

Natural England Commissioned Report NECR265

A review of the status of the beetles of Great Britain

The Staphylinidae: Tachyporinae beetles

Species Status No. 38

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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

Decisions about the priority to be attached to the conservation of species should be based upon objective assessments of the degree of threat to species. The internationally-recognised approach to undertaking this is by assigning species to one of the IUCN threat categories using the IUCN guidelines.

This report was commissioned to update the national threat status of beetles within the Staphylinidae: Tachyporinae. It covers all species in this group, identifying those that are rare and/or under threat as well as those which are non-threatened and non-native. Reviews for other invertebrate groups will follow.

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Further information

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1 Introduction to the Species Status project

1.1 The Species Status project

The Species Status project provides up-to-date assessments of the status and extinction risk faced by individual species using the internationally accepted Red List criteria and guidelines developed by the International Union for Conservation of Nature (IUCN) Standards and Petitions Subcommittee, 2017; (IUCN, 2012a; 2012b). It is the successor to the Joint Nature Conservation Committee's (JNCC) Species Status Assessment project () which ended in 2008.

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. All publications will explain the rationale for the assessments made. The approved threat and rarity statuses will be entered into the JNCC spreadsheet of species conservation designations (). This publication is one in a series of reviews to be produced under the auspices of the new project.

1.2 The status assessments

This Review adopts the procedures recommended for the regional application of the IUCN threat assessment guidelines (IUCN 2012b). Section 3 and Appendix 1 provide further details. This is a three-step process, the first identifying the taxa to be assessed, the second identifying those threatened in the region of interest using information only on the status of the taxa in that region (IUCN 2012a) and the third amending the initial assessment where necessary to take into account interaction with populations of the taxon in neighbouring regions (IUCN Standards and Petitions Subcommittee, 2017).

In addition, but as a separate exercise, the Great Britain Rarity System, used for assessing rarity and based solely on distribution, is used here 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 status of species, not least including 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, although the IUCN point out that a category of threat is often not sufficient to determine priorities for conservation action. 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 Beetle reviews

Many beetles are important ecological indicators (much more refined than most plants) due to their dependency on complex factors such as vegetation structure, microclimate and substrate. They are also found in a much wider range of habitats than some of the more popular groups of insects such as butterflies, dragonflies and bumblebees. Monitoring their status and abundance can provide a very useful indication of ecological ‘health’, in a way that monitoring plants, birds, bats or other insect groups, for example, may not.

The Staphylinidae: Tachyporinae are a well-defined and relatively easily recognisable group of beetles. However, considerable difficulty can be experienced with the identification of species, in particular in the genera *Mycetoporus* and *Sepedophilus*. Identification pitfalls can also be experienced with some *Tachyporus* and *Tachinus* species. The lack of up-to-date keys in English also makes the Tachyporinae relatively unpopular with coleopterists compared to well-recorded groups such as the ground beetles (Carabidae), larger leaf beetles (Chrysomelidae), weevils (Curculionoidea), stag beetles and chafers (Lucanidae, Scarabaeidae) and longhorn beetles (Cerambycidae). Within the Tachyporinae are some of the most frequently encountered taxa in the field ground layer. *Tachyporus hypnorum* for example, is one of the most widespread and abundant species in Britain.

2.1 Taxa selected for this Review

Table 1 summarises the 68 taxa included in this Review. Nomenclature follows Duff (2018) which supersedes Duff (2012). Data has been collated from the following data sources.

- historic records published in local and national journals;
- published county reviews;
- voucher specimens in local and national museums;
- records arising from the activity of the biological recording community. The community is represented by amateur and professional recorders who have donated their data to the Biological Records Centres including the NBN, and also directly to the author of this Review.

It is important to note that whilst the process of data collection has been intensive, it has not been exhaustive.

The taxon *Parabolitobius formosus* (Gravenhorst, 1806) is not included in this Review. It is recorded as *Bolitobius formosus* (Gravenhorst, 1806) in Shirt (1987) as Category ‘APPENDIX’ which relates to taxa formerly native to Britain but not recorded since 1900. However, the species was not keyed in Joy (1932) who considered it to be doubtfully British (Hodge & Jones, 1995) and Duff (2008) states that there is no reliable British record.

Table 1. List of selected taxa; Tachyporinae

Order	Family	Taxon
Coleoptera	Staphylinidae	<i>Bolitobius castaneus</i> (Stephens, 1832)
		<i>Bolitobius cingulatus</i> Mannerheim, 1830
		<i>Bryophacis crassicornis</i> (Mäklin, 1847)
		<i>Bryophacis maklini</i> (Sahlberg, J., 1871)
		<i>Bryoporus cernuus</i> (Gravenhorst, 1806)
		<i>Cilea silphoides</i> (Linnaeus, 1767)
		<i>Coproporus immigrans</i> Schülke, 2007
		<i>Ischnosoma longicorne</i> (Mäklin, 1847)
		<i>Ischnosoma splendidum</i> (Gravenhorst, 1806)
		<i>Lamprinodes saginatus</i> (Gravenhorst, 1806)
		<i>Lordithon exoletus</i> (Erichson, 1839)
		<i>Lordithon lunulatus</i> (Linnaeus, 1760)
		<i>Lordithon speciosus</i> (Erichson, 1839)
		<i>Lordithon thoracicus</i> (Fabricius, 1777)
		<i>Lordithon trinotatus</i> (Erichson, 1839)
		<i>Mycetoporus ambiguus</i> Luze, 1901
		<i>Mycetoporus angularis</i> Mulsant & Rey, 1853
		<i>Mycetoporus baudueri</i> Mulsant & Rey, 1875
		<i>Mycetoporus bimaculatus</i> Lacordaire, 1835
		<i>Mycetoporus clavicornis</i> (Stephens, 1832)
		<i>Mycetoporus despectus</i> Strand, A., 1969
		<i>Mycetoporus erichsonianus</i> Fagel, 1965
		<i>Mycetoporus lepidus</i> (Gravenhorst, 1806)
		<i>Mycetoporus longulus</i> Mannerheim, 1830
		<i>Mycetoporus monticola</i> Fowler, 1888
		<i>Mycetoporus nigricollis</i> Stephens, 1835
		<i>Mycetoporus piceolus</i> Rey, 1883
		<i>Mycetoporus punctus</i> (Gravenhorst, 1806)
		<i>Mycetoporus reichei</i> (Pandellé, 1869)
		<i>Mycetoporus rufescens</i> (Stephens, 1832)
		<i>Parabolitobius inclinans</i> (Gravenhorst, 1836)
		<i>Sepedophilus bipunctatus</i> (Gravenhorst, 1802)
		<i>Sepedophilus constans</i> (Fowler, 1888)
		<i>Sepedophilus immaculatus</i> (Stephens, 1832)
		<i>Sepedophilus littoreus</i> (Linnaeus, 1758)
		<i>Sepedophilus lusitanicus</i> Hammond, 1973
		<i>Sepedophilus marshami</i> (Stephens, 1832)
		<i>Sepedophilus nigripennis</i> (Stephens, 1832)
		<i>Sepedophilus pedicularius</i> (Gravenhorst, 1802)
		<i>Sepedophilus testaceus</i> (Fabricius, 1792)
		<i>Tachinus bipustulatus</i> (Fabricius, 1792)
		<i>Tachinus corticinus</i> Gravenhorst, 1802
		<i>Tachinus elongatus</i> Gyllenhal, 1810
		<i>Tachinus flavolimbatus</i> Pandellé, 1869
		<i>Tachinus humeralis</i> Gravenhorst, 1802

	<i>Tachinus laticollis</i> Gravenhorst, 1802
	<i>Tachinus lignorum</i> (Linnaeus, 1758)
	<i>Tachinus marginellus</i> (Fabricius, 1781)
	<i>Tachinus pallipes</i> (Gravenhorst, 1806)
	<i>Tachinus proximus</i> Kraatz, 1855
	<i>Tachinus rufipennis</i> Gyllenhal, 1810
	<i>Tachinus rufipes</i> (Linnaeus, 1758)
	<i>Tachinus scapularis</i> Stephens, 1832
	<i>Tachinus subterraneus</i> (Linnaeus, 1758)
	<i>Tachyporus atriceps</i> Stephens, 1832
	<i>Tachyporus chrysomelinus</i> (Linnaeus, 1758)
	<i>Tachyporus dispar</i> (Paykull, 1789)
	<i>Tachyporus formosus</i> Matthews, A.H., 1838
	<i>Tachyporus hypnorum</i> (Fabricius, 1775)
	<i>Tachyporus nitidulus</i> (Fabricius, 1781)
	<i>Tachyporus obtusus</i> (Linnaeus, 1767)
	<i>Tachyporus pallidus</i> Sharp, 1871
	<i>Tachyporus pusillus</i> Gravenhorst, 1806
	<i>Tachyporus quadriscopulatus</i> Pandellé, 1869
	<i>Tachyporus scitulus</i> Erichson, 1839
	<i>Tachyporus solutus</i> Erichson, 1839
	<i>Tachyporus tersus</i> Erichson, 1839
	<i>Tachyporus transversalis</i> Gravenhorst, 1806

The area covered in this Review is Great Britain (i.e. England, Scotland and Wales only). While Northern Ireland forms part of the United Kingdom, the recent trend has been for that area to work with the Irish Republic to cover whole Ireland reviews. The Channel Islands and the Isle of Man are not included.

2.2 Previous reviews

2.2.1 British Red Data Books: 2. Insects (1987)

The first account of threatened British Coleoptera was included in the British Red Data Books: 2. Insects (Shirt, 1987). This listed 546 of the total British beetle fauna of some 4000 species, which equates to 14% having a conservation status. Shirt used 5 Categories (Endangered, Vulnerable, Rare, Out of Danger and Endemic) as well as 'Appendix' which concerned extinct species formerly native to Britain but not recorded since 1900. Species were assigned to these categories using count data only and the magnitude of decline was not considered. Data sheets were only provided for each of the Category 1 (Endangered) and 2 (Vulnerable) species. The list of species covered in the present Review by category from Shirt (1987), allowing for taxonomic changes which have occurred since 1987 (see Duff, 2012 for changes) is provided in Table 2.

Table 2. Staphylinidae: Tachyporinae Red List assignments after Shirt (1987).

Taxon	CATEGORY
<i>Bryoporus cernuus</i> (Gravenhorst, 1806)	RDB3: Rare
<i>Bryoporus crassicornis</i> (Mäklin, 1847)	RDB3: Rare
<i>Tachinus bipustulatus</i> (Fabricius, 1792)	RDB2: Vulnerable
<i>Tachyporus quadriscopulatus</i> Pandellé, 1869	RDB3: Rare

2.2.2 A review of the scarce and threatened beetles of Great Britain (1992; 1994)

The British Red Data Book volume was followed by the publication of *A review of the scarce and threatened beetles of Great Britain Part 1* (Hyman (revised Parsons), 1992) and *Part 2* (Hyman (revised Parsons), 1994) which reviewed the status for all British beetles and presented data sheets for all scarce and threatened terrestrial species. Hyman (revised Parsons) expanded on Shirt's Categories, but retained Categories RDB1, 2, 3, Category 5 and 'APPENDIX' with their criteria. He also introduced additional categories, those for Red Data Book Indeterminate (RDBI), Red Data Book Insufficiently Known (RDBK), Nationally Scarce Category A (Notable A), Nationally Scarce Category B (Notable B) and Nationally Scarce (Notable). As with Shirt (1987), the magnitude of decline was not considered in the evaluation of status. Data sheets for aquatic beetles were not included, although for IUCN Categorised species, data sheets have subsequently been provided by Foster (2010). The list of species covered in the present Review by category from Hyman (revised Parsons), (1994) allowing for taxonomic changes which have occurred since 1994 (see Duff, 2018 for changes) is provided in Table 3.

Table 3. Rarity and scarcity categories assigned by Hyman (revised Parsons) (1994) for species in the Status Review of Staphylinidae: Tachyporinae.

Taxon	Category
<i>Bryophacis crassicornis</i> (Mäklin, 1847)	RDBK: Insufficiently Known
<i>Bryophacis maklini</i> (Sahlberg, J., 1871)	Notable
<i>Bryoporus cernuus</i> (Gravenhorst, 1806)	RDBK: Insufficiently Known
<i>Ischnosoma longicorne</i> (Mäklin, 1847)	Notable
<i>Lamprinodes saginatus</i> (Gravenhorst, 1806)	Na Notable
<i>Mycetoporus baudueri</i> Mulsant & Rey, 1875	Notable
<i>Mycetoporus bimaculatus</i> Lacordaire, 1835	RDBK: Insufficiently Known
<i>Mycetoporus despectus</i> Strand, A., 1969	Notable
<i>Mycetoporus erichsonianus</i> Fagel, 1965	Notable
<i>Mycetoporus monticola</i> Fowler, 1888	Notable
<i>Mycetoporus piceolus</i> Rey, 1883	Notable
<i>Mycetoporus punctus</i> (Gravenhorst, 1806)	Notable
<i>Sepedophilus bipunctatus</i> (Gravenhorst, 1802)	Nb Notable
<i>Sepedophilus constans</i> (Fowler, 1888)	Notable
<i>Sepedophilus pedicularius</i> (Gravenhorst, 1802)	Notable
<i>Sepedophilus testaceus</i> (Fabricius, 1792)	Notable
<i>Tachinus bipustulatus</i> (Fabricius, 1792)	RDB1: Endangered
<i>Tachinus flavolimbatus</i> Pandellé, 1869	RDBK: Insufficiently Known
<i>Tachinus lignorum</i> (Linnaeus, 1758)	Notable
<i>Tachinus rufipennis</i> Gyllenhal, 1810	RDB3: Rare
<i>Tachinus scapularis</i> Stephens, 1832	RDBI: Indeterminate

<i>Tachyporus formosus</i> Matthews, A.H., 1838	Na Notable
<i>Tachyporus quadriscopulatus</i> Pandellé, 1869	RDBK: Insufficiently Known
<i>Tachyporus scitulus</i> Erichson, 1839	RDBK: Insufficiently Known

2.3 This Review

The present Review provides an up to date assessment of the status of the Staphylinidae: Tachyporinae beetles in the universally adopted format for the assessment of threat in any taxa (IUCN 2012a, 2017). The IUCN criteria concentrate on imminent danger of regional extinction whereas the non-IUCN criteria for Nationally Rare and Nationally Scarce relate to the restriction of geographic distribution within Great Britain, irrespective of trends in range or abundance. Much new information on distribution and trends has become available since the publication of Shirt (1987) and Hyman (revised Parsons) (1992; 1994). This Review revises the British Rarity status assigned to many species in the earlier reviews and several nomenclatural changes have been incorporated in accordance with the latest checklist (Duff, 2018). For the purpose of hectad counts, data has been collated for the period up until 31st December 2017, although records post-dating this cut-off point have been considered and included where they materially affect the IUCN status of a taxon or where they add information about its ecology.

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

3.1 Summary of the 2001 Threat Categories

It is necessary to have a good understanding of the rationale behind red listing and the definitions used in the red listing process. This is because these definitions may differ from standard ecological definitions e.g. “populations” or have very specific meanings e.g. “inferred”. Details regarding methods and terminology are contained in the Guidelines for Using the IUCN Red List Categories and Criteria (IUCN 2017) whilst a concise summary is provided by IUCN Red List Categories and Criteria: Version 3.1 (IUCN 2012a). The procedure for assessing taxa at a regional level differs from that at a global level and is summarised in the Guidelines for Application of IUCN Red List Criteria at Regional and National Levels IUCN (IUCN 2012b).

A brief outline of the revised IUCN criteria and their application is given below. The definitions of the categories are given in Table 4 and the hierarchical relationship of the categories in Figure 1.

Table 4. Definitions of IUCN threat categories (from IUCN 2012b with a more specific definition for regional extinction).

<p>REGIONALLY EXTINCT (RE)</p> <p>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.</p>
<p>CRITICALLY ENDANGERED (CR)</p> <p>A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered (see Appendix 2).</p>
<p>ENDANGERED (EN)</p> <p>A taxon is Endangered when the best available evidence indicates that it meets any of the Criteria A to E for Endangered (see Appendix 2).</p>
<p>VULNERABLE (VU)</p> <p>A taxon is Vulnerable when the best available evidence indicates that it meets any of the Criteria A to E for Vulnerable (see Appendix 2).</p>
<p>NEAR THREATENED (NT)</p> <p>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.</p>
<p>LEAST CONCERN (LC)</p> <p>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.</p>
<p>DATA DEFICIENT (DD)</p> <p>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.</p>
<p>NOT EVALUATED (NE)</p> <p>A taxon is Not Evaluated when it has not yet been evaluated against the criteria.</p>
<p>NOT APPLICABLE (NA)</p> <p>Taxa deemed to be ineligible for assessment at a regional level because they are not wild populations or not within their natural range in the region, or non-natives (whether this is the result of accidental or deliberate importation), or because they are vagrants. A taxon may also be NA because it occurs at very low numbers in the region (i.e. when the regional Red List authority has decided to use a “filter” to exclude taxa before the assessment procedure) or the taxon may be classified at a lower taxonomic level (e.g. below the level of species or subspecies) than considered eligible by the regional Red List authority.</p>

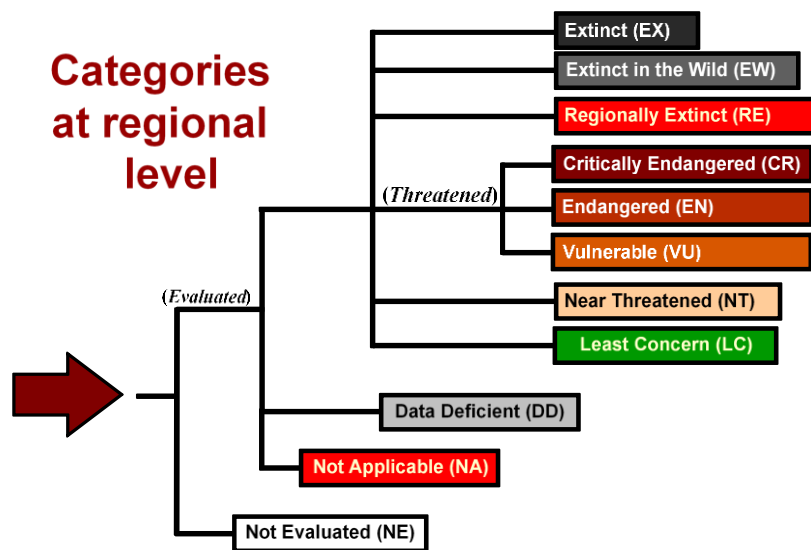


Figure 1. Hierarchical relationships of the categories adapted from IUCN (2001)

Taxa listed as *Critically Endangered*, *Endangered* or *Vulnerable* are defined as Threatened taxa. For each of these threat categories there is a set of five main criteria A-E, that indicate different reasons for the threat of extinction, 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. A taxon therefore need not meet all of the criteria A-E, but an attempt should be made to test information for each species against each of the five criteria. The taxon should then be listed against the highest threat category for one or more of the five criteria. The qualifying thresholds within the criteria A-E are detailed in Appendix 2: IUCN Criteria and Categories.

Status evaluation procedure relies on an objective assessment of the available evidence. Understanding data uncertainty and data quality is essential when applying the criteria. However, it is not always possible to have detailed and relevant data for every taxon. For this reason, the Red List Criteria are designed to incorporate the use of inference and projection, to allow taxa to be assessed in the absence of complete data. Although the criteria are quantitative in nature, the absence of high-quality data should not deter attempts at applying the criteria. In addition to the quality and completeness of the data (or lack of), there may be uncertainty in the data itself, which needs to be considered in a Red List assessment (data uncertainty is discussed in section 3.2; IUCN 2017). The IUCN criteria use the terms Observed, Estimated, Projected, Inferred, and Suspected to refer to the quality of the information for specific criteria and the specific IUCN red list definitions of these terms was used (see section 3.2; IUCN 2017).

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.

3.1.1 The use of the Not Applicable category

A taxon may be Not Applicable (NA) when it occurs in a region but is not included in the regional assessment because it is a vagrant or an immigrant occurring in very insignificant numbers or for a very brief period of time.

3.1.2 The use of the Near Threatened category

The IUCN guidelines recognise a *Near Threatened* category to identify taxa that need to be kept under review to ensure that they do not further decline to become Threatened. This category would be best considered for those taxa that come close to qualifying as VU; i.e. meeting many but not all of the criteria and sub-criteria and there is ongoing threat. 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.

