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A review of the status of the beetles of Great Britain

Longhorn Beetles (Cerambycidae)

Species Status No. 39

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Foreword

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

Background

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

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

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1 Introduction to the Species Status project

1.1 The Species Status project

The Species Status project is a recent initiative, providing up-to-date assessments of the threat status of taxa using the internationally accepted Red List guidelines developed by the International Union for Conservation of Nature (IUCN) IUCN Standards and Petitions Subcommittee, 2017); (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.

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). This publication is one in a series of reviews to be produced under the auspices of the new project.

1.2 The status assessments

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

In addition, but as a separate exercise, the Great Britain Rarity System, used for assessing rarity and based solely on distribution, is used 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 (2017) point out that a category of threat is often not sufficient to determine priorities for conservation action. However, the assessment of threats to survival should be separate and distinct from the subsequent process of deciding which species require action and what activities and resources should be allocated.

2 Introduction to the Beetle Reviews

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

The Cerambycidae comprise a group of well-defined and generally easily recognisable beetles. The family contains some of the best known and very familiar British beetles, such as the harlequin beetle *Rutpela maculata*, the wasp beetle *Clytus arietis* and musk beetle *Aromia moschata*. In addition, the saproxylic (wood decay) species in particular are ecosystem engineers, creating and maintaining habitat suitable for a whole host of associates. The family is involved in the provision of essential ecosystem services, being part of the processes of returning dead organic material back into the soil, thus releasing nutrients that other organisms may subsequently exploit. Many are attracted to blossom and are clearly involved in pollination services. A very few feed on living plant tissues, including both tall herbaceous plants as well as woody plants and at least one species is associated with soil fungi. While some species have been regarded as pest species – or at best nuisance species – the group is also notable for a range of rare and threatened native species.

The family is very popular amongst naturalists and many publications exist which provide overviews of the British fauna. Rejzek (2006) provides the most useful overview of their ecology, while Duff & Lewington (2007) and Duff (2016) provide the most up-to-date identification guides; the former a popular guide for naturalists, the latter a more technical guide for entomologists. The only volume available in the Royal Entomological Society's Handbooks for the Identification of British Insects (Duffy 1952) is now very out-of-date and has limited value to the modern recorder.

2.1 Taxa selected for this review

Table 1 summarises the taxa included in this review. Nomenclature follows Duff (2018). The Cerambycidae have been the subject of a British national recording scheme http://www.coleoptera.org.uk/cerambycidae/home, coordinated by the Biological Records Centre, and has involved a series of co-ordinators since being launched in 1983. A Provisonal Atlas has been published (Twinn & Harding 1999).

Table 1. Taxa in the Cerambycidae selected for review.

Order	**Family**	**Species**
Coleoptera	Cerambycidae	*Prionus coriarius* (Linnaeus, 1758)
		Rhagium bifasciatum Fabricius, 1775
		Rhagium mordax (De Geer, 1775)
		Rhagium inquisitor (Linnaeus, 1758)
		Stenocorus meridianus (Linnaeus, 1758)
		Dinoptera collaris (Linnaeus, 1758)
		Grammoptera abdominalis (Stephens, 1831)
		Grammoptera ruficornis (Fabricius, 1781)
		Grammoptera ustulata (Schaller, 178
		Pedostrangalia revestita (Linnaeus, 1767)
		Lepturobosca virens (Linnaeus, 1758)
		Leptura aurulenta Fabricius, 1792
		Leptura quadrifasciata Linnaeus, 1758
		Anastrangalia sanguinolenta (Linnaeus, 1760)
		Stictoleptura rubra (Linnaeus, 1958)
		Stictoleptura scutellata (Fabricius, 1781)
		Stictoleptura cordigera (Fuessly, 1775)

