae, Asilidae, Athericidae Bombyliidae, Rhagionidae, Scenopinidae, Stratiomyidae, Tabanidae, Therevidae, Xylomyidae.

Species Status No.29

First published 30th August 2017

www.gov.uk/natural-england

Foreword

Natural England commission a range of reports from external contractors to provide evidence and advice to assist us in delivering our duties. The views in this report are those of the authors and do not necessarily represent those of Natural England.

Background

Making good decisions to conserve species should primarily be based upon an objective process of determining the degree of threat to the survival of a species. The recognised international approach to undertaking this is by assigning the species to one of the IUCN threat categories.

This report was commissioned to update the threat status of Larger Brachycera flies last undertaken in 1991, using a more modern IUCN methodology for assessing threat.

Reviews for other invertebrate groups will follow.

This report should be cited as:

DRAKE, C.M. 2017. *A review of the status of Larger Brachycera flies of Great Britain - Species Status No.29*. Natural England Commissioned Reports, Number192.

Natural England Project Manager - David Heaver, Senior Invertebrate Specialist
david.heaver@naturalengland.org.uk

Contractor - C.M Drake

Keywords - Larger Brachycera flies, invertebrates, red list, IUCN, status reviews, IUCN threat categories, GB rarity status

Further information
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ISBN 978-1-78354-320-5

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1. Introduction to the Species Status project

1.1 The Species Status project

The Species Status project is a recent initiative, providing up-to-date assessments of the threat status of taxa using the internationally accepted Red List guidelines developed by the International Union for Conservation of Nature (IUCN) (IUCN, 2012a; 2012b; IUCN Standards and Petitions Subcommittee, 2013, 2014). It is the successor to the JNCC's Species Status Assessment project (http://jncc.defra.gov.uk/page-3352) which ended in 2008. This publication is one in a series of reviews to be produced under the auspices of the new project. Under the Species Status project, the UK's statutory nature conservation agencies, specialist societies and NGOs will initiate, resource and publish Red Lists and other status reviews of selected taxonomic groups for Great Britain which will then be submitted to JNCC for accreditation (http://jncc.defra.gov.uk/page-1773). This means that the UK's statutory nature conservation agencies and JNCC will be able to publish red lists. All publications will explain the rationale for the assessments made. The approved threat statuses will be entered into the JNCC spreadsheet of species conservation designations (http://jncc.defra.gov.uk/page-3408).

1.2 The status assessments

This review adopts the procedures recommended for the regional application of the IUCN threat assessment guidelines which can be viewed at http://cmsdocs.s3.amazonaws.com/keydocuments/Reg_Guidelines_en_web%2Bcover%2Bbackcover.pdf. Section 3 and Appendix 1 provide further details. This is a two-step process, the first identifying the taxa threatened in the region of interest using information on the status of the taxa of interest in that region (IUCN, 2001), the second amending the assessments where necessary to take into account interaction with populations of the taxon in neighbouring regions (IUCN Standards and Petitions Subcommittee, 2013). In addition, but as a separate exercise, the standard GB system of assessing rarity, based solely on distribution, is used alongside the IUCN system.

1.3 Species status and conservation action

Sound decisions about the priority to attach to conservation action for any species should primarily be based upon objective assessments of the degree of threat to the survival of a species. This is conventionally done by assigning the species to one of the IUCN threat categories. However, the assessment of threats to survival should be separate and distinct from the subsequent process of deciding which species require action and what activities and resources should be allocated.

2. Introduction to the Larger Brachycera review

The 'Larger Brachycera' is a taxonomically loose group of 11 families in three super-families consisting of 162 taxa. In the current British checklist (Chandler 1998) they comprise (in taxonomic order) the Xylophagidae, Athericidae, Rhagionidae, Tabanidae, Xylomyidae, Stratiomyidae, Acroceridae, Bombyliidae, Therevidae, Scenopinidae and Asilidae. Although the popular name has no taxonomic validity, it is a convenient label to denote a group that is popular with British Diptera recorders. They are all covered by one Recording Scheme.

The first account of threatened British Diptera was included in the *British Red Data Books: 2. Insects* (Shirt 1987). This listed 827 species of Diptera, including 46 species (including two extinct) in the 'Larger Brachycera', and gave 24 data sheets.

Table 1. Red List Categories (Shirt, 1987) for species covered in this review

Family	Category 1 Endangered	Category 2 Vulnerable	Category 3 Rare	Category 5 Endemic	Appendix No post 1900 records
Acroceridae					
Asilidae	3	3	1		1
Athericidae					
Bombyliidae		2	1		
Rhagionidae	1	1	3		
Scenopinidae					
Stratiomyidae	2	9			1
Tabanidae	3	1	4		
Therevidae	1		6		
Xylomyidae		2			
Xylophagidae	1				
Totals	11	18	15		2

This was followed by the publication of *A review of the scarce and threatened flies of Great Britain (Part 1)* (Falk 1991) which gave statuses with data sheets for 89 species (not including *Oxycera varipes* which was listed in error). Of these, 58 were included in Red Data Book categories (or extinct) and 31 were Nationally Scarce (Notable).

Table 2. Red List Categories (Falk, 1991) for species covered in this review							
Family	**Category 1 Endangered**	**Category 2 Vulnerable**	**Category 3 Rare**	**Category 5 Endemic**	**Category K Insufficiently Known (RDBK)**	**Appendix No post 1900 records**	**Notable**
Acroceridae							2
Asilidae	3	1	5		2	1	4
Athericidae			1				
Bombyliidae	1	2	1				3
Rhagionidae	1	1	2				4
Scenopinidae							1
Stratiomyidae	4	5	1			1	13
Tabanidae	3	2	6		2		2
Therevidae	1		8				1
Xylomyidae		1				1	1
Xylophagidae	1		1				
Totals	14	12	25		4	3	31

2.1 The new review

JNCC adopted revised IUCN Guidelines (IUCN 1994) in 1995, subsequently adopting the 3.1 (IUCN 2001) and subsequent revisions, making it desirable to revise the status of all species.

There have been a few new additions to the British fauna since 1991. These are the asilids *Leptarthrus vitripennis* and *Neomochtherus pallipes*, the stratiomyid *Oxycera fallenii*, the tabanid *Haematopota subcylindrica* and the therevid *Thereva cinifera*. The tabanid *Hybomitra solstitialis* has been confirmed as a extant British species, and there is an unconfirmed but possibly accurate recent photographic record of the bombyliid *Systoechus ctenopterus*. Another bombyliid record comes from a confirmed photograph of *Anthrax anthrax* taken in Cambridgeshire in 2016, an exciting near continental addition to our otherwise meagre beefly list.

The current Larger Brachycera list includes 161 (162 with *Anthrax*) species, of which four are almost certainly extinct or may never have occurred here as the records or authenticity of the specimens cannot be verified.

3. The IUCN threat categories and selection criteria as adapted for Invertebrates in Great Britain

3.1 Summary of the 2001 Threat Categories

A brief outline of the revised IUCN criteria and their application is given below. For a full explanation see Appendix 2 IUCN (2001; 2013) and the IUCN web site (http://www.iucnredlist.org/; www.iucn.org/). The definitions of the categories are given in Figure 1 and the hierarchical relationship of the categories in Figure 2. The categories *Extinct in the wild* and *Regionally Extinct* have not been applied in this review. All categories refer to the status in Great Britain (not globally).

REGIONALLY EXTINCT (RE)
A taxon is Extinct when there is no reasonable doubt that the last individual has died. In this review the last date for a record is set at fifty years before publication.

CRITICALLY ENDANGERED (CR)
A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered.

ENDANGERED (EN)
A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered.

VULNERABLE (VU)
A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable.

NEAR THREATENED (NT)
A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.

LEAST CONCERN (LC)
A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.

DATA DEFICIENT (DD)
A taxon 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 taxon 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. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate.

NOT EVALUATED (NE)
A taxon is Not Evaluated when it is has not yet been evaluated against the criteria.

Figure 1. Definitions of IUCN threat categories (from IUCN 2001 with a more specific definition for regional extinction)

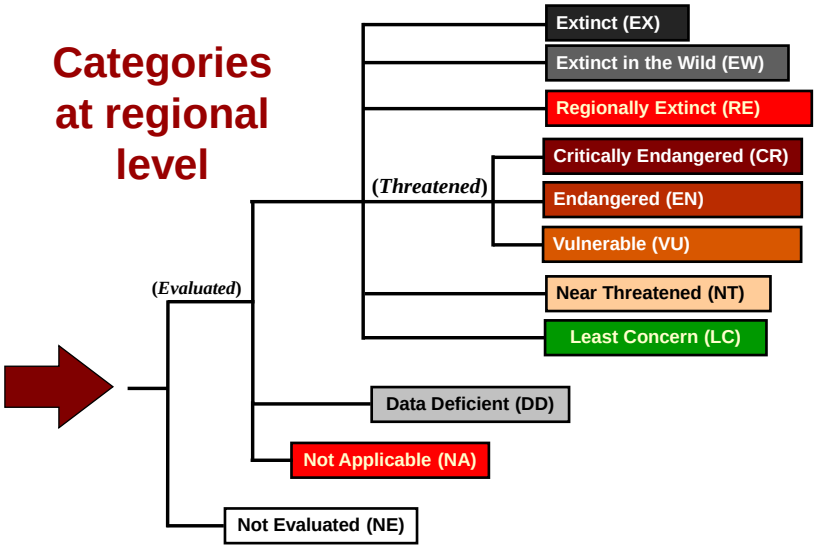

Figure adapted from IUCN (2001)

Figure 2. Hierarchical relationships of the categories

Taxa listed as *Critically Endangered*, *Endangered* or *Vulnerable* are defined as Threatened (Red List) species. For each of these threat categories there is a set of five main criteria A-E, with a number of sub-criteria within A, B and C (and an additional sub-criterion in D for the *Vulnerable* category), any one of which qualifies a taxon for listing at that level of threat. The qualifying thresholds within the criteria A-E are detailed in Appendix 2: Summary of IUCN Criteria.

In the main, the status evaluation procedure relies on an objective assessment of the available evidence. In certain cases, however, subjective assessments are acceptable as, for example, in predicting future trends and judging the quality of the habitat and methods involving estimation, inference and projection are acceptable throughout. Inference and projection may be based on extrapolation of current or potential threats into the future (including their rate of change), or of factors related to population abundance or distribution (including dependence on other taxa), so long as these can be reasonably supported. Suspected or inferred patterns in the recent past, present or near future can be based on any of a series of related factors, and these factors should be specified as part of the documentation. Some threats need to be identified particularly early, and appropriate actions taken, because their effects are irreversible or nearly so (IUCN, 2001). Since the criteria have been designed for global application and for a wide range of organisms, it is hardly to be expected that each will be appropriate to every taxonomic group or taxon. Thus a taxon need not meet all the criteria A-E, but is allowed to qualify for a particular threat category on any single criterion.

The guidelines stipulate/advise that a precautionary approach should be adopted when assigning a taxon to a threat category and this should be the arbiter in borderline cases. The

threat assessment should be made on the basis of reasonable judgment, and it should be particularly noted that it is not the worst-case scenario that will determine the threat category to which the taxon will be assigned.

The categorization process is only to be applied to wild populations inside their natural range (IUCN, 2001), with a long-term presence (since 1500 AD) in Britain. Taxa deemed to be ineligible for assessment at a regional level were placed in the category of **'Not Applicable (NA)'**. This category is typically used for introduced non-native species whether this results from accidental or deliberate importation. It may also be used for recent colonists (or attempted colonists) responding to the changing conditions available in Britain as a result of human activity and/or climate change.

3.2 Application of the Guidelines to Invertebrates

The criteria A, C, D1 and E are rarely appropriate for the Larger Brachycera as population data have not been gathered and quantitative analysis under Criterion E has not been undertaken for this species group.

In this Review, **Extent of occurrence** (EOO) is not applied to most species of Larger Brachycera as an agreed methodology for its measurement in relation to these species is not available. There are some instances where the known EOO can be measured but these are the exception. These tend to be species known to occur from one or a few sites and where their habitat resource is easily definable, in a restricted area and where intensive survey work has been undertaken to ascertain their distribution. Where EOO has been applied, the terms of this use has been defined within the status sheets on a species by species basis.

Area of occupancy (AOO) is another measure that is difficult to apply to invertebrate records and populations as defined by the IUCN guidelines (IUCN, 2012a; 2012b; 2013).

"Area of occupancy is defined as the area within its 'extent of occurrence' that is occupied by a taxon, excluding cases of vagrancy. The measure reflects the fact that a taxon will not usually occur throughout the area of its extent of occurrence, which may contain unsuitable or unoccupied habitats. In some cases (e.g. irreplaceable colonial nesting sites, crucial feeding sites for migratory taxa) the area of occupancy is the smallest area essential at any stage to the survival of existing populations of a taxon. 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 taxon, the nature of threats and the available data. To avoid inconsistencies and bias in assessments caused by estimating area of occupancy at different scales, it may be necessary to standardize estimates by applying a scale-correction factor. It is difficult to give strict guidance on how standardization should be done because different types of taxa have different scale-area relationships." (IUCN, 2012a).

The IUCN have recommended a scale of $4km^2$ (a tetrad) as the reference scale (IUCN, 2013). This needs to be applied with caution and there will be instances where a different scaling is more applicable, or where attempting to apply any scale is extremely difficult. For common

and widespread species applying this rule will lead to under-estimation of their true AOO and a degree of interpretation is required. This highlights the importance of peer review and shared expert opinion for making decisions on scale. For rarer, more restricted, species the tetrad is more applicable, in particular those species which may occur on a few fragmented sites within the UK and/or whom are often restricted to certain, well-defined habitat types that are easily identified. In most instances, the reviewer (and his peers) is best placed to judge which these species are.

3.2.1 The two-stage process in relation to developing a Red List

The IUCN regional guidelines (IUCN, 2003) indicate that if a given taxon is known to migrate into or out of the region it should be assessed using a two-stage approach. Populations in the region under review should firstly be assessed as if they were isolated taxa. They should then be reassessed and can be assigned a higher or a lower category if their status within the region is likely to be affected by emigration or immigration. Although recruitment from abroad has clearly accounted for the establishment of some newcomers to the British fauna, migration within Britain and between Britain and the Continent of populations of Larger Brachycera under threat is not considered to be a significant factor.

3.2.2 The use of the Near Threatened category

The IUCN guidelines recognise a Near Threatened category to identify species that need to be kept under review to ensure that they have not become Threatened. This category is used for species where a potential threat, natural habitat dependency or range change demand frequent review of status.

This category would be best considered for those species that come close to qualifying as CR, EN or VU but not quite; i.e. meets many but not all of the criteria and sub-criteria. For those criteria that are not quite met, there should be sufficient evidence to show that the taxon is close to the relevant threatened thresholds. As such, it is up to the reviewers to provide evidence and methods for discerning this.

The Invertebrate Inter Agency Working Group and JNCC have defined the following for the use of B2bii which is commonly used in reviews. Continuing decline has to be demonstrated – and proven that it isn't an artefact of under-recording. If decline is demonstrated then the reviewer needs to consider whether or not B2a (and B2c if the data is present) is met:

- If 10 or less current localities then Critically Endangered, Endangered, Vulnerable is applicable;
- If 11 or 12 current localities then Near Threatened applies;
- If 13-15 and the taxon can be shown to be vulnerable to a specific and realistic threat, then Near Threatened applies;
- If more than 15 locations then Least Concern applies.

4. GB Rarity Status categories and criteria

At the national level, countries are permitted under the IUCN guidelines to refine the definitions for the non-threatened categories and to define additional ones of their own. The Nationally Rare and Nationally Scarce categories are unique to Britain. Broadly speaking, the Nationally Rare category is equivalent to the Red Data Book categories used by Bratton (1991), namely: Endangered (RDB1), Vulnerable (RDB2), Rare (RDB3), Insufficiently Known (RDBK) and Extinct. These are not used in this review. The Nationally Scarce category is directly equivalent to the combined Nationally Notable A (Na) and Nationally Notable B (Nb) categories used in the assessment of various taxonomic groups (e.g. by Hyman and Parsons (1992) in assessing the status of beetles) but never used in a published format to assess the Larger Brachycera.

For the purposes of this review, the following definitions of Nationally Rare and Nationally Scarce have been applied:

Nationally Rare	Native species recorded from 15 or fewer hectads of the Ordnance Survey national grid in Great Britain since 31st December 1989 and where there is reasonable confidence that exhaustive recording would not find them in more than 15 hectads. This category includes species that are probably extinct.
Nationally Scarce	Native species which are not regarded as Nationally Rare AND which have not been recorded from more than 100 hectads of the Ordnance Survey national grid in Great Britain since 31st December 1989 and where there is reasonable confidence that exhaustive recording would not find them in more than 100 hectads.

Rather than a strict reliance of determing national rarity based on hectad counts, criteria have been derived to allow for audited deviation based on expert opinion. These are contained in Appendix 3, and deployed within the species table forming Appendix 1. Moderated status values are indicated by M in Table 6. Where M occurs on its own, this reflects a moderated status beyond Nationally Scarce, and is distinct from those taxa whose hectad count places them in a similar “common” assignment.

This national set of definitions is referred to as the GB Rarity Status within this document. Importantly, Nationally Rare and Nationally Scarce are not categories of threat.
The choice of 1990 as the start of the modern recording period for the Larger Brachycera is discussed in Section 5.2

5. Methods and sources of information in this review

5.1 Sources of data

Data were principally sourced from the Larger Brachycera Recording Scheme (LBRS) which runs under the auspices of the Dipterists Forum, and has been in existence since 1976. These data were collated by BRC at CEH, Wallingford, into a single dataset (the validated records forming the basis of the 1991 review being also on cards archived with Centre for Ecology and Hydrology at Lancaster). Where the data for some species had very high hectad counts (and so logically fell into Least Concern) the records were not considered further. Additional records, which at the time of writing were not part of the LBRS, were obtained from the Dipterists Forum's database of field meetings records held by Roger Morris, covering meetings from 2000 onwards. In addition, recent issues, back to 1990, of the entomological journals *Dipterists Digest*, *Entomologist's monthly Magazine* and the *British Journal of Entomology and Natural History* were consulted. Records were also obtained for rarer species from the NBN Gateway (www.searchnbn.net). Many of these were entirely plausible but a few were rejected as needing verification.

5.2 The spreadsheet

Data from the disparate sources were amalgamated into a single 'archive' sheet in Excel. The hectad and year were extracted from the grid reference and date using formulae. The three relevant fields of species name, hectad and year were reduced to unique 'records' by removing duplicates (using Excel's built-in function). A matrix of species against all the hectads of Britain (obtained from BRC's website) was populated with the occurrence of records using an array formula, with old (pre-1990) and recent records in two separate matrices.

It was judged that the adoption of a later date would have resulted in far too many species being found to have fewer than 100 hectads in the modern time period. This would obviously have seriously undermined the value of the assessments made. The use of this date has the consequence that Criterion B2b – continuing decline – has to rely heavily on estimation, inference and projection. The IUCN criteria assess declines based on data from the last ten years, but this clearly is not feasible for most invertebrate groups. It is rare that any fly has been comprehensively surveyed at all in the past ten years, let alone twice (to allow an estimate of change over this period). The reviewer has needed to assess whether reductions in the Area of Occupancy represent significant decline or lack of data. This will vary considerably between taxonomic groups and for different species within taxonomic groups depending on survey effort. Use of Criterion B2b for any taxon therefore demands justification by an explanation of confidence in the rate of decline.

Counts of the number of hectads occupied before and after 1989/1990 and those in common, were summed from the matrices. As the analysis was based on hectads, the number of records in the archive sheet was immaterial, especially as they included many duplicates. The final list comprised about 55,750 items (species in a hectad for a year). A copy of the key columns of this spreadsheet forms Appendix 1 of this Review.

An indication of decline was given by the percentage that ‘old’ hectads formed of all occupied hectads. This was compared with the IUCN criteria for rates of decline since 1990. Dual hectads were not usually found to be a useful measure since, on average, only 20% of hectads had both old and new records. However, high proportions of dual values for uncommon species were interpreted as indicating that the populations were moderately stable but had not expanded their range far, since recorders were clearly finding them at previously known sites but not at many new sites.

Maps were generated by splitting eastings and northings for both recent and old records, placed in separate matrices. Eastings and northings were treated as coordinates in two series on an Excel scatter graph. The outline of Britain was shown by applying a small grey dot to all hectads with land as one of the series in the graph. These maps were the basis for generalisations about distribution and the occurrence in England, Scotland and Wales.

Key habitat words were given for adults and sometimes for larvae. The key words were supplied by Natural England.

The remaining columns in the spreadsheet are self-explanatory.

Section 6 below assesses the species by their review status changes over time to provide an audit, as well as to enable faunal changes over time within this group to be seen.

6. Taxonomic list of Nationally Rare, Nationally Scarce and IUCN Red Data Book species.

This table includes moderated domestic rarity statuses, donoted by the superscript M. Where this occurs on its own it denotes a moderation beyond NS, i.e. local or common. Blank cells for this review indicate a status beyond NS as indicated by the hectad data in Appendix 1.

Species Name	Shirt 1987	Falk 1991	This review (IUCN Status)	This review (GB Rarity Status). Superscript M denotes status moderation
Acroceridae				
Acrocera orbiculus	-	-	LC	NS
Ogcodes gibbosus	-	Nb	NT	NR
Ogcodes pallipes	-	Nb	LC	NS
Asilidae				
Asilus crabroniformis	-	Nb	LC	
Choerades gilvus	RDB1	RDBK	EN	NR
Choerades marginatus			LC	M
Dioctria cothurnata	-	RDB3	LC	NS
Dioctria oelandica	-	Nb	LC	NS
Eutolmus rufibarbis	RDB2	RDB3	LC	NS
Laphria flava	RDB3	RDB3	LC	NS
Lasiopogon cinctus	-	Nb	LC	NS
Leptarthrus vitripennis	-	-	LC	NR
Leptogaster guttiventris			LC	M
Machimus arthriticus	RDB1	RDB1	EN	NR
Machimus cowini	RDB2	RDBK	EN	NR
Machimus rusticus	RDB2	RDB2	LC	NS
Neoitamus cothurnatus	RDB1	RDB1	CR	NR
Neomochtherus pallipes	-	-	CR	NR
Pamponerus germanicus	-	RDB3	LC	NS
Rhadiurgus variabilis	-	RDB3	VU	NR
Athericidae				
Atrichops crassipes	RDB3	RDB3	LC	NS[M]
Atherix ibis			LC	M
Ibisia marginata	-	-	LC	NS
Bombyliidae				
Anthrax anthrax	-	-	NE	-
Bombylius canescens	-	Nb	LC	NS
Bombylius discolor			LC	M
Bombylius minor	-	RDB2	VU	NR
Phthiria pulicaria	-	Nb	LC	NS

Systoechus ctenopterus			NE	
Thyridanthrax fenestratus	RDB3	RDB3	LC	NS
Villa cingulata	RDB2	RDB1	LC	NR
Villa modesta	-	-	LC	NS
Villa venusta	RDB2	RDB2	CR	NR
Rhagionidae				
Chrysopilus erythrophthalmus	RDB2	RDB2	LC	NS[M]
Chrysopilus laetus	RDB1	RDB1	NT	NS[M]
Chrysops viduatus			LC	[M]
Ptiolina nigra	-	Nb	LC	NS[M]
Ptiolina obscura			LC	[M]
Rhagio annulatus	RDB3	RDB3	NT	NR
Rhagio notatus			LC	[M]
Rhagio strigosus	RDB3	RDB3	VU	NR
Spania nigra			LC	[M]
Symphoromyia crassicornis			LC	[M]
Symphoromyia immaculata	-	Nb	LC	NS
Scenopinidae				
Scenopinus fenestralis			LC	[M]
Scenopinus glabrifrons	-	-	NE	
Scenopinus niger	-	Nb	NT	NS[M]
Stratiomyidae				
Beris fuscipes	-	Nb	LC	
Clitellaria ephippium	Extinct	Extinct	EX	
Chorisops nagatomii			LC	[M]
Eupachygaster tarsalis	-	Nb	LC	NS[M]
Nemotelus pantherinus			LC	[M]
Neopachygaster meromelas	-	Nb	LC	NS
Odontomyia angulata	RDB1	RDB1	VU	NR
Odontomyia argentata	RDB2	RDB2	LC	NS
Odontomyia hydroleon	-	RDB1	CR	NR
Odontomyia ornata	RDB2	RDB2	LC	NS
Oxycera analis	RDB2	RDB2	VU	NR
Oxycera dives	RDB2	RDB3	LC	NS
Oxycera fallenii	RDB2	-	VU	NR
Oxycera leonina	-	RDB1	VU	NR
Oxycera morrisii			LC	[M]
Oxycera pardalina	RDB2	Nb	LC	NS
Oxycera pygmaea			LC	[M]
Oxycera terminata	RDB2	RDB2	NT	NS[M]
Sargus cuprarius	-	-	DD	NR
Sargus flavipes			LC	[M]
Stratiomys chamaeleon	RDB1	RDB1	EN	NR
Stratiomys longicornis	RDB2	RDB2	LC	NS

Vanoyia tenuicornis			LC	M
Zabrachia tenella	-	Nb	EN	NR
Tabanidae				
Atylotus fulvus	-	Nb	LC	NS
Atylotus latistriatus	RDB3	RDB3	LC	NS
Atylotus plebeius	RDB1	RDB1	EN	NR
Atylotus rusticus	RDB1	RDB1	LC	NR
Chrysops sepulcralis	RDB2	RDB1	LC	NS[M]
Haematopota bigoti	RDB3	RDB3	LC	NS
Haematopota grandis	RDB3	RDB3	LC	NS
Haematopota pluvialis	-	-	LC	
Haematopota subcylindrica	-	-	LC	NR
Hybomitra bimaculata			LC	M
Hybomitra ciureai	RDB3	RDB3	LC	NS[M]
Hybomitra expollicata	RDB1	RDB2	NT	NR
Hybomitra lurida	-	RDB3	VU	NR
Hybomitra micans	-	RDB2	VU	NR
Hybomitra montana			LC	M
Hybomitra muehlfeldi	-	RDB3	LC	NS
Hybomitra solstitialis	-	-	EN	NR
Tabanus bovinus	-	RDBK	EN	NR
Tabanus cordiger	-	Nb	LC	NS
Tabanus glaucopis	-	RDB3	EN	NR
Tabanus maculicornis	-	-	LC	NS
Tabanus miki	-	RDBK	NT	NR
Tabanus sudeticus			LC	M
Therevidae				
Acrosathe annulata			LC	M
Cliorismia rustica	RDB3	RDB3	LC	NS
Dialineura anilis	-	RDB3	LC	NS
Pandivirilia melaleuca	RDB1	RDB1	NT	NR
Spiriverpa lunulata	RDB3	RDB3	LC	NS
Thereva bipunctata			LC	M
Thereva cinifera	-	-	NT	NR
Thereva fulva	-	RDB3	NT	NR
Thereva handlirschi	RDB3	RDB3	LC	NS[M]
Thereva inornata	RDB3	RDB3	EN	NR
Thereva plebeja			LC	M
Thereva strigata	RDB3	RDB3	EN	NR
Thereva valida	RDB3	RDB3	LC	NR
Xylomyidae				
Solva marginata			LC	M
Solva varia	-	Extinct	EX	
Xylomya maculata	RDB2	RDB2	VU	NR