3.1.3 The three-stage process in relation to developing a Red List

The IUCN regional guidelines (IUCN, 2012b) indicate taxa should be assessed using a three-stage approach. Populations in the region identified for review should firstly be assessed using the global guidelines. That status should then be reassigned a higher or a lower category if their status within the region is likely to be affected by emigration or immigration (IUCN, 2012b).

3.2 Application of the Guidelines to the Staphylinidae: Tachyporinae

3.2.1 Use of criteria in this Review

The IUCN process requires that each species is evaluated against all 5 criteria (criteria 'A - E').

Data concerning British invertebrates have been collected since the 19th century. Often there is only enough information to identify the median point in the overall number of records gathered and compare occupancy in the periods before and after the median. Sometimes the data are more numerous and can be grouped into multiple 10 year periods (e.g. 1985 – 1994 and so forth).

An attempt was made to assess all taxa against Criterion A but only in a minority of cases were the data deemed sufficient enough to generate a robust test statistic.

The Invertebrate Inter Agency Working Group has defined the following for the use of Criterion B which is commonly used in invertebrate reviews. Continuing decline has to be

demonstrated, and proven that it is not an artefact of under-recording. If decline is demonstrated then the reviewer needs to consider whether or not B2a, and B2c if the data are present, are met.

Criterion C could not be applied to any taxa in this Review because no population counts exist for the species other than random counts of individuals (e.g. in pitfall trap samples). No standardised or regular-frequency monitoring have been carried out on any of these taxa in Britain to the author's knowledge.

Criterion D was applied to taxa in this Review.

It was not possible to use Criterion E as the available data do not allow for determining the probability of extinction using population modelling.

3.2.2 Scale for calculating decline and area

The IUCN recommend a scale of 4km² (a tetrad) as the reference scale (IUCN, 2017). This needs to be applied with caution and there will be instances where a different scaling may be more applicable, or where attempting to apply any scale is extremely difficult. It should be noted that, historically, invertebrate datasets used hectads (10km square) as the default scale. Old records (e.g. pre 1950) have usually only been reported at this scale. This means that, for some taxa, estimates of decline can only be made at this scale. Hectads are also used to determine the Great Britain Rarity Status, so records which are only at this scale are less problematical. For rarer, more range-restricted, taxa the tetrad is applied where possible and is a significant scale for taxa which may occur on a few fragmented sites within the UK and/or which are often restricted to certain, well-defined habitat types that are easily identified. Tetrads have therefore been recorded for taxa that have been recorded in 15 or fewer hectads since 1990 or which appear to be significantly geographically localised in their distribution. Some of these taxa qualify as Critically Endangered (CR), Endangered (EN) or Vulnerable (VU). Future reviews should make efforts to record all Nationally Rare and significantly geographically restricted taxa at a 1km² scale.

Rate of Decline is used in Criteria A, B & C to assess threat status. For Criterion A and C1 a decline threshold is related to a specific number of years. For Criterion A it is the last ten years or the period of three generations, whichever is longer, and for Criterion C1 precisely the longer of 3 years or 1 generation, or 5 years and 2 generations or 10 years and 3 generations (exceptionally up to 100 years for long-lived species such as *Margaritifera margaritifera*). Criterion A is usually dependent on a pattern of decline in population size over the last 10-year period (unless quality data exist to prove significant former decline or projected future decline). Where data are patchy, this decline can be calculated from an estimate over a non-contemporary time interval providing, significantly, that a decline can be demonstrated, be it exponential, linear or otherwise. Decline (particularly linear decline) is easy to establish for taxa that have been the subject of repeated and regular population counts, where constant monitoring protocols or controlled sampling procedures have been adopted.

Examples might be transect butterfly counts, MV-light trapping of moth species over a prolonged period at regular intervals at a specific location and regular bird count and nesting surveys. The Tachyporinae, without exception, have not been sampled with this degree of regularity or control and as a consequence, the data are often too few to establish a rate of decline. Criterion C1 likewise utilises population size decline measured over specific time intervals but places more emphasis on population counts referring throughout to the number of mature individuals.

Criterion B also relies on a pattern of continuing decline. The number of hectads (older data are often only given to hectad resolution and are therefore not suitable for use in determining AoO at tetrad level) is calculated for several pre-determined periods. The degree of accuracy/resolution with which the location is recorded is variable and often imprecise. For example, *Tachinus rufipennis* is represented by 64 records in the National database, of which 42 are non-duplicates. Of these, 24 (57%), mainly old records, are referenced by a single hectad only. For at least 12 of these records (29% of the total) the hectad is an approximation for the locality which was originally recorded without a grid reference.

For any analysis, if a decline is apparent within the main recording period (i.e. between counts for the pre-1990 and post-1989 recording blocks), then reference to a later 'contemporary' time period division may be used to reinforce or weaken the suggestion of a 'continuing decline'. The quality of the data in the contemporary time period is invariably better than that in the earlier date class and may allow us to consider AoO (Area of Occupancy) to tetrad detail or better. In this latter date period, the number of locations is also calculated for taxa recorded from 15 or fewer hectads. The resulting figures are used for application of the spatial distribution Criteria under B.

For most invertebrate taxa, data are gathered by observation of presence in a particular location. The data are generated by field observation, the location and timing of which is at the whim of collectors of varying skills. However, it is usually possible to ascribe some degree of decline whether observed, or inferred (i.e. the balance of probability suggests that a decline is present). Using Criterion B, there is no specific requirement for the decline to be within the last 10-year period nor the requirement to meet any threshold. Continuous decline is assessed by the observation of a reduction in the AoO between the prescribed contemporary time periods. The number of contemporary locations is also a significant factor in the evaluation and is relatively straightforward to appreciate and is reliable. The author's and his peer group's professional and field knowledge and intuition of a species can play an integral part in the application of this criterion where the data are patchy.

Under Criterion B, the application of B1 (Extent of Occurrence) has also been carried out in the Review. For a taxon to qualify under Criterion B1, it must have a range that does not exceed 20,000 km² and then must satisfy two of the following criteria: severely fragmented OR occurring at 10 or fewer locations or either continuing decline or subject to extreme fluctuations. For all taxa in this Review, extreme fluctuations and fragmentation are factors of decline which cannot be inferred from the data, so to satisfy B1 reliance has to be upon the

area of the range of the taxon being below the minimum threshold value, implication of continuing decline and modern locations numbering 10 or less. Thus for taxa which are known from 10 or fewer post-1989 locations, the approximate area of their range in km² (i.e. equivalent to IUCN ‘Minimum Convex Hull’) has been calculated using mapping tools and then the same quantitative decline analysis applied as for Criterion B2. These individual analyses are detailed in the accompanying evaluation spreadsheet.

3.2.3 Taxa applicable to this Review

Taxa with wild populations inside their natural range and a long-term presence (at any time since 1500 AD) in Britain are considered for review. All other taxa are deemed to be ineligible for assessment at a regional level, e.g. non-natives, are placed in the category of ‘**Not Applicable (NA)**’ and include perceived recent colonists (or attempted colonists) responding to the changing conditions available in Britain as a result of human activity and/or climate change, with the exception of those with established breeding populations for greater than ten consecutive years (IUCN 2012b).

3.2.4 Knowledge about immigration and emigration effects for this group

The author is not aware of any research on this subject within the Staphylinidae: Tachyporinae, both taxonomically and geographically (North Temperate region).

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 adopted by this Review are unique to Britain. Broadly speaking, the Nationally Rare category is equivalent to the Red Data Book categories used by Hyman (revised Parsons) (1992, 1994), namely: Endangered (RDB1), Vulnerable (RDB2), Rare (RDB3), Insufficiently Known (RDBK), Indeterminate (RDBI) and Extinct. The Nationally Scarce category is directly equivalent to the combined ‘Notable’, Nationally Notable A (Na) and Nationally Notable B (Nb) categories used in the assessment of various taxonomic groups by Hyman (revised Parsons) (1992, 1994).

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

Great Britain Rarity Status	
Nationally Rare	<p>A species (not including introduced taxa) recorded from between 1- 15 hectads of the Ordnance Survey national grid in Great Britain since 1990 and:</p> <ul style="list-style-type: none"> • There is reasonable confidence that exhaustive recording would not find them in more than 15

	<p>hectads.</p> <ul style="list-style-type: none"> • Where it is believed to occur as a breeding species within each of these hectads (i.e. discount those that are known to contain only casual immigrants). • This category includes species that are possibly extinct, such as those in the CR(PE) category, but not those where there is confidence that they are regionally extinct (RE).
Nationally Scarce	<p>A species (not including introduced taxa) recorded from between 16 - 100 hectads of the Ordnance Survey national grid in Great Britain since 1990 and:</p> <ul style="list-style-type: none"> • There is reasonable confidence that exhaustive recording would not find them in more than 100 hectads. • Where it is believed to occur as a breeding species within each of these hectads (i.e. discount those that are known to contain only casual immigrants).

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 the date class as the start of the modern recording period for the Staphylinidae: Tachyporinae is discussed in Section 6.

5 Methods and sources of information

5.1 Sources of data

A key source of location-specific information on the Tachyporinae is the dataset collated by the Biological Records Centre (BRC), for which Peter Hammond (National Recorder) is largely credited. On initial interrogation, the BRC dataset was found to contain approximately 15,800 records, after errors were corrected. A small number of potentially erroneous records were queried further, such as with the original recorders or voucher specimens and this was especially the case with records of any species which were subsequently categorised as Threatened or had a GB rarity status. A small number of these unreliable or unverified records may be mentioned in the Species Accounts and elsewhere in this Review where informative. Data were then requested through the beetles-britishisles yahoo group. This group, founded by Andrew Duff in 1999 has over 370 members, many of whom are active

field coleopterists. Historical data were also sourced from a small number of museum collections and by selective literature searches.

The final dataset used in this Review contains approximately 39,000 records, the bulk of which have come directly to the author from coleopterists with experience of particular geographical areas. It is important to acknowledge the considerable contribution to our knowledge of the status of the Tachyporinae made by all of these recorders.

Three 'generic' maps showing: record distribution by hectad over the two main recording periods (pre-1990 and post-1989); taxon frequency by hectad, and record frequency by hectad were then created (by Colin Lucas). These are shown below. The maps utilise all readable data up until the end of 2017. Readable data are data that have both a grid reference and date (that can be interpreted as either pre-1990 or post-1989).

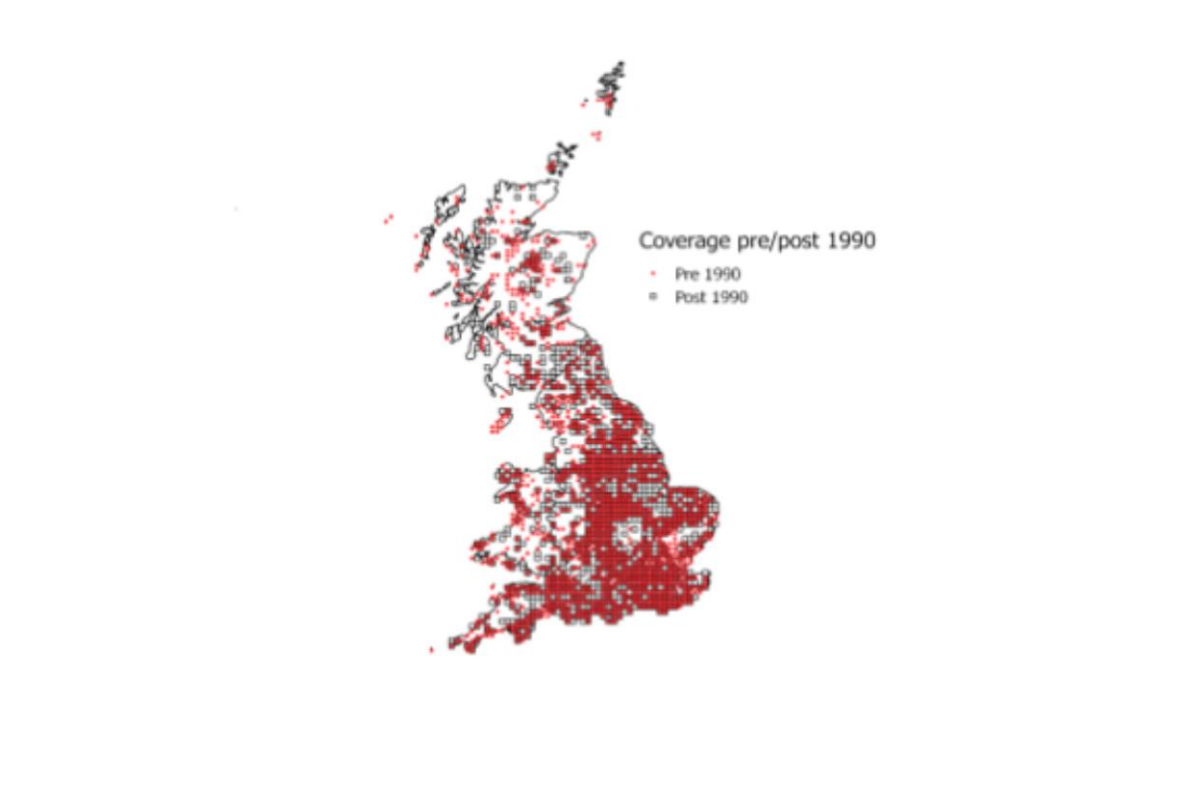


Figure 2. The distribution of Tachyporinae in GB: all records for all species in the database created for this review

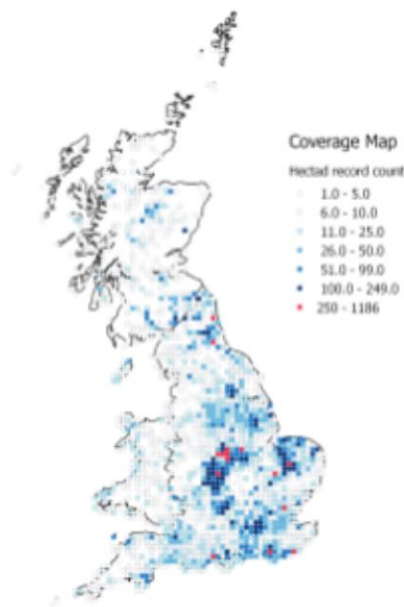


Figure 3. The number of records by occupied Hectad for all species of Tachyporinae combined

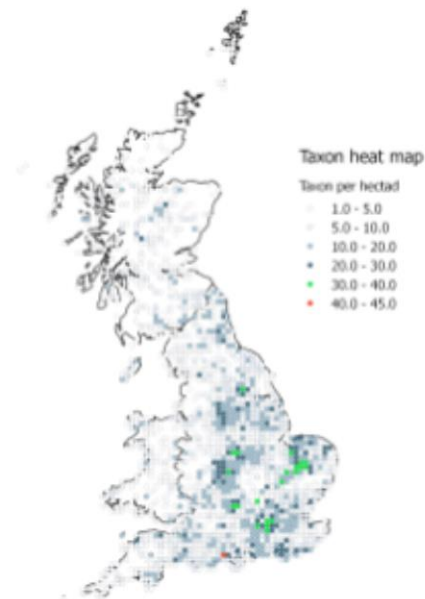


Figure 4. The number of Tachyporinae species recorded in each occupied hectad.

This Review assesses the status of all 68 British species of Tachyporinae using the information sources described in this section and the system described in Sections 3 and 6. During this process, the views of a number of other specialists (listed in Acknowledgements) were sought.

5.2 Methodology

Two methodologies are shown here to illustrate the application of Criterion A and B1.

5.2.1 Criterion A

Criterion A requires a measurement of the gradient of ongoing or current decline. This is most easily calculated by reference to hectad counts for recent recording blocks. Thus, in this Review, a small number of recent recording blocks have been incorporated. These cover the last 28-year period which is divided into two 14-year blocks and then also the last 30-year period which is divided into three consecutive 10-year period blocks. These blocks have generally only been used for taxa which occupy less than 100 post-1989 hectads, although occasionally the author has used them for very frequently recorded taxa, simply as a ‘control’ for comparison.

The process can be illustrated using *Tachinus proximus* data. From the main period of hectad counts (between pre-1990 and post-1989), we can see that there is a negligible decrease of 2 hectads (58 to 56 hectads), representing an apparent 3% decline (calculated roughly by subtracting 56 from 58, dividing the resultant number by 58 and multiplying by 100).

In the 28-year recording block, we have hectad counts of 40 for the first 14-year period and 21 for the second period. To calculate the 10-year rate of decline, we subtract 21 from 40 and divide the resultant number (19) by 40 which gives a value of 0.475 as a fraction value of reduction. We then feed this into the Category A calculation tool spreadsheet as the figure for ‘Overall Reduction’. We enter the time period (in years) as ‘28’ and the calculation tool gives us a value for ‘Annual Change’ and a value for ‘Ten Year Decline’ of 21% (see worked example in the mini-spreadsheet below). It is this last value that we compare against the values in Criterion A, e.g. a minimum threshold of $\geq 30\%$ is stated here under categories A2, A3 and A4 (see Appendix 2). Our value for *T. proximus* demonstrates that the decline in the most recent 28-year period is below the minimum threshold for the taxon to qualify under Criterion A ‘Vulnerable’.

Worked Example – Decline Gradient Tool

Overall Reduction	0.475
Time Period	28
Annual Change	0.9773
Ten Year Decline	21%

For the 10 year data blocks, we can try combinations of one block against its consecutive block. This uses a 20-year period and a decline from the hectad count in the first block to that in its next consecutive block. We can also look at the overall decline across the three blocks by using the hectad counts from the first and third blocks and applying the calculation tool to that 30-year period.

Thus we have several values of decline across several recent periods. If the decline rate from all of these is \pm constant, then it increases our confidence in the data. Where the results are inconsistent, then we need to consider why that is. For example is it due to under-recording or could it be indicative of genuine decline within this later post-1989 data?

5.2.2 Criterion B1

Under Criterion B2, we might find that a declining species is found in a number of tetrads that just exceeds the minimum threshold for categorisation as Vulnerable. However, if we consider its range, we might find that it is restricted to a small part of our region and may well qualify as Threatened for that reason. An example of a taxon which might be considered here is *Onthophagus fracticornis* (Preyssler) in the Scarabaeoidea. The species occurs in a restricted part of the Mendips in south-west England. Criterion B1 requires a value for the Extent of Occurrence (EOO). This is a measure of its range.

To calculate range, we go back to the raw data and plot the locations on a regional map. There are several available mapping tools online. This author used an application in wheresthepath (<https://wtp2.appspot.com/wheresthepath.htm>). The area within the polygon of the plotted points is calculated by the mapping tool (Fig. 5) and we can then use the resulting value to compare it against the threshold values given for Criterion B1 (see Appendix 2). Some common sense is required when calculating EOO for species which are habitat-specific. One example might be a strictly coastal species that is found at relatively few locations around the Welsh coastline. Obviously, it would make no sense to plot points in coastal south and north Wales and then calculate the area in between them which naturally encompasses the entire inland area. In this example, the coastal locations should be mapped and the resulting polygon fitted appropriately to the coastal fringe. Usually, this mapping gives a relatively approximate value, but if this significantly exceeds the maximum threshold value for range, then there is no need to investigate further. For a range value that is close to the maximum threshold, it would pay to return to the mapping tool at a much greater spatial resolution and map as accurately as possible.

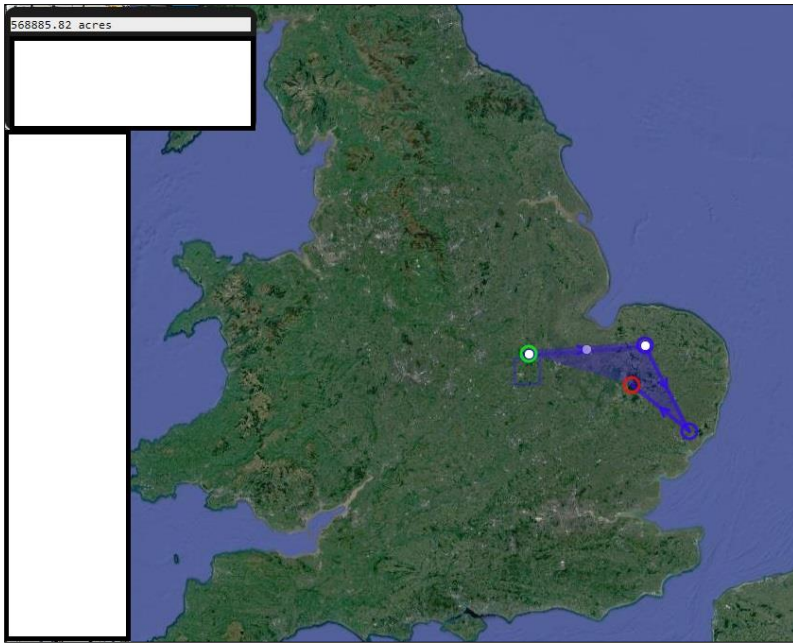


Figure 5. Mapping tool showing area within mapped region (imagery © 2019 TerraMetrics)

In the example above, a value of 568885.82 acres is given for the area within the mapped region. This is equivalent to 2302 km² which is above the maximum threshold for the taxon to qualify as threatened. However, it is relatively close to that value, so the mapping should be carried out again with finer precision if possible, for this species.