		Paracorymbia fulva (De Geer, 1775)
		Anoplodera sexguttata (Fabricius, 1775)
		Judolia sexmaculata (Linnaeus, 1758)
		Pachytodes cerambyciformis (Schrank, 1781)
		Alosterna tabacicolor (De Geer, 1775)
		Pseudovadonia livida (Fabricius, 1777)
		Strangalia attenuata (Linnaeus, 1758)
		Rutpela maculata (Poda von Neuhaus, 1761)
		Stenurella nigra (Linnaeus, 1758)
		Stenurella melanura (Linnaeus, 1758)
		Asemum striatum (Linnaeus, 1758)
		Tetropium castaneum (Linnaeus, 1758)
		Tetropium fuscum (Fabricius, 1787)
		Tetropium gabrieli Weise, 1905
		Arhopalus ferus (Mulsant, 1839)
		Arhopalus rusticus (Linnaeus, 1758)
		Trinophylum cribratum Bates, 1878
		Cerambyx cerdo Linnaeus, 1758
		Cerambyx scopolii (Fuessly, 1775)
		Gracilia minuta (Fabricius, 1781)
		Obrium brunneum (Fabricius, 1792)
		Obrium cantharinum (Linnaeus, 1767)
		Nathrius brevipennis (Mulsant, 1839)
		Molorchus minor (Linnaeus, 1758)
		Glaphyra umbellatarum (Schreber, 1759)
		Aromia moschata (Linnaeus, 1758)
		Hylotrupes bajulus (Linnaeus, 1758)
		Semanotus russicus (Fabricius, 1777)
		Callidium violaceum (Fabricus, 1775)
		Pyrrhidium sanguineum (Linnaeus, 1758)
		Phymatodes testaceus (Linnaeus, 1758)
		Poecilium alni (Linnaeus, 1767)
		Poecilium lividum (Rossi, 1794)
		Clytus arietis (Linnaeus, 1758)
		Plagionotus arcuatus (Linnaeus, 1758)
		Anaglyptus mysticus (Linnaeus, 1758)
		Mesosa nebulosa (Fabricius, 1781)
		Xylotoles griseus (Fabricius, 1775)
		Agapanthia cardui (Linnaeus, 1767)
		Agapanthia villosoviridescens (De Geer, 1775)
		Lamia textor (Linnaeus, 1758)
		Pogonocherus caroli Mulsant, 1863
		Pogonocherus hispidulus (Piller & Mitterpacher, 1783)
		Pogonocherus hispidus (Linnaeus, 1758)
		Pogonocherus fasciculatus (De Geer, 1775)

		Acanthocinus aedilis (Linnaeus, 1758)
		Leiopus linnei Wallin, Nylander & Kvamme, 2009
		Leiopus nebulosus s. str.. (Linnaeus, 1758)
		Leiopus nebulosus s. lat. (Linnaeus, 1758)
		Saperda populnea (Linnaeus, 1758)
		Saperda scalaris (Linnaeus, 1758)
		Saperda carcharias (Linnaeus, 1758)
		Stenostola dubia (Laicharting, 1784)
		Phytoecia cylindrica (Linnaeus, 1758)
		Oberea oculata (Linnaeus, 1758)
		Tetrops praeustus (Linnaeus, 1758)
		Tetrops starkii Chevrolat, 1859
		Aegosoma scabricorne (Scopoli, 1763)

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 Crown Dependencies and outside of the UK, and so 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, 1987a). 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 (1987a), allowing for taxonomic changes which have occurred since 1987 (see Duff, 2018 for changes) is provided in Table 2.

Table 2. Cerambycidae Red List assignments after Shirt (1987a)

Family	Species	Category
Cerambycidae	*Anoplodera sexguttata* (Fabricius, 1775)	RDB3: Rare
	Callidium violaceum (Fabricius, 1775))	RDB3: Rare
	Dinoptera collaris (Linnaeus, 1758)	RDB1: Endangered
	Grammoptera ustulata (Schaller, 1783)	RDB3: Rare
	Lamia textor (Linnaeus, 1758)	RDB2: Vulnerable
	Mesosa nebulosa (Fabricius, 1781)	RDB3: Rare
	Oberea oculata (Linnaeus, 1758)	RDB1: Endangered
	Obrium cantharinum (Linnaeus, 1767)	Appendix: Extinct
	Pedostrangalia revestita (Linnaeus, 1767)	RDB3: Rare
	Plagionotus arcuatus (Linnaeus, 1758)	Appendix: Extinct
	Pyrrhidium sanguineum (Linnaeus, 1758)	RDB2: Vulnerable
	Stictoleptura rubra (Linnaeus, 1758)	RDB3: Rare
	Strangalia attenuata (Linnaeus,1758)	Appendix: Extinct
	Tetropium castaneum (Linnaeus, 1758)	RDB3: Rare

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

The British Red Data Book volume was followed by the publication of *A review of the scarce and threatened beetles of Great Britain Part 1* (Hyman (revised Parsons), 1992) and Part 2 (Hyman (revised Parsons), 1994) which reviewed the status for all British beetles and presented data sheets for all scarce and threatened terrestrial species. Hyman expanded on Shirt's Categories, but retained Categories 1, 2, 3 and 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 (1987a), the magnitude of decline was not considered in the evaluation of status. Data sheets for aquatic beetles were not included, although these have been subsequently determined and data sheets provided by Foster (2010). The list of species covered in the present *Review* by category from Hyman (revised Parson), (1992, 1994) allowing for taxonomic changes which have occurred since 1994 (see Duff, 2018 for changes) is provided in Table 3.

