Joint Nature Conservation Committee

Species Status

No. 17

A review of the status of the beetles of Great Britain

The Byrrhidae (Pill Beetles), Clambidae (Fringe-winged Beetles), Dascillidae (Soft-bodied Plant Beetles), Eucinetidae (Plate-thigh Beetles), Monotomidae (Root-eating Beetles), Phalacridae (Shining Flower Beetles) and Ptilodactylidae

by

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Further information on the JNCC Species Status project can be obtained from the JNCC website at https://jncc.gov.uk/our-work/red-lists-in-great-britain/

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Foreword

JNCC 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 JNCC.

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 Byrrhidae, Clambidae, Dascillidae, Eucinetidae, Monotomidae, Phalacridae and Ptilodactylidae. 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.

This report should be cited as:

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Contents

1 Introduction to the Species Status project

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, 2017). 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.

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.

2 Introduction to the Beetle reviews

Many beetles are important ecological indicators 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.

Table 1 summarises the 65 taxa included in this Review. Nomenclature follows Duff (2018) which supersedes Duff (2012). Data have been collated from the following sources.

- historic records published in local and national journals;
- published county and regional reviews including the Victoria County Histories;
- 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 iRecord and 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.

Table 1. List of selected taxa.

Order	Family	Taxon
Coleoptera	Byrrhidae	*Byrrhus arietinus* (Steffahny, 1842) *Byrrhus fasciatus* (Forster, 1771) *Byrrhus pilula* (Linnaeus, 1758) *Byrrhus pustulatus* (Forster, 1771) *Chaetophora spinosa* (Rossi, 1794) *Curimopsis maritima* (Marsham, 1802) *Curimopsis nigrita* (Palm, 1934) *Curimopsis setigera* (Illiger, 1798) *Cytilus sericeus* (Forster, 1771) *Morychus aeneus* (Fabricius, 1775) *Porcinolus murinus* (Fabricius, 1794) *Simplocaria maculosa* (Erichson, 1847) *Simplocaria semistriata* (Fabricius, 1794)
	Clambidae	*Calyptomerus dubius* (Marsham, 1802) *Clambus armadillo* (De Geer, 1774) *Clambus evae* (Endrödy-Younga, 1960) *Clambus gibbulus* (LeConte, 1850) *Clambus nigrellus* (Reitter, 1914) *Clambus nigriclavis* (Stephens, 1835) *Clambus pallidulus* (Reitter, 1911) *Clambus pubescens* (Redtenbacher, 1847) *Clambus punctulum* (Beck, 1817) *Clambus simsoni* (Blackburn, 1902)
	Dascillidae	*Dascillus cervinus* (Linnaeus, 1758)
	Eucinetidae	*Nycteus meridionalis* (Laporte, 1838)
	Monotomidae	*Monotoma angusticollis* (Gyllenhal, 1827) *Monotoma bicolor* (Villa & Villa, 1835) *Monotoma brevicollis* (Aubé, 1837) *Monotoma conicicollis* (Chevrolat in Guérin-Méneville, 1837) *Monotoma longicollis* (Gyllenhal, 1827) *Monotoma picipes* (Herbst, 1793) *Monotoma quadricollis* (Aubé, 1837) *Monotoma quadrifoveolata* (Aubé, 1837) *Monotoma spinicollis* (Aubé, 1837) *Monotoma testacea* (Motschulsky, 1845) *Rhizophagus aeneus* (Richter, 1820) *Rhizophagus bipustulatus* (Fabricius, 1792) *Rhizophagus cribratus* (Gyllenhal, 1827) *Rhizophagus depressus* (Fabricius, 1792) *Rhizophagus dispar* (Paykull, 1800) *Rhizophagus fenestralis* (Linnaeus, 1758) *Rhizophagus ferrugineus* (Paykull, 1800) *Rhizophagus grandis* (Gyllenhal, 1827) *Rhizophagus nitidulus* (Fabricius, 1798) *Rhizophagus oblongicollis* (Blatch & Horner, 1892) *Rhizophagus parallelocollis* (Gyllenhal, 1827) *Rhizophagus perforatus* (Erichson, 1845) *Rhizophagus picipes* (Olivier, 1790)
	Phalacridae	*Olibrus aeneus* (Fabricius, 1792) *Olibrus affinis* (Sturm, 1807) *Olibrus corticalis* (Panzer, 1797) *Olibrus flavicornis* (Sturm, 1807) *Olibrus liquidus* (Erichson, 1845)

Order	Family	Taxon
		Olibrus millefolii (Paykull, 1800) *Olibrus norvegicus* (Minster, 1901 *Olibrus pygmaeus* (Sturm, 1807) *Phalacrus caricis* (Sturm, 1807) *Phalacrus championi* (Guillebeau, 1892) *Phalacrus corruscus* (Panzer, 1797) *Phalacrus fimetarius* (Fabricius, 1775) *Phalacrus substriatus* (Gyllenhal, 1813) *Stilbus atomarius* (Linnaeus, 1767) *Stilbus oblongus* (Erichson, 1845) *Stilbus testaceus* (Panzer, 1796)
	Ptilodactylidae	*Ptilodactyla exotica* (Chapin, 1927)

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.

The amassed data for the taxa in this Review number (minus duplicate records) 17,150 records.

3 The IUCN threat categories and selection criteria

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 2 and the hierarchical relationship of the categories in Figure 1.

Table 2. Definitions of IUCN threat categories (from IUCN 2012b with a more specific definition for regional extinction).

Criteria	Definition
REGIONALLY EXTINCT (RE)	A taxon is Extinct when there is no reasonable doubt that the last individual has died. In this review the last date for a record is set at fifty years before publication.
CRITICALLY ENDANGERED (CR)	A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered (see Appendix 2).
ENDANGERED (EN)	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).

Criteria	Definition
VULNERABLE (VU)	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).
NEAR THREATENED (NT)	A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.
LEAST CONCERN (LC)	A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.
DATA DEFICIENT (DD)	A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate.
NOT EVALUATED (NE)	A taxon is Not Evaluated when it is has not yet been evaluated against the criteria.
NOT APPLICABLE (NA)	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.

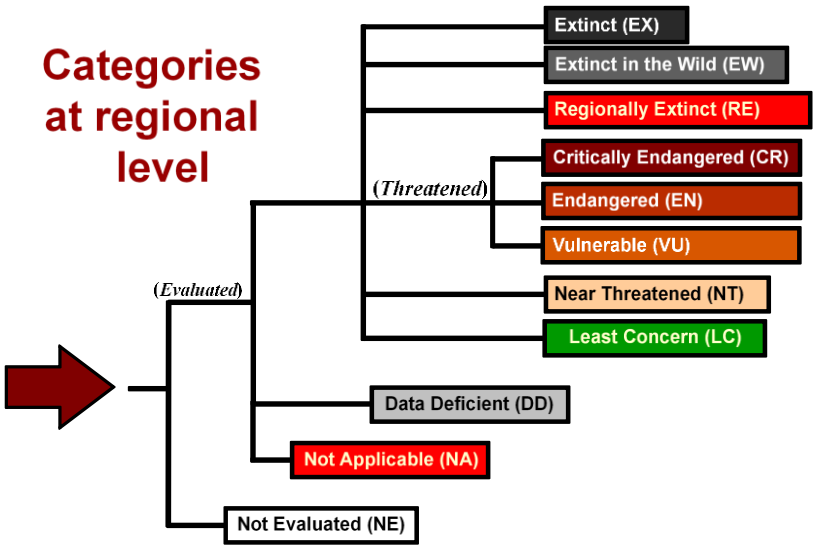

Figure 1. Hierarchical relationships of the categories adapted from IUCN (2001).

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 to 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 as a taxon for listing at that level of threat. A taxon therefore need not meet all of the criteria, A to 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 to 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 an introduced species, a vagrant or an immigrant occurring in very insignificant numbers or is in the region for a very brief period.

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 is considered for those taxa that come close to qualifying as threatened; 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 should first be identified and any NA species disregarded. Next, the species should 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 Byrrhidae, Clambidae, Dascillidae, Eucinetidae, Monotomidae, Phalacridae and Ptilodactylidae

3.2.1 Use of criteria in this Review

The IUCN process requires that each species is evaluated against all five criteria (criteria 'A to 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 to 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 proved that it is not an artefact of under-recording. If decline is demonstrated then the reviewer needs to consider whether or not the conditions under criteria B2a, and B2c are met.

Criterion C could not be applied to any of the taxa reviewed as no population counts or reliable estimates exist for the species other than mostly random counts of individuals (e.g., in pitfall trap samples). No standardised or regular-frequency monitoring has been carried out on any of these taxa in Britain to the author's knowledge. *Curimopsis nigrita* has been the subject of ‘spot’ research sampling in the 1990s, but this has not been carried out in a way that can extrapolate the data to embrace a whole population model and therefore Criterion C was rejected for this species.

Criterion D was applied to all 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 4km^2 (a tetrad) as the reference scale (IUCN 2017). In past reviews for Coleoptera in particular, a hectad resolution scaling has been applied only. 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 during this period, can only be made at this scale and because the older IUCN Reviews tended to use only two data periods for AOO summation; pre-1990 and post-1989, only hectad counts were used so that the magnitude of the two data period counts were directly comparable. Hectads are also used to determine the Great Britain Rarity Status, so records which are only at this scale are less problematical for this designation.

In this Review, both AOO and EOO have been calculated at tetrad resolution (with the exception of *Curimopsis nigrita*, where high resolution data allowed more accurate mapping of records from which to create a landscape-scale polygon). Because the Review only statistically analyses post-1989 data, there have been few concerns about the resolution of most of the data that has been forwarded or downloaded by the author. Exceptions are for some NBN data which have been deliberately withheld at hectad level only and for which, requests had to be made to individual BRCs, for them to release the data, usually with

associated formal constraints. The resulting spreadsheet contained post-1989 data at both tetrad (DINTY) and hectad resolutions. The app. and software-led AOO and EOO analyses counted tetrads per year, so in order to reduce duplication of frequency of records, any records in the spreadsheet at hectad-only level for a specific year and species were deleted from the spreadsheet **if** there was an additional record for that year and species, but with full tetrad resolution. Direct duplicates (i.e., tetrad/year/species) were also deleted from the spreadsheet, even if the date (day/month) of the record or 1km grid reference from that year differed. The exception to this rule was *Curimopsis nigrita,* for which the high data resolution allowed opportunity to map the species relatively accurately at its few known sites. Future reviews should make efforts to record all Nationally Rare and significantly geographically restricted taxa at a 1km² scale at least. Figure 2 shows a penultimate data analysis (some later incoming data were also incorporated). In this worksheet for *Olibrus affinis,* the hectads, pre-1990 and post-1989 are tallied from the raw data as are the post-1989 tetrads. Grid references are used to plot overall post-1989 EOO and draft supporting information is also included here, as well as values from the statistical analyses.

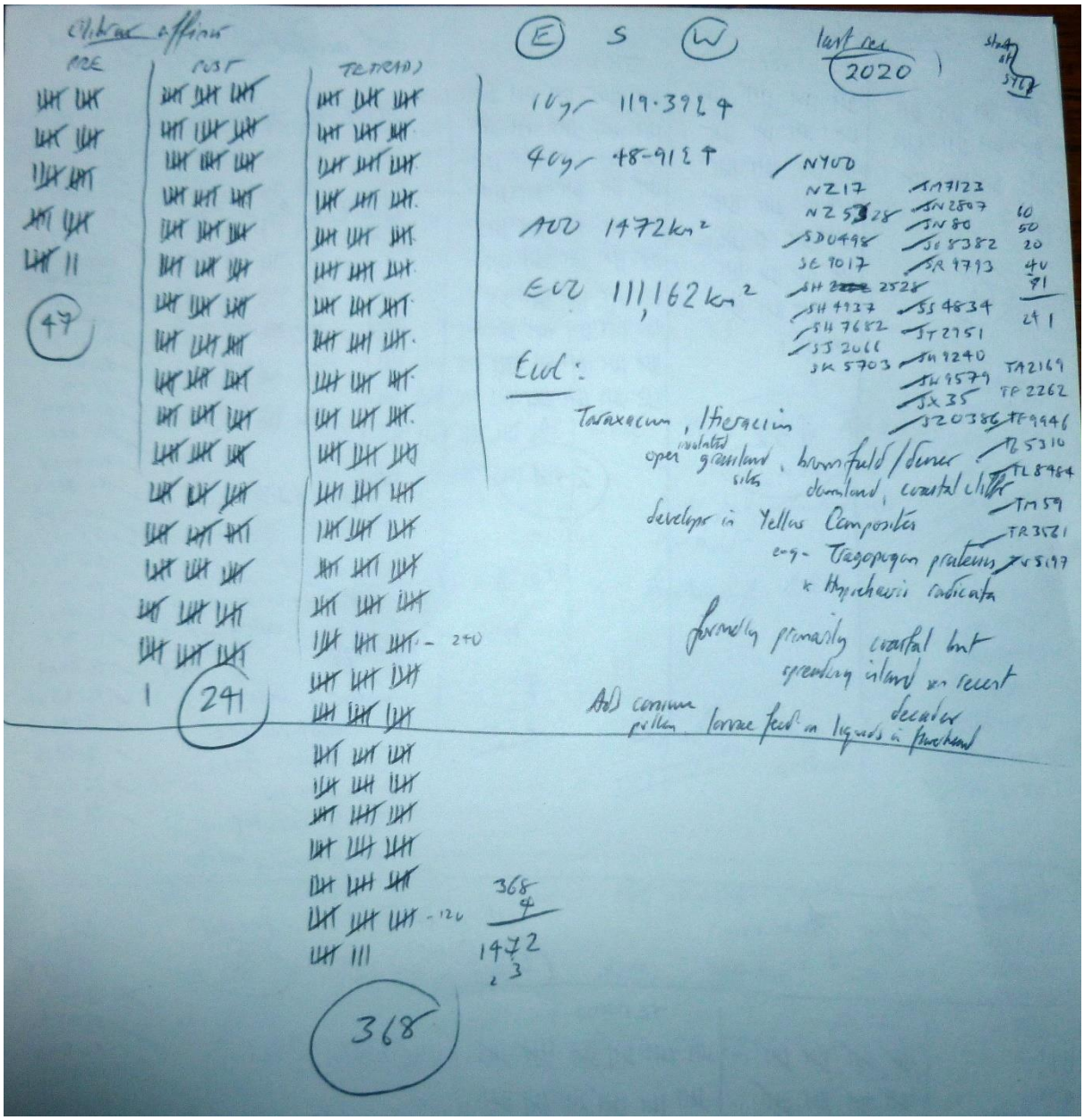

Figure 2. Basic worksheet for *Olibrus affinis*.

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 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 Coleoptera Families assessed in this review, 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. Regardless of this fact, Criterion A was still applied to each species, and the results, usually assuming linear trends, noted and discussed.

To calculate change in AOO, a pivot chart and pivot table in Excel were used to generate two separate graphs for each species; one of incremental year (x axis – 1990 to 2020), and the other showing incremental year (x axis – 2011-2020), against frequency of tetrads (y axis) and also the line of best fit, assuming linear trend. The slope of the line was also generated by Excel and this was used in the analysis. The Reviewer is aware that other lines of fit are possible such as exponential decline and accelerating decline, but these were not investigated. Due to the patchy nature of the data for any **apparently** declining species in this Review, an assumed linear trend is considered suitably pragmatic. Future Reviewers may wish to apply other analyses, if the dataset were to have improved significantly by then. Figs. 3 and 4 below show the two graphs for our working example of *Olibrus affinis*.

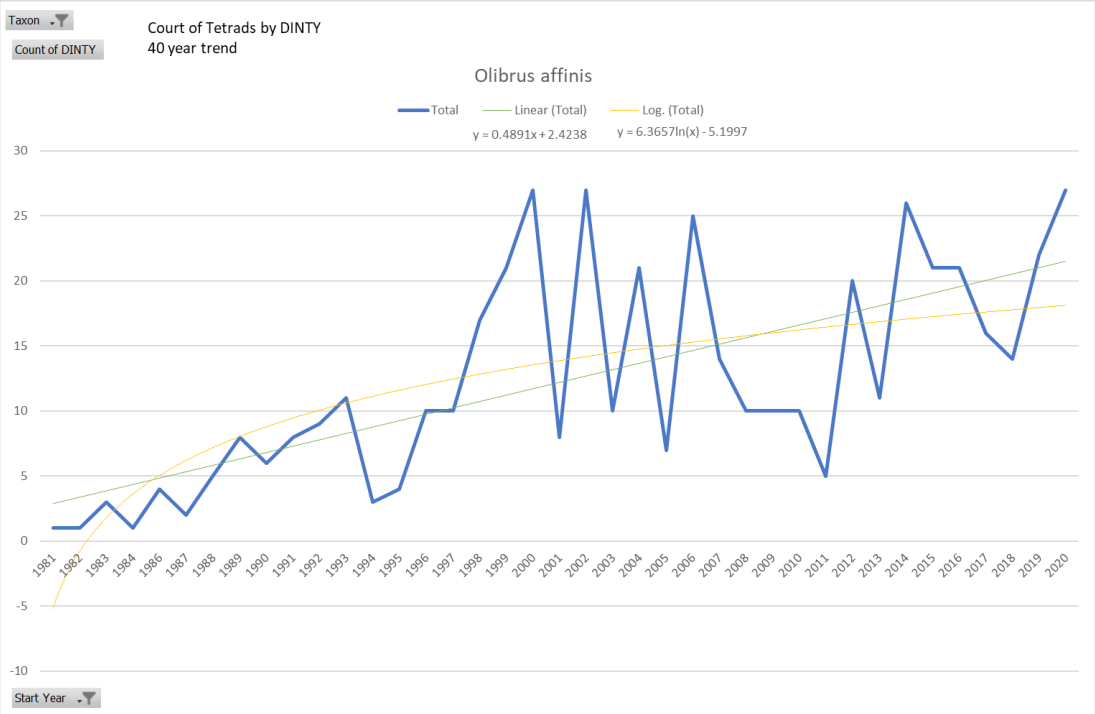

Figure 3. Graph illustrating tetrad counts per year (by DINTY) for last 40-year period. Green line shows linear trend of best fit of 'change in AOO' for *Olibrus affinis*.