Xylophagidae				
Xylophagus cinctus	-	RDB3	LC	NS[M]

7. Species listed by IUCN status category

Regionally Extinct

Asilidae	*Dasypogon diadema*
Stratiomyidae	*Clitellaria ephippium*
Xylomyidae	*Solva varia*
Xylophagidae	*Xylophagus junki*

Critically Endangered

Asilidae	*Neoitamus cothurnatus*
	Neomochtherus pallipes
Bombyliidae	*Villa venusta*
Stratiomyidae	*Odontomyia hydroleon*

Endangered

Asilidae	*Choerades gilvus*
	Machimus arthriticus
	Machimus cowini
Stratiomyidae	*Stratiomys chamaeleon*
	Zabrachia tenella
Tabanidae	*Atylotus plebeius*
	Hybomitra solstitialis
	Tabanus bovinus
	Tabanus glaucopis
Therevidae	*Thereva inornata*
	Thereva strigata

Vulnerable

Asilidae	
	Rhadiurgus variabilis
Bombyliidae	*Bombylius minor*
Stratiomyidae	*Odontomyia angulata*
	Oxycera analis
	Oxycera fallenii
	Oxycera leonina
Rhagionidae	*Rhagio strigosus*
Tabanidae	*Hybomitra lurida*

	Hybomitra micans
Therevidae	
Xylomyidae	*Xylomya maculata*
Not Evaluated	
Bombyliidae	*Anthrax anthrax*
	Systoechus ctenopterus
Data Deficient	
Stratiomyidae	*Sargus cuprarius*
Near Threatened	
Acroceridae	*Ogcodes gibbosus*
Rhagionidae	*Chrysopilus laetus*
	Rhagio annulatus
Scenopinidae	*Scenopinus niger*
Tabanidae	
	Tabanus miki
Therevidae	*Pandivirilia melaleuca*
	Thereva cinifera
	Thereva fulva

8. Species listed by GB Rarity Status Category

Nationally Rare

Acroceridae	*Ogcodes gibbosus*
Asilidae	*Choerades gilvus*
	Leptarthrus vitripennis
	Machimus arthriticus
	Machimus cowini
	Neoitamus cothurnatus
	Neomochtherus pallipes
	Rhadiurgus variabilis
Bombyliidae	*Bombylius minor*
	Villa cingulata
	Villa venusta
Rhagionidae	
	Rhagio annulatus
	Rhagio strigosus
Stratiomyidae	
	Odontomyia angulata
	Odontomyia hydroleon
	Oxycera analis
	Oxycera fallenii
	Oxycera leonina
	Sargus cuprarius
	Stratiomys chamaeleon
	Zabrachia tenella
Tabanidae	*Atylotus plebeius*
	Atylotus rusticus
	Haematopota subcylindrica
	Hybomitra expollicata
	Hybomitra lurida
	Hybomitra micans
	Hybomitra solstitialis
	Tabanus bovinus
	Tabanus glaucopis
	Tabanus miki

Therevidae	*Pandivirilia melaleuca*
	Thereva cinifera
	Thereva fulva
	Thereva inornata
	Thereva strigata
	Thereva valida
Xylomyidae	*Xylomyia maculata*

Nationally Scarce

Acroceridae	*Acrocera orbiculus*
	Ogcodes pallipes
Asilidae	
	Dioctria cothurnata
	Dioctria oelandica
	Eutolmus rufibarbis
	Laphria flava
	Lasiopogon cinctus
	Machimus rusticus
	Pamponerus germanicus
Athericidae	*Atrichops crassipes*
	Ibisia marginata
Bombyliidae	*Bombylius canescens*
	Phthiria pulicaria
	Thyridanthrax fenestratus
	Villa modesta
Rhagionidae	
	Chrysopilus erythrophthalmus
	Chrysopilus laetus
	Ptiolina nigra
	Symphoromyia immaculata
Scenopinidae	*Scenopinus niger*
Stratiomyidae	
	Eupachygaster tarsalis
	Neopachygaster meromelas

	Odontomyia argentata
	Odontomyia ornata
	Oxycera dives
	Oxycera pardalina
	Oxycera terminata
	Stratiomys longicornis
Tabanidae	*Atylotus fulvus*
	Atylotus latistriatus
	Chrysops sepulcralis
	Haematopota bigoti
	Haematopota grandis
	Hybomitra ciureai
	Hybomitra muehlfeldi
	Tabanus cordiger
	Tabanus maculicornis
Therevidae	*Cliorismia rustica*
	Dialineura anilis
	Spiriverpa lunulata
	Thereva handlirschi
Xylophagidae	*Xylophagus cinctus*

9. Criteria used for assigning species to threatened categories (see Appendix 2 for criteria and categories)

Species	**Category**	**Criteria applied**
Atylotus plebeius	EN	B2a, bii,biv
Bombylius minor	VU	B2a, bii, biv
Choerades gilvus	EN	B2a, bii, biv
Hybomitra lurida	VU	B2a, bii, biv; D2
Hybomitra micans	VU	B2a, bii, biv
Hybomitra solstitialis	EN	B2a, bii, biv
Machimus arthriticus	VU	B2a, biii, biv
Machimus cowini	EN	B2a, bii, biv.
Neoitamus cothurnatus	CR	B2a, bii, biv
Neomochtherus pallipes	CR	D1; C2aii
Odontomyia angulata	VU	B2a, bii, biv
Odontomyia hydroleon	CR	B2a, bii, biv; C2ai, ii
Oxycera analis	VU	B2a, bii, biv
Oxycera fallenii	VU	D2
Oxycera leonina	VU	D2
Rhadiurgus variabilis	VU	B2a, bii, biv
Rhagio strigosus	VU	D2
Stratiomys chamaeleon	EN	B2a, bii, biii, biv
Tabanus bovinus	EN	B2a, bii, biv
Tabanus glaucopis	EN	B2a, bii, biv
Thereva inornata	EN	B2a, bii, biv
Thereva strigata	VU	B2a, bii, biv.
Villa venusta	CR	B2a, bii, biv
Xylomya maculata	VU	B2a, bii, biii, biv
Zabrachia tenella	EN	B2a, bii. biv

10. Format of the species accounts

The species name
Nomenclature follows the most recent Diptera check list (Chandler 1998) and the updated version of this given in the Dipterists Forum website (www.dipteristsforum.org.uk). Any previous name used in Shirt (1987) or Falk (1991) is given. The English names follow those given in Stubbs & Drake (2001).

Identification
British Larger Brachycera are dealt with by Stubbs & Drake (2001) who provided keys to adults of nearly all species now known (and a few that could well be found) in Britain, and to larvae of several families. The previous standard works on this group were Oldroyd (1969) and before that the monumental work by Verrall (1909).

Distribution
Distributions were based on hectads (10km squares), often with Watsonian Vice-counties (Dandy 1969) where this was given or could be accurately judged from the grid reference. The records were plotted on maps to give a broad overview of the national distribution and these formed the basis of the statements giving the overall pattern of distributions. The method doing this is described below.

The European distribution was obtained from Fauna Europaea. The Larger Brachycera families appear in version 1 of 2004 http://www.fauna-eu.org/

Habitat and Ecology
Most of this information was obtained from Stubbs & Drake (2001) as it seemed unnecessary to repeat the research that went into this book. The 'comments' field of records submitted to recording schemes also contributed useful information.

Status
Status is largely based on range size and both short and long term trends, but association of a species with particular habitats under threat is also taken into account. Counts of hectads known to be occupied since 1990 were used to establish whether or not a species might be considered scarce. The IUCN guidelines (see Section 3) were then used to decide whether such species might also be considered under threat, and to assign a category. Detailed survey data is rare but has been used where available.

Only species which have been assessed as Critically Endangered, Endangered, Vulnerable, Near Threatened, or Data Deficient, are provided with species accounts in this Review. The status of these and all other species in this review is summarised in Appendix 1. Although this Reviews IUCN categories are from defined time periods, a few "post-review" records have been editorially included for some species, usually to provide more realistic geographical and ecological information, and these records **have not** influenced the IUCN assessment except in the case of *Neomochtherus pallipes.*

The IUCN criteria are not rigid about the need for real data, but allow for expert opinion – 'estimated, inferred, projected or suspected' are acceptable reasons. Therefore, some species currently known from fewer than one hundred hectads have been excluded from Nationally Scarce status on this basis i.e. taking an equivalent approach given that the IUCN criteria do not cover Nationally Scarce status. It is appreciated that many species of invertebrate are not yet recorded from more than one hundred hectads but might be expected to be found in more than one hundred when their distribution is better known. Thus, assessments of status can only be based on current knowledge, which is very unlikely to be comprehensive in the majority of cases, being based on the experience of a limited number of active recorders in each generation. The likely national distribution of each species and trends in population size must, therefore, be extrapolated from the available information so as to arrive at the best estimate of the likely national status of each species.

Threats

Long-term, this group may be strongly effected by climate change, although it is currently difficult to gauge to what extent this will be. In the shorter term, it is those human activities that result in the loss of sites or that change the nature of habitats that are most likely to pose the greatest threats to insect populations. Where specific threats might arise they are mentioned, otherwise the statements attempt to summarise in general terms those activities which are considered most likely to put populations of these flies at risk. Where known sites have the benefit of statutory protection, as, for example, in the case of National Nature Reserves (NNRs), this is often noted.

Management and conservation

Preventative measures and positive action designed to maintain populations are suggested where these are known or can reasonably be inferred. Inevitably, in many cases this section tends to be generalised, identifying practices that have been found to favour those aspects of the habitat with which the species may be associated. Kirby (2001) and Fry & Lonsdale (1991) provide further, more detailed, information on the management of habitats for the conservation of invertebrates.

Published sources

Literature references that refer to the previous conservation status of the species in Britain, or that have contributed information to the Data Sheet, are cited here.

11. Acknowledgements

Bjorn Beckman and Stephanie Rorke of the Biological Records Centre at CEH, Wallingford, put in considerable time in getting data to me. I thank Simon Hayhow, the national organiser of the Larger Brachycera National Recording Scheme, for allowing me to use the data, and Martin Harvey, Simon's successor, for comments on a draft. Roger Morris kindly forwarded records from the Dipterists Forum field meetings database together with his personal records. The Species Status Review Inter-Agency Working Group has variable membership depending on the Review being prepared, but in this case was composed of Steven Falk (Buglife), Mike Howe (Natural Resources Wales) and David Heaver (Natural England). The editors are grateful to Ant Maddock in JNCC for his views on the application of the IUCN criteria.

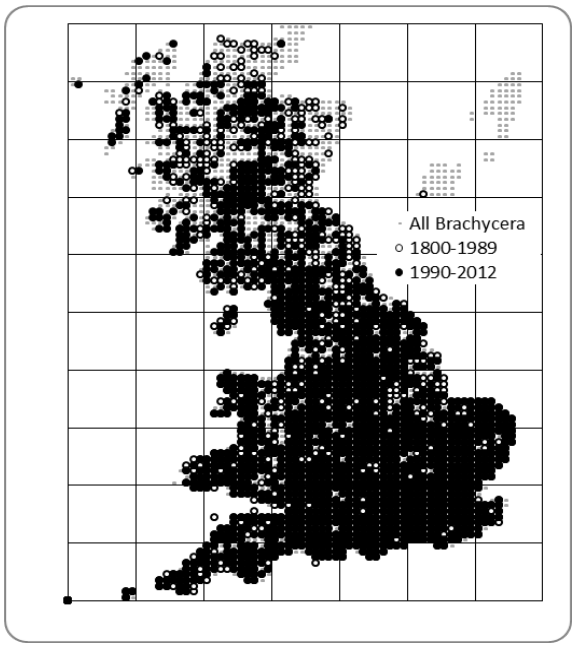

Figure 3. Distribution of records of all larger Brachycera used in the analysis

12. The data sheets

The data sheets are given in alphabetical order by scientific name within each family.

Acroceridae

The three species of hunchback-flies in Great Britain are easily recognised as a consequence of their fat dumpy shape and exceptionally large squamae. The larvae are internal parasitoids of spiders. Adults are most easily detected on isolated trees or bushes within grasslands, but are also found in similar situations on heathlands and wetlands.

OGCODES GIBBOSUS

NEAR THREATENED B2bii & iv

Smart-banded Hunchback

Order DIPTERA

Family ACROCERIDAE

Ogcodes gibbosus (Linnaeus, 1758)

Identification: Keyed by Stubbs & Drake (2001).

Distribution: Mostly confined to the southern counties of England, with a cluster of records from the New Forest, although there is a single record from Westmorland with North Lancashire (VC69). A record from Glamorgan in 1832 requires confirmation.

Habitat and ecology: Adults are most frequently encountered from June to August by sweeping the foliage of isolated or scattered scrub and trees within heathlands, valley mires and chalk grasslands. The larvae develop as internal parasites of spiders and foreign rearing records include spiders of the families Gnaphosidae, Clubionidae and Lycosidae.

Habitat key words: Isolated scrub or trees, grassland, heathland.

Status: Known from 25 hectads prior to 1990 and from just 13 hectads since. Records indicate a 61% decline and a contraction in range to a central-southern English distribution.

The species does not qualify as Threatened under Criteria A,C, or E.

It has declined from 25 hectads to only 13 and is present in less than 2,000km^2. It thus qualifies under B2bii and iv and whilst it is close to qualifying as Vulnerable (with the threshold being at 10), under B2a as it is present in 13 locations and it should therefore be considered Near Threatened. It does not meet the number of locations under D2, though does satisfy the AoO for Vulnerable, though the plausible threat is hard to satisfy.

Threats: Loss of scrub and host spider populations.

Management and conservation: The retention of isolated scrub and trees within grasslands, heathlands and wetland habitats.

Published sources: Falk (1991), Howe (2002), Stubbs & Drake (2001)

Asilidae

One of the larger families within the Larger Brachycera, with 28 species known to occur in Great Britain. Adult robberflies are predatory, feeding on a range of mostly insect prey, and though the diet of larvae has yet to be ascertained for most species is more than likely that they are as predatory as the adults.

CHOERADES GILVUS

ENDANGERED B2a, bii, biv

Ginger Robberfly

Order DIPTERA

Family ASILIDAE

Choerades gilvus (Linnaeus, 1758)

Identification: Keyed by Stubbs & Drake (2001). This is quite a moderately large species with a body length of 14-20mm.

Distribution: *Choerades gilvus* appeared for a brief period between 1938 and 1951 at nine sites with pines in Hampshire (VC12), Sussex (VC13), Surrey (VC17) and Berkshire (VC22), mostly on sand or gravel soils. Two records from 1990 were made further west than this early cluster of sites, from Crab Wood SSSI, Hampshire (VC11) and Garston Wood, Dorset (VC9), both being on the Chalk.

Its global distribution ranges widely in central Europe, northwards to Scandinavia and eastwards to central Russia and the Near East (Geller-Grimm 2004).

Habitat and ecology: All the early records specifically mentioned being from pine, whereas the two more recent records were from a broadleaved and a mixed woodland. Crab Wood lies on the Hampshire Upper Chalk plateau and is on relatively shallow clay-with-flints. It is dominated by oak *Quercus robur* standards over a hazel *Corylus avellana* shrub layer The larvae are predators of the immature stages of saproxylic weevils Curculionidae and longhorn beetles Cerambycidae.

Habitat key words: Heartwood decay.

Status: *Choerades gilvus* was thought to have been a temporary colonist but its recent presence at two sites about 40km apart suggests that it has been resident at extremely low density. Its habitat is not obviously threatened since pine is frequent in southern England in plantations and in amenity planting. *Choerades gilvus* clearly spread quickly and moderately widely in the 1940s to six hectads so has the capability to survive well in southern England. The sudden demise of the species may indicate a propensity to extreme fluctuations. If it was a recent colonist at that time, there may be genetic constraints that reduce its viability. It is unclear if the larval prey populations of saproxylic weevils and longhorn beetles have themselves been subject to declines, though clearly crop pest species such as the pine weevil *Hylobius abietis* are subject to chemical control. The concern over longhorn beetle infestation

results in similar control measures.
https://www.forestry.gov.uk/pdf/fcpn014.pdf/$FILE/fcpn014.pdf

The species does not qualify as Threatened under Criteria A,C, or E.
Choerades gilvus qualifies as Endangered under B2ab ii,iv as its current AOO is 200 km^2 (B2), it now occurs in no more than 2 locations (B2a), and it is in decline showing a reduction from 6 hectads (prior to 1980) to 2 hectads post-1980 (B2b ii, iv). Under D2 it satisfies Vulnerable both the number of locations, AoO and, given its very restricted distribution, the impacts from forestry operations which typically operate across large areas.

Threats: Wholesale felling of pine woodland or wholesale removal of old pines and associated stumps and fallen trunks at a site. Control of larval prey may be a concern.

Management and conservation: As the species has appeared in broadleaved woodland, it is presumably surviving on a wider range of hosts than originally assumed. No recommendations are possible.

Published sources: Falk (1991), Shirt (1987), Stubbs & Drake (2001) who provide all the references to earlier records

MACHIMUS ARTHRITICUS

ENDANGERED B2a, biii, biv.

Breck Robberfly

Order DIPTERA

Family ASILIDAE

Machimus arthriticus (Zeller, 1840)

Identification: Keyed by Stubbs & Drake (2001).

Distribution: *Machimus arthriticus* is confined to the Suffolk Breckland where it is known from a tight cluster of records centred on The King's Forest south of Thetford, with three other records within 20 km to the north. The distribution has not changed since the species was first recorded in Britain but there are many more records after 1990 than before, mainly from a single field meeting.

It has a wide but sparse distribution in Europe from Spain to Finland and Russia (Geller-Grimm 2004).

Habitat and ecology: The records are from open herb-rich heathland and grassland on calcareous sand. This includes such areas within rides and clearings of coniferous plantations. The larvae are almost certain to be predators in dry soil.

Habitat key words: Dry grassland, dry heath.

Status: The population appears to be persistent but very restricted in extent, with the Area of Occurrence about 40km^2 or less and few locations (see below), despite the records for all dates falling within six hectads (four since 1990). The species is clearly extremely vulnerable to any detrimental influences. A particularly strong population was observed over a period of 10 years at Elveden Centerparc (S. Falk *pers.comm*).

The species occupies just 40 km^2 of functional habitat, and though the hectad count has increased between periods, in "useable habitat" area terms this is a bit misleading. Although superficially it can be considered to be effectively one connected whole, in IUCN terms it has four locations, as threats are more likely to operate at each both independently and asynchronously. Notwithstanding the fact that the hectad count of occupied land over-estimates the extent of useable habitat, it is also clear that there will be more rides moving in and out of condition since the field records were made, so that adoption of the larger area will take in habitat that was deemed to be suitable but from which the fly was absent when surveyed for.

The species does not qualify as Threatened under Criteria A,C, or E.

Under B2 it lies in the high end of Endangered under B2a (4 hectads), B2biii (projected habitat decline), and iv (4 locations) based on a projected decline in habitat quality from scrub and bracken encroachment. It is D2 Vulnerable having 4 locations and a plausible threat. On a precautionary basis the species is categorised as Endangered as the habitat resource is small and fragile and the population restricted to it. Future Reviews should carefully assess the issues over habitat quality.

Threats: Loss of open grassland and heathland to scrub or bracken encroachment, afforestation and development. The sites are mainly grass heath with nearby arable land and conifer plantation. Spray drift and nutrient enrichment are possible threats. Some arable land is within the SSSI for farmland birds so there may be a direct conflict with other conservation aims. If grazing ceased, dense shading sward and scrub would develop.

Management and conservation: Many, if not all, of the recent sites lie within the Breckland Forest SSSI or Breckland Farming SSSI (arable fields). The habitat requirements of *Machimus arthriticus* are unknown but it is assumed that open, fairly sparse grassland is required, as would be promoted by light grazing or periodic disturbance.

Published sources: Falk (1991), Gibbs (2009), Hobby (1932), Parker (2004), Shirt (1987), Stubbs & Drake (2001)

MACHIMUS COWINI

ENDANGERED B2a, bii, biv.

Irish Robberfly

Order DIPTERA

Family ASILIDAE

Machimus cowini (Hobby, 1946)

Identification: Keyed by Stubbs & Drake (2001).

Distribution: Until recently, *Machimus cowini* was found only on the Isle of Man (VC71) where it has been recorded from several places in at least three hectads, mainly in the north of the island. It was recently found at Foulshaw Moss, Cumbria (VC69) (Smart & Wright, 2012), and records at several sites around Humphrey Head to the south-west of the Moss in 2013 confirmed that there was a population on the mainland (Stubbs, 2013). A record for Harlech, Meirionnydd (VC48) is an error for *M. cingulatus*.

Machimus cowini is rare in its entire range, which includes Ireland and a few mid European countries (France, Belgium, the Netherlands, Germany, Hungary, Croatia). The British population is therefore likely to be of global significance (Geller-Grimm 2004).

Habitat and ecology: The key features appear to be sandy soils with low scrubby vegetation. On the Isle of Man, *Machimus cowini* is associated with scrubby places, including lanes with hedges of bracken *Pteridium aquilinum* and bramble *Rubus*, and sand and gravel pits with gorse *Ulex* and bramble. In Ireland, the habitat is fixed grassland dune, with patches of bare sand that the adults sit on, and on low scrubby vegetation beside tracks in a conifer plantation on dunes (Speight 1987).

The Cumbrian records were from lowland raised mire with birch woodland on one site; this site was thought to be atypical habitat of the species (Smart & Wright 2012).

Habitat key words: Dunes; dry scrub edge.

Status: The species does not qualify as Threatened under Criteria A,C, or E.

Whilst the population on the Isle of Man is obviously restricted to the extent of the island, which at 570km^2, is less than the criterion of the extent of occurrence for 'Endangered' status, the GB mainland area which is covered by the review is much smaller, and the Manx position ignored.

Under B it satisfies Endangered B2a, B2b ii & iv. The English locations are some 11 kms apart, and re-enforcement of those populations from Manx individuals seems relatively remote, and they are probably far enough apart from each other to be considered fragmented as well. Humphrey Head protrudes out into the estuary, further adding to population isolation. Depending on the size of the founder populations , a decline could be projected. It satisfies

Vulnerable D2. Their foothold within England seems tentative at the moment, and a precautionary staus of Endangered is indicated.

Threats: The locations do not appear have obvious threats. Excessive tidying-up of lane hedges and other scrubby areas may pose a threat.

Management and conservation: No suggestions can be made as the particular habitat requirements are not known.

Published sources: Falk (1991), Hobby (1946), Howe (2002), Shirt (1987), Smart & Wright (2012), Speight (1987), Stubbs & Drake (2001)

NEOITAMUS COTHURNATUS

CRITICALLY ENDANGERED B2a, bii, biv
Scarce Awl Robberfly

Order DIPTERA

Family ASILIDAE

Neoitamus cothurnatus (Meigen, 1820)

Identification: Keyed by Stubbs & Drake (2001). This species is about 12–17 mm long. http://www.robberflies.info/keyger/htmle/ver006.html

Distribution: *Neoitamus cothurnatus* was known for a short period between 1895 and 1921 close to the city of Oxford at Stow Wood (VC23) and Tubney Wood and nearby areas (VC22). On 17 July 1997 it was found at Mynydd y Gaer, Glamorganshire (VC41), about 150km west of the original sites.

Neoitamus cothurnatus is found in central European countries and north to Finland and east to Russia (Geller-Grimm 2004).

Habitat and ecology: Adults of *Neoitamus cothurnatus* are found on the foliage of tall herbs in open woodland (Speight 1988). In France, it occurs in both broadleaved and conifer woodland. The Welsh record was from a purple moor-grass *Molinia caerulea*- jointed rush *Juncus articulatus* seepage in a glade on a bracken-covered hillside, though with significant areas of birch *Betula* and willow *Salix* scrub present (Howe 2000).

Habitat key words: Deciduous woodland.

Status: The species does not qualify as Threatened under Criteria A,C, or E.

Lack of any historic population data precludes an assessment against Criteria A and E Under C2ai it also matches Critically Endangered, having shown historic decline though that was well outside of the review period and it is not here used. D, if not fully matching D2, also indicates CR.

The species qualifies as Critically Endangered under B2a, bii and iv having been recorded in only 1 location since the previous record 76 years and, as it can be assumed that the recent record equates to a tetrad ($4km^2$) and the population has undergone a historic decline in area of occupancy and number of locations.
With only one recent record from an atypical habitat, and the apparent extinction of the earlier English colony, the species is Critically Endangered.

Threats: No threats can be identified as the recent record is in atypical habitat, and the Oxford/Berkshire woods still exist.

Management and conservation: No suggestions can be made beyond normal ride and glade management in deciduous woodlands.

Published sources: Falk (1991), Howe (2000, 2002), Shirt (1987), Speight (1988), Stubbs & Drake (2001)

NEOMOCHTHERUS PALLIPES

CRITICALLY ENDANGERED D1, C2aii

Devon Red-legged Robberfly

Order DIPTERA

Family ASILIDAE

Neomochtherus pallipes (Meigen, 1820)

Identification: Keyed by Stubbs & Drake (2001).

Distribution: *Neomochtherus pallipes* was first found in 1990 at Woodcombe, Devon (VC3) and has not been seen there again. A new population was discovered in Shropshire in 2016 (Jones *et al*, 2016)

In Europe it is found mainly in central-southern countries, northward to Poland, so it is probably on northern edge of its climatic range in England (Geller-Grimm 2004).

Habitat and ecology: *Neomochtherus pallipes* is probably a species of dry grassland. The Devon site was dry sandy cliff-top grassland on the south coast with soft rock cliff faces nearby. The Shropshire site has “sandy soils with rocks and sheltering trees”.

Habitat key words: Dry grassland.

Status: The single review period record in 1990 is probably sufficient to allow the assignment of a threat category other than Data Deficient; it has not been seen since there. The original record noted a number of individuals on the cliff top, suggesting a small population rather than an adventive event.