Table 3. Rarity and scarcity categories assigned by Hyman (1992, 1994) for species in the status review of Cerambycidae

Family	**Species**	**Category**
Cerambycidae	*Acanthocinus aedilis* (Linnaeus, 1758)	Nb
	Agapanthia villosoviridescens (De Geer, 1775)	Nb
	Anaglyptus mysticus (Linnaeus, 1758)	Nb
	Anastrangalia sanguinolenta (Linnaeus, 1760)	Na
	Anoplodera sexguttata (Fabricius, 1775)	RDB3: Rare
	Arhopalus ferus (Mulsant, 1839)	Nb
	Aromia moschata (Linnaeus, 1758)	Na
	Callidium violaceum (Fabricius, 1775)	RDB3: Rare
	Dinoptera collaris (Linnaeus, 1758)	RDB1: Endangered
	Glaphyra umbellatarum (Schreber, 1759)	Na
	Gracilia minuta (Fabricius, 1781)	Na
	Grammoptera abdominalis (Stephens, 1831)	Na
	Grammoptera ustulata (Schaller, 1783)	RDB3: Rare
	Hylotrupes bajulus (Linnaeus, 1758)	List 3: rare synanthropic species
	Judolia sexmaculata (Linnaeus, 1758)	Na
	Lamia textor (Linnaeus, 1758)	RDB2: Vulnerable
	Leptura aurulenta Fabricius, 1792	Na
	Leptura quadrifasciata Linnaeus, 1758	Nb
	Lepturobosca virens (Linnaeus, 1758)	RDB Appendix: Extinct
	Mesosa nebulosa (Fabricius, 1781)	RDB3: Rare
	Molorchus minor (Linnaeus, 1758)	Nb
	Oberea oculata (Linnaeus, 1758)	RDB1: Endangered
	Obrium brunneum (Fabricius, 1792)	Na
	Obrium cantharinum (Linnaeus, 1767)	RDB Appendix: Extinct
	Pachytodes cerambyciformis (Schrank, 1781)	Nb
	Paracorymbia fulva (De Geer, 1775)	Na
	Pedostrangalia revestita (Linnaeus, 1767)	RDB3: Rare
	Phytoecia cylindrica (Linnaeus, 1758)	Nb
	Plagionotus arcuatus (Linnaeus, 1758)	RDB Appendix: Extinct
	Poecilium alni (Linnaeus, 1767)	Nb
	Pogonocherus fasciculatus (De Geer, 1775)	Nb
	Prionus coriarius (Linnaeus, 1758)	Na
	Pyrrhidium sanguineum (Linnaeus, 1758)	RDB1: Endangered
	Rhagium inquisitor (Linnaeus, 1758)	Nb
	Saperda carcharias (Linnaeus, 1758)	Na
	Saperda scalaris (Linnaeus, 1758)	Na
	Stenostola dubia (Laicharting, 1784)	Nb
	Stenurella nigra (Linnaeus, 1758)	Na
	Stictoleptura rufa Brullé, 1832	RDB3: Rare
	Stictoleptura rubra (Linnaeus, 1758)	RDB3: Rare

	Stictoleptura scutellata (Fabricius, 1781)	Na
	Strangalia attenuata (Linnaeus, 1758)	RDB Appendix: Extinct
	Tetropium castaneum (Linnaeus, 1758)	RDB3: Rare
	Trinophyllum cribratum Bates, 1878	List 2: non-established immigrant species and species of doubtful occurrence or status

2.2.3 This review

The present review provides an up to date assessment of the status of the Cerambycidae beetle family in the format now almost universally adopted 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 (1987a) and Hyman (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, 2018).

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

3.1 Summary of the 2001 Threat Categories

It is necessary to have a good understanding of the rationale behind red listing and the definitions used in the red listing process. This is because these definitions may differ from standard ecological definitions e.g. “populations” or have very specific meanings e.g. “inferred”. Details regarding methods and terminology are contained in the *Guidelines for Using the IUCN Red List Categories and Criteria* (IUCN 2017). This is summarised without any detail in *IUCN Red List Categories and Criteria: Version 3.1* (IUCN 2012a). The procedure for assessing taxa at a regional level differs from that at a global level and is summarised in the *Guidelines for Application of IUCN Red List Criteria at Regional and National Levels IUCN* (2012b)

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

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

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) Certain taxa are deemed to be ineligible for assessment at a regional level, either because they are not wild populations or not within their natural range in the region, are 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.