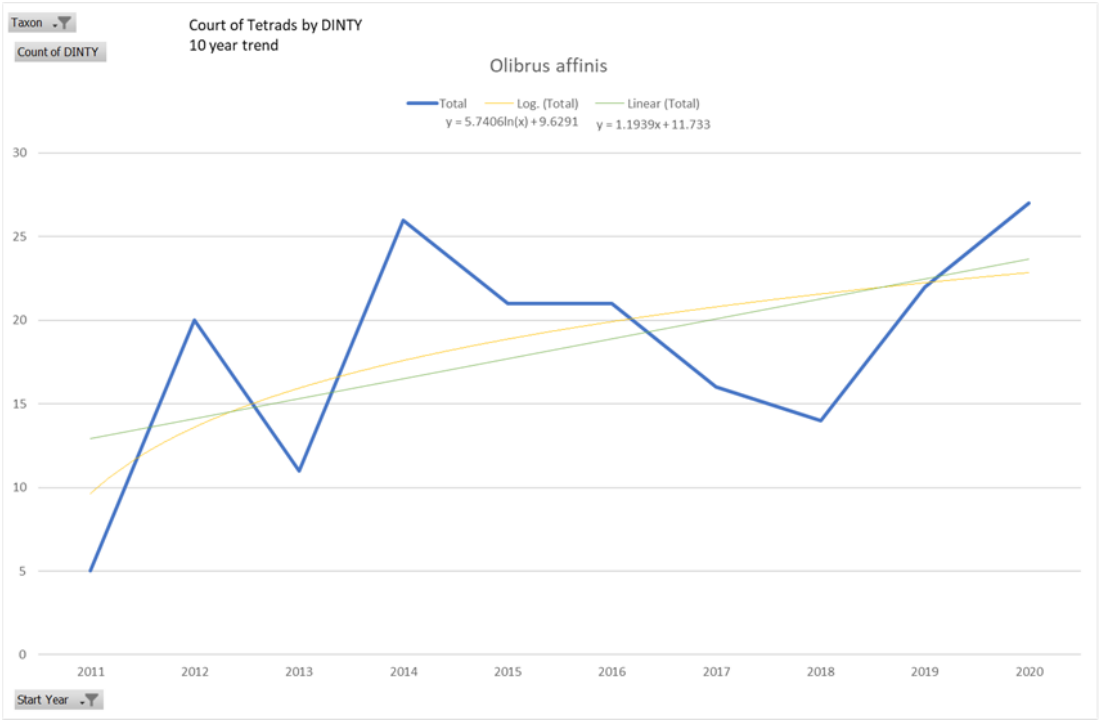

Figure 4. Graph illustrating tetrad counts per year (by DINTY) for last 10-year period. Green line shows linear trend of best fit of 'change in AOO' for *Olibrus affinis.*

An example of the dangers of applying Criterion A blindly to sample data, can be illustrated using the pill beetle *Simplocaria semistriata.* This is a widely distributed and relatively common species which can be found by grubbing in moss and particularly by pitfall-trapping, in a variety of short-turf habitats. The 40-year period AOO map shows a 4% increase in AOO, but the last 10-year period AOO map shows a decline of 94% magnitude. Taken on face value, this decline would place the species in threat category Critically Endangered A2(c). Reference to the AOO graph shows that spikes in tetrad frequencies in the years 2013 (28 tetrads), 2014 (26 tetrads) and 2015 (20 tetrads) and an evident dip in records in 2020 (5 tetrads only), are largely responsible for the decline and certainly the magnitude of the decline. By looking at the raw data, the spike in 2013 can be attributed to; (a) a survey by the RSPB Machair Life+ Project which pitfall-trapped the species at 12 tetrads in that year (actually '2011-2013' but assigned to the latter year in the spreadsheet, so as to be included in the Excel analysis) and also (b), the activity of the author who carried out intensive pitfall trapping across a number of sites in West Norfolk in 2013 resulting in 8 tetrads recorded, thus giving a combined total of some 20 tetrads over and above the 'normal' rate. The author continued to intensively pitfall trap in 2014 and 2015, resulting in 12 (out of the National total of 26) tetrads in 2014 and 5 tetrads in 2015 (out of a National total of 20 tetrads). The advent of the coronavirus pandemic in 2020 reduced that year's count to a mere 5 tetrads Nationally. Once the 2013-2015 anomalies were removed from the data but leaving one record from each recording event in the data, the resulting graph showed a 10% increase in AOO over the last 10-year period. This is a relatively well-recorded species, as far as Coleoptera are concerned, so the effects of arbitrary bouts of intensive sampling could be even more disruptive to species that are generally less-frequently recorded. Such is the random nature of Coleoptera sampling that the IUCN guidelines need to be applied with caution.

To calculate change in EOO, a third party (Robert Hawkes) generated maps based on convex polygons, such that tetrads were plotted for each species, in each 10-year period from 1981-2020 (Figs. 5 and 6), and the area inside these perimeter points was calculated for each period. These were then presented graphically in the same way as the AOO values, and the slope of the line used to generate a value of EOO trend (Fig. 7).

Figure 5. EOO of *Olibrus affinis* for years 1991-2000.

Figure 6. EOO of *Olibrus affinis* for years 2011-2020.

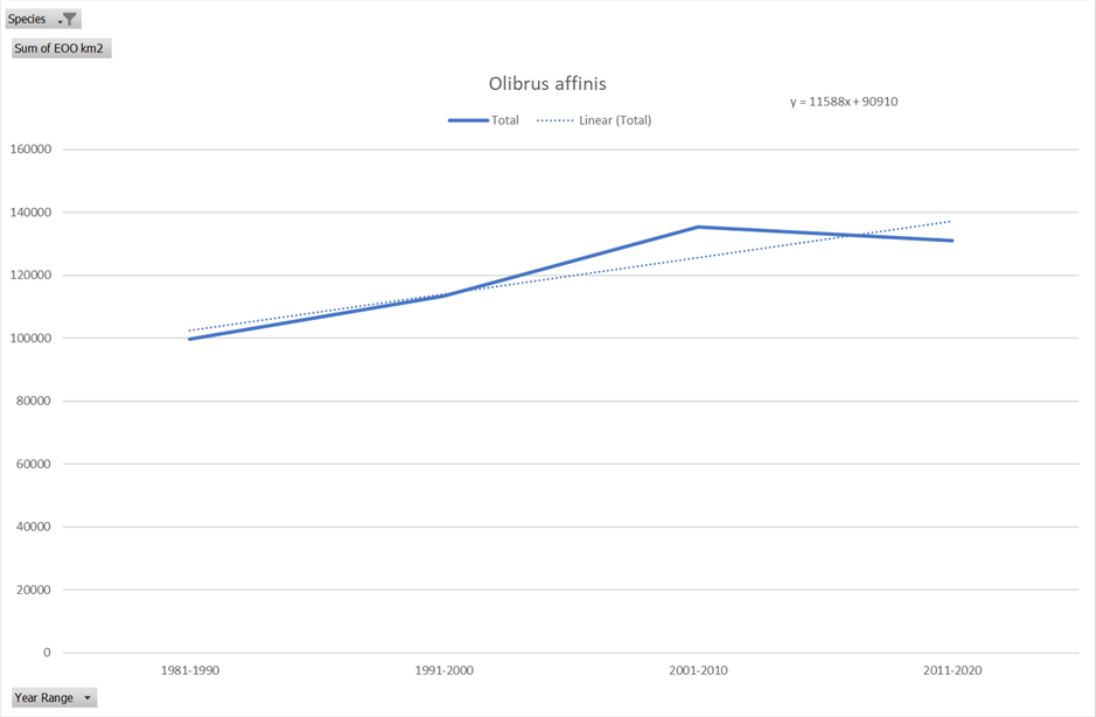

Figure 7. Graph illustrating AOO per 10-year block for last 40-year period. Dotted blue line shows linear trend of best fit of 'change in EOO' for *Olibrus affinis.*

The MCP function used to generate the mapping, would only create maps for taxa that had a minimum of 5 tetrad records per decade (for all four decades) to remove sample sets that are too small to produce any reliability. Had individual incremental years been used in this analysis (as they were for the AOO analysis), the MCP function would have rejected many more species, which is why the decade option was chosen as the most sensible time period resolution for data analysis for EOO. The outcome of the MCP mapping was to produce four maps each for 34 of the 65 species. That is to say that these 34 species met the criteria of having at least five records in each of the decades analysed. It is noted where relevant for the remaining 31 species, that their data were not evaluated for EOO (due to the small number of data or patchy data). It is important to note that the MCP function fitted the polygon edges to the land mass, thus eliminating extraneous areas of coast from the calculations. The IUCN guidelines suggest that a convex polygon or alpha-hull can be used to estimate EOO. These methodologies would include any incidental coastal mass that occurs between two connected land-mass data points. It is this reviewers' consideration that to remove coastal mass from the EOO calculation for a terrestrial species is acceptable in the current analysis **so long as** the methodology is constant across all analysed data for that species, for the purpose of establishing an estimate of the EOO.

Calculation of EOO using this method, gives a conservative value where coastal mass would otherwise be included within a polygon, so to ensure that species where EOO is below the maximum threshold for any given threat status, are correctly evaluated, checks have been made to calculate the total EOO **with** the additional coastal area included, for these few taxa (information included in spreadsheet accounts where relevant).

The use of data from 1981-2020 appears to contradict the expectation under Criterion A that it is the last 10 years that should be analysed. However, the statement earlier in this document that 'where data are patchy, the decline [in Criterion A] 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' is significant here. This is because the EOO represents the geographic location of more-or-less random recording, many tetrads denoting; where active recorders live, where active recorders have spent their holidays,

where professional invertebrate surveyors have undertaken contract surveys and also where recorders have been attracted to invertebrate ‘hotspots’ – sites where known individual species or rare assemblages have been recorded (e.g., Wicken Fen, Cambridgeshire). For this reason, the data are considered ‘patchy’ and the application or lack of, of EOO, defended.

In addition, the lessons learned with regard to the AOO for *Simplocaria semistriata* detailed above, should resonate here.

Like Criterion A, Criterion C1 uses 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, but in this application, it is a **qualitative** measurement of decline that is used along with a value of the modern AOO and EOO for the species. In the present Review, the modern AOO was calculated by summing unique post-1989 tetrads, multiplying the resulting value by 4, to calculate the area in km². The modern EOO was calculated using an internet app. to map the locations of post-1989 tetrads on a map of Britain and to then calculate the area within the perimeter described by the data points across the land mass. This calculation is reasonably assumed to be an estimate of the total area within the species’ range rather than an exact value (see Fig. 8).

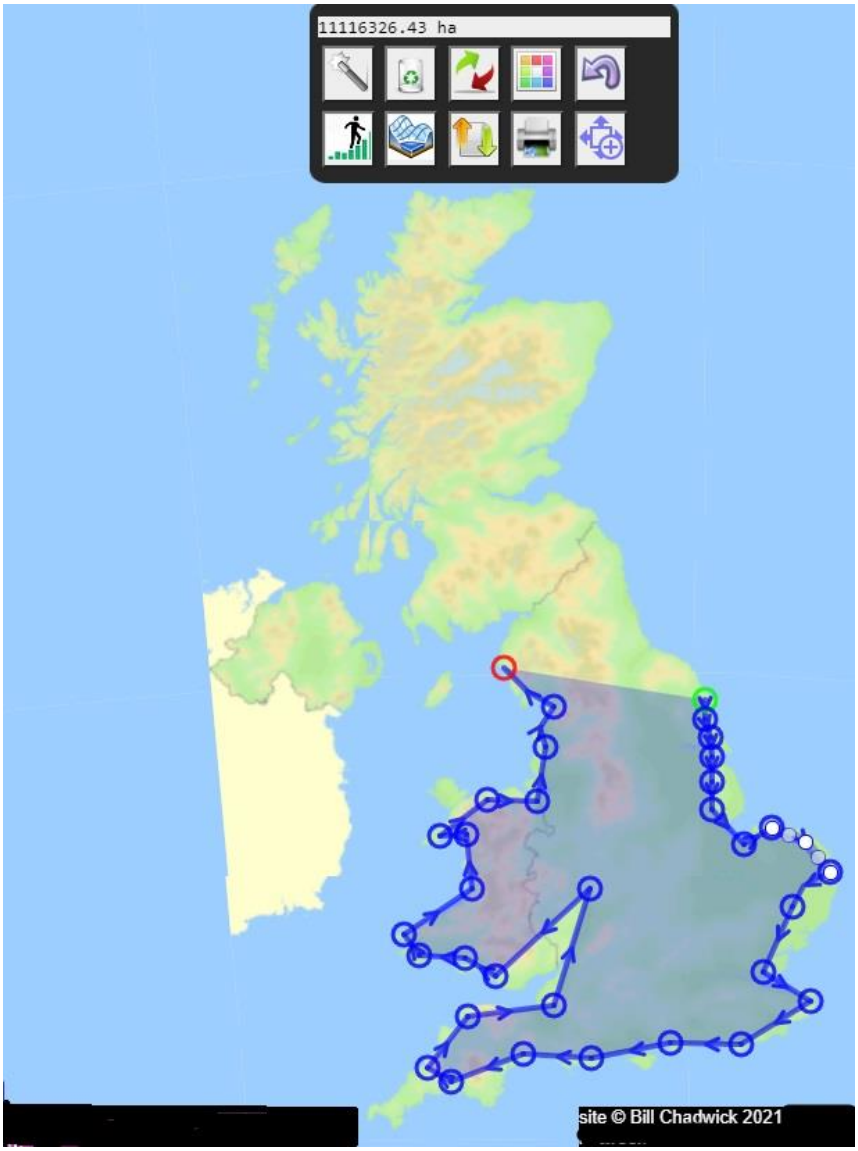

Figure 8. Plotted grid references on map of Britain on wheresthepath.htm, to calculate internal area of convex polygon – overall post-1989 range 'EOO' for our working example of *Olibrus affinis.*

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 observations of both the AOO and EOO output graphs discussed under Criterion A, earlier.

The Review also sums hectads for pre-1990 data and for post-1989 data. The difference between the values in these two counts can be helpful, particularly when the higher resolution yearly-counts are analysed, to indicate whether a historical decline (i.e., pre-1990) is continuing or whether it has ceased. The post-1989 hectad count is of course required to inform a judgement of British rarity status, which is dependent on the threshold values between Nationally Rare, Nationally Scarce and Least Concern and the authors' intuition, experience and knowledge and of no value to the IUCN threat designation.

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. The term 'Location' has a strict meaning in IUCN terminology, as does the term 'Severely fragmented'. Neither should be taken on face value as used in everyday language, although the concept of a Location is relatively easy to apply to geographically restricted taxa. For all taxa in this

Review, ‘fragmentation’ and ‘extreme fluctuation’, both considerations of Criterion B, are factors of decline which cannot be inferred from the data.

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 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 that have established breeding populations for less than 10 consecutive years in Britain, and ‘introduced species’ - species whose arrival in Britain is assisted by human operations or intervention. Such examples might include taxa that are introduced with trees or plants (found in artificially heated biomes, garden centres or zoological gardens), taxa that occur indoors as stored product pests, taxa that are associated only with ‘patch‘ habitats, litter heaps, etc., arising from and in association with human operations, taxa inadvertently imported with wood to timber yards and saw-mills, or via trade at ports and other trade access entry points.

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 Families under Review, both taxonomically and geographically (North Temperate region), so although Stage 3 of the evaluation was attempted, there are no data for immigration or emigration effects for any of the taxa concerned and these effects are either non-existent or unknown.

4 British Rarity Status categories and criteria

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).

Table 3. For the purposes of this Review, the following definitions of Nationally Rare and Nationally Scarce have been applied:

Great Britain Rarity Status	**Definition**
Nationally Rare	A species (not including introduced taxa) recorded from between 1- 15 hectads of the Ordnance Survey national grid in Great Britain since 1990 and: • There is reasonable confidence that exhaustive recording would not find them in more than 15 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 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	A species (not including introduced taxa) recorded from between 16 - 100 hectads of the Ordnance Survey national grid in Great Britain since 1990 and:

Great Britain Rarity Status	Definition
	• 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 and are not IUCN Red List categories.

5 The Assessments

5.1 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:

Order
Family
Taxon (Species name)
Vernacular (name)
GB IUCN status (2021)
Qualifying IUCN criteria

GB Rarity status (2021)
Presence in:
- England
- Scotland
- Wales

Is species endemic to Britain
Species Status code
Is British population considered to be of International significance?
Rationale (evaluation)
Ecology including habitat preferences
Current range
Year when last recorded in Britain
Former British status summary if last recorded before 2015
EOO trend over last 40- year period 1981-2020
AOO trend over last 40- year period 1981-2020
AOO trend over last 10- year period 2011-2020
Current EOO – post-1989 km²
Current AOO – post-1989 (4x tetrads) km²
Number of locations since 1989 if 5 or fewer
AOO (hectads) <1990
AOO (hectads) 1990-2020
AOO (tetrads) 1990-2020
No. of Locations 1990-2020 for taxa with 15 or less post-1989 hectads
Status in Shirt (1987)
Status in Hyman (1986)
Status in Hyman (revised Parsons) (1992)

5.2 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 and Mann (2016) - evaluation of *Gnormus nobilis* (Linnaeus)). However, it should be acknowledged that evidence of habitat fidelity in most of the taxa in this Review 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 Excluded species

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 4.

Table 4. Species categorised as 'Not Applicable (NA)'.

Scientific name	Post-1989 hectads	Rationale for exclusion
Clambus simsoni	61	A Tasmanian native, introduced to Britain and first recorded in the region, from Wales, in 1996. Since then, it has expanded rapidly in range, as expected of a colonising importation.
Monotoma quadrifoveolata	0	Introduced species recorded in England only – synanthropic in stored products (e.g., in flour mills) – last recorded in Britain in 1936.
Rhizophagus grandis	?	Introduced into north, west central and southern England, Wales and south-west Scotland for biological control of the great spruce bark beetle *Dendroctonus micans* and probably at least temporarily established locally (Duff 2020).
Ptilodactyla exotica	3	This is an exotic, introduced species, which is probably native to Mauritius. It was first recorded in Britain in the Palm House at Kew Gardens, Surrey, in 1990 (Mann 2006) and has since been discovered in artificially heated indoor premises at Whipsnade Zoo and also in heated glasshouses in Cambridge. The species has been introduced also into mainland Europe in recent years.

7 Acknowledgements

The author would like to thank the following people for their considerable help during the Review process. For information that has informed the evaluation of *Curimopsis nigrita,* the author is indebted to Brian Eversham, who has provided detailed information from his own personal experience and who has made available a number of research reports. It is through his detailed commitment and research that this species has merited designation as Critically Endangered. The author also thanks Helen Kirk, from Thorne & Hatfield Moors Conservation Forum for providing access to data and research, and for supplying additional data for this species, thanks are extended to Bob Marsh, County Recorder for Yorkshire and Charlie Barnes, County Recorder for Lincolnshire.

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Steve Lane

8 Species listed by IUCN threat status category

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

Critically Endangered
Curimopsis nigrita

Vulnerable
Olibrus norvegicus
Simplocaria maculosa
Stilbus atomarius

Near Threatened
Curimopsis setigera
Phalacrus substriatus

Data Deficient
Clambus evae
Clambus gibbulus
Clambus nigrellus
Clambus nigriclavis
Clambus pallidulus

Table 5. Summary of IUCN Status for All Taxa in this Review.