Though outside of the Review period, the new Shropshire record is of such significance that it cannot be ignored. It remains unclear if the Devon population now exists , though the species does seem to have a very short flight period, and this over coastal ground that is hard and hazardous to collect over.

The species does not qualify as Threatened under Criteria A or E.

The species qualifies as Critically Endangered on two criteria. Being a large species (11mm body length) and capable of easy field observation, it meets D1 (<50 mature individuals along the coastal strip). The species has not been refound there although no very recent searches appear to have been made. If the Shropshire population is assumed to have been in existence at the same time as the Devon one, but not discovered, then the assumed decline of the Devon population meets C2aii for Critically Endangered for the UK population. Applying B2a, B2biv,v might suggest either Endangered if both populations are considered extant, or Critically Endangered if only the Shropshire population exists. Given the threats around potential habitat change and shading, the higher threat category seems appropriate.

Threats: Presumably loss or deterioration of dry grassland on south-facing coastal cliffs would adversely affect the species. Shading and subsequent localised cooling might be an issue for a species on the its range edge.

Management and conservation: The Devon site is within the Prawle Point and Start Point SSSI. The Shropshire site is a Forestry Commission woodland.

Published sources: Stubbs (1997), Stubbs & Drake (2001)

RHADIURGUS VARIABILIS

VULNERABLE B2a, bii, biv

Northern Robberfly

Order DIPTERA

Family ASILIDAE

Rhadiurgus variabilis (Zetterstedt, [1838])

Identification: Keyed by Stubbs & Drake (2001).
http://www.robberflies.info/keyger/htmle/rhavar.html

Distribution: *Rhadiurgus variabilis* is a Scottish species with its distribution centred on the Highlands (VC92, 95, 96). Old records were more widespread, reaching southwards to Tentsmuir Forest (VC85) and a few sites in Perthshire (VC88).

Rhadiurgus variabilis is found in boreal European countries, with France and the Czech Republic being the most south-western (Geller-Grimm 2004). It is therefore probably restricted climatically within Britain to the north-east of Scotland.

Habitat and ecology: *Rhadiurgus variabilis* is species of forest glades and margins, especially in ancient Caledonian pine forest where heather and other dwarf shrubs occur. The current surveyed area of native pinewoods in Scotland is 87,599 hectares (Forestry Commission Scotland,2014), though it is probable that *Rhadirgus* might be able to utilise only a northern subset of this resource.It has also been found in conifer plantations on dunes, and can be found on partially vegetated river shingle. The larvae are soil-dwelling predators.

Habitat key words: Pine forest, woodland edge, exposed riverine sediment.

Status: *Rhadiurgus variabilis* has been recorded from 7 hectads since 1990, down from 17 in the previous period. There has been some second period recording effort, including the 2012 Speyside field meeting of the Dipterist forum. There is some suggestion of a contraction in range, with only one recent (post-1990) record outside the Highland area and about two-thirds of all hectads being represented by older records. Its apparent preference for ancient Caledonian pine forest indicates a need for a particularly type of uncommon woodland, although its occurrence in plantations indicates some flexibility at least as a foraging adult. The species is therefore both rare and its habitat is under a small degree of threat.

The species does not qualify as Threatened under Criteria A,C, or E.

The species qualifies as Vulnerable under B2a having 7 current locations, and under B2b ii,iv with both area of occupancy and number of locations supported by a decline from 17 to 7 hectads between the two periods. One might consider B2biii, though it is harder to match woodland condition declines with the locations; given the extent of herbivore impacts it might be inferred that there has been some impact on woodland condition. Under D2, the AoO of 7 hectads is <20 km^2 so meets Vulnerable, though again whether the widespread deer browsing threat impacting all populations is significant to drive it to CR is more debatable.

Threats: Degradation of open spaces within old pine forest is a probable threat. Development pressure within the Cairngorms National Park could reduce the area of suitable habitat. Herbivore impact is seen as the greatest threat to native pinewood condition, followed by impacts from non-native tree species. There is a current disease threat to pines from *Dothistroma* Needle Blight (DNB) (Forestry Commission Scotland,2014)

Management and conservation: Maintain glades and rides within old pine woodland, and allow pine woodland to continue to grow next to larger rivers with exposed sediments.

Published sources: Falk (1991), Godfrey (2001), Parker (2006), Stubbs & Drake (2001), Verrall (1909)

Bombyliidae

There are nine species of bee-fly in Great Britain, most of which have restricted distributions with a marked preference for warm microclimates in southern England. *Bombylius* species are parasitoids of solitary bees, their larvae consuming bee larvae within the hosts' nests. The hosts of *Villa* are probably the larvae of noctuid moths, whilst the tiny *Phthiria* is likely to be a parasitoid of micro-moth larvae. In 2016, the near continental *Anthrax anthrax* was photographed at a "bee-hotel" in Sutton, Cambridgeshire by Rob Mills (Mills & Harvey, 2016). It remains to be seen if this will lead to another generation. It stands as Not Evaluated.

BOMBYLIUS MINOR

VULNERABLE B2a, bii, biv; D2.

Heath Bee-fly

Order DIPTERA

Family BOMBYLIIDAE

Bombylius minor (Linnaeus, 1758)

Identification: Keyed by Stubbs & Drake (2001).

Distribution: Since 1990, *Bombylius minor* has been found only on the heaths of south-east Dorset (VC9) where it is moderately widespread and recorded in seven hectads, although this gives an exaggerated impression of populations confined to the remaining heathland. It is also present on the Isle of Man (VC71). Before 1990 it was recorded more widely but the only records that seem plausible or have been confirmed are North Devon (no locality data) (VC4), Lyme Regis, Dorset (VC9), Shanklin, Isle of Wight (VC10), Ringwood, Hampshire (VC11) and Barmouth, Meirionnydd (VC48) (19th century). Others are likely to be errors for *B. canescens*.

Bombylius minor is a widespread European species (Greathead &Evenhuis, 2004).

Habitat and ecology: *Bombylius minor* is a species of dry open heathland. It is not closely associated with bare paths, unlike other heathland flies, though the presence of small yellow composites on sandy paths are a nectar lure for it. The main host is the bee *Colletes succinctus* but there are records of it being associated with C. *daviesanus*. The adults feed on a range of flowers but principally on fleabane *Pulicaria dysenterica*, small yellow composites, tormentil *Potentilla erecta* and bell heather *Erica cinerea*; other flowers visited on habitats adjacent to the heaths are sea lavender *Limonium* on saltmarsh and sheep's bit *Jasione montana* on dunes.

Habitat key words: Dry heath.

Status: *Bombylius minor* is currently confined within the review geographical area to the Dorset heaths (and the assessment excludes the Isle of Man). It shows a small reduction in

range since it has not been reported recently at nearby areas (Isle of Wight, New Forest) where it once occurred. While the population appears locally to be stable, it has a low density and may be highly localised on the heaths. It shows a 50% decline in the number of occupied hectads (fourteen down to seven), and a rather small proportion of hectads are in common before and after 1990 which suggests that recording has still to cover all its likely terrain in the Dorset heaths, though much targeted research was undertaken within the second recording period. The Dorset heaths have contracted in area considerably and are still under threat from development.

The species does not qualify as Threatened under Criteria A, C, or E.

This species qualifies as Vulnerable under B2a as it has an AoO of less than700km^2 and occurs at 7 sites and under B2bii and iv as it's AoO and number of locations have been in decline. Under D2 it does not meet the number of locations, but does satisfy Vulnerable under both the AoO and the threats. The latter are real as the species has a dependency of bee nesting colonies which can easily be destroyed.

Threats: The main threats are from extensive fires, housing and industrial development and increasingly dense vegetation, followed by scrub and tree encroachment, due to lack of disturbance or light grazing. The last threat will remove bee nesting sites and reduce the availability of flowers on which both hosts and adult *Bombylius minor* feed.

Management and conservation: Nesting sites for host bees can be created as small steep banks on sand (not gravel or clay). Plants other than heather, for nectaring, can be encouraged by disturbance of maturing heather swards, to created 'verge heath' (the transitional stage from bare sand to closed heather). Light grazing that does not destroy the verge heath will maintain more open vegetation. Footpaths can be a useful source of the yellow composites it likes to feed on. Large areas of the Dorset heaths are currently under conservation management.

Published sources: Falk (1991), Howe (2002), Ismay & Schulten (2006), Miles (2000), Parker (2006), Payne (1974), Spilling (2003), Stubbs (1996), Stubbs & Drake (2001)

VILLA VENUSTA

CRITICALLY ENDANGERED (PRESUMED EXTINCT) B2a, bii, biv

Heath Villa

Order DIPTERA

Family BOMBYLIIDAE

Villa venusta (Meigen, 1830) [*Villa circumdata*]

Identification: Keyed by Stubbs & Drake (2001).
https://www.flickr.com/photos/63075200@N07/sets/72157629235637926/

Distribution: *Villa venusta* was last recorded in Britain in 1958. Its distribution was the Morden, Lodmoor and Gore heathlands of the Isle of Purbeck area, Dorset (VC9) and with few apparently isolated occurrences from Lyndhurst in the New Forest, Hampshire (VC11), St Helens, Isle of Wight (VC10) and Charterhouse and Chobham, Surrey (VC17). Records from elsewhere in Devon, Cornwall and Gwynedd cannot be confirmed and may be errors.

Its European distribution range is predominantly mid to southern countries although it is recorded from Scandinavia (Greathead & Evenhuis 2004). It is likely to be on the northern edge of its climatic range in Britain.

Habitat and ecology: In Britain, *Villa venusta* was a species of dry heathland. Stubbs (2009) deduced from information in Pearce (1915, 1921, 1928) that it was probably associated with grass heath or areas with heather *Calluna*, and that adults were found on bare sand of tracks. These early publications stated that it parasitised the bees *Megachile* and *Anthophora* but other *Villa* often parasitise larger moths. Adults have been recorded feeding on wild parsnip *Pastinaca sativa*, hogweed *Heracleum sphondylium* and angelica *Angelica sylvestris*.

Habitat key words: Dry heathland

Status: While the absence of a conspicuous fly for over 50 years suggests that it is probably extinct, the recent and widespread re-appearance of the related *Villa cingulata* after an absence of 62 years shows that extinction of species in this genus cannot be assumed.

The species does not qualify as Threatened under Criteria A, C, or E.

However, it meets the criteria for CR(PE). A taxon is presumed Regionally Extinct when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic UK range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form. The last record, Studland, was in both one location and in less than a single 10km^2, so this satisfies Criteria B2a, and B2bii & iv for Critically Endangered. It meets D2 only in respect of being Vulnerable.

Threats: In the past this was primarily the loss of open heathland and associated grassland to afforestation and development. Where this was not a factor, other threats included loss of open ground and short sparse vegetation by growth of heather, gorse *Ulex* and pine *Pinus sylvestris*. Rabbits may be useful in keeping open areas, so myxomatosis may have been a factor. Flowers used by adults can be scarce in heathland, especially where disturbance is minimal. Extensive fires may eradicate host moths or bees as well as the fly.

Management and conservation: No particular advice can be suggested. Large areas of its former habitat are currently under conservation management.

Published sources: Falk (1991), Howe (2002), Pearce (1915, 1921, 1928), Shirt (1987), Stubbs (1996, 2009), Stubbs & Drake (2001), Verrall (1909)

Rhagionidae

The 15 species of snipefly range in size from the 16mm *Rhagio scolopaceus*, a very common species, to the easily-overlooked 2mm *Spania nigra*. Surprisingly little is known about the feeding habits of either adult flies or larvae, although the larvae of *Chrysopilus* and *Rhagio* are thought to be carnivorous.

CHRYSOPILUS LAETUS

NEAR THREATENED B2biii

Tree Snipefly

Order DIPTERA

Family RHAGIONIDAE

Chrysopilus laetus (Zetterstedt, 1842)

Identification: Keyed by Stubbs & Drake (2001).

Distribution: *Chrysopilus laetus* was once known from only Windsor Forest, Berkshire (VC22) but in the 1980s was found in sites in the Fens area in Cambridgeshire and Norfolk (VC27, 29). Since about 1990 it has undergone an expansion of its range in the Thames Basin and has been found far more widely in England, now being recorded from Gloucestershire (VC34) in the west, and more frequently in the Fens cluster which now includes Suffolk (VC26). The Thames Basin cluster remains the strongest, with records from Oxfordshire (VC23), Berkshire (VC22), Buckinghamshire (VC24), Middlesex (VC21), Surrey (VC17) and Kent (VC16). In 2014 it was also recorded from Sandy, Bedfordshire (VC30) (Harvey, 2014). Richardson (2014) notes its occurrence in parts of north London. W.Cornwall (VC1) was added in 2015, although the Knightshayes Park record from Devon is in error (Harvey, 2015).

In Europe it is widely but rather sparsely distributed from France and Romania to Russia and Sweden, and may be uncommon across most of this range (Jozsef 2004). The expanding British population may therefore have global importance.

Habitat and ecology: *Chrysopilus laetus* is associated with ancient trees in woodland, wood pasture and even isolated old trees in arable landscapes. The larvae are saproxylic in wet wood mould slurry in the base of beech *Fagus* and in well-rotted heart wood of standing and felled poplar *Populus* (including *P. nigra*) trees, and in low rot holes. It has also been found where old hornbeam *Carpinus* was the most abundant tree. Adults have been found on birch *Betula* logs and elder *Sambucus niger* next to rotting logs.

Habitat key words: Heartwood decay

Status: *Chrysopilus laetus* was regarded as Endangered in the last review (Falk 1991) but it has been discovered more widely in recent years as a result of better field-craft. In view of its relatively uncommon and declining habitat of heartwood-rot old trees and the vulnerability of

such trees to being felled for safety reasons, there is still a great risk of the species reverting to its former very rare condition.

The species does not qualify as Threatened under Criteria A, C, or E.

It is in 14 hectads since 1990, a rise from 3 hectads in the previous period, though this is a reflection of better field craft rather than any notion of range expansion. Though it is present in less than 2,000km^2 , the decline is only met under B2biii, with a demonstrable decline in area, extent and/or quality of saproxylic habitat. (Alexander, 2014). It satisfies neither D or D2. As such, Near Threatened seems more appropriate. This is a species to watch.

Threats: Felling of old trees that are perceived as a danger to the public is the main threat now that *Chrysopilus laetus* is moving into parks and the wider countryside outside conservation sites where such trees receive a greater degree of protection.

Management and conservation: Continued publicity stressing the importance of retaining old trees is the most practical way to help the saproxylic fauna.

Published sources: Allen (1982), Damant (2002), Falk (1991), Gibbs (2006, 2009), Halstead (2011), Hawkins (2009), Ismay (2001), Jones (2009, 2010), Kirby (1998), Oldroyd (1939), Perry (2000, 2009, 2011), Shirt (1987), Stubbs & Drake (2001)

RHAGIO ANNULATUS

NEAR THREATENED B2

Wood Snipefly

Order DIPTERA

Family RHAGIONIDAE

Rhagio annulatus (De Geer, 1776)

Identification: Keyed by Stubbs & Drake (2001).

Distribution: *Rhagio annulatus* occurs in a narrow swathe of southern England from Herefordshire (VC36) to Surrey (VC17), with an outlier in Dorset (VC9). Two records from Scotland may be errors but the species is recorded well north of Scotland in Scandinavia, so these records cannot be totally dismissed.

Its European distribution range is wide, covering many northern European countries and extending northwards to Scandinavia (Jozsef 2004).

Habitat and ecology: The habitat associations are unclear but *Rhagio annulatus* is probably a species of woodland edge with dappled shade (Stubbs & Drake 2001). It has been found in wet and dry woodland. Some sites are on base-rich soils, including chalk, but this is not a consistent factor.

Habitat key words: Deciduous woodland

Status: *Rhagio annulatus* has been recorded from six hectads since 1990, a reduction from ten in the previous recording period. One of the most recent period records is in Scotland and may be an error. It does show a decline and there are no recent records from the west of its range in England, so its range may have contracted slightly. Only one hectad has records before and after 1990 so it may be well under-recorded. However, there has been no focused recording work on this species and whilst survey work has been done in the areas where it may be found, its close resemblance to *R. tringarius* may lead it to being dismissed in the field as this common species and so will not often be closely examined.

The species does not qualify as Threatened under Criteria A,C, or E.

It has declined from 25 hectads to only 13 and is present in less than 600 km^2. It meets the AoO for Vulnerable under B2, but is only close to qualifying as Vulnerable as under B2a it is present in 13 locations. There is no evidence of severe fragmentation, with the populations occurring in larger landscape-scale habitats, and no evidence that it undergoes extreme fluctuations in numbers. Under D2 it fails to meet either the number of locations or the AoO threshold. It should be considered Near Threatened.

Threats: The main threat is possibly damage to a graduated woodland edge, for example by removing a scrubby border and loss of wide rides.

Management and conservation: Conventional ride and glade maintenance are recommended.

Published sources: Audcent (1930), Chandler (1983), Collins (2000), Falk (1991), Parker (2005), Porter (1992), Shirt (1987), Stubbs & Drake (2001)

RHAGIO STRIGOSUS

Vulnerable D2

Yellow Downlooker Snipefly

Order DIPTERA

Family RHAGIONIDAE

Rhagio strigosus (Meigen, 1804)

Identification: Keyed by Stubbs & Drake (2001).

Distribution: *Rhagio strigosus* has been reliably recorded from a small area of the Chilterns within Berkshire and Oxfordshire (VC22, 23) and from the North Downs around Box Hill, Surrey (VC17). A close outlier at Bagley Wood near Oxford (VC23) may be incorrect although the wood lies on Corallian limestone. Records that are regarded as most probably incorrect are Blakeway Coppice on Wenlock Edge, Shropshire (VC40) which is also on

limestone, Shobdon Marsh, Herefordshire which is on Old Red Sandstone, and Ferndown, Dorset (VC9) which is heathland.

Its European distribution extends from Spain to Russia but not further north than Britain and the Netherlands (Jozsef 2004). It is likely to be on the northern edge of its climatic range in England.

Habitat and ecology: *Rhagio strigosus* is associated with the Chalk although the overlying soil may be clay. It is found on isolated trees, for example, in hedgerows in arable farmland, as well as in old chalk grassland. The surrounding habitat is usually old grassland within scrub or woodland.

Habitat key words: Dry grassland, scrub

Status: *Rhagio strigosus* has been recorded from seven hectads since 1990. Over half of these have pre-1990 records, indicating that the species has a persistent but tiny population in these squares. There has been a small decline in records, but even when the possibly incorrect outlying records are excluded, the population appears to have maintained itself so far better than many other rare species.

The species does not qualify as Threatened under Criteria A,C, or E.
Records have declined from 10 hectads to only 7 and it is present in an AoO of considerably less than 2,000km^2. It does not meet D2 in terms of locations, though does in AoO, and there has been a decline in the number of records, and the population is very restricted so satisfies Vulnerable. Reduction in habitat structure is a plausible threat here. It also qualifies under B2bii and iv as Vulnerable (with the threshold being at <10 locations).

Threats: The main threat is possibly damage to a transitional woodland edge, for example by removing a scrubby border and loss of wide rides. Removal of hedgerow trees may be a minor threat.

Management and conservation: Conventional ride and glade maintenance are recommended.

Published sources: Alexander & Foster (1998), Baker (1980), Biddulph (1964), Collins (2000), Falk (1991), Harvey (1998), Harvey (1999), Kidd (1955), Merrifield & Merrifield (2007), Parmenter (1955), Shirt (1987), Skidmore (1955), Stubbs & Drake (2001)

Scenopinidae

Only two species of windowfly are native to Britain. Adults are small, dark flies and most frequently encountered on windows. Larvae are thought to be predatory upon the larvae of clothes moths, fleas, carpet beetles and woodworm beetles. *Scenopinus fenestralis* is associated with synanthropic situations such as stables, houses and flour mills.

SCENOPINUS NIGER

NEAR THREATENED B2bii, biii, biv

Forest Windowfly

Order DIPTERA

Family SCENOPINIDAE

Scenopinus niger (De Geer, 1776)

Identification: Keyed by Stubbs & Drake (2001).

Distribution: The majority of records are from southern England (Devon to Suffolk) and Wales, with single records from Cumbria and Moray (VC95) in Scotland.

Habitat and ecology: Larvae are likely to feed on the larvae of dermestid and woodworm beetles in heart-rot, rot-holes and bracket fungi on veteran broadleaved trees including oak and beech. Alexander (2005) reported that the species emerged from a piece of bracket fungus *Ganoderma adspersum* collected from Parham Park, West Sussex.

Habitat key words: ancient trees, dead-wood, heart-rot

Status: *Scenopinus niger* has been recorded from 13 hectads since 1990, with records from 24 hectads prior to this date representing a 61% decline. Records also suggest a contraction in range. Although uncommon, the fly's secretive behaviour is likely to have led to some under-recording, and future recording may show that a rarity status of Nationally Scarce is more appropriate.

The species does not qualify as Threatened under Criteria A,C, or E.

It does not meet Vulnerable D2 in terms of locations, though does in AoO.The plausible future threat is the decline in quality of saproxylic resources documented by Alexander (2014) though with this number of locations the drive to CR is more difficult. It has declined from 24 hectads to only 13 and is present in less than 2,000km^2. It thus qualifies under B2bii and iv and whilst it is close to qualifying as Vulnerable under B2a (with the threshold being at 10 hectads), it is present in 13 locations. B2iii under the habitat decline argument also applies here. It is Near Threatened.

Threats: The loss or mis-management of parkland and loss of ancient trees.

Management and conservation: Ancient trees, particularly those in more open areas, should continue to be given high priority that should include supporting park authorities in understanding the importance of these trees.

Published sources: Alexander (1991, 1996, 2005), Stubbs & Drake (2001)

Stratiomyidae

The largest family within the Larger Brachycera, with 47 species in Britain. Ranging in size from 2mm (*Zabrachia*) to 15mm (*Stratiomys chamaeleon*), adult soldierflies are often brightly coloured and many species can be found nectaring on flowers such as hogweed. Larvae feed on a range of soft organic materials including dung (*Sargus*), compost (*Chloromyia*) and decomposing wood (*Eupachygaster*). The larvae of several genera (*Oxycera*, *Odontomyia*, *Stratiomys*), which include most of the species regarded as threatened, are aquatic or amphibious.

ODONTOMYIA ANGULATA

VULNERABLE B2a, bii, biii, biv

Orange-horned Green Colonel

Order DIPTERA

Family STRATIOMYIDAE

Odontomyia angulata (Panzer, [1798])

Identification: Adults and larvae keyed by Stubbs & Drake (2001).

Distribution: *Odontomyia angulata* is known mainly from fens and pingo sites in East Anglia, and the Cothill Fen complex, Oxfordshire (VC22), and was historically known from the Brue valley moors from Street Heath to Edington, Somerset (VC6). The East Anglian sites include the pingo sites at East Walton Common and Thompson Common, Norfolk (VC28), several fens in the Ant and Bure valleys of the Norfolk Broads (VC27), historically at Cavenham Heath and Barton Mills in the Breckland, Suffolk (VC26) and Wicken Fen, Cambridgeshire (VC29). It was also recorded in two base-enriched mire systems in the south New Forest (S. Falk pers. comm).

Odontomyia angulata is widespread and probably frequent in Europe, occurring from Spain to Russia and Scandinavia (Rozkošný & Knutson 2004b).

Habitat and ecology: *Odontomyia angulata* is a wetland species found in old fens and wet commons with pingo pools. It was historically found in a small area of the Somerset Moors where the habitat may have been grazing marsh but could have been more similar to wet fenny heath on peat. In the New Forest it is associated with mire that has input of base-rich water from the Headon Beds, and may be using tufa-enriched springs and marl as a breeding site. Larvae have been recorded from the vegetated edges of pools, and they may be amphibious rather than truly aquatic as some of the pools are ephemeral.

Habitat key words: Wetland, fen, vegetated standing water, base-rich seepage, mire.

Status: *Odontomyia angulata* has been recorded from ten discrete locations in five hectads since 1990 (one after 2011), of which four are older hectads, indicating very localised populations. The sites are fen or similar habitat of high quality, probably related to high and constant levels of ground-water and high water quality. Within each of the sites or clusters of

sites, the species is clearly very rare, even though apparently suitable habitat exists in nearby areas. The habitat requirement is therefore much more specific than just fen or pool margins. The sites are also low-lying so there may be a climatic limitation. populations.

The species does not qualify as Threatened under Criteria A,C, or E.

It does not meet Vulnerable D2 in terms of locations, though does in AoO; with the plausible future threat operating over a very short time increasing the already noted localised drying of pingo pools it suggests a higher risk to the populations.

Whilst this species qualifies as Endangered under B2 with an AoO of less than 500km^2 , it occurs at 10 locations and under B2b iv satisfies Vulnerable. The number of sites in unfavourable condition from the SSSI condition statistics, suggests legitimate use of B2biii. A status of Vulnerable is therefore assigned though it worth increasing survey effort to track any changes for these populations.

Threats: The biggest threat is likely to be lower ground-water levels and deterioration in water quality. Prolonged drought and lowering of the water table by water abstraction could reduce the availability of shallow pools on pingo sites and saturated peat in fens. Scrubbing over of pools and open fen will reduce the area of shallow water and saturated ground. Deterioration in water quality from agricultural run-off or atmospheric deposition is possible in the isolated sites close to arable farmland.

Management and conservation: Water tables should be at or close to the land surface for most of the year so that saturated ground always remains. Light grazing or mowing will reduce encroachment by reeds and scrub.

Published sources: Falk (1991), Gibbs (2012), Halstead (2004), Parker (2004), Perry (1982), Shirt (1987), Stubbs & Drake (2001)

ODONTOMYIA HYDROLEON

CRITICALLY ENDANGERED B2a, bii, biv; C2ai, ii.

Barred Green Colonel

Order DIPTERA
Family STRATIOMYIDAE

Odontomyia hydroleon (Linnaeus, 1758)

Identification: Adults and larvae keyed by Stubbs & Drake (2001).

Distribution: *Odontomyia hydroleon* is known from only two sites, Sieve Dale Fen, North Yorkshire (VC62) and Banc-y-mwldan, Ceredigion (VC46) where it has been declining and is now possibly extinct. Two unattributed records (Swanage, Dorset and north Somerset Levels, 2011) have been disregarded.

Odontomyia hydroleon is widespread and probably frequent in Europe, from Spain to Russia and Scandinavia (Rozkošný & Knutson 2004b).

Habitat and ecology: The two sites are base-rich spring-fed sites with fen vegetation and open seepages. Larvae live in the shallow seepages. As the larvae are 'scrapers' feeding on the micro-organisms on the mud or peat surface, they require open, fairly short or tussocky vegetation that does not shade the seepages. Both sites are at about 100m OD, and relatively small, Banc-y-mwldan being 18.8 ha, and Sieve Dale fen 10.4ha, though the extent of the occupied flushes is considerably less than this.

