Natural England Commissioned Report NECR235

A review of the status of the beetles of Great Britain

The clown beetles and false clown beetles - Histeridae and Sphaeritidae

Species Status No. 32

First published 30th August 2017

www.gov.uk/natural-england

Foreword

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

Background

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 Histeridae and Sphaeritidae. It covers all species in these groups, 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: LANE, S.A, 2017. A review of the status of the beetles of Great Britain - The clown beetles and false clown beetles - Histeridae and SphaeritidaeNatural England. Commissioned Reports, Number235

Natural England Project Manager - Jon Webb, **jon.webb@naturalengland.org.uk**

Author- Steve A. Lane

Contractor - Steve A. Lane

Keywords - Histeridae, Sphaeritidae, clown beetles, false clown beetles, invertebrates, red list, IUCN, status reviews

Further information
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ISBN 978-1-78354-436-3

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1.1 The Species Status project

The Species Status project is a recent initiative, providing up-to-date assessments of the threat status of taxa using the internationally accepted Red List guidelines developed by the International Union for Conservation of Nature (IUCN) IUCN Standards and Petitions Subcommittee, 2014); (IUCN, 2012a; 2012b). It is the successor to the Joint Nature Conservation Committee (JNCC) Species Status Assessment project (http://jncc.defra.gov.uk/page-3352) which ended in 2008. This publication is one in a series of reviews to be produced under the auspices of the new project.

Under the Species Status project, the UK's statutory nature conservation agencies, specialist societies and NGOs will initiate, resource and publish Red Lists and other status reviews of selected taxonomic groups for Great Britain. All publications will explain the rationale for the assessments made. The approved threat statuses will be entered into the JNCC spreadsheet of species conservation designations (http://jncc.defra.gov.uk/page-3408).

1.2 The status assessments

This Review adopts the procedures recommended for the regional application of the IUCN threat assessment guidelines which can be viewed at IUCN (2012b). http://cmsdocs.s3.amazonaws.com/keydocuments/Reg_Guidelines_en_web%2Bcover%2Bbackcover.pdf Section 3 and Appendix 1 provide further details. This is a two-step process, the first identifying the taxa threatened in the region of interest using information on the status of the taxa of interest in that region (IUCN, 2012), the second amending the assessments where necessary to take into account interaction with populations of the taxon in neighbouring regions (IUCN Standards and Petitions Subcommittee, 2014; http://cmsdocs.s3.amazonaws.com/RedListGuidelines.pdf).

In addition, but as a separate exercise, the Great Britain Rarity System, used for assessing rarity and based solely on distribution, is used alongside the IUCN system.

1.3 Species status and conservation action

Sound decisions about the priority to attach to conservation action for any species should primarily be based upon objective assessments of the degree of threat to the survival of a species. This is conventionally done by assigning the species to one of the IUCN threat categories although the IUCN (2014) point out that a category of threat is often not sufficient to determine priorities for conservation action. However, the assessment of threats to survival should be separate and distinct from the subsequent process of deciding which species require action and what activities and resources should be allocated.

2. Introdcution to the Beetles review

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

The Histeridae and Sphaeritidae are a well-defined and easily recognisable group of beetles. However, difficulty can be experienced with the identification of some of the genera. Many of the species are to be found only in dung, decomposing fungi or carrion and many are also of very similar form and are unicolorous black, making them relatively unpopular with coleopterists compared to groups such as the larger leaf beetles (Chrysomelidae), weevils (Curculionoidea), stag beetles and chafers (Lucanidae, Scarabaeidae) and longhorn beetles (Cerambycidae).

2.1 Taxa selected for this Review

Table 1 summarises the 54 taxa included in this Review. Nomenclature follows Duff (2012), except for the recent addition to the British fauna *Platysoma elongatum* (Thunberg, 1787). These taxa have very recently become the subject of a British national recording scheme, coordinated by the Biological Records Centre. The work of this scheme includes the collation of information from the following data sources:

- historic records published in local and national journals;
- published county reviews;
- voucher specimens in local and national museums;
- records arising from the activity of the biological recording community.

Table 1. Distribution across higher taxonomic groupings of the taxa selected for review.

Order	Family	Species
Coleoptera	Sphaeritidae	*Sphaerites glabratus* (Fabricius, 1792)
	Histeridae	*Abraeus granulum* Erichson, 1839
		Abraeus perpusillus (Marsham, 1802)
		Acritus nigricornis (Hoffmann, J., 1803)
		Acritus homoeopathicus Wollaston, 1857
		Aeletes atomarius (Aubé, 1842)
		Atholus bimaculatus (Linnaeus, 1758)
		Atholus duodecimstriatus (Schrank, 1781)
		Carcinops pumilio (Erichson, 1834)
		Dendrophilus punctatus (Herbst, 1792)
		Dendrophilus pygmaeus (Linnaeus, 1758)
		Dendrophilus xavieri Marseul, 1873
		Epierus comptus Erichson, 1834
		Gnathoncus buyssoni Auzat, 1917
		Gnathoncus communis (Marseul, 1862)
		Gnathoncus nannetensis (Marseul, 1862)
		Gnathoncus rotundatus (Kugelann, 1792)
		Haeterius ferrugineus (Olivier, 1789)

		Halacritus punctum (Aubé, 1843)
		Hister bissexstriatus Fabricius, 1801
		Hister illigeri Duftschmid, 1805
		Hister quadrimaculatus Linnaeus, 1758
		Hister quadrinotatus Scriba, 1790
		Hister unicolor Linnaeus, 1758
		Hololepta plana (Sulzer, 1776)
		Hypocaccus crassipes (Erichson, 1834)
		Hypocaccus dimidiatus (Illiger, 1807)
		Hypocaccus metallicus (Herbst, 1792)
		Hypocaccus rugiceps (Duftschmid, 1805)
		Hypocaccus rugifrons (Paykull, 1798)
		Kissister minimus (Laporte, 1840)
		Margarinotus brunneus (Fabricius, 1775)
		Margarinotus marginatus (Erichson, 1834)
		Margarinotus merdarius (Hoffmann, J., 1803)
		Margarinotus striola (Sahlberg, C.R., 1819)
		Margarinotus obscurus (Kugelann, 1792)
		Margarinotus neglectus (Germar, 1813)
		Margarinotus purpurascens (Herbst, 1792)
		Margarinotus ventralis (Marseul, 1854)
		Myrmetes paykulli Kanaar, 1979
		Onthophilus punctatus (Müller, O.F., 1776)
		Onthophilus striatus (Forster, 1771)
		Paromalus flavicornis (Herbst, 1792)
		Paromalus parallelepipedus (Herbst, 1792)
		Platysoma elongatum (Thunberg, 1787)
		Plegaderus dissectus Erichson, 1839
		Plegaderus vulneratus (Panzer, 1796)
		Saprinus aeneus (Fabricius, 1775)
		Saprinus immundus (Gyllenhal, 1827)
		Saprinus planiusculus Motschulsky, 1849
		Saprinus semistriatus (Scriba, 1790)
		Saprinus subnitescens Bickhardt, 1909
		Saprinus virescens (Paykull, 1798)
		Teretrius fabricii Mazur, 1972

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

2.2 Previous reviews

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

The first account of threatened British Coleoptera was included in the British Red Data Books: 2. Insects (Shirt, 1987). This listed 546 of the total British beetle fauna of some 3900 species, which equates to 14% having a conservation status of threat. Shirt used 5 Categories (Endangered, Vulnerable, Rare, Out of Danger and Endemic) as well as 'Appendix' which

concerned extinct species formerly native to Britain but not recorded since 1900. These categories were assigned by count data only. Magnitude of decline was not considered. Data sheets were only provided for each of the Category 1 (Endangered) and 2 (Vulnerable) species. The list of species covered in the present Review by category from Shirt (1987), allowing for taxonomic changes which have occurred since 1987 (see Duff, 2012 for changes) is provided in Table 2.

Table 2. Histeridae and Sphaeritidae Red List assignments after Shirt (1987).

FAMILY	SPECIES	CATEGORY
Sphaeritidae	*Sphaerites glabratus* (Fabricius, 1792)	*RDB3: Rare*
Histeridae	*Aeletes atomarius* (Aubé, 1842)	*RDB3: Rare*
	Acritus homoeopathicus Wollaston, 1857	*RDB3: Rare*
	Epierus comptus Erichson, 1834	*RDB3**
	Haeterius ferrugineus (Olivier, 1789)	*RDB3: Rare*
	Hister illigeri Duftschmid, 1805	*APPENDIX: Extinct*
	Hister quadrimaculatus Linnaeus, 1758	*RDB2: Vulnerable*
	Hister quadrinotatus Scriba, 1790	*APPENDIX: Extinct*
	Hypocaccus metallicus (Herbst, 1792)	*RDB2: Vulnerable*
	Hypocaccus rugiceps (Duftschmid, 1805)	*RDB2: Vulnerable*
	Margarinotus obscurus (Kugelann, 1792)	*RDB2: Vulnerable*
	Paromalus parallelepipedus (Herbst, 1792)	*RDB1: Endangered*
	Saprinus subnitescens Bickhardt, 1909	*APPENDIX: Extinct*
	Teretrius fabricii Mazur, 1972	*RDB1+: Endangered, believed to be extinct*

The Category RDB3* denotes a species which is believed to be rare but is too recently discovered or recognised to be certain of placing. The Category RDB1+ given to *Teretrius fabricii* denotes a Category 1 species believed to be extinct (and recorded since 1900). The Category APPENDIX is reserved for those taxa that were formerly native to Britain but had not been recorded since 1900.

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

The British Red Data Book volume was followed by the publication of *A review of the scarce and threatened beetles of Great Britain Part 1* (Hyman (revised Parsons), 1992) and *Part 2* (Hyman (revised Parsons), 1994) which reviewed the status for all British beetles and presented data sheets for all scarce and threatened terrestrial species. Hyman (revised Parsons) expanded on Shirt's Categories, but retained Categories RDB1, 2, 3, Category 5 and 'Appendix' with their criteria. He also introduced additional categories, those for Red Data Book Indeterminate (RDBI), Red Data Book Insufficiently Known (RDBK), Nationally Scarce Category A (Notable A), Nationally Scarce Category B (Notable B) and Nationally Scarce (Notable). As with Shirt (1987), the magnitude of decline was not considered in the evaluation of status. Data sheets for aquatic beetles were not included, although for IUCN Categorised species, data sheets have subsequently been provided by Foster (2010). The list of species covered in the present Review by category from Hyman (revised Parsons), (1992) allowing for taxonomic changes which have occurred since 1992 (see Duff, 2012 for changes) is provided in Table 3.

Table 3. Rarity and scarcity categories assigned by Hyman (revised Parsons) (1992) for species in the Status Review of Histeridae and Sphaeritidae.

FAMILY	SPECIES	CATEGORY
Sphaeritidae	*Sphaerites glabratus* (Fabricius, 1792)	RDB3: Rare
Histeridae	*Abraeus granulum* Erichson, 1839	Na Notable
	Acritus homoeopathicus Wollaston, 1857	RDB3: Rare
	Aeletes atomarius (Aubé, 1842)	RDB3: Rare
	Epierus comptus Erichson, 1834	RDBK
	Gnathoncus buyssoni Auzat, 1917	Na Notable
	Haeterius ferrugineus (Olivier, 1789)	RDBI: Indeterminate
	Halacritus punctum (Aubé, 1843)	RDBK: Insufficiently Known
	Hister bissexstriatus Fabricius, 1801	Nb Notable
	Hister illigeri Duftschmid, 1805	EXTINCT
	Hister quadrimaculatus Linnaeus, 1758	RDBK: Insufficiently Known
	Hister quadrinotatus Scriba, 1790	EXTINCT
	Hypocaccus dimidiatus (Illiger, 1807)	Nb Notable
	Hypocaccus metallicus (Herbst, 1792)	RDB3: Rare
	Hypocaccus rugiceps (Duftschmid, 1805)	Na Notable
	Hypocaccus rugifrons (Paykull, 1798)	Nb Notable
	Margarinotus marginatus (Erichson, 1834)	Nb Notable
	Margarinotus obscurus (Kugelann, 1792)	RDB1: Endangered
	Myrmetes paykulli Kanaar, 1979	Nb Notable
	Onthophilus punctatus (Müller, O.F., 1776)	RDBK: Insufficiently Known
	Paromalus parallelepipedus (Herbst, 1792)	RDB1: Endangered
	Plegaderus dissectus Erichson, 1839	Nb Notable
	Saprinus immundus (Gyllenhal, 1827)	Nb Notable
	Saprinus planiusculus Motschulsky, 1849	Nb Notable
	Saprinus subnitescens Bickhardt, 1909	EXTINCT
	Saprinus virescens (Paykull, 1798)	RDBK: Insufficiently Known
	Teretrius fabricii Mazur, 1972	RDB1: Endangered

2.3 This Review

The present Review provides an up to date assessment of the status of the Histeridae and Sphaeritidae beetle families in the universally adopted format for the assessment of threat in any taxa. The IUCN Guidelines have been revised (IUCN, 1994) and subsequently updated (IUCN, 2012a): the criteria for threat categories concentrate on imminent danger of regional extinction whereas the older, non-IUCN criteria for Nationally Rare and Nationally Scarce relate to the restriction of geographic distribution within Great Britain without taking any account of trends, whether for increase or decline. Much new information on distribution and trends has become available since the publication of Shirt (1987) and Hyman (revised Parsons) (1992; 1994). This Review revises the status assigned to many species in the earlier reviews and several nomenclatural changes have been incorporated in accordance with the latest checklist (Duff, 2012).

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

3.1 Summary of the 2001 Threat Categories

It is necessary to have a good understanding of the rationale behind red listing and the definitions used in the red listing process. This is because these definitions may differ from standard ecological definitions e.g. "populations" or have very specific meanings e.g. "inferred". Details regarding methods and terminology are contained in the *Guidelines for Using the IUCN Red List Categories and Criteria* (IUCN 2014; http://www.iucnredlist.org/documents/RedListGuidelines.pdf). This is summarised without any detail in *IUCN Red List Categories and Criteria: Version 3.1* (IUCN 2012a; h HYPERLINK "http://cmsdocs.s3.amazonaws.com/keydocuments/Categories_and_Criteria_en_web%2Bcover%2Bbckcover.pdf"ttp://cmsdocs.s3.amazonaws.com/keydocuments/Categories_and_Criteria_en_web%2Bcover%2Bbckcover.pdf). 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; http://cmsdocs.s3.amazonaws.com/keydocuments/Reg_Guidelines_en_web%2Bcover%2Bbackcover.pdf).

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

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

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).
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.

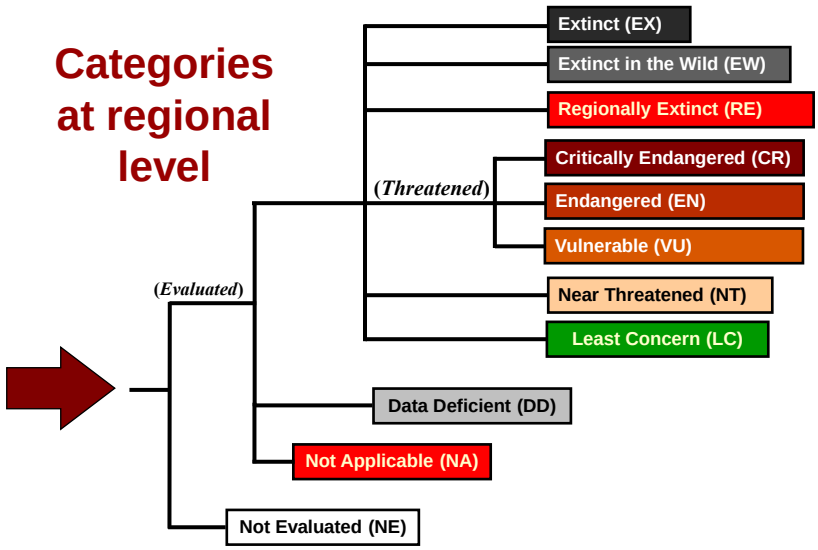

Figure 1. Hierarchical relationships of the categories adapted from IUCN (2001)

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-E, that reflect

varying degrees of threat of extinction, with a number of sub-criteria within A, B and C (and an additional sub-criterion in D for the *Vulnerable* category), any one of which qualifies a taxon for listing at that level of threat. A taxon therefore need not meet all of the criteria A-E, but must be tested against all five criteria. The taxon should then be listed against the highest threat category for one or more of the five criteria. The qualifying thresholds within the criteria A-E are detailed in Appendix 2: IUCN Criteria and Categories.

Status evaluation procedure relies on an objective assessment of the available evidence. Understanding data uncertainty and data quality is essential when applying the criteria. However, it is not always possible to have detailed and relevant data for every taxon. For this reason, the Red List Criteria are designed to incorporate the use of inference and projection, to allow taxa to be assessed in the absence of complete data. Although the criteria are quantitative in nature, the absence of high-quality data should not deter attempts at applying the criteria. In addition to the quality and completeness of the data (or lack of), there may be uncertainty in the data itself, which needs to be considered in a Red List assessment (data uncertainty is discussed in section 3.2; IUCN 2014). 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 2014).

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. See Table 4 for details.