IUCN Status	No. of Taxa	% of all Taxa in this Review
Least Concern	50	77
Data Deficient	5	8
Near Threatened	2	3
Vulnerable	3	4.5
Critically Endangered	1	1.5
Regionally Extinct	0	0
Not Applicable	4	6
Not Evaluated	0	0
	Total = 65	**Total = 100**

9 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
Clambus evae
Clambus gibbulus
Clambus nigrellus
Clambus nigriclavis
Clambus pallidulus
Curimopsis nigrita
Curimopsis setigera
Olibrus norvegicus
Phalacrus substriatus
Porcinolus murinus
Rhizophagus aeneus
Rhizophagus oblongicollis
Simplocaria maculosa
Stilbus atomarius

Nationally Scarce
Byrrhus arietinus
Monotoma angusticollis
Monotoma conicicollis
Morychus aeneus
Nycteus meridionalis
Olibrus millefolii
Olibrus pygmaeus
Rhizophagus cribratus
Rhizophagus fenestralis
Rhizophagus parallelocollis
Rhizophagus picipes

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

Table 6. 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
Curimopsis nigrita	CR	B1(a)(b)i,ii,iii,iv,v.
Olibrus norvegicus	VU	D2
Simplocaria maculosa	VU	D2
Stilbus norvegicus	VU	D2

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Appendix 1: summary table – an alphabetical list of the Byrrhidae, Clambidae, Dascillidae, Eucinetidae, Monotomidae, Phalacridae and Ptilodactylidae
(Note: figures in parentheses refer to tally counts which include unverified records).
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

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
Byrrhidae	*Byrrhus arietinus*	LC		First recognised in Britain as published by Johnson (1966a), so some older records of *Byrrhus fasciatus* may be misidentifications of the present species. Primarily northern and western in distribution in Britain (although there is a small population in the East Anglian brecks) and therefore probably under-represented in less well-recorded regions of Scotland and Wales. For the reasons given, the species is likely to be more widespread than current data suggest. IUCN Criterion A: The tetrad graph shows assumed linear increase in the change in AOO over the past 10-year period of 10% magnitude, but the data is patchy and unreliable, and the graph does not take into account zero recorded tetrads in 2018, 2019 and 2020 (data in the latter year possibly not helped by covid lockdowns). The Category A calculation tool (IUCN) is also unreliable for tetrad counts of 1,0,1,0,2,2,1,0,0,0 in consecutive years 2011-2020 inclusive. However, the 37-year period graph (1981-2017) of this under-recorded species shows a decline of only 0.53% in AOO and whilst this too, fails to account for the last three year's data, it is considered more reliable because more data is used in the analysis. This negligible decline falls well short of the minimum 30% decline threshold required for threat status designation. Change in	NS	E	S	W	Montane and upland in northern and western Britain. Also found in breck heath regions of East Anglia and in moorland habitat in south and south-west England (Dorset and Cornwall). Adults and larvae are phytophages, feeding on mosses (probably pleurocarpous mosses in short-turf habitats – pers comm MG Telfer). They are likely to overwinter in the turf layer, becoming active in spring.	Relatively widespread	37,800km²	108km²	16	23	27

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				EOO was not evaluated due to patchy data. Criterion B1: Post-1989 EOO is estimated to be in excess of 37,000km² (this area encompasses the montane and upland regions of midland to northern England, North Wales and Scotland and doesn't include the smaller south/south-western areas) which far exceeds the IUCN threshold for Vulnerable. Criterion B2: Post-1989 AOO is 27 tetrads (108km²), which would potentially place the species in the Endangered or Vulnerable categories, but the species is found at more than 10 modern locations and there are no extreme fluctuations evidenced by the data or by observation and neither does the population appear to be severely fragmented. Evidence of ongoing decline is debatable when the data is so patchy. Criterion C: The current data does not allow for population estimates. Criterion D: The current data does not allow for population estimates, although the population is very likely to be >1,000 individuals and there are more than 5 modern locations. Criterion E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.										
Byrrhidae	*Byrrhus fasciatus*	LC		Some older (pre-1966a) records may be misidentified *Byrrhus arietinus* as that species was not recognised in Britain until Johnson (1965). Widespread in distribution throughout England, Wales and Scotland. IUCN A: Negligible 10-year decline in	none	E	S	W	Short turf on free-draining substrates; habitats including upland, moorland, heathland, breck grassland and downland. Adults and larvae are phytophages,	Widespread, although some habitat restrictions apply	>50,000km²	516km²	86	95 (likely to be present in more than 100 hectads)	129

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				AOO of 10.9% evidenced in the 10-year period graph of AOO – this decline may be partly due to a possible covid-related fall in 2020 recording. This is well below the minimum threshold of 30% above which a species might potentially be designated with threat status. The 40-year period graph of AOO shows an increase in records. The 40-year period graph of EOO shows a trend of 4.48% increase. The species fails to qualify for threat status under criterion A. B1: Post-1989 EOO is estimated well in excess of 50,000km², which far exceeds the maximum threshold for designation as threatened. B2: Post-1989 AOO is 129 tetrads (516 km²), which would potentially place the species in the Endangered or Vulnerable categories, but the species is found at more than 10 modern locations and there are no extreme fluctuations evidenced by the data or by observation and neither does the population appear to be severely fragmented. Evidence of ongoing decline is debatable when the 40-year period graph actually shows an increase in recorded frequency. C: The current data does not allow for population estimates. D: The current data does not allow for population estimates, although the population is very likely to be >1,000 individuals and there are more than 5 modern locations. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.					feeding on mosses (probably pleurocarpous mosses in short-turf habitats – pers comm MG Telfer). They are likely to overwinter in the turf layer, becoming active in spring.					

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
Byrrhidae	*Byrrhus pilula*	LC		Widespread with no habitat restrictions; in distribution, found throughout England, Wales and Scotland. IUCN A: Negligible 10-year decline in AOO of 8.5% evidenced in graph is well below the minimum threshold of 30% above which a species might potentially be designated with threat status. The 40-year period graph of AOO shows an increase in recorded area. The 40-year period graph of EOO shows an increase of 16.09%. B1: Post-1989 EOO is estimated well in excess of 50,000km², which far exceeds the maximum threshold for designation as threatened. B2: Post-1989 AOO is 735 tetrads (2940km²), which far exceeds the maximum threshold for designation as threatened. C: The current data does not allow for population estimates although the population is very likely to be >10,000 individuals. D: The current data does not allow for population estimates, although the population is very likely to be >10,000 individuals and there are more than 5 modern locations. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.	none	E	S	W	Widespread in short-turf (e.g., rabbit-grazed) grassland habitats where adults and larvae feed on mosses (probably on pleurocarpous mosses – pers comm MG Telfer). Adults overwinter, emerging in early spring.	Widespread	>50,000km²	2940km²	227	481	735
Byrrhidae	*Byrrhus pustulatus*	LC		Widespread with some habitat restrictions (e.g., heathland, moorland, breck heath); in distribution, found throughout England, Wales and Scotland. IUCN A: Negligible 10-year decline in AOO of 8.3% evidenced in graph is well below the minimum threshold of 30% above which a species might potentially be	none	E	S	W	Widespread in short turf grassland and heathland habitats where adults and larvae feed on mosses (probably on pleurocarpous mosses – pers comm MG Telfer). Adults overwinter, emerging in early spring.	Widespread	>50,000km²	332km²	51	64 (considered likely to be present in more than 100 hectads)	83

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				designated with threat status. 40-year graph shows an increase in recorded AOO. The 40-year period graph of EOO shows an increase in range area of 11.85%. B: Post-1989 EOO is estimated in excess of 50,000km², which far exceeds the maximum threshold for designation as threatened. Post-1989 AOO is 83 tetrads (332 km²), but species found at more than 10 locations and there are no extreme fluctuations evidenced by the data or by observation. C: The current data does not allow for population estimates. D: The current data does not allow for population estimates, although the population is very likely to be >1,000 individuals and there are more than 5 modern locations. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.										
Byrrhidae	*Chaetophora spinosa*	LC		Widespread with some habitat restrictions (e.g., short turf on free-draining soils); in distribution, found since 1989, through south and south-east England, including East Anglia and with an outlier from Speyside, Scotland. IUCN A: Negligible 40-year decline in AOO of 5.75% evidenced in graph is well below the minimum threshold of 30% above which a species might potentially be designated with threat status. The 10-year graph shows an increasing AOO. The 40-year period graph of EOO shows an increase of 1.48% in range area. B1: Post-1989 EOO is estimated to be approximately	none	E	S	W	Currently south and south-east England only (with one erroneous outlier in Scotland). Found in short turf habitats, e.g., sand quarries, chalk pits, chalk downland, etc., where the substrate is free draining. Adults and larvae are phytophagous, feeding on mosses	Widespread within range, but present in southern England only (with the exception of an odd distant outlier in Speyside, Scotland).	35,950km² (excluding Speyside record)	260km²	22	54 (considered likely to be present in more than 100 hectads)	65

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				35,950km² (excluding the Speyside record), which exceeds the maximum threshold for designation as threatened. B2: Post-1989 AOO is 65 tetrads (260km²) which potentially places the species in the Endangered or Vulnerable categories, but the species is found at more than 10 modern locations and there are no extreme fluctuations evidenced by the data or by observation and neither is the regional population severely fragmented, so conditions for IUCN designation under criterion B are not met. Evidence of ongoing decline is debatable when the 10-year period graph actually shows an increase in recorded frequency. C: The current data does not allow for population estimates. D: The current data does not allow for population estimates, although the population is very likely to be >1,000 individuals and there are more than 5 modern locations. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.										
Byrrhidae	*Curimopsis maritima*	LC		Widespread with some habitat restrictions (e.g., short turf on free-draining soils). IUCN A: No declines in AOO evidenced by graphs and a decline of 5.58% in the 40-year period graph of EOO is well below the minimum 30% threshold for designation as Vulnerable, so the species does not qualify for threat status under criterion A. B1: Post-1989 EOO is estimated to be approximately 63,000km², which far exceeds the	NS	E		W	A ground-dwelling species associated with short turf and brownfield habitats on sandy or chalky free-draining substrates. Sites include quarries, sandpits, calcareous grassland, clifftops, breck heath and other insolated sparsely vegetated habitats where the food-plants,	Widespread in midland and southern England and Wales only.	>50,000km²	224km²	50	38	56

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				maximum threshold for designation as threatened. B2: Post-1989 AOO is 56 tetrads (224km²) which potentially places the species in the Endangered or Vulnerable categories, but the species is found at more than 10 modern locations and there are no extreme fluctuations evidenced by the data or by observation and neither is the regional population severely fragmented. There is also no continuing decline, so conditions for IUCN designation under criterion B are not met. C: The current data does not allow for population estimates. D: The current data does not allow for population estimates, although the population is certain to be >1,000 individuals and there are more than 5 modern locations. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.					arocarpous mosses, grow. The species is predominantly coastal but is also found in suitable inland localities within its range.					
Byrrhidae	*Curimopsis nigrita*	Critically Endangered	B1(a)(b)i,ii,iii,iv,v.	This is a Schedule 5, BAP, NERC S. 41 species. It is highly range-restricted and rare in our region with only three sites known, two of which are Nationally important raised lowland peat mires. **IUCN A**: It is impossible to quantify population declines in AOO and EOO as evidenced by observations of adults, because the data are very much a product of snapshot one-off surveys for the species at its known sites in Yorkshire only, plus a small number of casual observations from all three sites (North Yorkshire and North Lincolnshire). The population was sampled in	NR	E			*Curimopsis nigrita* is a phytophage with a strong preference for Forklet-mosses (specifically *Dicranella cerviculata* and *D. heteromalla*). It is very range-restricted in Britain, to a small area of North Lincolnshire /South-west Yorkshire where it occurs in lowland raised mire peat bogs (uniquely located in this small area in Britain). The adults are ground-dwelling and have	Highly range-restricted to just one small area in South-west Yorkshire/North Lincolnshire	48.6km² (maximum area of site boundaries, regardless of specific data points, is collectively approximately 30km² and collective area encompassed by the perimeters of all sites within the landscape is 48.6km², by using a polygon that	48km² (specifically closer to 8.0km² but IUCN unit of tetrad must be used as minimum unit)	3	3	12

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				1996, but at that time, sampling was not extended to the entirety of the population and Eversham (1996) recognised that some of the measurements were not entirely reliable then. Habitat deterioration has certainly occurred at all of its known sites, although this has not been accurately quantified. The isolated North Lincolnshire population at Haxey Grange Fen may have been lost, but this represents only 16 of some 3,300 hectares of the combined sites area, so this particular loss is negligible in the sense that it is much less than the minimum threshold of 30% which would be required to meet threat designation under criterion A. Significant, however, is the qualified loss and deterioration of habitat at the Yorkshire and contiguous North Lincolnshire sites. This loss is accounted for by the following causal factors: flooding of management-restored habitat, scrub encroachment, the widespread and abundant establishment of invasive southern-hemisphere moss (*Campylopus introflexus*) and extensive fires (e.g., affecting over 40% of Hatfield Moors in 2020). Whilst this habitat deterioration has not been accurately quantified, it is estimated anecdotally, that more than 80% of the suitable supporting micro-habitat within the site boundaries has disappeared (the EOO may appear to have changed less radically as a whole), and that the decline due to these specific factors may have happened recently; within the last 20 years (pers comm					been recorded in the field in all months, with most observations between April and July. The ecology and life history of the species are described in detail in Eversham (1996). The species was first discovered in Britain, at Thorne Moors in April 1977 (Johnson, 1978) and is confined to this site, the contiguous Crowle Moor and Hatfield Moor in south-west Yorkshire/North Lincolnshire and also some 8km SSE, at Haxey Grange Fen in North Lincolnshire where it may or may not still exist. Both of the northerly ‘sites’ have been damaged in the past by extensive peat extraction, but this has all but ceased. Causative factors for population and habitat decline are currently operating at all sites. Thorne and Hatfield are notified as SSSIs and part of Thorne Moor is an NNR. - Hyman (1992). Haxey Grange Fen is partly an SSSI.		connects all post-1989 data points across all three ‘sites’.				

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				Brian Eversham). There is an inferred and ongoing population reduction, which started in the recent past (probably 1980s with the introduction of peat milling) and will likely continue into the future based on a decline in habitat quality. Using the IUCN category, a calculation tool, the estimated 80% loss over 20 years gives a % reduction value over a 10-year period of 55%. This reduction is further increased by the 'temporary' habitat loss to fire of 42% of Hatfield Moors (representing approximately 28% of the overall site area of the combined sites) in 2020, a loss which increases the assumed linear 55% reduction by a further (45% remaining x 0.28) % giving an overall reduction in a 10-year period of 68%. Under **Criterion A2,3 and 4** (A1 assumes that the cause of reduction has ceased, which it hasn't), this % value places the species in the **Endangered** category, based on (c) – a decline in habitat quality. **B1**: Post-1989 EOO of locations of mapped observations (data from Eversham (1996) and subsequent records to 2017) encompassing the three sites on a landscape scale is 48.6km². Severe fragmentation is highly probable, though difficult to prove quantitatively without further research. The number of locations is 1, as all three sites are geographically close and could feasibly be affected simultaneously by flooding or by a specific drought year (after a succession of previous drought years) and there is inferred continuing decline in										

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				quality of habitat and anecdotally, in the number of mature individuals observed (pers comm, Brian Eversham). At the Haxey Grange site, where last recorded in 1994, the species may now be extinct, as despite survey work carried out in at least three recent years, the beetle has not been found and the food-plant has been reduced to a very small area at that site. This also constitutes an inferred decline in extent of occurrence and area of occupancy, and number of subpopulations. Eversham (ibid.) estimates annual fluctuations of the Thorne Moor populations due to flooding or drought, at between 50 and 75%. According to the terminology of the IUCN, this fluctuation is not 'severe', although I would argue that in combination with small area and continuing threats it is sufficient to consider the taxon threatened. Notwithstanding this last point, the analysis satisfies all sub-categories of B1: (a)(b)i,ii,iii,iv and v and designation as category **Critically Endangered**. **B2:** Post-1989 AOO is 12 tetrads (48 km²) as measured at the scale used by IUCN. This approaches **Endangered,** rather than Critically Endangered, in the analysis and therefore the analysis is not taken further under B2. C: The current data does not allow for population estimates, although Eversham (ibid.) designed a statistical model for future estimates. **D1:** The current data does not allow for population estimates. **D2:** The AOO in IUCN resolution is 48km², but D2									

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				Vulnerable is satisfied by the number of locations and plausible threats. E: there is no quantitative population analysis for this species. **Conclusion: Critically Endangered CR B1(a)(b)i,ii,iii,iv,v.**										
Byrrhidae	*Curimopsis setigera*	NT		Widespread with some habitat restrictions (e.g., short turf on free-draining soils and mainly in coastal districts). IUCN A: No declines in AOO evidenced by the graphs, but the data are too patchy to draw any clear conclusions B: The estimated EOO is 5,200km² which places the species in the Vulnerable category, and the number of locations is 10 which also places the species in this category. Including coastal areas in the summation of area does not increase the value of EOO beyond the maximum 20,000km² threshold for threat category Vulnerable. The data are too poor to assume or speculate on continuing decline, fragmentation or fluctuations. B2: Post-1989 AOO is 56 tetrads (224km²) which potentially places the species in the Endangered or Vulnerable categories, but for the same reasons given for B1 above, the species fails to meet the conditions for the criterion to apply, although the fall in hectads recorded between the pre-1990 and post-1989 periods might indicate a continuing population decline. C: The current data do not allow for population estimates. D: The current data do not allow for population estimates, although	NR	E	S	W	A ground dwelling beetle feeding on arocarpous mosses in dry sandy and chalky short turf grassland habitats, Presently, chiefly found along the coasts of south Wales, North Devon and south England from Dorset to East Kent. There is one modern inland locality in Buckinghamshire (SU89).	Currently restricted to the coastal fringe of South Wales and south England, with the exception of an inland ‘outlier’, although formerly more widespread with a range that extended into Scotland.	5,200km²	48km²	25	11	12

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				the population is certain to be >1,000 individuals and there are more than 5 modern locations. E: not applied as there are no quantitative population analyses for this species. Conclusion: If a decline is operating, as possibly inferred by a fall in hectad counts between the two main recording periods, then the species would satisfy Vulnerable B1(a)(b) and B2(a)(b), but without a stronger inclination to infer decline, a designation of Near Threatened is appropriate.										
Byrrhidae	*Cytilus sericeus*	LC		Widespread with no habitat restrictions; in distribution, found throughout England, Wales and Scotland. IUCN A: The 10-year period graph of AOO evidences a decline of 14.55% which is well below the minimum threshold of 30% above which a species might potentially be designated with threat status. The 40-year period graph of AOO shows an increasing area recorded as does the 40-year period graph for EOO. B1: Post-1989 EOO is estimated in excess of 100,000km², which far exceeds the maximum threshold for designation as threatened. B2: Post-1989 AOO is 521 tetrads (2084 km²), which exceeds the maximum threshold for designation as threatened. C: The current data does not allow for population estimates, but the population is likely to exceed 10,000 individuals. D: The current data does not allow for population estimates, although the population is very likely to be >10,000 individuals. E: not applied as	none	E	S	W	A ground dwelling species associated with moss on which adults and larvae feed, although larvae also known to eat heather debris. It is found in a variety of habitats, most frequently in humid situations, e.g., wetland margins, wet woodland and heath, damp grassland etc, but also known from dry habitats. Adults overwinter, becoming active in spring. They are likely to be entirely parthenogenetic in Britain and are unusual amongst the Byrrhids in being diurnal in behaviour. The larvae also differ from other species in the group, by being active above the soil surface where they feed on moss rhizoids and vegetative detritus.	Widespread	>130,000km²	2084	200	393	521