Habitat key words: Base-rich seepage, base-rich fen

Status: *Odontomyia hydroleon* is one of the rarest and most threatened soldierflies in Britain. The occupied habitat area on both sites is very small and measured in the tens of square metres, and much less than 1km at each site; Banc-y-mwldan spans two hectads, thus exaggerating the area effect. The populations are therefore susceptible to extinction. Conservation management is essential at both sites for the continued survival of the populations. The species was recorded from Banc-y-mwldan between 1986-2006, but not after this time and recent intensive survey in 2014 and 2016 have failed to relocate the species. At Sieve Dale, adults are counted annually, with numbers typically in the order of tens of individuals (e.g. 21 in 2006, 26 in 2008) at the most although numbers can fluctuate hugely from year to year.

The data do not easily support the use of Criteria E.

With count data and the apparent loss of the Welsh site, Criterion A can be considered. Whilst 1 count date on 13/07/1987 at Banc-y-mwldan did see 20 adults, more typical counts from 1986-2006 was only 2 adult flies. Whilst admittedly a sub-sample of the full adult population, the same argument also holds true at Sieve Dale, and the likelihood of capture is the same at both sites as they have similar habitat structure. Despite this, Sieve Dale holds more. As with *Stratiomys chameleon*, the difficulty of establishing a robust percentage population *decline* under A1 with the available data (despite the causes of the reduction being reversible (at least at Sieve Dale), understood, and have ceased especially in light of the recent management actions at Seive Dale) make applying it difficult.

The species qualifies as CR under B2 (AoO<10 km^2). It meets the B2a criterion in that the two sites are widely fragmented and, given the apparent halving of the UK resource, under B2b(ii,iv) as well. Based on the typical adult counts rather than the occasional population surges, and either the loss of the Welsh population or a huge reduction in that population to below effective detection, C2a i and ii satisfy CR.

D2 Vulnerable is satisfied by the speed of rank sward encroachment and shading of flushes which is a well demonstrated and documented threat, with 1 location and the AoO <20km^2. D itself is satisfied as the number of mature individuals is typically in low double figures and certainly below the 250 for Endangered, and qualifying for CR.

Threats: The habitat is vulnerable to lowering of the water table so that the springs no longer run continuously. Encroachment and shading by tall herbaceous vegetation and scrub, due to a lack of grazing, would destroy the larval habitat.

Management and conservation: Maintain light grazing or mowing. Both sites are SSSI, and the management required by *Odontomyia hydroleon* is known by the managing operators, and grazing is again in place at Sieve Dale fen.

Published sources: Crossley (2005, 2007), Falk (1991), Howe (2002), Skidmore (2000), Stubbs & Drake (2001)

OXYCERA ANALIS

VULNERABLE B2a, bii, biv

Dark-winged Soldier

Order DIPTERA

Family STRATIOMYIDAE

Oxycera analis (Wiedemann in Meigen, 1822)

Identification: Keyed by Stubbs & Drake (2001).

Distribution: Records of *Oxycera analis* from all years indicate a wide distribution in lowland England in a block from Dorset to Kent and from Herefordshire and Warwickshire to Norfolk, and covering many counties in this area. Records since 1990 show a much more limited range in a narrow band from Gloucestershire to Norfolk. A record from Durham (VC66) has been treated as an error.

Its European distribution range is central European countries from France to Ukraine, and does not extend north of Poland (Rozkošný & Knutson 2004b).

Habitat and ecology: Adults occur in fen and fen carr, and by spring-fed pools and streams on calcareous rocks, either in deciduous woodlands or at wood margins. The aquatic larvae have been collected from silt at the margins of small calcareous streams, where they live in the very shallow water film. One Warwickshire site is a flooded old railway cutting served by calcareous seepages, thus not an ancient feature.

Habitat key words: calcareous water margins, wet woodland, calcareous seepages

Status: *Oxycera analis* has been recorded from only nine hectads since 1990, from a previous period of 23 hectads. It exhibits a strong decline of 70% compared to earlier records and a marked contraction of range. There appears to have been a period when it flourished in the 1980 and 1990s but has been scarcely seen since 2000. There is only one hectad in common before and after 1990 so recording may not have detected small persistent colonies.

The species does not qualify as Threatened under Criteria A,C, or E.

It does not meet Vulnerable D2 in terms of locations or AoO, though the plausible future threat of drying or water table reductions could operate over a very short time over some of the locations.

The species qualifies as Vulnerable under B2 with an AoO of less than 2000km^2 and its the current locations now down to nine, and B2bii and iv in reflection of the 70% decline between recording periods from 23 hectads down to 9.

Threats: Drying-up of headwater springs and seepages due to continued water abstraction from calcareous aquifers, and deteriorating water quality are the main threats. Drainage of wet woodland and other habitats. The High Speed 2 proposal may threaten one of its two known Warwickshire sites.

Management and conservation: The recognised threats require intervention in the water industry's practices, and to a lesser extent how the Environment Agency can deal with nutrient enrichment of small streams.

Published sources: Falk (1991), Perry (2004), Shirt (1987), Stubbs & Drake (2001)

OXYCERA FALLENII

VULNERABLE D2

Irish Major

Order DIPTERA

Family STRATIOMYIDAE

Oxycera fallenii (Staeger, 1844)

Identification: Keyed by Stubbs & Drake (2001).

Distribution: Reliable records are confined to Ashberry Pastures and Dalby Bush Fen, North Yorkshire (VC62), which are about 15km apart. Records from Rewe Mead Meadow, Somerset (VC5), Fleam Dyke, Cambridgeshire (VC29),Walberswick, Suffolk (VC25) and Wool, Dorset (VC9) (this being a larva) are likely to be misidentifications of *O. rara*, which is more probable in these situations.

Its European range is mainly central and eastern countries but it is unreported from several countries within the range, so is likely to be rare (Rozkošný & Knutson 2004b).

Habitat and ecology: *Oxycera fallenii* is a wetland species. The feature in common to the English and Irish sites appears to seepages or small streams, often with obvious base-rich influence at English sites. Irish sites are alder swamps with streams and seepages. European records are from upland streams and torrents.

Habitat key words: base-rich seepages and streams

Status: The species was recognised in Britain only in 1997 although it was recorded in Ireland in the early 20th century. The only accepted records indicate a tiny population in the North York Moors, currently at two sites in two adjacent hectads.

The species does not qualify as Threatened under Criteria A,C, or E.

It does meet Vulnerable D2 in terms of locations and AoO, with the plausible future threats of over-shading, drying or table table reductions operating over a very short time for at least one of the locations. The data meet B2 Endangered and B2a, though the lack of decline on the trend line, with no evidence of severe fragmentation and no evidence of severe fluctuations rules out application of any B2b sub-criteria. Vulnerable seems a reasonable position though it seems close to Endangered, and survey work should track the fate of the two populations..

It probably remains at great risk since the total area of both sites is only 105ha, and much of that is unsuitable woodland. The flushed areas supporting the larvae are much smaller.

Threats: Lowering of water tables so that seepages dry out. A lack of grazing if larvae are associated with open seepages as over-shading reduces both light and warmth.

Management and conservation: No clear recommendations can be given. If larvae are associated with open seepages, then grazing will be required.

Published sources: Shirt (1987), Stubbs & Drake (2001)

OXYCERA LEONINA

VULNERABLE D2

Twin-spotted Major

Order DIPTERA

Family STRATIOMYIDAE

Oxycera leonina (Panzer, [1798])

Identification: Keyed by Stubbs & Drake (2001).

Distribution: *Oxycera leonina* has been recorded from only two pairs of closely adjacent sites: East Walton Common and Lynford Meadows, Norfolk (VC28), and Gromford Meadow SSSI and Farnham, which are in the same river catchment, Suffolk (VC25). The population at East Walton Common appears to be stable and the fly has been recorded here over several years since its discovery in 1989, the first British occurrence.

Its European distribution ranges from Spain to Russia but no further north than Denmark. It is probably more frequent in southern countries (Rozkošný & Knutson 2004b).

Habitat and ecology: Adults have been found on tree foliage, mainly that of alder *Alnus* and sallow *Salix*, by small streams, a ditch and a sluggish river. Three sites are at the junction of wet peat and dry sand and this may be significant for the larvae, which are probably amphibious or even terrestrial, and may develop on wet or damp shaded peat (Stubbs 1998), and ancient seepage systems with peat abutting sand (S.Falk *pers comm*). Rozkosný (1982) treats the larvae as terrestrial, living in soil with the decaying remnants of vegetation. As such it may be that they are particularly susceptible to draw-down effects and localised drying.

Habitat key words: damp soil

Status: The range and area occupied are small. As the records are all recent (since 1989), no decline is evident. On the face of it, the presumed habitat is not particularly uncommon or threatened but the paucity of records suggests that the fly's requirements are more specific. Both locations are currently unfavourable recovering.

The species has barely any real trend line between the two recording periods, having been added to the UK list at the extreme end of the first period, but with only 4 hectads in the second. The fact that the records have not increased, and the proximity of the locations, gives a very clumped distribution, with small range and area.

The species does not qualify as Threatened under Criteria A,C, or E.

Under Vulnerable D2 it satisfies the number of locations (4) and although on one of the locations monitoring showed no deeper pattern of drying, the site has been noted as "drier". The impacts on a near-terrestrial larvae of even small drying would probably be significant. This threat could act quickly. It is unclear if under-grazing and taller sward heights impact this species as it does the aquatic seepage species, as this has been a feature of both locations. The data meet B2 Endangered and B2a, though the lack of decline on the trend line rules out application of any B2b sub-criteria. Vulnerable seems a reasonable fit with both instances.

Threats: Excessive drought or water abstraction may make the assumed damp transitional habitat unfavourable.

Management and conservation: No guidance can be suggested.

Published sources: Falk (1991), Halstead (2004), Stubbs (1998), Stubbs & Drake (2001)

STRATIOMYS CHAMAELEON

ENDANGERED B2a, bii, biii, biv
Clubbed General

Order DIPTERA

Family STRATIOMYIDAE

Stratiomys chamaeleon (Linnaeus, 1758)

Identification: Keyed by Stubbs & Drake (2001). The key to larvae may be unreliable.

Distribution: *Stratiomys chamaeleon* was once widespread in Britain, recorded in many counties from Devon to Lincolnshire, and northwards to Cheshire and Anglesey, with a single record from Grampian. These records may include a few errors but the distribution was nevertheless wide. Since 1990 it has been recorded from only three small areas, and before that the last records were 1983 (Kent), 1968 (Middlesex) and 1963 (Suffolk). The three extant sites are Cothill Fen & Parsonage Moor SSSI plus a few adjacent areas such as Dry Sandford Pit, Oxfordshire (VC22), with adults observed at several sites near the breeding area on umbellifers (Webb et al. 2010)). A small cluster of sites in Anglesey (VC52) support it, as well as Braelangwell Wood SSSI, Highland (VC106). Unattributed recent NBN records from Suffolk and Wiltshire have been ignored.

Stratiomys chamaeleon is widely distributed in Europe (Rozkošný & Knutson 2004b).

Habitat and ecology: *Stratiomys chamaeleon* is a wetland species associated with base-rich seepages, runnels and pools in fens. In Anglesey the vegetation is dominated by tussocks of black bog rush *Schoenus nigricans* and blunt-flowered rush *Juncus subnodulosus*, in Highland by small sedges and yellow saxifrage *Saxifraga aizoides*, set in a birch-juniper *Betula- Juniperus communis* scrub, and in Oxfordshire by mixed fen vegetation with silty marl and stoneworts. Adults appear to prefer to feed on umbels, typically of hogweed *Heracleum sphondylium* or parsley water-dropwort *Oenathe lachenalii*. Larvae have been found in moss, stonewort *Chara* and sediment in tufa-rich seepages, in shallow water with little flow, avoiding the main runnels (Howe & Howe 1995; Webb *et al*. 2010). The calcium content of the water is particularly high, leading to tufa formation, and it is likely that very old seepages are required.

Habitat key words: calcareous fen, tufa springs and seepages

Status: *Stratiomys chamaeleon* has undergone a large decline (80%) which may have stabilised over the last 20 years. The area occupied is now very small, in three widely separated populations that allows little realistic chance of re-colonisation should any of them go extinct.

The species does not qualify as Threatened under Criteria C, or E.

Four of the six hectads with recent records are on Anglesey but the actual fen area here is small - a block of fen less than 0.35km^2 in extent and the occupied habitat is considerably

smaller than this. Populations are centred on Cors Bodeilio, Cors Erddreiniog, Cors Goch and Waun Eurad. Each of these can be considered a location. Previous monitoring (Howe & Howe, 1995) in the late 1980s-early 1990s. showed the Anglesey site group as being dominated by Cors Erddreiniog in terms of numbers of adults, with single figures being reported in 1987 & 1989, but with counts there going up to 19 (1990), 70 (1991) and 79 (1992). Waun Eurad peaked at 14 in 1991, with the remainder of the site showing singletons. The key site here has deteriorated over the last 10 to 15 years due to a lack of grazing, a situation only recently rectified and the population has yet to recover.

The situation at Cothill Fen and Parsonage Moor is similar with larval development possibly confined to a particular zone of wetland smaller than a football pitch. This site is also vulnerable to intensification of usage and ongoing quarrying and development proposals in the surrounding catchment. Counts at Cothill suggest a smaller population. The population at Cothill fen and Parsonage Moor as both described as "very sparse" (J.Webb *pers comm*), though she notes that the lack of good hogweed stands do not aggregate the adults as is the case at Cors Erddreiniog NNR, making adult counts harder.

Whilst it might not be unreasonable to consider that the Anglesey site cluster now holds the bulk of the UK population , and has itself declined by at least 70% (so at least matching Endangered A1, and A1a), the lack of recent adult count data make the percentage population reduction less than robust. It is considered that A1 is better than A2 since declines are reversible by grazing management, we understand the importance of open, short-sward tufaceous seepages for this species, and that the decline may have ceased given the current management work at the key sites. The lack of count data from the Scottish site make its importance currently unknown.

It is Vulnerable D2 under AoO, but not on the number of locations, and one could consider D CR based on an adult count of <50 mature adults, though the lack of count data from the Scottish site makes this harder to justify.

Although having 6 hectads in the current recording period, the ***actual*** extent of habitat for this species is very small, estimated on Anglesey at c.0.35 km^2 of occupied habitat. In addition, the species populations in Anglesey and Oxfordshire centres are highly fragmented from each other (B2a, with more than half of the GB population considered to be in part of the Anglesey fen basin SAC)) and, to a lesser extent, between individual Anglesey fen basins (historic counts suggest only 2 centres supported good numbers). The number of locations is greater than allowed for under CR. The huge drop in AoO between the two recording periods (down from 27 hectads to 6) demonstrates a clear decline, and the data meet B2bii & iv for Endangered. B2biii is referenced as habitat quality declines are still impacting the species, despite recent management initatives.

Threats: Lowering of the water table will lead to the drying-out of seepages and pools. Shading by tall herbs, reed and scrub will make the larval habitat unsuitable. Cothill Fen is threatened by pollution from run-off from adjoining agricultural fields, nearby quarrying and development of areas known to support foraging adults.

Management and conservation: Maintaining open and relatively short vegetation at seepages and pools can be achieved by light grazing and mowing. Newly dug pools may provide open habitat if existing ones become overgrown, though an emphasis must be on preserving older seepages and fens and their subtle hydrology/water chemistry. Work over

the winter of 2016-17 has aimed at reducing scrub incursion and raking out cut reed at Cothill Fen and Parsonage Moor (J.Webb pers comm), to benefit larval habitat.

Published sources: Falk (1991), Howe (2002), Howe & Howe (1995), Ismay (1978,), Kidd & Brindle (1959), Parker (2001), Philp (1989), Shirt (1987), Stubbs & Drake (2001), Verrall (1909), Webb *et al*. (2010), White (1943)

ZABRACHIA TENELLA

ENDANGERED B2a, bii, biv

Pine Black

Order DIPTERA

Family STRATIOMYIDAE

Zabrachia tenella (Jaennicke, 1866), [*Pachygaster minutissima*]

Identification: Adults and larvae keyed by Stubbs & Drake (2001).

Distribution: Historically *Zabrachia tenella* had a very wide distribution from southern England to Highland in Scotland, in at least 12 vice-counties, with three separated areas distinguishable: lowland south-east England, Cheshire – Lancashire area, and the Highlands. Since 1990, it has been recorded only in a narrow band in southern and eastern England and may follow the Greensand outcrops. It is known from four vice-counties and five hectads, two of which are the same population with records about 10km apart. Recent sites are Newton Tony, Wiltshire (VC8), Stokeford Heath, Dorset (VC9), The King's Forest in Breckland, Suffolk (VC26) and Sandy Warren, Bedfordshire (VC30).

In Europe *Zabrachia tenella* is found from France to central Russia and Sweden, especially in the more boreal countries (Rozkošný & Knutson 2004b).

Habitat and ecology: *Zabrachia tenella* is associated with pines. The larvae live under the bark of recently dead trees, in the vacated galleries of bark beetles before the bark becomes loose. The chosen trees are often those that have become shaded-out in thickets of dense young trees. Larvae have also been found in fallen trunks. On mainland Europe, other conifers including fir, larch and spruce are used, and rarely birch.

Habitat key words: bark and sapwood decay in conifers.

Status: *Zabrachia tenella* has undergone a marked decline (78%) and contraction of its range since 1990 (starting well before 1990). The reason cannot be that it is more difficult to find than many other Stratiomyidae since the difficulty would have been similar at all times.

The species does not qualify as Threatened under Criteria A,C, or E.

The species decline from 18 to 5 current hectads satisfies B2b ii & iv, and with the number of locations (4) under B2a indicating Endangered.
Under D2 , it satisfies Vulnerable under number of locations, and AoO.

Threats: The larval habitat in plantations appears to be common throughout Britain and so seems not to be the reason for the decline and scarcity, though how many commercial pine plantations leave bark beetle infested trees within a crop needs consideration.

Management and conservation: Untidy forestry practice (leaving a quantity of freshly felled or fallen trees) would benefit the species.

Published sources: Falk (1991), Perry (1992), Shirt (1987), Stubbs & Drake (2001)

Tabanidae

Thirty species of horseflies are recorded in Britain. As females require a blood meal before their eggs can mature, they are a familiar if disliked part of our fauna. The main hosts include domestic livestock and deer, and some clegs (*Haematopota*) and deerflies (*Chrysops*) are regularly recorded on humans. Males do not bite, with some feeding on nectar. Larvae mostly develop in moist or wet soil, peat or mud. With the exception of *Chrysops*, whose larvae appear to feed on decaying vegetation, larvae are active predators feeding on worms, molluscs and other fly larvae.

ATYLOTUS PLEBEIUS

ENDANGERED B2a, bii, biv

Cheshire Horsefly

Order DIPTERA

Family TABANIDAE

Atylotus plebeius (Fallén, 1817)

Identification: Keyed by Stubbs & Drake (2001). A small species with a wing length of only around 8mm.

Distribution: *Atylotus plebeius* is confined to a small cluster of sites at the conjunction of Cheshire, Shropshire and Clwyd. The sites fall into two blocks 25km apart: in the south, Bettisfield, Fenns and Whixall Mosses, and a little further north the Delamere to Abbots Moss area, which includes Abbotts Moss, Little Budworth Common, Newchurch Common, Nunsmere, Shemmy Moss and Wybunbury. The old names for some sites (for example, Delamere) cannot be located precisely. The sites lie on the Quaternary sands and gravels which are patchily distributed in these three counties. An unattributed NBN record from Yorkshire has been ignored.

In mainland Europe is found in central and northern countries to Scandinavia and Russia (Chvála 2004).

Habitat and ecology: The sites are all acidic basin mire at low altitude on sands and gravels. Adults have been found at bog pools where floating *Sphagnum* may be present. Females feed on the blood of large mammals as a prerequisite for egg development.

Habitat key words: acid mire

Status: *Atylotus plebeius* has been recorded in only two hectads since 1990, and in five on all dates, all falling within a small area that represents at most two distinct populations. Hectad counts alone show a 60% decline since 1990, and the occurrence of the species on individual mosses probably shows higher losses. The current area of acid mire in the two blocks occupied is far smaller than 100km^2. The few recent records all fall within the same small

area. The acid mire habitat in this area has diminished considerably over the years as a result of coniferisation and drainage, leaving isolated blocks that are scarce and vulnerable. Populations of *Atylotus plebeius* populations are therefore extremely vulnerable to the effects of isolation as corridors between habitat patches do not exist. A status of Endangered reflects the scarcity of lowland basin mire, the tiny range and the delicate nature of bogs. Although the few records give no indication of recent decline; the species may possibly have always been very rare and restricted in Britain.

The species does not qualify as Threatened under Criteria A,C, or E.

The species qualifies as Endangered under B2a being in two locations that occupy less than 500km^2. It is in decline, under B2b (ii & iv), where it has moved from 5 to 2 hectads, and these within a small, fragmented geographical area. In the face of the proposed habitat management, the plausible threat operating over a very short time as required under D2 is, perhaps questionable, though it otherwise satisfies Vulnerable under that criterion.

Threats: Most sites where *Atylotus plebeius* is found are in conservation management, which reflects the threat to its habitat. Threats include continued drainage for agriculture and development, and scrub (birch) encroachment.

Management and conservation: Water levels need to be kept high so that the mire continues to grow and pools remain. Birch and pine need to be controlled. Sites under failing conifer plantation could be restored to mire. 8 ha of mire are scheduled for restoration under the Forestry Commission's Delemere Forest Plan 2016-2026, as part of the wider Delamere's Lost Mosses project which itself aims to put large areas into positive management.http://www.forestry.gov.uk/pdf/DelamereFP2016Text.pdf/$FILE/DelamereFP2016Text.pdf

Published sources: Falk (1991), Goffe (1944), Howe (2002), Shirt (1987), Stubbs & Drake (2001)

HYBOMITRA LURIDA

VULNERABLE B2a, bii, biv

Broad-headed Horsefly

Order DIPTERA

Family TABANIDAE

Hybomitra lurida (Fallén, 1817)

Identification: Keyed by Stubbs & Drake (2001).

Distribution: *Hybomitra lurida* is recorded mainly in Scotland from the Highlands (VC92, 95, 96) although as far north as Sutherland (VC107), westward to Bute (VC100) and south to Dumfries and Galloway (VC73). In England there was a population at Fenns & Whixall Moss, Shropshire (VC40) and in the Delamere Forest area, Cheshire (VC58). It has recently been located in Cumbria (VC70). Improbable old records are from Kent (Philp 1989) and Gloucestershire.

Its European distribution ranges from France to Ukraine and north to Finland (Chvála 2004).

Habitat and ecology: There is little information on the ecology of *Hybomitra lurida*. It has been recorded at lowland acid mire in Cheshire and in the Spey valley in Scotland where it was presumably close to the River Spey. It has been seen sitting on sandy roads in the Maviston Sand Hills. Females feed on the blood of large mammals as a prerequisite for egg development.

Habitat key words: acid mire

Status: *Hybomitra lurida* has been recorded in ten hectads since 1990, and shows a moderately large decline (68%) since 1990 from 26 hectads. There is no marked contraction in the main northern Scottish range. The Cheshire / Shropshire population may be in decline. The wide distribution of *H. lurida* in Britain and the likelihood of a moderately strong Scottish population suggest that this species may eventually prove to be only Nationally Scarce in rarity terms, though many larger horseflies seem to decline much faster than habitat loss.

The species does not qualify as Threatened under Criteria A,C, or E.

It has declined from 26 hectads to only 10 and is present in an AoO less than 2,000km^2. It thus qualifies under B2bii and iv and is qualifying as Vulnerable as it is present in 10 locations (with the threshold being at 10) under B2a. There is fragmentation between the main Scottish range and the populations in the Cheshire / Shropshire cluster.
Under D2 it fails to meet the number of locations, though does meet AoO, though no threat can be described which drives the taxon to CR.

Additional recording in the Scottish part of the range is advised to ascertain the true extent of this part of the species range.

Threats: None can be identified.

Management and conservation: No suggestions can be made.

Published sources: Falk (1991), Howe (2002), Mawdsley (1992), Parker (2011), Philp (1989), Stubbs & Drake (2001), Telfer & Lyszkowski (2006), Verrall (1909)

HYBOMITRA MICANS

VULNERABLE B2a, bii, biv

Black-legged Horsefly

Order DIPTERA

Family TABANIDAE

Hybomitra micans (Meigen, 1804)

Identification: Keyed by Stubbs & Drake (2001).

Distribution: *Hybomitra micans* had a wide distribution in central, southern and south-west England, Wales and the Lake District. There is a single old record for the Highlands. Its current distribution is a few sites in the southern half of Wales and the Lake District and north Cumbria.

Its European distribution is from Spain to Poland but no further north than Poland (Chvála 2004).

Habitat and ecology: *Hybomitra micans* is associated with wet grasslands and rough hillside grassland near woodland, as well as with woodland rides. The woodlands include birch *Betula* woods on peat and bog, and conifer plantations on dunes. There may be an association with more acid soils such as bogs and acid pastures, and with wetter sites. Adults have been recorded feeding at hogweed *Heracleum sphondylium*. Females feed on the blood of large mammals as a prerequisite for egg development.

Habitat key words: wet hillside grassland, woodland edge

Status: *Hybomitra micans* has been recorded from eight hectads since 1990 and has undergone a large decline (76%) since then, and a very large contraction in its range. It is a large (body length 11-12mm) and distinctive tabanid and not easily under-recorded, though it does fly early in the season from mid-May to June.

The species does not qualify as Threatened under Criteria A,C, or E.

The species qualifies as Vulnerable under B2a with 8 current hectads equating to less than 800km^2 and 8 locations. The great decline in hectads recorded between the two recording periods, a reduction from 27 hectads down to 8, meet B2b (ii & iv). Under D2 it satisfies the AoO, but neither meets the number of locations (8) or a defined threat that would drive the taxon to CR.

Threats: Changes in use of wet woodlands on hillsides, such as by allowing heavy grazing of the understory and draining, may influence this species, although the limited information on its habitat requirements does not allow more specific threats to be identified.

Management and conservation: No suggestions can be made beyond the usual management of rides and glades in deciduous woodlands to maximise shelter, sunlight and flowers.

Published sources: Falk (1991), Hamm (1933, 1941), Howe (2002), Kloet (1941), Parker (1995), Stubbs & Drake (2001), Verrall (1909)

HYBOMITRA SOLSTITIALIS

ENDANGERED B2a, bii, biv

Scarce Forest Horsefly

Order DIPTERA

Family TABANIDAE

Hybomitra solstitialis (Meigen, 1820)

Identification: Keyed by Stubbs & Drake (2001).