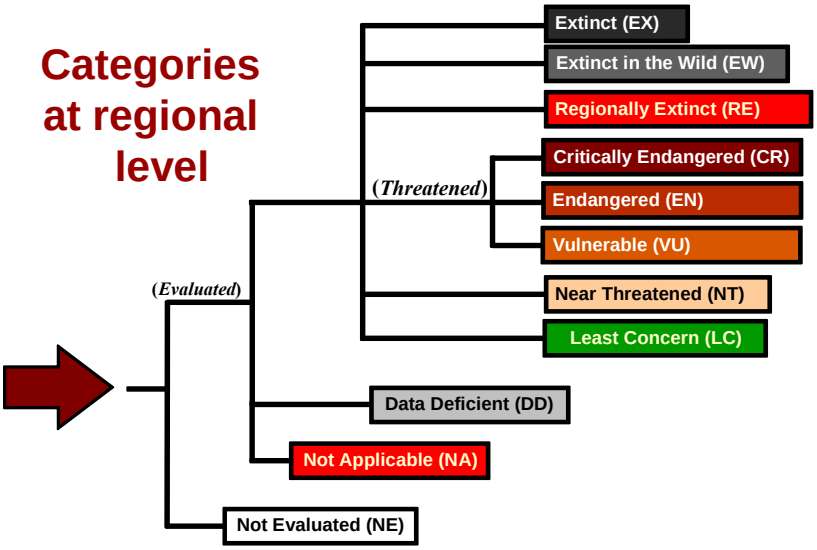

Figure 1. Hierarchical relationships of the categories adapted from IUCN (2001)

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 2017). The IUCN criteria use the terms Observed, Estimated, Projected, Inferred, and Suspected to refer to the quality of the information for specific criteria and the specific IUCN red list definitions of these terms was used (see section 3.2; IUCN 2017).

The guidelines stipulate/advise that a precautionary approach should be adopted when assigning a taxon to a threat category and this should be the arbiter in borderline cases. The threat assessment should be made on the basis of reasonable judgment, and it should be particularly noted that it is not the worst-case scenario that will determine the threat category to which the taxon will be assigned.

3.1.1 The use of the Not Applicable category

A taxon may be Not Applicable (NA) when it occurs in a region but is not included in the regional

assessment because it a vagrant or an immigrant occurring in very insignificant numbers or for a very brief period of time. 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 is used for those taxa that come close to qualifying as 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 three-stage process in relation to developing a Red List

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

3.2 Application of the Guidelines to the Cerambycidae

3.2.1 Use of criteria in this review

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

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

Insufficient data were available to generate trends appropriate for assessing any species against Criterion A. Similarly, data were not available on population size and so Criterion C could not be applied. It was not possible to use Criterion E as the current data do not allow for determining the probability of extinction using population modelling. It proved feasible only to use Criteria B and D using the available data.

The Invertebrate Inter Agency Working Group has defined the following for the use of Criterion B which is commonly used in invertebrate reviews. Continuing decline has to be demonstrated and proven that it is not an artefact of under-recording. If decline is demonstrated, then the reviewer needs to consider whether or not B2a, and B2c if the data are present, are met.

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, 2017). This needs to be applied with caution and there will be instances where a different scaling may be more applicable, or where attempting to apply any scale is extremely difficult. It should be noted that, historically, invertebrate datasets used hectads (10km squares) as the default scale. Old records

(e.g. pre-1950) have usually 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, so records which are only at this scale are less problematical. For rarer, more restricted, taxa the tetrad is applied where possible and is a significant scale for taxa which may occur on a few fragmented sites within Britain and/or which 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 poor or 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 Cerambycidae have not been sampled with this degree of regularity or control and, as a consequence, the data quality is too poor to establish whether a decline is linear. Criterion C1 likewise utilises population size decline measured over specific time intervals but places more emphasis on population counts referring throughout to number of mature individuals.

Criterion B also relies on a pattern of continuing decline. The number of hectads (older data are often only given to hectad resolution and are therefore not suitable for use in determining AoO at tetrad level) is calculated for several pre-determined periods. The degree of accuracy/resolution with which the location is recorded is variable and often imprecise. For any analysis, if a decline is apparent in this initial main recording period, then reference to a later 'contemporary' time period may be used to reinforce or weaken the suggestion of a ‘continuing decline’. The quality of the data in the contemporary time period is invariably better than that in the earlier date class and 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 generated by field observation, the location and timing of which is at the random whim of collectors of varying skills. However, it is usually possible to ascribe some degree of decline whether observed or inferred (i.e. the balance of probability suggests that a decline is present). Using Criterion B, there is no specific requirement for the decline to be within the last 10-year period nor the requirement to meet any threshold. Continuous decline is assessed by the observation of a reduction in the AoO between the prescribed contemporary time periods. The

number of contemporary locations is also a significant factor in the evaluation and is relatively straightforward to appreciate and is reliable. The author's 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

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

In practice, long-term presence can be difficult or even impossible to demonstrate unequivocally. Data available on sub-fossil material known from Britain can be extremely helpful in this respect, although coverage is very incomplete. Even these data can mask patterns of periodic colonisation and local extinction.