3.1.2 The use of the Near Threatened category

The IUCN guidelines recognise a *Near Threatened* category to identify taxa that need to be kept under review to ensure that they do not further decline to become Threatened. This category would be best considered for those taxa that come close to qualifying as CR, EN or VU but not quite; i.e. meets 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 two-stage process in relation to developing a Red List

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

3.2 Application of the Guidelines to the Histeridae and Sphaeritidae

3.2.1 Use of criteria in this Review

The IUCN process requires that each species is evaluated against all 5 criteria.

Data concerning British invertebrates have been collected since the 19th century in a presence absence form. Often there is only enough information to identify the median point in the overall number of records gathered and compare presence/absence 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 – 1996 and so forth).

An attempt was made to assess all taxa against Criterion A, but an assessment was found to be viable in only one instance - for *Acritus homoeopathicus, with* just nine records.

Criterion B applies the concept of spatial decline assessed by locations occupied (AoO) over a given period. The Invertebrate Inter Agency Working Group has defined the following for the use of B2bii which is commonly used in invertebrate reviews. Continuing decline has to be demonstrated, and proven that it isn't an artefact of under-recording. If decline is demonstrated then the reviewer needs to consider whether or not B2a (and B2c if the data are present) is met:

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

Criterion B was successfully applied to one taxon in the group.

Criterion C utilises numerical true values and estimates for populations. Analysis of the data across the taxonomic group shows that none is currently suitable for applying Criteria C.

Criteria D was successfully applied to several taxa which are restricted to a small number of locations and for which at least one clear threat is perceived.

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

3.2.2 Scale for calculating decline and area

The IUCN have recommended a scale of 4km^2 (a tetrad) as the reference scale (IUCN, 2014). This needs to be applied with caution and there will be instances where a different scaling may be more applicable, or where attempting to apply any scale is extremely difficult. It should be noted that, historically, invertebrate datasets used hectads (10km^2) as the default

scale. Old records (e.g. pre 1950) have usually only been recorded at this scale. This means that, for some taxa, comparative declines can only be made at this scale. Hectads are also used to determine the Great Britain Rarity Status, and are therefore still usefully recorded. For rarer, more restricted, taxa the tetrad is more applicable, in particular those taxa which may occur on a few fragmented sites within the UK and/or whom are often restricted to certain, well-defined habitat types that are easily identified. Tetrads have therefore been recorded for taxa that qualify as Critically Endangered (CR), Endangered (EN) or Vulnerable (VU) and future reviews should make efforts to record all taxa at both the hectad and tetrad scale.

Rate of Decline is used in Criteria A, B & C to assess threat status. For Criterion A and C1 a decline threshold is related to a specific number of years. For Criterion A it is the last ten years or the period of three generations, whichever is longer, and for Criterion C1 precisely the longer of 3 years or 1 generation, or 5 years and 2 generations or 10 years and 3 generations (exceptionally up to 100 years for long-lived species such as *Margaritifera margaritifera*). [Criterion A is usually dependent on a pattern of decline in population size over the last 10-year period (unless quality data exist to prove significant former decline or projected future decline). Where data are patchy, this decline can be calculated from an estimate over a non-contemporary time interval providing, significantly, that a decline can be demonstrated, be it exponential, linear or otherwise. Decline (particularly linear decline) is easy to establish for taxa that have been the subject of repeated and regular population counts, where constant monitoring protocols or controlled sampling procedures have been adopted. Examples might be transect butterfly counts, MV-light trapping of moth species over a prolonged period at regular intervals at a specific location and regular bird count and nesting surveys. The Histeridae and Sphaeritidae without exception, have not been sampled with this degree of regularity or control and as a consequence, the data are often too few to establish a rate of decline. Criterion C1 likewise utilises population size decline measured over specific time intervals but places more emphasis on population counts referring throughout to the number of mature individuals.

Criterion B also relies on a pattern of continuing decline, this time with the emphasis on geographical range of the taxon. The number of hectads (older data is often only given to hectad resolution and is therefore not suitable for use in determining AoO at tetrad level) is calculated for several pre-determined periods. The degree of accuracy with which the location is recorded is variable and often imprecise. For example, *Hister quadrimaculatus* is represented by 57 records in the National database, of which 36 (63%) are referenced at best by a single hectad and in 10 instances (18% of the records for this taxon), by a possibility of several hectads for a record or simply a district i.e. 'London' and 'Gloucester'. Likewise, in a much better-recorded species, *Dendrophilus pygmaeus*, the number of records represented only at hectad level or larger is 47 of a total of 96, approximately 49%. If a decline is apparent in this initial main recording period analysis, reference to a later 'contemporary' time period may be used to reinforce or weaken the suggestion of a decline. The quality of the data in the contemporary time period is invariably better than that in the earlier date class and usually allows us to consider AoO (Area of Occupancy) to tetrad detail or better. In this latter

date period, the number of locations is also calculated for taxa recorded from 15 or fewer hectads. The resulting figures are used for application of the spatial distribution Criteria under B.

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

3.2.3 Taxa applicable to this Review

Taxa with wild populations inside their natural range and a long-term presence (since 1500 AD) in Britain were considered for review. All other taxa deemed to be ineligible for assessment at a regional level, e.g. non-natives, were placed in the category of **'Not Applicable (NA)'** and included recent colonists (or attempted colonists) responding to the changing conditions available in Britain as a result of human activity and/or climate change.

3.2.4 Knowledge about immigration and emigration effects for this group

The review process includes consideration of the relative isolation of the regional population, the proximity and the population dynamics of conspecific populations if they exist and the presence of barriers to immigration of neighbouring populations. The author is not aware of any research on this subject within the Histeridae and Sphaeritidae, both taxonomically and geographically (North Temperate region). None of the species in this taxonomic group are endemic in our region. None of our populations are known to be augmented by migrants from mainland European populations, although this might be shown to occur with any future research in this field. Within the confines of our current knowledge it is safe to assume that there is no such movement and therefore no perceived 'rescue effect' by conspecific populations for the taxa which are IUCN categorised in our region.

4 GB Rarity Status categories and criteria

At the national level, countries are permitted under the IUCN guidelines to refine the definitions for the non-threatened categories and to define additional ones of their own. The Nationally Rare and Nationally Scarce categories adopted by this Review are unique to Britain. Broadly speaking, the Nationally Rare category is equivalent to the Red Data Book categories used by Hyman (revised Parsons) (1992, 1994), namely: Endangered (RDB1), Vulnerable (RDB2), Rare (RDB3), Insufficiently Known (RDBK), Indeterminate (RDBI) and Extinct. The Nationally Scarce category is directly equivalent to the combined Nationally Notable A (Na) and Nationally Notable B (Nb) categories used in the assessment of various taxonomic groups (e.g. by Hyman (revised Parsons) (1992) in assessing the status of beetles) but never used in a published format to assess the Histeridae and Sphaeritidae solely.

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

Great Britain Rarity Status	
Nationally Rare	A native species 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 native species recorded from between 16 - 100 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 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).

The choice of the date class as the start of the modern recording period for the Histeridae and Sphaeritidae is discussed in Section 6.

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.

5. Methods and sources of information

5.1 Introduction

The most recent published list of scarce and threatened beetles (Hyman (revised Parsons) 1992, 1994) was based on the Red Data Book criteria used in the British Insects Red Data Book (Shirt, 1987) with the addition of the category RDBK (Insufficiently Known) after Wells *et al*. (1983). The original IUCN criteria for assigning threat status used in these publications gave the categories Endangered, Vulnerable and Rare, which were defined rather loosely and without quantitative thresholds. The application of these categories was largely subjective, and it was not easy to apply consistently within a taxonomic group or to make comparisons between groups of different organisms.

5.2 Data sources

This Review's author assessed the status of all 54 British species of clown beetles and the species *Sphaerites glabratus* using the information sources described in this section and the system described in Sections 3 and 6. During this process, the views of a number of other specialists (listed in Acknowledgements) were sought.

A key source is the dataset collated by the Biological Records Centre (BRC). The BRC is supported by the Joint Nature Conservation Committee and the Centre for Ecology and Hydrology. The work of the BRC is a major component of the National Biodiversity Network Gateway (NBN). The BRC dataset when received by the author contained approximately 4,800 records. This dataset was interrogated for mistakes, and potentially erroneous records were highlighted and followed up. Data were then requested through the beetles-britishisles yahoo group. This group, founded by Andrew Duff in 1999, has over 370 members, many of whom are Coleopterists active in the field. Historical data were also sourced from a small number of Museum Collections and from selective literature searches.

The resulting dataset used in this Review contains approximately 10,500 records, the bulk of which has come directly to the author from coleopterists with experience of particular geographical areas. It is important to acknowledge the considerable contribution made by all of these recorders.

As a result of processing the data for this Review, the author decided to initiate a National Recording Scheme for Histeridae and Sphaeritidae. The dataset produced for the Review will be used as the basis for that scheme's data.

For species attaining IUCN or GB Rarity Status, data were more intensely scrutinized and records considered unreliable were discounted. However, a small number of these records are mentioned in the Species Accounts and elsewhere in this Review where informative.

6. The assessments

6.1 The data table

The key outcome of this Review is the generation of a table which lists all of the taxa in the beetle families covered. The full table has been produced as a stand-alone spreadsheet which accompanies this text. Appendix 1 provides an extract of the key data. The columns completed in the full accompanying Excel table are as follows:

Species name
GB IUCN status (2016)
Qualifying criteria
Rationale
Distribution Overview
GB Rarity status (2016)
GB Rarity status comments - these are currently written into the Rationale column
Moderated status - these are currently written into the Rationale column
Presence in:
- England
- Scotland
- Wales

Area of occupancy:
- Total number of hectads occupied for period up to and including 1989
- Total number of hectads occupied from period from 1990-2016
- Total number of dual hectads where species have been recorded from within the hectad in both date classes
- Tetrads 1990-2016, for species that qualify as NR (i.e. 15 or less hectads from 1990-2016)
- No. of locations, for species that qualify as NR (i.e. 15 or less hectads from 1990-2016)
- Total number of hectads occupied during fifteen year period 1986-2000
- Total number of hectads occupied during fifteen year period 2001-2015
- Total number of hectads occupied during ten year period 1976-1985
- Total number of hectads occupied during ten year period 1986-1995
- Total number of hectads occupied during ten year period 1996-2005

Total number of hectads occupied during ten year period 2006-2015
BRC concept code
NBN taxon number
Status in Shirt (1987)
Status in Hyman (revised Parsons) (1986)
Status in Hyman (revised Parsons) (1992)
Ecological account

6.2 Category columns introduced in this Review

6.2.1 Distribution overview.

Unlike a number of the invertebrate groups that have been the subject of IUCN Reviews to date (e.g. Carabidae, Chrysomelidae), the Histeridae and Sphaeritidae have not been the subject of a National Atlas publication. Whilst the NBN Gateway provides a representation of the National distribution, these data occasionally contain errors because there is currently no system to ensure that all of the data has been verified by specialists. The author therefore includes descriptions of the Regional distribution of each species in the Review and combines this with an historical account of records by geographical region (usually at vice-county level) where relevant.

6.2.3 Recent date ranges for hectad counts (columns denoting two recent 16-year periods and four recent 10-year periods).

The issue of 'continuing decline' is fundamental to the IUCN categorisation process. Several declines in the size and/or range of species in this group occurred historically (e.g. before 1950). The prescribed recording periods for hectad counts are $\leq$ 1989 and 1990-2016 (hereto referred to as the 'main recording period'). It is the author's opinion that in order to demonstrate that a species is undergoing 'continuing decline', evidence of current or recent decline is necessary and to achieve this, a more recent recording period is required. The choice of the years 2001-2015, and an equivalent, earlier period preceding this, of 1986-2000, provides a 30-year block of data which allows for the determination of recent trends. The 'main recording period' count provides vital information about the species' historical distribution and decline. It was applied to all species. The use of the more recent 30-year recording period in the analysis ensures that any 'false positives' arising from an analysis of change during the main recording period, can be identified and excluded.

A further, more detailed, measure of decline is used to detect recent decline for the purpose of applying Criterion A to the data. This is the introduction of the four recent ten year blocks of records: 1976-1985, 1986-1995, 1996-2005 and 2006-2015. Data from 2016 was not included in this recording period nor in the two 15-year blocks referred to earlier, because these recording periods were devised at the beginning of the review process in 2015, when the main data-counting was undertaken. It would necessitate complete re-evaluation of all species data if these recording blocks were to be redefined to accommodate the present year-2016.

However, data from 2016 is included in the Distribution overviews, Species Rationale column and in the 'main recording period' counts.

6.3 Other considerations

Habitat decline values can be used as a proxy for population declines for species that are strongly associated with specific habitat types. However, it should be acknowledged that evidence of habitat fidelity in most Histeridae and Sphaeritidae is generally anecdotal. Even where such fidelity exists, quantitative data on habitat declines are rarely available and the reviewer needs to work with very imperfect data.

A requirement of this Review is to assess whether any reduction in the Area of Occupancy represents a real decline or an apparent decline caused by a lower level of search effort (leading to a lack of data) in the later time period. Search effort (and hence data availability) is likely to vary considerably between taxonomic groups and for different species within taxonomic groups. Use of Criterion B2b for any taxon therefore demands a clear assessment of the available data in order for us to be confident in the scale or rate of any decline. The IUCN Guidelines state that: "A continuing decline is a recent, current or projected future decline (which may be smooth, irregular or sporadic) which is liable to continue unless remedial measures are taken.

Fluctuations will not normally count as continuing declines, but an observed decline should not be considered as a fluctuation unless there is evidence for this." It is clear then that a full review of the evidence is not essential but that it can be projected, much as the 'population reduction' criterion may rely on 'observed, estimated, inferred, projected or reduction'. The objective is to achieve consensus amongst the appropriate experts on the level of evidence available and to apply it pragmatically.

7 Downgraded, upgraded and excluded species

7.1 Downgraded and Upgraded species

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

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

Table 5a provides a list of species downgraded and the justification for downgrading since the publication of Shirt (1987) and Hyman (revised Parsons) (1992). Table 5b provides a list of species upgraded and the justification for upgrading since those same publications.

Table 5a. Species included in Hyman (revised Parsons) (1992) which are downgraded in this Review.

Scientific name	Shirt (1987)	Hyman (revised Parsons) (1992)	This review	Rationale for downgrading
Aeletes atomarius	RDB3: Rare	RDB3: Rare	NS	29 post-1990 hectads, and recorded from 20 of these between 2001-2015 inclusive. Increase is probably due to increased recorder effort at parkland and pasture woodland sites, improved knowledge of the habits of the species and also the probable increase in popularity of extraction techniques for dead-wood samples.
Plegaderus dissectus	-	Nb Notable	-	110 post-1990 hectads. Ditto the above comments for *Aeletes.*

Table 5b. Species included in Hyman (revised Parsons) (1992) which are upgraded in this Review.

Scientific name	Shirt (1987)	Hyman (revised Parsons)(1992)	This review	Rationale for upgrading
Dendrophilus pygmaeus	-	-	NS	Only recorded in 15 post-1990 hectads, a count that would normally place a taxon into the Nationally Rare category. In this case, however, the author believes that the species is likely to be under-recorded, particularly in Scotland and upland areas of Wales. A new British Rarity designation of Nationally Scarce recognises a possibly continuing decline and the much fragmented nature of its distribution in our region.
Hister bissexstriatus	-	Nb	NR	The species has been recorded from only 12 post-1990 hectads, but despite clear historic decline, there

				is no evidence that decline is continuing. In common with many species of the dung-feeding Scarabaeidae, the invertebrate prey of *Hister bissexstriatus* may be susceptible to livestock endectocide treatments. The beetle itself may be adversely affected by pasture 'improvement' management practices and to changes in grazing regimes which might impact negatively on dung-availability. Consequently, it is vulnerable in the broadest sense, but not to the degree of qualifying currently for Vulnerable IUCN status, although it may be a candidate in future Reviews.
Hypocaccus rugifrons	-	Nb	NR	Only recorded from 9 post-1990 hectads. Although this species appears to be more-or-less stable in terms of AoO occupied in the last 30 year period, it has undergone a dramatic decline historically with a 75% decrease in hectads occupied in the main hectad count period.
Saprinus aeneus	-	-	NS	This species has suffered a significant (mainly historical) decline, with a decrease of more than 57% of hectads in the main recording period. With only 43 post-1990 hectads the species has been elevated to Nationally Scarce status.
Saprinus immundus	-	Nb	NR	The species has declined significantly. With so little data, so few current sites and no monitoring of the populations, it is uncertain whether this decline is continuing. Its recent demise appears to have occurred 'off-radar', as Hyman (revised Parsons) as recently as 1992 only categorised it as Nb Notable. The species has been found at only three post-1990 locations and is thought by the author to be established at only two of these.
Teretrius fabricii	RDB1+	RDB1	Regionally Extinct	Last recorded in Britain in 1936.

7.2 Excluded species

The status of some species newly recorded in Britain or recorded after a protracted absence can be very difficult to ascertain. Most problematic are those species that could conceivably be on the edge of their natural range in Britain and only occur in a limited number of

locations to which they may equally have been introduced. The geographical position of Britain makes it inevitable that our fauna includes Western European, Northern European and even Central European species some of which are considered native, but others which are demonstrably present through introduction. It is important to recognise that lack of clear evidence of native status is not automatically taken to mean that a species has been introduced.