Distribution: *Hybomitra solstitialis* was found in Chippenham Fen, Cambridgeshire (VC29) in 1886, and at several sites in the New Forest, Hampshire (VC11) between 1898 and 1934, and was again re-found here in 2011. It was recorded in 2012 from two adjacent spring-fed fens at Dry Sandford Pit and Parsonage Moor, Oxfordshire (VC23). Records from other sites in southern England require verification.

Its European distribution is from France to Poland and Sweden but it is found in far fewer countries than many other British tabanids (Chvála 2004).

Habitat and ecology: *Hybomitra solstitialis* seems be associated with mire and unshaded fen. In the strongly base-rich spring-fed Oxfordshire fens, a female was swept from short sedge and rush vegetation on the edge of a small streamlet which crosses the peat, and another female was reared from a pupa found in waterlogged moss mat near a pool. It is likely that the larvae develop in unshaded waterlogged conditions, perhaps in moss, but not in the extreme acid conditions of ombrotrophic bog. Females feed on the blood of large mammals as a prerequisite for egg development. In the New Forest, a female was observed trying to oviposit in an area of valley mire with *Myrica*, *Menyanthes*, *Eriophorum* etc. and a very teneral female that had clearly not flown, was swept in *Sphagnum* and *Eriophorum*-rich mire nearby. This is acidic, boggy mire with some base-rich influence from the Headon Beds.

Habitat key words: transition mire

Status: The species has probably always been rare and, until the recent Oxfordshire record, thought to have been confined to the New Forest. It is still known from only two sites and has undergone extreme fluctuations in abundance, being unrecorded between 1934 and 2011. The distribution is clearly fragmented. From the limited number of New Forest records with site names, the species appears to have been recorded from the same small area in which mire occupies far less than 30km^2; the area of the entire suite of Oxfordshire fen SSSI around Cothill and Dry Sandford (which may be unsuitable) amounts to less than 1km^2. Given the

apparently precise nature of the species' preferred habitat, the area of occupancy is likely to be less than 10km^2.

The species does not qualify as Threatened under Criteria A,C, or E.

The species qualified in the recent past as CR under B2a, as only 1 hectad was known for this species, though the recent addition of the Oxfordshire site does ease the position. That said, the fundamental rarity of the micro-habitat (base-enriched transitional communities in acid mire) offers up little opportunity of finding many more populations. The historic decline lies outside of the recording period, records having been absent between 1934-2011.

Under B2 it now satisfies Endangered having two locations, with the revised AoO (considerably less than 500 km^2) and number of locations (2) meeting B2b(ii,iv).
Under D2 it satisfies Vulnerable under both the AoO and number of locations, and with an acute hydrological vulnerability which could quickly move the taxon back to CR. Based on the threat, Endangered is selected to better reflect the position for this species.

Threats: These are likely to relate to drying-out of mire and fen, which is not especially likely in the New Forest. Without understanding the habitat requirements properly, no specific threats can be identified but the small size of the population makes it liable to stochastic extinction.
Management and conservation: None can be suggested.

Published sources: Stubbs & Drake (2001), Judy Webb (in litt.)

TABANUS BOVINUS

ENDANGERED B2a, bii, biv

Pale Giant Horsefly

Order DIPTERA

Family TABANIDAE

Tabanus bovinus (Linnaeus, 1758)

Identification: Keyed by Stubbs & Drake (2001).

Distribution: The only specimens that are thought to be this species are from Lyndhurst, New Forest, Hampshire (VC11) in 1897 (and on an earlier date), and the Clevedon and Gordano areas (1946 to the present), Somerset (VC6). Other specimens identified as *bovinus* are *sudeticus*. It has not been possible to identify which records have been checked and dismissed as *sudeticus*, so the accompanying spreadsheet includes more records than are known to be correct.

Tabanus bovinus has an apparently large and well-populated range in Europe (Chvála 2004) but this may be a false impression if the records are as suspect as those from Britain.

Habitat and ecology: As far as can be judged, the species is mostly associated with the ditches of grazing marsh (A.Grayson *pers comm*). Females feed on large mammals as a prerequisite for egg development.

Habitat key words: deciduous woodland, grazing marsh

Status: Based on confirmed records, *Tabanus bovinus* is known recently from only one population in North Somerset, on the assumption that it is extinct (or extremely rare) in the New Forest. The very few records suggest that it has undergone fluctuations in abundance.

The species does not qualify as Threatened under Criteria A,C, or E.

Though the most recent period data suggests an AoO within 5 hectads (down from a former period total of 19), there is much uncertainty over some of the records, and all that is known for sure is that it definitely has at least 1 population, and has undergone decline.

Under B2 it qualifies as Endangered as it is present in, at most, 5 locations and with an AoO of less than 500km^2 under B2b(ii,iv), and has undergone decline. Under D2, it satisfies Vulnerable in both AoO and number of locations, though perhaps struggles to present a clear threat that would drive the taxon to CR.

Threats: These cannot be assessed.

Management and conservation: Maintain grazing marsh ditches in a good condition, ensuring good water quality, rotational clearance and the promotion of shallow-sided banks and varied margins.

Published sources: Falk (1991), Stubbs & Drake (2001)

TABANUS GLAUCOPIS

ENDANGERED B2a, bii, biv

Downland Horsefly

Order DIPTERA

Family TABANIDAE

Tabanus glaucopis (Meigen, 1820)

Identification: Keyed by Stubbs & Drake (2001).

Distribution: *Tabanus glaucopis* had a relatively small distribution on the Chalk in central-southern England, with improbable single outliers in Cornwall (VC1), Norfolk (VC28) and Hereford (VC36). Since 1990 it has been recorded from only three areas over four hectads: Box Hill and Newlands Corner, Surrey (VC17) on the North Downs, Farley Mount,

Hampshire (VC11) on the South Downs, and Aston Rowant, Oxfordshire (VC23) on the Chilterns.

Tabanus glaucopis has a wide European distribution (Chvála 2004).

Habitat and ecology: *Tabanus glaucopis* is found on chalk grassland, perhaps in association with scrub or woodland. None of the three outlying records (see distribution) are on chalk, although the Norfolk site (a fen) was on head deposit over chalk. Adults have been recorded at wild parsnip *Pastinaca sativa*. Females feed on large mammals as a prerequisite for egg development. Egg laying was recently recorded on grass stems in dry chalk grassland, suggesting larvae cope with dry, shallow soils.

Habitat key words: chalk grassland, chalk scrub

Status: *Tabanus glaucopis* has undergone a large decline (82%) and contraction in range, having been recorded from four hectads since 1990. Together the individual sites occupy no more than 10km^2. The reason for such a contraction is not clear since there remains much chalk grassland with scrub in southern England, though drought years may impact the populations.

The species does not qualify as Threatened under Criteria A,C, or E.

If one summed the "useful" habitat area under B2 it qualifies as Critically Endangered, although spatially the AoO of 4 hectads (B2) and the 3 locations (B2a) in the current recording period better satisfy Endangered. This position supported by the decline from 21 hectads in the previous period, and a huge range contraction under B2b(ii,iv). Whilst it satisfies D2 Vulnerable for AoO and the number of locations, it is hard to see what the clear threat operating over a very short time would be, though lack of grazing, sward height and scrub invasion would have an impact.

Threats: These are unclear since scrubbed chalk grassland is a widespread common habitat.

Management and conservation: No special measures are needed; it is unlikely that over-grazing will remove all scrub on the Downs and Chilterns.

Published sources: Andrews (1934), Else (1975), Falk (1991), Goffe (1931), Parmenter (1950), Perry (2008), Stubbs & Drake (2001), Verrall (1909)

TABANUS MIKI

NEAR THREATENED B2bii, iv

Plain-eyed Brown Horsefly

Order DIPTERA

Family TABANIDAE

Tabanus miki (Brauer in Brauer & von Bergenstamm**,** 1880)

Identification: Keyed by Stubbs & Drake (2001).

Distribution: The British distribution of *Tabanus miki* is centred on the New Forest, where it has been recorded since 1931. It has also been recorded from single sites in Norfolk, Northamptonshire (VC32), Surrey (VC17), Glamorgan (VC41) and Monmouthshire (VC35).

Habitat and ecology: The habitat requirements are far from clear though it seems to prefer base-poor wetlands and wet woodlands.

Habitat key words: wet woodland, mire

Status: This species appears to be very scarce. Most records are from the New Forest but, even here, records are very few.

The species does not qualify as Threatened under Criteria A,C, or E.

It has declined slightly from 12 hectads to 10 between recording periods and is present in an AoO of less than 2,000km^2. It satisfies B2bii and iv as Vulnerable as it is present in 10 locations (with the threshold being at 10) under B2a but the magnitude of the decline remains slight and there is some constancy in the New Forest habitat resource, so it better matches Near Threatened. Under D2 it fails to meet the number of required locations (5 or less) but does meet the AoO for Vulnerable. However, the lack of a tangible or projected threat driving the taxon to CR is not apparent here. This seems a species to watch as it is on the edge of Vulnerable and might easily slip further.

Threats: These cannot be assessed.

Management and conservation: No suggestions are possible.

Published sources: Durrant (1990), Howe (1998, 2002), Howe & Howe (2001), Stubbs & Drake (2001)

Therevidae

The majority of the 13 species of stiletto-fly are associated with sandy substrates on coastal and inland dunes, exposed riverine sediments and south-facing coastal cliffs, although the most widespread species, *Thereva nobilitata*, can be found on a variety of soil types. One species, *Pandivirilia melaleuca*, is associated with old trees. Little is known of adult feeding behaviour, but the majority of larvae are predatory with a preference for beetle larvae.

PANDIVIRILIA MELALEUCA

NEAR THREATENED B2biii

Forest Silver-stiletto

Order DIPTERA

Family THEREVIDAE

Pandivirilia melaleuca (Loew, 1847)

Identification: Keyed by Stubbs & Drake (2001).

Distribution: *Pandivirilia melaleuca* has two centres of distribution: the Thames valley and Gloucestershire-Worcesteshire. Within the Thames valley, there are records from Windsor Forest, Berkshire (VC22) and its neighbourhood in Egham, Surrey (VC17) and Rowley Wood, Buckinghamshire (VC24), and with unconfirmed but probably correct larval records from Greenwich and Woolwich, Kent (VC16). It has also been found at Oakle Street and Churcham Orchards, Gloucestershire (VC34) and Drakes Broughton, Worcestershire (VC37). There are unconfirmed records based on larvae from deadwood in old trees from Cirencester Park (VC33) and Elmley Deer Park (VC37), and an old adult record from Wyre Forest, Worcestershire (VC37) which, in the light of recent records, may be correct. In 2014, it was recorded in a converted cowshed in Berrow, Worcestershire (VC37), further strengthening the county position for this species (Harvey, 2014).

Pandivirilia melaleuca is sparsely distributed in central Europe from France to Slovakia and Germany (Holston 2004). The British populations are therefore globally significant, despite their tiny size.

Habitat and ecology: Adult *Pandivirilia melaleuca* are associated almost exclusively with wood pasture in parklands where they are found by ancient trees. The record from Gloucestershire was from an old orchard. Larvae have been reared from red-rotten oak *Quercus* (e.g. Owen 1993) and less frequently from rotten beech *Fagus*, and once from wood mould at the base of a pear *Pyrus* hollowed by the chicken-of-the-woods fungus *Laetiporus sulpureus* (Alexander 2007). Captive larvae have been recorded eating larvae of moths and beetles (*Dorcus*, *Rhagium*) but not accepting larvae of the beetles in the genera *Ampedus*, *Prionychus* or *Gnorimus* (Owen 1993), although the commonest larvae were *Prionychus* in the Gloucestershire pear and was thought to be the most probable prey item there.

Habitat key words: ancient trees, dead-wood, heart-rot

Status: *Pandivirilia melaleuca* has been recorded from six hectads since 1990 in two small areas, although the total number of separate locations is at least ten. There is no indication of decline, but rather the newly found Gloucestershire and Worcestershire sites suggest that it may be a little more widespread.

The species does not qualify as Threatened under Criteria A,C, or E.

The occupation of more than ten locations and AoO do satisfy B2/B2a Vulnerable, but the lack of decline does not allow application of the B2 sub-criteria. However, it still has a very small area of occupancy that is defined by the presence of ancient trees. Its available habitat is therefore very restricted, highly vulnerable and declining (Alexander, 2014a) and thus satisfies B2biii. Under D2 it does not meet the number of locations but does for the AoO. Given the dependence on heart rot, a threat would have to operate across 9 of the 10 locations for the taxon to be pushed to CR which seems a bit unlikely given the range of tree species used (ruling out tree disease), or large-scale tree removal (across a range of owners). The species seems to be on the cusp of Near threatened and Vulnerable, though the lack of decline suggests that a status of Near Threatened might be appropriate.

Threats: Loss of old hollow trees in open situations owing to the perception of them being a danger to the public (most of the London basin sites are public parks), and over-enthusiastic pruning of such trees. Continued loss of old orchards in Worcestershire and Gloucestershire and their replacement by commercial orchards is a further threat. The long-term future of insects associated with dead-wood in the Windsor Forest area is probably moderately well assured, but removal of dead wood and compaction of soil at the base of ancient trees is a problem in other sites with public access.

Management and conservation: Ancient trees, particularly those in more open areas, should continue to be given high priority that should include supporting park authorities in understanding the importance of these trees. Attention needs to be focused on the importance of old orchards with old fruit trees.

Published sources: Alexander (1994, 2007, 2008), Allen (1965, (1968), (1982), Collin (1948), Crow (1967), Falk (1991), Hodge (1992), Ismay (1981), McGee (2010), Owen (1993), Shirt (1987), Southwood (1964), Stubbs & Drake (2001), Telfer & Harvey (2011), Verdcourt (2003), Whitehead (1992)

THEREVA CINIFERA

NEAR THREATENED D2

Large Plain Stiletto

Order DIPTERA

Family THEREVIDAE

Thereva cinifera (Panzer, [1798])

Identification: Keyed by Stubbs & Drake (2001).

Distribution: *Thereva cinifera* was only added to the British list in 1992 (Stubbs 1992) so there may be misidentified specimens from other sites sitting in collections. It is known from the River Usk at Aberffrwd and Pant-y-Goitre, Monmouthshire (VC35), Merthyr Mawr Warren and Crymlyn Burrows, Glamorgan (VC41), North Dock Dunes, Carmarthenshire (VC44), Dungeness, Kent (VC15) and Pett Levels (VC14).

Its European distribution extends from Spain to Romania and north to Scandinavia, although it is probably rather sparsely distributed. It might be expected to be found in a few other countries within this range (Holston, 2004)

Habitat and ecology: The sites are coastal dunes or shingle (Dungeness) sandy, rabbit disturbed parts of coastal grazing marsh (Pett) and the exposed riverine sediments of a sandy river, the River Usk. On dunes, adults have been collected from sparsely vegetated sand near the landward margin (Stubbs 1992). A larva reared to a male was collected in the stony to muddy backwater with reed canary grass *Phalaris* on the bank of River Usk (Skidmore 2001).

Habitat key words: dunes, river shingle

Status: The recent recognition of this species in Britain, the widely spaced localities and the two types of habitat suggest that *Thereva cinifera* may be more widespread and has been confused with similar species of both these habitats so, although it is undoubtedly rare, it may not be threatened.

The species does not qualify as Threatened under Criteria A,C, or E.

Under B2 and B2a it satisfies Endangered, though there is no trend line for the first period, thus ruling out application of the B2 sub-criteria.
It has been recorded from only five hectads since 1990 and qualifies as Vulnerable under D2, but fails to meet the immediacy required from the threat of habitat decline (Howe *et al*, 2012), suggesting that Near Threatened is more accurate. This is clearly a species to watch though.

Threats: On sandy rivers, disruption of the natural flow regime may lead to degradation of sandy deposits in which the larvae live; for example, regulation of flow will allow excessive vegetation and insufficient deposition of sand. Coastal dunes are unlikely to be threatened. Removal of shingle and industrial development are threats at Dungeness.

Management and conservation: No special measures are possible as the habitat relies on natural processes of erosion and deposition for its maintenance.

Published sources: Howe (2002), Skidmore (2001), Stubbs (1992), Stubbs & Drake (2001)

THEREVA FULVA

NEAR THREATENED B2biii

Small Plain Stiletto

Order DIPTERA

Family THEREVIDAE

Thereva fulva (Meigen, 1804)

Identification: Keyed by Stubbs & Drake (2001).

Distribution: *Thereva fulva* has a wide but very patchy southern distribution in England and Wales. In Wales it occurs on dunes on the south coast and on Anglesey. In England it has been recorded from Hampshire to Kent, including Surrey and the Thames estuary in Essex, with isolated records from Wiltshire, Gloucestershire and the Lincolnshire coast, although these require verification.

In Europe it has been recorded from Spain to Romania and no further north than Germany. It appears to be sparsely distributed (Holston 2004).

Habitat and ecology: In Wales, *Thereva fulva* is a coastal species where it is found most often on dunes, sometimes on adjacent saltmarsh, and occasionally within sallow scrub on dunes. The English records come from a range of habitats, both coastal marshes which are presumably on clay but perhaps with sand included, from a dry inland valley through the Chalk; this wide range of possible habitats may indicate identification errors if the species is a dune species, though if it is driven more by free-draining substrate then they could be correct.

Habitat key words: dunes

Status: *Thereva fulva* has been recorded from 11 hectads since 1990 and shows a slight increase in the number of hectads but this is coupled with a possible contraction in overall range. However, records may include some errors; removal of some apparent outliers would make a more likely pattern of distribution on inland sandy geology as well as coastal dunes.

The species does not qualify as Threatened under Criteria A,C, or E.

It does not meet B2 Vulnerable, having an AoO of 11 hectads or B2a for locations but is associated with dunes, a habitat of declining quality (Howe *et al*, 2012) and thus qualifies under B2biii, but it does not meet Vulnerable. For D2, it exceeds the number of locations and AoO required.

In view of this a status of Near Threatened is given. As with *Thereva cinifera*, this is a species to watch.

Threats: Loss or damage to coastal dunes through severe erosion, trampling by people, stabilisation measures that cause dune grassland to thicken and turn to scrub, and conversion to golf courses.

Management and conservation: Natural processes should be allowed to take place unhindered by stabilisation and encroachment of leisure-orientated activities.

Published sources: Audcent (1930), Dixon (2006), Edwards & Hodge (1993), Falk (1991), Howe (2002), Howe & Howe (2001), Parker (2010), Perry (2000), Stubbs & Drake (2001), Verrall (1909), White (1945)

THEREVA INORNATA

ENDANGERED B2a, bii, biv

Light Scottish Stiletto

Order DIPTERA

Family THEREVIDAE

Thereva inornata (Verrall, 1909)

Identification: Keyed by Stubbs & Drake (2001).

Distribution: *Thereva inornata* is found mainly in the Scottish Grampians and more sparsely in the North-West Highlands (VC92, 94, 95, 96). An old record from Mull (VC98) cannot be dismissed, but another from lowland coastal Galloway (VC74) seems unlikely to be correct. Records from Yorkshire (VC63) and Kent are almost certainly errors. Since 1990 it has been recorded from only four sites, Doire Bhraghad, Braemar, Grampian (VC92), Dorback Burn, Highland (VC95), Coille Garbh and Culbin Forest (VC96).

Its European distribution ranges from Italy to Finland and North Russia but it has been recorded in few countries, mainly in north-central Europe (Holston 2004). The British population is probably of international significance.

Habitat and ecology: There is little information on the sites where T*hereva inornata* has been found but they include the banks of uplands rivers with stony and sandy exposed sediments, dune-like sand beside such a river, and in a birch and pine wood. It has been recorded at 300 - 500mOD, well above the larger streams and rivers in the recorded localities. The larval habitat is unknown.

Habitat key words: upland river margins, upland woodland

Status: *Thereva inornata* appears to have undergone a decline (74%) and contraction in range since 1990, and is presently known from only four sites in four hectads in the core of

its range in the Grampians. The entire historical range, ignoring the Mull and Galloway records, is less than 20,000km^2.

The species does not qualify as Threatened under Criteria A,C, or E.

This species qualifies as Endangered as it is present in only four locations (B2a) and has an AoO of 400km^2 under B2. It has declined from 16 to 4 hectads thus also qualifying under B2b (ii,iv). Under D2 it satisfies the number of locations and the AoO requirements for Vulnerable, though the threat that would operate across even such a small range to move the taxon to CR is hard to establish.

Threats: As the habitat is unclear, the threats cannot be guessed.

Management and conservation: No suggestions are possible.

Published sources: Falk (1991), Godfrey (2002), Parker (1996), Shirt (1987), Stubbs & Drake (2001), Verrall (1909)

THEREVA STRIGATA

ENDANGERED B2a, bii, biv.

Cliff Stiletto

Order DIPTERA

Family THEREVIDAE

Thereva strigata (Fabricius, 1794)

Identification: Keyed by Stubbs & Drake (2001).

Distribution: *Thereva strigata* has a limited distribution on the southern English coast from Kent to Devon: Shakespeare Cliff and St Margarets Cliff, Kent (VC15), Niton and Freshwater, Isle of Wight (VC10), Lulworth Cove, Dorset (VC9), Branscombe Pastures SSSI and Torquay, Devon (VC3). There is one inland record from Box Hill, Surrey (VC17) which is assumed to be correct (Stubbs & Drake 2001) and an unattributed NBN record for the Suffolk coast (VC25) which has been ignored here.

Its European distribution ranges from Italy and Greece to Finland and covers central European countries, so there is no obligatory association with coasts (Holston 2004).

Habitat and ecology: Nearly all the records are from (or close to) chalk cliffs; the exception at Torquay may have been from the small outcrops of limestone here. One record was from a grassy scree slope but no other information on the adult's habitat is available. It is assumed that the larvae develop in dry chalk soil or the sandy cappings that sometimes occur on these, especially cliff top areas. The restriction to the south coast (with the exception of the Box Hill record) suggests that the species may be climatically limited.

Habitat key words: dry grassland

Status: *Thereva strigata* has been recorded from four hectads since 1990 but none is in common with earlier records, indicating that the populations may be tiny. There is no obvious decline. The extent of its coastal Chalk habitat is small, perhaps 10-20km in total, so small changes to the condition of the habitat may make some populations vulnerable to extinction.

The species does not qualify as Threatened under Criteria A,C, or E.

The species qualifies under D2 for having only 4 locations, though with only a small decline (5 hectads down to 4 between the recording periods). Since the supporting habitat occupied is so small, the UK range being only 10-20 kilometres of coastal chalk grassland, changes in grassland condition is a plausible threat across its range, and could quickly move the taxon to CR. Under B, it satisfies Endangered under B2a, with 4 locations, and B2 for AoO, though a continuing decline is not observed, estimated, or inferred but might be projected should grazing and management regimes adversely impact this species. On this precautionary basis it is considered Endangered.

Threats: Scrubbing-up of chalk grassland through lack of grazing or diminution of coastal erosion by dewatering to stabilise cliffs. Agricultural improvement or development of cliff-top areas.

Management and conservation: No special measures can be suggested until the ecology is better understood.

Published sources: Falk (1991), Shirt (1987), Stubbs & Drake (2001)

Xylomyidae

Two British species referred to as wood soldierflies, with larvae that develop in decaying wood or rot holes of old living trees. The adults are wasp mimics, especially *Xylomya maculata* and are most often seen resting on trunks or lying timber.

XYLOMYA MACULATA

ENDANGERED B2a, bii, biii, biv

Wasp Wood-soldierfly

Order DIPTERA

Family XYLOMYIDAE

Xylomya maculata (Meigen, 1820)

Identification: Keyed by Stubbs & Drake (2001).

Distribution: *Xylomya maculata* is found in only three small and discrete areas: the New Forest, Hampshire (VC11), Epping Forest, Essex (VC18), the Windsor Forest area, Berkshire (VC22) and nearby areas in VC17 and 21. Within the New Forest, records are mainly from the Lyndhurst / Denny Wood area. The 'Windsor' area includes Windsor Great Park, Virginia Water, Silwood Park and a 2009 record from Maidenhead Thicket (Chandler, 2013); Ruislip Wood and Finchley are sites lying between the Windsor and Epping clusters.

In Europe it is recorded from Italy to north-west Russia, and no further north than Lithuania, but is absent from several countries within this range (Rozkošný & Knutson 2004c).

Habitat and ecology: *Xylomya maculata* is associated with ancient woodland and wood pasture where its larvae develop in damp to wet wood detritus, or even wet slurry, in rot-holes in old trees. Trees from which it has been reared or found as immature stages are oak *Quercus* and beech *Fagus*.

Habitat key words: deciduous woodland, rot-holes

Status: *Xylomya maculata* had only been recorded from four hectads since 1990. Each of the hectads reflects the three clusters of known sites, but this level of recording represents a decline of 50% since earlier records. Even within apparently suitable areas such as the New Forest and Epping Forest, it has been recorded from small patches, which suggests that the fly has some particular requirements that are not obvious. The larval habitat of rot-holes in old trees is moderately scarce, and is susceptible to mismanagement in some of the forest and parks with public access where old trees may be seen as a danger. However, the adults are elusive, and a moderately large proportion of records are from reared larvae, so there a strong possibility that the species is under-recorded or adults or larvae passed over by saproxylic coleopterists who work this habitat more than most dipterists.

The species does not qualify as Threatened under Criteria A,C, or E.

The species qualifies under B2a as Endangered, with an AoO of less than 300km^2 and is present at three locations. It shows a decline in number of records from 8 hectads down to 3, (B2b ii,iv) reflecting the decline, as well as for B2biii for saproxylic habitat decline (Alexander, 2014a). Under D2 it is Vulnerable under the number of locations and AoO, the threats associated with saproxylic micro-habitats already noted. Rearing may eventually reveal more locations for this species but until that time the data indicate Endangered.

Threats: Loss of old trees with rot-holes owing to the perception of them being a danger to the public. The long-term future of insects associated with dead-wood in Windsor and Epping Forest is probably moderately well assured, though there remain many tree age class gaps. Many of the sites are within SSSI where the dead-wood interest is an important reason for the notification, so will not be subject to the sorts of damage occurring elsewhere.

Management and conservation: Ancient trees should continue to be given high priority that should include supporting park authorities in understanding the importance of these trees.