6 The Assessments

6.1 The data table

The key output of this Review is a table which provides information on a list of attributes (below) for all taxa embraced by the review. **The full table has been produced as a stand-alone spreadsheet which accompanies this text.** Appendix 1 provides an extract of the key data. The columns completed in the full accompanying Excel table are as follows:

Species name
 GB IUCN status (2017)
 Qualifying criteria
 Rationale
 GB Rarity status (2017)
 Presence in:
 England
 Scotland
 Wales
 Area of occupancy:

Total number of hectads occupied for period up to and including 1989
Total number of hectads occupied from period from 1990-2017
Total number of dual hectads occupied by a species in both date classes
Number of tetrads occupied 1990-2017, for species that qualify as at least NR (i.e. 15 or less hectads from 1990-2017)
Number of locations, for species that qualify as NR (i.e. 15 or less hectads from 1990-2017)
Total number of hectads occupied during fourteen year period 1990-2003
Total number of hectads occupied during fourteen year period 2004-2017
Total number of hectads occupied during ten year period 1988-1997
Total number of hectads occupied during ten year period 1998-2007
Total number of hectads occupied during ten year period 2008-2017

BRC concept code

NBN taxon number

Status in Shirt (1987)

Status in Hyman (1986)

Status in Hyman (revised Parsons) (1992)

Ecological account

6.2 Category columns introduced in this Review

6.2.1 Recent date ranges for hectad counts (columns denoting the two most recent 14-year periods and the three most recent 10-year periods).

The issue of 'continuing decline' is fundamental to the IUCN categorisation process. In common with many other taxa, declines in the size and/or range of several species in this group occurred historically (e.g. before 1950), before the period relevant to an IUCN assessment to the group. In order to determine whether any species in the current review is also undergoing 'continuing decline', evidence of current or recent decline was sought by examining change in hectad occupancy between more recent recording period divisions 2004-2017 and an equivalent, earlier period 1990-2003. The "standard" 'main recording period' (<1989 and 1990-2017) counts provide vital information about the species' historical distribution and decline and was applied to all species, but the additional use of the two smaller recording periods in the analysis ensures that any 'false positives' arising from an analysis of change during the main recording period can be identified and excluded.

A further, still more fine-grained, measure of 'continuing decline' was used to examine the data for the purpose of applying Criterion A, with occupancy in the ten-year periods 1988-1997, 1998-2007 and 2008-2017 being identified. Such scrutiny was only undertaken when the initial assessment (using the "main recording period" suggested a decline. Note that data from 2018 (excluded from the main analysis as this began in 2017) is included in the Species Rationale column and in the evaluation of IUCN status and British Rarity where it significantly affects an assessment for a species. For example, *Tachinus bipustulatus* would

be assigned an IUCN status of ‘CR(PE)’ were the 2018 record not considered in the Review. With the addition of this recent record, the taxon is correctly assigned ‘CR’ status.

6.3 Other considerations

Information on habitat loss can be used as a proxy for population decline for species that are strongly associated with specific habitat types (see *e.g.* Lane & Mann (2016) - evaluation of *Gnormus nobilis* (Linnaeus)). However, it should be acknowledged that evidence of habitat fidelity in most of the Tachyporinae is generally anecdotal. Even where such fidelity exists, quantitative data on habitat loss are rarely available and the reviewer needs to work with very imperfect data.

6.4 Constraints

This Review has been particularly problematic, for a number of reasons. The following list sets out the challenges encountered and how these have been resolved.

6.4.1 The BRC database

The date for many of the records in the BRC database that was originally supplied to the author, has been entered only as an end date and these records also lack the name of a collector. It is believed by this author that when a record is represented only by an end date, this probably relates to the date of a publication from which the records were extracted, although no publication references are apparent in the dataset.

The lack of an end date poses no problem when the end date is pre-1990 as this record can simply be tallied as a hectad count for the earlier main recording period. However, where this end date is post-1989, we do not know whether the true date of the record belongs to the pre-1990 period or the post-1989 period. This problem also affects counts for the later smaller recording periods. The overall effect is one of under-representation in the final analyses because these problematic data are discarded.

6.4.2 Under-recording, Recording bias and British Rarity status

This is an unpopular group with Coleopterists, probably due to the lack of reliable keys in English and the identification difficulties posed by certain genera. The response to an appeal for data was poor relative to those made for Scarabaeoidea and Histeridae data. The 'final' dataset collated for analysis has more than doubled the size of the original, but it does contain duplicated data and the author's own personal contribution of 3,862 records - approximately one tenth of the entire dataset. The ERS surveys conducted by Mick Eyre *et. al* in northern England also provide 2,703 records. Thus there is a recording bias to certain parts of the country, which is perhaps more evident for this group than for other, more popular, groups. As can be seen from the heat map in **Figure 3**, Warwickshire and West Norfolk, both areas where the author has collected extensively, are conspicuous for the density of associated data. Whilst this is not necessarily of concern for an IUCN assessment, there will be more records for those taxa that occur in these regions of lowland England whilst species with a northern

and western distribution are likely to be particularly poorly represented in the dataset. This is a common issue in invertebrate datasets, but it is particularly evident for the present taxa. **Figure 2** illustrates this recording distribution bias.

As a consequence of this bias it has been difficult to assign British Rarity values to species within this group. Species which ought to be relatively well-recorded appear not to be. For example *Lordithon exoletus*, a taxon which is often found below ground at the roots of fungi (P. Hammond *pers comm.*) is represented by a mere 43 post-1989 hectads and would be designated Nationally Scarce (NS) if the prescribed hectad count rule is strictly adhered to. There are many instances of widely distributed taxa which should be found relatively frequently, failing to reach the higher limit of post-1989 hectads for designation as NS - altogether more than two-thirds of the species evaluated would be assigned Nationally Scarce or Rare status if the hectad count rules are strictly applied. Clearly the apparent rarity of most of the Tachyporinae misrepresents their true status. The few taxa that far exceed the 100 post-1989 hectad threshold are those that are more-or-less ubiquitous and are very easily found by general survey techniques and which pose few or no identification difficulties (e.g. *Tachyporus obtusus* (Linnaeus), *Sepedophilus nigripennis* (Stephens)).

In cases where species have not been automatically assigned a rarity status in line with the agreed thresholds, a full justification is provided.

6.4.3 The problematic Northern England and Scotland taxa

There are a small number of taxa found in northern England and/or Scotland which are associated specifically with upland and montane habitats. Some of these are strictly montane and are very poorly recorded because few people actively search for them, not least because the places in which they tend to be found are difficult or impossible to access. Two examples of such taxa are:

- *Mycetoporus erichsonianus* Fagel, only one post-1989 record; last recorded in the region in 1992, from Gategill Fell, Cumbria.
- *Mycetoporus monticola* Fowler, only one, possibly two, post-1989 records; last certainly recorded in the region, in the main period covered by the Review, in 2002, from Abernethy Forest, East Inverness-shire. This species has however been recorded once in 2018 (Roger Booth *pers comm.*).

The status of such taxa is very difficult to evaluate with the present dataset. They are certain to be under-recorded, but second guessing their true status is ill-advised. It is interesting that Hyman (revised Parsons) (1994) awarded a designation of Nationally Scarce ('Notable') only, to both of the above taxa. Clearly, this was based on the assumption that they would be more widely distributed than the data suggested at the time of that Review. The true picture can only emerge with increased recording effort.

7 Downgraded, upgraded and excluded species

7.1 Downgraded and Upgraded species

Down-grading of species should not be seen necessarily as evidence that species status has improved. In many cases species were categorised too highly in the early Reviews (Hyman (revised Parsons), 1992; 1994) due to limitations in the available data. The intervening period has generally seen an increase of recorder effort, targeting species with Nationally Scarce or RDB status. In particular, these earlier Reviews acted as a focus, stimulating new recording effort, and the revised statuses provided by the present Review more accurately reflect the status of those species. Hyman (revised Parsons) (1992; 1994) should in many ways be regarded as a first draft and an initial attempt at assessing status. Some species have increased in abundance and/or range in the intervening period, but the reasons for some or all of these increases remain unclear.

Other species, based on available data, appear to be declining, and the lack of records following publication of Hyman (revised Parsons) (1992; 1994) is therefore all the more significant.

Table 5a provides a list of the species which have been downgraded and the justification for downgrading since the publication of Shirt (1987) and Hyman (revised Parsons) (1994). Table 5b provides a list of species upgraded and the justification for upgrading since those same publications.

Table 5a. Species included in Hyman (revised Parsons) (1994) which are downgraded in this Review.

Scientific name	Rarity Status in Shirt (1987)	Rarity Status in Hyman (1994)	Rarity Status in this Review	Rationale for downgrading
<i>Lamprinodes saginatus</i>	-	Na Notable	none	With only 51 post-1989 hectads, the species would normally be designated as Nationally Scarce (NS). The author has found it at 10 sites (9 hectads) in West Norfolk since 2013 and a further 2 hectads (Suffolk) in 2018, by sieving moss and grass tussocks, mainly between February and April. It has recently been found in a garden and on a motorway grassland verge. Unless there is a stronghold in East Anglia, the author suspects that elsewhere it ought to be widespread, but is probably under-recorded.
<i>Sepedophilus testaceus</i>	-	Notable	none	Formerly scarce but increasing, with every accounting period showing an increase in recorded hectads (39 hectads in the last 10-year period alone). With a count of 80 post-1989 hectad records, the species would normally qualify for designation as Nationally Scarce (NS), but it is believed that its true current distribution is certain to exceed 100 hectads of the National grid.
<i>Tachinus flavolimbatus</i>	-	RDBK	NS	Distributed across south-eastern England northwards into East Anglia. Although the species is undoubtedly newly arrived, there is no reason to assume that its arrival in Britain was either deliberately or accidentally through importation. The records show increasing frequency, reflecting ongoing expansion, certainly within its known range. This range expansion is typical of a recent coloniser. With 38 post-1989 hectad records, the species' AOO exceeds the upper limit for designation as Nationally Rare. A designation of NS is therefore appropriate.

Table 5b. Species included in Hyman (revised Parsons) (1994) which are upgraded in this Review.

Scientific name	Rarity Status in Shirt (1987)	Rarity Status in Hyman (1994)	Rarity Status in this Review	Rationale for upgrading
<i>Bryophacis maklini</i>	-	Notable	NR	This strictly montane species is likely to be under-recorded. This is particularly true of its populations in Scotland, where the overall coverage for the group as a whole is low relative to central and southern England (see Fig. 2) and where the montane habitats that support the species are potentially inaccessible. In the 1980s, there were records from six hectads, but it has only been recorded, as far as the author is aware, from three sites since 1990. A designation of British Rarity status NR is appropriate.
<i>Ischnosoma longicorne</i>	-	Notable	NR	Known since 1990 from fewer than 10 locations. Like many taxa in this sub-family, this species is probably under-recorded. However, its range at least in England (see Fig. 2), has relatively good coverage so one would expect this species to have turned up with greater frequency were it to be genuinely only Nationally Scarce as designated in Hyman (1994). A British rarity status of NR is more appropriate.
<i>Mycetoporus baudueri</i>	-	Notable	NR	Evaluation of this taxa is rendered problematic due to the paucity of data and confusion with other closely related species. However, with only 6 post-1989 hectads known to support the species, a British Rarity designation of NR seems appropriate, but it is fair to say that this usually montane and upland rove is likely to be significantly under-recorded, particularly in Scotland. Therefore, this designation is cautious and specifically provisional. The most recent record in the database is from 1995.
<i>Mycetoporus erichsonianus</i>	-	Notable	NR	This is a difficult taxon to evaluate with only 24 records in the database. It appears to be found exclusively in montane habitats on fells, ridges and summits in northern England and Scotland. The <i>baudueri/piceolus/erichsonianus</i> species complex presents identification difficulties due to the

				close similarity between the taxa. <i>M. erichsonianus</i> is likely to be under-represented for the following reasons: the genus <i>Mycetoporus</i> is particularly poorly recorded and the sub-family generally so; if the species' distribution is truly restricted to montane habitat, the beetle is also likely to be significantly under-recorded, particularly in montane areas of Scotland where the coverage and frequency of recording is low compared to lowland Britain (see Fig. 2). So the single post-1989 record known to the author, can be attributed, at least in part, to poor recording. A specifically provisional British Rarity status of NR is appropriate.
<i>Mycetoporus monticola</i>	-	Notable	NR	The database has only 16 records for this montane species, all originating from Scotland, although Hyman (1994) also cites north-west England as a source of data. It is apparent, notwithstanding the fact that the species is likely to inhabit potentially remote and inaccessible locations, that Hyman has underestimated its scarcity in designating it as Nationally Scarce (Notable) only. Apparently last certainly recorded in the Review period, in Britain in 2002 (Abernethy Forest, East Inverness-shire) although there is a recent 2018 record known to the author. A British rarity status of NR seems most appropriate.

7.2 Excluded species

The status of some species newly recorded in Britain or recorded after a protracted absence can be very difficult to ascertain. Most problematic are those species that could conceivably be on the edge of their natural range in Britain and only occur in a limited number of locations to which they may equally have been introduced. The geographical position of Britain makes it inevitable that our fauna includes Western European, Northern European and even Central European species some of which are considered native, but others which are demonstrably present through introduction. It is important to recognise that lack of clear evidence of native status is not automatically taken to mean that a species has been introduced.

Where the presence of a species results from natural colonisation from the continent they may be expected to continue to expand their distribution. Their natural range, or 'Extent of Occurrence' under the IUCN Guidelines expands with them. These taxa should be excluded from IUCN regional assessment **only if** they have been established in the region for a short

period of time (typically for less than 10 consecutive years) or they have certainly been introduced rather than reaching our region unassisted. Thus, *Tachinus flavolimbatus* is here assessed, because it is well-established in the region and arguably could have arrived here unaided as part of a natural colonisation throughout mainland Europe.

Species excluded from assessment on the basis they are introduced non-natives, whether this is the result of accidental or deliberate importation, are assigned to the category ‘Not Applicable (NA)’ as required under the IUCN Guidelines. Even where these species occur in 100 hectads or less, they have not been assessed for scarcity or rarity as they are not considered to be native to Britain. A list of the excluded species and the rationale for their exclusion is provided in Table 6.

Table 6. Species categorised as ‘Not Applicable (NA)’.

Scientific name	Post-1990 hectads	Rationale for exclusion
<i>Coproporus immigrans</i>	7	An alien species originating from outside of Europe (probably from the old world Australian region) and very likely to have been introduced. First discovered in Britain in 2004 (Esher Common, Surrey) and spreading to West Kent, Middlesex, Berkshire, West Norfolk and Worcestershire at least. Also known from mainland European countries and a recent immigrant into North America (P. Hammond, <i>pers comm.</i>)

8 Format of the species accounts

8.1 Information on the species accounts

Species accounts have been prepared for each of the Regionally Extinct, Critically Endangered (Possibly Extinct), Critically Endangered, Endangered, Vulnerable and Near Threatened species. These account for 4 of the 68 species on the British checklist; approximately 6% of our Staphylinidae: Tachyporinae fauna.

Information on each species is given in a standard format. The Species Accounts are in the form of data sheets designed to be largely self-contained in order to enable site managers to compile species-related information for site files; this accounts for some repetition between the Species Accounts. This section provides context for eight information sections provided for each species data sheet.

8.2 The species name

The nomenclature used in this Review follows the most recent checklist for the British fauna (Duff, 2018), unless otherwise stated. Under the Species Accounts where the name differs from that used by Hyman (revised Parsons) (1994) the previous name is indicated.

8.3 Identification

The emphasis in the accounts, where possible, is on readily available English language publications covering the British Isles; work in other languages or from other/wider geographical areas is only referred to where no other options are available or where the non-English/wider work is more detailed or up-to-date.

Whilst not part of the remit of this document, it is worthwhile including some general information about identification of the Tachyporinae in this section as follows:

With practise, a small number of species are readily identifiable in the field. *Cilea silphoides*, *Parabolitobius inclinans* and *Tachinus subterraneus* for example, are unmistakable and other taxa once familiar, can be identified in the field with confidence, including *Sepedophilus bipunctatus* and *S. littoreus*, *Tachyporus hypnorum* and *T. obtusus* amongst others. A microscope is required to identify or confirm the identification of most taxa however, particularly superficially similar species of *Tachyporus* (for which the characteristic distribution of elytral setae is informative), *Sepedophilus* and *Tachinus*. Certain taxa in the genus *Mycetoporus* are notoriously difficult to separate from one another and dissection and examination of the male genitalia is required for certain identification of closely allied species. This methodology, is useful too, for checking identity of some *Tachinus* taxa, particularly the potentially difficult species pairs *rufipes/pallipes* and *humeralis/proximus* and also for separating *Sepedophilus constans* and *lusitanicus*.

The standard work in English is Joy (1932), but this is long out-of-date and omits 13 taxa from six genera. Volume 2 of Beetles of the British Isles (Duff, in prep) which will include the subfamily Tachyporinae will be the last instalment of this monumental four-volume work to see publication, so until that time, reliance has to be placed on the few texts in English and a variety of works from mainland Europe. Indispensable papers and keys in English are:

- for *Lordithon speciosus*, Schülke (2015)
- for *Mycetoporus ambiguus/clavicornis/reichei*, Schülke (2011)
- for *Sepedophilus*, Hammond (1973)
- for *Tachinus laticollis/flavomarginatus/marginellus*, Steel (1961)
- for *Tachyporus*, Booth (1984) superseded by Booth (2009, unpublished). The translation from German into English of Lompe (2009) by Hackston (2018) is useful. A paper dealing specifically with the distinction between *T. chrysomelinus* and *T. dispar* is Booth (1988).

Joy can be used **with caution** for the remaining genera and taxa with the exception of *Mycetoporus* and *Coproporus* for which Freude, Harde & Lohse (1964) and supplement volumes thereafter, and Lompe (n. G.A. Lohse) (2009) should be consulted.

The larvae of the Tachyporinae have not been keyed in any British identification literature. Larval identification is considered superfluous to this Review. For many species, the larva is as yet undescribed.

8.4 Distribution

Records held in the database of the national species recording scheme form the basis for determining the distribution of each species. In many cases these data can be accessed through the NBN Atlas () and therefore all individual records have generally not been listed. The exceptions are those species known from only a relatively small number of sites and where site information is considered essential to understanding habitat, ecology, status, threats and conservation. The Watsonian vice-counties (Dandy, 1969) are included in the NBN database for many records and are referred to in this Review. International distribution is referred to within the Species Accounts where a comment on biogeography is considered relevant and where the information is readily accessible but it has not influenced the assessment of status.

8.5 Habitat and ecology

This section aims to provide an overview of both the known habitat requirements for each species and the wider landscape context. However, for most species this information is inadequate or incomplete. Information on the life cycle and seasonal activity for Britain is included where known, or taken from the wider European literature. The understanding of species-level habitat preferences, even when there are well-known localities, can be difficult to ascertain.

The ecology of the Tachyporinae is relatively poorly understood compared to the more popular beetle groups. Most of them are predatory, probably on the larvae of Diptera and they are generally found in the ground layer, with exceptions. The genus *Sepedophilus* differs in being mycophagous (feeding on fungi). Table 7 shows some of the primary habitat associations of the taxa in this Review.

Table 7. A generalisation of the most familiar habitat associations for Tachyporinae in our region, along with geographical distribution where this is known to be region-restricted.