Where the presence of a species results from natural colonisation from the continent, they may be expected to continue to expand their distribution and records may occur from more than 50 hectads over the next few decades. Their natural range, or 'Extent of Occurrence' under the IUCN Guidelines expands with them, but they are not considered long-term residents in Britain and are therefore excluded from the IUCN categorisation. The precautionary principle suggests that they should not be afforded a regional conservation status unless the source population itself is threatened, which would seem unlikely in most cases, although climate change may impose such a threat.

Species excluded from assessment on the basis they are introduced non-natives, whether this is the result of accidental or deliberate importation, have been assigned to the category 'Not Applicable (NA)' as required under the IUCN Guidelines. Even where these species occur in 50 hectads or less, they have not been assessed for scarcity or rarity as they are not considered to be native to Britain. A list of the excluded species and the rationale for their exclusion is provided in Table 6.

Table 6. Species categorised as 'Not Applicable (NA)'.

Scientific name	Post-1990 hectads	Rationale for exclusion
Dendrophilus xavieri	1	This is a strictly synanthropic species of sporadic and transient occurrence in our region and has only been recorded in indoor situations (warehouses, mills and factories) often close to ports, where it has certainly been introduced. It originates from Japan, but is also present in North America.

8 Format of the species accounts

- **8.1 Information on the species accounts**

Species accounts have been prepared for each of the Regionally Extinct, Critically Endangered (Possibly Extinct), Critically Endangered, Endangered, Vulnerable and Near Threatened species as well as Data Deficient Species. These account for 20 of the 54 species on the British checklist; approximately 37% of our Histeridae and Sphaeritidae fauna. Previous Reviews have included species accounts for all Nationally Rare and Nationally Scarce taxa. It is beyond the scope of the current Review to include all of these for the Histeridae and Sphaeritidae.

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

- **8.2 The species name**

The nomenclature used in this Review follows the most recent checklist for the British fauna (Duff, 2012), unless otherwise stated. Under the Species Accounts where the name differs from that used by Hyman (revised Parsons) (1992) the previous name is indicated.

- **8.3 Identification**

The emphasis in the accounts, where possible, is on readily available English language publications covering the British Isles; work in other languages or from other/wider geographical areas is only referred to where no other options are available or where the non-English/wider work is more detailed or up-to-date. A small number of species are readily identifiable in the field (e.g. *Sphaerites, Hololepta, Atholus bimaculatus, Hister quadrimaculatus*) and with experience, identification of a few other British species (e.g. *Onthophilus, Atholus duodecimstriatus, Carcinops, Paromalus*) can be achieved in the field with a good hand lens. A microscope is required to identify and/or confirm the identitification for most taxa, particularly the smaller species; the genera *Acritus, Aeletes, Abraeus* and *Halacritus* and also the larger all-black *Hister* and *Margarinotus*. Dissection of the male aedeagus is desirable as a confirmatory character for the four *Gnathoncus* species, although with a good, reliable reference collection, it should be at least possible to assign females to the correct taxa.

Halstead (1963) and Duff (2012) are the standard works on the British fauna, but Joy (1932) can be surprisingly useful for his simplistic approach to the genera *Hister* and *Margarinotus* which are lumped together under *Hister*. There are some issues with the identification of *Gnathoncus* using Duff (2012) which may lead to misidentifications, so Halstead (1963) is currently preferred for this genus. The author is currently working with Duff on a re-write of identification of British *Gnathoncus*. Halstead (1963) is out of print, but can be downloaded

for free from the Royal Entomological Society website at http://www.royensoc.co.uk/content/out-print-handbooks.

The larvae of the Histeridae have not been keyed in any British identification literature with the exception of some of those inhabiting stored products (Hinton, 1945). Larval identification is considered superfluous to this Review. For many species, the larva is as yet undescribed.

A single species has been added to the British list since the publication of Duff (2012). This is *Platysoma elongatum*, which can be identified using Witzgall (1971) and Yélamos (2002). Notes on identification are also provided in Denton (2016), who discovered it in Britain. Halstead (1963) omits the two extinct *Hister* species (*illigeri* and *quadrinotatus)* and *Epierus, Hololepta, Hypocaccus crassipes, Platysoma and Plegaderus vulneratus* are not included in his identification key as all were discovered in Britain after its publication.

- **8.4 Distribution**

Records held in the database of the national species recording scheme form the basis for determining the distribution of each species. In many cases these data can be accessed through the NBN Gateway (https://data.nbn.org.uk/) and therefore all individual records have generally not been listed. The exceptions are those species known from only a relatively small number of sites and where site information is considered essential to understanding habitat, ecology, status, threats and conservation. The Watsonian vice-counties (Dandy, 1969) are included in the NBN database for many records and are referred to in this Review. International distribution is referred to within the Species Accounts where a comment on biogeography is considered relevant and where the information is readily accessible but it has not influenced the assessment of status. For the Histeridae and Sphaeritidae, the distribution section of the *Species Account* tends to focus on the currently known distribution with details of former distribution patterns discussed either here or under the Status section (see 8.6 below). However, where a species is Regionally Extinct its known distribution history will always be presented in the *Distribution* section of the account.

- **8.5 Habitat and ecology**

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

The ecology of the Histerids and Sphaeritids is relatively poorly understood compared to the more popular beetle groups. Halstead (1963) gives an introduction to Histerid biology in which he states that they are 'probably all carnivores, preying on mites, insect larvae (which he later qualifies as fly and beetle larvae) and primitive insects'. The Histerids and Sphaeritids can be roughly categorised in terms of the habitats that they occupy (see Table 7).

Table 7. A generalisation of the most familiar habitat associations for selected Histeridae and Sphaeritidae species in our region.

Species	**Most Commonly Associated Habitat**
Acritus homoeopathicus	Fungi associated with fires in woodland
Sphaerites glabratus	Decaying fungi, carrion, primarily in woodland
Margarinotus ventralis	Decaying fungi, carrion in various habitats
Margarinotus brunneus	Carrion in various habitats
Saprinus aeneus	Carrion in various habitats (mainly on free-draining substrates)
Saprinus semistriatus	Carrion in various habitats
Hister bissexstriatus	Dung on unimproved pasture
Hister unicolor	Dung on pasture
Margarinotus obscurus	Dung on unimproved pasture
Margarinotus ventralis	Dung on pasture
Onthophilus striatus	Dung on pasture
Saprinus aeneus	Dung on pasture/dunes (mainly on free-draining substrates)
Acritus nigricornis	Dung heaps
Atholus bimaculatus	Dung heaps
Atholus duodecimstriatus	Dung heaps
Carcinops pumilio	Dung heaps/Grass heaps
Onthophilus striatus	Dung heaps/Grass heaps
Margarinotus merdarius	Dung heaps/Grass heaps
Dendrophilus pygmaeus	Myrmecophilous in ant nests
Haeterius ferrugineus	Myrmecophilous in ant nests
Myrmetes paykulli	Myrmecophilous in ant nests
Carcinops pumilio	Birds nests in tree hollows
Dendrophilus punctatus	Birds nests in tree hollows (partly myrmecophilous also)
Gnathoncus buyssoni	Birds nests in tree hollows
Gnathoncus communis	Birds nests in tree hollows
Gnathoncus nannetensis	Birds nests in tree hollows
Gnathoncus rotundatus	Birds nests in tree hollows
Margarinotus merdarius	Birds nests in tree hollows
Abraeus granulum	Under bark or in dead wood
Abraeus perpusillus	Under bark or in dead wood
Aeletes atomarius	Under bark or in dead wood
Epierus comptus	Under bark or in dead wood - beech
Hololepta plana	Under bark or in dead wood - poplar
Paromalus flavicornis	Under bark or in dead wood
Paromalus parallelepipedus	Under bark or in dead wood - pine
Platysoma elongatum	Under bark or in dead wood - pine
Plegaderus dissectus	Under bark or in dead wood
Plegaderus vulneratus	Under bark or in dead wood - pine
Dendrophilus xavieri	Synanthropic, indoors
Halacritus punctum	Seashore
Hister quadrimaculatus	Dunes, seashore and coastal pasture

Hypocaccus crassipes	Dunes, seashore and coastal pasture
Hypocaccus dimidiatus	Dunes, seashore and coastal pasture
Hypocaccus metallicus	Dunes, seashore
Hypocaccus rugiceps	Dunes, seashore and coastal pasture
Hypocaccus rugifrons	Dunes, seashore
Margarinotus neglectus (SE England)	Dunes, seashore and coastal pasture
Saprinus immundus	Dunes, seashore
Saprinus planiusculus	Dunes, seashore and coastal pasture
Margarinotus neglectus (North &West)	Upland, moorland
Margarinotus marginatus	Mammal nests and runs
Onthophilus punctatus	Mammal nests and runs
Kissister minimus	Non-specific – short turf, free-draining soils incl. dunes
Margarinotus purpurascens	Non-specific, pasture etc
Margarinotus striola	Non-specific, carrion, dung, fungi etc in various habitats
Saprinus virescens	Mainly wetland, predator of leaf beetles

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

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

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

- **8.6 Status**

Reference to former distribution by Vice-County has been a particularly useful tool for demonstrating decline from large regions of Britain. Status is largely based on range size and both short and long term trends, but association of a species with particular habitats under threat is also taken into account. Counts of hectads known to be occupied since 1990 were

used to establish whether or not a species might be considered scarce or rare. The IUCN guidelines (see Section 3) were then used to decide whether such species might also be considered under threat, and to assign a category. Detailed research survey data is non-existent for the Histeridae and Sphaeritidae.

Only species which have been assessed as Regionally Extinct, Critically Endangered, Endangered, Vulnerable, Near Threatened and Data Deficient are provided with species accounts. The status of these and all other species in this Review is summarised in Appendix 1 and in the stand-alone spreadsheet that accompanies this document.

The IUCN criteria allow data of different quality to be used in the assessments as explained for 'estimated, inferred, projected or suspected' data. In addition, there is the problem of under-recording and three species currently known from fifteen or fewer locations from 1990 onwards have been excluded from both Near Threatened categorisation and IUCN criteria because the author has good reason to believe either that they are under recorded (*Myrmetes paykulli*) or are under recorded and in addition, little understood in terms of their distribution and requirements in our region (*Hypocaccus crassipes, Platysoma elongatum*). Assessments of status can only be based on current knowledge, which is very unlikely to be comprehensive in the majority of cases, being based on the experience of a limited number of active recorders in each generation. The likely national distribution of each species and trends in population size must, therefore, be extrapolated from the available information so as to arrive at the best estimate of the likely national status of each species.

Beetles lend themselves to preservation as sub-fossils by virtue of their hard body parts. Many studies of organic deposits that can be reliably dated to post-glacial times generate valuable information on the history of a particular species in what is now referred to as Britain. Those studies provide irrefutable evidence for long-term presence. The data have been collated and made available by Buckland & Buckland (2006). Such studies have shown for example, that *Paromalus parallelepipedus* is present in the peat sub-fossil layer at Thorne Moor in South-west Yorkshire (B. Marsh pers comm).

- **8.7 Threats**

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

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

Further degradation of habitat can occur through factors such as pollutants from road run-off or oil spills and the application of herbicides and pesticides to arable land, horticultural borders and lawns. Increased footfall and vehicle access may also be detrimental to the conservation value of sites.

Coastal habitats are prime areas for development, such as holiday villages and homes, port facilities, marinas and golf courses. Not all threats to maritime invertebrate populations are anthropogenic and coastal populations are especially vulnerable to episodes of extreme weather. Coastal erosion is often essential for maintaining the habitat of species associated with soft cliffs or mobile dunes, but could for example in extreme cases cause the local extinction of a species with a very restricted distribution if it destroys the site or the species population beyond recovery. The recent tidal surge in December 2013 that affected much of the eastern coastline of England causing significant erosion of yellow dune systems is a phenomenon that may be seen more frequently as a consequence of future climate change. Species restricted to or predominantly occurring on shingle formations may be similarly vulnerable.

Species inland can be threatened by severe flooding, such as was seen in mid and western England in early 2014, especially if the species only occur at a very small number of sites, in isolated or fragmented populations.

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

The complete cessation of grazing will have significant negative impact, often with immediate effect since without a food supply adult beetles are unable to feed or provide food for their larvae. It is only when other source populations exist on sites within flight capacity that re-colonisation of sites becomes possible, and then only when livestock are reintroduced during the beetles activity period. If there are no local source populations, or grazing ceases simultaneously at a wider landscape level, this is likely to have extinction level impacts. In some cases, species that are highly localised and conservative in their requirements (e.g. *Hister bissexstriatus* and *Margarinotus obscurus*) could feasibly be locally extirpated within a few years. Continuity of dung supply can be adversely affected by changes in grazing regimes, or in the use of intermittent grazing for conservation management of grasslands.

Endectocides are used in the treatment and control of internal and external parasites of livestock. There is now an incontrovertible body of evidence on the negative impact that endectocides have on the dung fauna (e.g. Beynon *et al*., 2012, Floate *et al*., 2001). Endectocides are usually macrocyclic lactones which are broad-spectrum parasiticides, which comprise three classes of chemicals, Avermectins (i.e. ivermectin, doramectin, abamectin),

Milbemycins (i.e. moxidectin), and Spinosyns (i.e. spinosad) (Lumaret *et al*., 2012). The link between high sensitivity and decline of species requires further research. Liebig *et al*. (2010) critically reviewed the existing *Risk Mitigation Measures* for veterinary medical products (including endectocides) and concluded that measures proposed thus far are not sufficiently helpful to protect the biodiversity and function of dung and soil organism communities.

Histeridae and Sphaeritidae are predatory on invertebrates that inhabit a variety of adult and larval food sources in addition to dung. These sources include sub-cortical wood and the deadwood of standing trees, dry and decomposing animal organic matter (carcases and skins) including that present in birds' nests in tree hollows and subterranean mammal nests and decomposing fungi, grass heaps and dung heaps. For these species of Histeridae and Sphaeritidae, the following threats are apparent:

- lack of regeneration of suitable habitat in mature woodland and parkland
- scrub encroachment on open areas through lack of grazing or decrease in rabbit populations
- increased countryside hygiene and 'tidying up' which results in the removal of animal carcases, dead and diseased wood and bird's nests etc.

- **8.8 Management and conservation**

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

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

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

None of the threatened taxa in this Review have been the subject of detailed ecological research or even standardised monitoring in our region. The implementation of such survey,

or monitoring or a specific line of research is occasionally recommended where it is considered of future benefit for the species.

Preventative measures and positive action designed to maintain populations are suggested where these are understood or can reasonably be inferred. Inevitably in many cases, this section tends to be generalised, identifying practices that have been found to favour those aspects of the habitat with which the species may be associated. However, this general advice is retained in order to ensure that the species data sheets can be read as stand-alone documents. Fry & Lonsdale (1991) and Kirby (2001) both give excellent general accounts of the relevant conservation issues and habitat management measures which may be undertaken.

- **8.9 Published sources**

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

9 Acknowledgements

Jon Webb (Natural England) commissioned the current Review and the report was quality assured by Inter-Agency IUCN Red Listing Group. The format and content is based closely on the recent Water Beetle Review (Foster, 2010) and subsequent publications in this Review series (Alexander, 2014; Alexander, Dodd & Denton, 2014; Hubble, 2014; Lane & Mann, 2016, Lee, 2015; Macadam, 2015; Telfer, 2016); key sections of text have been adopted and adapted for the current Review in order to maintain a consistent approach.

The Review would not have been possible without the efforts of the many contributors to Local Records Centre databases and also to the newly recognised national recording scheme for Histeridae and Sphaeritidae. It is not possible to list here every individual who has contributed to Local Record Centres and to the BRC. However, the following people either responded to a request for data on the yahoo group beetles-britishisles and/or have sent data directly to the author, who would like to thank them for providing personal records or collated regional data:

Martin Albertini, Keith Alexander, Tony Allen, Robert Angus, Ralph Atherton, Tristan Bantock, Charlie Barnes, Dave Boyce, John Bratton, Paul Brock, Andy Brown, Dave Buckingham, Graham Calow, Martin Collier, Richard Comont, Nigel Cuming, Jonty Denton, Scotty Dodd, Tony Drane, Alan Drewitt, Adrian Dutton, Andrew Duff, Graham Finch, Adrian Fowles, Mark Gurney, David Hanse, Tom Harrison, Martin Harvey, Robert Hawkes, Wil Heeney, Peter Hodge, Dave Hodges, Dave Hubble, Trevor James, Jim Jobe, Andy Jukes, Harry Kenward, Pete Kirby, Jerry Lee, Brian Levey, Martin Luff, Darren Mann, Bob Marsh, Howard Mendel, David Murray, Andy Musgrove, Adrian Mylward, David Nicholls, John Paul, Dilys Pendleton, Trevor Pendleton, Bruce Philp, Bryan Sage, Andrew Salisbury, Don Stenhouse, Mark Telfer, John Walters, Stuart Warrington, Clive Washington, Richard Weddle and Richard Wright.

I would also like to thank the following museum curators for access to collections or data in their care: Tony Irwin (Castle Museum, Norwich), Darren Mann (Hope Museum, Oxford), Jeanne Robinson (The Hunterian (Zoology), University of Glasgow) and Ali Wells (The Herbert, Coventry).