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				there are no quantitative population analyses for this species. Conclusion: Least Concern.											
Byrrhidae	*Morychus aeneus*	LC		Widespread within its range in northern England and Scotland but restricted in habitat to riverine and stream-side sites. IUCN A: The 40-year period graph of AOO evidences a decline of 5.14% which is well below the minimum threshold of 30% above which a species might potentially be designated with threat status. Additionally, the recent 10-year period graph of AOO shows an increase in recorded frequency; at 17.86% assuming a linear trend. B1: Post-1989 EOO is estimated at 32,133km², which exceeds the maximum threshold for designation as threatened. In addition, there is no continuing decline as evidenced by the increase in records in the last 10-year period and the number of modern locations exceeds 10. B2: Post-1989 AOO is 37 tetrads (148km²), which places the species potentially in the Endangered or Vulnerable threat categories. However, as for B1 above, there is no continuing decline evidenced and the number of modern locations exceeds 10. In addition, there is no indication of severe fragmentation or extreme fluctuations in the population, so the species fails to qualify for threat status here. C: The current data does not allow for population estimates. D: The current data does not allow for population estimates, although the	NS	E	S		A ground dwelling species associated with moss on which adults and larvae feed. It is restricted in habitat, to northern riverine and stream sites, sometimes at the coast.	Widespread, but present in northern England and Scotland only	32,133km²	148km²	20	32	37

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				population is very likely to exceed 1,000 individuals, the AOO is greater than 20km² and there are more than 5 current locations. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.											
Byrrhidae	*Porcinolus murinus*	LC		Distribution restricted currently to specific regions of southern England and East Anglia. Formerly more widespread. IUCN A: There is no decline evidenced in the 10-year and 40-year graphs of AOO. B1: Post-1989 EOO is estimated at 9,971km², which potentially places the species under IUCN threat category 'Vulnerable'. However, although the population could be described as fragmented in terms of its geographical distribution, it does not qualify as 'severely fragmented' as far as the IUCN definition for that term is concerned. Additionally, the number of locations just exceeds 10, there is no continuing decline in either population or habitat and no extreme fluctuations known (although the species population dynamics have not been researched). Thus, the species fails to qualify as threatened under the criteria in B1. B2: Post-1989 AOO is 15 tetrads (60km²), which potentially places the species in the Endangered or Vulnerable categories. However, for the reasons outlined in B1 above, the species fails to qualify for threat status under the criteria here. C: The current data does not allow for population estimates. D1: The current	NR	E			This is a species of heathland, and other sandy open habitats such as breck grassland and sand dunes. The adults and presumably, also the larvae, are ground-dwelling and are found at the roots of ling *Calluna vulgaris*, and marram *Ammophila arenaria* and presumably other grasses also.	Currently restricted to heathland and breck grassland habitat in West Norfolk, West Suffolk, North and South Hampshire, Dorset, Oxfordshire and Surrey. Formerly more widespread in England and found for example, further north, as far as Yorkshire.	9,971km²	60km²	23	11	15

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				data does not allow for population estimates and the species population dynamics have not been researched. It is quite possible that there are less than 1000 individuals, but this is not known. D2: The AOO is more than 20km² and the number of locations is greater than 5, so although a plausible threat may exist to heathland habitats in particular, the species fails to qualify under criterion D2. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.										
Byrrhidae	*Simplocaria maculosa*	VU	D2	First described as British by Johnson (1966b) based on the discovery of three records; from mid-west Yorkshire and Worcestershire, all of which pre-date 1960. Currently (since 1989) restricted in distribution to four riverine locations in England, Wales and Scotland. This is a species of riparian habitats, specifically associated with well-vegetated shingle bars. IUCN A: With only three records before 1990 and only seven since 1989, there are too few data to establish whether there has been a reduction in AOO or EOO. B1: Post-1989 EOO is estimated at 29,699km², which exceeds the maximum threshold for designation as threatened. B2: Post-1989 AOO is 7 tetrads (28km²), which would potentially place the species in the Endangered or Vulnerable categories. The species is found at only 4 modern locations, but there are no extreme fluctuations	NR	E	S		This moss-feeding ground dwelling species is found in riparian habitats where it is associated with the well-vegetated silt-bars of rivers, above the shingle zone. Eyre *et. al*. (1998) noted that the locations where the species was pitfall-trapped, were caused by 'man-made' obstructions in the flow of the river. The species has also been recorded from flood refuse in England. In Central Europe, the beetle is found on the banks of rivers and streams, amongst moss between stones. The species has occurred in March, April, May, August, September	Currently restricted to a small number of riparian sites in north-central Wales, northern England and southern Scotland. Vice-counties Lanarkshire, Roxboroughshire/Selkirkshire, Yorkshire (intersection of VCs) and Shropshire.	29,699km²	28km²	3	6	7

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				evidenced by the data or by observation (very few data) and neither does the population appear to be severely fragmented. Evidence of ongoing decline is impossible to realise with so few data. C: The current data do not allow for population estimates. D: The current data do not allow for population estimates, although the population is likely to be less than 1,000 individuals. D2: The AOO is not less than 20km² but there are only 4 modern locations and plausible future threats related to flooding (climate change) so the species qualifies under Vulnerable D2. E: not applied as there are no quantitative population analyses for this species. Conclusion: Vulnerable D2. The species may also qualify in future under Criteria A and B, should there be adequate data with which to undertake reliable statistical analysis.					and December in Britain.						
Byrrhidae	*Simplocaria semistriata*	LC		. Widespread; in distribution, found throughout England, Wales and Scotland. IUCN A: There is a significant decline in AOO evidenced in the 10-year period graph, of 93.94% magnitude. This potentially places the species in the Critically Endangered threat category for criteria A1,2,3 and 4. As most invertebrate surveyors who are familiar with this species will know, it is certainly not in decline. The 10-year graph, which is based on a relatively small data sample shows marked peaks in the number of tetrads for years 2013 (28 tetrads), 2014 (26 tetrads) and 2015 (20	none	E	S	W	This ground dwelling pill beetle is found in a variety of sites, but predominantly in open habitats including grassland and heathland, where adults have been observed at the roots of vegetation and in moss. The species feeds on mosses.	Widespread	148,497km²	1,584km²	202	285	397

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				tetrads) which is in stark contrast to a mere 5 tetrads recorded in 2020. The graph has been wildly skewed and influenced by survey intensity. This author pitfall-trapped widely in West Norfolk in 2013 through to 2015, recording the species at many sites; 8 tetrads in 2013, 12 tetrads in 2014 and 5 tetrads in 2015. Add to this the pitfall-trap data from the intensive research work carried out by the Machair Life+ project on the Outer Hebridean islands 'between 2011-2013' (and for the sake of the data, assigned to 2013 only) and this bumps the value for 2013 up by a farther 12 tetrads. Further skewing the trend is the poor number of records in 2020 which is partly if not entirely due to the coronavirus pandemic. If these factors and the resulting data are removed, the species actually shows an increase in AOO during the 10-year period! This shows the danger of analysing Coleoptera species using Criterion A, because there are no supporting factors in the analysis that can temper the outcome of artificially increased changes in AOO and EOO values resulting from skewed data. The graph showing change in EOO over the last 40-year period may be more reliable. This indicates an increase in range area of 7.50%. B1: Post-1989 EOO is estimated in excess of 140,000km², which far exceeds the maximum threshold for designation as threatened. B2: Post-1989 AOO is 397 tetrads (1,588 km²), which would potentially place the species in the										

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				Vulnerable category, but the species is found at more than 10 modern locations and there are no extreme fluctuations evidenced by the data or by observation and neither does the population appear to be severely fragmented. Evidence of ongoing decline is highly debatable when the 40-year period graph actually shows an increase in recorded frequency and the 10-year period graph is effectively flawed. C: The current data does not allow for population estimates but the population is highly likely to exceed 10,000 individuals. D: The current data does not allow for population estimates, although the population is likely to be very much >10,000 individuals and there are more than 5 modern locations. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.										
Clambidae	*Calyptomerus dubius*	LC		Widespread; in distribution, found throughout England, Wales and Scotland. This is a species of poor habitat integrity, being found in ‘patch’ habitats, primarily associated with vegetation litter heaps associated with human activity. IUCN A: Negligible 10-year decline in AOO of 3.3% evidenced in graph is well below the minimum threshold of 30% above which a species might potentially be designated with threat status. The 40-year graph of AOO shows an increase in recorded area. The 40-year period graph of EOO shows a decline of 24.47% which is below the 30% minimum threshold,	none	E	S	W	Widespread in decaying organic vegetable matter, usually in grass heaps, sedge and reed piles, haystacks and straw piles, etc., occasionally also in bird’s nests (which might explain flight-interception trapped specimens) and also noted from a dry chicken carcase. The adults and larvae are almost certainly mycophagous, feeding on moulds.	Widespread	>80,000km²	240km²	85	52 (certain to be present in more than 100 hectads as the species is minute and poorly recorded and the typical ‘patch’ heap habitats are often on private land and inaccessible by the public)	60

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				above which a species might be categorised as Vulnerable. B1: Post-1989 EOO is estimated in excess of 80,000km², which far exceeds the maximum threshold for designation as threatened. B2: Post-1989 AOO is 60 tetrads (240km²), which would potentially place the species in the Endangered or Vulnerable categories, but the species is found at more than 10 modern locations and there are no extreme fluctuations evidenced by the data or by observation and neither does the population appear to be severely fragmented. Evidence of ongoing decline is debatable when the 40-year period graph actually shows an increase in recorded frequency. C: The current data does not allow for population estimates. D: The current data does not allow for population estimates, although the population is likely to be very much >1,000 individuals and there are more than 5 modern locations. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.										
Clambidae	*Clambus armadillo*	LC		Widespread; in distribution, found throughout England, Wales and Scotland. This is a species of poor habitat integrity, being found in 'patch' habitats, primarily associated with vegetation litter heaps associated with human activity. IUCN A: A 40-year decline rate in AOO of 10.0% evidenced in that graph is well below the minimum threshold of 30% above which a species might potentially be	none	E	S	W	Widespread in decaying organic vegetable matter, usually in haystack refuse, straw debris, grass heaps and fen litter heaps. Adults have also been found in grass tussocks, hibernating, during winter. The adults and larvae are almost certainly	Widespread	>80,000km²	444km²	92	92 (certain to be present in more than 100 hectads – this is a minute 'patch' species which is under-recorded)	111

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				designated with threat status. The 10-year graph shows an increase in recorded AOO. The 40-year period graph of EOO shows an 11.14% decrease in range area, but this is well below the minimum threshold. B1: Post-1989 EOO is estimated in excess of 80,000km², which far exceeds the maximum threshold for designation as threatened. B2: Post-1989 AOO is 111 tetrads (444km²), which would potentially place the species in the Endangered or Vulnerable categories, but the species is found at more than 10 modern locations and there are no extreme fluctuations evidenced by the data or by observation and neither does the population appear to be severely fragmented. Evidence of ongoing decline is debatable when the 10-year period graph actually shows an increase in recorded frequency. C: The current data does not allow for population estimates. D: The current data does not allow for population estimates, although the population is likely to be very much >1,000 individuals and there are more than 5 modern locations. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.					mycophagous, feeding on moulds.					
Clambidae	*Clambus evae*	DD		Very restricted distribution and currently known from only two locations (woodland sites in North-west Yorkshire and South Hampshire) where it occurs near water in wooded habitat. IUCN A: There is no evidence of decline. The species has always been rare	NR	E	S	W	There is little supporting information with data, although the species is assumed to be a mycophage. It occurs in damp flood litter and in woodland leaf litter, close to water	Restricted to two modern locations only	26.5km²	8km²	13	2	2

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				in our region and is also presumably poorly recorded as are all members of the Clambidae, due to its small size (<2mm), identification difficulties and the unpopularity of this group with recorders. The species is impossible to evaluate under Criterion A. B1: Post-1989 EOO is difficult to estimate. The area of the New Forest that includes Brinken Wood is approximately 26km² and the area of Foxglove Covert, approximately 0.5km². The immediate area of the two modern locations that includes stream-side wooded habitat is only 0.44km², but it is logical to assume that the species is more widely distributed in both locations than the immediate site of either record. The current EOO estimate places the species in the 'Endangered' threat category. However, not enough is known about the populations or specific habitat requirements of the species, to be able to accurately speculate about decline or fluctuation in either, so the species cannot be evaluated. Furthermore, it is logical given the spread of older records from Scotland south to East Kent, that the species is currently more widespread than the data suggest, but like others in the Family that frequent natural habitat and for which recent records are few, it is possibly under recorded and overlooked to a lesser or greater extent and may or may not be genuinely scarce or threatened. B2: Post-1989 AOO is 2 tetrads (8km²), which would potentially place the species in					(stream banks, lake bank).					

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				the Endangered category, but again, for the reasons given under B1 above, the species cannot be evaluated currently. C: The current data does not allow for population estimates. D1: The current data do not allow for population estimates, although the population at the two currently known sites is likely to be below 1,000 individuals D2: The AOO is less than 20km² and there are less than 5 modern locations, so VUD2 might apply here if there were also plausible threats to the locations; none can be identified because the requirements of the species are not fully understood. Because the author believes the species to be under recorded, a designation of Data Deficient is more appropriate until such time as more is known about the species habitat requirements and targeted survey work has been undertaken to find it at suitable sites. E: not applied as there are no quantitative population analyses for this species. Conclusion: Data Deficient DD.										
Clambidae	*Clambus gibbulus*	DD		Widespread; in distribution, it is currently found throughout southern England and with outlier records in south-west Yorkshire and east-central Wales. IUCN A: There is no evidence of decline, but there are too few records to evaluate. The species has always been rare in our region and is also presumably poorly recorded as are all members of the Clambidae, due to its small size (<1.5mm), identification difficulties and the unpopularity of this group	NR	E	?	W	There is little supporting information with the data, although the species is assumed to be a mycophage. It has occurred in leaf litter, sedge litter and under mouldy dry bark. Duff (2020) also cites sources of carrion and cut grass.	Widespread within its range, but currently southern England north to south-west Yorkshire and one record in east-central Wales only. An NBN entry for Scotland is thought by this evaluator to be an error.	23,600km²	36km²	13	8	9

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				with recorders. The species is impossible to evaluate under Criterion A because there are not enough data. B1: Post-1989 EOO is estimated at approximately 38,800km², which comfortably exceeds the maximum threshold for designation as threatened. B2: Post-1989 AOO is 9 tetrads (36km²), which would potentially place the species in the Endangered or Vulnerable categories. The species is found at only 8 modern locations which would place it in the Vulnerable category. The data are so patchy that any conclusions are impossible to make around population fluctuations and fragmentation. There is no evidence of decline, but there are too few records to evaluate. C: The current data do not allow for population estimates. D1: The current data do not allow for population estimates, although the population is likely to be below 1,000 individuals. D2: The AOO is more than 20km² and there are more than 5 modern locations, so VUD2 does not apply here. E: not applied as there are no quantitative population analyses for this species. Conclusion: Data Deficient.									

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
Clambidae	*Clambus nigrellus*	DD		Widespread in distribution. IUCN A: There is no evidence of decline, but there are too few records to evaluate. The species has always been rare in our region and is also presumably poorly recorded as are all members of the Clambidae, due to its small size (<1.5mm), identification difficulties and the unpopularity of this group with recorders. The species is impossible to evaluate under Criterion A because there are not enough data. B1: Post-1989 EOO is estimated at approximately 53,300km², which comfortably exceeds the maximum threshold for designation as threatened. B2: Post-1989 AOO is 15 tetrads (60km²), which would potentially place the species in the Endangered or Vulnerable categories. The species is found at 12 modern locations which exceeds the maximum number for designation in the Vulnerable category. The data are so patchy that any conclusions are impossible to make around population fluctuations and fragmentation. There is no evidence of decline, but there are too few records to evaluate. C: The current data do not allow for population estimates. D1: The current data does not allow for population estimates, although the population may be below 1,000 individuals. D2: The AOO is more than 20km² and there are more than 5 modern locations, so VUD2 does not apply here. E: not applied as there are no quantitative population analyses for this species. Conclusion: Decline cannot be demonstrated due	NR	E	S	W	The species has been found in a variety of situations, usually in decaying organic vegetation, e.g., flood refuse and damp branches, ground litter by a stream and from refuse on exposed riverine shingle. Also recorded from garden compost and moss and recovered from a flight interception trap on a beech tree. Like others in the genus, the species is thought to be a mycophage.	Widespread.	53,300km²	60km²	10	13	15

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				to the paucity of data. Similarly, conclusions cannot be drawn about fragmentation or extreme fluctuations. Any of these may be possible, and until further information is forthcoming about the species habitat requirements, and current distribution, a designation of Data Deficient is most appropriate. Data Deficient.											
Clambidae	*Clambus nigriclavis*	DD		Widespread in distribution, but primarily a northern and western species in Britain. First discovered in our region in 1962. IUCN A: There is no evidence of decline, but there are too few records to evaluate. The species has always been rare in our region and is also presumably poorly recorded as are all members of the Clambidae, due to its small size (<2.0 mm), identification difficulties and the unpopularity of this group with recorders. The species is impossible to evaluate under Criterion A because there is not enough data. B1: Post-1989 EOO is estimated at approximately 35,800km² (ignoring an east Sussex outlier), which comfortably exceeds the maximum threshold for designation as threatened. B2: Post-1989 AOO is 14 tetrads (56km²), which would potentially place the species in the Endangered or Vulnerable categories. The species is found at 13 modern locations which exceeds the maximum number for designation in the Vulnerable category. The data are so patchy that any conclusions are impossible to make around population fluctuations	NR	E	S	W	This species appears to be particularly associated with riverine habitats and wooded riverbanks. Records cite specimens from flood refuse, flood drift, wet logs by stream, muddy flood debris hanging from tree branches, moss under trees on riverbank etc. Like others in the genus, the species is thought to be a mycophage both in the adult and larval stages.	Widespread, but specifically associated with riverine habitats and predominantly northern and western in distribution.	35,800km² (ignoring East Sussex outlier)	56km²	15	14	14

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				and fragmentation. There is no evidence of decline, but there are too few records to evaluate. C: The current data do not allow for population estimates. D1: The current data do not allow for population estimates, although the population may be below 1,000 individuals. D2: The AOO is more than 20km² and there are more than 5 modern locations, so VUD2 does not apply here. E: not applied as there are no quantitative population analyses for this species. Conclusion: Data Deficient – because fragmentation, extreme fluctuations and decline cannot be proven or indeed understood for this species. Any of these factors may be operating, so until further information and modern data is forthcoming, a designation of 'Data Deficient' is most appropriate.										
Clambidae	*Clambus pallidulus*	DD		Widespread in distribution, but to date only recorded in England as far north as South Lancashire. IUCN A: There is no evidence of decline, but there are too few records to evaluate. The species has always been rare in our region and is also presumably poorly recorded as are all members of the Clambidae, due to its small size (<2.0 mm), identification difficulties and the unpopularity of this group with recorders. The species is impossible to evaluate under Criterion A because there is not enough data. B1: Post-1989 EOO is estimated at approximately 30,200km², which comfortably exceeds the maximum threshold for	NR	E		Found in woodland and fen habitats. Records cite specimens in grey encrusting fungus on the underside of an elder log, individuals recovered from flight interception traps at a fallen beech and next to log piles, and specimens collected from moss on logs, from cut sedge heaps and from a decaying apple. Like others in the genus, the species is thought to be a mycophage both in the adult and larval stages.	Widespread, but only found in England to date.	30,200km²	44km²	5	11	11

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				designation as threatened. B2: Post-1989 AOO is 11 tetrads (44km²), which would potentially place the species in the Endangered or Vulnerable categories. The species is found at 11 modern locations which just exceeds the maximum number for designation in the Vulnerable category. The data is so patchy that any conclusions are impossible to make around population fluctuations and fragmentation. There is no evidence of decline, but there are too few records to evaluate. C: The current data does not allow for population estimates. D1: The current data does not allow for population estimates, although the population may be below 1,000 individuals. D2: The AOO is more than 20km² and there are more than 5 modern locations, so VUD2 does not apply here. E: not applied as there are no quantitative population analyses for this species. Conclusion: Data Deficient – because fragmentation, extreme fluctuations and decline cannot be proven or indeed understood for this species. Any of these factors may be operating, so until further information and modern data is forthcoming, a designation of ‘Data Deficient’ is most appropriate.										