Taxon	Habitat (Primary)	Distribution (where regional)
<i>Bryophacis maklini</i>	Open montane heath and grassland. Ground layer.	Scotland and Northern England.
<i>Lamprinodes saginatus</i>	Open habitats, probably in association with ants. Mainly in moss. Ground layer.	
<i>Mycetoporus ambiguus</i>	Open habitats on free-draining soils. Ground layer.	
<i>Mycetoporus erichsonianus</i>	Open montane and upland habitats. Ground layer.	Scotland and Northern England.
<i>Mycetoporus monticola</i>	Open montane (mountain summits and ridges). Ground layer.	Scotland only.
<i>Mycetoporus nigricollis</i>	Open habitats on free-draining soils. Ground layer.	
<i>Mycetoporus piceolus</i>	Open habitats. Predominantly coastal and	

	Breckland on free-draining soils. Ground layer.	
<i>Tachinus corticinus</i>	Open habitats mainly. Ground layer.	Mainly northern.
<i>Tachinus flavolimbatus</i>	Open habitats mainly, in litter and manure heaps, refuse, carrion and dung. Ground layer.	East Anglia and south-east England.
<i>Tachyporus quadriscopulatus</i>	Open habitats. Upland carboniferous limestone moorland/heath. Ground layer.	Scotland and Northern England.
<i>Tachyporus scitulus</i>	Open, insolated dry habitats including Breck heath, dunes and post-industrial grassland. Ground layer.	
<i>Tachyporus tersus</i>	Open habitats, mainly in moss. Ground layer.	
<i>Lordithon exoletus</i>	Woodland habitats in fungi.	
<i>Lordithon lunulatus</i>	Woodland habitats in fungi.	
<i>Lordithon speciosus</i>	Woodland habitats (Highland) in fungi.	Scotland only.
<i>Lordithon thoracicus</i>	Woodland habitats in fungi.	
<i>Lordithon trinotatus</i>	Woodland habitats in fungi.	
<i>Parabolitobius inclinans</i>	Woodland mainly. Under bark, in fungi and ground layer.	
<i>Sepedophilus bipunctatus</i>	Woodland and parkland primarily but also isolated trees in other habitats. Under bark and in wood rot.	England and Wales only.
<i>Sepedophilus constans</i>	Woodland in upland, moorland, river valleys. Under bark, in fungi and ground layer.	Mainly northern and western.
<i>Sepedophilus littoreus</i>	Woodland mainly. Under bark, in fungi and ground layer (litter heaps etc).	
<i>Sepedophilus testaceus</i>	Woodland primarily but also in wooded fens and in isolated trees in other habitats. In rotten wood, under bark, in fungi, litter heaps etc.	England and Wales only.
<i>Tachinus bipustulatus</i>	Woodland including parkland and also isolated hedgerow trees, particularly where <i>Cossus</i> -damaged. In wood rot etc.	England only.
<i>Tachinus humeralis</i>	Woodland mainly, in fungi, dung and litter heaps. Mainly ground layer.	
<i>Sepedophilus pedicularius</i>	Wetland, fen and carr mainly, but also wet woodland rides etc. Ground layer.	
<i>Tachyporus formosus</i>	Mainly wetland and wet grassland, more rarely in other habitats. Ground layer.	?England only
<i>Tachyporus pallidus</i>	Wetland habitats. Ground layer.	
<i>Tachyporus transversalis</i>	Wetland habitats. Ground layer.	
<i>Bolitobius castaneus</i>	Various. Ground layer.	
<i>Bolitobius cingulatus</i>	Various. Ground layer.	
<i>Bryophacis crassicornis</i>	Various. Upland woodland, moorland, river valleys. Ground layer.	Scotland and Northern England.
<i>Bryoporus cernuus</i>	Various including heathland and fen. Ground layer.	England only.
<i>Ischnosoma longicorne</i>	Various. Wet woodland, wooded fen, fen, grassland (Scotland). Ground layer.	
<i>Ischnosoma splendidum</i>	Various. Ground layer.	
<i>Mycetoporus angularis</i>	Various. Ground layer.	
<i>Mycetoporus baudueri</i>	Various. Montane and upland moorland and woodland. Ground layer mainly.	Scotland and Northern England.
<i>Mycetoporus bimaculatus</i>	Various. Ground layer.	

<i>Mycetoporus clavicornis</i>	Various. Ground layer.	
<i>Mycetoporus despectus</i>	Various. Ground layer.	
<i>Mycetoporus lepidus</i>	Various. Ground layer.	
<i>Mycetoporus longulus</i>	Various mainly open habitats. Ground layer.	
<i>Mycetoporus punctus</i>	Various mainly on acid soils, including heathland, bogs, woodland and moorland. Ground layer.	
<i>Mycetoporus rufescens</i>	Various mainly on acid soils, including heathland, bogs, woodland and moorland. Ground layer.	
<i>Sepedophilus immaculatus</i>	Various. Ground layer.	England and Wales only.
<i>Sepedophilus lusitanicus</i>	Various. In rotten wood, fungi, litter heaps and ground layer.	England and Wales only. Mainly south and eastern.
<i>Sepedophilus marshami</i>	Various. In rotten wood, fungi, litter heaps and ground layer.	
<i>Sepedophilus nigripennis</i>	Various. Ground layer.	
<i>Tachinus elongatus</i>	Various. Upland moorland, woodland, peat mosses. Ground layer.	Mainly northern and western.
<i>Tachinus laticollis</i>	Various, in dung, fungi, litter heaps etc. Ground layer.	
<i>Tachinus lignorum</i>	Various, mainly in dung (horse), but also at fungi and sap. Mainly ground layer.	
<i>Tachinus marginellus</i>	Various, in dung, fungi, litter heaps etc. Ground layer.	
<i>Tachinus pallipes</i>	Various. Upland moorland, woodland, forest and acid grassland mainly. In dung, fungi, carrion etc. Ground layer.	Mainly northern and western.
<i>Tachinus proximus</i>	Various. Upland and montane moorland, heath, woodland and forest mainly. In dung, fungi, carrion etc. Ground layer.	Mainly northern and western.
<i>Tachinus rufipennis</i>	Various. Upland and montane moorland, heath, forest and fell. In lowland regions, in rough grassland and woodland. In dung, fungi, carrion etc. Ground layer.	Mainly northern and western.
<i>Tachinus rufipes</i>	Various. Ground layer.	
<i>Tachinus scapularis</i>	Various? Litter heaps, carrion, <i>Cossus</i> -infested trees.	England only.
<i>Tachinus subterraneus</i>	Various, in dung, fungi, litter heaps etc. Ground layer.	
<i>Tachyporus atriceps</i>	Various, mainly in moss. Ground layer.	
<i>Tachyporus chrysomelinus</i>	Various. Ground layer.	
<i>Tachyporus dispar</i>	Various. Ground layer.	
<i>Tachyporus hypnorum</i>	Various. Ground layer.	
<i>Tachyporus nitidulus</i>	Various. Ground layer.	
<i>Tachyporus obtusus</i>	Various. Ground layer.	
<i>Tachyporus pusillus</i>	Various. Ground layer.	
<i>Tachyporus solutus</i>	Various. Ground layer.	
<i>Cilea silphoides</i>	Manure heaps, particularly 'hotbeds'. Also occasionally in horse dung on pasture.	
<i>Coproporus immigrans</i>	Fermenting woodchip piles.	England only.
<i>Mycetoporus reichei</i>	Very little information	

Habitat attributes, such as vegetation structure, food source and substrate type are well known to be of major importance to invertebrates. However, most published records label data associated with specimens in collections, and data submitted to the various recording schemes and records centres lack this level of detail. Comments provided in the Species Accounts are thus based on a relatively few, and often *ad hoc*, personal experiences, or are gathered from the wider scientific literature (e.g. from continental Europe-based research).

Flight and dispersive ability are key to understanding how beetles utilise habitat mosaics, how they move within the wider landscape and how habitat fragmentation will affect populations. However, there has been limited research and our understanding of this complex topic is incomplete. Local climatic factors are an important influence and will vary across the country. In many beetle species flight activity is directly correlated with conditions of relatively high temperatures, high relative humidity, and little or no air movement. Mobility will naturally be higher under the more continental climatic conditions of southern and eastern Britain than in the cooler north and west. Species on the edge of their European range in Britain may be less mobile than their continental equivalents.

This Review pays particular attention to the importance of relict sites for supporting rare species. In such instances, this normally indicates that a species has limited dispersal ability or that they require a specific suite of environmental conditions only provided by such sites, or in some cases a combination of both factors.

8.6 Status

Reference to former distribution by Vice-County has been a particularly useful tool for demonstrating decline from large regions of Britain. 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 are used to establish whether or not a species might be considered scarce or rare. The IUCN guidelines (see Section 3) are then used to decide whether such species might also be considered under threat, and to assign a category. Detailed research survey data are non-existent for the Tachyporinae.

The status of all species in this Review is summarised in Appendix 1 and in the stand-alone spreadsheet that accompanies this document.

The IUCN criteria allow data of different quality to be used in the assessments as explained for ‘estimated, inferred, projected or suspected’ data. In addition, there is the problem of under-recording. Nine species currently known from fifteen or fewer locations from 1990 onwards have been designated as Data Deficient (see Table 11), the author having good reason to believe that they are under-recorded. They are: *Bryophaeis crassicornis* and *maklini*, *Bryoporus cernuus*, *Mycetoporus baudueri*, *bimaculatus*, *erichsonianus*, *monticola* and *reichei* and *Tachyporus quadriscopulatus*. Whilst all of these taxa are currently considered to be Nationally Rare in the Review, their true IUCN status cannot be evaluated because there is insufficient data available for assessment. They are likely in all cases to be

under-recorded and little understood in terms of their distribution and requirements in our region. 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.

Beetles lend themselves to preservation as sub-fossils by virtue of their hard body parts. Many studies of organic deposits that can be reliably dated to post-glacial times generate valuable information on the history of a particular species in what is now referred to as Britain. Those studies provide irrefutable evidence for long-term presence. The data have been collated and made available by Buckland & Buckland (2006).

8.7 Threats

It is those human activities that result in the loss of sites or that degrade habitat quality that pose the greatest threat to invertebrate populations. Where specific threats are recognised they are included in the Species Accounts, otherwise the statements attempt to summarise in general terms those activities that are considered most likely to place populations at risk.

The greatest causes of decline of invertebrate taxa in our region are habitat fragmentation and destruction due to agricultural intensification. Whilst much of the environmental damage occurred 'historically' (in recording terms), the continuing neglect for conservation that is apparent in much of modern farming and the expansion of infrastructure for human habitation is certain to further deplete our regional fauna.

These threats are exacerbated by abandonment. The reduction or cessation of more traditional land management has subsequently led to habitat loss and degradation through vegetational succession. For example, calcareous grassland areas have become scrubbed over and open areas within woodland have reverted to a closed canopy. This neglect of habitat management can even be observed at sites with some conservation protection or designation where the required level of rotational disturbance (e.g. felling, coppicing, mowing, grazing) has not been implemented or maintained.

Further degradation of habitat can occur through factors such as pollutants from road run-off or oil spills and the application of herbicides and pesticides to arable land, improved and semi-improved grassland (where the use of herbicides for weed treatment is a particular issue), horticultural borders and lawns. Increased footfall and vehicle access may also be detrimental to the conservation value of sites.

In some instances taxa and their natural habitats, in locations that have been compromised by human activity and development, are more vulnerable to stochastic events. For example, coastal habitats are popular areas for development, such as holiday villages and homes, port facilities, marinas and golf courses, and range-restricted coastal invertebrate populations may

be especially vulnerable to episodes of extreme weather affecting fragmented and degraded habitats in these locations.

Although coastal erosion is often essential for maintaining the habitat of species associated with soft cliffs or mobile dunes it can, in extreme cases, cause the local extinction of a species with a very restricted distribution if it destroys the site or reduces the species' population beyond recovery. The recent tidal surge in December 2013 that affected much of the eastern coastline of England causing significant erosion of yellow dune systems is a phenomenon that may be seen more frequently as a consequence of future climate change. Species restricted to or predominantly occurring on shingle formations may be similarly vulnerable.

Species inland can be threatened by severe flooding, such as was seen in mid and western England in early 2014 and subsequently throughout the region. This is particularly devastating if a species is impacted that only occurs at a very small number of sites, in isolated or fragmented populations.

Major threats for the Tachyporinae that prey on dung-inhabiting invertebrates, include; the loss of permanent pasture through conversion to other uses, degradation of habitat through pasture improvement, cessation of grazing and therefore dung supply, changes in grazing regimes and therefore dung continuity and the use of endectocides as a prophylactic treatment for livestock.

The complete cessation of grazing will have significant negative impact, often with immediate effect since without a dung supply adult beetles are unable to feed or provide food for their larvae. It is only when other source populations exist on sites within flight range that re-colonisation of sites becomes possible, and then only when livestock are reintroduced during the beetles' activity period. If there are no local source populations, or grazing ceases simultaneously at a wider landscape level, this is likely to have extinction level impacts. Continuity of dung supply can be adversely affected by changes in grazing regimes, or in the use of intermittent grazing for conservation management of grasslands.

Endectocides are used in the treatment and control of internal and external parasites of livestock. There is now an incontrovertible body of evidence on the negative impact that endectocides have on the dung fauna (e.g. Beynon *et al.*, 2012, Floate *et al.*, 2001). Endectocides are usually macrocyclic lactones which are broad-spectrum parasiticides, which comprise three classes of chemicals, Avermectins (i.e. ivermectin, doramectin, abamectin), Milbemycins (i.e. moxidectin), and Spinosyns (i.e. spinosad) (Lumaret *et al.*, 2012). The link between high sensitivity and decline of species requires further research. Liebig *et al.* (2010) critically reviewed the existing *Risk Mitigation Measures* for veterinary medical products (including endectocides) and concluded that measures proposed thus far are not sufficiently helpful to protect the biodiversity and function of dung and soil organism communities.

The Tachyporinae are predatory on invertebrates that inhabit a variety of adult and larval food sources in addition to dung, whilst the *Sepedophilus* species are mycophages. Thus their food sources can include damaged and fungoid dead wood and rot in standing trees, dry and decomposing animal organic matter (carcasses and skins), including that present in subterranean mammal nests, and decomposing fungi, grass heaps and dung heaps. The following general threats are apparent:

- lack of regeneration of suitable habitat in mature woodland and parkland;
- increased countryside hygiene and 'tidying up' which results in the removal of animal carcasses and dead, diseased and fungoid wood etc.

8.8 Management and conservation

Some of the oldest Nature Reserves in Britain were created to protect their invertebrate fauna (e.g. Wicken Fen NNR), however beetles are rarely amongst the primary reasons for site designation and protection. Nevertheless, the value of beetles as indicators of habitat quality has been recognised when many Sites of Special Scientific Interest (SSSIs) have been re-evaluated. Beetles also feature in designations for some Special Areas of Conservation (SACs).

Where a taxon is known from very few sites and these sites have the benefit of statutory protection as, for example, in the case of National Nature Reserves (NNRs) or SSSIs, this is noted. Sites designated as SACs under the European Habitats Directive and SSSIs have the potential to provide protection for beetles as long as the conservation interest associated with them is acknowledged, and as long as that interest is effectively translated into site conservation objectives.

Loss and degradation of suitable habitat continues in undesignated sites. The populations of many beetle species with fragmented distributions are relicts of previously widespread populations, surviving in small patches of relatively undisturbed habitats after loss of the interconnecting habitats. For these species it is critical to maintain connectivity of protected sites. Other species are more mobile and often rely on dynamic ecological processes operating over areas larger than those normally covered by individual designated sites.

None of the threatened taxa in this Review have been the subject of detailed ecological research or even standardised monitoring in our region. The implementation of such survey, or monitoring or a specific line of research is occasionally recommended where it is considered of future benefit for the species.

Preventative measures and positive action designed to maintain populations are suggested where these are understood or can reasonably be inferred. Examples include continuity of traditional management practices of annual cutting of wetland vegetation and the provision of litter heaps at fen sites and in parkland and pasture woodland, leaving dead and dying wood in situ and providing for the continuity of dead wood. 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. However, this general advice is retained in order to ensure that the species data sheets can be read as stand-alone documents. Fry & Lonsdale (1991) and Kirby (2001) both give excellent general accounts of the relevant conservation issues and habitat management measures which may be undertaken.

8.9 Published sources

Literature references specific to the taxon that have contributed information to the data sheet are cited here.

9 Acknowledgements

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10 Species listed by IUCN threat status category

In this list the species are given in alphabetical order within status categories (nomenclature follows Duff, 2018).

Regionally Extinct

Tachinus scapularis Stephens

Critically Endangered

Tachinus bipustulatus (Fabricius)

Vulnerable

Lordithon speciosus (Erichson)

Near Threatened

Ischnosoma longicorne (Mäklin)

Tachinus rufipennis Gyllenhal

Data Deficient

Bryophacis crassicornis (Mäklin)

Bryophacis maklini (Sahlberg, J.)

Bryoporus cernuus (Gravenhorst)

Mycetoporus baudueri Mulsant & Rey

Mycetoporus bimaculatus Laccordaire

Mycetoporus erichsonianus Fagel

Mycetoporus monticola Fowler

Mycetoporus reichei (Pandellé)

Tachinus elongatus Gyllenhal

Tachyporus quadriscopulatus Pandellé

11 Species listed by GB Rarity Status category

In this list the species are given in alphabetical order within status categories (nomenclature follows Duff, 2018).

Nationally Rare

Bryophacis crassicornis (Mäklin)

Bryophacis maklini (Sahlberg, J.)

Bryoporus cernuus (Gravenhorst)

Ischnosoma longicorne (Mäklin)

Lordithon speciosus (Erichson)

Mycetoporus baudueri Mulsant & Rey

Mycetoporus bimaculatus Laccordaire
Mycetoporus erichsonianus Fagel
Mycetoporus monticola Fowler
Mycetoporus reichei (Pandellé)
Tachinus bipustulatus (Fabricius)
Tachinus rufipennis Gyllenhal
Tachyporus quadriscopulatus Pandellé
Tachyporus scitulus Erichson

Nationally Scarce

Mycetoporus ambiguus Luze (**provisional**)
Mycetoporus angularis Mulsant & Rey
Mycetoporus despectus Strand, A.
Mycetoporus piceolus Rey
Mycetoporus punctus (Gravenhorst)
Parabolitobius inclinans (Gravenhorst)
Sepedophilus bipunctatus (Gravenhorst)
Sepedophilus constans (Fowler)
Sepedophilus lusitanicus Hammond
Sepedophilus pedicularius (Gravenhorst)
Tachinus flavolimbatus Pandellé
Tachinus lignorum (Linnaeus)
Tachyporus formosus Matthews, A.H.

12 Taxa with level of IUCN threat status of VU or greater

Table 8. Taxa with level of threat VU or greater, not including Regionally Extinct (RE) or Data Deficient (DD) species. (See Appendix 2 for summary of criteria and categories)

Scientific Name	Status	Criteria used
<i>Lordithon speciosus</i> (Erichson)	VU	D2
<i>Tachinus bipustulatus</i> (Fabricius)	CR	B2 ab ii, iv

13 List of Threatened, Nationally Rare and Nationally Scarce species

Table 9. List of Threatened, Nationally Rare and Nationally Scarce species.