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. There has been very limited research on this subject within the Cerambycidae, 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 assumed 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.

A wide range of longhorn beetle species are known to be brought into Britain with trade in timber products and these include species which are native to Britain as well as non-natives, and species native to continental Europe as well as from farther afield. Species may also be brought in incidentally in packaging materials, or just in or on travelling vehicles, so even species of herbaceous habits such as *Agapanthia cardui* - recently found on the grassy road verges at the mouth of the Channel Tunnel – can be transported and have the potential to establish locally if conditions are suitable. However, so far as is known, none of the species native to Britain have been significantly augmented by Continental stock.

4 GB Rarity Status categories and criteria

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

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. • There is reasonable confidence that exhaustive recording would not find them in more than 100 hectads. • Where it is believed to occur as a breeding species within each of these hectads (i.e. discount those that are known to contain only casual immigrants).

This national set of definitions is referred to as the GB Rarity Status within this document. Importantly, Nationally Rare and Nationally Scarce are not categories of threat.

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

5 Methods and sources of information

5.1 Data sources

This review provides status assessments for all 75 British species of longhorn beetle 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. The bulk of the data come from the National Longhorn Beetle Recording Scheme (NLBRS) http://www.coleoptera.org.uk/cerambycidae/home and the National Biodiversity (NBN) Atlas https://nbnatlas.org/ supplemented by information provided directly by people in response to an appeal for data through the beetles-british-isles yahoo group. Additionally, a number of people with experience in particular species and/or locations were consulted. It is important to acknowledge the considerable contribution made by all these recorders.

The key sources are the datasets collated by the NLBRS and through the NBN Atlas. The datasets were interrogated for mistakes, and potentially erroneous records were highlighted and followed up where readily feasible. These datasets were found to contain a wide range of 'problem' records, including incomplete data, lacking especially source details, as well as records of rarities from unlikely locations. The author has used discretion in deciding which to put aside as potentially unreliable. Additional data were then requested through the beetles-british-isles yahoo group. This group, founded by Andrew Duff in 1999 has 371 members, many of whom are Coleopterists active in the field. Historical data were also sourced from literature searches. No attempt was made to collate data for imported species as these data are not generally accessible, being held by specialists dealing specifically with imported pests, e.g. within the relevant Government Departments.

The total number of records used in the whole review is 58,570, comprising 42,166 records downloaded from the NBN Atlas plus 9,097 supplied by Wil Heeney and Katy Potts from the relatively new NLBRS and 7,303 collated in a separate exercise through contacting recorders direct and extracting from literature. There will naturally be some duplication among these totals.

For species attaining IUCN or GB Rarity Status, data were more intensively 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 considered 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 standalone 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 (2018)
Qualifying criteria
Rationale
GB Rarity status (2018)
Global IUCN status (2010)
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 1990-2015
- Total number of dual hectads where species have been recorded from within the hectad in both date classes (see 5.2 below)
- Total number of hectads occupied during sixteen year period 1990-2015
- No. of locations, for species that qualify as NR (i.e. 15 or less hectads from 1990-2015)

Old BRC number
BRC concept code
NBN taxon number
Status in Shirt (1987a)
Status in Hyman (1986)
Status in Hyman (1992)
Ecological account
Popular synonyms

7 Downgraded and excluded species

7.1 Downgraded 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 in 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 earlier

Reviews (Hyman, 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 5 provides a list of species downgraded and the justification for downgrading since the publication of Shirt (1987a) and Hyman (revised Parsons) (1992, 1994).