Special thanks go to Tony Drane who provided a vast quantity of useful information in the Victoria County History chapters for the vice-counties and also in the many historical county list publications that he kindly collated and sent to the author. Tony Allen and Martin Collier were also instrumental in extracting data from a number of journals for the author. A number of people provided invaluable comments during discussions on draft versions of the Review Spreadsheet and of specific species, species accounts and IUCN review procedure, including Jon Webb and those members of the Inter-Agency Working Group (IAWG) whose comments were anonymised or combined.

The author would also like to thank the following contributors: Leicestershire Museums Services for permission to use data extracted from their extensive collections, and the RSPB for allowing premature release of data from the Brecks grass heath management study. This is being undertaken as part of the stone-curlew LIFE project, ‘Securing the future of the stone-curlew in the UK’, which is funded by EU LIFE+.

Steve Lane

5 Lancaster Way
East Winch
King's Lynn
Norfolk
PE32 1NY

10 Species listed by IUCN status category

In this list the species are given in taxonomic order within status categories (nomenclature follows Duff, 2012).

Regionally Extinct
Teretrius fabricii Mazur, 1972
Saprinus subnitescens Bickhardt, 1909
Hister illigeri Duftschmid, 1805
Hister quadrinotatus Scriba, 1790

Vulnerable
Acritus homoeopathicus Wollaston, 1857
Saprinus immundus (Gyllenhal, 1827)
Paromalus parallelepipedus (Herbst, 1792)
Margarinotus obscurus (Kugelann, 1792)
Hister quadrimaculatus Linnaeus, 1758
Haeterius ferrugineus (Olivier, 1789)

Near Threatened
Halacritus punctum (Aubé, 1843)
Saprinus virescens (Paykull, 1798)
Hypocaccus metallicus (Herbst, 1792)
Hypocaccus rugifrons (Paykull, 1798)
Epierus comptus Erichson, 1834
Hister bissexstriatus Fabricius, 1801

Data Deficient
Hypocaccus crassipes (Erichson, 1834)
Hololepta plana (Sulzer, 1776)
Platysoma elongatum (Thunberg, 1787)

11 Species listed by GB Rarity Status category

In this list the species are given in taxonomic order within status categories (nomenclature follows Duff, 2012).

Nationally Rare
Sphaerites glabratus (Fabricius, 1792)
Acritus homoeopathicus Wollaston, 1857
Halacritus punctum (Aubé, 1843)

Saprinus immundus (Gyllenhal, 1827)
Saprinus virescens (Paykull, 1798)
Hypocaccus crassipes (Erichson, 1834)
Hypocaccus metallicus (Herbst, 1792)
Hypocaccus rugifrons (Paykull, 1798)
Paromalus parallelepipedus (Herbst, 1792)
Onthophilus punctatus (Müller, O.F., 1776)
Epierus comptus Erichson, 1834
Margarinotus obscurus (Kugelann, 1792)
Hister bissexstriatus Fabricius, 1801
Hister quadrimaculatus Linnaeus, 1758
Hololepta plana (Sulzer, 1776)
Platysoma elongatum (Thunberg, 1787)
Haeterius ferrugineus (Olivier, 1789)

Nationally Scarce
Abraeus granulum Erichson, 1839
Aeletes atomarius (Aubé, 1842)
Saprinus aeneus (Fabricius, 1775)
Saprinus planiusculus Motschulsky, 1849
Hypocaccus rugiceps (Duftschmid, 1805)
Hypocaccus dimidiatus (Illiger, 1807)
Gnathoncus buyssoni Auzat, 1917
Myrmetes paykulli Kanaar, 1979
Dendrophilus pygmaeus (Linnaeus, 1758)
Margarinotus marginatus (Erichson, 1834)

12 Criteria used for assigning species to IUCN threat categories

Table 8. Criteria used to assign extant species to GB IUCN categories with a 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
Acritus homoeopathicus Wollaston, 1857	VU	A2c B2a, bii, biv
Saprinus immundus (Gyllenhal, 1827)	VU	D2
Paromalus parallelepipedus (Herbst, 1792)	VU	D2
Margarinotus obscurus (Kugelann, 1792)	VU	D2
Hister quadrimaculatus Linnaeus, 1758	VU	D2
Haeterius ferrugineus (Olivier, 1789)	VU	D2

13 List of Threatened, Nationally Rare and Nationally Scarce species

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

Species Name	**Shirt (1987)**	**Hyman (revised Parsons) (1992)**	**This Review (IUCN Status)**	**This Review (GB Rarity)**
Sphaerites glabratus	RDB3	RDB3	NT	NR
Abraeus granulum		Na	LC	NS
Plegaderus dissectus		Nb	LC	-
Acritus homoeopathicus	RDB3	RDB3	VU	NR
Aeletes atomarius	RDB3	RDB3	LC	NS
Halacritus punctum		RDBK	NT	NR
Teretrius fabricii	RDB1+	RDB1	RE	-
Saprinus aeneus			LC	NS
Saprinus immundus		Nb	VU	NR
Saprinus planiusculus		Nb	LC	NS
Saprinus subnitescens	Extinct	Extinct	RE	-
Saprinus virescens		RDBK	NT	NR
Hypocaccus crassipes			DD	NR
Hypocaccus metallicus	RDB2	RDB3	NT	NR
Hypocaccus rugiceps	RDB2	Na	LC	NS
Hypocaccus rugifrons		Nb	NT	NR
Hypocaccus dimidiatus		Nb	LC	NS
Gnathoncus buyssoni		Na	LC	NS
Myrmetes paykulli		Nb	LC	NS
Dendrophilus pygmaeus			LC	NS
Paromalus parallelepipedus	RDB1	RDB1	VU	NR
Onthophilus punctatus		RDBK	LC	NR
Epierus comptus	RDB3*	RDBK	NT	NR
Margarinotus obscurus	RDB2	RDB1	VU	NR
Margarinotus marginatus		Nb	LC	NS
Hister bissexstriatus		Nb	NT	NR
Hister illigeri	Extinct	Extinct	RE	-
Hister quadrimaculatus	RDB2	RDBK	VU	NR
Hister quadrinotatus	Extinct	Extinct	RE	-
Hololepta plana			DD	NR
Platysoma elongatum			DD	NR
Haeterius ferrugineus	RDB3	RDBI	VU	NR

14 The data sheets

Data sheets for the species assessed as Regionally Extinct, Vulnerable, Near Threatened and Data Deficient are given in this section. The data sheets are arranged, within each Family of the Histeridae and Sphaeritidae, in alphabetical order by scientific name.

ACRITUS HOMOEOPATHICUS
VULNERABLE A2c: B2ab(ii)(iv)
Order COLEOPTERA
Family HISTERIDAE

Acritus homoeopathicus Wollaston, 1857

Identification This is a small globose species measuring 0.8-1.0mm in length, which is superficially similar to a number of other minute Histerid species of the genera *Acritus, Abraeus, Aeletes* and *Halacritus.* It is identifiable by a combination of the lack of a ventral gular lobe (a forward-pointing projection) on the prosternum, the body length, the four-segmented (rather than five-segmented) posterior tarsi, the visible scutellum, the presence of a line of punctures at the base of the pronotum and the presence of extensive reticulation on the dorsal surface of the elytra which is dull and darker-coloured, when compared to the closely-related *A. nigricornis* (Hoffmann). The adult is keyed by Halstead (1963) and Duff (2012).

Distribution Very locally distributed in England south of an imaginary line drawn from the Wash on the east coast to the Severn on the west coast. Within this region, it has occurred as far north as Monks Wood NNR (TL28, Huntingdonshire, 1966) and Kemerton Estate (SO93, Worcestershire, between 1992 and 1996). It recently appears to be largely confined to the south-eastern counties with eight out of nine post-1990 hectads in the Surrey, West Sussex, East Sussex and East Kent region. Outside of this 'stronghold', it has only occurred in Dorset (most recently 1941), South Hampshire (1970), Berkshire (1945), Huntingdonshire (most recently in 1973) and Worcestershire (see above). There are only three post-2000 records: St Michael's, East Kent (TL83), July 2000, Blean Woods, East Kent (TR16), in 2004 and Thornden Woods, East Kent (TR16), April 2011. In the Palaearctic region, it is recorded from Europe, into North Africa and Asia. In Central Europe, it is rare, but less so in the southern part of the region (Löbl & Löbl, 2015).

Habitat and Ecology Associated with burnt ground and burnt bark in woodland and pasture woodland. Specifically recorded in the fungus *Pyronema omphalodes* (Bull.), a species associated with burnt ground, but also recorded under scorched bark and in moss on a fire site. Tree species ash and beech are referenced in several of the records. Adults have been recorded between April and October inclusive.

Status Introduced as British by Blair (1938) and first recorded in the region in 1937, from Crichel, Dorset (ST90). Due to the species' association with burnt ground, a habitat not regularly investigated by the majority of Coleopterists, the beetle is very likely to be under-recorded. However, it is certainly very restricted in distribution in Britain. Data evidences a continuing decline (although the data are few). There are only 38 records for this species in the database.

Application of IUCN Category A criteria to the last 30-year's of data gives an adjusted 10-year period decline of 45% which qualifies for designation as IUCN Category Vulnerable VU A2c. With continuing decline inferred from the data, only three post-2000 records, and only eight localities recorded for the species since 1990, a designation of IUCN VU B2ab(ii)(iv) is also appropriate because the area of occurrence (AoO) as a measure of geographic range, is demonstrated to have decreased significantly.

Threats Threats specific to this species are difficult to evaluate, although cessation of the management practise of burning felled wood, would impact negatively at its known localities. Also, the removal of scorched fragments and ash from fire sites in woodland and parkland would be deleterious to species continuity.

Management and Conservation At its known sites, burning should be implemented or continued in habitat management as should the retention of fire sites for colonisation by the fungus and the beetle.

Published Sources Blair (1938); Duff (2012); Halstead (1963); Löbl & Löbl (2015).

EPIERUS COMPTUS
NEAR THREATENED
Order COLEOPTERA
Family HISTERIDAE

Epierus comptus Erichson, 1834

Identification This is a small species of length, 2.0-3.0mm. It is identifiable by a combination of characters which include the presence of a forwardly-directed ventrally-situated gular lobe on the prosternum, that is without deep lateral incisions, the lack of large teeth on the outer edge of the fore-tibiae and the presence of six deeply-impressed elytral striae. The adult is keyed by Duff (2012).

Distribution Known from only four localities in two vice-counties. In South Wiltshire it has been recorded from Groveley Wood (SU03, 1980–1988). In South Hampshire it is known from the Lyndhurst environs of the New Forest; from Mark Ash Wood and Wooson's Wood (SU20, 1997-2008), from Broom Hill (SU21, 2014) and from Mallard Wood (SU30, 2006). The species is possibly increasing, but records are few. In Europe, it is known from Rhineland and Burgenland, from the Czech Republic and Slovakia.

Habitat and Ecology This is a saproxylic species, associated in our region, with dead and dying beech trees. It has usually been found under bark and is sometimes numerous in this situation. For example, 36 specimens were located under the bark of a fallen beech in an area of about 6cm² (Nash, 1999). The appearance of the species in large numbers is also documented in Horian (1949) who observed over 200 adults in a rotten fallen poplar in southern Hungary. In Britain, adults have been recorded in March and between July and October inclusive.

Status Introduced to the British list by Nash (1982) on the basis of a specimen found at Groveley Wood, South Wiltshire (SU03) in 1980. This is a highly restricted species, occurring at only a handful of localities in South Wiltshire and South Hampshire since its discovery in England. It is considered by some to be a possible introduction (*e.g.* Duff, 2012), but for the purposes of this Review, the species is treated as a long-overlooked native. There is no evidence of decline and to the contrary, the discovery of new sites in recent years suggests a possible increase although data is very limited. There are only 14 records in the database.

With an AoO of 12km2 and a presence in only 3 locations since 1990, the species nearly qualifies for Endangered under B2a. However, as there is no evidence of decline (b) or extreme fluctuations (c), it affords a Near Threatened category instead.

Threats There are no specific threats to this species, but generalised threats throughout its limited range could include the felling and subsequent clearance of diseased and damaged trees and the removal of dead or dying standing wood for several reasons such as a perceived health and safety

hazard or maintenance of forest hygiene. Over-zealous collecting of specimens in vulnerable and isolated populations could possibly contribute to localised extinctions or population destabilisation.

Management and Conservation Woodland management should aim to retain dead or dying standing and dead fallen timber in situ. Additional safeguards to protect the long-term continuity of dead wood might include a selective planting regime of *Fagus*. Groveley Wood is designated as a County Wildlife Site and the New Forest as a National Park with designated areas of SSSI status within its boundaries. Any collecting of specimens should be undertaken responsibly and with consideration for the habitat and the species.

Published Sources Duff (2012); Horian (1949); Nash (1982, 1999).

HAETERIUS FERRUGINEUS
VULNERABLE D2
Order COLEOPTERA
Family HISTERIDAE

Haeterius ferrugineus (Olivier, 1789)

Identification This is a small (1.5-2.0mm) but distinctive reddish-brown, rounded species that can be distinguished from all other Histeridae by the sparse but long pubescence on the dorsal surface. The adult is keyed by Joy (1932), Halstead (1963) and Duff (2012).

Distribution The species has been recorded since 1990 from only three locations, all in southern England: Chobham Common, Surrey (SU96) in 2005, Stokeford Heath, Dorset (SY88) in 2008 and most recently, at an undisclosed site in Worcestershire (SO87) in 2012.

Its world distribution extends from central Europe as far as the Caucasus (Harde, 1998).

Habitat and Ecology Myrmecophilous. Adults feed on small invertebrates in ant's nests including dead and dying ants. Found on heaths and commons where it is associated with ant nests, particularly those of *Formica sanguinea* Latreille, but also *Formica fusca* Linnaeus. Three records associate the beetle with other ant species; *Lasius flavus* (Fabricius), *Lasius fuliginosus* (Latreille) and *Lasius niger* (Linnaeus). Brown (2012) observed individuals frequenting a *Formica sanguinea* nest under a piece of oak wood in open, sandy grassland on a 'slightly south-facing slope'. Bedwell noted the species at Box Hill, Surrey in a nest of '*Formica fuliginosa'* at the base of a juniper tree. Adults have been recorded in Britain between April and June inclusive and also in August.

Status This species is of highly localised distribution and is very scarce. It was first recognised as British from Highgate, Hampstead, in Middlesex in 1848 where it was recorded until 1860. Since then, it has only been recorded from Worcestershire (in 2012), Dorset (in 2008), the Isle of Wight (in 1920), South Hampshire (in 1954) and Surrey. The latter county has produced the most localities and records with four recorded hectads. Nine localities are known in total. There are only 13 records in the database.

The species is recently known from only three locations and although no recent or continuing decline is evident, the paucity of data makes any evaluation difficult. There are very plausible threats to its habitat, such as heathland fires and scrub encroachment. A combination of only three modern locations and plausible threats qualifies the species for IUCN designation VU D2.

Threats The colonisation of heathland and open grassland, particularly by gorse scrub and bracken, could cause localised extinction of ant populations and adversely impact on *Haeterius.* Heathland fires are an ever present threat in arid habitats, particularly where these sites are subject to regular recreational use by the public. Over-zealous collecting of specimens in vulnerable and isolated populations could possibly contribute to localised extinctions.

Management and Conservation Scrub should be managed by selective removal at sites where the species has been historically recorded or is still present. Chobham Common is an NNR managed by Surrey Wildlife Trust. Stokeford Heath is an SSSI, but has been subject to past land use changes which have affected the site's integrity in part. The Worcestershire site is protected. Any collecting of specimens or research of populations should be undertaken responsibly and with consideration for the habitat and the species.

Published Sources Brown (2012); Duff (2012); Halstead (1963); Harde (1998); Joy (1932).

HALACRITUS PUNCTUM
NEAR THREATENED
Order COLEOPTERA
Family HISTERIDAE

Halacritus punctum (Aubé, 1843)

Identification This is a small globose species measuring 1.0-1.4mm in length, which is superficially similar to a number of other minute Histerid species of the genera *Acritus, Abraeus* and *Aeletes.* It is identifiable by a combination of the lack of a ventral gular lobe (a forward-pointing projection) on the prosternum, the body length, the four-segmented posterior tarsi (rather than five-segmented), the visible scutellum and the lack of a basal line of punctures on the pronotum. The adult is keyed by Joy (1932), Halstead (1963) and Duff (2012).

Distribution Highly localised and currently restricted to the south and west coasts of England and Wales. In the west it is known from Dunster Beach (SS94, in 1998) in South Somerset, north to Newborough Warren NR in Anglesey (SH36 and SH46, recorded in 2008 and 2012 respectively). The other known sites for *H. punctum* within this coastal swathe are Berrow, North Somerset (ST25, last recorded 2014), Braunton Burrows, North Devon (SS43, last definitely recorded 1965), Merthyr-mawr Warren, Glamorganshire (SS87, last recorded 2003), Crymlyn Burrows, Glamorganshire (SS79, last recorded 2001), Oxwich Bay, Glamorganshire (SS58. Last recorded 1920), Burry Port, Carmarthenshire (SN40, last recorded 1993) and Llanbedr, Merionethshire (SH52, last recorded 1906).

Previously more widely distributed with historical records pre-dating 1907 from Tregantle Sands, East Cornwall (SX35) and Key, Plymouth, South Devon (SX55). Old records also exist east to the Chesil Beach/Portland/Weymouth area, Dorset [SY67], Bembridge on the Isle of Wight (SZ68) and Hayling Island in South Hampshire [SZ69].