Taxon	Shirt (1987)	Hyman (revised Parsons) (1994)	This Review (IUCN Status)	This Review (GB Rarity)
<i>Bryophacis crassicornis</i> (Mäklin)	RDB3	RDBK	DD	NR
<i>Bryophacis maklini</i> (Sahlberg, J.)	-	Notable	DD	NR
<i>Bryoporus cernuus</i> (Gravenhorst)	RDB3	RDBK	DD	NR
<i>Ischnosoma longicorne</i> (Mäklin)	-	Notable	NT	NR
<i>Lamprinodes saginatus</i> (Gravenhorst)	-	Na Notable	LC	-
<i>Lordithon speciosus</i> (Erichson)	-	-	VU	NR
<i>Mycetoporus ambiguus</i> Luze	-	-	LC	pNS
<i>Mycetoporus angularis</i> Mulsant & Rey	-	-	LC	NS
<i>Mycetoporus baudueri</i> Mulsant & Rey	-	Notable	DD	NR
<i>Mycetoporus bimaculatus</i> Lacordaire	-	RDBK	DD	NR
<i>Mycetoporus despectus</i> Strand, A.	-	Notable	LC	NS
<i>Mycetoporus erichsonianus</i> Fagel	-	Notable	DD	NR
<i>Mycetoporus monticola</i> Fowler	-	Notable	DD	NR
<i>Mycetoporus piceolus</i> Rey	-	Notable	LC	NS
<i>Mycetoporus punctus</i> (Gravenhorst)	-	Notable	LC	NS
<i>Mycetoporus reichei</i> (Pandellé)	-	-	DD	NR
<i>Parabolitobius inclinans</i> (Gravenhorst, 1836)	-	-	LC	NS
<i>Sepedophilus bipunctatus</i> (Gravenhorst)	-	Nb Notable	LC	NS
<i>Sepedophilus constans</i> (Fowler)	-	Notable	LC	NS
<i>Sepedophilus lusitanicus</i> Hammond, 1973	-	-	LC	NS
<i>Sepedophilus pedicularius</i> (Gravenhorst)	-	Notable	LC	NS
<i>Sepedophilus testaceus</i> (Fabricius)	-	Notable	LC	-
<i>Tachinus bipustulatus</i> (Fabricius)	RDB2	RDB1	CR	NR
<i>Tachinus flavolimbatus</i> Pandellé	-	RDBK	LC	NS
<i>Tachinus lignorum</i> (Linnaeus)	-	Notable	LC	NS
<i>Tachinus rufipennis</i> Gyllenhal	-	RDB3	NT	NR
<i>Tachinus scapularis</i> Stephens	-	RDBI	RE	EXTINCT
<i>Tachyporus formosus</i> Matthews, A.H.	-	Na Notable	LC	NS
<i>Tachyporus quadriscopulatus</i> Pandellé	RDB3	RDBK	DD	NR
<i>Tachyporus scitulus</i> Erichson	-	RDBK	LC	NR

14 Summary of IUCN Status for All Taxa in this Review

Table 10. Summary of IUCN Status for All Taxa in this Review

IUCN Status	No. of Taxa	% of all Taxa in this Review
Least Concern	51	75
Data Deficient	10	14.7
Near Threatened	2	2.9
Vulnerable	1	1.48
Critically Endangered	1	1.48
Regionally Extinct	1	1.48
Not Applicable	1	1.48
Not Evaluated	1	1.48
	Total = 68	Total = 100

15 Summary of Data Deficient Species and Rationale for Designation

Table 11. Summary of Data Deficient ('DD') Taxa and Rationale for Designation

Taxon	Rationale
<i>Bryophacis crassicornis</i>	The species is known only from a cluster of records in South Northumberland, an old record from VC Durham, one old and two modern records from Scotland, a record of unknown reliability from North-east Yorkshire (Hyman, 1994) and a record, thought by its originator to have resulted from a data entry error, for Catfield Fen, East Norfolk. Its requirements in our region are not understood and its habitats seemingly varied. It may be that the taxon occurs at very low population densities and is thus difficult to find but, regardless, our understanding of its distribution and ecology is poor and it is difficult to know, with so few data, what population dynamics are operating in our region. It is certainly impossible to say whether there is ongoing decline, fluctuation or fragmentation. If continuing decline were suspected, the species would qualify as IUCN Vulnerable B1ab(ii)(iv) or Endangered B2ab(ii)(iv). Its EOO range is approximately 9,500km ² . However, a designation of Data Deficient is appropriate until such time as research on the species can produce more information. 10 records in the database (including duplicates).
<i>Bryophacis maklini</i>	This is a strictly montane species and is likely to be under-recorded, particularly in Scotland. In the 1980s there were records from 6 hectads (due mostly to the recording efforts of the late John Owen), but it has only been recorded from three sites since: Scar Crag in Cumbria in 1992, Mount Morone, South Aberdeenshire in 2009 and the summit of Beinn a' Chreachain, mid-Perthshire in the same year. These are the most recent records known to the author. Climate change is a plausible threat to the boreo-alpine assemblages in our region, of which this is a component. With so few records, any present evaluation is impossible. The taxon is likely to qualify under IUCN criteria as threatened (for example, EoO is calculated at approx. 8600km ² , and with five or fewer modern locations, this would give an IUCN designation of Endangered were continuing decline thought to be operating), but more information is required through increased recorder effort, so that a designation can be ascribed. The species is likely to be very poorly recorded and may be Least Concern. For now, a designation of Data Deficient is appropriate. 48

	records in the database (including duplicates).
<i>Bryoporus cernuus</i>	The ecology and true distribution of this taxon are poorly known. There are only seven British records known to the author, two of which may be in error and the habitats occupied are varied, ranging from <i>Calluna</i> heath to fen. Threats are difficult to perceive when the habitat and requirements of the species in Britain are hard to qualify. Consequently and with no evident decline indicated by the scant data, a designation of Data Deficient is appropriate until such time as research can produce more information.
<i>Mycetoporus baudueri</i>	The true <i>M. baudueri</i> was formerly brought forward as a British species (as <i>hellieseni</i> Strand) in Pelham-Clinton (1960), as distinct from <i>erichsonianus</i> and <i>piceolus</i> . <i>M. erichsonianus</i> was also at one time known as <i>baudueri</i> . Both species would have been easily misidentified as <i>piceolus</i> historically since Joys key (1932) only accounted for <i>piceolus</i> in the British fauna. Thus there is great scope for taxonomic confusion in our interpretation of older data for this species complex. In evaluating the data for the true <i>baudueri</i> , there is a 57% decrease in hectads between the two main recording periods and a 100% calculated 10-year rate of decline over the last 28 years. This is unlikely though to represent the true dynamics of the species as, like other members of this sub-family, and in particular the genus <i>Mycetoporus</i> , this taxon is likely to be very poorly recorded. Evaluation is rendered problematic due to the paucity of data. For example, if we dismiss the Camber record as erroneous, the species can be seen to presently occupy an EoO of approx. 6085km ² and an AoO of 24km ² and would therefore satisfy IUCN category Vulnerable B1ab(ii)(iv) and B2ab(ii)(iv) if a decline were operating, but due to the poor quality of the data, the species has been evaluated as Data Deficient (DD). With only 6 post-1989 hectads known to support the species this usually montane and upland taxon is likely to be significantly under-recorded, particularly in Scotland. The most recent record in the database is from 1995. 24 records in the database.
<i>Mycetoporus bimaclatus</i>	With so little data it is impossible to know whether the species is declining or not. Interestingly, Hyman (1994) only recognises the vice-counties South Aberdeenshire and West Sussex as having supported the species, whereas the database holds records for VC's 11, 13, 17, 21, 32, 46, 63, 64, 70 and 96. If decline were accepted, it would be designated as Critically Endangered (CR B2ab). If no decline were evidenced or suspected, then the species would fall into either Category VUD2 if plausible threat was identified or NT otherwise. It is highly likely that the species is under-recorded, in common with the other members of the genus. Currently, it is evaluated as Data Deficient (DD). 14 records in the database.
<i>Mycetoporus erichsonianus</i>	This is a difficult taxon to evaluate with only 24 records in the database. It appears to be found exclusively(?) in montane habitats on fells, ridges and summits in northern England and Scotland. The <i>baudueri/piceolus/erichsonianus</i> species complex presents identification difficulties due to the close similarity between the taxa. <i>M. erichsonianus</i> is likely to be under-represented for the following reasons: the genus <i>Mycetoporus</i> is particularly poorly recorded; if the species' distribution is truly restricted to montane and upland habitat, the beetle is also likely to be significantly under-recorded, particularly in Scotland where the frequency of recording in montane regions is in direct contrast to that in lowland Britain, due to access issues, climate, remoteness of suitable locations and other factors; on 5 dates between June and October 1980, recording effort in the Meall Garbh region of the Càrn Mairg group produced the sum total of 7 specimens of <i>M. erichsonianus</i> from moss – this suggests that the species ought to be found with some confidence elsewhere in suitable habitat, at least in the Scottish Highlands. So, the apparent decrease of 92% in the main recording period and the single post-1989 record known to the author, can probably be attributed to poor recording. If there is continuing decline, then the data as it stands would place the taxon in the Critically Endangered Category under both B1 and B2 criteria. If no continuing decline is

	evident, the taxon would qualify, with the data as it stands, for VUD2 if a plausible threat (e.g. climate change and geographical shift of montane taxa) was identified. If no threat then the taxon would be designated as NT. Another possibility, assuming the data are truly representative of population dynamics is CRA2, on the basis that the population, if the data are to be believed, has declined in recent years by an apparent 100%. A rational approach assumes that the data are deplete and unrepresentative of the true dynamics of the species. This scenario suggests categorisation as Data Deficient as it is suspected that <i>erichsonianus</i> may qualify for an IUCN threat category but there is not enough data to attribute it specifically.
<i>Mycetoporus monticola</i>	The database has only 16 records for this montane species, all originating from Scotland. Hyman (1994) also cites north-west England as a source of data. It is apparent, notwithstanding the fact that the species is likely to inhabit the most remote and inaccessible locations, that Hyman (1994) has underestimated its scarcity in designating it as Nationally Scarce (Notable) only. Apparently last certainly recorded in Britain in 2002 (Abernethy Forest, East Inverness-shire), although there is a record of a probably good specimen also from East Inverness-shire in 2012. There is an apparent 78% decrease in the population since 1990, but allowance has to be made for under-recording and for the relative inaccessibility to large tracts of its habitat to recorders. In the later recording periods, the number of hectad counts (at the rate of one hectad per recording block!) has remained stable. If decline were operating, the species would qualify under criterion B1 and B2 (EOO and AOO) as IUCN Endangered or under criterion D as Vulnerable should a plausible threat be identified. The small dataset does not allow for any evaluation of decline, fluctuation, fragmentation or otherwise, and as far as the reviewer is aware, there have been no concerted efforts to find or monitor the species across its range in recent years, so a categorisation of Data Deficient seems appropriate.
<i>Mycetoporus reichei</i>	This species has only recently been recognised as a distinct British taxon (Schülke, 2011) and as such, all records prior to 2011 of <i>Mycetoporus clavicornis</i> (Stephens) with which it has been confused, must be treated as <i>sensu lato</i> unless they have been redetermined as that species. It is likely that at least some of these records will refer to <i>M. reichei</i> . Currently, the latter species has been recorded only from three locations: in South-west Scotland, the New Forest and Ditchling (East Sussex). The most recent record is from 1916. Although undoubtedly rare and potentially threatened, the species is likely to be under-recorded, hence a designation of Data Deficient, until further records are forthcoming and a clearer picture emerges of its true distribution and population dynamics. Five records.
<i>Tachinus elongatus</i>	This is a predominantly northern and western species and consequently, it is likely to be significantly under-recorded. Within the main recording period, there is an apparent decrease of 15%. In the later 28-year recording period, there is a decline of 34% which is just above the 30% minimum threshold at which a taxon would qualify as IUCN Vulnerable under Category A. In the later 30-year period, there are apparent declines of 41% between the first two 10-year periods and 48% between the last two periods. These later declines are well above the minimum threshold for Category A Vulnerable, but the species is not thought to be in this category, as it is likely to be widely distributed across Scotland which is relatively poorly recorded. This factor coupled with the consideration that, along with most members of the sub-family, this taxon is likely to be significantly under-recorded, could lead one to designate it Least Concern, but a current and more cautious designation of DD is more appropriate, at least until further recording effort can clarify whether an apparently significant decline is operating. Neither EOO nor AOO approach the thresholds for consideration as Threatened under Criterion B and D2 whilst the number of location exceeds the threshold under Criterion D2. 308 records in the database (including duplicates).
<i>Tachyporus quadriscopulatus</i>	Known from only two localities in our region. A singleton was recorded by C.E.Tottenham in August 1958 from Mugdock (NS57 – VC Stirlingshire) and a

total of up to eight individuals were pitfall-trapped at Scar Close, Mid-west Yorkshire (SD77) in May and July 1977 and in May 1978 (these dates may refer to just one record of two specimens, that has been erroneously duplicated in the database). The species is difficult to identify and the habitat where it was most recently found is not poorly represented in this region of Yorkshire, so the taxon is possibly under-recorded. The lack of subsequent records is of concern. Assuming a significant ongoing decline, and with no tetrads recorded for some 40 years, a designation of IUCN Critically Endangered using Criteria A and B seems appropriate. However, were no decline in evidence, as perceived for a taxon that is significantly under-recorded, then in the absence of any obvious threat, a designation of Near Threatened would be most appropriate. Neither of these circumstances can be qualified because the data are too few and the species may have been overlooked elsewhere or may simply be under-recorded. Consequently, a designation of Data Deficient is most appropriate until further information can be attained.
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16. The data sheets

Data sheets for the species assessed as Regionally Extinct, Critically Endangered, Vulnerable and Near Threatened are given in this section. The data sheets are arranged in alphabetical order by scientific name.

ISCHNOSOMA LONGICORNE

NEAR THREATENED

Order COLEOPTERA

Family STAPHYLINIDAE

Ischnosoma longicorne (Mäklin, 1847)

Identification This species exhibits the typical dorsal appearance of the Tachyporinae in having the abdomen strongly narrowed towards its apex. The genus can be distinguished by the raised border along the suture, the maxillary palp with a much narrower apical joint relative to the subapical segment and the antennal segments which are appreciably longer than in the closely-related *Mycetoporus*. It differs from *splendidum* in being generally larger, with a less elongate head that lacks microsculpture on the dorsal surface and in the male, by the different arrangement of setae on the 5th and 6th sternites. The adult is keyed by Fowler (1888) and Joy (1932), but more recent keys should also be consulted e.g. Freude *et. al.* (1964) and Lompe (2009).

Distribution In Scotland, pre-1990 records come from East Ross, Mid Perthshire, Clyde Isles, Midlothian and Dumfriesshire, but there are no post-1989 records in the database. In England, it has been noted from the following vice-counties: Cumberland, Lancashire, Nottinghamshire, East and West Gloucestershire, Worcestershire, Warwickshire, Oxfordshire, South Devon, South Somerset, North Somerset, Dorset, South Hampshire, Berkshire, East and West Sussex, East and West Norfolk, Northamptonshire, Cambridgeshire, North Essex and Surrey. The only post-1989 records are from Oxfordshire (Shotover Hill, SP50, 2001), South Hampshire (Bignell Wood, 1999), West Sussex (Brandy Hole Copse, SU80, between 2002 and 2005), West Norfolk (Cranwich Heath, TL79, 2009) and East Norfolk (Wheatfen Broad, TG30, 1997 and Sutton Fen, TG32, 2016). In Wales, it has been recorded from Denbighshire, Pembrokeshire and Cardiganshire, the latter vice-county providing the sole post-1989 record (Creigiau Gwbart, SN14, 2003).

The beetle was formerly widely distributed but appears to have genuinely declined throughout much of its range. The factor of under-recording which plagues this sub-family, coupled with the difficulty in identification of this taxa and the lack of recent keys in English, means that the few recent records may significantly underestimate the species' true distribution and abundance, but so few records in relatively well-recorded areas of lowland England where the species has formerly been found suggests that factors of decline may be at play.

The species is distributed widely throughout mainland Europe.

Habitat and Ecology This, like many of the Tachyporinae, is a predatory species on small invertebrates. It appears to occur mainly in wet woodland and in wooded fen and carr habitats where it is found in the ground layer, usually in leaf litter, bracken litter or in moss (including *Sphagnum*). However, two out of the three post-1989 records from East Anglia originate from litter heaps resulting from cut vegetation in fen habitat. It has also been pitfall-trapped in serpentine grassland in South Ayrshire. Adults have been recorded in Britain from March to June, August to October and in December.

Status Like most of the taxa in this sub-family, the present species is likely to be under-recorded. There is a suggested 81% decline within the main recording period and a 30-year decline rate calculated at 12% for the later recording period, which is well below the 30% minimum threshold required for IUCN designation as Vulnerable under Category A. In terms of AoO, were the species recorded from only five rather than eight modern tetrads and a plausible threat identified, then it could be considered to qualify for designation as Vulnerable D2, but neither of these conditions are satisfied. The range of this species, at least in England, occupies a relatively accessible and well-recorded region for many taxa so perhaps one would expect this species to have turned up with greater frequency were it to be only Nationally Scarce as designated in Hyman (1994).

Recently, the species has been recorded from less than 10 locations and a decline is suspected by the reviewer but hardly inferred from the data. With such little information, a cautious approach suggests that a designation of NT would be appropriate rather than Vulnerable B2ab.

Threats This appears to be a hygrophilous species, showing a preference for habitats that are at least partially shaded and humid. It also appears to be attracted to litter, perhaps in particular to litter heaps, so the main factors which could potentially impact on populations are habitat destruction and landscape changes including development and water abstraction and drainage schemes.

Management and Conservation The continuity of traditional management practices of annual cutting of vegetation (e.g. *Phragmites* beds) at fen sites and in wet grassland rides in woodland, may be important to population stability and longevity. It is likely to benefit the species if litter heaps resulting from these management operations are left in situ and not burned. Research on the species' ecology in Britain would give greater insight into its requirements.

The majority of sites where the species has been found recently are afforded some protection: Sutton Fen is jointly managed by Natural England and the RSPB and falls within a larger area designated as an SSSI and SAC. Shotover Country Park is an SSSI owned by Oxford City Council, Swanton Novers Great Wood SSSI is managed by Natural England and is a designated NNR, Bignell Wood is part of the New Forest designated SSSI, Brandy Hole Copse is an LNR, Wheatfen is an SSSI managed by the Ted Ellis Trust

Published Sources Fowler (1888); Freude *et al.*(1964); Joy (1932); Lompe (2009).

LORDITHON SPECIOSUS
VULNERABLE D2
Order COLEOPTERA
Family STAPHYLINIDAE

Lordithon speciosus (Erichson, 1839)

Identification This distinctive species exhibits the significantly narrowed abdomen typical of the Tachyporinae. It is further differentiated by the raised elytral border along the suture, by having the terminal segment of the maxillary palp of similar width to the sub-apical segment, as broad at its base as that segment and distinctly elongate, with the pronotum not entirely black and the elytra having at least one row of longitudinal punctures. From the closely superficial *Lordithon lunulatus*, it can be separated by size (8.0-10.8mm vs. 5.0-7.0mm), the colouration of the elytra (scutellum and base of elytra are orange) and the structure of the aedeagus. The adult is keyed by Schülke (2012b) and from closely-related species by Schülke (2015).

Distribution A single specimen was found in Glenmore Forest, near Loch Morlich, Aviemore, East Inverness-shire (VC 96) in 2006. Its discovery is documented by Schülke (2015) who suggests that its population 'may be a relict of a once continuous European distribution in the early post-glacial period'. In mainland Europe (from France east to Siberia), it has a boreo-montane distribution, occurring in ancient montane forested localities where it is described as endangered or-extinct. It follows that its distribution in Britain can be expected to be restricted to the Highlands regions of Scotland, with a very slender chance of its discovery in other mountain systems in Scotland, or perhaps in north-west England and north Wales.

Habitat and Ecology Like other *Lordithon*, this is a predator of fly larvae in fungi. The immediate habitat for the 2006 record was of fungi on a large deciduous tree stump. As discussed above, the species is boreomontane in mainland Europe.

Status There have been no further records and normally a single occurrence such as this would be treated as a new arrival to our region and designated as Data Deficient, but because of Schülke's inference that the species is an overlooked native, and because it has not been recorded previously or indeed since, it stands to reason that it is very likely to be very rare in Britain and that a designation of Vulnerable D2 is appropriate, not least because the species' immediate habitat occupies one very small area of forest that could be destroyed or significantly altered by forestry operations or disturbance. No value of decline, fluctuation or fragmentation, can be presently evaluated for its population. If future records are forthcoming, the species may qualify under additional IUCN criteria.

Threats Forestry operations such as localised felling and clearance or the accidental destruction of the immediate habitat by machinery or other disturbance are significant threats. Climate change could adversely affect the regional population although scientific research into the effects of global warming is still very much in its infancy for invertebrates. However, some observations do suggest that the fauna and flora of northern Britain is undergoing change, e.g. Ross (2013) has suggested that boreo-arctic montane and arctic-montane elements of the plant community on Ben Lawers (southern Highlands) have declined in recent years as a result of climate change, whilst Mossman (2015) concluded that there is only limited evidence that the southern range margins of [invertebrate] species have shifted north and the ranges of northern species have contracted.

Habitat loss is an obvious threat through deforestation and land use changes. Forest management could also threaten the regional population if the emphasis is on the promotion of hygiene and the removal of dead and dying trees that support fungal growth.

Management and Conservation Dead and dying wood should be left in situ and only removed if a viable hazard has been identified. Further field survey should be conducted to attempt to find the species. Research to assess its probable distribution and to understand its ecology in our region is

desirable. Glenmore Forest is a largely ancient woodland site (1440 hectares designated as an SSSI) and is managed by Forestry Commission Scotland.

Published Sources Mossman *et al.* (2015); Ross (2013); Schülke (2012b); Schülke (2015).