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
Clambidae	*Clambus pubescens*	LC		Widespread; in distribution, found throughout England, Wales and Scotland. This is a species of poor habitat integrity, being found in 'patch' habitats, primarily found in vegetation and other organic litter heaps associated with human activity. IUCN A: No decline indicated in the graphs of AOO for 10 year and 40-year periods, nor for the 40-year period for EOO. B1: Post-1989 EOO is estimated in excess of 80,000km², which far exceeds the maximum threshold for designation as threatened. B2: Post-1989 AOO is 61 tetrads (244km²), which would potentially place the species in the Endangered or Vulnerable categories, but the species is found at more than 10 modern locations and there are no extreme fluctuations evidenced by the data or by observation and neither does the population appear to be severely fragmented. There is certainly no continuing decline. C: The current data does not allow for population estimates, although we can speculate that it is in excess of 10,000 individuals. D: The current data does not allow for population estimates, although the population is likely to be very much greater than 1,000 individuals and there are more than 5 modern locations. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.	none	E	S	W	A mycophagous species found in decaying vegetation and other decaying organic matter. Records come from dung heaps, fen litter piles, grass and compost heaps, dovecote debris, a mouse nest and a wood chip pile.	Widespread.	>80,000km²	244km²	52	58 (certain to be present in more than 100 hectads – this is a minute 'patch' species which is under-recorded)	61

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
Clambidae	*Clambus punctulum*	LC		Widespread; in distribution, found throughout much of England, Wales and into Scotland. IUCN A: No decline indicated in the graphs of AOO for 10-year and 40-year periods. The 40-year period graph of EOO shows a negligible decline of 0.02%. B1: Post-1989 EOO is estimated in excess of 50,000km², which far exceeds the maximum threshold for designation as threatened. B2: Post-1989 AOO is 45 tetrads (180km²), which would potentially place the species in the Endangered or Vulnerable categories, but the species is found at more than 10 modern locations and there are no extreme fluctuations evidenced by the data or by observation and neither does the population appear to be severely fragmented. There is certainly no continuing decline. C: The current data does not allow for population estimates, although we can speculate that it is well in excess of 1,000 individuals. D: The current data does not allow for population estimates, although the population is likely to be greater than 1,000 individuals and there are more than 5 modern locations. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.	none	E	S	W	A mycophagous species found in decaying vegetation and other decaying organic matter. There appears to be a fairly strong association with woodland, or at least with trees. Records cited include by beating birch, oak, willow and elder, in wood mould of sycamore, in a burned lime tree, under dead alder bark, and in-flight interception traps, variously. Also recorded from dung heaps and horse dung, in leaf litter, fungi cut grass heaps and a dead sheep.	Widespread.	>50,000km²	180km²	36	42 (considered highly likely to be present in more than 100 hectads – this is a minute species which is under-recorded)	45

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
Clambidae	*Clambus simsoni*	NA		A Tasmanian native, introduced to Britain and first recorded in the region, from Wales, in 1996. Since then, it has expanded rapidly in range, as expected of a colonising importation. Conclusion: Not Applicable	none	E		W	A mycophagous species found in decaying vegetation and other decaying organic matter. Associated with wood chipping heaps, garden grass heaps, sedge and fen litter piles, horse dung-baited pitfall traps in woodland, and also flight interception traps.	Widespread and expanding rapidly in range and frequency. Not yet recorded in Scotland	>60,000km²	308km²	0	61	77
Dascillidae	*Dascillus cervinus*	LC		Widespread with no habitat restrictions; in distribution, found throughout England, Wales and Scotland. IUCN A: There is no decline evidenced in the graphs of AOO, or of EOO. B1: Post-1989 EOO is estimated in excess of 100,000km², which far exceeds the maximum threshold for designation as threatened. B2: Post-1989 AOO is 658 tetrads (2632km²), which exceeds the maximum threshold for designation as threatened. C: The current data does not allow for population estimates, but the population is likely to exceed 10,000 individuals. D: The current data does not allow for population estimates, although the population is very likely to be >10,000 individuals and the AoO far exceeds the 20km threshold for D2. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.	none	E	S	W	Found in various habitats, but most frequent in grassland, particularly in calcareous downland. Adults are often recorded at flowers or by sweeping vegetation, whereas the larvae feed at the roots of vegetation, often grasses. The adults appear in May through to early July. And can be found	Widespread	>100,000km²	2632km²	220	391	658

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
Eucinetidae	*Nycteus meridionalis*	LC		Widespread with no obvious habitat restrictions; in distribution, found to date in England only. Expanding its range. IUCN A: There is a 1.3% decline evidenced in the 40-year period graph of AOO, although this is based on few data and is therefore unreliable. No decline or increase evidenced in the 10-year graph of AOO which just shows a constant line. B1: Post-1989 EOO is estimated at 24,019km², which just exceeds the maximum threshold for designation as threatened (IUCN 'Vulnerable'). In addition, there are more than 10 modern locations, no evidence of fluctuations and no continuing decline evident. Neither is the population severely fragmented. On the basis of these facts, the species fails to qualify under criterion B1. B2: Post-1989 AOO is 20 tetrads (80km²), which places the species in either Endangered or Vulnerable categories. However, as for B1, there are no declines, no fluctuations and no fragmentation in evidence, so the species fails to qualify for threat status under this criterion. C: The current data does not allow for population estimates. D: The current data does not allow for population estimates. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.	NS	E		W	The adults and larvae of this sole representative of the Family in Britain, are fungivores. Adults are most often found under fungoid bark (particularly of pine), but in winter, they have been found at hibernation sites in woodchip piles and fen litter heaps. The adults are also known to visit flowers. The species has been expanding its European range in recent decades and was first noted in England in 1968 (Gardner 1969). As a recent coloniser, it is increasing in range and observer frequency, albeit relatively slowly.	Widespread within its range which extends from Dorset in the south as far north as south-east Yorkshire. All records are in the eastern half of England, with the exception of a record from Pembrey in South Wales.	24,019km²	80km²	4	18	20

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
Monotomidae	*Monotoma angusticollis*	LC		Widespread, but restricted to sites that support wood ant (Formica) species in south-east, south and west England and Wales. IUCN A: There is a 2.67% decline evidenced in the 40-year period graph of AOO, although this is based on few data and is therefore unreliable. There is no decline or increase evidenced in the 10-year graph of AOO which just shows a constant line, but once again, this is based on very few data. B1: Post-1989 EOO is estimated at 46, 433km², which far exceeds the maximum threshold for designation as threatened (IUCN 'Vulnerable'). In addition, there are more than 10 modern locations, no evidence of fluctuations and no continuing decline evident (as decline is only apparent in the 40-year period graph). Neither is the population severely fragmented. On the basis of these facts, the species fails to qualify under criterion B1. B2: Post-1989 AOO is 29 tetrads (116km²), which places the species in either Endangered or Vulnerable categories. However, as for B1, there are no reliably observed declines, no fluctuations and no fragmentation in evidence, so the species, which has been found at more than 10 modern locations, fails to qualify for threat status under this criterion. C: The current data does not allow for population estimates. D: The current data does not allow for population estimates. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.	NS	E		W	In woodland inhabited by species of wood ant. The adults and larvae feed on ants and possibly on other invertebrates that the ants bring into the nest. In the laboratory, ant eggs were also eaten (Wagner *et. al*. 2020).	Widespread within its range from southern England north to Westmorland, and including much of Wales. Restricted to sites where wood ant is present.	46,400km²	116km²	25	22	29

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
Monotomidae	*Monotoma bicolor*	LC		Widespread with no habitat restrictions; in distribution, found throughout England, Wales and possibly also Scotland. The species previously known as 'bicolor' in Britain, was recognised as comprising two distinct species by Vorst (1999). These are bicolor Villa & Villa and quadricollis Aubé. The latter was first detected in Britain by Booth (2001) and as a result of this recent addition to the fauna, at least 56 old records pre-dating 1990, and at least 25 modern records (probably many more), are still attributed to the species complex rather than specific taxa. This would normally make evaluation difficult, but because both species appear to be widespread and relatively frequent, there is enough data to apply the IUCN criteria adequately. IUCN A: There is no decline evidenced in the graphs of AOO. B1: Post-1989 EOO is estimated in excess of 50,000km², which far exceeds the maximum threshold for designation as threatened. B2: Post-1989 AOO is 92 tetrads (368km²), which potentially places the species in threat categories Vulnerable or Endangered. However, the population is not severely fragmented, there are more than 10 modern locations, there is no continuing decline and no known population fluctuations, so the species fails to qualify for threat status under the criteria here. C: The current data does not allow for population estimates, but the population is likely to exceed 10,000 individuals. D: The current data does not allow for	none	E	?	W	A predatory species inhabiting mouldy decomposing vegetation in patch microhabitats, such as grass cuttings heaps, fen litter heaps, dung heaps, etc. Found in a wide variety of habitats including wetland, arable farmland and gardens.	Widespread throughout England and Wales, although apparently scarce in northern England. No Scottish records are known to the author, although there are records from Scotland of 'bicolor' (indeterminate bicolor complex) which may refer to this species	53,250km²	368km²	8 (but more records will undoubtedly come to light as voucher specimens of old records of 'bicolor complex' are redetermined as this species)	72 (but considered highly likely to be in more than 100 hectads – the species is a patch species found in litter heaps, many of which are on private land, so this is a habitat that is very under recorded. Additionally, some modern records that are currently indeterminate 'bicolor' complex will undoubtedly contribute to the hectad count for this species once voucher specimens have been accurately determined)	92

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				population estimates, although the population is very likely to be >10,000 individuals and range is not extremely restricted to qualify under D2. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.											
Monotomidae	*Monotoma brevicollis*	LC		Widespread in midlands and southern England and Wales. IUCN A: There is no decline evidenced in the graphs of AOO or of EOO. B1: Post-1989 EOO is estimated at >60,000km² which far exceeds the maximum threshold for designation as threatened. B2: Post-1989 AOO is 86 tetrads (344km²), which potentially places the species in threat categories Vulnerable or Endangered. However, the population is not severely fragmented, there are more than 10 modern locations, there is no continuing decline and no known population fluctuations, so the species fails to qualify for threat status under the criteria here. C: The current data does not allow for population estimates, although the current population is likely to be in excess of 10,000 individuals. D: The current data does not allow for population estimates, although the population is very likely to exceed 10,000 individuals. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.	none	E		W	A predatory species inhabiting mouldy decomposing vegetation in patch microhabitats, such as grass cuttings heaps, compost and dung heaps etc. There are also several occurrences of the species in cattle and horse dung on pasture. Found in a wide variety of habitats including arable farmland and gardens.	Widespread throughout central and southern England and Wales	63,950km²	344km²	53	71 (but certain to be present in more than 100 hectads – this is a small 'patch' species which is under-recorded)	86

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
Monotomidae	*Monotoma conicicollis*	LC		Widespread, but restricted to sites that support wood ant (*Formica*) species. IUCN A: There is a 3.0% decline evidenced in the 40-year period graph of AOO, although this is based on few data and is therefore relatively unreliable. There is no decline evidenced in the 10-year graph of AOO which shows a 20% increase, but again, the data is patchy and the interpretation unreliable. The 40-year period graph of EOO shows an increase of 15.61%. B1: Post-1989 EOO is estimated at 78,780km², which far exceeds the maximum threshold for designation as threatened (IUCN 'Vulnerable'). In addition, there are more than 10 modern locations, no evidence of fluctuations and no continuing decline evident (as unreliable 'decline' is only apparent in the 40-year period graph). Neither is the population severely fragmented. On the basis of these facts, the species fails to qualify under criterion B1. B2: Post-1989 AOO is 40 tetrads (160km²), which places the species in either Endangered or Vulnerable categories. However, as for B1, there are no reliably observed declines, no fluctuations and no fragmentation in evidence, so the species, which has been found at more than 10 modern locations, fails to qualify for threat status under this criterion. C: The current data does not allow for population estimates. D: The current data does not allow for population estimates. E: not applied as there are no quantitative population analyses for this	NS	E	S	W	In woodland inhabited by species of wood ant. The adults and larvae feed on ants, their eggs and possibly on other invertebrates that the ants bring into the nest.	Widespread, but restricted to sites where wood ants (*Formica* sp.) are present.	78,780km²	156km²	31	31	40

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				species. Conclusion: Least Concern.											
Monotomidae	*Monotoma longicollis*	LC		Widespread with no obvious habitat restrictions. IUCN A: There are no declines evidenced in either of the graphs illustrating AOO and the graph of EOO shows an insignificant decline of 0.21% over the last 40-year period. B1: Post-1989 EOO is estimated at 107,600km², which far exceeds the maximum threshold for designation as threatened (IUCN 'Vulnerable'). In addition, there are more than 10 modern locations, no evidence of fluctuations and no continuing decline evident. Neither is the population severely fragmented. On the basis of these facts, the species fails to qualify under criterion B1. B2: Post-1989 AOO is 92 tetrads (368km²), which potentially places the species in either Endangered or Vulnerable categories. However, as for B1, there are no declines, no fluctuations and no fragmentation in evidence, so the species fails to qualify for threat status under this criterion. C: The current data does not allow for population estimates, although the population is thought to number more than 10,000 individuals. D: The current data does not allow for population estimates, although it is expected that the population would exceed 10,000 individuals. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.	none	E	S	W	A predatory species inhabiting mouldy decomposing vegetation in patch microhabitats, such as grass cuttings heaps, fen litter heaps, dung heaps, haystack refuse, woodchip piles, etc. Found in a wide variety of habitats including wetland, arable farmland and gardens.	Widespread.	107,600km²	368km²	79	78 (but considered highly likely to be in more than 100 hectads – the species is a patch species found in litter heaps, many of which are on private land, so this is a habitat that is very under recorded).	92

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
Monotomidae	*Monotoma picipes*	LC		Widespread with no obvious habitat restrictions. IUCN A: There are no declines evidenced in either of the graphs illustrating AOO and only a negligible 2.87% decline in the graph illustrating EOO. B1: Post-1989 EOO is estimated to be greater than 100,000km², which far exceeds the maximum threshold for designation as threatened (IUCN 'Vulnerable'). In addition, there are more than 10 modern locations, no evidence of fluctuations and no continuing decline evident. Neither is the population severely fragmented. On the basis of these facts, the species fails to qualify under criterion B1. B2: Post-1989 AOO is 279 tetrads (1116km²), which potentially places the species in the Vulnerable category. However, as for B1, there are no declines, no fluctuations and no fragmentation in evidence, so the species fails to qualify for threat status under this criterion. C: The current data does not allow for population estimates, although the population is certain to number more than 10,000 individuals. D: The current data does not allow for population estimates, although it is expected that the population exceeds 10,000 individuals. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.	none	E	S	W	A predatory species inhabiting mouldy decomposing vegetation in patch microhabitats, such as grass cuttings heaps, dung heaps, haystack refuse, woodchip piles, straw bales, fen litter heaps, etc. Found in a wide variety of habitats including wetland, arable farmland and gardens. The species also turns up at light traps regularly and has also been found in cattle and horse dung on pasture in summer.	Widespread.	>100,000km²	1104km²	113	199	279

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
Monotomidae	*Monotoma quadricollis*	LC		Widespread in England at least, with no habitat restrictions; probably also present in Wales and possibly also Scotland. The species previously known as 'bicolor' in Britain, was recognised as comprising two distinct species by Vorst (1999). These are bicolor Villa & Villa and quadricollis Aubé. The latter was first detected in Britain by Booth (2001) and as a result of this recent addition to the fauna, at least 56 old records pre-dating 1990, and at least 25 modern records (probably many more), are still attributed to the species complex rather than specific taxa. This would normally make evaluation difficult, but because both species appear to be widespread and relatively frequent, there is enough data to apply the IUCN criteria adequately. IUCN A: There is no decline evidenced in the graphs of AOO. B1: Post-1989 EOO is estimated at 23,700km² (which itself is under-representative of the true extent of range of the species, due to under-representation). This value just exceeds the maximum threshold for designation as threatened. B2: Post-1989 AOO is 24 tetrads (96km²), which potentially places the species in threat categories Vulnerable or Endangered. However, the population is not severely fragmented, there are more than 10 modern locations, there is no continuing decline and no known population fluctuations, so the species fails to qualify for threat status under the criteria here. C: The current data does not allow for	none	E	?	?	A predatory species inhabiting mouldy decomposing vegetation in patch microhabitats, such as grass cuttings heaps, fen litter heaps, dung heap etc. Found in a wide variety of habitats including wetland, arable farmland and gardens.	Widespread in England, but not known to the author from Wales or Scotland. It is highly likely that the species has been recorded in Wales at least, but that the author is unaware of confirmed records or vouchers of 'bicolor complex' from that country have yet to be determined. It may also be present in Scotland.	23,700km² (likely to be under-represented)	96km² (very likely to be under-represented)	2 (but more records will undoubtedly come to light as voucher specimens of old records of 'bicolor complex' are redetermined as this species)	21 (but considered highly likely to be in more than 100 hectads – the species is a patch species found in litter heaps, many of which are on private land, so this is a habitat that is very under recorded. Additionally, some modern records that are currently indeterminate 'bicolor' complex will undoubtedly contribute to the hectad count for this species once voucher specimens have been accurately determined)	24