Published sources: Allen (1965), Chandler (2013), Falk (1991), Gorham (1899), Ismay (2000), Palmer (1994), Parmenter (1950), Perry (2006, 2007), Richards (1934), Shirt (1987), Stubbs & Drake (2001), Uffen (1975)

13. References and Further Reading

Further reading list

Ainsworth, A.M. , Smith, J.H., Boddy, L., Dentinger, B.T.M., Jordan, M., Parfiitt, D., Rogers, H.J. & Skeates, S.J. 2013. Red List of Fungi for Great Britain: Boletaceae. A pilot conservation assessment based on national database records, fruit body morphology and DNA barcoding. *Species Status Assessment* No 14, ISSN 1473-0154, Joint Nature Conservation Committee, Peterborough.

Alexander, K.N.A., 2014. *A review of the scarce and threatened beetles of Britain. Aderidae, Anthicidae, Colydiidae, Melandryidae, Meloidae, Mordellidae, Mycetophagidae, Mycteridae, Oedemeridae, Pyrochroidae, Pythidae, Ripiphoridae, Salpingidae, Scraptiidae, Tenebrionidae & Tetratomidae (Tenebrionoidea less Ciidae).* Natural England Commissioned Reports, Number 134.

Alexander, K.N.A, Dodd, S. & Denton, J.S. 2014 *A review of the scarce and threatened beetles of Britain.The darkling beetles and their allies. Aderidae, Anthicidae, Colydiidae, Melandryidae, Meloidae, Mordellidae, Mycetophagidae, Mycteridae, Oedemeridae, Pyrochroidae, Pythidae, Ripiphoridae, Salpingidae, Scraptiidae, Tenebrionidae & Tetratomidae (Tenebrionoidea less Ciidae)* Natural England Commissioned Reports, in press.

Carles-Tolrá, M. 2004. Fauna Europaea: Scenopinidae. In: Pape, T. & Beuk, P. 2004 Fauna Europaea: Diptera Flies. Fauna Europaea version 1.0, http://www.faunaeur.org

Cheffings, C. & Farrell, L. (eds). 2005. The Vascular Plant Red Data List for Great Britain. *Species Status Assessment* No **7**, ISSN 1473-0154, Joint Nature Conservation Committee, Peterborough.

Daguet, C., French, G. & Taylor, P. (eds.) 2008. The Odonata Red Data List for Great Britain. *Species Status Assessment* No 11, ISSN 1470-0154, Joint Nature Conservation Committee, Peterborough.

Edwards, M. & Hodge, P.J. 1980. The Recorder's Report for Entomology 1978-1979. *The Reading Naturalist* **32**.

Falk, S.J. & Chandler, P.J. 2005. A review of the scarce and threatened flies of Great Britain. Part 2: Nematocera and Aschiza not dealt with by Falk (1991). *Species Status Assessment* No 2, ISSN 1473-0154, Joint Nature Conservation Committee, Peterborough.

Falk, S.J. & Crossley, R. 2005. A review of the scarce and threatened flies of Great Britain. Part 3: Empidoidea. *Species Status Assessment* No 3, ISSN 1473-0154, Joint Nature Conservation Committee, Peterborough.

Foster, G.N. 2010 A review of the scarce and threatened Coleoptera of Great Britain Part (3): Water beetles of Great Britain. *Species Status* 1. Joint Nature Conservation Committee, Peterborough.

Fox, R., Warren, M.S. and Brereton, T.M. 2010 A new Red List of British Butterflies, *Species Status* 12; 1-32. Joint Nature Conservation Committee, Peterborough.

Nartshuk, E.P. 2004. Fauna Europaea: Acroceridae. In: Pape, T. & Beuk, P. 2004 Fauna Europaea: Diptera Flies. Fauna Europaea version 1.0, http://www.faunaeur.org

Perring, F.H. & Farrell, L. 1977. *British Red Data Books: 1. Vascular Plants*. Society for Nature Conservation, Lincoln.

Perring, F.H. & Farrell, L. 1983. *British Red Data Books: 1. Vascular Plants, edn 2*. Royal Society for Nature Conservation, Lincoln.

Stewart, N.F. & Church, J.M. 1992. *Red Data Books of Britain and Ireland: Stoneworts.* Joint Nature Conservation Committee, Peterborough.

Wigginton, M.J. (ed.). 1999, *British Red Data Books.* 1. Vascular Plants. 3rd edition. Joint Nature Conservation Committee, Peterborough.

Woods, R.G. & Coppins, B.J. 2012. A Conservation Evaluation of British Lichens and Lichenicolous Fungi. *Species Status Assessment* No 13, ISSN 1473-0154, Joint Nature Conservation Committee, Peterborough.

Review References

Alexander, K.N.A. 1991. Scenopinus niger Degeer (Scenopinidae) in Montgomeryshire. *Dipterists Digest* No.**8**: 24.

Alexander, K.N.A. 1994. *Pandivirilia melaleuca* (Loew) (Dipt., Therevidae) new to Gloucestershire. *British Journal of Entomology and Natural History* **7**, 180.

Alexander, K.N.A. 1996. A review of records for *Scenopinus niger* (Degeer) (Diptera, Scenopinidae) in Wales. *Dipterists Digest* **2**: 90-91.

Alexander, K.N.A. 2005. *Scenopinus niger* (De Geer) (Diptera, Scenopinidae) reared from a bracket fungus. *Dipterists Digest* **12**: 86.

Alexander, K.N.A. 2007. *Pandivirilia melaleuca* (Loew) (Diptera, Therevidae) confirmed as a Gloucestershire Species. *Dipterists Digest (Second Series)* **14**, 87 – 89.

Alexander, K.N.A. 2008. 2007 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **21**, 174.

Alexander, K.N.A. 2012. The Gloucestershire population of Downland Villa *Villa cingulata* (Meigen) (Diptera, Bombyliidae). *Dipterists Digest (Second Series)* **19**, 96-97.

Alexander, K.N.A . 2014 *A review of the beetles of Great Britain: The Soldier Beetles and Their Allies.* Species Status No.16 Natural England Commissioned Reports, Number 134.

Alexander, K.N.A. & Foster, A.P. 1998. 1997 Annual exhibition, Diptera. *British Journal of Entomology and Natural History* **11**, 98-99.

Allen, A.A. 1965. A few notable Diptera from Windsor Forest. *Entomologist's Record and Journal of Variation* **77**, 105-109.

Allen, A.A. 1968. A note on the occurrence of *Psilocephala ardae* (F.) and *P. melaleuca* (Lw.) (Dipt., Therevidae) in Berks. *Entomologist's monthly Magazine* **104**, 224.

Allen, A.A. 1982. Further notable Diptera from Windsor Forest. *Entomologist's Record and Journal of Variation* **94**, 191-194.

Andrews, H. 1901. *Atrichops crassipes*, Meig.: a new British dipteron. *Entomologist's monthly Magazine* **37**, 10.

Andrews, H.W. 1934. Three 'Diptera' records. *Entomologist's Record and Journal of Variation* **46**, 125-126.

Audcent, H.L.F. 1930. Bristol insect fauna (part 3). *Proc. Bristol Nat. Soc. 4th Series* **7** (1948), 197-207.

Barnett, R. 2004. *Villa cingulata* (Meigen) (Diptera, Bombyliidae) in the Bristol region. *Dipterists Digest (Second Series)* **11**: 119.

Biddulph, J. 1964. *Rhagio strigosa* Meigen (Dipt., Rhagionidae) from, Streatley, Berkshire; a second British locality. *Entomologist* **97**, 78.

Brightwell. R, Dransfield, R (2014) Survey of Tabanidae (horseflies) in southern England 2014. Occasional Paper, InfluentialPoints, Sept. 2014

Chandler, P. J. 1975. The discovery of *Psilocephala rustica* (Panzer) (Dipt., Therevidae) in West Sussex. *Entomologist's monthly Magazine* **111**, 247.

Chandler, P.J. 1983. An overlooked record of *Rhagio annulatus* Degeer (Dipt: Rhagionidae). *Proceedings and Transactions of the British Entomological and Natural History Society* **16**, 49.

Chandler, P.J. 1998. Checklists of Insects of the British Isles (New Series) Part 1: Diptera. *Handbooks for the Identification of British Insects*, **12**, 1-234. The Royal Entomological Society.

Chandler, P.J. 1999. New records of Asilidae (Diptera) at Hartslock nature reserve in Oxfordshire. *Dipterists Digest (Second Series)* **6**, 117.

Chandler, P.J. 2013. A new Berkshire locality for *Xylomya maculata* (Meigen) (Diptera, Xylomyidae). *Dipterists Digest (Second Series)* **20**, 72.

Chandler, P.J. 2014. Villa cingulata (Meigen) (Diptera, Bombyliidae) at Bushy Park, Middlesex. *Dipterists Digest (Second Series)* **21**(2), 171-172.

Clemons, L. 1999. Kent Diptera 1998. *Bulletin of the Kent Field Club* **44**, 78-88.

Cole, J.H. 1981. *Chysopilus erythrophthalmus* Loew (Diptera: Rhagionidae) new to Britain. *Entomologist's Gazette* **32**, 275-277.

Collin,J.E. 1948. British Therevidae (Diptera). Proceedings of the Royal Physical Society of Edinburgh 23, 95-102.

Collins, G.A. 2000. 1999 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **13**, 167.

Crossley, R. 2005. Dipterists Day exhibits 2004 - compiled by Editor from exhibitors' notes. Crossley, R. Some noteworthy Diptera from Yorkshire in 2004. *Dipterists Digest (Second Series)* **12**, 70.

Crossley, R. 2007. Dipterists Day exhibits 2006 - compiled by Editor from exhibitors' notes. Crossley, R. Some noteworthy Diptera from the North Yorks Moors National Park. *Dipterists Digest (Second Series)* **14**, 94.

Crow, P.N. 1967. *Psilocephala ardea* F. (Dipt., Therevidae) in Berkshire. *Entomologist's monthly Magazine* **103**, 176.

Chvála, M. 2004. Fauna Europea: Tabanidae. In: Pape, T. & Beuk, P. 2004 Fauna Europaea: Diptera Flies. Fauna Europaea version 1.0, http://www.faunaeur.org

Damant, S.G. 2002. Dipterists Day exhibits 2001 - compiled by Editor from exhibitors' notes. Damant, S.G. Photographs. *Dipterists Digest (Second Series)* **6**, 20.

Dandy, J.E. 1969. *Watsonian vice-counties of Great Britain.* Ray Society, London.

Denton, J. 1993. Some observations on the habits of two rare coastal horseflies. *Larger Brachycera Recording Scheme Newsletter* **10**, 6.

Dixon, R.J. 2006. 2005 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **19**, 182.

Drake, C.M. & Chandler, P.J. 1997. *Chrysopilus erythrophthalmus* (Diptera, Rhagionidae) in Scotland and more records from England. *Dipterists Digest (Second Series)* **3**, 59 - 61.

Drake, C.M. 2005. Aquatic Stratiomyidae (Diptera) on grazing marshes. *Dipterists Digest (Second Series)* **12**, 87 - 90.

Durrant, K.C. 1990. (Diptera: Tabanidae) - a rare horsefly in Norfolk. *Trans. Norfolk Norwich Nat. Soc*. **28**, 356.

Edwards, M. & Hodge, P.J. 1993. *An entomological survey of the remaining heathlands of west Sussex*. West Sussex Heathland Forum.

Else, G.R. & Edwards, M. 1996. Observations on *Osmia inermis* (Zetterstedt) and *O. uncinata* Gerstacker (Hym., Apidae) in the central Scottish Highlands. *Entomologist's monthly Magazine* **132**, 291-298.

Else, G.R. 1975. Uncommon Diptera from Oxenbourne Down, Hampshire in 1972-74. *Entomologist's monthly Magazine* **111**, 114.

Falk, S. 1991. A review of the scarce and threatened flies of Great Britain (Part 1). *Research & survey in nature conservation No. 39*. Nature Conservancy Council, Peterborough.

Forestry Commission Scotland, 2014, Scotland's native woodlands. http://scotland.forestry.gov.uk/supporting/strategy-policy-guidance/native-woodland-survey-of-scotland-nwss/national-nwss-report

Foster, A.P. 2012. A recent record for *Villa cingulata* (Meigen) (Diptera, Bombyliidae) in Wiltshire. *Dipterists Digest (Second Series)* **19**, 124.

Fry, R. & Lonsdale, D. 1991. *Habitat Conservation for Invertebrates - a Neglected Green Issue.* The Amateur Entomologists' Society. Middlesex.

Geller-Grimm, F. 2004. Fauna Europaea: Asilidae. In: Pape, T. & Beuk, P. 2004 Fauna Europaea: Diptera Flies. Fauna Europaea version 1.0, http://www.faunaeur.org

Gibbs, D.J. 1987. Some interesting insects from the Kennet Valley. *Entomologist's monthly Magazine* **123**, 242.

Gibbs, D.J. 2002. Scarcer Diptera found in the Bristol Region in 1999, 2000 and 2001. *Dipterists Digest (Second Series)* **9**, 1-13.

Gibbs, D.J. 2003. 2002 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **16**, 178.

Gibbs, D.J. 2006. Dipterists Day exhibits 2005 - compiled by Editor from exhibitors' notes. Gibbs, D.J. - Some scarcer Diptera collected in 2005. *Dipterists Digest (Second Series)* **13**, 10-11.

Gibbs, D.J. 2009. Scarce Diptera recorded in 2008. 2008 Annual Exhibition. *British Journal of Entomology and Natural History* **22**, 175.

Gibbs, D.J. 2012. 2011 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **25**, 167.

Godfrey, A. 1998. 1997 Annual exhibition, Diptera. *British Journal of Entomology and Natural History* **11**, 99.

Godfrey, A. 2000. 1999 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **13**, 167-168.

Godfrey, A. 2001. 2000 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **14**, 154-155.

Godfrey, A. 2002. 2001 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **15**, 170-171.

Goffe, E.R. 1931. British Tabanidae (Diptera) with an account of the principal variation, with descriptions of a number of new forms, and of some additions to the British list. *Trans. ent Soc. S. Eng.* **6** (1930), 43-114, 2 pls.

Goffe, E.R. 1944. *Tabanus* (*Atylotus*, *Ochrops*) *plebejus* Fallén (Dipt., Tabanidae) in Cheshire. *J. Soc. Br. Ent.* **2**, 178-179.

Gorham, H.S. 1899. *Xylomyia maculata*, Fab. (Diptera), bred from the New Forest. *Entomologist's monthly Magazine* **35**, 71.

Grayson, A. 1998. *Hybomitra ciureai* Séguy in Hampshire. *Larger Brachycera Recording Scheme Newsletter No*. **16,** 2-3.

Grayson, A. 2009b. Dipterists Day exhibits 2008 - compiled by Editor from exhibitors' notes. Grayson, A. Some Diptera taken during the Dipterists Forum summer field meeting. *Dipterists Digest (Second Series)* **16**, 55-56.

Grayson, A. & Coldwell, J.D. 1997. *Thereva valida* (Diptera, Therevidae) new to England. *Dipterists Digest (Second Series)* **4**, 29.

Greathead, D.J.& Evenhuis, N.L. 2004. Fauna Europaea: Bombyliidae. In: Pape, T. & Beuk, P. 2004 Fauna Europaea: Diptera Flies. Fauna Europaea version 1.0, http://www.faunaeur.org

Halstead, A.J. 1999. 1998 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **12**, 166-167.

Halstead, A.J. 2004. 2003 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **17**, 170.

Halstead, A.J. 2007. 2006 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **20**, 175.

Halstead, A.J. 2009. 2008 Annual Exhibition, Diptera: Some local or uncommon Diptera recorded in 2008. *British Journal of Entomology and Natural History* **22**, 176.

Halstead, A.J. 2010. 2009 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **23**, 197.

Halstead, A.J. 2011. 2010 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **24**, 162.

Hamm, A.H. 1933. *Therioplectes micans* Mg., and other Tabanidae in and near Oxford (Dipt.). *J. ent. Soc. S. Engl.* **1**, 66-67.

Hamm, A.H. 1941. Habits of *Tabanus micans* Mg (Dipt.). *Entomologist's monthly Magazine* **77**, 235.

Harvey, M. 1998. Dipterists Day exhibits. Harvey, M.- Tipulidae and Asilidae from the BBONT area. *Dipterists Digest (Second Series)* **5**, 25-26.

Harvey, M.C. 1999. 1998 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **12**, 167.

Harvey, M.C. 2008. 2007 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **21**, 175.

Harvey, M.C. 2014. Recent Record Highlights, Soldierflies & Allies Recording Scheme Newsletter 2, Autumn, 2014 in Bulletin of the Dipterists Forum, Autumn, 2014.

Harvey, M.C. 2015. Correction: *Chrysopilus laetus* Zetterstedt (Diptera:Rhagionidae) has not been recorded from Devon. *Dipterist Digest* (*Second Series*) **22**,122.

Hawkins, R.D. 1999. 1998 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **12**, 167.

Hawkins, R.D. 2009. 2008 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **22**, 176.

Heaver, D. 1997. *Hybomitra ciureai* Séguy (Tabanidae) new to Wales and western Britain. *Larger Brachycera Recording Scheme Newsletter No*. **15,** 2-3.

Heaver, D. 2000. *Chrysopilus erythrophthalmus* Loew (Diptera, Rhagionidae) 102 years on. *Dipterists Digest (Second Series)* **7**, 1-2.

Hobby, B.M. 1932. *Epitriptus arthriticus* Zeller; an asilid fly new to Britain. *Entomologist's monthly Magazine* **68**, 132-133.

Hobby, B.M. 1946. *Epitriptus cowini*, a new asilid (Dipt.) from the Isle of Man. *Entomologist's monthly Magazine* **82**, 88-91.

Hodge, P.J. 1992. *A preliminary survey of the insects of Bushy Park*. - December 1992.

Hodge, P.J. 1998. 1998 Annual Exhibition, Diptera. Five species of Diptera found in 1996. *British Journal of Entomology and Natural History* **10**, 166.

Hodge, P.J. 2000. 1999 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **13**, 168.

Hodge, P.J. 2008. 2007 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **21**, 175.

Hodge, P.J. & Grayson, A. 1996. *Haematopota subcylindrica* (Diptera, Tabanidae) New to Britain. *Dipterists Digest (Second Series)* **3**, 36 - 37.

Hodgetts, N. 2011. A revised red list of bryophytes in Britain. *Field Bryology* **103**, 40-49.

Holston, K.C. 2004. Fauna Europaea: Therevidae. In: Pape, T. & Beuk, P. 2004 Fauna Europaea: Diptera Flies. Fauna Europaea version 1.0, http://www.faunaeur.org

Howe, M.A. 1998. *Field meeting of the Dipterists Forum at Abergavenny, June 1997*. CCW Natural Science Report **98/5/2**. Countryside Council for Wales.

Howe, M.A. 2000. *Neoitamus cothurnatus* (Diptera, Asilidae) new to Wales. *Dipterists Digest (Second Series)* **7**, 32.

Howe, M.A. 2002. A provisional checklist of the invertebrates recorded in Wales. 3. Brachyceran flies (Diptera: Xylophagidae to Dolichopodidae). Countryside Council for Wales.

Howe, M. & Howe, L. 1995. The soldier fly *Stratiomys chamaeleon* on Anglesey and the Black Isle. *Dipterists Digest (Second Series)* **2**, 24 - 28.

Howe, M.A. & Howe, E.A. 2001. A review of the Dipterists Forum summer field meeting at Abergavenny, 1997. *Dipterists Digest (Second Series)* **8**, 31 - 48.

Howe, M.A., Litt, E. & Pye, K. 2012. Rejuvenating Welsh Dunes. *British Wildlife* **24,** 85-94.

Hyman, P.S (revised Parsons, M. S.) (1992). A review of the scarce and threatened Coleoptera of Great Britain. Part 1. UK Nature Conservation: 3. Peterborough: UK Joint Nature Conservation Committee.

IUCN. 1994. *IUCN Red List Categories and Criteria: Version 2.3*, IUCN Species Survival Commission. IUCN, Gland.

IUCN. 2001. *IUCN Red List Categories and Criteria: Version 3.1*. IUCN Species Survival Commission. IUCN, Gland and Cambridge.

IUCN. 2003. Guidelines for Application of IUCN Red List Criteria at Regional Levels: Version 3.0. IUCN Species Survival Commission IUCN, Gland and Cambridge.

IUCN. 2012a. *IUCN Red List Categories and Criteria*. Version 3.1. 2nd Edition, IUCN Species Survival Commission. IUCN, Gland.

IUCN. 2012b. Guidelines for Application of IUCN Red List Criteria at Regional and National Levels. Version 4.0, IUCN Species Survival Commission. IUCN, Gland.

IUCN. 2013. *Guidelines for Using the IUCN Red List Categories and Criteria*. Version 10, IUCN Species Survival Commission. IUCN, Gland.

Ismay, J.W. 1978. *Stratiomys chamaeleon* (L.) (Dipt., Stratiomyidae) at Cothill. *Entomologist's monthly Magazine* **114**, 151.

Ismay, J.W. 1981. *Psilocephala melaleuca* Loew (Dipt., Therevidae) at Egham, Surrey. *Entomologist's monthly Magazine* **117**, 34.

Ismay, J.W. 2001. Records of *Raineria calceata* (Fallén) (Dipt., Micropezidae) and *Chrysopilus laetus* (Zetterstedt) (Dipt., Rhagionidae) from Burham Beeches, Buckinghamshire. *Entomologists's monthly Magazine* **137**, 214.

Ismay, J.W. 2000. *Report on the Diptera of Epping Forest, Essex*. Unpublished report for the Corporation of London. Hope Entomological Collections, Oxford.

Ismay, J.W. & Schulten, B. 2006. 2005 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **19**, 182-183.

Jones, N.P., Smart,M. & Westwood, B . 2016 A second British site for the robberfly *Neomochtherus pallipes* (Meigen) (Diptera, Asilidae). *Dipterists Digest (Second Series).* **23**, 205-210

Jones, R.A. 2004. 2003 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **17**, 170-1.

Jones, R.A. 2009. *Chrysopilus laetus* Zetterstedt, 1842 (Diptera, Rhagionidae), in south-east London. *Dipterists Digest (Second Series)* **16**, 79.

Jones, R.A. 2010. Another record of *Chrysopilus laetus* Zetterstedt, 1842 (Diptera, Rhagionidae) in south-east London. *Dipterists Digest (Second Series)* **17**, 45.

Jozsef, M. 2004. Fauna Europea: Rhagionidae. In: Pape, T. & Beuk, P. 2004 Fauna Europaea: Diptera Flies. Fauna Europaea version 1.0, http://www.faunaeur.org

Keil, P. 2005. Microhabitat preferences of stiletto fly larvae (Diptera: Therevidae) in mountain primeval forest. *Studia Dipterologica* **12**, 87-92.

Kidd, L.N. 1955. A reinstatement of *Rhagio strigosa* (Meigen) (Dipt., Rhagionidae) as a British species. *Entomologist's monthly Magazine* **91**, 137.

Kidd, L.N. & Brindle, A. 1959. *The Diptera of Lancashire and Cheshire. Part 1*. Lancashire and Cheshire Fauna Committee.

Kirby, P. 1991. Cliffe & Higham Marshes, Kent. Survey of terrestrial invertebrates July 1991. Unpublished report for English Nature. 34p.

Kirby, P. 1998. *Cobham and Ashenbank Woods Invertebrate Survey 1998*. Unpublished report.

Kirby, P. 1995. *Stoke and Allhallows Marshes, Kent. Terrestrial invertebrate survey of ditches.* Unpublished report to English Nature.

Kirby, P. 2001. *Habitat management for invertebrates: a practical handbook*. RSPB, Sandy.

Kloet, G.S. 1941. Habits of *Hybomitra micans* Mg (Dipt.). *Entomologist's monthly Magazine* **77**, 202.

Mawdsley, T. 1992. *Historic and 1992 field records compiled by Liverpool Museum as part of a CCW and EN invertebrate site survey.*

McGee, K.A. 2010. The discovery of *Pandivirilia melaleuca* (Diptera: Therevidae) in Worcestershire. *British Journal of Entomology and Natural History* **23**, 56-57.

Merrifield, R.K. & Merrifield, R.M. 2004. 2003 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **17**, 171.

Merrifield, R.K. & Merrifield, R.M. 2007. 2006 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **20**, 177-178.

Miles, S. 2000. 1999 Annual Exhibition, Diptera *British Journal of Entomology and Natural History* **13**, 168-169.

Mills,R. & Harvey, Martin.C. 2016, *Anthrax anthrax* (Schrank) (Diptera, Bombyliidae) found in Britain. *Dipterists Digest (Second Series)*. **23**, 225-226.

Oldroyd, H. 1939. *Chrysopilus nubecula* Fallen (Diptera: Rhagionidae), a species new to Britain. *Entomologist's monthly Magazine* **75**, 12-13.

Oldroyd, H. 1969. Diptera Brachycera. Section (a) - Tabanoidea and Asiloidea. *Handbooks for the Identification of British Insects* **9(4)**, 1-132. Royal Entomological Society, London.

Owen, J. 1993. Rearing *Psilocephala melaleuca* (Loew) (Diptera: Therevidae) from larvae. Entomologist's Record **105**, 257-259.

Palmer, C. 1994. A note on the rearing of *Solva maculata* (Meigen) (Xylomyiidae). *Dipterists Digest (Second Series)* **1**, 85 - 86.

Parker, J.B. 1995. The horsefly *Hybomitra micans* from Martin Mere, Oulton. *The Carlisle Naturalist* **3,** 28-29.

Parker, M.J. 1996. 1995 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **9**, 231.

Parker, M.J. 1998. 1997 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **11**, 100.

Parker, M.J. 1998. 1996 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **10**, 167.

Parker, M. 2001. 2000 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **14**, 158.

Parker, M. 2003. 2002 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **16**, 180.

Parker, M. 2004. 2003 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **17**, 171-2.

Parker,M. 2014. *Villa cingulata* (Meigen) (Diptera, Bombyliidae) in Dorset. *Dipterists Digest (Second Series)* **21** (2), p171.

Parker, M. 2005. Some rare or unusual Diptera from Dorset, Wiltshire, Easterness and the Western Isles of Scotland in 2004. *British Journal of Entomology and Natural History* **18**, 199.

Parker, M.J. 2006. 2005 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **19**, 184.

Parker, M.J. 2007. 2006 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **20**, 178.

Parker, M.J. 2009. 2008 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **22**, 176-177.

Parker, M.J. 2010. 2009 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **23**, 198.

Parker, M.J. 2011. 2010 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **24**, 162.

Parmenter, L. 1950. The Diptera of Bookham Common. *The London Naturalist* **29**, 98-132.

Parmenter, L. 1955. On *Rhagio strigosa* Mg. (Dipt: Rhagionidae). *Entomologist's Record and Journal of Variation* **67**, 332-333.

Payne, K. 1974. Some records of Asiloidea and Tabanoidea (Diptera) from Dorset and Hampshire with notes on life history and ecology. *Entomologist's Gazette* **25**, 187-192.