The species was thought to be long-extinct along the south coast of England until its rediscovery in April 2015 at Hayling Island, South Hampshire (SZ69) and also at Kimmeridge Bay, Dorset (SY97) in September 2016. It is probable also that it still survives at the well-surveyed Braunton Burrows in North Devon (SS43) where an as yet unconfirmed, but very probable record comes from 2015.

A published record for Gumley, Leicestershire (Bouskell in Page, 1907) is almost certain to be erroneous, although it was published in Fowler (1889).

In the Palaearctic region, it is recorded from Europe, into North Africa (Löbl & Löbl, 2015).

Habitat and Ecology Exclusively maritime. Associated with decaying seaweed in tide-line refuse on beaches and in and at the foot of dune systems. At least two of the British records are from pebbly or rocky shores and at one recent site, it was observed beneath inter-tidal boulders. Adults have been recorded in our region between March and June and between August and October inclusive.

Status The species has been recorded from only 8, possibly 9, modern (post-1990) locations, but there are no plausible imminent or near-future threats to the sites and there is no evidence of decline, except for some slight possibility of localised decline along the south coast of England. Overall, no current decline is suspected. This is a very small species that is easily overlooked and for that reason it could be significantly under-recorded. There are 39 records in the database.

The species would have qualified as Vulnerable VU B2(a)(b) with less than 10 modern locations, if continuing decline were suspected or proven, but because no decline is evident, a designation of Near Threatened is appropriate.

Threats The main threat to the species is through clearance of strand-line refuse from beaches for aesthetic reasons. The construction of coastal defence systems may also cause a deterioration or loss of habitat as could contamination from oil pollution. Sea level rise may be a future issue as a result of the global warming phenomenon.

Management and Conservation Beach cleaning (tidying) should be discouraged along coastal strips, particularly where this entails removal of organic debris from the strand-line.

Published Sources Bouskell in Page (1907); Duff (2012); Halstead (1963); Joy (1932); Löbl & Löbl (2015).

HISTER BISSEXSTRIATUS
NEAR THREATENED
Order COLEOPTERA
Family HISTERIDAE

Hister bissexstriatus Fabricius, 1801

Identification This species exhibits the typical dorsal appearance of the *Hister* and *Margarinotus* genera with which the Family is most commonly associated. It is unicolorous black. The elytra have four very-nearly complete outermost striae, the thorax has two impressed lines on the pronotum (at least near the front angles) and the front tibiae each have three or four teeth. This combination of characters along with the size (3.0-4.5mm) will distinguish it from all related species in our region. The adult is keyed by Joy (1932), Halstead (1963) and Duff (2012).

Distribution This beetle is currently of highly localised distribution in England, with post-1990 records from only ten vice-counties (the most recent record is given in parenthesis in the list that follows): Shropshire (2006), East Gloucestershire (2003), South Wiltshire (1995), South Hampshire

(2008), Berkshire (2013), South Devon (2003), Dorset (2000), West Suffolk (2002), Surrey (2000) and West Kent (1994).

It was formerly more widespread with records from as far north as Lanarkshire in Scotland and from Lancashire, Leicestershire, Nottinghamshire, East Cornwall, North Devon, Glamorganshire, North Wiltshire, Hertfordshire, Cambridgeshire, East Suffolk, East Sussex and East Kent. For the most part, the records for these counties pre-date1940, the exceptions being East Cornwall in 1972 and North Wiltshire in 1946.

Distributed throughout central Europe into Asia in the Palaearctic (Löbl & Löbl, 2015).

Habitat and Ecology A species of unimproved pasture on free-draining soils such as chalk and sand. The adults are found in association with cattle and cow dung, although there are a very few records from carrion (*e.g.* brown rat *Rattus norvegicus* (Berkenhout) and brown hare *Lepus europaeus* Pallas) in Britain. At Totnes (South Devon), specimens were collected from meadows flooded by the River Dart at extra high tides in 1894 (Newbery Collection, Cambridge Museum). Adults have been recorded in our region between April and September inclusive and also in November.

Status There is evidence of a historical decline with a 52% decrease in AoO corresponding to a reduction in hectads from 25 in the pre-1990 count, to 12 in the post-1990 count. There are only 11 post-1990 locations (but 12 hectads). Consequently, the species is vulnerable in the broadest sense, but not to the degree of qualifying currently for IUCN status Vulnerable, although it may be a candidate in future reviews. There are 46 records for this species in the British database.

The species, with only 12 modern locations, narrowly misses designation as IUCN Vulnerable VUB2ab. For this reason, a designation of Near Threatened is considered appropriate.

Threats In common with many species of the dung-feeding Scarabaeidae, the invertebrate prey of *Hister bissexstriatus* may be susceptible to livestock endectocide treatments. The beetle itself may also be directly adversely affected by pasture 'improvement' management and to changes in grazing regimes which might impact negatively on dung-availability. Land use conversion to development is another threat.

Management and Conservation Continuity of dung supply is a priority for this species, so it is important to have grazing livestock throughout the year for its continued survival. Environmentally sensitive farming, with limited grassland improvements and minimal or no reliance on endectocide applications will be beneficial to populations reliant on livestock dung.

Published Sources Duff (2012); Halstead (1963); Joy (1932); Löbl & Löbl (2015).

HISTER ILLIGERI
REGIONALLY EXTINCT
Order COLEOPTERA
Family HISTERIDAE

Hister illigeri Duftschmid, 1805

Identification This distinctive species exhibits the typical dorsal appearance of the *Hister* and *Margarinotus* genera with which the Family is most commonly associated. It is black with a very

large and well-defined red lunulate mark on each elytron. The fourth elytral stria counting inwards from the elytral margin is only partial (present in ± apical half of elytra only). The inner pronotal stria is approximately twice the length of the outer stria and the beetle is 6.0-8.5mm long. The adult is keyed by Duff (2012).

Distribution Extinct. Formerly known from sporadic occurrences in Worcestershire (Worcester), Glamorganshire (Swansea), South Devon (Kingsbridge) and West Kent (Dartford Heath). All records are exceptionally old and pre-date 1839. In the Palaearctic region, it is widely distributed in Europe, extending into Asia (Löbl & Löbl, 2015).

Habitat and Ecology The species is associated with dung and carrion where it probably predates the larvae of other invertebrates.

Status The species is extinct in the region, if it was ever truly established as a British species. Fowler (1889) even questioned the accuracy of some of the records. With such old and limited data, it is difficult to assess the integrity of the species as indigenous, but for the purposes of this Review, it is considered a long-extinct native. There are only 4 records of this species in the database.

Threats The cause of regional extinction is unknown.

Management and Conservation None.

Published Sources Duff (2012); Fowler (1889); Löbl & Löbl (2015).

HISTER QUADRIMACULATUS
VULNERABLE D2
Order COLEOPTERA
Family HISTERIDAE

Hister quadrimaculatus Linnaeus, 1758

Identification This usually distinctive and large (8.0-11.0mm) species exhibits the typical dorsal appearance of the *Hister* and *Margarinotus* genera with which the Family is most commonly associated. Within these genera, it can be identified by the following combination of characters. The fourth elytral stria counting inwards from the elytral margin is only partial (present in ± apical half of elytra only). The front angles of the pronotum have two impressed marginal lines. There are three large teeth on the front tibiae and a large but variable red lunulate mark (rarely absent) on each elytron. The pro-pleurae are pubescent rather than glabrous. The species can occasionally be entirely black when it can closely resemble *Hister unicolor* Linnaeus in size, but compared to that species, the habitus is distinctly and significantly less rounded in outline. The adult is keyed by Joy (1932), Halstead (1963) and Duff (2012).

Distribution England. Extremely local and scarce. Known in modern times only from four localities in three hectads; in South Hampshire and East Kent only. The sites are Gilicker Point in South Hampshire (SZ69, in 2001), Dungeness in East Kent (TR01, from 1989 to 2016), Graveney Marshes in East Kent (TR06, before 1890 and between 2005 and 2012) and Faversham in East Kent (TR06, in 2013).

It was formerly more widespread, though still considered a rarity, with records from 'Gloucester' (pre-1900), Weymouth in Dorset (in 1901), Ryde on the Isle of Wight (in 1859), Southsea Common in South Hampshire (pre-1913), Clacton-on-Sea (1905) and Harwich (pre-1890) in North Essex, Chatham in West Kent (pre-1890) and also in this vice-county, from Stoke Marshes on the Isle of Grain between 1922 and 1952 and Port Victoria in 1929. In East Kent, the species' stronghold, it appears to have been lost from former haunts in Sheerness and Leysdown on Sheppey, at Herne Bay, Deal and Ramsgate and 'Blean', all historically (before 1910) and from Iwade by circa 1939.

Inland records from the New Forest, South Hampshire and Castle Cary in North Somerset, are suspect and a record from Wisley in Surrey (based on larval identification) is almost certainly erroneous.

The species is widespread in Central Europe (Lucht, 1987). It occurs in Central and Southern Europe, North Africa, West Asia and the Caucasus (Harde, 1998)

Habitat and Ecology Recorded with certainty only from coastal sites where it has been found, in recent years at least, under stones, pieces of wood and in moss, either in coastal grassland or on shingle, near or on beaches. Exceptions are specimens found on a sea wall, found under sheep's wool mixed with dryish dung, found at a light trap, and found 'sparingly in flood refuse' (in December). In Stephens (1830), there is an account of the species covering Southsea Common in 1827, with many crushed under foot.

In light of the above observations, it is perhaps surprising to learn that the species is reported to have been found as adults 'mainly in cow and horse dung, carcasses and decomposing vegetable matter' (Owen, 2002). Harde (1998) states that in central Europe, the beetle is found mainly in horse and cow dung, but also under decaying vegetation. Duffy (1954) states that larvae feed on Diptera larvae in dung.

This is a thermophilic species that is restricted to the south of our region and is also more-or-less restricted to low altitudes across most of its world range. Adults have been recorded in England between March and June inclusive and in December.

Status There is no evidence that the historical decline shown by the data is continuing. In fact, the species has been 'discovered' at several sites in recent years after a long absence of records. The 1989 discovery at Dungeness, East Kent, was the first recorded in Britain since 1952. However, with only four post-1990 locations and plausible threats, an IUCN designation of VUD2 is appropriate. There are 57 records of this species in the database.

Threats In common with many species of the dung-feeding Scarabaeidae, the invertebrate prey of *Hister quadrimaculatus* may be susceptible to livestock endectocide treatments. The beetle itself may also be directly adversely affected by pasture 'improvement' management practises and to changes in grazing regimes which might impact negatively on dung-availability. Sea level rise may be a future issue as a result of the global warming phenomenon.

Management and Conservation Beach cleaning should be discouraged along coastal strips, particularly where this entails removal of organic debris and refugia from the strand-line. Continuity of dung supply is a priority for this species, so it is important to have grazing livestock throughout the year for its continued survival. Environmentally sensitive farming, with limited grassland improvements and minimal or no reliance on endectocide applications will be beneficial to populations reliant on livestock dung.

Published Sources Duff (2012); Duffy (1954); Halstead (1963); Harde (1998); Joy (1932); Lucht (1987); Owen (2002).

HISTER QUADRINOTATUS
REGIONALLY EXTINCT
Order COLEOPTERA
Family HISTERIDAE

Hister quadrinotatus Scriba, 1790

Identification This distinctive and relatively large (6.0-8.0mm) species exhibits the typical dorsal appearance of the *Hister* and *Margarinotus* genera with which the Family is most commonly associated. Within these genera, it can be identified by the following combination of characters. Elytra lacking a complete sub-humeral stria and with only three complete dorsal striae, pronotum with two marginal striae near the front angles, pro-pleurae glabrous rather than pubescent (cf *quadrimaculatus*) and each elytron with either a comma-shaped red patch or two red patches. The adult is keyed by Duff (2012).

Distribution Extinct. Known only from the 'London district' and from 'Bristol', both records pre-dating 1839. Fowler (1889) considered the species to be 'doubtfully British'. Present throughout central Europe, but particularly frequent in the south-east. Its distribution in the Palaearctic extends into Western Asia (Löbl & Löbl, 2015).

Habitat and Ecology There is no information on British specimens. The literature refers to carrion as a habitat for adults. In central Europe, it occurs in dung and manure (http://www.coleo-net.de).

Status The species is extinct in the region if it was ever truly established as a British species. With such old and limited data, it is difficult to assess the integrity of the species as indigenous, but for the purposes of this Review, it is considered a long-extinct native. There are only 2 records of this species in the database.

Threats The cause of regional extinction is unknown.

Management and Conservation None.

Published Sources Duff (2012); Fowler (1889); Löbl & Löbl (2015).

HOLOLEPTA PLANA
DATA DEFICIENT DD
Order COLEOPTERA
Family HISTERIDAE

Hololepta plana (Sulzer, 1776)

Identification A very distinctive species on account of its highly flattened form, appearing almost paper-thin and with a highly polished 'black-mirror' dorsal surface. The adult is keyed by Duff (2012).

Distribution Highly localised and scarce. First discovered in the region in May 2009 (Allen & Hance, 2009) at Santon Downham, West Norfolk (TL88) where it has been found fairly regularly up to the

present date. It has also been discovered at Two Mile Bottom, West Suffolk (TL88) in 2012, Hackney Marshes in Middlesex (TQ38) in 2014, at a second West Norfolk site; Shouldham Warren (TF61) in 2014 and at Icklingham Plains, West Suffolk (TL77) in 2016. It is possibly spreading, but is more likely to have been overlooked. In the Palaearctic, the species is widely distributed throughout most of Europe into Asia (Löbl & Löbl, 2015).

Habitat and Ecology The depressed form of this species is an adaptation to a sub-cortical existence beneath bark. It is found specifically under the laminating bark of fallen trunks of poplar and stacked poplar logs in wet plantation habitats. Adults have been recorded in Britain in February and March and between May and August inclusive.

Status There is no evidence of a decline as the species has only recently been added to the British list and has since been discovered at a further four locations. Some authors believe that this species might have been introduced (e.g. Duff, 2012). There are 7 records in the database, although the author suspects that this number is in reality likely to be much higher due to repeated visits by Coleopterists to known sites to see or collect the species, particularly at the Santon Downham site.

With only five modern locations and with plausible threats, an IUCN designation of VUD2 would normally be assigned. However, the possibility of the taxon being a recent introduction and the fact that there are so few records makes a designation of DD more appropriate, until further information about its distribution and abundance is forthcoming.

Threats Plausible threats include the lack of continuity of poplar plantation dead-wood habitat through clearance of plantations, 'harvesting' and tidying-up of fallen trees. Because the species favours the sappy bark of poplars of a certain age, it is possible that at a site with limited habitat, too much attention from collectors, might impact negatively on a population.

Management and Conservation Poplar plantation management should aim to retain dead or dying standing and dead fallen timber in situ. Additional safeguards to protect the long-term continuity of dead wood might include selective planting of poplars at known sites. Any collecting of specimens should be undertaken responsibly and with consideration for the habitat and the species.

Published Sources Allen & Hance (2009); Duff (2012); Löbl & Löbl (2015).

HYPOCACCUS CRASSIPES
DATA DEFICIENT
Order COLEOPTERA
Family HISTERIDAE

Hypocaccus crassipes (Erichson, 1834)

Identification This is a small (3.0-4.0mm) species distinguished by the combination of; marginal pronotal punctures, the elytra which is both striate and punctured, the head which has a raised border across the forehead continuing along the inner edge of each eye and specific but variable characteristics of the sutural stria and punctation. The adult is keyed by Duff (2012) and (Telfer et al. unpublished).

Distribution Only recently recognised as British. Apparently highly localised and scarce. From the limited available data, it appears to be restricted to the dune systems of North Devon (Braunton

Burrows and Saunton Sands, SS43) where it was recorded in consecutive years 1962 and 1963, and from the adjacent Welsh coast-line at Pembrey Dunes in Glamorganshire (SS49) in 1974. It is very likely that further records will emerge as collections are examined for this species, which had been previously mistaken for both H. metallicus and H. rugiceps but the true extent of its distribution is currently unknown.

In the Palaearctic, the species is widely distributed throughout most of Europe (Löbl & Löbl, 2015).

Habitat and Ecology Very little is known about the ecology of this species in the region. It has been found in carrion and dung on maritime dune systems and in this respect, it appears to occupy a similar habitat-niche to H. metallicus. Adults have been recorded in June and August.

Status This species has only recently been added to the British list and has formerly been misidentified as other species in the genus Hypocaccus. Consequently, although the species is considered likely to be highly localised in distribution, the current situation is one where data is insufficient to evaluate its true regional status. A designation of Data Deficient DD is therefore appropriate. There are only 3 records in the database.

Threats Removal of carcases and beach cleaning for hygiene purposes, may present a threat to this species. Tidal events such as witnessed in winter 2013 along much of the east coast, could cause significant loss of habitat, as could the encroachment of dune scrub, in particular of highly invasive species such as sea-buckthorn Hippophae rhamnoides and bramble Rubus fruticosus agg. Cessation of grazing regimes on dune systems may also impact on this species. Development relating to tourism may be a threat to existing habitat. Sea level rise may be a future issue as a result of the global warming phenomenon.