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				population estimates. D: The current data does not allow for population estimates, although the population is very likely to exceed 1,000 individuals. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.											
Monotomidae	*Monotoma quadrifoveolata*	NA		Introduced synanthropic species, long 'extinct' in Britain	none	E			A predatory species inhabiting stored products. Not recorded in Britain since 1936. There is hardly any data referencing situations in which it was found.	n/a	0km²	0km²	0	0	0
Monotomidae	*Monotoma spinicollis*	LC		Widespread with no obvious habitat restrictions. The only Scottish record concerns a specimen found in a box of horns in a taxidermist shop in 1920, presumed 'imported' due to the situation. IUCN A: There is no decline evidenced in the 40-year period graph of AOO. However, the last 10-year period shows a decline in AOO of magnitude 14.29%. This is below the minimum threshold for IUCN designation as Vulnerable, and besides, the statistical analysis is based on very few records in this period and is therefore largely unreliable. B1: Post-1989 EOO is estimated to be 60,379km², which far exceeds the maximum threshold for designation as threatened (IUCN 'Vulnerable'). In addition, there are more than 10 modern locations and no evidence of fluctuations and no continuing decline reliably evident. Neither is the	none	E	[S]	W	A predatory species inhabiting mouldy decomposing vegetation in patch microhabitats, such as grass cuttings heaps, grain heaps, piles of rotting vegetables and straw. Found in a wide variety of habitats including wetland and arable farmland. Also recorded at light.	Widespread, but in England and Wales only.	60,370km²	148km²	36	32 (but this is a 'patch' habitat species so is likely to be very under recorded; considered to be present in more than 100 hectads)	37

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				population severely fragmented. On the basis of these facts, the species fails to qualify under criterion B1. B2: Post-1989 AOO is 37 tetrads (148 km²), which potentially places the species in the Endangered or Vulnerable categories. However, as for B1, there are no declines reliably shown in the analysis, no fluctuations and no fragmentation in evidence, so the species fails to qualify for threat status under this criterion. C: The current data does not allow for population estimates. D: The current data does not allow for population estimates, although it is expected that the population exceeds 1,000 individuals and there are more than 10 modern locations. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.										
Monotomidae	*Monotoma testacea*	LC		Widespread with no obvious habitat restrictions. IUCN A: There is a negligible decline shown in the 40-year period graph of AOO, which is well below the minimum threshold above which a species might potentially qualify as IUCN Vulnerable under A2,3 or 4 and the same is true for the 40-year period graph of EOO. The 10-year period graph of AOO shows an increase in that value. B1: Post-1989 EOO is estimated to be 75,470km², which far exceeds the maximum threshold for designation as threatened (IUCN 'Vulnerable'). In addition, there are more than 10 modern locations, no evidence of fluctuations and	none	E		W	A predatory species inhabiting mouldy decomposing vegetation in patch microhabitats, such as grass cuttings heaps, compost piles, manure heaps, fen sedge litter heaps, and haystack refuse. Found in a wide variety of habitats including wetland and arable farmland.	Widespread, but in England and Wales only.	75,470km²	136km²	30	31 (but this is a 'patch' habitat species so is likely to be very under recorded; considered to be present in more than 100 hectads)	34

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				no continuing decline evident. Neither is the population severely fragmented. On the basis of these facts, the species fails to qualify under criterion B1. B2: Post-1989 AOO is 34 tetrads (136km²), which potentially places the species in the Endangered or Vulnerable categories. However, as for B1, there are no continuing declines, no fluctuations and no fragmentation in evidence, so the species fails to qualify for threat status under this criterion. C: The current data does not allow for population estimates. D: The current data does not allow for population estimates, although it is expected that the population exceeds 1,000 individuals and there are more than 10 modern locations. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.										
Monotomidae	*Rhizophagus aeneus*	LC		Widespread, but restricted to wet woodland and wooded river habitats IUCN A: There is an 8.21% decline evidenced in the 40-year period graph of AOO, which is well below the minimum threshold of 30% required to potentially place the species in the IUCN 'Vulnerable' category. There is a much greater 50% decline in AOO in the last 10-year period, but the magnitude of this decline is probably unreliable, as the data is based on only a handful of records. The species cannot be categorised under A1 because any causes of any decline are not understood. Criteria A3 and A4 cannot be	NR	E	S	W	Most frequent in riverine habitats where adults have been found under bark of partially submerged logs, but also known in other situations, for example, under bark in wet woodland. Associated with a range of deciduous and coniferous trees, although Hyman (1992) mentions elm, beech and oak as the most frequent. The beetle is probably a predator of Scolytine bark beetles (e.g.,	Currently widespread in south and south-west England, Wales, and north-west England. Formerly with a wider distribution.	49,157km²	64km²	19	13	16

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				tested against the data because so few recent records are involved in the period that delivered the 50% decrease in AOO. Under criterion A2, the species might qualify as Vulnerable based on (a) and (c) an 'observed decline' in AOO and direct observation. However, due to the small number of data, this qualification is tenuous at best. B1: Post-1989 EOO is estimated at 49,157km², which far exceeds the maximum threshold for designation as threatened (IUCN 'Vulnerable'). In addition, there are more than 10 modern locations and no evidence of fluctuations. Neither is the population severely fragmented, although a continuing decline is possible. On the basis of these facts, the species fails to qualify under criterion B1. B2: Post-1989 AOO is 16 tetrads (64km²), which potentially places the species in either the Endangered or Vulnerable categories. However, as for B1, there are no fluctuations and no fragmentation in evidence, so the species, which has been found at more than 10 modern locations, fails to qualify for threat status under this criterion, despite possible ongoing decline. C: The current data does not allow for population estimates. D: The current data does not allow for population estimates. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.					*Xyleborus, Scolytus* and *Hylesinus*)					

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
Monotomidae	*Rhizophagus bipustulatus*	LC		Widespread with no obvious habitat restrictions, other than the need for trees. IUCN A: There is a decline of 17.98% evidenced in the 40-year period graph of AOO, which is well below the 30% minimum threshold for potential threat designation as IUCN Vulnerable under criteria A2, A3 and A4. The later 10-year period graph of AOO shows a 67.27% increase in AOO, so this negates any decline shown in earlier decades and infers that any previous decline is not ongoing. The graph showing change in EOO also shows an increase (over a 40-year period) of 4.91%. B1: Post-1989 EOO is estimated to be greater than 100,000km², which far exceeds the maximum threshold for designation as threatened (IUCN 'Vulnerable'). In addition, there are more than 10 modern locations, no evidence of fluctuations and no continuing decline evident. Neither is the population severely fragmented. On the basis of these facts, the species fails to qualify under criterion B1. B2: Post-1989 AOO is 530 tetrads (2120km²), which exceeds the maximum threshold for designation as threatened (IUCN 'Vulnerable'). As for B1, there are no continuing declines, no fluctuations and no fragmentation in evidence, so the species fails to qualify for threat status under this criterion. C: The current data does not allow for population estimates, although the population is certain to number more than 10,000 individuals. D: The current data does not allow for	none	E	S	W	Found in a variety of habitats, predominantly in woodland and parkland, but also in hedgerows. Adults as well as the larvae, feed on fungal mycelia, but the adults also feed on Scolytine bark beetles, specifically the ova and larval stages of *Xyloterus domesticus* and *Hylastes* sp. but undoubtedly others also. All developmental stages can be found under the bark of a variety of deciduous and coniferous trees in all but the later stages of decay, but usually in the first few years and particularly where the bark is sappy or fungus-infected.	Widespread.	103,470km²	2,116km²	160	357	530

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				population estimates, although it is expected that the population exceeds 10,000 individuals. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.											
Monotomidae	*Rhizophagus cribratus*	LC		Widespread with no obvious habitat restrictions, other than the need for trees. Significant decline noted between the two main hectad count periods. IUCN A: There are declines of 1.13% and 5.0% evidenced in the 40-year and 10-year period graphs of AOO respectively, both of which are well below the 30% minimum threshold for potential threat designation as IUCN Vulnerable under criteria A2, A3 and A4. The graph showing change in EOO indicates an increase in range area of 2.44%. B1: Post-1989 EOO is estimated to be 76,860km², which far exceeds the maximum threshold for designation as threatened (IUCN 'Vulnerable'). In addition, there are more than 10 modern locations, no evidence of fluctuations and neither is the population severely fragmented. Despite a possible continuing decline, on the basis of these facts, the species fails to qualify under criterion B1. B2: Post-1989 AOO is 46 tetrads (184km²), which potentially places the species in the IUCN Endangered and Vulnerable categories, but for the reasons given above for B1, the species fails to qualify for threat status under this criterion. C: The current data does not allow for population	NS	E	S	W	A predominantly subterranean species, found mainly in parkland and woodland habitats, where it feeds on tree roots underground. Records come primarily from oak and beech, but it has also been noted at the base of limes and horse-chestnut amongst other tree species.	Widespread throughout England and Wales, but not recorded recently from Scotland.	76,860km²	184km²	60	38	46

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				estimates. D: The current data does not allow for population estimates, although it is expected that the population exceeds 1,000 individuals. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.											
Monotomidae	*Rhizophagus depressus*	LC		Widespread with no obvious habitat restrictions, other than the need for coniferous trees. Significant decline noted between the two main hectad count periods. IUCN A: Neither the 10-year nor 40-year period graphs of AOO show a decline, so the species fails to qualify under UICN threat status here. The EOO graph does indicate a decline in range area over the last 40-year period, but the rate of this decline at 1.75% is insignificant. B1: Post-1989 EOO is estimated to be greater than 120,000km², which far exceeds the maximum threshold for designation as threatened (IUCN 'Vulnerable'). In addition, there are more than 10 modern locations, no evidence of fluctuations and no continuing decline evident. Neither is the population severely fragmented. On the basis of these facts, the species fails to qualify under criterion B1. B2: Post-1989 AOO is 86 tetrads (344km²), which potentially places the species under IUCN threat categories Endangered and Vulnerable, but as in B1 above, the fact that there are no continuing declines, no fluctuations and no fragmentation in evidence, means that the species fails to	none	E	S	W	A species that is almost always found beneath sappy bark of pines, although occasionally recorded from deciduous trees (e.g., beech and oak). One record associates the species with pine bark infested with the Scolytine beetle *Tomicus piniperda*, the larvae and eggs of which may form part of the food source of the monotomid. Larvae probably feed on fungal mycelia beneath the bark along with dead scolytine debris.	Widespread.	122,028km²	336km²	91	65 (but considered highly likely to be present in more than 100 hectads)	86

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				qualify for threat status under this criterion. C: The current data does not allow for population estimates. D: The current data does not allow for population estimates, although it is highly likely that the population exceeds 1,000 individuals. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.											
Monotomidae	*Rhizophagus dispar*	LC		Widespread with no obvious habitat restrictions, other than the need for trees. IUCN A: There is a decline of 28.9% evidenced in the 40-year period graph of AOO, which is just shy of the 30% minimum threshold for potential threat designation as IUCN Vulnerable under criteria A2, A3 and A4. However, the later 10-year period graph of AOO shows a 132% increase in area, so this negates any decline shown in earlier decades. The graph of change in EOO shows an increase in range area over the last 40-year period. B1: Post-1989 EOO is estimated to be greater than 140,000km², which far exceeds the maximum threshold for designation as threatened (IUCN 'Vulnerable'). In addition, there are more than 10 modern locations, no evidence of fluctuations and no continuing decline evident. Neither is the population severely fragmented. On the basis of these facts, the species fails to qualify under criterion B1. B2: Post-1989 AOO is 841 tetrads (3364 km²), which far exceeds the maximum threshold for	none	E	S	W	Found in a variety of habitats including woodland, parkland and hedgerows, where adults live under bark of both deciduous and coniferous trees in various stages of decay and particularly where there are fungal mycelia below the bark. Both the adults and the larvae are known to feed on a range of fungi and also on bark beetle (Scolytine – including *Tomicus*, *Ips*, *Pityogenes*) larvae and ovae.	Widespread.	140,625km²	3364km²	319	523	841

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				designation as threatened (IUCN 'Vulnerable'). As for B1, there are no continuing declines, no fluctuations and no fragmentation in evidence, so the species fails to qualify for threat status under this criterion. C: The current data does not allow for population estimates, although the population is certain to number more than 10,000 individuals. D: The current data does not allow for population estimates, although it is expected that the population exceeds 10,000 individuals. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.											
Monotomidae	*Rhizophagus fenestralis*	LC		The species was first recorded in Britain, in Scotland, in 1962 (Johnson 1963) and has since expanded in range in the manner of an establishing colonist, although its distribution in Britain is highly disjunct. It has not been recorded in Scotland since 1983.The species is likely either to be a recent unassisted colonist from the continent into England or an introduction into Scotland that has possibly died out in that region and perhaps been introduced further south into England where it has established. Fowler (1885) suggested that it might appear in Britain, Hammond (2007) appears to suggest that it is indeed a recent colonist and by his inference, possibly an introduced species, whilst Troukens *et al.* (2020) mention its expanding range in Belgium and The Netherlands.	NS	E	S		This species is found under the sappy bark of deciduous trees, particularly oaks, although Hyman (1992) also cites silver birch, in Scotland, Fowler (1885) associated it with aspen on the continent, and Welch (2000) found it under fungus-infected sycamore bark. The adults and larvae are likely to be both fungivores and predators of life stages of Scolytine beetles.	Widespread, but within a current range that covers much of East Anglia, south-eastern and eastern England only.	22,289km²	68km²	4	17	17

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				It is well-established in mainland Europe, so its arrival in Britain should not be out of the question, but there is no evidence to suggest that the species has been imported in timber and conversely, no evidence to suggest that it arrived here in aerial plankton from the continent or even that its spread on the continent is wholly unassisted. Its original appearance in Scotland followed by its much later appearance at a handful of pasture woodland sites in England is indeed suspicious. If there is either a lack of clear evidence for introduction, or an unassisted colonisation is possible, then the adoption of a cautious approach should result in the species; (a)being considered as a possible unassisted migrant that has established in the region, (b)being evaluated under IUCN criteria and (c), being designated with a British Rarity status. If this were not done, and a species designated as 'introduced N/A' which would otherwise have qualified under IUCN threat status, and which later becomes extinct with research showing that it was indeed indigenous, then the loss to conservation is unacceptable (pers comm Andrew Brown, 2021). IUCN A: There is no decline evidenced in either of the graphs of AOO. B1: Post-1989 EOO is estimated to be 22,126km², which exceeds the maximum threshold for designation as threatened (IUCN 'Vulnerable'). In addition, there are more than 10 modern locations, no evidence of fluctuations and no continuing decline evident.									

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				Neither is the population severely fragmented. On the basis of these facts, the species fails to qualify under criterion B1. B2: Post-1989 AOO is 17 tetrads (68km²), which places the species potentially in the IUCN Endangered or Vulnerable categories under this criterion. However, for the same reasons given in B1 above, the species fails to qualify for threat status under this criterion. C: The current data does not allow for population estimates. D1: The current data does not allow for population estimates, although it is expected that the population is likely to exceed 1,000 individuals. D2: The AOO is greater than 20km², there are more than 5 locations and there is no plausible threat to the number of locations, so the species fails to qualify as threatened 'Vulnerable' under criterion D2 E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.										
Monotomidae	*Rhizophagus ferrugineus*	LC		Widespread in wooded habitats. IUCN A: There is a 7.93% increase in AOO evidenced in the 40-year period graph. The later 10-year period graph of AOO shows no change in recorded AOO and the change in EOO indicated over the last 40-year period is 0.96% increase. B1: Post-1989 EOO is estimated to be 119,602km², which far exceeds the maximum threshold for designation as threatened (IUCN 'Vulnerable'). In addition, there are more than 10 modern	none	E	S	W	Found in a variety of woodland habitats, where adults live under the bark and in heart-rot of both deciduous and coniferous trees in various stages of decay and particularly where there are fungal mycelia. Sappy bark is particularly productive for the species. Deciduous trees named in the data include beech,	Widespread.	119,602km²	752km²	122	140	190

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				locations, no evidence of fluctuations and no continuing decline evident. Neither is the population severely fragmented. On the basis of these facts, the species fails to qualify under criterion B1. B2: Post-1989 AOO is 190 tetrads (760km²), which places the species potentially in the IUCN Vulnerable category under this criterion. However, for the same reasons given in B1 above, the species fails to qualify for threat status here. C: The current data does not allow for population estimates. D1: The current data does not allow for population estimates, although it is expected that the population exceeds 1,000 individuals. D2: The AOO is greater than 20km², there are more than 5 locations and there is no plausible threat to the number of locations, so the species fails to qualify as threatened 'Vulnerable' under criterion D2 E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.					oak and birch. Both the adults and the larvae are known to feed on a range of fungi and also on bark beetle (Scolytine) larvae and ovae. This species is also known to occur underground as it has been found in subterranean traps.					
Monotomidae	*Rhizophagus grandis*	NA		An introduced species. Conclusion: Not Applicable NA.	none	E	S	W	Under the bark of spruce Picea in conifer plantations. Introduced into north, west central and southern England, Wales and south-west Scotland for biological control of the great spruce bark beetle *Dendroctonus micans* and probably at least temporarily established locally (Duff 2020)	Widespread introductions, but rarely recorded by coleopterists. No data received by this author.	?	?	?	?	?