Pearce, E.K. 1915. *Typical flies. A photographic atlas of Diptera including Aphaniptera*. xii + 47 pp. Cambridge University Press.

Pearce, E.K. 1921. *Typical flies. A photographic atlas. Series II.* xiv + 38 pp. Cambridge University Press.

Pearce, E.K. 1928. *Typical flies. A photographic atlas of Diptera. Series III*. xv + 64 pp. Cambridge University Press.

Perry, I. 1982. *Wicken Fen species list 1982.* Unpublished computer printout (of all Diptera recorded up to and including 1982).

Perry, I. 1992. Annual exhibition. Diptera. *British Journal of Entomology and Natural History* **5**, 70.

Perry, I. 2000. 1999 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **13**, 170.

Perry, I. 2004. 2003 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **17**, 172.

Perry, I. 2006. 2005 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **19**, 184.

Perry, I. 2007a. Francis John Henry Jenkinson, his life and legacy. *Dipterists Digest (Second Series)* **14**, 49 - 73.

Perry, I. 2007b. 2006 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **20**, 178.

Perry, I. 2008. 2007 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **21**, 175.

Perry, I. 2009. 2008 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **22**, 177.

Perry, I. 2011. 2010 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **24**, 163.

Philp, E.G. 1989. *The Natural History of Chattenden.*

Porter, K. 1992. *Rare and notable invertebrates recorded from Cothill Fen, Oxfordshire.* Unpublished list prepared for management plan. English Nature (South Region).

Richards, O.W. 1934. Some breeding records of Diptera. *Journal of the Society for British Entomology* **1**, 2-3.

Richardson, J. 2014.*Chrysopilus laetus* (Zetterstedt) (Diptera, Rhagionidae) in North London in 2014. *Dipterists Digest (Second Series)* **21**, (2), 169-170.

Rozkošný, R.& Knutson, L. 2004a. Fauna Europaea: Athericidae. In: Pape, T. & Beuk, P. 2004 Fauna Europaea: Diptera Flies. Fauna Europaea version 1.0, http://www.faunaeur.org

Rozkošný, R.& Knutson, L.2004b. Fauna Europaea: Stratiomyidae. In: Pape, T. & Beuk, P. 2004 Fauna Europaea: Diptera Flies. Fauna Europaea version 1.0, http://www.faunaeur.org

Rozkošný, R. & Knutson, L. 2004c. Fauna Europaea: Xylomyidae. In: Pape, T. & Beuk, P. 2004 Fauna Europaea: Diptera Flies. Fauna Europaea version 1.0, http://www.faunaeur.org

Rozkošný, R. & Knutson, L. 2004d. Fauna Europaea: Xylophagidae. In: Pape, T. & Beuk, P. 2004 Fauna Europaea: Diptera Flies. Fauna Europaea version 1.0, http://www.faunaeur.org

Rozkošný, R. (1983) A Biosystematic Study of the European Stratiomyidae (Diptera): Volume 2 . Springer Science & Business Media.

Shirt, D.B. (ed.). 1987. *British Red Data Books: 2. Insects*. Nature Conservancy Council: Peterborough.

Skidmore, P. 1955. *Rhagio strigosa* Mg. (Dipt: Rhagionidae) in Britain. *Entomologist's Record and Journal of Variation* **67**, 153.

Skidmore, P. 2000. The status of *Odontomyia hydroleon* (Diptera, Stratiomyidae) in the Banc y Mwldan SSSI, Ceredigion. *CCW Contract Sceince Report No. 410.*

Skidmore, P. 2001. The status of *Cliorismia rustica* (Diptera, Therevidae) in the valleys of the Usk and Monnow in 2000. *CCW Contract Science Report No. 427.*

Smart, M.J. & Wright, R. 2012. A first record of *Machimus cowini* (Hobby) (Diptera, Asilidae) on the British mainland. *Dipterists Digest (Second Series)* **19**, 151-154.

Southwood, T.R.E. 1964. *Psilocephala ardea* F. (Dipt., Therevidae) in Berkshire. *Entomologist's monthly Magazine* **100**, 60.

Speight, M.C.D. 1987. Re-affirmation of the status of *Machimus cowini*, (Diptera: Asilidae), as a separate species, with a key to distinguish the male from males of some related species. *Irish Naturalist's Journal* **22**, 296-304.

Speight, M.C.D. 1988. *Neoitamus cothurnatus* (Diptera: Asilidae) not an Irish species, and a key to the West European *Neoitamus* species. *Irish Naturalist's Journal* **22**, 485-487.

Spilling, C. 2003. Dipterists Day exhibits 2002 - compiled by Editor from exhibitors' notes. Spilling, C. Photographs of mating *Bombylius minor*. *Dipterists Digest (Second Series)* **10**, 43.

Stubbs, A.E. 1991. Observations on *Dioctria cothurnata* Mg. (Diptera: Asilidae) in Dorset. *Entomologist's Record and Journal of Variation* **103**, 283-286.

Stubbs, A.E. 1992. Wildlife reports: flies. *British Wildlife* **4**, 53-54.

Stubbs, A.E. 1996. *The status of the bee-flies Bombylius minor and Villa circumdata, with particular reference to the East Dorset heaths.* Report to English Nature, Peterborough. 59pp.

Stubbs, A. 1997.Wildlife reports: flies. *British Wildlife* **8**, 190-192.

Stubbs, A. 1998. The occurrence of the soldierfly *Oxycera leonina* (Panzer) (Diptera, Stratiomyidae) in Norfolk and Suffolk. *Dipterists Digest (Second Series)* **5**, 77 - 79.

Stubbs, A.E. 2004. The horsefly *Atylotus rusticus* (L.) in the Central Weald. *British Journal of Entomology and Natural History* **17**, 23.

Stubbs, A.E. 2009. Pearce's photographs in Typical Flies. *Dipterists Digest (Second Series)* **16**, 103 – 116.

Stubbs, A.E. & Drake, C.M. 2001. *British soldierflies and their allies*. British Entomological and Natural History Society. 512pp.

Stubbs, A.E. 2013. Summer Field Meeting 2013, Lancaster 6-13 July 2013, *Bulletin of the Dipterists Forum*, **76**, Autumn 2013, p26.

Telfer, M.G. & Harvey, M.C. 2011. 2010 Annual Exhibition, Diptera. *British Journal of Entomology and Natural History* **24**, 163-164.

Telfer, M.G. & Lyszkowski, R.M. 2006. *Chrysops sepulcralis* (Fabricius) new to South Devon with a further record from Kirkcudbrightshire and *Hybomitra lurida* (Fallén) new to Kirkcudbrightshire (Diptera, Tabanidae). *Dipterists Digest (Second Series)* **13**, 57 - 58.

Uffen, R.W.J. 1975. Proceedings. Exhibit 12th June 1975. *Proceedings and Transactions of the British Entomological and Natural History Society* **8**, 61.

Verdcourt, B. 2003. *Pandivirilia melaleuca* (Loew) (Dipt., Therevidae) at Maidenhead, Berks. *Entomologist's monthly Magazine* **139**, 166.

Verrall, G. H. 1909. *British Flies, vol. 5. Stratiomyidae and succeeding families of the Diptera Brachycera of Great Britain.* Gurney & Jackson, London.

Webb, J., Porter, K., Smith, M. & Raper, C. 2010. *Stratiomys chamaeleon* (Linnaeus) (Diptera, Stratiomyidae) at Cothill, Oxfordshire *Dipterists Digest (Second Series)* **17**, 141 - 144.

White, J.H 1943. Diptera Report. *Transactions of the Lincolnshire Naturalists' Union* **11**, 163-175.

White, J.H. 1945. A preliminary list of the Lincolnshire Diptera. *Trans. Lincs. Naturalists' Union* **11**, 163-175.

Whitehead, P. 1992. *The Coleoptera of Bredon Hill, Worcestershire. Part 2.* Unpublished report to English Nature.

Wright, J.F., Furse, M.T., Gunn R.J.M., Blackburn J.H., Bass J.A.B.& Syes K.L. (1992). Invertebrate survey and classification of rivers for nature conservation. *Research, Survey & Monitoring No. 1.* Scottish Natural Heritage.

Wright, J.F., Blackburn, J.H., Gunn, R.J.M., Furse, M.T., Armitage, P.D., Winder, J.M. & Symes, K.L. 1996. Macro-invertebrate frequency data for the RIVPACS III sites in Great Britain and their use in conservation evaluation. *Aquatic Conservation: Marine and Freshwater Ecosystems* **6**, 141-167.

Appendix 1. All Species reviewed in the "Larger Brachycera"

The GB Rarity status values presented here are unmoderated and will differ from any moderated values given in Table 6. The criteria used to explain the moderation are given here in the rationale and will be reflected in the rarity status given in Table 6.

Species Name	GB IUCN Status	Qualifying Criteria	GB Rarity Status unmoderated	Rationale	Presence in England	Presence in Scotland	Presence in Wales	AoO(hectads)<1989	AoO(hectads)1990-2011	Dual Hectads
Acrocera orbiculus	LC		NS	Recorded in 30-70 hectads since 1990.	E	S	W	67	58	14
Acrosathe annulata	LC		NS	Recorded in 71-99 hectads since 1990. Moved beyond NS, invoking Criterion 7.	E	S	W	86	79	35
Anthrax anthrax	NE			A single individual was photographed in Cambridgeshire in 2016.	E					
Asilus crabroniformis	LC			Recorded in >100 hectads since 1990.	E		W	140	102	52
Atherix ibis	LC		NS	Apparent decline perhaps a result of under-recording. Moved beyond NS under Criteria 2 & 7.	E	S	W	103	65	18
Atrichops crassipes	LC		NR	Atrichops crassipes has been recorded from six hectads since 1990 but the tiny proportion of records from early and recent hectads suggests that recording has	E		W	15	6	1

				not yet covered much of the species' range. The apparently large decline of 70% since 1990 may be due to several records being of larvae recorded in a period of greater aquatic sampling activity in the 1980s; since such records have not been collected more recently, the real distribution is probably closer to that given by all relatively recent hectads (15 hectads since 1980, eight before 1980). Atrichops was considered exceptionally rare earlier in the 20th century, and it may have become more frequent in the last 30 years. Moved beyond NR, invoking Criterion 7 & 2						
Atylotus fulvus	LC		NS	Recorded from 19 hectads since 1990 and showing a strong decline (72%) from earlier records, and a large contraction in range to a few small prime areas of bog. If the decline continues, a status if Near Threatened would be more appropriate.	E	S	W	61	19	11
Atylotus latistriatus	LC		NS	Recorded in 26 hectads since 1990, showing no decline and having a large proportion of old and recent hectads in common, indicating that the populations are stable and probably occupy most of the available habitat that is suitable for it. This species may be becoming less uncommon and may move out of the Scarce category in future.	E			20	26	16

Atylotus plebeius	EN	B2a; B2b(ii, iv)	NR	*Atylotus plebeius* has been recorded in only two hectads since 1990, and in five on all dates, all falling within a small area that represents at most two distinct populations. Hectad counts alone show a 60% decline since 1990, and the occurrence of the species on individual mosses probably shows higher losses. The current area of acid mire in the two blocks occupied is far smaller than 100km^2. The few recent records all fall within the same small area. The acid mire habitat in this area was historically diminished as a result of coniferisation and drainage, leaving isolated patches that are scarce and vulnerable, though more recent plans are aimed at peat soil restoration. Populations of *Atylotus plebeius* remain extremely vulnerable to effects due to isolation as corridors between habitat patches do not exist. A status of Endangered reflects the scarcity of lowland basin mire, the tiny range and the delicate nature of bogs, although the few records give no indication of recent decline; the species may possibly have always been very rare and restricted in Britain.	E			5	2	2
Atylotus rusticus	LC		NR	Atylotus rusticus has been recorded from eight hectads since 1990 and shows no overall decline. It has been lost from The Fens but 'gained' in Oxfordshire. The south coast populations are apparently stable. Its habitat requirement appears to be fairly specific and is geographically restricted. The	E			7	8	2

				species' absence from apparently suitable marshes on the east coast may be due to these being too brackish.						
Beris chalybata	LC			Recorded in >100 hectads since 1990.	E	S	W	447	529	186
Beris clavipes	LC		NS	Recorded in >90 hectads since 1990. Moved beyond NS under Criterion 7.	E	S	W	126	94	27
Beris fuscipes	LC			Recorded in >100 hectads since 1990.	E	S	W	62	111	18
Beris geniculata	LC			Recorded in >100 hectads since 1990.	E	S	W	210	208	50
Beris morrisii	LC			Recorded in >100 hectads since 1990.	E	S	W	162	180	57
Beris vallata	LC			Recorded in >100 hectads since 1990.	E	S	W	499	585	226
Bombylius canescens	LC		NS	Recorded in 30-70 hectads since 1990.	E	S	W	82	38	15
Bombylius discolor	LC		NS	Recorded in >80 hectads since 1990. Moved beyond NS under Criterion 7.	E		W	119	89	31
Bombylius major	LC			Recorded in >100 hectads since 1990.	E	S	W	329	546	229

Bombylius minor	VU	B2a, B2b (ii, iv)	NR	Bombylius minor is currently confined to the Dorset heaths and Isle of Man, and shows a small reduction in range since it has not been reported recently at nearby areas (Isle of Wight, New Forest) where it once occurred. While the population appears to be stable, it has a low density and may be highly localised on the heaths. However, it shows no marked decline (given the level of recording effort) in the number of occupied hectads. A rather small proportion of hectads in common before and after 1990 suggests that recording has still to cover all its likely terrain in the Dorset heaths. These Dorset heaths have contracted in area considerably and are still under threat from development. The status may need revising upwards if its population in the Dorset heaths continues to be eroded.	E		W	15	7	6
Chloromyia formosa	LC			Recorded in >100 hectads since 1990.	E	S	W	731	858	438
Choerades gilvus	EN	B2a, B2b (ii,iv)	NR	Recorded at only two sites in two hectads since 1990, and previously known from only 6 other hectads from another part of the small range. Its rapid rise and fall at the original centre of its distribution indicates extreme fluctuations in its population. It has declined by at least 75% from its earlier period of occurrence between 1938 and 1951.	E			6	2	0
Choerades marginatus	LC		NS	Recorded in >90 hectads since 1990. Moved beyond NS under Criterion 7.	E			68	92	26

Chorisops nagatomii	LC		NS	Recorded in >90 hectads since 1990. Moved beyond NS under Criterion 7.	E		W	57	97	17
Chorisops tibialis	LC			Recorded in >100 hectads since 1990.	E		W	187	275	69
Chrysopilus asiliformis	LC			Recorded in >100 hectads since 1990.	E	S	W	184	284	86
Chrysopilus cristatus	LC			Recorded in >100 hectads since 1990.	E	S	W	586	771	294
Chrysopilus erythrophthalmus	LC		NR	Since its discovery in 1979, *Chrysopilus erythrophthalmus* has been found widely in Britain although considering that it is a moderately conspicuous species, there are still few records. It has been recorded in 12 hectads since 1990. It does appear to be rare and probably has a low density. Its well defined habitat is widespread in Britain but is susceptible to damage by agricultural enrichment and pesticides. Moved beyond NR under Criteria 2 and 7.	E	S	W	2	12	0
Chrysopilus laetus	NT		NR	*Chrysopilus laetus* was regarded as Endangered in the last review (Falk, 1991) but it has expanded its range so far in recent years that it only just qualifies for Near Threatened, as it has been found in 14 hectads since 1990. However, in view of the relatively uncommon habitat of heartwood-rotted old trees and the vulnerability of such trees to being felled for safety reasons, there is still a greater risk of the species reverting to its former very rare condition. Moved beyond NR under Criteria 2 and 7.	E			3	14	2

Chrysops caecutiens	LC			Recorded in >100 hectads since 1990.	E	S	W	313	204	85
Chrysops relictus	LC			Recorded in >100 hectads since 1990.	E	S	W	251	232	95
Chrysops sepulcralis	LC		NR	*Chrysops sepulcralis* has been recorded in 12 hectads since 1990 and has not declined. The contiguous English populations of Dorset and Hampshire have remained relatively stable and show no real sign of contraction in range, as indicated by the high proportion of old and recent hectads in common. The widely spaced Scottish records suggest that there may be a large, if scattered, population at the south-west end of the Southern Uplands. It appears that there is no immediate threat to the British populations but clearly they are very Localised and at a low density so susceptible to regional extinction. In view of the stability of the English population and likelihood of a moderate population in Scotland, its status has been downgraded from the previous status of Endangered to Least Concern. Moved beyond NR under Criterion 7.	E	S		13	12	9
Chrysops viduatus	LC		NS	Recorded in 71-99 hectads since 1990. Moved beyond NS under Criterion 7	E	S?	W	98	72	34
Cliorismia rustica	LC		NS	Recorded from 29 hectads since 1990 and showing an apparent expansion but this is due entirely to targeted survey through the BAP process. The specific and restricted habitat makes it unlikely that C.	E	S	W	20	29	11

				rustica will move out of the Nationally Scarce category but its wide range and locally frequent occurrence indicate that it is not Near Threatened.						
Clitellaria ephippium	RE			One unconfirmed 19th century record from Kent.	E			0	0	0
Dasypogon diadema	RE			Not seen since the 19th century when it was recorded from a few sites on the Welsh coast.	E		W	3	0	0
Dialineura anilis	LC		NS	Recorded in 17 hectads since 1990 and showing no decline, but a moderately large proportion of old and recent hectads in common, indicating that recording has not located new sites and that established ones probably support a stable population. The wide distribution and possible occurrence at isolated sites in Scotland suggests that it may be more widespread there	E	S	W	19	17	9
Dioctria atricapilla	LC			Recorded in >100 hectads since 1990.	E		W	157	257	86
Dioctria baumhaueri	LC			Recorded in >100 hectads since 1990.	E		W	194	231	98
Dioctria cothurnata	LC		NS	Recorded from 16-19 hectads since 1990 and showing no sign of decline.	E	S	W	23	17	3
Dioctria linearis	LC			Recorded in >100 hectads since 1990.	E		W	155	229	69
Dioctria oelandica	LC		NS	Dioctria oelandica has been recorded in >40 hectads since 1990 but shows a decline and perhaps slight contraction of range in SW England. It is possible that this species could move into Near Threatened if the decline continues,	E	S	W	84	43	18

				although its habitat of old deciduous woodlands is not under threat.						
Dioctria rufipes	LC			Recorded in >100 hectads since 1990.	E	S	W	321	373	127
Dysmachus trigonus	LC			Recorded in >100 hectads since 1990.	E	S	W	141	149	65
Eupachygaster tarsalis	LC		NR	Recorded from 14 hectads since 1990 but widespread in lowland England and with almost no old and recent hectads in common, indicating that recent recording has not covered its range. There is no obvious decline. It is elusive and almost certainly under-recorded. Several records are from reared larvae. Moved beyond NR under Criteria 2 and 7.	E			14	13	1
Eutolmus rufibarbis	LC		NS	*Eutolmus rufibarbis* has been recorded in >40 hectads since 1990, though only slightly more frequent than before 1990. Its discrete range on southern heathlands has not altered so it is likely to remain at a similar level of scarcity even if there is no further deterioration of its habitat.	E			39	46	25
Haematopota bigoti	LC		NS	Recorded from 16 hectads since 1990 and showing no marked decline or change in range, although there are no recent records for some areas.	E	S	W	25	16	3
Haematopota crassicornis	LC			Recorded in >100 hectads since 1990.	E	S	W	223	235	54
Haematopota grandis	LC		NS	Recorded from 25 hectads since 1990, and not declining and shows a marked expansion of its range northwards along the East Anglian coast and from the Bristol Channel	E		W	24	25	8

				to north Wales.						
Haematopota pluvialis	LC			Recorded in >100 hectads since 1990.	E	S	W	580	680	295
Haematopota subcylindrica	LC		NR	Haematopota subcylindrica has been recorded from nine hectads since 1990, and obviously no decline can be inferred from a recently discovered species. The wide spread of records belies a far more restricted distribution since so few specimens have been taken since it was first found in England. The presumed larval habitat is apparently widespread on the east and south coasts of England, but the absence of records from the Thames estuary and north Kent marshes may indicate that the habitat requirements are fairly specific.	E			1	9	1
Hybomitra bimaculata	LC		NS	Recorded in >100 hectads since 1990. Moved beyond NS under Criterion 7	E	S	W	160	98	50
Hybomitra ciureai	LC		NR	Recorded from 13 hectads since 1990 and showing no real decline, and a moderately large proportion of old and recent hectads in common, indicating that some populations may be stable. The species nearly qualifies as Near Threatened (11-12 locations) but the distribution is scattered in the south-east of England (one south Welsh record) which suggests that the species is not confined to a single habitat (although most records are from coastal freshwater grazing marsh). Moved beyond NR under Criterion 2 and 7.	E		W	15	13	5

Hybomitra distinguenda	LC			Recorded in >100 hectads since 1990.	E	S	W	172	110	43
Hybomitra expollicata	NT		NR	Hybomitra expollicata has been recorded from 12 hectads since 1990, with a relatively high proportion of old and recent hectads in common, indicating that the populations may be moderately stable but restricted. As the species was only added to the British list in 1972, there is no indication of a decline. The habitat appears to be the narrow strip of coastal brackish water that is both moderately scarce in Britain, and threatened by both sea level rise and coastal defence squeeze. It qualifies as Near Threatened under the number of locations.	E			10	12	5
Hybomitra lurida	VU	B2a, B2b (ii, iv)	NR	Hybomitra lurida has been recorded in ten hectads since 1990, and shows a moderately large decline (68%) since 1990. There is no marked contraction in the main northern Scottish range. The Cheshire / Shropshire population may be in decline. The wide distribution of *H. lurida* in Britain and the likelihood of a moderately strong Scottish population suggest that this species may eventually prove to be only Nationally Scarce.	E	S		26	10	5
Hybomitra micans	**VU**	B2a, B2b (ii,iv)	NR	*Hybomitra micans* has been recorded from eight hectads since 1990 and has undergone a large decline (76%) since then, and a very large contraction in its range.	E	S?	W	27	8	2
Hybomitra montana	LC		NS	Recorded in 30-70 hectads since 1990. Moved beyond NS, invoking	E	S	W	76	44	13

				Criterion 1.						
Hybomitra muehlfeldi	LC		NR	*Hybomitra muehlfeldi* has been recorded from 15 hectads since 1990, but it is difficult to detect a decline since there are so many potential errors. There has been no change in the core population in Norfolk where it remain a common species. Re-evaluation of the specimens may result in the species being classified as threat ened..	E		W	27	15	7
Hybomitra solstitialis	EN	B2a, B2b(ii,iv)	NR	The species has probably always been rare and, until the recent Oxfordshire record, thought to have been confined to the New Forest. It is still known from only two sites and has undergone extreme fluctuations in abundance, being unrecorded between 1934 and 2011. The distribution is clearly fragmented. From the limited number of New Forest records with site names, the species appears to have been recorded from the same small area in which mire occupies far less than 30km^2; the area of the entire suite of Oxfordshire fen SSSI around Cothill and Dry Sandford (which may be unsuitable) amounts to less than 2km^2. Given the apparently precise nature of the species' preferred habitat, the area of occupancy is likely to be less than 10km^2.	E			0	**2**	0
Ibisia marginata	LC		NS	Recorded in 30-70 hectads since 1990.	E	S	W	33	37	9

Laphria flava	LC		NS	The population of *Laphria flava* is stable and the adult can be found fairly readily in some areas. Its status is Nationally Scarce, based purely on the area of occurrence (16 hectads since 1990) but the habitat used is very specific, restricted in area within the Highlands and cannot be replaced by plantation trees.		S		24	16	14
Lasiopogon cinctus	LC		NS	Recorded in 30-70 hectads since 1990.	E		W	52	48	20
Leptarthrus brevirostris	LC			Recorded in >100 hectads since 1990.	E	S	W	187	185	81
Leptarthrus vitripennis	LC		NR	Recorded from 13 hectads since 1990 but only recently recognised in Britain (1996) so it is likely to be under-recorded. Its distribution appears to be restricted to Chalk grassland.	E			3	13	2
Leptogaster cylindrica	LC			Recorded in >100 hectads since 1990.	E		W	241	414	130
Leptogaster guttiventris	LC		NS	This species has been moved beyond NS under Criteria 7, in recognition of its widespread distribution and that it is best described as thinly spread across suitable landscapes.	E	S	W	75	63	16
Machimus arthriticus	EN	B2a, biii, biv	NR	Recorded in a small area of Breckland in 4 hectads since 1990 and two before this time. The population appears to be stable but is effectively a single large one. The Area of Occurrence is smaller than the hectad count suggests, probably about 40km^2.	E			2	4	0
Machimus atricapillus	LC			Recorded in >100 hectads since 1990.	E	S	W	226	355	133

Machimus cingulatus	LC			Recorded in >100 hectads since 1990.	E	S	W	84	144	38
Machimus cowini	EN	B2a,bii, biv.	NR	Recorded in the Isle of Man at only two hectads since 1990 and that is outside of the review area. The much smaller English population requires more survey work to establish both its extent and robustness, but with two isolated hectads and little opportunity for population reinforcement, Endangered is considered appropriate based on the likelihood of projected decline.	Man (E)			6	2	1
Machimus rusticus	LC		NS	*Machimus rusticus* has been recorded from 22 hectads since 1990 and shows no decline in records and very little change in range. It is distributed in southern counties of England from Dorset to Norfolk, with old records from Kent and one unlikely record from Devon dunes. Its restriction to warm dry calcareous grasslands limits its distribution. Although the range is wide, the available occupied land is small, and the status of Nationally Scarce is appropriate.	E			24	21	7
Microchrysa cyaneiventris	LC			Recorded in >100 hectads since 1990.	E	S	W	225	196	43
Microchrysa flavicornis	LC			Recorded in >100 hectads since 1990.	E	S	W	291	297	80
Microchrysa polita	LC			Recorded in >100 hectads since 1990.	E	S	W	329	302	105
Nemotelus nigrinus	LC			Recorded in >100 hectads since 1990.	E	S	W	182	131	59
Nemotelus notatus	LC			Recorded in >100 hectads since 1990.	E	S	W	147	127	75