TACHINUS BIPUSTULATUS
CRITICALLY ENDANGERED B2ab(ii)(iv)
Order COLEOPTERA
Family STAPHYLINIDAE

Tachinus bipustulatus (Fabricius, 1792)

Identification This species exhibits the significantly narrowed abdomen typical of the Tachyporinae. The genus *Tachinus* is recognised by the lack of a raised sutural border on the elytra, the glabrous head and pronotum and the lack of setae on the side margins of the pronotum, elytra and (with the exception of *lignorum*) basal abdominal segments. Within the genus, *T. bipustulatus* is identified amongst the other British species by having a fine reticulation between the elytral punctures, by the lack of distinct bright orange longitudinal marks on the elytra, by the reddish (rather than black) antennal base, the lack of setae at the sides of the four basal abdominal segments, quadrate to transverse (rather than quadrate to elongate) antennal segments 6-10, the shape of the apex of the last abdominal tergite, the colouration of the antennae which are typically entirely reddish or only very indistinctly pitchy towards their apices, the red to pitchy-red legs and a small \pm well-defined reddish-yellow marks at the humeral angles of the elytra. The structure of the aedeagus is also useful, but only by comparison with other *Tachinus*. The adult is keyed by Fowler (1888) and Joy (1932), but more recent keys should also be consulted for a positive identification e.g. Freude *et. al.* (1964), Lompe (2009) and Schülke (2012b).

Distribution Formerly scarce in southern England north to Derbyshire. Recorded with certainty from Devon, Dorset, Isle of Wight, South Hampshire, Surrey, West Kent, Middlesex, Huntingdonshire, Berkshire, Oxfordshire, Cambridgeshire and Derbyshire. Most of the records pre-date 1918. The only officially accepted 'historical' record thereafter is from the 1930's from Windsor Forest, Berkshire. However, other possibly valid records come from Wimbledon Common, Surrey (1944), Savernake Forest, North Wiltshire (1945) and Wytham Wood, Oxfordshire (1957) and require verification. Remarkably, it was rediscovered in Britain in 2018 when a male and female were found at a '*Cossus*' oak in Suffolk (Mark G. Telfer *pers comm.*). The location is currently confidential. A record outside of the recording period in the Review would not normally be considered, but in this case, the record is exceptional and significant.

The species is widespread but rare in Central Europe.

Habitat and Ecology Predatory. Associated with dead and decaying trees in parkland, pasture woodland, forests and a hedgerow. A particular association is noted with sap flows and trees damaged by the Goat Moth *Cossus cossus* (Hammond in Shirt, 1987). Adults have been recorded in the field between June and August. The Goat Moth is a UK BAP species which has undergone recent decline.

Status The 2018 discovery is the first reliable record in Britain since the 1930s, before which a significant decline is evidenced by the data. There is no reason to assume that this decline has ceased, particularly as the habitat of the species, that of dead and decaying trees, mainly in accessible parkland sites, is a familiar one to British Coleopterists who have been 'working' this habitat for at least a century. Hammond (in Shirt, 1987) surmised that because 'the species is apparently at the north-western limit of its range in southern England, its recent decline may involve climatic factors'. Climate change as we currently understand it, may eventually reverse such fortunes for a predominantly southern species.

With only one post-1989 location of less than 10km² and continuing decline suspected, a designation of IUCN CR is appropriate. Notwithstanding this designation, the species, like many others in the Tachyporinae, is in all likelihood, under-recorded. It is hoped that targeted use of bottle traps located on suitable *Cossus*-damaged oaks will produce further modern records of the species (Mark G. Telfer *pers comm.*).

Threats Significant threats are any which cause a reduction of available decaying or dead standing trees in parkland, hedgerow, woodland and forest sites in southern England. Land use changes, deforestation and development are viable threats, the last of particular significance for isolated hedgerow trees that support this species.

Management and Conservation Dead and dying wood should be left in situ and only removed if a viable hazard has been identified. Further field survey should be encouraged to attempt to rediscover the species at former sites and to identify and conserve breeding sites. Many of the species' known localities are pasture woodland and parkland SSSI's.

Published Sources Fowler (1889); Freude *et al.*(1964); Joy (1932); Lompe (2009); Shirt (1987).

TACHINUS RUFIPENNIS
NEAR THREATENED
Order COLEOPTERA
Family STAPHYLINIDAE

Tachinus rufipennis Gyllenhal, 1810

Identification This species exhibits the significantly narrowed abdomen typical of the Tachyporinae. The genus *Tachinus* is recognised by the lack of a raised sutural border on the elytra, the glabrous head and pronotum and the lack of setae on the side margins of the pronotum, elytra and (with the exception of *lignorum*) basal abdominal segments. Within the genus, *T. rufipennis* is identified amongst the other British species by having a smooth ground between the elytral punctures and the combination of a black pronotum and entirely or nearly entirely bright red elytra. The adult is keyed by Fowler (1888) and Joy (1932), but more recent keys should also be consulted for a positive identification e.g. Freude *et. al.* (1964) and Lompe (2009).

Distribution Formerly widely distributed throughout England, Scotland and Wales, but much declined in range in recent decades. Modern (since 1989) records are from only 14 hectads and from the following vice-counties; West Ross & Cromarty, Kincardineshire and Dumfriesshire in Scotland; Cumberland, County Durham, South Northumberland, North-west Yorkshire, Leicestershire and Berkshire in England, and from Caernarvonshire in Wales. In Europe, it is widely distributed.

Habitat and Ecology Predatory. This is a mainly northern and western species in its British distribution. It is typically associated with upland and montane moorland, heath, forest and fell. In lowland regions, it has been found in rough grassland and woodland. The beetle is associated specifically with carrion; grouse, gull and red deer (*Cervus elaphus*), but it is also found in other decaying organic matter including fungi. The adults and larvae are assumed to be predatory on other invertebrate larvae. Adults have been recorded between March and July and between September and November inclusive.

Status There appear to be declines in almost every period for which hectad counts were made, indicating that the species may be genuinely in decline in our region. An apparent decrease of 42% within the main recording period is further supported by a decrease of 28% (which is just below the minimum 30% threshold above which a taxon may be designated as Vulnerable Category A) in the last 28-year recording block and an overall decrease of 31% calculated over the last 30-year period.

With an estimated AOO of 56km² (14 modern tetrads/locations) and ongoing decline inferred from the data, but without any indication of fragmentation or extreme population fluctuations, the taxon fails to satisfy all criteria required to place it in Vulnerable Category B. All things considered, a designation of Near Threatened is appropriate because the species satisfies Vulnerable B2b but not B2a or B2c. With only 14 post-1989 hectads recorded, this taxon is designated Nationally Rare. There are 64 records in the database (including duplicates).

Threats There are no known threats specific to this species.

Management and Conservation There are currently no recommended management or conservation measures for this species.

Published sources Fowler (1889); Freude *et al.*(1964); Joy (1932); Lompe (2009).

TACHINUS SCAPULARIS REGIONALLY EXTINCT

Order COLEOPTERA

Family STAPHYLINIDAE

Tachinus scapularis Stephens, 1832

Identification This species exhibits the significantly narrowed abdomen typical of the Tachyporinae. The genus *Tachinus* is recognised by the lack of a raised sutural border on the elytra, the glabrous head and pronotum and the lack of setae on the side margins of the pronotum, elytra and (with the exception of *lignorum*) basal abdominal segments. Within the genus, *T. scapularis* is identified amongst the other British species by having a fine reticulation between the elytral punctures, by the lack of distinct bright orange longitudinal marks on the elytra, by the blackish antennae with paler basal segments, the lack of setae at the sides of the four basal abdominal segments, quadrate to elongate (rather than quadrate to transverse) antennal segments 6-10, the shape of the apex of the last abdominal tergite (which is similar to that of *pallipes*), the completely black pronotal front margin, the punctuation of the pronotum and elytra being almost identical and a small ± well-defined reddish-yellow mark at the humeral angle of the elytra. The aedeagus is diagnostic but only by comparison with other *Tachinus*. The adult is keyed by Fowler (1888) and Joy (1932), but more recent keys should also be consulted for a positive identification e.g. Freude *et. al.* (1964) and Lompe (2009).

Distribution Formerly widespread in England with records from the late 19th century/early 20th century from Cumberland, Derbyshire, Oxfordshire, Berkshire, South Devon, South Hampshire, Surrey and North Essex. Most of the records pre-date 1918 but there is a record from Wallington, Surrey for 1936 and a series of at least 27 specimens (in The Natural History Museum, London) from 'Cambridge', Cambridgeshire between 1943 and 1948. It was last recorded in Britain in A.A.Allen's garden at Blackheath, Greenwich, West Kent in October 1953 (Allen, 1964).

Found throughout central southern Europe where it is described as rare (Lompe, 2009).

Habitat and Ecology Predatory. Little is known about the habitat preferences of this species in Britain. Allen (1964) found it in 'much decayed grass heaps' and 'under decomposing fish' in his garden, 'nearly always in late autumn; rare though occasionally in small numbers' and in the 'wettest and most putrid part of compost heaps and heaps of decaying vegetation' (P. Hammond *pers comm.*). It had also been observed at the sap of a *Cossus*-infested tree and in woodland localities. Along with other members of the genus, it was likely to be associated with decaying organic matter in general. Adults have been recorded in February, May, June and August – December.

Status With no records since 1953, the species is considered extinct in Britain.

Threats The cause of regional extinction is unknown.

Management and Conservation None.

Published Sources Allen (1964); Fowler (1889); Freude *et al.*(1964); Joy (1932); Lompe (2009).

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Appendix 1: summary table – an alphabetical list of the Staphylinidae: Tachyporinae

(Note: figures in parentheses refer to tally counts which include unverified records; more information in accompanying excel spreadsheet).

Rationale: unless otherwise specified neither EOO nor AOO approach the thresholds for consideration as Threatened under Criterion B and/or D2 and the number of locations exceeds the threshold under Criterion D2. Data were not available for an assessment against Criteria C and E

Species Name	GB IUCN Status (2017)	Qualifying criteria	Rationale	GB Rarity status (2016)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2017	AoO (tetrads) 1990-2017	No. of Locations 1990-2017	AoO (hectads) 1990-2003	AoO (hectads) 2004-2017	AoO Hectads 1988-1997	AoO Hectads 1998-2007	AoO Hectads 2008-2017
<i>Bolitobius castaneus</i> (Stephens)	LC		There are no specific known threats to this species and although a decrease of 28% is evident in the main recording period, a rate of 10-year decline of only 7% is calculated for the last 28 years which is well below the threshold for IUCN category designation under Criterion A. 461 records in the database (including duplicates).	none	E	S	W	149	107			54	44			
<i>Bolitobius cingulatus</i> (Mannerheim)	LC		There are no specific known threats to this species and although a decrease of 17% is evident within the main recording period, a rate of 10-year decline of only 2% is calculated for the last 28 years which is well below the threshold for IUCN category under Criterion A. . 394 records in the database (including duplicates).	none	E	S	W	124	103			45	43			
<i>Bryophacis crassicornis</i> (Mäklin)	DD		The species is known only from a cluster of records in South Northumberland, an old record from VC Durham, one old and two modern records from Scotland, a record of unknown reliability from North-east Yorkshire (Hyman, 1994) and a record thought by its originator to have resulted from a data entry error, for Catfield Fen, East Norfolk. Its requirements in our region are not understood and its habitats seemingly varied. It may be that the taxon occurs at very low population densities and is thus difficult to find but, regardless, our understanding of its distribution and ecology is poor and it is difficult to know with such little data, what population dynamics are operating in our region. It is certainly impossible to say whether there is ongoing decline, fluctuation or fragmentation. If continuing decline were suspected, the species would qualify as Vulnerable B1ab(ii)(iv) or Endangered B2ab(ii)(iv). Its range is approximately 9,500km ² . However, a designation of 'Data Deficient' is appropriate until such time as research on the	NR	E	S		2(3)	5	5	5	3	2	2	1	2

Species Name	GB IUCN Status (2017)	Qualifying criteria	Rationale	GB Rarity status (2016)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2017	AoO (tetrad) 1990-2017	No. of Locations 1990-2017	AoO (hectads) 1990-2003	AoO (hectads) 2004-2017	AoO Hectads 1988-1997	AoO Hectads 1998-2007	AoO Hectads 2008-2017
			species can produce more information. 10 records in the database (including duplicates).													
<i>Bryophasis maklini</i> (Sahlberg, J.)	DD		This is a strictly montane species and is likely to be under-recorded in Scotland in particular. In the 1980s, there were records from 6 hectads (due mostly to the recording efforts of the late Jon Owen), but it has only been recorded from three sites since: Scar Crag in Cumbria in 1992, Mt Morone, South Aberdeenshire in 2009 and the summit of Beinn a' Chreachain, mid-Perthshire in the same year. These are the most recent records known to the author. Global warming is a plausible threat to the boreo-alpine assemblages in our region, of which this is a component. With so little data, any evaluation is rendered impossible currently. The taxon is likely to qualify under IUCN criteria as threatened (for example, EoO is calculated at approx. 8600km ² , and with 5 or fewer modern locations, this would give an IUCN designation of Endangered were continuing decline thought to be operating), but more information is required through increased recorder effort, so that a designation can be ascribed. For now, a designation of Data Deficient is appropriate. 48 records in the database (including duplicates).	NR	E	S		20	3	3	3	1	2	1	0	2
<i>Bryoporus cernuus</i> (Gravenhorst)	DD		The ecology and true distribution of this taxon are poorly known. There are only seven British records known to the author, two of which may be in error, and the habitats occupied are varied, ranging from <i>Calluna</i> heath to fen. Threats are difficult to perceive when the habitat and requirements of the species in Britain are difficult to qualify. Consequently and with no evident decline indicated by the scant data, a designation of Data Deficient is appropriate until such time as research can produce more information.	NR	E			3(5)	2(3)	2(3)	2(3)	0(1)	2	0(1)	0	2
<i>Cilea silphoides</i> (Linnaeus)	LC		There are no known specific threats to this species and although a decrease of 22% is evident within the main recording period, there is an increase in records in the later recording period during the last 28 years. With only 67 post-1989 hectads, the species would normally qualify for designation as Nationally Scarce (NS), but it inhabits dung and 'hotbeds', both of which are often inaccessible and largely ignored by many Coleopterists. Thus the species is undoubtedly under-recorded in the region along with many other taxa in this sub-family. 271 records in the database	none	E	S	W	86	67			20	40			

Species Name	GB IUCN Status (2017)	Qualifying criteria	Rationale	GB Rarity status (2016)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2017	AoO (tetrads) 1990-2017	No. of Locations 1990-2017	AoO (hectads) 1990-2003	AoO (hectads) 2004-2017	AoO Hectads 1988-1997	AoO Hectads 1998-2007	AoO Hectads 2008-2017
			(including duplicates).													
<i>Coproporus immigrans</i> Schülke	NA		An alien species which inhabits woodchip piles; originating from outside of Europe and almost certainly introduced. First discovered in Britain in 2004 (Esher Common, Surrey) and spreading to Middlesex, Berkshire, West Norfolk and Worcestershire at least. 11 records in the database.	none	E			0	7			0	7	0	1	6
<i>Ischnosoma longicorne</i> (Mäklin)	NT		Like most of the taxa in this sub-family, the present species is likely to be under-recorded. Whilst there is a suggested 81% decline within the main recording period data are too few from later periods to make a judgement against Criterion A.. In terms of AoO, were the species recorded from only five rather than seven modern tetrads and a plausible threat identified, then it could be considered to qualify for designation as Vulnerable D2, but neither of these conditions are satisfied. In terms of EoO, the species occupies approximately 22,000km ² which is above the maximum threshold for area of range to qualify under B1 as Vulnerable. The range of this species, at least in England, is relatively well-recorded so perhaps one would expect this species to have turned up with greater frequency for a Nationally Scarce species (as designated in Hyman 1994). The species has been categorised as NT on the basis that its EOO approaches the threshold for Vulnerable, and it is known from less than 10 locations. 77 records in the database (including duplicates).	NR	E	S	W	37	7	7	7	4(5)	2(3)	3	4	2
<i>Ischnosoma splendidum</i> (Gravenhorst)	LC		There are no known specific threats to this species and there is no evidence of decline. 771 records (including duplicates).	none	E	S	W	139	183			96	111			
<i>Lamprinodes saginatus</i> (Gravenhorst)	LC		There are no known specific threats to this species and there is no evidence of decline (with the exception of an apparent 9% decrease over the last 28 years which is not evident in the later 10-year period blocks), therefore Criterion A is not applicable. With only 51 post-1989 hectads, the species would normally be designated as Nationally Scarce (NS) but like others in this sub-family, this taxon is poorly recorded. That the author has found it at 10 sites (9 hectads) in West Norfolk since 2013, by sieving moss and grass tussocks, mainly in March and April, suggests that elsewhere it ought to be widespread, but is probably under-recorded. 192 records (including duplicates).	none	E	S	W	46	51			29	22	18	17	20

Species Name	GB IUCN Status (2017)	Qualifying criteria	Rationale	GB Rarity status (2016)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2017	AoO (tetrads) 1990-2017	No. of Locations 1990-2017	AoO (hectads) 1990-2003	AoO (hectads) 2004-2017	AoO Hectads 1988-1997	AoO Hectads 1998-2007	AoO Hectads 2008-2017
<i>Lordithon exoletus</i> (Erichson)	LC		There are no known specific threats to this species but a decline is evident in all three periods of evaluation. Within the main recording period, the overall decline is 39%. The 10-year rate of decline is calculated at 26% over the last 30-year period of 10-year recording blocks, so whilst a decline is operating, the gradient of decline falls below the minimum 30% threshold that would place the population under IUCN Category Vulnerable VUA2 for Criterion A. This taxon, like others in the sub-family is poorly recorded and the apparent declines may simply be a result of recording bias. With only 43 post-1989 hectads, the species would normally be designated as Nationally Scarce (NS) but the low post-1989 hectad count is considered to be due to under recording. 180 records in the database (including duplicates).	none	E	S	W	70	43			33	11	22	15	9
<i>Lordithon lunulatus</i> (Linnaeus)	LC		There are no known specific threats to this species and although an overall decrease of 29% is evident between the main recording periods, the calculated rate of 10-year decline for the last 28 years is 14% which is well below the 30% minimum threshold for IUCN Vulnerable Category A designation. 408 records in the database (including duplicates).	none	E	S	W	145	103			55	36			
<i>Lordithon speciosus</i> (Erichson)	VU	D2	Described as new to the British fauna from Loch Morlich, Glenmore Forest in Aviemore in 2006 (Schülke, 2015) and only known from this site to date. Schülke ventured that the British population may be a relict of a once continuous European distribution in the post-glacial period. Accepting this hypothesis, a designation of VUD2 is thought appropriate for an overlooked and evidently rare indigenous species for which no value of decline, fluctuation or fragmentation can be presently evaluated for its population. If future records are forthcoming, the species may qualify under additional IUCN criteria.	NR		S		0	1	1	1	0	1	0	1	0
<i>Lordithon thoracicus</i> (Fabricius)	LC		There are no known specific threats to this species and although an overall decrease of 37% is evident within the main recording period, the calculated rate of 10-year decline for the last 28 years is 21% which is below the 30% minimum threshold for IUCN Vulnerable Category A designation. The apparent 'decline' in range may simply reflect a bias in recording. 456 records in the database (including duplicates).	none	E	S	W	168	105			54	28			

Species Name	GB IUCN Status (2017)	Qualifying criteria	Rationale	GB Rarity status (2016)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2017	AoO (tetrads) 1990-2017	No. of Locations 1990-2017	AoO (hectads) 1990-2003	AoO (hectads) 2004-2017	AoO Hectads 1988-1997	AoO Hectads 1998-2007	AoO Hectads 2008-2017
<i>Lordithon trinotatus</i> (Erichson)	LC		There are no known specific threats to this species and although an overall decrease of 29% is evident within the main recording period, the hectad counts over the last 28 year period suggest that the population is stable if not increasing, so there is no gradient of decline to be measured for Criterion A. 476 records in the database (including duplicates).	none	E	S	W	148	105			53	60			
<i>Mycetoporus ambiguus</i> Luze	NE		This species has only recently been recognised as a distinct British taxon (Schülke, 2011) and as such, all records prior to 2011 of <i>Mycetoporus clavicornis</i> (Stephens), with which it has been confused, must be treated as <i>sensu lato</i> unless they have been redetermined as that species. It is likely that at least some of these records will refer to <i>M. ambiguus</i> although <i>M. clavicornis</i> does appear to be the more widely distributed of the species complex. Currently, <i>M. ambiguus</i> has been recorded only from Scotland and from midland, south and south-east England. Because it has only recently been recognised as British, the taxon has not been evaluated in the current Review. With only 4 post-1989 hectads, a provisional British Rarity designation of Nationally Scarce is ascribed until further clarification is achieved. 24 records in the database (excluding duplicates).	pNS	E	S		17	4			2	2			
<i>Mycetoporus angularis</i> Mulsant & Rey	LC		There are no known specific threats to this species and although a decrease of 70% is evident within the main recording period, the rate of 10-year decline is only 7% over the last 28 years which is well below the minimum threshold of 30% required for designation as IUCN Vulnerable under criteria for Category A. A greater rate of 10-year decline (13%) is evident between the 10-year periods 1989-97 and 1998-2007, but in the following 10-year period, the hectad count is stable. Whilst there may be some suggestion of decline, there are more than 10 modern locations, the taxon is not represented by severely fragmented populations, as defined by the IUCN criteria, and is not subject to extreme fluctuations, and so fails the requirements for designation as Vulnerable Category B. With only 19 post-1989 hectads, the species qualifies for designation as Nationally Scarce (NS), despite the likelihood that it is under-recorded in the region along with many other taxa in this sub-family. 118 records in the database (including duplicates).	NS	E	S	W	63	19			11	9	8	6	6