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
Monotomidae	*Rhizophagus nitidulus*	LC		Widespread in wooded habitats. IUCN A: There is a decline of 9.41% evidenced in the 40-year period graph of AOO, which is well below the minimum threshold for potential threat designation as IUCN Vulnerable under criteria A2, A3 and A4. However, the later 10-year period graph of AOO shows a decline in AOO of 30.3% magnitude which just exceeds that minimum threshold value and so places the species potentially in the threat category. Under A2, we can conclude that the decline in AOO may not have ceased and is not understood and may not be reversible, so the species would normally qualify under A2(c) here. However, it is important to note that the conclusion is based on relatively little data (32 records in the 10-year period) data, a period that includes a year of restricted recording in 2020. Caution is proposed before designating the taxon and only if there is supporting evidence in the other criteria, should a designation under A2 be considered here. The 40-year period graph of change in EOO shows a decline also, but this is of a lower magnitude at 7.58%, well below the 30% minimum threshold. B1: Post-1989 EOO is estimated to be 103,614km², which far exceeds the maximum threshold for designation as threatened (IUCN 'Vulnerable'). In addition, there are more than 10 modern locations, no evidence of fluctuations and no severe fragmentation of the population, although an apparent continuing decline is	none	E	S	W	Found in a variety of woodland and parkland habitats where adults are usually found under sappy bark of deciduous trees, primarily beech and oak. There are also records from sycamore, elm and hazel. The adults and the larvae are likely to feed on fungus and also to scavenge the larvae and ova of bark beetles (Scolytinae).	Widespread.	103,614km²	392km²	79	85 (but considered to be present in more than 100 hectads)	98

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				evident. On the basis of these facts, the species fails to qualify under criterion B1. B2: Post-1989 AOO is 98 tetrads (392km²), which places the species potentially in the IUCN Endangered and Vulnerable categories under this criterion. However, for the same reasons given in B1 above, the species fails to qualify for threat status here, although a continuing decline is apparent. C: The current data does not allow for population estimates. D1: The current data does not allow for population estimates, although it is expected that the population exceeds 1,000 individuals. D2: The AOO is greater than 20km², there are more than 5 locations and there is no plausible threat to the number of locations, so the species fails to qualify as threatened 'Vulnerable' under criterion D2 E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern (there is no supporting 'evidence' under the criteria to support an unreliable conclusion under A2 above).										
Monotomidae	*Rhizophagus oblongicollis*	LC		Restricted to a small number of woodland and pasture woodland localities in Wales, the west midlands and south/south-east England. IUCN A: There is a 1.65% increase in AOO evidenced in the 40-year period graph. The later 10-year period graph of AOO shows no change in recorded AOO. B1: Post-1989 EOO is estimated at 7,492km², which potentially places the species in the IUCN threat category	NR	E		W	The species inhabits ancient broad-leaved woodland and pasture woodland sites (and rarely, isolated oaks) where 'it probably develops underground in old borings of scolytines, in moist dead roots, usually of old oaks, but at times comes to the surface and seeks new larval habitat. Above	Restricted to a number of parkland sites and also isolated trees, in Wales, west midlands and south/south-east England.	7,492km²	40km²	7	9	10

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				'Vulnerable'. There are no coastal regions within the polygon created for summation of EOO. In addition, there are only 9 modern locations, no evidence of fluctuations and no continuing decline evident. Neither is the population severely fragmented according to the terminology used by IUCN. On the basis of these facts, the species fails to qualify under criterion B1. B2: Post-1989 AOO is 10 tetrads (40km²), which places the species potentially in the IUCN Endangered and Vulnerable categories under this criterion. However, for the same reasons given in B1 above, the species fails to qualify for threat status here. C: The current data does not allow for population estimates. D1: The current data does not allow for population estimates, although the population may be less than 1,000 individuals. D2: The AOO is greater than 20km², there are more than 5 locations and there is no plausible threat to the number of locations, so the species fails to qualify as threatened 'Vulnerable' under criterion D2 E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.					ground it is attracted to sap associated with damaged bark' (Alexander 2018). Several records originate from subterranean pitfall traps at the base of veteran oaks.					
Monotomidae	*Rhizophagus parallelocollis*	LC		Widespread, with no habitat restrictions. Significant decline noted between the two main hectad count periods. IUCN A: There is a decline of 4.78% evidenced in the 40-year period graph of AOO, which is well below the minimum threshold for potential threat designation as IUCN	NS	E	S	W	A predominantly subterranean species, found in a variety of parkland and woodland habitats, and also in grassland habitats such as paddocks and gardens. It is associated with	Widespread.	82,364km²	164km²	72	38	42

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				Vulnerable under criteria A as is the 0.24% decline indicated by the 40-year period graph showing change in EOO. The later 10-year period graph of AOO shows an increase in recorded AOO. B1: Post-1989 EOO is estimated to be 82,364km², which far exceeds the maximum threshold for designation as threatened (IUCN 'Vulnerable'). In addition, there are more than 10 modern locations, no evidence of fluctuations, no severe fragmentation of the population and no continuing decline evident. On the basis of these facts, the species fails to qualify under criterion B1. B2: Post-1989 AOO is 42 tetrads (168km²), which places the species potentially in the IUCN Endangered and Vulnerable categories under this criterion. However, for the same reasons given in B1 above, the species fails to qualify for threat status here. C: The current data does not allow for population estimates. D1: The current data does not allow for population estimates, although it is expected that the population exceeds 1,000 individuals. D2: The AOO is greater than 20km², there are more than 5 locations and there is no plausible threat to the number of locations, so the species fails to qualify as threatened 'Vulnerable' under criterion D2 E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.					buried decaying organic matter. For example, a number of records come from a pig corpse buried in a sandpit. The vernacular name 'Graveyard Beetle' originates from its historical association with exhumed remains in coffins and the observation that it occasionally swarmed in cemeteries. The species has also been taken at sap, fungi and flowers and rarely under deciduous tree bark.					

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
Monotomidae	*Rhizophagus perforatus*	LC		Widespread, with no habitat restrictions. IUCN A: There is a decline of 0.34% evidenced in the 40-year period graph of AOO, which is well below the minimum threshold for potential threat designation as IUCN Vulnerable under criteria A. The later 10-year period graph of AOO shows an increase in recorded AOO as does the 40-year period graph of change in EOO. B1: Post-1989 EOO is estimated to be 111,499km², which far exceeds the maximum threshold for designation as threatened (IUCN 'Vulnerable'). In addition, there are more than 10 modern locations, no evidence of fluctuations, no severe fragmentation of the population and no continuing decline evident. On the basis of these facts, the species fails to qualify under criterion B1. B2: Post-1989 AOO is 145 tetrads (580km²), which places the species potentially in the IUCN Vulnerable category under this criterion. However, for the same reasons given in B1 above, the species fails to qualify for threat status here. C: The current data does not allow for population estimates. D1: The current data does not allow for population estimates, although it is expected that the population is well in excess of 1,000 individuals. D2: The AOO is greater than 20km², there are more than 5 locations and there is no plausible threat to the number of locations, so the species fails to qualify as threatened 'Vulnerable' under criterion D2 E: not applied as there are no quantitative population	none	E	S	W	A predominantly subterranean species, found in a variety of habitats including woodland, grassland and scrub. It is associated with buried decaying organic matter, both plant and animal tissue. Many records are from subterranean pitfall traps, but also recorded in underground situations, from a mole nest and a badger sett. The species has also been taken at sap, fungi and flowers and rarely under deciduous tree bark; in the latter situation, invariably on the underside of logs.	Widespread.	111,499km²	580km²	96	117	145

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				analyses for this species. Conclusion: Least Concern.											
Monotomidae	*Rhizophagus picipes*	LC		Widespread in wooded habitats. IUCN A: There is a decline of 1.79% evidenced in the 40-year period graph of AOO, which is well below the minimum threshold for potential threat designation as IUCN Vulnerable under criteria A. The 10-year period graph of AOO shows no change in recorded AOO. B1: Post-1989 EOO is estimated to be 69,804km², which far exceeds the maximum threshold for designation as threatened (IUCN 'Vulnerable'). In addition, there are more than 10 modern locations, no evidence of fluctuations and no severe fragmentation of the population. On the basis of these facts, the species fails to qualify under criterion B1. B2: Post-1989 AOO is 18 tetrads (72km²), which places the species potentially in the IUCN Endangered and Vulnerable categories under this criterion. However, for the same reasons given in B1 above, the species fails to qualify for threat status here. C: The current data does not allow for population estimates. D1: The current data does not allow for population estimates, although it is plausible that the population might not exceed 1,000 individuals. D2: The AOO is greater than 20km², there are more than 5 locations and there is no plausible threat to the number of locations, so the species fails to qualify as threatened 'Vulnerable' under criterion D2 E: not applied as there are no	NS	E	S	W	A species of woodland, pasture woodland and wooded riverine habitats. Found under bark and at sap of a variety of trees including pines, oak, beech, ash, poplar, alder, aspen and sycamore. Also observed in fungi. The adults and the larvae are likely to feed on fungus and also to predate the larvae and ova of bark beetles (Scolytinae).	Widespread.	69,804km²	72km²	25	16	18

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				quantitative population analyses for this species. Conclusion: Least Concern.											
Phalacridae	*Olibrus aeneus*	LC		Widespread with no habitat restrictions; in distribution, found throughout England, Wales and north into Scotland. Certainly, expanding its range northwards in recent decades. IUCN A: There is no decline evidenced in the 10-year and 40-year graphs of AOO, or the graph illustrating change in EOO. B1: Post-1989 EOO is estimated in excess of 100,000km², which far exceeds the maximum threshold for designation as threatened. B2: Post-1989 AOO is 834 tetrads (3,336km²), which far exceeds the maximum threshold for designation as threatened, so the species fails to qualify for threat status under the criteria here. C: The current data does not allow for population estimates, but the population is certain to exceed 10,000 individuals. D: The current data does not allow for population estimates, although the population is certain to exceed 10,000 individuals. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.	none	E	S	W	This species is found in various habitats, but is most frequent in dry open situations and can be abundant at for example, arable field margins on mayweeds, etc. Adults are oliphages on a variety of Asteracaea. Eggs are laid in spring and for up to eight weeks after commencement. The larvae generally feed in the seedhead and receptacle of the food-plant, moving down the stem and pupating in the ground when mature. New generation adults appear from mid-summer.	Widespread in England and Wales, but distribution is patchy in northern England and north into Scotland. Expanding its range, possibly due to climate change.	104,850km²	3340km²	146	437	834

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
Phalacridae	*Olibrus affinis*	LC		Widespread with no habitat restrictions; in distribution, found throughout most of England and Wales and formerly in Scotland. Formerly primarily a coastal species but expanding its range inland and northwards in recent decades. IUCN A: There is no decline evidenced in the 10-year and 40-year graphs of AOO or in the graph illustrating change in EOO. B1: Post-1989 EOO is estimated in excess of 100,000km², which far exceeds the maximum threshold for designation as threatened. B2: Post-1989 AOO is 369 tetrads (1,476km²), which potentially places the species in the Vulnerable category. However, there is no indication of fragmentation, nor of population fluctuations or of any continuing decline, so the species fails to qualify for threat status under the criteria here. C: The current data does not allow for population estimates, but the population is certain to exceed 10,000 individuals. D: The current data does not allow for population estimates, although the population is certain to exceed 10,000 individuals. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.	none	E	S	W	This species is found in various habitats but is most frequent in dry open high insolation situations such as dunes, downland, post-industrial and urban brownfield sites. The adults are oliphages, consuming the pollen in a variety of yellow-flowered Asteracaea including species such as *Hypochaeris radicata*, *Tragopogon pratensis* and Hieracium. The larvae generally feed in the seedhead and receptacle of the food-plant. They pupate in the capitulatum among the florets and the scales.	Widespread throughout most of England and Wales	111,162km²	1472km²	47	242	369
Phalacridae	*Olibrus corticalis*	LC		Widespread with no habitat restrictions; in distribution, found throughout much of England and Wales with two old records (possibly in error?) from Scotland. Probably expanding its range in recent decades. IUCN A: There is no decline evidenced in the 10-	none	E	S?	W	This species is found in various habitats but is most frequent in dry open situations such as grassland verges, waste and disturbed ground. The adults eat pollen in a variety of yellow-	Widespread throughout central and southern England and Wales	92,307km²	988km²	66	153	247

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				year and 40-year graphs of AOO, or the graph illustrating EOO. B1: Post-1989 EOO is estimated at 92,300km², which far exceeds the maximum threshold for designation as threatened. B2: Post-1989 AOO is 247 tetrads (988km²), which potentially places the species in the Vulnerable category. However, there is no indication of fragmentation, nor of population fluctuations or of any continuing decline, so the species fails to qualify for threat status under the criteria here. C: The current data does not allow for population estimates, but the population is likely to exceed 10,000 individuals. D: The current data does not allow for population estimates, although the population is likely to exceed 10,000 individuals. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.					flowered Asteracaea of the Senecio genus (ragwort, groundsel, etc). The larvae generally feed in the seedhead and receptacle of the food-plant.						
Phalacridae	*Olibrus flavicornis*	LC		Widespread within its current range in southern and south-east England and expanding rapidly in range. Formerly very rare and known from very few sites, with the last record in 1950, until its reappearance in West Kent in 1991, after which time it has appeared with increasing frequency, particularly in brownfield habitats along the Thames Gateway, in the fashion of a new coloniser or introduced species. It may be that the old pre-1951 population and the more recent 1991+ populations have different origins. An old record or Scotland (as '*bicolor var flavicornis*') is thought to refer	none (but see hectad count)	E			This species is found in various habitats but is most frequent in dry open high insolation situations such as post-industrial and urban brownfield sites. The adults consume the pollen of yellow-flowered Asteracaea, particularly autumn hawkbit *Scorzoneroides autumnalis*. The larvae feed in the seedhead and receptacle of the food-plant.	Widespread; currently only in south and south-east England regions, but expanding rapidly in range and frequency. Most frequent in the Thames Gateway where it is often abundant.	17,210km²	296km²	4	40 (but the species is expanding rapidly in range and if is not yet occupying 100 hectads within its range, the author believes that it will exceed this number of hectads within the next decade).	74

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				to liquidus, and a more recent record from the south coast of Wales (Whiteford NNR 1992) is suspect as it is a very distant outlier from the main population and the date is very early in terms of its recent appearance and range expansion. IUCN A: There is no decline evidenced in the 10-year and 40-year graphs of AOO. B1: Post-1989 EOO is estimated at 17,210km², which potentially places the species in threat category Vulnerable. Including coastal areas within the polygon increases this value to 18,630km², However, the population is not severely fragmented, there is no continuing decline in either habitat or EOO/AOO and the population is not subject to extreme fluctuations, although its disappearance between 1950 and 1991 is intriguing. B2: Post-1989 AOO is 74 tetrads (296km²), which potentially places the species in the Endangered or Vulnerable categories. However, for the same reasons cited for B1 above, the species fails to qualify for threat status under the criteria here. C: The current data does not allow for population estimates, but the population is likely to exceed 10,000 individuals. D: The current data does not allow for population estimates, although the population is likely to exceed 10,000 individuals. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.									

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
Phalacridae	*Olibrus liquidus*	LC		Widespread with no habitat restrictions; in distribution, found throughout much of England and Wales. Certainly, expanding its range northwards in recent decade(s). IUCN A: There is no decline evidenced in the 10-year and 40-year graphs of AOO, or in the graph illustrating change in EOO. B1: Post-1989 EOO is estimated at 108,800km², which far exceeds the maximum threshold for designation as threatened. B2: Post-1989 AOO is 280 tetrads (1120km²), which potentially places the species in the Vulnerable category. However, there is no indication of fragmentation, nor of population fluctuations or of any continuing decline, so the species fails to qualify for threat status under the criteria here. C: The current data does not allow for population estimates, but the population is likely to exceed 10,000 individuals. D: The current data does not allow for population estimates, although the population is likely to exceed 10,000 individuals. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.	none	E		W	This species is found in various habitats but is most frequent in dry open high insolation situations such as sand dunes and post-industrial and urban brownfield sites. The adults consume the pollen of Asteracaea. The larvae feed in the seedhead and receptacle of the food-plant.	Widespread throughout England and Wales only.	108,800km²	1120km²	49	188	280
Phalacridae	*Olibrus millefolii*	LC		Restricted to south-east England and East Anglia. Possibly expanding its range in recent decades or overlooked to some degree. For example, the species was thought to be restricted to the breckland region in East Anglia but has been found widely in breck habitat right up through West Norfolk and into	NS	E			This is a species of insolated grassland habitats, typically sandy, weedy arable margins subject to disturbance, and road verges, and breck heath. The adults consume the pollen of yarrow *Achillea millefolium*	Present in south-east England and East Anglia with most records from the breck habitat in West Norfolk.	23,520km²	208km²	16	26	52

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				Cambridgeshire in recent years. IUCN A: There is no decline evidenced in the 10-year and 40-year graphs of AOO. B1: Post-1989 EOO is estimated at 23,520km², which just exceeds the maximum threshold for designation as threatened IUCN Vulnerable. However, the number of modern locations is more than 10, there is no decline in either habitat or population and no extreme fluctuations known (a spike in records in 2017 is due to the author's recording), and probably no severe fragmentation, although the range outside of East Anglia appears somewhat discontinuous. B2: Post-1989 AOO is 53 tetrads (208km²), which potentially places the species in the Endangered or Vulnerable categories, but for the reasons given in B1 above, the species fails to qualify for threat status under the criteria here. C: The current data does not allow for population estimates. D: The current data does not allow for population estimates, although the population is certain to exceed 1,000 individuals and there are more than 5 modern locations. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.					and the larvae feed in the seedhead and receptacle of the flower. The larvae pupate in the ground.					

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
Phalacridae	*Olibrus norvegicus*	VU	D2	Restricted to one location in East Kent; Sandwich Bay, where it was discovered in 2012 (Telfer 2013). It appears to be established at the site, as others have recorded it since its discovery. The most recent observation is in 2017. The species has either colonised very recently or has been established in East Kent but overlooked. An argument for the former is that the species has been discovered in mainland European countries relatively recently (pers comm, MG Telfer). An argument for the latter scenario is that the dung beetle *Melinopterus punctatosulcatus* Sturm had gone undetected in East Kent (where known from only two sites) since 1938, until Darren and Ceri Mann carried out a targeted search for it in 2018 and rediscovered it at Deal. *Olibrus norvegicus* is a smaller and less conspicuous species than *Melinopterus punctatosulcatus*, which makes it more likely to have gone undetected for so long. IUCN A: There is not enough data to analyse for decline, although there is no reason to suspect a decline, with records received for 2012 (1 tetrad) and 2017 (2 tetrads) and no known habitat deterioration since its discovery in Britain. B1: The EOO of appropriate habitat at its single location is approximately 3.65km² (although the known specific area in which it occurs is much less than this value, the linear line drawn between the two specifically known points of observation being approximately 1.28-1.5km in	NR	E			In Britain, this is a species of insolated grassland habitat, specifically sand dunes, and at a single location in East Kent only. The adults consume the pollen of yellow Asteraceae, possibly hawk's-beards *Crepis* sp and the larvae feed in the seedhead and receptacle of the flower.	Discovered in Britain as recently as 2012 (Telfer, 2013) and apparently restricted to Sandwich Bay, although it may currently be overlooked in other coastal fringes of East Kent.	3.65km² maximum. So far found in a linear strip approximately 1.28-1.5km in length	4x2 tetrads = 8km², but appropriate habitat only occupies 3.65km² maximum. So far found in a linear strip approximately 1.28-1.5km in length	0	1	2

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				length). This places the species in the IUCN Endangered category. The number of modern locations is 1 which further substantiates this designation. However, there are not enough data to analyse for decline in either habitat or population and extreme population fluctuations, so analysis to designation is not possible under this criterion. B2: Post-1989 AOO is 8km² (although the known specific area in which it occurs is much less than this value). This places the species in the IUCN Endangered category. The number of modern locations is 1 which further substantiates this designation. However, there are not enough data to analyse for decline in either habitat or population and extreme population fluctuations, so analysis is not possible. C: The current data does not allow for population estimates, although there are likely to be less than 250 individuals. Telfer (pers comm.) in a targeted search for the species found only three adults out of 104 *Olibrus* swept at the site, so we can conclude that the population is at low density relative to other *Olibrus* species recorded there. However, there is not enough data to infer or evidence continuing decline, so the analysis cannot designate under this criterion. D1: The data do not allow for population estimates, although the population is likely to be less than 250 individuals and probably more than 50 which would place the species in the IUCN Endangered category. However, this estimate is at									