Table 5. Species included in Hyman (1992) but downgraded in this review

Scientific name	**Shirt (1987a)**	**Hyman (1992)**	**This Review**	**Rationale for downgrading**
Lepturobosca virens		Extinct	NA	Non-native, boreo-alpine distribution on Continent. Temporarily established population in Forest of Dean in 19C
Stictoleptura rubra	RDB3	RDB3	LC	Known from 101 hectads between 1990 and 2015.
Paracorymbia fulva		RDB3	LC, NS	Trending upwards, known from 34 hectads between 1990 and 2015.
Stranġalia attenuata	RDB App	Extinct	NA	A few casual old records only; no evidence for a resident population.
Aromia moschata		Nb	LC	Known from 101 hectads between 1990 and 2015.
Pyrrhidium sanguineum	RDB2	RDB2	LC	Known from 40 hectads between 1990 and 2015. A dramatic increase in range and frequency of records. There is now reasonable confidence that exhaustive recording would find them in more than 100 hectads today.
Anaglyptus mysticus		Nb	LC	Known from 187 hectads between 1990 and 2015.
Mesosa nebulosa	RDB3	RDB3	LC, NS	Known from 16 hectads between 1990 and 2015.
Lamia textor	RDB2	RDB1	DD, NR	Only four modern locations but no information available on any threats; under-recording suspected.
Phytoecia cylindrica		Nb	LC	Known from 161 hectads between 1990 and 2015.
Tetrops starkii		RDBK	NA	First noted in Britain in 1991 and no early records have been forthcoming from specimens previously misidentified under *T. praeusta* in museum collections – the two are very similar in appearance. New sites however continue to be found and a recent colonization – accidental or natural – does seem the most likely explanation for its sudden appearance in Britain. Its numbers and range continue to expand and it is expected to become another common and widespread species in the near future.

7.2 Excluded species

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

Where the presence of a species results from natural colonisation from the continent, they may be expected to continue to expand their distribution. Their natural range, or 'Extent of Occurrence' under the IUCN Guidelines expands with them. These taxa should be excluded from IUCN regional assessment only if they have been established in the region for a short period of time (typically for less than 10 consecutive years) or they have certainly been introduced rather than reaching our region unassisted.

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 100 hectads or less, they have not been assessed for scarcity or rarity as they are not considered to be native to Britain. A list of the excluded species and the rationale for their exclusion is provided in Table 6.

Table 6. Species categorised as Not Assessed (NA).

Scientific name	**Post-1990 hectads**	**Rationale for exclusion**
Aegosoma scabricorne	1	Adults are attracted to lights and one was taken at a moth trap on the Dorset coast in 2013 -a presumed stray from the continental population
Lepturobosca virens	0	Temporarily established population in Forest of Dean in 19C; a species of boreo-alpine conifer forest and therefore almost certainly a casual introduction to this historic oak forest.
Stictoleptura cordigera	1	A southern European species with no established history in Britain. Discovered at Hackney Marshes in 2014 and males, females and mating observed from 23 July until 6 August. One had been photographed at Hackney Wick in 2007 but not reported but now may confirm an established population in the area for some time.
Strangalia attenuata	0	A few casual old records only; no evidence for a resident population.
Tetropium castaneum	5	Imported mainly from northern Europe in softwoods used by the building industry, predominantly so during the post WWII years of reconstruction. Although found in the lowlands, it is more typically a montane species.
Tetropium fuscum	3	Native range across northern Europe and northern Asia; introduced into Britain.
Tetropium gabrieli	14	A plantation species particularly attracted to afforested areas where there is a preponderance of larch. Not considered a pest of larch within its native Switzerland, but damage often develops in areas where larch has been planted outside of its native range, where the beetle has spread.
Arhopalus ferus	5	An early introduction. A beetle occurring mainly in pine plantations and woods, more particularly those established in southern counties. First reported in Britain from the New Forest in 1902.
Trinophylum cribratum	4	Native to India.
Cerambyx cerdo	0	Only known in Britain with certainty from the sub-fossil record (approx. 4000 before present) and known only as casual importations in the historic period. It therefore does not meet

Scientific name	Post-1990 hectads	Rationale for exclusion
		the IUCN criterion for residence since 1500.
Cerambyx scopolii	0	Debatable as an extinct native. May have occurred until the early 1900s although the evidence for its presence as a long-term British resident has recently been assessed as 'not overwhelming'; reliably known only as casual importations in the historic period. No subfossil evidence.
Obrium brunneum	20	Unrecorded in Britain until the 1930s; slowly extending its limits through the southern counties.
Nathrius brevipennis	5	Native wild populations of this species are likely only to be found in southern Europe; the species has been imported into central and northern Europe with movements of woven baskets and other wood products. It is questionable whether this species is native to Europe as the larvae might have been introduced through commercial transport (IUCN Red List 2010).
Molorchus minor	47	Introduction, steadily expanding, predicted to exceed 100 hectads very soon.
Hylotrupes bajalis	2	In timber in buildings; long established introduction.
Semanotus russicus	1	Male and female emerged from cut logs of moribund Lawson's cypress in Berkshire, 2007.
Callidium violaceum	1	An introduction. Primarily found with summer houses, garden seats, pergolas, palisades, etc. in Britain, not in wild situations.
Poecilium lividum	0	An introduced species; seemed to establish a synanthropic breeding colony at one location for at least 10 years: breeding in wooded barrel hoops at Reading between 1894 and 1905. There are also specimens from the New Forest in old entomological collections.
Xylotoles griseus	1	New Zealand Fig Longhorn. Discovered breeding in a garden in the settlement of Westward Ho!, North Devon, in 2014.
Agapanthia cardui	1	Discovered at Folkestone in 2017 and present in numbers 2018.
Tetrops starkii	8	First noted in Britain only in 1991 and no early records have been forthcoming from specimens under the native *T. praeusta* in museum collections. New sites however continue to be found and a recent colonization – accidental or natural – does seem the most likely explanation for its sudden appearance in Britain.