Species Name	GB IUCN Status (2017)	Qualifying criteria	Rationale	GB Rarity status (2016)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2017	AoO (tetrads) 1990-2017	No. of Locations 1990-2017	AoO (hectads) 1990-2003	AoO (hectads) 2004-2017	AoO Hectads 1988-1997	AoO Hectads 1998-2007	AoO Hectads 2008-2017
<i>Mycetoporus baudueri</i> Mulsant & Rey	DD		The true <i>M. baudueri</i> was formerly brought forward as a British species (as <i>M. hellieseni</i> Strand) in Pelham-Clinton (1960), as distinct from <i>M. erichsonianus</i> and <i>M. piceolus</i> , and <i>M. erichsonianus</i> was also at one time known as <i>M. baudueri</i> . Both species would have been easily misidentified as <i>M. piceolus</i> historically since Joy's key (1932) only accounted for <i>M. piceolus</i> in the British fauna. Thus there is great scope for taxonomic confusion in our interpretation of older data for this species complex. In evaluating the data for the true <i>M. baudueri</i> , there is a 57% decrease in hectads between the two main recording periods and a 100% calculated 10-year rate of decline over the last 28 years. This is unlikely though to represent the true dynamics of the species as, like other members of this sub-family and in particular the genus <i>Mycetoporus</i> , this taxon is likely to be very poorly recorded. Evaluation is rendered problematic due to the paucity of data. For example, if we dismiss the Camber record as erroneous, the species can be seen to presently occupy an EOO of approx. 6085km ² and an AOO of 24km ² and would therefore satisfy IUCN category Vulnerable B1ab(ii)(iv) and B2ab(ii)(iv) if a decline were operating, but due to the poor quality of the data, the species has been evaluated as Data Deficient (DD). With only 6 post-1989 hectads known to support the species, a British Rarity designation of NR seems appropriate, but it is fair to say that this usually montane and upland taxon is likely to be significantly under-recorded, particularly in Scotland, so this designation is cautious. The most recent record in the database is from 1995. 24 records in the database.	NR	E	S	W	14	6	6	6	6	0	8	0	0
<i>Mycetoporus bimaculatus</i> Laccordaire	DD		With so little data it is impossible to know whether this species is declining or not. Interestingly, Hyman (1994) only recognises the vice-counties South Aberdeenshire and West Sussex as having supported the species, whereas the database holds records for VC's 11, 13, 17, 21, 32, 46, 63, 64, 70 and 96. If decline were accepted, it would be designated as Critically Endangered (CR B2ab). If no decline were evidenced or suspected, then the species would fall into either Category VUD2 if plausible threat was identified or NT otherwise. It is highly likely that the species is under-recorded, in common with the other members of the genus and sub-family. Currently, it is evaluated as data Deficient (DD). 14 records in the	NR	E	S	W	11	1	1	1	1	0	1	0	0

Species Name	GB IUCN Status (2017)	Qualifying criteria	Rationale	GB Rarity status (2016)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2017	AoO (tetrad) 1990-2017	No. of Locations 1990-2017	AoO (hectads) 1990-2003	AoO (hectads) 2004-2017	AoO Hectads 1988-1997	AoO Hectads 1998-2007	AoO Hectads 2008-2017
			database.													
<i>Mycetoporus clavicornis</i> (Stephens)	LC		There are no known specific threats to this species and although a decrease of 35% is evident within main recording period, there is no decline apparent over the last 28 year period, nor between the three decadal blocks of the last 30 years. Thus there is no decline for consideration under Criterion A. With only 28 hectads recorded for the species since 1990, a British Rarity designation of NS would normally be appropriate, but the taxon is undoubtedly under-recorded in the region, along with all <i>Mycetoporus</i> and the sub-family in general, and this taxa perhaps more so because of the difficulty of assigning identification within the newly-instated species complex. 102 records in the database (including duplicates) – some may refer to <i>M. ambiguus</i> and <i>M. reichei</i> , both of which have been recently recognised as British (Schülke, 2011).	none	E	S	W	43	28			11	18	9	13	9
<i>Mycetoporus despectus</i> Strand, A.	LC		There are no known specific threats to this species and although a decrease of 74% is evident within the main recording period, there is a negligible apparent decline of 5% over the last 28 year period and no decline between the three decades of the last 30 years, although data are very sparse indeed. Thus the rate of decline is not great enough to place the taxon in a threat category under Criterion A. With only 12 hectads recorded for the species since 1990, a British Rarity designation of NR would normally be appropriate, but the taxon is undoubtedly under-recorded in the region along with all other <i>Mycetoporus</i> and the sub-family in general, so a provisional designation of NS is thought more appropriate. 70 records in the database.	NS	E	S	W	46	12	12	12	7	6	4	5	5
<i>Mycetoporus erichsonianus</i> Fagel	DD		This is a difficult taxon to evaluate with only 24 records in the database. It appears to be found exclusively(?) in montane habitats on fells, ridges and summits in northern England and Scotland. Two records for Sussex are likely to be in error (possibly misidentified <i>M. piceolus</i> specimens - SL) and in addition to his reference to the 'south-east' of England, Hyman (1994) cites the West Midlands as a region in which the species has been recorded – these records need to be viewed with a certain amount of caution. The <i>M. baudueri/piceolus/erichsonianus</i> species complex presents identification difficulties due to the close similarity between	NR	E	S		13	1	1	1	1	0	1	0	0

Species Name	GB IUCN Status (2017)	Qualifying criteria	Rationale	GB Rarity status (2016)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2017	AoO (tetrads) 1990-2017	No. of Locations 1990-2017	AoO (hectads) 1990-2003	AoO (hectads) 2004-2017	AoO Hectads 1988-1997	AoO Hectads 1998-2007	AoO Hectads 2008-2017
			the taxa. <i>M. erichsonianus</i> is likely to be under-represented for the following reasons: the genus <i>Mycetoporus</i> is particularly poorly recorded and the sub-family generally so; if the species' distribution is truly restricted to montane and upland habitat, the beetle is also likely to be significantly under-recorded, particularly in Scotland where the frequency of recording in this type of habitat is relatively low compared to lowland Britain, due to access issues, climate, remoteness of suitable locations and other factors; on five dates between June and October 1980, recording effort in the Meall Garbh region of Càrn Gorm produced the sum total of seven specimens of <i>M. erichsonianus</i> from moss – this suggests that the species ought to be found with some confidence elsewhere in suitable habitat, at least in the Scottish Highlands. So, the apparent decrease of 92% in the main recording period and the single post-1989 record known to the author, can probably be attributed to poor recording. If there is continuing decline, then the data as it stands would place the taxon in the Critically Endangered Category under both B1 and B2 criteria. If no continuing decline is evident, the taxon would qualify, with the data as it stands, for VUD2 if a plausible threat (e.g. global warming and geographical shift of boreo-alpine taxa) was identified. If no threat then the taxon would be designated as NT. Another possibility, assuming the data are truly representative of population dynamics is CRA2, on the basis that the population, if the data are to be believed, has declined in recent years by an apparent 100%. A more rational approach assumes that the data are deplete and unrepresentative of the true distribution of the species. This scenario suggests categorisation as Data Deficient (DD) as it is suspected that <i>M. erichsonianus</i> may qualify for an IUCN threat category but there is not enough data to attribute it specifically. DD seems appropriate.													
<i>Mycetoporus lepidus</i> (Gravenhorst)	LC		There are no known specific threats to this widely distributed species, the most frequently recorded of the genus. A small decrease of 9% is apparent within the main recording period and a rate of 10-year decline of 18% is calculated for the last 28 years which is well below the 30% minimum threshold required for IUCN Vulnerable Category A designation. In any case, the total for the 1990's is artificially high due to a substantial recording effort by Eyre, Lott and Luff in northern	none	E	S	W	147	134			95	55	66	42	47

Species Name	GB IUCN Status (2017)	Qualifying criteria	Rationale	GB Rarity status (2016)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2017	AoO (tetrad) 1990-2017	No. of Locations 1990-2017	AoO (hectads) 1990-2003	AoO (hectads) 2004-2017	AoO Hectads 1988-1997	AoO Hectads 1998-2007	AoO Hectads 2008-2017
			England. Consequently, the elevated totals for the first period in both the 28 recording block and the later 30 year recording block can be explained. Despite there being records from 134 post-1989 hectads, the species is undoubtedly under-recorded in the region along with many other taxa in this sub-family. 716 records in the database (including duplicates).													
<i>Mycetoporus longulus</i> Mannerheim	LC		There are no known specific threats to this species. A decrease of 35% is apparent within the main recording periods. A rate of 10-year decline over the last 28 years is calculated at 31% which is just above the 30% minimum threshold required for a taxon to qualify as IUCN Vulnerable Category A. Other calculated decline rates are 33% over the last 30-year period and 0% and 47% respectively between the first/second and second/third of these three recent 10-year periods. Despite the apparent declines, the species like all others in the genus is likely to be significantly under-recorded making evaluation of the data difficult. With an AOO of 60 modern hectads, no plausible threats and a decision to attribute the apparent declines to poor recording, a designation of Least Concern is thought appropriate. With only 60 post-1989 hectads, the species would normally qualify for designation as Nationally Scarce (NS), but because of under recording, a British Rarity designation of 'none' is considered more appropriate. 278 records in the database (including duplicates).	none	E	S	W	92	60			46	16	27	28	8
<i>Mycetoporus monticola</i> Fowler	DD		The database has only 16 records for this montane species, all originating from Scotland. Hyman (1994) also cites north-west England as a source of data. It is apparent, notwithstanding the fact that the species is likely to inhabit the most remote and inaccessible locations, that Hyman (1994) has underestimated its scarcity in designating it as Nationally Scarce (Notable). Apparently last certainly recorded in Britain in 2002 (Abernethy Forest, East Inverness-shire), although there is a record of a probably good specimen also from East Inverness-shire in 2012. There is an apparent 78% decrease in the population between the two main recording period hectad counts, but allowance has to be made for under-recording and for the relative inaccessibility of large tracts of its habitat. In the later recording periods, the number of hectad counts (at the rate of one hectad per recording block!) has remained stable. If decline were operating, the species would qualify under	NR	(E)	S		9	1(2)	1(2)	1(2)	1	1(0)	1	1	1(0)

Species Name	GB IUCN Status (2017)	Qualifying criteria	Rationale	GB Rarity status (2016)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2017	AoO (tetrads) 1990-2017	No. of Locations 1990-2017	AoO (hectads) 1990-2003	AoO (hectads) 2004-2017	AoO Hectads 1988-1997	AoO Hectads 1998-2007	AoO Hectads 2008-2017
			criterion B1 and B2 (EOO and AOO) as IUCN Endangered or under criterion D as Vulnerable should a plausible threat be identified The deplete dataset does not allow for any evaluation of decline, fluctuation or fragmentation or otherwise, and as far as the reviewer is aware, there have been no concerted efforts to find or monitor the species in recent years, so a categorisation of Data Deficient seems appropriate.													
<i>Mycetoporus nigricollis</i> Stephens	LC		There are no known specific threats to this species. Within the main recording period, a small decline of 6% is noted. The calculated 10-year rate of decline over the last 28-year period is 9%, a value which is well below the 30% minimum threshold required for designation of the taxon as IUCN Vulnerable Category A. Decreases in recorded hectads between the 10-year periods of the later 30-year evaluation period indicate that an ongoing decline may be operating, but the overall decline here is calculated at 26% which is still below the 30% minimum threshold for Vulnerable Category A. There are no severe fluctuations observed in populations and no fragmentation as defined in the IUCN criteria and with more than 10 recent locations, the taxon fails to satisfy Category B criteria for IUCN Vulnerable. Its range in EOO is also above the maximum threshold required to place it in Criterion B Vulnerable and the number of location exceeds the threshold under Criterion D2. With only 59 post-1989 hectad records, the species would normally be designated as Nationally Scarce (NS) but like others in this sub-family and particularly this genus, this taxon is poorly recorded and is thought to be present in over 100 hectads of the National OS grid. 192 records in the database (including duplicates).	none	E	S	W	63	59			35	27	32	28	13
<i>Mycetoporus piceolus</i> Rey	LC		There are no known specific threats to this species. Within the main recording period, a small decline of 21% is noted. No declines are evident over the last 28 and 30 year periods, so there is no decline with which to calculate a rate of decline for Criterion A. With only 22 post-1989 hectad records, the species is designated as Nationally Scarce (NS). 80 records in the database (including duplicates).	NS	E	S	W	28	22			11	11	8	3	11
<i>Mycetoporus punctus</i> (Gravenhorst)	LC		There are no known specific threats to this species. Within the main recording period, a decline of 35% is apparent. The calculated 10-year rate of decline over the last 28-year period is 9% which is well below the 30% minimum threshold value	NS	E	S	W	71	46			26	20	20	12	17

Species Name	GB IUCN Status (2017)	Qualifying criteria	Rationale	GB Rarity status (2016)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2017	AoO (tetrads) 1990-2017	No. of Locations 1990-2017	AoO (hectads) 1990-2003	AoO (hectads) 2004-2017	AoO Hectads 1988-1997	AoO Hectads 1998-2007	AoO Hectads 2008-2017
			required for designation as Vulnerable under IUCN Category A. During the last 30 years, a 10-year decline rate of 23% is notable between the first two 10-year recording blocks, but the number of hectads recorded for the species actually increases between the two later blocks and the decline over this whole period is negligible at 5%. With only 46 post-1989 hectad records, the species is designated as Nationally Scarce (NS). 299 records in the database (including duplicates).													
<i>Mycetoporus reichei</i> (Pandellé)	DD		This species has only recently been recognised as a distinct British taxon (Schülke, 2011) and as such, all records prior to 2011 of <i>Mycetoporus clavicornis</i> (Stephens), with which it has been confused, must be treated as <i>sensu lato</i> unless they have been re-determined as that species. It is likely that at least some of these records will refer to <i>M. reichei</i> . Currently, the latter species has been recorded only from three locations: in south-west Scotland, the New Forest and Ditchling (East Sussex). The most recent record is from 1916. Although undoubtedly rare and potentially threatened, the species is likely to be under-recorded, hence a designation of Data Deficient until further records are forthcoming and a clearer picture emerges of its true distribution and population dynamics. 5 records.	NR	E	S		5	0	0	0	0	0	0	0	0
<i>Mycetoporus rufescens</i> (Stephens)	LC		There are no known specific threats to this species. Within the main recording period, the population appears to be stable. The calculated 10-year rate of decline over the last 28-year period is 15% which is well below the 30% minimum threshold value for designation as Vulnerable under IUCN category A. During the last 30 years, a 10-year decline rate of 26% is notable between the first two 10-year recording blocks, but the number of hectads recorded for the species is similar between the two later blocks. With only 57 post-1989 hectad records, the species would normally be designated as Nationally Scarce (NS) but like others in this sub-family and particularly this genus, this taxon is poorly recorded and is thought very likely to be present in more than 100 hectads. 239 records in the database (including duplicates).	none	E	S	W	56	57			38	24	31	17	15
<i>Parabolitobius inclinans</i> (Gravenhorst)	LC		There are no known specific known threats to this species. A decrease of 42% is apparent between the main recording periods and the rate of 10-year decline over the last 28 years is 32% which is just above the minimum threshold required for a taxon to qualify as VU A. Other calculated decline rates are	NS	E	S	W	67	39			29	10	23	14	5

Species Name	GB IUCN Status (2017)	Qualifying criteria	Rationale	GB Rarity status (2016)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2017	AoO (tetrads) 1990-2017	No. of Locations 1990-2017	AoO (hectads) 1990-2003	AoO (hectads) 2004-2017	AoO Hectads 1988-1997	AoO Hectads 1998-2007	AoO Hectads 2008-2017
			40% over the last 30-year period and 22% and 40% respectively between the first/second and second/third of these three recent 10-year block periods. Despite this apparent ongoing decline, the species like all others in the genus, is likely to be significantly under-recorded making evaluation of the data difficult. With an AOO of 39 modern hectads, no plausible threats known and a decision to attribute the apparent declines to under recording, a designation of Least Concern is thought appropriate. With only 39 post-1989 hectads, the species is designated Nationally Scarce (NS). 175 records (including duplicates).													
<i>Sepedophilus bipunctatus</i> (Gravenhorst)	LC		There are no known specific threats to this species. An increase is evident within main recording period and it is likely that this species is expanding its range. An apparent decline over the last 28-year period is probably due to recording bias. The 10-year decline rate calculated over the last 28 years is 18% which is well below the minimum 30% threshold required for a taxon to qualify as IUCN Vulnerable Category A. There is also a decline rate of 18% between the latter two 10-year recording blocks, but the overall decline over the 30-year period as a whole is negligible. With an AOO of only 49 post-1989 hectads in a well-worked habitat and a geographically restricted distribution, the species is designated as Nationally Scarce (NS). 193 records in the database (including duplicates).	NS	E		W	27	49			33	19	18	24	16
<i>Sepedophilus constans</i> (Fowler)	LC		There are no known specific threats to this species. Within the main recording period, an apparent decline of 21% is noted. A 10-year rate of decline of 24% is calculated for the later 28-year period, which is below the 30% minimum threshold for IUCN designation as Vulnerable Category A. Over the last 30-year period the decline rate is 18%, with a 29% decline rate calculated between the last two ten-year recording blocks. The latter can probably be attributed to under-recording. With only 22 post-1989 hectad records, the species is designated as Nationally Scarce (NS). 79 records in the database (including duplicates).	NS	E	S	W	28	22			15	7	9	10	5

Species Name	GB IUCN Status (2017)	Qualifying criteria	Rationale	GB Rarity status (2016)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2017	AoO (tetrads) 1990-2017	No. of Locations 1990-2017	AoO (hectads) 1990-2003	AoO (hectads) 2004-2017	AoO Hectads 1988-1997	AoO Hectads 1998-2007	AoO Hectads 2008-2017
<i>Sepedophilus immaculatus</i> (Stephens)	LC		Although a decline of 26% is apparent within the main recording period, this is probably due either to historical decline or to recording bias. Within the last 30 years, the species appears to be increasing, there being increases in hectads recorded for the species in all evaluation periods so there is no decline with which to calculate a rate of decline for Criterion A. With only 85 post-1989 hectad records, the species would normally be designated as Nationally Scarce (NS) but, like others in this sub-family, this taxon is poorly recorded and so a designation of 'none' is more appropriate. 393 records in the database (including duplicates).	none	E		W	115	85			32	41	14	31	35
<i>Sepedophilus littoreus</i> (Linnaeus)	LC		Although a decline of 31% is apparent within the main recording period, this is probably due either to historical decline or to recording bias. Within the last 30 years, the species appears to be stable or increasing, although there is a decline apparent within the later 28-year period, calculated at 11% which is well below the 30% minimum threshold required for IUCN designation as Vulnerable Category A. In the three 10-year recording blocks covering the last 30-year period, this decline is not evident. With only 86 post-1989 hectad records, the species would normally be designated as Nationally Scarce (NS) but like others in this sub-family, this taxon is poorly recorded and so a designation of 'none' is more appropriate. 388 records in the database (including duplicates).	none	E	S	W	125	86			52	38	31	30	35
<i>Sepedophilus lusitanicus</i> Hammond	LC		There are no known specific threats to this species. Although a small decline of 9% is apparent over the last 28-year period, this is probably due to irregularities in recording (recording bias). The rate of decline is well below the minimum 30% threshold to qualify as threatened under Criterion A. With only 42 post-1989 hectad records and a geographically restricted distribution in England and Wales only, the species is here designated as Nationally Scarce (NS). 146 records in the database (including duplicates).	NS	E		W	39	42			25	19	11	20	16
<i>Sepedophilus marshami</i> (Stephens)	LC		There are no known specific threats to this widespread species and no declines indicated in the data so there is no decline with which to calculate a rate of decline for Criterion A. 1409 records in the database (including duplicates).	none	E	S	W	263	269			163	160			