Nemotelus pantherinus	LC		NS	Recorded in >90 hectads since 1990. Moved beyond NS, invoking Criterion 7.	E	S	W	113	98	42
Nemotelus uliginosus	LC			Recorded in >100 hectads since 1990.	E	S	W	129	123	57
Neoitamus cothurnatus	CR	B2b (ii,iv)	NR	With only one record from an atypical habitat, and the apparent extinction of the earlier English colony, the species is clearly Critically Endangered. It qualifies under the criteria for extreme fluctuations, and the tiny area of occupancy and extent of occurrence.	E		W	3	1	0
Neoitamus cyanurus	LC			Recorded in >100 hectads since 1990.	E	S	W	139	161	62
Neomochtherus pallipes	CR	D1; C2aii	NR	The species was known from a single record from Devon in 1990 and an apparently good colony was found in 2016 in Shropshire.	E			0	1(+1, 2016)	0
Neopachygaster meromelas	LC		NS	Recorded widely in England north to Cumbria and Durham, from 26 hectads since 1990 and a similar number earlier, with almost none in common, indicating that recording has not covered its range. There is no obvious decline. There is one old (1907) record from Highland which may be an error.	E			27	26	2
Odontomyia angulata	VU	B2a, B2b (ii,iv)	NR	Odontomyia angulata has been recorded from eight discrete sites in five hectads since 1990, of which four are older hectads, indicating very localised populations. The sites are exclusively fen or similarly habitat of high quality, probably related to high and constant levels of ground-water and high water quality. Within each of the sites or	E			9	5	4

				cluster of sites, the species is clearly very rare, even though apparently suitable habitat exists in nearby areas. The habitat requirement is therefore much more specific than just fen or pool margins. The sites are also low-lying so there may be a climatic limitation. A status of Vulnerable is therefore appropriate even though there are several extant populations.						
Odontomyia argentata	LC		NS	Recorded from 23 hectads since 1990. The distribution is lowland England from Somerset to Norfolk but not in the extreme south-east of England. Within this band it is found frequently, suggesting that it is probably climatically limited (although widespread from central Europe to Scandinavia and Russia). It shows no decline, no obvious contraction in range and a relatively low proportion of old and recent hectads in common, suggesting that there are probably many extant sites unvisited recently. Adults have an early flight period so may be under-recorded.	E			41	23	9
Odontomyia hydroleon	CR	B2a, 2b(ii,iv); C2ai, ii.	NR	*Odontomyia hydroleon* is one of the rarest soldierflies in Britain. The larval habitat area on both sites is very small making the populations susceptible to extinction. Conservation management is essential at both sites for the continued survival of the populations, despite the possibility of loss at the Welsh site. The numbers of adults counted in annual monitoring is in the order of tens of	E		W	2	3	2

				individuals at the most. While there has been no consistent decline at the Yorkshire site, numbers fluctuate yearly.						
Odontomyia ornata	LC		NS	Recorded in >40 hectads since 1990, showing no decline.	E		W	39	43	18
Odontomyia tigrina	LC			Recorded in >100 hectads since 1990.	E		W	114	112	57
Ogcodes gibbosus	NT		NR	Recorded in 13 hectads since 1990 and showing a decline (61%) and contraction in range since this date.	E			25	13	5
Ogcodes pallipes	LC		NS	Recorded in 21 hectads since 1990 and showing a decline (66%) and strong contraction in range since this date. Although its historical range is large, its recent strong contraction in range to just a few counties indicates that it may be in real decline. It will be important to track this species to determine if the declines are real and continuing.	E		W	44	21	4
Oplodontha viridula	LC			Recorded in >100 hectads since 1990.	E	S	W	214	236	110
Oxycera analis	VU	B2a, B2b (ii, iv)	NR	Oxycera analis has been recorded from nine hectads since 1990. It exhibits a strong decline of 70% compared to earlier records. There appears to have been a period when it flourished in the 1980 and 1990s but has been scarcely seen since 2000. There is only one hectad in common before and after 1990 so recording may not have detected small persistent colonies.	E			23	9	1
Oxycera dives	LC		NS	Recorded from 16 hectads since 1990 and showing no decline or change in range. It is likely to prove	E	S	W	19	16	5

				more widespread in the less well recorded north of Britain.						
Oxycera fallenii	VU	D2	NR	The species was recognised in Britain only in 1997 although it was recorded in Ireland in the early 20th century. The only accepted records indicated a tiny population in the North York Moors, currently at two sites in two adjacent hectads. While the species appears to meet the criteria for Critically Endangered, a lesser status of Endangered has been applied to take account of its recent addition to the fauna, doubt over several records and the low level of recording in upland England.	E			0	2	0
Oxycera leonina	VU	D2	NR	Oxycera leonina has been recorded from only two pairs of closely adjacent sites: East Walton Common and Lynford Meadows, Norfolk (VC28), and Gromford Meadow SSSI and Farnham, which are in the same river catchment, Suffolk (VC25). The population at East Walton Common is stable and the fly has been recorded here over several years since its discovery in 1989, the first British occurrence. Adults have been found on tree foliage, mainly that of alder Alnus and sallow Salix, by small streams, a ditch and a sluggish river. Three sites are at the junction of wet peat and dry sand and this may be significant for the larvae, which are probably amphibious or even terrestrial, and may develop on wet or damp shaded peat (Stubbs, 1998).	E			1	4	1
Oxycera morrisii	LC		NS	Recorded in >90 hectads since 1990. Moved beyond NS invoking	E	S	W	61	90	10

				Criterion 7.						
Oxycera nigricornis	LC			Recorded in >100 hectads since 1990.	E		W	123	142	58
Oxycera pardalina	LC		NS	Recorded in 30-70 hectads since 1990.	E	S	W	61	64	16
Oxycera pygmaea	LC		NS	Recorded in 30-70 hectads since 1990. Moved beyond NS, invoking Criterion 2 & 8.	E	S	W	61	62	21
Oxycera rara	LC			Recorded in >100 hectads since 1990.	E	S?	W	179	170	67
Oxycera terminata	NT		NR	Recorded from 12 hectads since 1990 across southern Britain from Gwent and Powys to Cambridgeshire and Leicestershire, and south to Dorset. There has been no decline or contraction in range, and the low proportion of old and recent hectads in common indicates that recording has not covered many of the available sites. It meets the criteria for Near Threatened, though the wide distribution and varied sites suggests that O. terminata may not be threatened by any single identifiable factor. Moved beyond NR, invoking Criteria 2 & 7	E		W	15	12	2
Oxycera trilineata	LC			Recorded in >100 hectads since 1990.	E		W	163	160	61
Pachygaster atra	LC			Recorded in >100 hectads since 1990.	E		W	209	281	96
Pachygaster leachii	LC			Recorded in >100 hectads since 1990.	E		W	162	254	67
Pamponerus germanicus	LC		NS	Recorded from 16 hectads since 1990 and showing no obvious decline; its range appears to be stable as indicated by the large proportion (31%) of dual hectads.	E	S	W	29	16	10

Pandivirilia melaleuca	NT	B2biii	NR	Pandivirilia melaleuca has been recorded from six hectads since 1990 in two small areas, although the total number of separate sites is more than ten. There is no indication of decline, but rather the newly found Gloucestershire and Worcestershire sites suggest that it may be more widespread. It still has a very small area of occupancy that is defined by the presence of ancient trees. Its available habitat is therefore very restricted and highly vulnerable. In view of the recent confirmation of populations in western England, a status of Near Threatened, rather than Vulnerable, is appropriate, although the species is clearly still a rare insect.	E			6	6	2
Philonicus albiceps	LC		NS	Recorded in 72-100 hectads since 1990. Moved beyond NS, invoking Criterion 7	E	S	W	102	72	45
Phthiria pulicaria	LC		NS	*Phthiria pulicaria* has been recorded in >40 hectads since 1990. It shows no decline or contraction of range but has not been recorded recently at some dune systems where it was previously known.	E	S	W	41	41	16
Ptiolina nigra	LC		NR	Recorded from ten hectads since 1990 but with none in common with earlier recording, indicating that the finds are random and that there is more to be found. There is no marked decline. This small black and undistinguished species will be overlooked by recorders of larger Brachycera. Moved beyond NR under Criteria 2 & 8.	E	S	W	21	10	0
Ptiolina obscura	LC		NS	Recorded in 30-70 hectads since	E	S	W	46	37	2

				1990. Moved beyond NS, invoking Criterion 2& 8						
Rhadiurgus variabilis	VU	B2a, B2b (ii,iv)	NR	There is some suggestion of a contraction in range, with only one recent (post-1990) record outside the Highland area and about two-thirds of all hectads being represented by older records. Its apparent preference for ancient Caledonian pine forest indicates a need for a particularly type of uncommon woodland, although its occurrence in plantations indicates some flexibility. The species is therefore both rare and its habitat is under a small degree of threat. *Rhadiurgus variabilis* has been recorded from 7 hectads since 1990, though was formerly more common and found in 17 hectads.		S		17	7	5
Rhagio annulatus	NT		NR	*Rhagio annulatus* has been recorded from six hectads since 1990, although one of these is in Scotland and may be an error. It shows not obvious decline but there are no recent records from the west of its range in England, so its range may have contracted slightly. Only one hectad has records before and after 1990 so it may be well under-recorded. Its close resemblance to *R. tringarius* may lead it to be dismissed in the field as this common species and so will not often be closely examined. While *R. annulatus* is technically on the verge of being Vulnerable, more careful recording may show it to be more widespread.	E	[S]		10	6	1

Rhagio lineola	LC			Recorded in >100 hectads since 1990.	E	S	W	436	444	174
Rhagio notatus	LC		NS	Recorded in 30-70 hectads since 1990. Moved beyond NS under criterion 1.	E	S	W	48	47	11
Rhagio scolopaceus	LC			Recorded in >100 hectads since 1990.	E	S	W	529	629	230
Rhagio strigosus	VU	D2	NR	*Rhagio strigosus* has been recorded from seven hectads since 1990. Over half of these have pre-1990 records, indicating that the species has a stable but tiny population in these squares. There has been no obvious decline and, when the possibly incorrect outlying records are excluded, the population appears to have maintained itself far better than many other rare species.	E			10	7	6
Rhagio tringarius	LC			Recorded in >100 hectads since 1990.	E	S	W	377	419	141
Sargus bipunctatus	LC			Recorded in >100 hectads since 1990.	E	S	W	184	170	56
Sargus cuprarius	DD		NR	Records indicate a once very widespread species across much of England with isolated records in Wales and Scotland, and which has undergone a huge decline and contraction in range. However, there are few reliably identified species, making the data impossible to interpret. The species may be Near Threatened or under greater threat, as there are no records since the publication in 2001 of Stubbs & Drake.	E	S?		65	6	1
Sargus flavipes	LC		NS	Recorded in >90 hectads since 1990 but showing the greatest decline among 'common' species, possibly	E	S	W	189	90	24

				linked to avermectin use in cattle. Moved beyond NS under Criterion 7.						
Sargus iridatus	LC			Recorded in >100 hectads since 1990.	E	S	W	250	223	64
Scenopinus fenestralis	LC		NS	Scenopinus fenestralis has been recorded in >40 hectads since 1990. An apparent decline appears to be due to exceptional coverage in Great London in earlier years which has not been continued since 1990, and there is an indication of a slight contraction of range from the north-west of its range to SE lowland England. The scarcity of records of this small black fly outside of buildings has probably led to under-recording by contemporary dipterists. Moved beyond NS, invoking Criterion 2.	E		W	76	45	12
Scenopinus glabrifrons	NE			Non-native.				0	0	0
Scenopinus niger	NT	B2bii, biii, biv	NR	Recorded from 13 hectads since 1990 from Wales to East Anglia and to the south English coast. Older records extend to the West Country, and there are single records from Cumbria and Highland. There is no obvious decline but there is an moderately high proportion (18%) of old and recent hectads in common, which suggests that populations may be localised in ancient woodland and parklands. Although uncommon, the fly's secretive behaviour is likely to have led to under-recording. Moved beyond NR under Criterion 2.	E	S	W	24	13	4
Solva marginata	LC		NS	Recorded in 70-100 hectads since 1990. Moved beyond NS, invoking	E			61	71	23

				Criterion 2 & 7						
Solva varia	RE			Known only from two specimens collected in 1830.				0	0	0
Spania nigra	LC		NS	Recorded very widely throughout Britain. Although recorded from only 20 hectads since 1990, very few are in common with earlier records, indicating that recording is random and that there are potentially many more extant sites. There is no obvious decline. This tiny black species will be overlooked by recorders of larger Brachycera. Moved beyond NS, invoking Criterion 8	E	S	W	39	20	3
Spiriverpa lunulata	LC		NS	Recorded in 30-70 hectads since 1990.	E	S	W	22	39	7
Stratiomys chamaeleon	EN	B2a,B2b (ii,iii,iv)	NR	*Stratiomys chamaeleon* has undergone a large decline (80%) which may have stabilised over the last 20 years. The area occupied is now very small, in three widely separated populations that allows little realistic chance of re-colonisation should any of them go extinct. Four of the six hectads with recent records are on Anglesey but this is a misleading exaggeration of the area occupied; the separate fens span four hectads but lie within a block less than 0.35km^2 in extent and the occupied habitat is considerably smaller than this. The habitat is scarce in Britain, and the Oxfordshire sites are also vulnerable to intensification of usage in surrounding arable farmland and settlements. Monitoring at Anglesey gives	E	S	W	27	6	3

				numbers of adults (sometimes larvae) in single figures and rarely as many as 75 individuals. A status of Endangered is clearly more appropriate than Vulnerable.						
Stratiomys longicornis	LC		NS	Recorded from 26 hectads since 1990, showing no decline but with a moderately high proportion of dual hectads, indicating a limited range of sites where it can be recorded. It occurs in Solent (Hampshire, Isle of Wight, West Sussex), Dungeness and Romney Marsh in Kent, the Thames estuary (Kent, Essex), the South Essex marshes where it is most often recorded, and more rarely on the coastal marsh of Suffolk, Norfolk and The Wash. It does not appear to occupy all apparently suitable habitat so may have a particular requirement that is moderately scarce.	E			39	26	12
Stratiomys potamida	LC			Recorded in >100 hectads since 1990.	E		W	224	169	76
Stratiomys singularior	LC			Recorded in >100 hectads since 1990.	E	S	W	123	120	69
Symphoromyia crassicornis	LC		NS	Recorded in 30-70 hectads since 1990. Moved beyond NS given its Scottish presence, invoking Criterion 1	E	S	W	48	49	11
Symphoromyia immaculata	LC		NS	Recorded in 29 hectads since 1990 and widely distributed in lowland England (one old records from south Wales), showing no obvious decline and with relatively few old and recent hectads in common, indicating that recent recording has not covered much of its range. It is unlikely in the face of future	E		W	52	27	9

				recording effort to remain Nationally Scarce.						
Systoechus ctenopterus	NE			The single sighting from Surrey in 2008 was obtained from a photograph and has not been confirmed with a specimen.	E			0	0	0
Tabanus autumnalis	LC			Recorded in >100 hectads since 1990.	E		W	137	118	53
Tabanus bovinus	EN	B2a, B2b (ii,iv)	NR	Tabanus bovinus is known recently from only one population in North Somerset, on the assumption that it is extinct (or extremely rare) in the New Forest. The very few records suggest that it has undergone fluctuations in abundance.	E			19	5	2
Tabanus bromius	LC			Recorded in >100 hectads since 1990.	E		W	183	138	59
Tabanus cordiger	LC		NS	Recorded in 26 hectads since 1990 but widely distributed and likely to prove more frequent.	E	S	W	60	26	8
Tabanus glaucopis	EN	B2a, B2b (ii,iv)	NR	*Tabanus glaucopis* has undergone a large decline (82%) and contraction in range, having been recorded only four sites in four hectads since 1990. These lie within an area less than 1000km^2, and together the individual sites occupy no more than 10km^2. The reason for such a contraction is not clear since there remains much chalk grassland with scrub in southern England.	E			21	4	3
Tabanus maculicornis	LC		NS	Recorded in 28-70 hectads since 1990.	E	S?	W	74	28	15

Tabanus miki	NT	B2 bii and iv	NR	Although recorded in only 10 hectads since 1990, this species closely resembles the common T. bromius and the validity of many records is uncertain. Whilst Data Deficient may be appropriate, the status of Near Threatened has been applied to focus attention on this rare and poorly-understood species.	E		W	12	10	1
Tabanus sudeticus	LC		NS	Recorded in 87 hectads since 1990. Moved beyond NS invoking Criterion 7.	E	S	W	134	87	28
Thereva bipunctata	LC		NS	Recorded in 30-70 hectads since 1990. Moved beyond NS invoking Criterion 7 & 8.	E	S	W	66	66	25
Thereva cinifera	NT	D2	NR	The recent recognition of this species in Britain (1992), the widely spaced localities and the two types of habitat suggest that *Thereva cinifera* may be more widespread. It has been confused with similar species of both these habitats so, although it is undoubtedly rare, it may not be threatened. It has been recorded from only five hectads since 1990 but the few records may reflect its recent addition to the British list. A status of Near Threatened seems appropriate, although this may be too conservative and a higher threat category may be considered in future.	E		W	0	5	0
Thereva fulva	NT	B2 biii	NR	*Thereva fulva* has been recorded from 11 hectads since 1990 and shows a slight decrease in the number of hectads but coupled with a possible contraction in overall range. However, records may	E		W	15	11	5

				include some errors; removal of some apparent outliers would make a more likely pattern of distribution on inland sandy geology as well as coastal dunes. In view of this uncertainty, a status of Near Threatened is given						
Thereva handlirschi	LC		NR	*Thereva handlirschi* has been recorded from 15 hectads since 1990, mainly in Scotland, and has been recorded more widely recently than before. Its recent discovery in Northumberland marks a large extension of the range although presumably this is a highly disjunct distribution. Although the species is clearly rare and restricted in its range, recent records suggest that its status should be Nationally Rare. Moved beyond NR under Criterion 7.	E	S		8	15	4
Thereva inornata	EN	B2a, B2b (ii,iv)	NR	*Thereva inornata* appears to have undergone a decline (74%) and contraction in range since 1990, and is presently known from only four sites in five hectads in the core of its range in the Grampians. The entire historical range, ignoring the Mull and Galloway records, is less than 20,000km^2.		S		16	5	2
Thereva nobilitata	LC			Recorded in >100 hectads since 1990.	E	S	W	219	320	96
Thereva plebeja	LC		NS	Recorded in 71 hectads since 1990. Moved beyond NS under Criterion 7.	E		W	66	71	23

Thereva strigata	EN	B2a, bii, biv.	NR	*Thereva strigata* has been recorded from four hectads since 1990 but none are in common with earlier records, indicating that the populations may be tiny so that recording is effectively random. There is no obvious decline although with so few historical records this cannot be put into context well. The extent of its coastal Chalk habitat is small, perhaps 10-20km in total, so small changes to the condition of the habitat may make some populations vulnerable to extinction. Despite the wide geographic range, a status of Vulnerable is more appropriate than Near Threatened. If more inland populations on the Chalk are found, the status may need downgrading.	E			5	4	0
Thereva valida	LC		NR	*Thereva valida* has been recorded from eight hectads since 1990 and shows no decline or contraction of its core range in Scotland, and the recently discovered English population shows that it may be more widespread. The total area occupied is much less than 10,000km^2. The English population is very small, occupying a single small upper catchment that spans two hectads.	E	S		6	8	2
Thyridanthrax fenestratus	LC		NS	Recorded in 31 hectads since 1990.	E			31	31	23
Vanoyia tenuicornis	LC		NS	Recorded in >90 hectads since 1990. Moved beyond NS under Criterion 7.	E		W	75	90	31

Villa cingulata	LC		NR	Villa cingulata has been recorded from ten hectads since 2000, and these were the first records since 1938. Only one recent hectad duplicates an old record, suggesting that the species has moved into new terrain. Although it is population is undergoing a significant expansion in range and strength, it is still in two small areas compared to a much wider previous range. It may well fluctuate as it has in the past. Its apparent requirement for neither short-grazed nor long rank grassland makes it susceptible to changes in pastoral practice, and a run of cool wet summers may damage the population of this thermophilic species.	E			14	10	1
Villa modesta	LC		NS	Recorded in 30-70 hectads since 1990.	E	S	W	39	36	13
Villa venusta	CR	B2b (ii,iv)	NR	While the absence of a conspicuous fly for over 50 years suggests that it is probably extinct, the recent and widespread re-appearance of Villa cingulata after an absence of 62 years shows that extinction of species in this genus cannot be assumed. Therefore the status of Critically Endangered is given, although there are no IUCN criteria to cover this situation.	E			16	0	0
Xylomya maculata	VU	B2a, B2b (ii,iii,iv)	NR	Xylomya maculata has been recorded from only three hectads since 1990, each within the three clusters of known sites, but this level of recording represents a decline of 67% since earlier records. The overall distribution has not	E			8	3	3

				changed (no extinction in any of the three main clusters) but the area of occupancy is small and is estimated generously from the distribution map to be less than 5000km^2 but more realistically less than 2000km^2. Even within apparently suitable huge areas such as the New Forest and Epping Forest, it has been recorded from small patches, which suggests that the fly has some particular requirements that are not obvious. The larval habitat of rot-holes in old trees is a moderately scarce, and is susceptible to mismanagement in some of the forest and parks with public access where old trees may be seen as a danger. However, the adult is elusive, and a moderately large proportion of records are from reared larvae, so there a strong possibility that the species is under-recorded.						
Xylophagus ater	LC			Recorded in >100 hectads since 1990.	E	S	W	255	172	76
Xylophagus cinctus	LC		NR	Xylophagus cinctus has been recorded from 14 hectads since 1990 and is apparently expanding its range. It is now found in conifer plantations with trees older than 50 years and developing in spruce as well as pine, so it seems likely to continue to extend its range. Moved beyond NR invoking Criterion 2 and 7.		S		14	14	5
Xylophagus junki	RE			Known from only one specimen taken in 1913.		S		1	0	0

Zabrachia tenella	EN	B2a, B2b (ii.iv)	NR	Zabrachia tenella has undergone a marked decline (78%) and contraction of its range since 1990 (starting well before 1990). The reason cannot be that it is more difficult to find than many other Stratiomyidae since the difficulty would have been similar at all times. The current small number of hectads (5) coupled with this decline suggest that it status should be Endangered. This marks a considerable upgrading in status from Nationally Scarce (Falk, 1991); the species was not mentioned in Shirt (1987).	E	S		18	5	0

Appendix 2. IUCN Criteria and Categories

Summary of the five criteria (A–E) used to evaluate if a taxon belongs in a threatened category (Critically Endangered, Endangered or Vulnerable)

	Critically Endangered	Endangered	Vulnerable
A. Population reduction			
A1	≥ 90%	≥ 70%	≥ 50%
A2, A3 & A4	≥ 80%	≥ 50%	≥ 30%

A1. Population reduction observed, estimated, inferred, or suspected in the past where the causes of the reduction are clearly reversible **AND** understood **AND** have ceased, based on and specifying any of the following:

(a) direct observation

(b) an index of abundance appropriate to the taxon

(c) a decline in area of occupancy (AOO), extent of occurrence (EOO) and/or habitat quality

(d) actual or potential levels of exploitation

(e) effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.

A2. Population reduction observed, estimated, inferred, or suspected in the past where the causes of reduction may not have ceased **OR** may not be understood **OR** may not be reversible, based on (a) to (e) under A1.

A3. Population reduction projected or suspected to be met in the future (up to a maximum of 100 years) based on (b) to (e) under A1.

A4. An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a maximum of 100 years in future), and where the causes of reduction may not have ceased **OR** may not be understood **OR** may not be reversible, based on (a) to (e) under A1.

B. Geographic range in the form of either B1 (extent of occurrence) AND/OR B2 (area of occupancy)			
B1. Extent of occurrence (EOO)	< 100 km²	< 5,000 km²	< 20,000 km²
B2. Area of occupancy (AOO)	< 10 km²	< 500 km²	< 2,000 km²

AND at least 2 of the following:

(a) Severely fragmented, **OR**

Number of locations	= 1	≤ 5	≤ 10

(b) Continuing decline observed, estimated, inferred or projected in any of: **(i)** extent of occurrence; **(ii)** area of occupancy; **(iii)** area, extent and/or quality of habitat; **(iv)** number of locations or subpopulations; **(v)** number of mature individuals.

(c) Extreme fluctuations in any of: **(i)** extent of occurrence; **(ii)** area of occupancy; **(iii)** number of locations or subpopulations; **(iv)** number of mature individuals.

C. Small population size and decline			
Number of mature individuals	< 250	< 2,500	< 10,000
AND at least one of C1 or C2:			
C1. An observed, estimated or projected continuing decline of at least (up to a maximum of 100 years in future):	25% in 3 years or 1 generation (whichever is longer)	20% in 5 years or 2 generations (whichever is longer)	10% in 10 years or 3 generations (whichever is longer)
(up to a max. of 100 years in future)			
C2. An observed, estimated, inferred or projected continuing decline **AND** at least 1 of the following 3 conditions:			
(a i) Number of mature individuals in each subpopulation:	≤ 50	≤ 250	≤ 1,000
or			
(a ii) % of mature individuals in one subpopulation =	90–100%	95–100%	100%
(b) Extreme fluctuations in the number of mature individuals.			

D. Very small or restricted population			
Either:			
Number of mature individuals	< 50	< 250	**D1.** < 1,000
D2. *Only applies to the VU category*. Restricted area of occupancy or number of locations with a plausible future threat that could drive the taxon to CR or EX in a very short time.			**D2.** typically: AOO < 20 km² or number of locations ≤ 5
E. Quantitative Analysis			
Indicating the probability of extinction in the wild to be:	≥ 50% in 10 years or 3 generations, whichever is longer (100 years max.)	≥ 20% in 20 years or 5 generations, whichever is longer (100 years max.)	≥ 10% in 100 years

Appendix 3. Moderating criteria for NR/NS rarity status

Rather than a strict reliance of determing national rarity based on hectad counts, the following criteria have been derived to allow for audited deviation based on expert opinion.
The categories available are:

1. **Geographical**- it lives in an area where no one goes, so no-one encounters it, yet it is within its known range;
2. **Ecological**- it, for example, lives in caves, or tussocks, so is rarely encountered unless specifically looked for.
3. **Temporal**- it only comes out at night, or in early Spring, and so is missed by most diurnal summer collectors
4. **Artifactual**- it was widely trapped before when you put out 100's of water traps, but unless you repeat that level of effort it will be missed
5. **Nomenclatural**- it was part of a group that is now split, so we have no idea which parts of the group are where anymore
6. **Contextual**- it is part of a taxon unit that is poorly worked and/or taxonomically uncertain, so the context of the records is often unclear, or is too recently discovered.
7. **Boundary**- it is described as widespread or is apparently widespread, and the hectad count is close to a category boundary.

8. **Re-scaling** – within this family the level of recording effort is such that the threshold for accepting NR/NS status may requires fewer records for some taxa than is required in better recorded groups. As such the consensus is that although there are relatively few records it is actually fairly widespread.