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, Endangered, Vulnerable and Near Threatened species. These species account for 10 of the 75 species assessed; approximately 13% of our Cerambycidae fauna. However, with 21 species (see Table 6) not being long-term natives, the 10 species detailed actually form about 19% of the native fauna. Previous reviews have included species accounts for all taxa now re-assessed as remaining Nationally Rare and Nationally Scarce taxa, but do not cover species raised to these statuses by this review, i.e. *Pogonocherus caroli* which appears to be a long-overlooked native species discovered in Caledonian pine forest areas in 2006.

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 six information sections provided for each species data sheet.

8.2 The species name

The nomenclature used in this *Review* follows the most recent checklist for the British fauna (Duff, 2018), unless otherwise stated. Under the *Species Accounts* where the name differs from that used by Shirt (1987a) or Hyman (revised Parsons) (1992, 1994) the previous name is indicated.

8.3 Identification

The emphasis in the accounts, where possible, is on readily available English language publications covering the British Isles; work in other languages or from other/wider geographical areas is only referred to where no other options are available or where the non-English/wider work is more detailed or up-to-date. With experience, identification for many British species can be achieved in the field, although some only with the aid of a good hand lens. A microscope is required to identify and/or confirm the identitification of the remaining species.

Duff (2016) is now the standard work on the identification of the adults of British Cerambycidae and allows for the accurate identification of the majority of British species. Larvae are covered by Duffy (1953) but this does not include the many species discovered in Britain in the intervening 65 years. A number of Cerambycidae species have been added to the British list since the publication of Duff (2016) and the identification resources required for these species are listed in Table 7.

Table 7. Cerambycidae species not covered in Duff (2016)

Species	**Identification reference(s)**
Aegosoma scabricorne	Allen (2013)
Xylotoles griseus	Walters *et al*. (2016)
Agapanthia cardui	Chmurova *et al.* (in press)
Pogonocherus caroli	Rejzek & Barclay (2017)

The Field Studies Council have also produced an identification chart of a large selection of British species, many of which can be identified in the field (Heeney *et al*., 2018).

8.4 Distribution

Records held by the National Longhorn Beetle Recording Scheme and in the NBN Gateway (https://data.nbn.org.uk/) form the basis for determining the distribution of each species. The Watsonian vice-counties (Dandy, 1969) are included in the NBN Atlas database for many records and are referred to in this review. International distribution is referred to within the species accounts where a comment on biogeography is considered relevant and where the information is readily accessible, but it has not influenced the assessment of status.

8.5 Habitat and ecology

This section aims to provide an overview of both the known habitat requirements for each species and the wider landscape context. However, for many 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. Several species are able to disperse over long distance and therefore the recorded capture site may not be the breeding site.

Habitat data, such as vegetation structure 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 NBN Gateway 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 vital 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.

Emphasis is placed in this *Review* on 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. The key relict habitat types are outlined below in order to provide a framework for assessing threats at the species level. While there are: a few field layer associates; an even smaller grouping of species which develop in grassland soils; and another small group of species which develop in living woody stems; the great majority of British Cerambycidae are saproxylic, either dependent on fungal decay of wood or reliant on gut bacteria to break down undecayed wood. This last grouping play an important role in nutrient recycling in woodlands, wood pastures, parklands and even in-field and hedgerow tree systems – where these still survive in modern landscapes