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				best tenuous, and so does not allow for designation in category D1. D2: The AOO is less than 20km² and there is only one location for which there is a plausible future threat of tidal events, so whilst a designation of IUCN Endangered under Criterion D1 is tenuous, the species certainly qualifies for Vulnerable D2. E: not applied as there are no quantitative population analyses for this species. Conclusion: Vulnerable D2 or Data Deficient.										
Phalacridae	*Olibrus pygmaeus*	LC		Restricted to eastern England and East Anglia. IUCN A: There is no decline evidenced in the 10-year and 40-year graphs. B1: Post-1989 EOO is estimated at 23,340km², which just exceeds the maximum threshold for designation as threatened IUCN Vulnerable. However, the number of modern locations is more than 10, there is no decline in either habitat or population and no extreme fluctuations known, and probably no severe fragmentation, although the range outside of East Anglia appears somewhat discontinuous. B2: Post-1989 AOO is 39 tetrads (156km²), which potentially places the species in the Endangered or Vulnerable categories, but for the reasons given in B1 above, the species fails to qualify for threat status under the criteria here. C: The current data does not allow for population estimates. D: The current data does not allow for population estimates, although the population is certain to	NS	E			This is a species of insolated grassland habitats, typically sandy, weedy arable margins subject to disturbance, and road verges, and breck heath. The adults consume the pollen of common cudweed *Filago vulgaris* (and possibly other Asteraceae). The larvae feed in the seedhead and receptacle of the flower.	Distributed through eastern England and East Anglia only	23,340km²	156km²	18	28	39

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				exceed 1,000 individuals and there are more than 5 modern locations. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.											
Phalacridae	*Phalacrus caricis*	LC		Widespread, but with habitat restricted to wetland sites where smutted Carex is present; in distribution, found throughout much of England and Wales. In Scotland, only recorded historically and perhaps erroneously? IUCN A: There is a sharp decline in AOO observed in the last 10-year period as evidenced in the graph, although this graph and the 40-year period graph are based on such a relatively small amount of data, that neither are considered very reliable. The 40-year period graph shows an increase in AOO. The 42% decline in the last 10 years if reliable, would place the species potentially in category 'Vulnerable' for IUCN criteria A2, A3 and A4. The nature of the data for this species and our understanding of the population does not allow analysis under A3 and A4, but under A2, we could speculate that any imagined 'causes of reduction' are not understood based on (a) direct observation and (c) a decline in area of occupancy (AOO). However, given the author's and other surveyor's experience of observation of this species and its habitats, it is considered that no real decline is operating and that the 10-year period graph merely projects a quirk of random recording exacerbated	none	E	S	W	A wetland species found, often in abundance, on smutted sedges *Carex* sp. The larvae feed on the spore mass of the smut fungus (*Ustilaginales*) whilst the adults are known to be pollen feeders.	Widespread, but throughout midlands and southern England and Wales only	89,120km²	452km²	50	93 (but considered to be in more than 100 hectads)	113

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				by the coronavirus outbreak restrictions in 2020. The graph of change in EOO shows an increase of 11.96%. B1: Post-1989 EOO is estimated at 89,120km², which far exceeds the maximum threshold for designation as threatened. B2: Post-1989 AOO is 113 tetrads (452km²), which potentially places the species in the Endangered or Vulnerable category. However, although there is an indication of continuing decline in AOO, there is no indication of fragmentation, nor of population fluctuations and the number of modern locations is more than 10, so the species fails to qualify for threat status under the criteria here. C: The current data does not allow for population estimates. D: The current data does not allow for population estimates, although the population is certain to exceed 1,000 individuals, the AOO is more than 20km² and there are more than 5 locations. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.										
Phalacridae	*Phalacrus championi*	LC		Apparently currently restricted to south and south-eastern England and East Anglia and expanding its range significantly in recent years. IUCN A: There is no decline evidenced in the 10-year and 40-year graphs of AOO or in the graph showing change in EOO. B1: Post-1989 EOO is estimated at 39,330km², which far exceeds the maximum threshold for designation as threatened IUCN Vulnerable. B2: Post-1989 AOO is 75	none	E	S?		Found in a variety of habitats including saltmarsh, arable margins, downland and woodland, where it may be associated with smutted grasses and possibly also sedges *Carex* sp, although there is much uncertainty about its specific requirements in Britain. The larvae	Currently widespread throughout south and south-east England and East Anglia. Hyman (1992) also cites central Scotland, but no information known to the author. Rapidly expanding its range.	39,330km²	296km²	14	66 (but considered due to rapid expansion, to now be in more than 100 hectads)	75

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				tetrads (300km²), which potentially places the species in the Endangered or Vulnerable categories. However, the number of modern locations is more than 10, there is no decline in either habitat or population and no extreme fluctuations known, and no severe fragmentation evident either, so the species fails to qualify for threat status under the criteria here. C: The current data does not allow for population estimates. D: The current data does not allow for population estimates, although the population is very likely to exceed 1,000 individuals and there are more than 5 modern locations. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.					are likely to feed on the fungal spores.						
Phalacridae	*Phalacrus corruscus*	LC		Apparently currently restricted to midland and southern England. There appears to have been a significant historical decline, evidenced by the difference in the hectad counts between the two main periods. However, it should be noted that old records of *P. corruscus* may be misidentifications of *P. fimetarius* due to identification difficulties in the older literature ID keys: this may have resulted in *P. fimetarius* appearing to be the scarcer of the two historically when in fact, the converse may be true. IUCN A: There is no decline in AOO evidenced in the 10-year and 40-year graphs. B1: Post-1989 EOO is estimated at 48,430km², which far exceeds the maximum threshold for designation as	none	W	S		Found in a variety of habitats where it is thought to be associated with smutted cereal crops, although many of the records are from habitats other than arable. The larvae are likely to feed on the fungal spores.	Currently widespread in southern, south-eastern and mid-eastern England and also East Anglia. Formerly also known from Scotland.	48,437km²	208km²	62	41 (but considered to be present in more than 100 hectads)	52

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				threatened IUCN Vulnerable. B2: Post-1989 AOO is 52 tetrads (208km²), which potentially places the species in the Endangered or Vulnerable categories. However, the number of modern locations is more than 10, there is no decline in either habitat or population and no extreme fluctuations known, and no severe fragmentation evident either, so the species fails to qualify for threat status under the criteria here. C: The current data does not allow for population estimates. D: The current data does not allow for population estimates, although the population is very likely to exceed 1,000 individuals and there are more than 5 modern locations. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.										
Phalacridae	*Phalacrus fimetarius*	LC		Apparently currently found in England only. It should be noted that old records of *P. corruscus* may be misidentifications of *P. fimetarius* due to identification difficulties in the older literature ID keys: this may have resulted in *P. fimetarius* appearing to be the scarcer of the two historically when in fact, the converse may be true. IUCN A: There is no decline in AOO evidenced in the 10-year and 40-year graphs and a decline of 12.45% indicated in the 40-year graph showing change in EOO is below the 30% minimum threshold, above which a species might be considered IUCN Vulnerable. B1: Post-1989 EOO is	none	E	S	W	Found in a variety of (usually) open habitats, including dune systems. It is supposed to be associated with smutted chalk false-brome *Brachypodium rupestre* but is also found in regions where this species appears to be absent, so other Poaceae are also presumably hosts. The larvae develop in the flower spikes attacked by the fungi, where they feed on the fungal spore mass.	Currently widespread throughout much of England, although not in the north or extreme south-west.	70,265km²	1024km²	73	152	257

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				estimated at 70,265km², which far exceeds the maximum threshold for designation as threatened IUCN Vulnerable. B2: Post-1989 AOO is 257 tetrads (1028km²), which potentially places the species in the Vulnerable category. However, the number of modern locations is more than 10, there is no decline in either habitat or population and no extreme fluctuations known, and no severe fragmentation evident either, so the species fails to qualify for threat status under the criteria here. C: The current data does not allow for population estimates. D: The current data does not allow for population estimates, although the population is very likely to exceed 10,000 individuals and there are more than 5 modern locations. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.										
Phalacridae	*Phalacrus substriatus*	NT		Apparently currently found in northern and western England and Scotland only (with the exception of an odd outlier in South Lincolnshire). IUCN A: There is no decline in AOO evidenced in the 10-year and 40-year graphs, but these are based on so little data that they are unreliable and analysis under Criterion A is rendered impossible. B1: Post-1989 EOO is estimated at 20,700km². This estimate only just exceeds the maximum threshold for designation as threatened IUCN Vulnerable, so other factors should be considered here. The population is not evidenced to be severely	NR	E	S		A species which appears to be restricted in modern times, to upland and montane moorland habitat where the larvae are thought to feed on smutted inflorescences of glaucous sedge *Carex flacca*. Adults have been associated with the flowers of bog asphodel *Narthecium ossifragum*, an association in keeping with the current northern and western distribution in Britain.	A predominantly northern and western species, according to post-1989 data, although it is curiously absent from Wales, and there is also a recent record for Lincolnshire, TF11, which has been left out of the analysis as a significant outlier. Older records, if reliable, indicate a much wider distribution in England.	20,700km²	40 (44) km²	9 (-11)	8 (9)	10 (11)

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				fragmented but little data is available; there are 10 or possibly 11 modern locations, no continuing decline evidenced by the graphs of AOO, though confidence in these is low due to the small number of data available, and no extreme fluctuations are known. The species essentially fails to qualify for threat status under Criterion B1, but it is close to qualifying. B2: Post-1989 AOO is 10 or 11 tetrads (40-44km²), which potentially places the species in the Endangered or Vulnerable categories. However, for the reasons cited in B1 above, the species just fails to qualify for threat status under the criteria here. C: The current data does not allow for population estimates. D1: The current data does not allow for population estimates, although the population might possibly be lower than 1,000 individuals, D2: The species fails to qualify under D2 because the AOO is greater than 20km², there are more than 5 modern locations and there is no plausible future threat to the population. E: not applied as there are no quantitative population analyses for this species. Conclusion: It is considered that the species is close to qualifying for Vulnerable status under criteria B1 and B2, so a status of Near Threatened is appropriate.									

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
Phalacridae	*Stilbus atomarius*	VU	D2	Highly localised and currently known from only three locations (4 sites). Formerly more widespread across southern England, but some older records may be unreliable. IUCN A: There is very little available data; only 8 records since 1989, two of which are from the same date and locality. Thus, analysis under criterion A is rendered impossible. B1: Post-1989 EOO is estimated at 4,045km² (this calculation includes negligible coastal area). This estimate places the species potentially in the IUCN threat categories of Endangered and Vulnerable. The population is not evidenced to be severely fragmented but little data is available – the three locations are certainly separated by a distance greater than the dispersal flight of the species, but it is not thought that more than 50% of the habitat within the AOO is not large enough to support populations of the species and furthermore, the (meta-)population dynamics are not understood. There are less than 5 current locations. The data sample size is too small to have any confidence in detecting declines or fluctuations in the populations, and the quality of the habitat at least two of the locations is maintained by sympathetic fen conservation and restoration management so is not thought to be deteriorating at a significant rate. Data for the other sites is not available. The species cannot be fully assessed for threat status under Criterion B1, but it is close to qualifying and may do so if more data is forthcoming by way of research into the	NR	E			A species of fens, marshes and ditch sides which is associated with Typha (reedmace). The adults and larvae are found primarily in fungoid decaying vegetation, such as dead Typha stems and reed fen litter.	Highly localised. Restricted to three locations (four sites) in England: Woodbastwick and Reedham Fens in East Norfolk, Lopham Fen in East Suffolk and Lewes Brooks in East Sussex.	4,045km²	20km²	11 (? all reliable)	3	5

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				population. B2: Post-1989 AOO is 5 tetrads (20km²), which potentially places the species in the Endangered or Vulnerable categories. However, for the reasons cited in B1 above, the species cannot be fully assessed under the criteria here. C: The current data does not allow for population estimates. D1: The current data does not allow for population estimates, although the population is likely to be lower than 1,000 individuals. D2: The species qualifies under D2 for the following reasons: there are less than 5 modern locations and there is a plausible future threat to the East Norfolk and East Suffolk populations through water extraction and lowering water tables, through the impact of inflow of brackish water from tidal events (e.g. tidal storm surge in 2014 killed many thousands of fish in the Broads due to saltwater inflow along the River Bure), from flooding, and also from contamination in the groundwater of run-off and seepage pollutants from farming practices on adjacent arable land. The East Sussex location is also potentially susceptible to at least some of these threats. E: not applied as there are no quantitative population analyses for this species. Conclusion: Vulnerable D2. The species may also qualify in future under Criteria A and B, should there be adequate data with which to undertake reliable statistical analysis.									

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
Phalacridae	*Stilbus oblongus*	LC		Widespread, but with habitat restricted to wetland sites where Typha is present (and also Phragmites?); in distribution, found throughout much of England and South Wales. IUCN A: There is a sharp decline in AOO observed in the last 10-year period as evidenced in the graph. This 21.82% decline falls below the 30% minimum threshold value that would place the species in the IUCN threat category Vulnerable under criteria A2,3 and 4, so the species fails to qualify as threatened under criterion A. The last 40-year period graphs of change in AOO and EOO both indicate increases in area. B1: Post-1989 EOO is estimated at 78,563km², which far exceeds the maximum threshold for designation as threatened. B2: Post-1989 AOO is 145 tetrads (580km²), which potentially places the species in the IUCN Vulnerable category. However, although there is an indication of continuing decline in the 10-year graph of AOO (in the 40-year period AOO graph, there is, conversely an increasing AOO), there is no indication of fragmentation, nor of population fluctuations and the number of modern locations is more than 10, so the species fails to qualify for threat status under the criteria here. C: The current data does not allow for population estimates. D1: The current data does not allow for population estimates, although the population is certain to exceed 1,000 individuals. D2: the AOO is more than 20km² and there are more than 5 locations. E: not applied as	none	E		W	A species of fens, marshes and ditch and pool edges which is associated with Typha (reedmace). The adults and larvae are found primarily in fungoid decaying vegetation, such as dead Typha stems and reed fen litter.	Widespread in England (north to north midlands) and South Wales.	78,563km²	580km²	46	103	145

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
				there are no quantitative population analyses for this species. Conclusion: Least Concern.											
Phalacridae	*Stilbus testaceus*	LC		Widespread with no habitat restrictions; in distribution, found throughout much of England and Wales. Formerly known from Scotland, but only from one historical record which may be in error. IUCN A: There is no decline evidenced in the 10-year and 40-year graphs of AOO or in the last 40-year period graph of change in EOO. B1: Post-1989 EOO is estimated at 105,930km², which far exceeds the maximum threshold for designation as threatened. B2: Post-1989 AOO is 1072 tetrads (4288km²), which far exceeds the maximum threshold for designation as threatened. C: The current data does not allow for population estimates, but the population is very likely to exceed 10,000 individuals. D: The current data does not allow for population estimates, although the population is likely to exceed 10,000 individuals. E: not applied as there are no quantitative population analyses for this species. Conclusion: Least Concern.	none	E	S (?)	W	Ubiquitous within its range, occurring in a wide variety of habitats including wetland sites where it can, like other members of the genus, be beaten off emergent vegetation and recorded from wet litter. The species can be particularly frequent in grass heaps and hay refuse. Little is known of its biology, but the adults and larvae are likely to feed on decaying organic matter or the moulds associated with decaying vegetation. Adults are visitors to MV and actinic light traps.	Widespread throughout England and Wales as far north as Yorkshire	105,931km²	4,288km²	236	474	1072

Family	Taxon	New British IUCN Status	Qualifying IUCN Criteria	Rationale	New British Rarity status (2021)	Presence in England	Presence in Scotland	Presence in Wales	Ecology	Current Range	Current EOO – post 1989	Current AOO – post 1989	AOO (hectads) <1990	AOO (hectads) 1990-2020	AOO (tetrads) 1990-2020
Ptilodactylidae	*Ptilodactyla exotica*	NA		The species is certainly introduced and has only become established under synanthropic conditions. Conclusion: Not Applicable	none	E			This is an exotic, introduced species which is probably native to Mauritius. It was first recorded in Britain in the Palm House at Kew Gardens, Surrey, in 1990 (Mann 2006) and has since been discovered in artificially heated indoor premises at Whipsnade Zoo and also in heated glasshouses in Cambridge. The species has been introduced also into mainland Europe in recent years. The larval development takes place in soil with a high humidity, where the larvae feed on fungal spores. Adults are particularly active in the evening.	n/a	n/a	n/a	0	3	5

Appendix 2. Summary of IUCN Criteria

Table 2.1 Summary tables of the five criteria (A to E) used to evaluate if a taxon belongs in a threatened category (Critically Endangered, Endangered or Vulnerable).

Criteria	Critically Endangered	Endangered	Vulnerable
A. Population reduction			
A1	≥ 90%	≥ 70%	≥ 50%
A2, A3 & A4	≥ 80%	≥ 50%	≥ 30%
A1. Population reduction observed, estimated, inferred, or suspected in the past where the causes of the reduction are clearly reversible **AND** understood **AND** have ceased, based on and specifying any of the following: **(a)** direct observation **(b)** an index of abundance appropriate to the taxon **(c)** a decline in area of occupancy (AOO), extent of occurrence (EOO) and/or habitat quality **(d)** actual or potential levels of exploitation **(e)** effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.			
A2. Population reduction observed, estimated, inferred, or suspected in the past where the causes of reduction may not have ceased **OR** may not be understood **OR** may not be reversible, based on (a) to (e) under A1.			
A3. Population reduction projected or suspected to be met in the future (up to a maximum of 100 years) based on (b) to (e) under A1.			
A4. An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a maximum of 100 years in future), and where the causes of reduction may not have ceased **OR** may not be understood **OR** may not be reversible, based on (a) to (e) under A1.			

Criteria	Critically Endangered	Endangered	Vulnerable
B. Geographic range in the form of either B1 (extent of occurrence) AND/OR B2 (area of occupancy)			
B1. Extent of occurrence (EOO)	<100km²	<5,000km²	<20,000km²
B2. Area of occupancy (AOO)	<10km²	<500km²	<2,000km²
AND at least 2 of the following:			
(a) Severely fragmented, **OR**			
Number of locations	= 1	≤ 5	≤ 10
(b) Continuing decline observed, estimated, inferred or projected in any of: **(i)** extent of occurrence; **(ii)** area of occupancy; **(iii)** area, extent and/or quality of habitat; **(iv)** number of locations or subpopulations; **(v)** number of mature individuals.			
(c) Extreme fluctuations in any of: **(i)** extent of occurrence; **(ii)** area of occupancy; **(iii)** number of locations or subpopulations; **(iv)** number of mature individuals.			

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

Criteria	Critically Endangered	Endangered	Vulnerable
D. Very small or restricted population			
Either:			
Number of mature individuals	<50	<250	**D1.** <1,000
D2. *Only applies to the VU category*. Restricted area of occupancy or number of locations with a plausible future threat that could drive the taxon to CR or EX in a very short time.			**D2.** typically: AOO <20km² or number of locations ≤5

Criteria	Critically Endangered	Endangered	Vulnerable
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