Species Name	GB IUCN Status (2017)	Qualifying criteria	Rationale	GB Rarity status (2016)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2017	AoO (tetrads) 1990-2017	No. of Locations 1990-2017	AoO (hectads) 1990-2003	AoO (hectads) 2004-2017	AoO Hectads 1988-1997	AoO Hectads 1998-2007	AoO Hectads 2008-2017
			Wood, Oxfordshire (1957) and require verification. It was rediscovered in Britain in 2018 when a male and female were found at a 'Cossus' oak in Suffolk (Mark G. Telfer <i>pers comm.</i>). A record outside of the recording period in the Review would not normally be considered, but in this case, the record is exceptional and significant. With only one post-1989 location of less than 10km ² and continuing decline suspected, a designation of CR is appropriate. Notwithstanding this designation, the species, like many others in the group, is in all likelihood, under-recorded.													
<i>Tachinus corticinus</i> Gravenhorst	LC		Between the main recording periods, there is an apparent increase of 85%, but in the later 28-year recording period, there is a decline of 25% which is below the 30% minimum threshold at which a taxon would qualify as Vulnerable under Category A. In the later 30-year period, there are apparent declines of 37% between the first two 10-year periods and 8% between the last two periods. The 37% decline is above the minimum threshold for Category A Vulnerable, but the species is clearly not in this category, as the other more recent trend observed in the data does not support this apparent decline. It should also be considered that along with most members of the sub-family, this taxon is likely to be significantly under-recorded. Least Concern is considered appropriate. With only 85 post-1989 hectad records, the species would normally be designated as Nationally Scarce (NS). 362 records in the database (including duplicates).	none	E	S		46	85			57	25	51	20	17
<i>Tachinus elongatus</i> Gyllenhal	DD		Within the main recording period, there is an apparent decrease of 15%. In the later 28-year recording period, there is a decline of 34% which is just above the 30% minimum threshold at which a taxon would qualify as IUCN Vulnerable under Category A. In the later 30-year period, there are apparent declines of 41% between the first two 10-year periods and 48% between the last two periods. These later declines are well above the minimum threshold for Category A Vulnerable, but the species is not thought to be in this category, as it is likely to be widely distributed across Scotland which is relatively poorly recorded. This factor coupled with the consideration that, along with most members of the sub-family, this taxon is likely to be significantly under-recorded, could lead one to designate it Least Concern, but a current and more cautious designation of	none	E	S	W	72	61			45	14	43	15	4

Species Name	GB IUCN Status (2017)	Qualifying criteria	Rationale	GB Rarity status (2016)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2017	AoO (tetrads) 1990-2017	No. of Locations 1990-2017	AoO (hectads) 1990-2003	AoO (hectads) 2004-2017	AoO Hectads 1988-1997	AoO Hectads 1998-2007	AoO Hectads 2008-2017
			DD is more appropriate until further recording effort can clarify whether a decline is truly operating. Neither EOO nor AOO approach the thresholds for consideration as Threatened under Criterion B and D2 whilst the number of location exceeds the threshold under Criterion D2. With only 61 post-1989 hectad records, the species would normally be designated as Nationally Scarce (NS) but for reasons already stated, this designation would be an inaccurate reflection of its likely distribution. 308 records in the database (including duplicates).													
<i>Tachinus flavolimbatus</i> Pandellé	LC		This species was first recorded in Britain in 1939 in the Gravesend area of West Kent, although two records in the database of uncertain accuracy pre-date this considerably. Distributed across south-eastern England and north into East Anglia. Although the species is a recent arrival, there is no reason to assume that its arrival in Britain was either deliberately or accidentally through importation. It has undergone range expansion and has spread throughout Europe and so it is evaluated in the present report. The records show increasing frequency, reflecting ongoing expansion, certainly within its known range. This range expansion is typical of a recent coloniser, so there is no decline with which to calculate a rate of decline for Criterion A. With only 38 post-1989 hectad records the species is designated as Nationally Scarce (NS) but it is expected in the near future to exceed the 100 10km square maximum threshold associated with this British Rarity status. 102 records in the database (including duplicates).	NS	E			12	38			11	29	6	9	29
<i>Tachinus humeralis</i> Gravenhorst	LC		There are no known specific threats to this species. There is an apparent decline of 42% within the main recording period. However, if this were to indicate ongoing significant decline, the evaluation of hectads in the later recording period does not support this. A calculated 13% decline in the last 28-year period is well below the minimum 30% threshold required for designation as IUCN Vulnerable under Category A. Like most taxa in the sub-family, <i>Tachinus humeralis</i> is under-recorded, so a count of only 87 post-1989 hectads, although below the minimum threshold of 100 required for designation as Nationally Scarce (NS), is in this instance thought to be significantly under-representative of the true AOO which certainly will exceed 100 hectads. 503 records in the database	none	E	S	W	149	87			56	38			

Species Name	GB IUCN Status (2017)	Qualifying criteria	Rationale	GB Rarity status (2016)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2017	AoO (tetrads) 1990-2017	No. of Locations 1990-2017	AoO (hectads) 1990-2003	AoO (hectads) 2004-2017	AoO Hectads 1988-1997	AoO Hectads 1998-2007	AoO Hectads 2008-2017
			(including duplicates).													
<i>Tachinus laticollis</i> Gravenhorst	LC		There are no known threats specific to this widely distributed species. An apparent decline of 23% within the main recording period is most probably a reflection of recorder activity but this rate of decline still falls below the minimum 30% threshold required for the taxon to qualify as threatened under Criterion A. In the later 28-year period, a calculated decline of 5% is negligible. 923 records in the database (including duplicates).	none	E	S	W	243	187			104	91			
<i>Tachinus lignorum</i> (Linnaeus)	LC		Despite an apparent decrease within the main recording period of 48%, there is a small increase in recorded hectads for the species in the later 28 and 30-year periods, so any historical decline appears not to be ongoing. Threats to the species include the use of endectocides in livestock treatments and the cessation of grazing or disruption of grazing regimes in areas that support populations. It currently appears only to be well-established in East Anglia where no less than 9 out of the 14 post-1989 hectads are found. Warwickshire has contributed 3 post-1989 hectads. That most of these records (8 of the 14 recent hectad records) are the author's indicates that this species is significantly under-recorded. It may be that dung is unpopular as a sampling habitat to many, and what efforts have been made in this area in recent decades have been mainly for the coprophagous Scarabaeoidea. With an AOO of only 56km ² but an EOO that exceeds the required threshold for Category B Vulnerable, and with plausible threats but no evidence of continuing decline, a designation of Least Concern is appropriate. A British Rarity status of NR would normally be designated for a taxon with 14 post-1989 hectads, but because this is primarily a dung-frequenting species and because that habitat has been largely neglected for recording of rove beetles, a designation of NS is thought appropriate for now. It may well be that with further recording effort of rove beetle communities in dung, this status may become redundant. 52 records in the database (including duplicates).	NS	E	S	W	28	14	15	15	6	8	7	2	8

Species Name	GB IUCN Status (2017)	Qualifying criteria	Rationale	GB Rarity status (2016)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2017	AoO (tetrads) 1990-2017	No. of Locations 1990-2017	AoO (hectads) 1990-2003	AoO (hectads) 2004-2017	AoO Hectads 1988-1997	AoO Hectads 1998-2007	AoO Hectads 2008-2017
<i>Tachinus marginellus</i> (Fabricius)	LC		There are no known threats to this widely distributed species. An apparent decline of 27% in the main recording period is not reflected in the later 28-year recording period which gives a negligible decline of only 3% which falls well below the 30% minimum threshold for designation as Vulnerable under Criterion A1098 records in the database (including duplicates).	none	E	S	W	255	187			109	101			
<i>Tachinus pallipes</i> (Gravenhorst)	LC		There are no known threats specific to this species and with the exception of the later of the three 10-year recording periods, all recording periods show an increase in records. Thus there is no decline with which to calculate a rate of decline for Criterion A. Whilst the species undoubtedly occurs throughout our region, it is predominantly northern and western and therefore it is highly likely that some of the records for southern England are erroneous and referable to male <i>Tachinus rufipes</i> with pale pronotal margins. Records should be qualified by dissection of males (and based on the form of the aedeagus) or identification of females (based on the form of the terminal abdominal segment). However, it is not within the scope of this Review to confirm or negate these data and they have all been accepted on face value at the current time. With only 72 post-1989 hectads recorded, this taxon would normally be designated as Nationally Scarce but due to under recording of species in this sub-family and the fact that this species' range extends predominantly into the relatively poorly recorded regions of northern and western Britain, it is thought that the true AOO will exceed 100 hectads and therefore a designation of 'none' seems more appropriate. 250 records in the database (including duplicates).	none	E	S	W	50	72			35	38	18	38	26
<i>Tachinus proximus</i> Kraatz	LC		There are no known specific threats to this species. A decrease of a negligible 3% is apparent between the two main recording periods and although a decrease of 21% is evident from the data in the later 28-year recording period, this is below the minimum 30% threshold required to suggest designation as Vulnerable Category A. The last 30-year period also shows decline (overall of 29%), but as with most members of this Sub-Family, this taxon is likely to be under-recorded, so the significance of this apparent ongoing decline is probably not as great as it would appear. A designation of Least Concern is thought appropriate. With only 56 post-1989 hectads recorded, the species would normally be designated as Nationally Scarce	none	E	S	W	58	56			40	21	33	21	12

Species Name	GB IUCN Status (2017)	Qualifying criteria	Rationale	GB Rarity status (2016)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2017	AoO (tetrads) 1990-2017	No. of Locations 1990-2017	AoO (hectads) 1990-2003	AoO (hectads) 2004-2017	AoO Hectads 1988-1997	AoO Hectads 1998-2007	AoO Hectads 2008-2017
			(NS) but the fact that this species' range extends predominantly into the relatively poorly recorded regions of northern and western Britain, it is suggested that the true AOO will exceed 100 hectads and therefore a designation of 'none' seems more appropriate. 261 records in the database (including duplicates).													
<i>Tachinus rufipennis</i> Gyllenhal	NT		There are no known threats specific to this species. There do appear to be declines in almost every period for which hectads were counted, indicating that the species may be genuinely in decline in our region. An apparent decrease of 42% within the main recording period is further supported by a decrease of 28% (which is just below the minimum 30% threshold above which a taxon may be designated as Vulnerable Category A) in the 28-year recording block and an overall decrease of 31% calculated over the last 30-year period. However, it is important to balance this apparent trend with the rationale that this taxon, like many others in the sub-family, is highly likely to be under-recorded. The apparent decline in the recent recording block which exceeds the minimum IUCN categorisation threshold, may be due to under-recording/recording irregularity. With an estimated AOO of only 56km ² (14 modern tetrads/locations) and ongoing decline inferred from the data, but without any indication of fragmentation or extreme population fluctuations, the taxon fails to satisfy all criteria required to place it in Vulnerable Category B. All things considered, a designation of Near Threatened is appropriate because the species satisfies Vulnerable B2b but not a or c, . With only 14 post-1989 hectads recorded, this taxon is designated Nationally Rare. 64 records in the database (including duplicates).	NR	E	S	W	24	14	14	14	10	4	6	6	2
<i>Tachinus rufipes</i> (Linnaeus)	LC		There are no known threats specific to this widely distributed and common species and although a 10-year decline rate of 6% is calculated over the last 28 year period, this is very likely to reflect the difference in the amount of recording effort rather than any genuine population decline. It may be prudent to deduct this 6% from any declines in this 28-year period across the whole group to give a more accurate measure of true status for all taxa but this has not been done in the current Review. The 6% decline rate is well below the minimum 30% rate that would qualify the taxon as Vulnerable under Criterion A. 3663	none	E	S	W	415	501			326	271			

Species Name	GB IUCN Status (2017)	Qualifying criteria	Rationale	GB Rarity status (2016)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2017	AoO (tetrads) 1990-2017	No. of Locations 1990-2017	AoO (hectads) 1990-2003	AoO (hectads) 2004-2017	AoO Hectads 1988-1997	AoO Hectads 1998-2007	AoO Hectads 2008-2017
			records in the database (including duplicates).													
<i>Tachinus scapularis</i> Stephens	RE		Formerly widespread in England with records from the late 19th century/early 20th century from Cumberland, Derbyshire, Oxfordshire, Berkshire, South Devon, South Hampshire, Surrey and North Essex. The species persisted until 1948 in Cambridgeshire and was last recorded from Blackheath, Greenwich, West Kent in October 1953. It is considered extinct in Britain.	extinct	E			17	0			0	0	0	0	0
<i>Tachinus subterraneus</i> (Linnaeus)	LC		There are no known threats specific to this species and no ongoing declines evident or implied by the data. An apparent decrease in AOO of 20% in the main recording period is possibly due to recorder effort bias, but if not, there is no evidence of continuing decline in the more recent evaluation periods. 397 records in the database (including duplicates).	none	E	S	W	126	101			48	45	39	26	42
<i>Tachyporus atriceps</i> Stephens	LC		There are no known threats specific to this species and no ongoing declines evident or implied by the data. An apparent decrease in AOO of 19% in the main recording period is possibly due to recorder effort bias, but if not, there is no continuing decline in the more recent evaluation periods. 644 records in the database (including duplicates).	none	E	S	W	180	146			68	82			
<i>Tachyporus chrysomelinus</i> (Linnaeus)	LC		There are no known threats specific to this species and no ongoing declines evident or implied by the data. An apparent decrease in AOO of 20% in the main recording period is possibly due to recorder effort bias, but is more rationally explained by the fact that older records pre-dating 1988 probably include <i>Tachyporus dispar</i> as these two species were only understood to be distinct British taxa after Booth (1988) and were both previously confused under <i>T. chrysomelinus</i> . There is no decline evident in the later evaluation periods. 2812 records in the database were evaluated (including duplicates).	none	E	S	W	487	390			227	244			

Species Name	GB IUCN Status (2017)	Qualifying criteria	Rationale	GB Rarity status (2016)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2017	AoO (tetrads) 1990-2017	No. of Locations 1990-2017	AoO (hectads) 1990-2003	AoO (hectads) 2004-2017	AoO Hectads 1988-1997	AoO Hectads 1998-2007	AoO Hectads 2008-2017
<i>Tachyporus dispar</i> (Paykull)	LC		There are no known threats specific to this species and no ongoing declines evident or implied by the data. Older records pre-dating 1988 are relatively few due to the fact that <i>Tachyporus dispar</i> and <i>T. chrysomelinus</i> were only understood to be distinct British taxa after Booth (1988) and were both previously confused under <i>T. chrysomelinus</i> . Thus there will be a proportion of <i>T. dispar</i> misidentified as <i>T. chrysomelinus</i> in the dataset for the latter species. This also explains the three fold-plus increase in AOO within the main recording period. 1543 records in the database (including duplicates).	none	E	S	W	107	365			203	214			
<i>Tachyporus formosus</i> Matthews, A.H.	LC		Drainage of wetland for water abstraction schemes and the development or improvement of permanent wet grassland and fluctuating marsh may threaten populations of the species locally. Although a decline of 93% is suggested within the main recording period, there is no evidence that any historic decline is continuing. Both recent evaluation periods actually show increases in AOO. This species although distinctive when seen, is notoriously claimed for teneral examples of the other larger 'orange' <i>Tachyporus</i> species, particularly amongst older material in Museum collections. For the purposes of the Review, all records are accepted on face value and the author believes that the database probably contains few errors and that most older records have already been processed and analysed by the National Recorder. However, Booth (2009) states that this is a species restricted to south English counties and he understands the Nottinghamshire records to be the furthest north (R. Booth <i>pers comm.</i>). Thus the few records from Scotland and Wales in the database may be in error. 190 records in the database (including duplicates).	NS	E	S?	W?	336	22			7	17	5	6	15
<i>Tachyporus hypnorum</i> (Fabricius)	LC		There are no known specific threats to this, one of the most frequently encountered British beetle species. There are no material declines indicated by the data. The later 30-year block was evaluated simply to discover any trends in recorder effort, since this species is highly likely to be recorded on any single visit to a site, provided the recorder is familiar with the taxon. As can be seen, there is little difference in the total AoO for each of these later 10-year periods and a small increase is evident. 5638 records in the database (including duplicates).	none	E	S	W	512	615			422	417	295	342	351

Species Name	GB IUCN Status (2017)	Qualifying criteria	Rationale	GB Rarity status (2016)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2017	AoO (tetrads) 1990-2017	No. of Locations 1990-2017	AoO (hectads) 1990-2003	AoO (hectads) 2004-2017	AoO Hectads 1988-1997	AoO Hectads 1998-2007	AoO Hectads 2008-2017
			Deficient is most appropriate until further information can be attained.													
<i>Tachyporus scitulus</i> Erichson	LC		There are no known threats specific to this species, although the effects of nitrification, under-grazing, land use changes, development and habitat fragmentation could be considered as potential threats in the Breckland region and could be investigated for this species through research opportunities. No ongoing declines are evident or implied by the data. The main core populations of this highly localised species appear to be in the East Anglian Breckland region of West Norfolk and West Suffolk and the apparent increase in AOO of the species is in no small way, due to a recent extensive pitfall-trapping project in this region, but an increasing awareness of the type of habitat in which the species occurs has also contributed. Elsewhere there are very few reliable post-1989 records; only from the dune systems of Merthyr-Mawr Warren SSSI in Glamorganshire and Tilbury Power Station in South Essex. Records from Scotland (East Inverness-shire; a record between 1900 and 1960) and Wales (inland Severn River ERS data from several sites in Montgomeryshire, a few records from moorland in Radnorshire and one from Anglesey which is quoted by Hyman (1994)) require verification and have only been included in the tally counts in parentheses. There are additional old records from England; Wimbledon ?Common,Surrey in 1867 and Berrow, North Somerset, 1926. With only 11(13) post-1989 hectads recorded, the species is designated as Nationally Rare (NR). 111 records in the database (including duplicates).	NR	E	S?	W	3(9)	11 (13)	25 (29)	12 (15)	1(3)	10	1(2)	1(3)	10
<i>Tachyporus solutus</i> Erichson	LC		There are no known threats specific to this species and no ongoing declines evident or implied by the data. An apparent decrease in AoO of 19% in the main recording period is possibly due to recorder effort bias. There is no decline in the later 28-year evaluation period. 1347 records in the database (including duplicates).	none	E	S	W	298	241			140	139			

Species Name	GB IUCN Status (2017)	Qualifying criteria	Rationale	GB Rarity status (2016)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2017	AoO (tetrads) 1990-2017	No. of Locations 1990-2017	AoO (hectads) 1990-2003	AoO (hectads) 2004-2017	AoO Hectads 1988-1997	AoO Hectads 1998-2007	AoO Hectads 2008-2017
<i>Tachyporus tersus</i> Erichson	LC		Although an increase is apparent within the main recording period, there is a decline apparent between the two 14-year recording blocks, calculated at 8% which is well below the 30% minimum threshold for IUCN designation as Vulnerable category A. In the three 10-year recording blocks, there is an overall increase, but a decline of 18% apparent between the last two 10-year periods. This fluctuation is probably due to recording bias. This taxon, more than most in the genus, is subject to under-recording, perhaps because it has such a strong association with moss, a relatively underworked habitat for many recorders. For this reason, it is considered to be present in more than 100 hectads of the National grid since 1990, even though the database only accounts for records in 95 post-1989 hectads. 384 records in the database (including duplicates).	none	E	S	W	80	95			54	36	14	54	36
<i>Tachyporus transversalis</i> Gravenhorst	LC		Drainage of wetland for water abstraction schemes and the development or improvement of permanent wet grassland and fluctuating marsh may threaten populations of the species locally. No declines are evident or inferred from the data. With only 60 post-1989 hectads recorded, the species would normally be designated as Nationally Scarce (NS) but like many other taxa in this sub-family, the current species is under-recorded and a designation of NS would be an inaccurate reflection of its likely distribution. 239 records in the database (including duplicates).	none	E	S	W	58	60			27	31	11	25	25

Appendix 2. Summary of IUCN Criteria

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%
<p>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:</p> <ul style="list-style-type: none"> (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. <p>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.</p> <p>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.</p> <p>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.</p>			
B. Geographic range in the form of either B1 (extent of occurrence) AND/OR B2 (area of occupancy)			
B1. Extent of occurrence (EOO)	< 100 km ²	< 5,000 km ²	< 20,000 km ²
B2. Area of occupancy (AOO)	< 10 km ²	< 500 km ²	< 2,000 km ²
AND at least 2 of the following:			
(a) Severely fragmented, OR			
Number of locations	= 1	≤ 5	≤ 10
<p>(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.</p> <p>(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.</p>			
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): (up to a max. 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)
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. <i>Only applies to the VU category.</i> 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 km ² 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