Management and Conservation Removal of dune scrub should be undertaken to open up the habitat where sea-buckthorn and bramble are becoming dominant. Beach cleaning, specifically relating to decaying organic material, should be discouraged in coastal strips known to be inhabited by the beetle. Grazing of dune systems should be encouraged, although there is no evidently strong association between this species and livestock dung. Its sites are protected areas.

Published Sources Duff (2012); Löbl & Löbl (2015).

HYPOCACCUS METALLICUS
NEAR THREATENED
Order COLEOPTERA
Family HISTERIDAE

Hypocaccus metallicus (Herbst, 1792)

Identification This is a small (2.0-3.0mm) black species distinguished by the combination of; marginal pronotal punctures, the elytra which is both striate and punctured, the head which has a raised border across the forehead continuing along the inner edge of each eye, and the fore-tibiae with only three or four, usually blunt teeth. There are also specific but variable characteristics of the sutural stria and punctation that aid differentiation from *H. crassipes*. The adult is keyed by Joy (1932), Halstead (1963), (Telfer *et al.* unpublished) and Duff (2012).

Distribution Highly localised and occurring for certain only in England, with a national stronghold along the north-west Norfolk coast where it occurs not infrequently from Holme-next-the-Sea (TF64) east to Blakeney (TG04), a coastal strip comprising approximately six locations and twice as many

post-1990 tetrads that support the species. Other populations occur in East Kent; at Greatstone-on-Sea (TR02) and along the Sandwich Bay coastline (TR36). Camber Sands, East Sussex (TQ91) may still support the species, but it has not been recorded here since 1998.

An outlier and now probably extinct population occurred in North Lincolnshire (TF58), pre-1898. Unusually, it has also been recorded from an inland site at Stanford Training Ground in the Brecks where *bona fide* specimens were identified from pitfall traps set into a sandpit in June and July 2003. Two old records; from North Devon and Glamorganshire require confirmation and have not been tallied in the hectad counts.

In the Palaearctic, the species is widely distributed throughout most of Europe (Löbl & Löbl, 2015).

Habitat and Ecology Usually maritime, occurring on yellow dune systems and on beaches where it has been found under rabbit droppings and dog faeces on sand, under dead seals and under a rat carcase in a sandpit, under driftwood and observed crawling over sand and in dune 'blow-outs'. Adults have been recorded in Britain between April and October inclusive.

Status The species is highly localised in the region, but appears to be stable at its nine modern locations, occupying 17 tetrads. There is no continuing decline evidenced or inferred by the data.

A designation of Near Threatened is appropriate because if there were a decline, the species being recorded from only nine post-1990 locations, would qualify as Vulnerable VUB2ab. There are 97 records for this species in the database.

Threats Removal of carcases and beach cleaning for hygiene purposes, may present a threat to this species. Tidal events such as witnessed in winter 2013 along much of the east coast, could cause significant loss of habitat, as could the encroachment of dune scrub, in particular of highly invasive species such as sea-buckthorn *Hippophae rhamnoides* and bramble *Rubus fruticosus agg.* Cessation of grazing regimes on dune systems may also impact on this species. Development relating to tourism may be a threat to existing habitat. Sea level rise may be a future issue as a result of the global warming phenomenon.

Management and Conservation Removal of dune scrub should be undertaken to open up the habitat where sea-buckthorn and bramble are becoming dominant. Beach cleaning, specifically relating to decaying organic material, should be discouraged in coastal strips known to be inhabited by the beetle. Grazing of dune systems should be encouraged, although there is no evidently strong association between this species and livestock dung. Most of its sites are protected areas.

Published Sources Duff (2012); Halstead (1963); Joy (1932); Löbl & Löbl (2015).

HYPOCACCUS RUGIFRONS
NEAR THREATENED
Order COLEOPTERA
Family HISTERIDAE

Hypocaccus rugifrons (Paykull, 1798)

Identification A small (2.5-3.5mm) black species identifiable on a combination of characters which includes the presence of marginal punctures on the pronotum, the elytra being both striate and

punctured, the head having a raised border across the forehead continuing along the inner edge of each eye, and the fore-tibiae with five or six teeth. The adult is keyed by Joy (1932), Halstead (1963) and Duff (2012).

Distribution A very widely distributed species, but with few post-1990 records. Found since that time only from nine locations, seven of which are on the Welsh coast; in Glamorganshire (SS48, 49, 58 and 87), Caernarvonshire (SH22), Anglesey (SH46) and Merionethshire (SH72). The other modern records are outliers at Dawlish Warren, South Devon (SX97) in 2006 and Minsmere NR in East Suffolk (TM46) in 1994.

There are old inland records from Sherwood Forest (SK66) in Nottinghamshire, the New Forest (SU20/30) in South Hampshire, Bury St Edmunds (TL86) in West Suffolk and Bentley Woods (TM13) in East Suffolk. The integrity of these inland records is in question until they can be confirmed.

The species has suffered losses from some parts of the region, most notably from northern England (Cumberland, County Durham and North-east Yorkshire), from East Anglia (the north and east Norfolk coastlines) and from south-eastern England (South Essex, East Sussex and East Kent). In none of these regions is it thought to be extant. It may yet be rediscovered in south-west England in North Somerset, where last recorded at Berrow Dunes (ST25) in 1989.

Distributed throughout Europe (Löbl & Löbl, 2015).

Habitat and Ecology Occurring primarily in maritime habitat but also apparently found inland in a variety of habitats. Found under driftwood on the seashore, in dune systems, under horse dung on bare sand in an estuarine meadow and under a dead rabbit. The literature refers to carrion and dung as resources for the species. In Britain, adults have been recorded in February (unusually) and between April and October inclusive.

Status Although this species appears to be more-or-less stable in terms of AoO occupied in the last 30 year period, it has undergone a dramatic decline historically with a 75% decrease in hectads occupied between the two main hectad-count periods. Most of this decline occurred before 1910. The species is currently restricted in distribution to south-west England and Wales with an odd outlier in East Suffolk.

A designation of Near Threatened is appropriate because were decline proven or suspected to be continuing, it would qualify for Vulnerable VUB2ab as it has only been recorded from 9 post-1990 locations. There are 74 records for this species in the database.

Threats Removal of carcases and beach cleaning for hygiene purposes, may present a threat to this species. Tidal storm events could cause significant loss of habitat, as could the encroachment of dune scrub, in particular of highly invasive species such as sea-buckthorn *Hippophae rhamnoides* and bramble *Rubus fruticosus agg.* Cessation of grazing regimes on dune systems may also impact on this species. Development relating to tourism may be a threat to existing habitat. Sea level rise may be a future issue as a result of the global warming phenomenon.

Management and Conservation Removal of dune scrub should be undertaken to open up the habitat where sea-buckthorn and bramble are becoming dominant. Beach cleaning, specifically relating to decaying organic material, should be discouraged in coastal strips known to be inhabited by the beetle. Grazing of dune systems should be encouraged.

Published Sources Duff (2012); Halstead (1963); Joy (1932); Löbl & Löbl (2015).

MARGARINOTUS OBSCURUS
VULNERABLE D2
Order COLEOPTERA
Family HISTERIDAE

Margarinotus obscurus (Kugelann, 1792)
Paralister obscurus (Kugelann, 1792)

Identification This relatively small (3.0-5.0mm) species exhibits the typical dorsal appearance of the *Hister* and *Margarinotus* genera with which the Family is most commonly associated. It is unicolorous black and has only three complete dorsal elytral striae. Only one marginal stria is present laterally on the pronotum. It can be differentiated from *M. ventralis* (Marseul) by its smaller size and less rounded appearance, the pronotum and elytra being less transverse, and from *M. neglectus* (Germar) it can be identified by its smaller size, by there being no shallow impression at the base of the third dorsal stria, by the teeth on the fore-tibiae which number 3 or 4 instead of 5 or 6 (in *neglectus*) and by the more strongly punctured pygidium. Unlike the majority of *Margarinotus,* this species also possesses an incomplete and distinctly abbreviated sub-humeral stria on the side of the elytra. The adult is keyed by Joy (1932), Halstead (1963) and Duff (2012).

Distribution Extremely local and scarce in England, Wales & Scotland. Known since 1990 with certainty from only four locations. The sites are: Monmouthshire, the River Usk at Llangibby Bottom (ST39) in 1998; South Hampshire, Stagbury Hill (SU21) in 2001; West Cornwall, Gribin Head (SX04) in 2011 and West Kent, Marden Beech (TQ74) in 2002.

This species has always been considered a 'rarity' and old records are also few and far between. They come from the following vice-counties and usually comprise a single locality for each county: East Inverness-shire (Nethy Bridge NJ01 or 02), South Lancashire (Ainsdale dunes SD21 and 'Liverpool district'), Shropshire (Netley Hall SJ40), 'Norfolk', the 'London district', Nottinghamshire ('Newark'), North Devon (Braunton Burrows SS43), Glamorganshire ('Llandaff', 'Swansea'), Pembrokeshire (Tenby SS19 or SN10), North Somerset (Shapwick Heath ST44), South Hampshire (West Wood SU49), West Cornwall (St Buryan SW42, Trevelloe Valley SW42, 'Padstow' SW97), East Cornwall ('Saltash') and South Devon ('Exmouth' and Colyton SY29). The most recent of this batch is the Colyton record which dates from 1947.

Its world distribution extends from south and central Europe into western Asia and North Africa (Löbl & Löbl, 2015).

Habitat and Ecology Associated with dung in various habitats which include coastal sand-hills and unimproved pasture. Specifically recorded from cow dung in South Hampshire. In Britain, adults have been recorded between April and July inclusive.

Status There is no evidence of continuing decline, although the data is so minimal that any occurring decline would be difficult to ascertain.

The species has only been recorded from 5 post-1990 locations and there are plausible threats, so due to these factors, an IUCN designation of VUD2 is appropriate. There are only 23 records for this species in the database.

Threats The most immediate threat is cessation of grazing or changes in grazing regimes, causing discontinuity of dung resources. The use of endectocides is also likely to negatively impact the dung-frequenting prey of this beetle. Land use changes and pasture improvements may also be detrimental

to its survival. On coastal sites, an additional threat comes from tidal storm events which may destroy habitat.

Management and Conservation Continuity of dung supply is a priority for this species, so it is important to have grazing livestock throughout the year for its continued survival. Environmentally sensitive farming, with limited grassland improvements and minimal or no reliance on endectocide applications will be beneficial to populations reliant on livestock dung for their prey. At the Stagbury Hill site in the New Forest, Hance (2002) noted that rough grazing by cattle has been continuous for years, with no pesticide or herbicide application to the ground and the cattle left to their own devices. He attributes this to a particularly healthy dung-associated invertebrate assemblage at the site.

Published Sources Duff (2012); Halstead (1963); Hance (2002); Joy (1932); Löbl & Löbl (2015).

PAROMALUS PARALLELEPIPEDUS
VULNERABLE D2
Order COLEOPTERA
Family HISTERIDAE

Paromalus parallepipedus (Herbst, 1792)

Identification Very similar in size and superficial appearance, to *Paromalus flavicornis* but it can be differentiated from that species by the parallel form and by the mesosternal keel which is angled, though somewhat variably, in this species. The adult is keyed by Halstead (1963) and Duff (2012).

Distribution Currently known from only two locations in the region. These are West Stow, West Suffolk (TL77 and TL78) in 2009 and 2016 and near Stratford St Mary, West Suffolk (TM03) in 2016. Specimens from Glamorganshire in the 1920's are thought to be imported (Lane & Lee, 2016) and Mark Telfer *(pers comm*) reports that specimens in the J.J.Walker collection from 'Oxford district' and 'New Forest' are in error for *P. flavicornis*. Lane (2016) documents the regional status more fully, with further records published in Lane & Lee (2016).

In the Palaearctic region, it is widely distributed in Europe and also occurs in Asia (Löbl & Löbl, 2015).

Habitat and Ecology A saproxylic species, inhabiting woodland where it has been found under bark of conifers. The species predates the larvae of bark beetles (Curculionidae, Scolytinae) in their galleries. The recent British records concern specimens found under bark, mainly on the upper-side of a fallen Scot's Pine tree and also on cut logs resulting from felling operations in conifer plantations. One old record from the New Forest reads 'in black powdery fungus on fir stumps'. In mainland Europe it is found primarily in association with conifers (Duff, 2012). March-May, July.

Status First recorded in Britain from the New Forest (locations include Mark Ash Wood, SU20) in South Hampshire and known from this area until 1910. Later discovered at Denge Wood ('Denge and Penypot Woods' (TR15)) near Chartham in East Kent, a single specimen only, in 1952. There were then no reports of the species until 2009. It is clearly rare in our region and there are perceived threats to the populations (see below).

With only two locations and perceived threats, but no evidence of decline, a designation of IUCN Category VUD2 is appropriate.

Threats Normally, there would be no perceived threats to a species that inhabits conifer plantations. In two of the areas where the species has been recorded; the Brecks region of West Suffolk and the New Forest, there are vast tracts of Forestry Commisson woodland that could potentially support the species. However, if the past and present rarity of the beetle are considered, we can hypothesise that it is only present in highly localised populations. The author has carried out extensive but unfruitful searches for the species in suitable plantation habitat in West Norfolk and the species has also been actively looked for in the New Forest since last recorded there in 1910. Any highly localised, small or fragmented populations are vulnerable to very real threats such as felling and clearing of conifers and conifer log stacks.

Management and Conservation Targeted searches should be undertaken to discover the extent of the species distribution in the Suffolk Breckland. Where populations are identified, the habitat should be managed to ensure their continuity. This will involve leaving inhabited trees and logs of a certain age in-situ until they are no longer suitable to support the species and its prey. Research may be required to evaluate the suitability of habitat in terms of natural ageing of deadwood. A constant source of dead wood will also be required in the immediate vicinity. This could be achieved by sensitive selective felling and re-cropping. It may be difficult to negotiate such management practise with current silviculture methods, as these seek to deter infestation of living trees with bark beetle and may also promote the removal of dead wood in the interest of forest hygiene.

Published Sources Duff (2012); Halstead (1963); Lane (2016); Lane & Lee (2016); Löbl & Löbl (2015).

PLATYSOMA ELONGATUM
DATA DEFICIENT DD
Order COLEOPTERA
Family HISTERIDAE

Platysoma elongatum (Thunberg, 1787)
Cylister elongatus (Thunberg, 1787)

Identification This is a small (3.5-4.0mm) black, distinctly elongate beetle which has three complete striae on each elytron and toothed tibiae. It is quite distinctive amongst our Histerid fauna. The adult is not keyed in any British fauna literature. Keyed in Witzgall (1971).

Distribution The species is currently only known from a single specimen, at Smart's Heath, Surrey (SU95) in August 2014 (Denton, 2016). Allen (1965) listed previous occurrences of the species presumably imported in pitprops, before the 1930's, from Manchester, North Devon and Glamorganshire. The species is distributed throughout most of Europe (Löbl & Löbl, 2015) and has been recorded as an introduction in Japan.

Habitat and Ecology The specimen was found under the bark of a felled Scot's Pine in a woodpile in an area of Forestry operations in August. The trees had been felled from heathland habitat in the previous year (2013) (Denton, 2016). In mainland Europe, it is a predator of bark beetles inhabiting their galleries beneath the bark of conifers (Witzgall, 1971).

Status It is not currently known whether the single specimen found is an adventive, an introduction, or a recent colonist. For the purposes of this review, a designation of DD is appropriate until further records or targeted surveys for the species can clarify its distribution and status.

Threats No specific threats have been identified for this species in the region, but any highly localised, small or fragmented populations are vulnerable to very real threats such as felling and clearing of conifers and conifer log stacks. Denton (2016) noted that the log stack in which the specimen was found had since been removed.

Management and Conservation Targeted searches should be undertaken to discover the extent of the species distribution at and in the vicinity of Smart's Heath. Where populations are identified, the habitat should be managed to ensure their continuity. This will involve leaving inhabited trees and logs of a certain age in-situ until they are no longer suitable to support the species and its prey. Research may be required to evaluate the suitability of habitat in terms of natural ageing of deadwood. A constant source of dead wood will also be required in the immediate vicinity. This could be achieved by sensitive selective felling and re-cropping. It may be difficult to negotiate such management practise with current silviculture methods, as these seek to deter infestation of living trees with bark beetle and may also promote the removal of dead wood in the interest of forest hygiene.

Published Sources Denton (2016); Löbl & Löbl (2015); Witzgall (1971).

SAPRINUS IMMUNDUS
VULNERABLE D2
Order COLEOPTERA
Family HISTERIDAE

Saprinus immundus (Gyllenhal, 1827)

Identification This is a relatively small (2.5-4.5mm) black species distinguished by the combination of; the presence of marginal pronotal punctures, the elytra being both striate and punctured, the head having a raised border along the inner edge of each eye only, not continuing across the forehead, and the elytra with punctures at sides towards base which are dense, enclosing an impunctate area adjacent to stria 4 that is a quarter or less than the size enclosed between the suture and stria 4. The adult is keyed by Joy (1932), Halstead (1963) and Duff (2012).

Distribution This beetle is only currently (since 1990) known from three locations in Britain: Holkham NNR/Burnham Overy dunes in West Norfolk (TF64) between 1994 and 2015, Stanford PTA in the Brecks in West Norfolk (TL89) in 2006 and Sandwich Bay in East Kent (TR36) in 2004. It was recorded from the Deal sand-hills close to this last site between 1900 and 1973.

It was formerly more widespread in the region, but some of the records may require validation. Most date from pre-1900 unless stated otherwise. Previously known from: Hunstanton, West Norfolk, where it was described as 'in numbers and by far the commonest member of the genus' in Fowler (1889) and also found at Brancaster on this north Norfolk coastal fringe and then from Ostend, East Norfolk, Waxham, East Norfolk (1979), Great Yarmouth, East Norfolk (1917), Bedford Purlieus in Northamptonshire (1936), Felixstowe, Southwold and Kessingland in East Suffolk, Loughton in South Essex and Camber dunes in East Sussex (up until 1971).

A specimen in the King collection at The Hunterian Museum, Glasgow, from Irvine Sands, Ayrshire (NS23/33), June 1874, was originally determined as *S. aeneus* but since redetermined as *immundus*. Records from 'Wales', South and West Lancashire and 'Lincolnshire' before 1900, Dorset (pre-1929) and West Cornwall in 1969 require validation and are possibly erroneous.

Distributed throughout most of Europe (Löbl & Löbl, 2015).

Habitat and Ecology Almost exclusively maritime, occurring on dune systems but also very rarely inland. Associated with carrion and dung (mainly dog faeces, but also recorded in sheep dung). There is also a record of a specimen extracted from grass cuttings on sand and pebble substrate. In Britain, adults have been recorded between May 3rd and September 12th inclusive.

Status The species has declined significantly. With so little data, so few current sites and no monitoring of the populations, it is uncertain whether this decline is continuing. Its recent demise appears to have occurred 'off-radar', as Hyman (revised Parsons) as recently as 1992 only categorised it as Nb Notable. Research into the species' populations and requirements at its known haunts as well as some targeted survey work to rediscover it at former haunts, would be worthwhile.

Continuing decline cannot be proven. The species has been found at only three post-1990 locations and can only be said to be established at two of these (Holkham NNR and Sandwich Bay) because the Breckland capture was of a single inland specimen in a pitfall trap. It is vulnerable to threats such as tidal events and to continuity of dung. Consequently, a designation of VUD2 seems appropriate. If continuing decline could be proven or inferred, the species could even be considered Endangered B2ab. Despite not observing a decline in recent data, IUCN criteria for A2 was applied, allowing for a 55-year time period and a 75% decrease as observed in the main hectad recording period. This gave an adjusted 10-year decline of 22% which is below the 30+% threshold for Vulnerable. There are only 46 records of this species in the database.

Due to plausible threats, but no evidence of continuing decline and presence at only three post-1990 locations, a designation of Vulnerable D2 is appropriate.

Threats Removal of carcases and beach cleaning for hygiene purposes, may present a threat to this species. Tidal storm events could cause significant loss of habitat, as could the encroachment of dune scrub, in particular of highly invasive species such as sea-buckthorn *Hippophae rhamnoides* and bramble *Rubus fruticosus agg.* Cessation of grazing regimes on dune systems may also impact on this species. The use of endectocides is also likely to negatively impact the dung-frequenting prey of this beetle. Development relating to tourism may be a threat to existing habitat. Sea level rise may be a future issue as a result of the global warming phenomenon.

Management and Conservation Removal of dune scrub should be undertaken to open up the habitat where sea-buckthorn and bramble are becoming dominant. Beach cleaning, specifically relating to decaying organic material, should be discouraged in coastal strips known to be inhabited by the beetle. Grazing of dune systems should be encouraged without the use of endectocidal treatments to the livestock.

Published Sources Duff (2012); Halstead (1963); Joy (1932); Löbl & Löbl (2015).

SAPRINUS SUBNITESCENS
REGIONALLY EXTINCT
Order COLEOPTERA
Family HISTERIDAE

Saprinus subnitescens Bickhardt, 1909

Identification This is a relatively large (4.0-7.0mm) metallic-reflective black species that very superficially resembles the typical *Hister* and *Margarinotus* species forms. However, it is distinguished from them and other, more closely-related taxa by the combination of; the presence of marginal pronotal punctures, the elytra being both striate and punctured, the head having a raised border along the inner edge of each eye only, not continuing across the forehead, and the elytra without dense punctation and no distinct enclosed smooth area towards the base. The beetle is superficially similar to *S. planiusculus* Motschulsky from which it can only be reliably identified by the form of the male abdominal segments. The adult is keyed by Halstead (1963) and Duff (2012).

Distribution Extinct in Britain. Recorded from Colgate in West Sussex in August 1892 and also known as 'British' from a Museum specimen with no locality or date. Recorded from many Central Europe countries (Löbl & Löbl, 2015).

Habitat and Ecology There is no information on British specimens, but in mainland Europe, it is associated with carrion and decaying vegetation. The only date pertaining to a British-caught specimen is August.

Status The species is extinct in the region, if it was ever truly established as a British species. With such old and limited data, it is difficult to assess the integrity of the species as indigenous, but for the purposes of this Review, it is considered a long-extinct native. There are only 2 records of this species in the database.

Threats The cause of regional extinction is unknown.

Management and Conservation None.

Published Sources Duff (2012); Halstead (1963); Löbl & Löbl (2015).

SAPRINUS VIRESCENS
NEAR THREATENED
Order COLEOPTERA
Family HISTERIDAE

Saprinus virescens (Paykull, 1798)

Identification This is a relatively small (3.0-4.0mm) but distinctive blue-green metallic species with the pronotum punctured throughout. It bears a strong superficial resemblance to the leaf beetle *Phaedon cochleariae* (Fabricius). The adult is keyed by Joy (1932), Halstead (1963) and Duff (2012).

Distribution Since 1990, the species has been recorded from only 12 locations: East Gloucestershire (SP15 in 1998), South Hampshire (SU50 and 51 in 2001 and 2002 respectively), West Sussex (SU82 in 2000), Dorset (SY98 in 2002), Isle of Wight (SZ47 and 58 in 2004 and 2002 respectively), East Suffolk (TG40, TM24 and 46 in 1997, 2003 and 1996 respectively), Cambridgeshire (TL57 in 1999) and East Kent (TR06 in 2011). There have been no British records since 2011.

A significant large-scale decline is noted historically which appears to have continued well into the middle of the 20th century with apparent vice-county extinctions as follows: County Durham (pre-1839), Mid-west Yorkshire (1953), South-west Yorkshire (1941), Nottinghamshire (1905),

Staffordshire (1958), Leicestershire (1958), Worcestershire (1933), Warwickshire (1958), Oxfordshire (1938), North Devon (1940's?), Glamorganshire (pre-1829), Somerset (1960), Berkshire (1933), Lincolnshire (1912), Norfolk (1960), Hertfordshire (pre-1902), Bedfordshire (1935), Huntingdonshire (pre-1890), Essex (pre-1903), Surrey (1886) and West Kent (1951).

Habitat and Ecology Found in open habitats, in a weedy arable site apparently in company with *Gastrophysa polygoni* (Linnaeus) (Hodge & Hance, 2000) or around ponds or flowing water on or under watercress where it is generally assumed to be in company with *Phaedon* [*armoraciae* (Linnaeus) and *cochleariae*]. It predates the larvae of these chrysomelids. The beetle has also been found in carrion (rabbits and hares), in hibernation under a rotten alder trunk on the date of April 3rd and in flood refuse on the date of April 22nd. Non-hibernating individuals have been recorded in Britain between April 30th and October 6th inclusive.

Status A dramatic decline is evidenced by an 83% decrease in occupied hectads between the two main recording periods (pre-1990 and post-1990). In the 30-year period between 1986 and 2015, this decline appears to have ceased as the hectad count increases slightly in the latter 15 year period, from 5 to 7 hectads. However, if we look at the last 10-year period, there is only one record (from one hectad). This strongly suggests that although the species is likely to be under-recorded along with most species in the Histeridae, the decline is continuing. Looking at older data in 10-year blocks gives the following hectad total counts: 1896-1905 (3), 1906-1915 (3), 1916-1925 (5), 1926-1935 (7), 1936-1945 (3), 1946-1955 (8), 1956-1965 (6), 1966-1975 (2), 1976-1985 (0), 1986-1995 (0), 1996-2005 (11), 2006-2015 (1). There is no clear linear pattern of decline, so the data does not support analysis for IUCN Category A2. The data does suggest possible significant periodic fluctuation in population, but further research would need to be conducted to prove this as conclusive because, as for all Histerid species, the current dataset is based on non-systematic observations and not on standardised sampling and the data quality is therefore not of the standard required. There are 117 records for this species in the database.

The species satisfies designation in the Near Threatened category because it is undergoing continuing decline but just falls wide of the threshold for the number of modern locations that would place it into the IUCN Vulnerable category.

Threats It is very difficult to evaluate specific threats to a species which appears to be a predator of generally distributed and common leaf beetle species and which is found in such a diversity of habitats, including arable margins and watercourses amongst others. Any operations which cause deterioration or loss of wetland habitat will potentially impact on the species at sites where it is known to be present. Such causative agents might include water abstraction or drainage for the improvement of agricultural land.

Management and Conservation Management and conservation effort should be designed to safeguard specific extant populations wherever they occur. For this to be achievable, some basic research will be required when a population is discovered. Conservation measures should take into account the immediate habitat occupied by the species and the likely prey species and its associated food-plant. The management package should consider the welfare of the whole assemblage.

Published Sources Duff (2012); Halstead (1963); Joy (1932).

TERETRIUS FABRICII
REGIONALLY EXTINCT
Order COLEOPTERA
Family HISTERIDAE

Teretrius fabricii Mazur, 1972

Identification This species can be identified by the lack of a gular lobe at the front of the prosternum (present in the superficially similar *Paromalus*) in combination with the parallel form and small size(1.8-2.1mm). The adult is keyed by Joy (1932), Halstead (1963) and Duff (2012).

Distribution Not recorded in Britain since 1936 (Walderslade, East Kent TQ76) and considered extinct in this Review.

Formerly known also from East Norfolk, Glamorganshire, North Somerset, Berkshire, Middlesex and East Suffolk, all before 1900. Its stronghold in the region however, appears to be in Surrey where it was recorded from five hectads and last recorded in 1907. The Surrey localities are: Ashtead and Ashtead Common (1905-1907, TQ15), Oxshott Heath (1907, TQ16), Putney (1902-1907, TQ27), Shirley (1874, TQ36) and from Biggin Hill Upper Norwood, Camberwell, Forest Hill and Peckham (pre-1890, TQ37). Some of these locations might be duplicated under different names.

Habitat and Ecology The only data relating to British specimens cite the sources as 'in oak fences in company with *Lyctus brunneus*', 'on an old fence', 'with *Lyctus canaliculatus*, no *L. brunneus* to be found' and 'from fresh oak palings in company with *Tillus unifasciatus* and *Lyctus brunneus*'. The species preys on Bostrichid larvae within the galleries of dead wood. In central Europe, it is known to prey on *Ptilinus pectinicornis* (Linnaeus) on willows, elms and other softwoods (http://www.coleo-net.de). Adults have been recorded in our region between April and July inclusive.

Status Extinct in Britain. Last recorded in 1936. There are 36 records of this species in the database.

Threats The cause of regional extinction is unknown.

Management and Conservation None.

Published Sources Duff (2012); Halstead (1963); Joy (1932).

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Appendix 1: Summary Table – An alphabetical list of the clown beetles and false clown beetles (note: more information is included in the accompanying Excel spreadsheet).

Species Name	GB IUCN Status (2016)	Qualifying criteria	Rationale	GB Rarity status (2016)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2016	AoO (tetrads) 1990-2016	No. of Locations 1990-2016
***Sphaerites glabratus* (Fabricius)**	LC		In spite of a possible decline historically as suggested by a decrease in the main period hectad counts, there appears during the last 30 year period (1986-2015), to have been no obvious decline, although the data is poor and any decline is difficult to appreciate. The species is also likely to be under recorded due to its distribution in forested regions of the Scottish Highlands where (from limited data) its strongholds appear to be. For this reason, there are thought to be no immediate threats to the species.86 records.	NR	E	S	W	20	12	14	12
***Abraeus granulum* Erichson**	LC		There are no specific threats to this widely distributed species and no observed decline. 123 records.	NS	E		W	26	39		
***Abraeus perpusillus* (Marsham)**	LC		There are no specific threats to this widely distributed species and no observed decline. 770 records.		E	S	W	134	197		
***Acritus homoeopathicus* Wollaston**	VU	A2c: B2a,b(ii),(iv)	Due to the species' association with burnt ground, a habitat not regularly investigated by the majority of Coleopterists, the beetle is very likely to be under-recorded. However, it is certainly very restricted in distribution in Britain and efforts to find it are likely to be best-rewarded at 'new' sites within its known range. Data evidences a continuing decline. Application of IUCN Category A2 criteria to the last 30-year's of data gives an adjusted 10-year period decline of 45% which equates to designation as IUCN Category Vulnerable VUA2c With only three post-2000 records and only eight localities recorded for the species since 1990, a designation of IUCN VUB2a,b (ii)(iv) is also appropriate. 38 records.	NR	E			12	9	10	8

Acritus nigricornis **(Hoffman, J.)**	LC		Acritus nigricornis occurs in a wide variety of habitats and is associated with heaps of decaying organic matter, a prolific habitat largely under-worked by a great many Coleopterists, presumably due in part to inaccessibility as many of these piles are often on private land. The species is also small and easily overlooked, particularly in the field. As such, it has not been designated as Nationally Scarce (NS), although it would normally qualify for this with only 44 post-1990 hectads.176 records.		E	S	W	88	44		
Aeletes atomarius **(Aubé)**	LC		There are no specific immediate threats to this widely distributed species, although continuity of dead-wood is a concern. There is also no observed decline. Due to its small size, this species is likely to be under-recorded. Its apparent increase in the region, demonstrated by a more than doubling of hectad counts in the main recording period is probably due to increased recorder effort at pasture woodland and parkland sites coupled with an increase in the popularity of extraction techniques such as the use of Tullgren Funnels. It is clearly more widespread and frequent than previously believed (cf Hyman, 1992). 75 records.	NS	E		W	14	29	35	32
Atholus bimaculatus **(Linnaeus)**	LC		There are no specific threats to this widely distributed species and no readily observed recent decline. It shares the same under-recorded habitats as *Acritus nigricornis* and for the same reason, this author believes it to be much more widespread in the region than current data suggests. 210 records.		E	S	W	96	54		
Atholus duodecimstriatus **(Schrank)**	LC		There are no specific threats to this widely distributed species and no observed decline. 381 records.		E	S	W	133	118		
Carcinops pumilio **(Erichson)**	LC		There are no specific immediate threats to this widely distributed species and no observed decline. It is certainly even more widespread than the data suggests. 355 records.		E	S	W	108	122		
Dendrophilus punctatus **(Herbst)**	LC		There are no specific threats to this species and no readily observed recent decline. With only 52 post-1990 hectads, the species would normally qualify for designation as Nationally Scarce (NR), but it is undoubtedly under-recorded in the region due to its primary association with bird's nests in tree-cavities and the inconvenience to the majority of Coleopterists in accessing this habitat niche, except in the event of fallen trees or by the employment of Flight Interception Traps. 181 records.		E	S	W	56	52		
Dendrophilus pygmaeus **(Linnaeus)**	LC		The historic decline evidenced by the data may be ongoing, but the species is likely to be under recorded in upland forested regions of Wales and Scotland as there are vast tracts of land that have yet to be surveyed in these areas. So, despite the species nearly qualifying for IUCN categorisation based on only 16 post 1990 hectads and a possible continuing decline, the author believes that it is probably under-recorded and with more recording effort, particularly in Wales and Scotland, it ought to be found to be more widespread than the current data suggests.	NS	E	S	W	44	16	20	16

***Dendrophilus xavieri* Marseul**	NA		This is a synanthropic species of sporadic and transient occurrence in our region and has only been recorded in indoor situations often close to ports, where it has certainly been introduced. 5+ records.		E			4+?	1	1	1
***Epierus comptus* Erichson**	NT		This is a highly restricted species, occurring only at a handful of localities in South Wiltshire and South Hampshire since its discovery in England in 1980. Considered by some to be a possible introduction, but for the purposes of this Review, the species is treated as a long-overlooked native. There is no evidence of decline and to the contrary, the discovery of new sites in recent years suggests a possible increase although data is limited. There are also no plausible threats to the species at present. With an AoO of 12km2 and a presence in only 3 locations since 1990, the species nearly qualifies for Endangered under B2a. However, as there is no evidence of decline (b) or extreme fluctuations (c), it affords a Near Threatened category instead. 14 records.	NR	E			1	3	3	3
***Gnathoncus buyssoni* Auzat**	LC		A very locally distributed species that is under recorded due to: its primary association with bird's nests, a habitat infrequently sampled by the majority of Coleopterists; the difficulty of assigning certain identification to specimens (in particular to females) in the genus *Gnathoncus* and the fact that old records of *Gnathoncus* before 1928 that have not been more recently validated, may include unidentified *buyssoni* amongst them, because *buyssoni* was first introduced as British at that time. There are no threats recognised for this species. The quality of the data is too unreliable to apply IUCN criteria. 64 records.	NS	E		W	20	18		
***Gnathoncus communis* (Marseul)**	LC		An apparently very locally distributed species, but under recorded due to the difficulty of attributing certain identification to specimens (in particular to females) in the genus *Gnathoncus* and to the fact that bird's nests and saproxylic habitats are still under-worked by many Coleopterists. The quality of the data is too unreliable to apply IUCN criteria. 57 records.		E		W	17	25		
***Gnathoncus nannetensis* (Marseul)**	LC		There are no specific threats to this widely distributed species and no observed recent decline. The post-1990 hectad count would normally be considered sufficiently low to designate the species as Nationally Scarce, but like others in the genus, this taxon is likely to be under-recorded and in this instance, having no British rarity status is the preferred option. 184 records.		E	S		53	54		
***Gnathoncus rotundatus* (Kugelann)**	LC		An apparently locally distributed species, but under recorded due to the difficulty of attributing certain identification to specimens (in particular to females) in the genus *Gnathoncus* and to the fact that bird's nests, grain stores and poultry house litter are still under-worked by many Coleopterists. The post-1990 hectad count would normally be considered sufficiently low to designate the species as Nationally Scarce, but like others in the genus, this taxon is likely to be under-recorded and in this instance, having no British rarity status is the preferred option. The quality of the data is too unreliable to apply IUCN criteria. 105 records.		E	S	W	47	26		

***Haeterius ferrugineus* (Olivier)**	VU	D2	The species is currently known from only 3 hectads and although no recent or continuing decline is evident, there are very plausible threats to its habitat, such as heathland fires and scrub encroachment. For these reasons, an IUCN designation of VUD2 is appropriate. 13 records.	NR	E			6	3	3	3
***Halacritus punctum* (Aubé)**	NT		The species has been recorded from only 8 (possibly 9) modern (post-1990) locations, but there are no plausible imminent or near-future threats to the sites and there is no evidence of decline, except for some possible localised decline along the south coast of England. No current decline is suspected. This is a very small species that is easily overlooked. A designation of Near Threatened is appropriate because the species would have qualified as Vulnerable if continuing decline were suspected and proven. 39 records.	NR	E		W	9	9(10)	11(12)	8(9)
***Hister bissexstriatus* Fabricius**	NT		The species has been recorded from only 12 post-1990 hectads, but despite clear historic decline, there is no evidence that decline is continuing. In common with many species of the dung-feeding Scarabaeidae, the invertebrate prey of *Hister bissexstriatus* may be susceptible to livestock endectocide treatments. The beetle itself may be adversely affected by pasture 'improvement' management practices and to changes in grazing regimes which might impact negatively on dung-availability. Consequently, it is vulnerable in the broadest sense, but not to the degree of qualifying currently for IUCN status, although it may be a candidate in future reviews. 46 records.	NR	E	S	W	25	12	12	11
***Hister illigeri* Duftschmid**	EX		The species is extinct in the region, if it was ever truly established as a British species. Fowler (1890) even questioned the accuracy of some of the records. With such old and limited data, it is difficult to assess the integrity of the species as indigenous, but for the purposes of this Review, it is considered a long-extinct native. 4 records.		E		W	4 (?)	0		
***Hister quadrimaculatus* Linnaeus**	VU	D2	There is no evidence that the historical decline shown by the data is continuing. In fact, the species has been 'discovered' at several sites in recent years after a long absence of records. The 1989 discovery at Dungeness, East Kent, was the first recorded in Britain since 1952. However, with only four post-1990 locations and plausible threats in the form of events such as tidal surges, flooding, coastal land use changes and developments such as flood defence barriers and industrial complexes, an IUCN designation of VUD2 is appropriate. 57 records.	NR	E			20 (21)	3	6	4
***Hister quadrinotatus* Scriba**	EX		The species is extinct in the region, if it was ever truly established as a British species. With such old and limited data, it is difficult to assess the integrity of the species as indigenous, but for the purposes of this Review, it is considered a long-extinct native. 2 records.		E			2	0		
***Hister unicolor* Linnaeus**	LC		There are no specific threats to this widely distributed species and no observed decline. 471 records.		E	S	W	162	167		

***Hololepta plana* (Sulzer)**	DD		There is no evidence of a decline as the species has only recently been added to the British list and has since been discovered at a further four locations. Due to the small number of records and uncertainty about its true status, a designation of DD is more appropriate until such time as we have a clearer indication of its distribution. 7+ records.	NR	E			0	4	5	5
***Hypocaccus crassipes* (Erichson)**	DD		This species has only recently been added to the British list and has formerly been misidentified as other species in the genus Hypocaccus. Consequently, although the species is considered likely to be highly localised in distribution, the current situation is one where data is insufficient to evaluate its true regional status. 3 records.	NR	E		W	2	0	0	0
***Hypocaccus dimidiatus* (Illiger)**	LC		This species appears to have undergone decline, having disappeared from some former haunts and a hectad count reduction of 38% in the main count period is a concern. However, hectad counts in the last 30 year-period are stable indicating no continuing decline. 329 records.	NS	E	S	W	78	48		
***Hypocaccus metallicus* (Herbst)**	NT		The species is highly localised in the region, but appears to be stable at its nine modern locations, occupying 17 tetrads. There is no continuing decline evidenced or inferred by the data. A designation of Near Threatened is appropriate because if there were a decline, the species being recorded from only nine post-1990 locations, would qualify as Vulnerable VUB2ab. 97 records.	NR	E			8	9	17	9
***Hypocaccus rugiceps* (Duftscmid)**	LC		This is a very localised species in the region, but the population appears to be stable if not increasing (10 hectads increasing to 15 hectads in the last 30 year period) and it fails to qualify for IUCN status. 165 records.	NS	E	S	W	28	19		
***Hypocaccus rugifrons* (Paykull)**	NT		Although this species appears to be more-or-less stable in terms of AoO occupied in the last 30 year period, it has undergone a dramatic decline historically with a 75% decrease in hectads occupied in the main hectad count period. Most of this decline occurred before 1910. A designation of Near Threatened is appropriate because were further decline to occur, it would qualify for Vulnerable VUB2ab as it has only been recorded from 9 post-1990 locations. 75 records.	NR	E		W	36	9	10	9
***Kissister minimus* (Laporte)**	LC		There are no specific threats to this widely distributed species and no observed recent decline. 406 records.		E		W	79	112		
***Margarinotus brunneus* (Fabricius)**	LC		There are no specific threats to this widely distributed species. There does appear to be a decline in AoO over the last three ten-year periods, from 62 to 39 hectads, but applying IUCN Criteria A2 to this data gives a 10-year rate of decline of only 14%; well below the threshold that would place this species in a Threatened category. 473 records.		E	S	W	202	121		

***Margarinotus marginatus* (Erichson)**	LC		The reduction in hectads in the main and later count periods infers that this species has declined historically and is also undergoing current ongoing decline, but it is important to factor in the habitat of the species in underground mammal nests and runs and the fact that few present-day Coleopterists investigate mole fortresses or deep litter in rabbit burrows. For this reason, the species is undoubtedly under-recorded and is likely to be much more widespread and frequent than the data suggests. 101 records.	NS	E	S	W	49	28		
***Margarinotus merdarius* (Hoffmann, J.)**	LC		There are no specific threats to this widely distributed species and no observed recent decline. 341 records.		E	S	W	102	117		
***Margarinotus neglectus* (Germar)**	LC		There are no specific threats to this widely distributed species and no observed recent decline. With only 62 post-1990 hectads, the species would normally qualify for designation as Nationally Scarce (NR), but it is undoubtedly under-recorded in the region, particularly in Scotland where it should be widespread. Because it has a largely northern and western distribution, a designation of Nationally Scarce has not been awarded. 190 records.		E	S	W	57	62		
***Margarinotus obscurus* (Kugelann)**	VU	D2	There is no evidence of continuing decline, although the data is so minimal that any occurring decline would be difficult to ascertain. The species has only been recorded from 5 post-1990 locations. There are plausible threats, the most immediate of which is availability and continuity of dung. The use of endectocides is also likely to negatively impact the dung-frequenting prey of this beetle. Land use changes and pasture improvements may also be detrimental to its survival. On coastal sites, an additional threat comes from tidal events which may destroy habitat. Due to these factors, an IUCN designation of VUD2 is appropriate. 23 records.	NR	E	S	W	18	5	6	5
***Margarinotus purpurascens* (Herbst)**	LC		There are no specific threats to this widely distributed species and no observed decline. With 93 post-1990 hectads, the species would normally qualify for designation as Nationally Scarce (NR), but it is undoubtedly under-recorded in the region, particularly in northern England, Wales and Scotland. 334 records.		E	S	W	100	93		
***Margarinotus striola* (Sahlberg)**	LC		There are no specific threats to this widely distributed species and no observed decline. 430 records.		E	S	W	145	132		
***Margarinotus ventralis* (Marseul)**	LC		There are no specific threats to this widely distributed species and no observed decline. 558 records.		E	S	W	166	205		

***Myrmetes paykulli* Kanaar**	LC		There has been a dramatic decrease in AoO of this species historically with a 48% decline evidenced between the main period hectad counts. The reasons for this decline are unknown, but wood ant (*Formica rufa*) has certainly died out at former sites in central England and Forestry operations and woodland clearance may have contributed to the decline. However, there is no evidence that this decline is ongoing as the recent 30-year period hectad counts show. The species is also highly likely to be under-recorded in forested tracts of Scotland, so the post-1990 hectad count of 15 is possibly a gross under-representation of the true extent of the population across the region. For these reasons, the species falls short of qualifying for IUCN status. The status of Nationally Scarce is maintained, rather than upgraded, based on the assumption that the species is more widespread than current records suggest. 80 records.	NS	E	S		29	15	16	16
***Onthophilus punctatus* (Müller, O.F.)**	LC		A historical decline of nearly 44% in AoO is evidenced by a reduction in hectads between the main recording periods. There is some indication from the two recent 15-year hectad counts that this decline is ongoing, with a further decrease of 25% in recorded hectads, but the four consecutive recent 10-year hectad counts negate this apparent trend. There are 21 locations since 1990, occupying 24 tetrads. Fifteen of these locations (71%) are in West Norfolk indicating that the British population is highly localised. Currently, the author believes that the species is not threatened, but agricultural improvements, development and land-use changes may impact in the long-term, resulting in its designation in future reviews. 87 records.	NR	E	[S]		25	14	24	21
***Onthophilus striatus* (Forster)**	LC		There are no specific threats to this widely distributed species and no observed decline. 528 records.		E	S	W	174	136		
***Paromalus flavicornis* (Herbst)**	LC		There are no specific threats to this widely distributed species and no observed decline. 1,178 records.		E	S	W	153	259		
***Paromalus parallelepipedus* (Herbst)**	VU		This is a little understood species in Britain. There are very few records and these are from localities that are a considerable distance apart. Due to the uncertainty of the species' status in the region, the widely-spaced localities with sporadic records only and to the possibility of it being overlooked, a designation of DD may be considered appropriate. However, the species is undeniably rare currently and was historically also considered a real rarity. The populations are also fragmented in terms of their spatial distribution. Accounting for these facts, the populations could be impacted by threats such as the felling and clearance of plantations. Hence, a designation of IUCN Category VUD2 is appropriate. 12+ records.	NR	E			4 (?)	3	3	2
***Platysoma elongatum* (Thunberg)**	DD		There are no specific threats known to this species which has only recently been added to the British List (Denton, 2016). It is not currently known whether the single specimen found is an adventive, an introduction, or a recent colonist. For the purposes of this review, a designation of DD is appropriate until further records or targeted surveys for the species can clarify its distribution and status. 1 record.	NR	E			0	1	1	1

***Plegaderus dissectus* Erichson**	LC		There are no specific threats to this widely distributed species and no observed recent decline. The hectad counts in the main period suggest that this species is increasing. Consequently, and due to a post-1990 hectad count of >100, the species is no longer considered Nationally Scarce. 414 records.		E		W	46	111		
***Plegaderus vulneratus* (Panzer)**	LC		There are no specific threats to this widely distributed species. With only 21 post-1990 hectads, the species would normally qualify as Nationally Scarce, but the author believes that the data is vastly under-representing its current distribution, due to the fact that the species was first discovered in the region as recently as 1962 (Silwood Park, Berkshire) and also because conifers are not as productive for their saproxylic assemblages as oak and beech for example, and thus receive relatively less attention from Coleopterists. 74 records.		E		W	23	21		
***Saprinus aeneus* (Fabricius)**	LC		This species has suffered a significant (mainly historical) decline, with a decrease of more than 57% of hectads between the main recording periods. This decline appears to be continuing with a further 33% reduction in hectads in the last 30 year period (1986-2015). The three consecutive 10 year period recording blocks suggest a trend that could be described as 'linear continuing decline'. With only 43 post-1990 hectads and this history of decline, the species has been elevated to Nationally Scarce status. 263 records.	NS	E	S	W	101	43		
***Saprinus immundus* (Gyllenhal)**	VU	D2	The species has declined significantly. With so little data, so few current sites and no monitoring of the populations, it is uncertain whether this decline is continuing. The species has been found at only three post-1990 locations and can only be said to be established at two of these (Holkham NNR and Sandwich Bay) because the Breckland capture was of a single inland specimen in a pitfall trap. It is vulnerable to threats such as tidal events and to continuity of dung. Consequently, a designation of VUD2 seems appropriate. If continuing decline could be proven or inferred, the species could even be considered Endangered ENB2ab.	NR	E	S	(W)	19	3	3	3
***Saprinus planiusculus* Motschulsky**	LC		The species has potentially declined, but is likely to have been overlooked for *Saprinus semistriatus* from which it can only be differentiated by using underside characters and/or by dissection of males. The author believes that it is under-recorded and evidence of its continued existence should be sought at recent former haunts and 'new' coastal sites. Despite a mere 16 post-1990 hectads, a designation of Nationally Scarce only, is considered to be an accurate reflection of its probable current status. It falls short of qualifying for IUCN status and the data quality is not of sufficiently high standard to apply IUCN criteria. 67 records.	NS	E		W	22	16	21	18
***Saprinus semistriatus* (Scriba)**	LC		There are no specific threats to this widely distributed species and no observed decline. 484 records.		E	S	W	163	159		
***Saprinus subnitescens* Bickhardt**	EX		Extinct in Britain, if it was ever truly indigenous. The paucity of data makes judgement of status difficult, but for the purposes of this Review, it is considered a long-extinct native. 2 records.		E			2	0		

***Saprinus virescens* (Paykull)**	NT		Dramatic decline evidenced by an 83% decrease in occupied hectads between the two main recording periods (pre-1990 and post-1990). In the 30-year period between 1986 and 2015, this decline appears to have ceased as the hectad count increases slightly in the latter 15 year period, from 5 to 7 hectads. The species is likely to be under-recorded along with most species in the Histeridae, the decline is continuing. The species satisfies designation in IUCN Category Near Threatened as it is undergoing continuing decline but just falls wide of the threshold for the number of modern locations. . 119 records.	NR	E		W	71	12	12	12
***Teretrius fabricii* Mazur**	EX		Extinct in Britain. Last recorded in 1936. 36 records.	EX	E		W	12	0		

Appendix 2. Summary of IUCN Criteria

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

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

B. Geographic range in the form of either B1 (extent of occurrence) AND/OR B2 (area of occupancy)			
B1. Extent of occurrence (EOO)	< 100 km²	< 5,000 km²	< 20,000 km²
B2. Area of occupancy (AOO)	< 10 km²	< 500 km²	< 2,000 km²
AND at least 2 of the following:			
(a) Severely fragmented, **OR**			
Number of locations	= 1	≤ 5	≤ 10
(b) Continuing decline observed, estimated, inferred or projected in any of: **(i)** extent of occurrence; **(ii)** area of occupancy; **(iii)** area, extent and/or quality of habitat; **(iv)** number of locations or subpopulations; **(v)** number of mature individuals.			
(c) Extreme fluctuations in any of: **(i)** extent of occurrence; **(ii)** area of occupancy; **(iii)** number of locations or subpopulations; **(iv)** number of mature individuals.			
C. Small population size and decline			
Number of mature individuals	< 250	< 2,500	< 10,000
AND at least one of C1 or C2:			
C1. An observed, estimated or projected continuing decline of at least (up to a maximum of 100 years in future):	25% in 3 years or 1 generation (whichever is longer)	20% in 5 years or 2 generations (whichever is longer)	10% in 10 years or 3 generations (whichever is longer)
(up to a max. of 100 years in future)			

C2. An observed, estimated, inferred or projected continuing decline **AND** at least 1 of the following 3 conditions:			
(a i) Number of mature individuals in each subpopulation:	≤ 50	≤ 250	≤ 1,000
or			
(a ii) % of mature individuals in one subpopulation =	90–100%	95–100%	100%
(b) Extreme fluctuations in the number of mature individuals.			
D. Very small or restricted population			
Either:			
Number of mature individuals	< 50	< 250	**D1.** < 1,000
D2. *Only applies to the VU category*. Restricted area of occupancy or number of locations with a plausible future threat that could drive the taxon to CR or EX in a very short time.			**D2.** typically: AOO < 20 km² or number of locations ≤ 5
E. Quantitative Analysis			
Indicating the probability of extinction in the wild to be:	≥ 50% in 10 years or 3 generations, whichever is longer (100 years max.)	≥ 20% in 20 years or 5 generations, whichever is longer (100 years max.)	≥ 10% in 100 years