The key ecological systems that support rare and threatened saproxylic Cerambycidae are as follows: Caledonian pine forests; southern oak forests; and open mixed broadleaf mosaics. Caledonian pine forests have recently been identified by IUCN as a Near Threatened habitat type in Europe – as part of the G3.4a Temperate and continental *Pinus sylvestris* woodland. The associated rare and threatened Cerambycidae in Britain are associated primarily with old growth stands of Scots pine and especially large open-grown granny pines. The Timberman *Acanthocinus aedilis* develops beneath the bark of freshly dead trunks and stumps of relatively large diameter Scots pine. *Anastrangalia sanguinolenta* develops in the wood of sun-exposed, standing or fallen stems of large girth pine without bark. *Judolia sexmaculata* develops under basal bark and in the wood below of dead standing and fallen pine, although the girth requirements appear not to be documented. Although not requiring large girth stems, the two small longhorns *Pogonocherus caroli* and *P. fasciculatus* develop in freshly dead or dying lateral pine branches and so may have a requirement for open-grown pines with extensive development of lateral branching. These five longhorn beetles appear to be the key assemblage associated with old pine forest in Britain and the

data suggests that they are most strongly associated with open old growth pine forest. This implies that they may be threatened by the modern approach to forest management which seeks to remove grazing pressure and allows dense young growth of pine to develop between the older pines, threatening the structural variety that is so important to their long-term survival.

Southern oak forests also support a distinctive assemblage of Cerambycidae. *Pedostrangalia revestita* has a requirement for veteran open-grown trees with large lateral branches and appears to have maintained a presence in certain old coppice-with-standards ancient woodland networks, as well as ancient wood pasture systems such as the New Forest. Presumably it survives where suitable trees have occured at landscape scale, where woodland boundary trees have provided habitat while the internal standard oaks have been regularly cropped. *Anoplodera sexguttata* develops in large items of seasoned oak being decayed by the heartwood-decay fungus *Hymenochaete rubiginosa* and where suitable larval habitat is available on the larger scale, as in the old medieval forest remnants. *Grammoptera abdominalis* breds in the lower lateral branches of open-grown oaks in ancient wood pastures and parklands. *Poecilium alni* develops in hanging dead lateral branches on open-grown oaks. *Prionus coriarius* develops in moist stumps and decaying roots of mature and older oaks (and other tree species) usually where the tree is growing in open-grown situations on free-draining warm soils. As with the old pine forest species, the old oak forest species show a strong association with open-grown conditions, where the trees have space to develop lateral branches, and where the soil beneath can be warmed by sunshine. It is interesting that ancient woodlands actively managed as coppice-with-standards can support some of these species, but the full suite of species tends to be confined to ancient wood pastures and historic parklands.

The open mixed broadleaf mosaic assemblage appears to be less coherent and to have more complex management implications. *Grammoptera ustulata*, *Stenurella nigra*, *Gracilia minuta* and *Glaphyra umbellatarum* are basically species which develop in dead wood in the crowns of open-grown broad-leaved trees, the last also using dead bramble stems. They are essentially species of open landscapes with scattered trees and shrubs, a type of landscape that has become increasingly scarce through modern intensive land exploitation industries. *Mesosa nebulosa* probably also fits here although is said to develop on dead branches high in the crowns of trees. Some of these longhorns are able to live in actively managed woodlands, where the canopy is kept open by cutting programmes, and are also able to exploit traditional orchards, riverside tree corridors, etc.

Open conditions are also needed by the adult stages of many of these longhorns as foraging areas for pollen and nectar. These may be provided by woodland edge and rideside situations, but open mosaic landscapes have the potential to be especially rich places for longhorn beetles. And open areas are also needed as places where new generation trees can become established. Site management for conservation needs to accommodate the dynamic nature of such places and the complex requirements of the longhorn beetles which are able to exploit the changing conditions.

8.6 Status

Status is largely based on range size and both short- and long-term trends, but association of a species with particular habitats under threat is also taken into account. Counts of hectads known to be occupied since 1990 were used to establish whether or not a species might be considered scarce 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 survey data is rare but has been used where available, to inform the designation process. Provisonal statuses were made available to the beetles-british-isles yahoo group for discussion, in order to provide a final approval stage by the recording community.

Only species which have been assessed as Regionally Extinct, Critically Endangered, Endangered, Vulnerable or Near Threatened are provided with species accounts. The status of these and all other species in this review is summarised in Appendix 1.

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. Assessments of status can only be based on current knowledge, which is very unlikely to be comprehensive in the majority of cases, being based on the experience of a limited number of active recorders in each generation. The likely national distribution of each species and trends in population size must, therefore, be extrapolated from the available information so as to arrive at the best estimate of the likely national status of each species.

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

8.7 Threats

It is those human activities that result in the loss of sites or 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 majority of the most threatened Cerambycidae are associated with saproxylic habitats and veteran trees in particular. It is not merely the widespread clearance of dead and decaying wood from the countryside that has created this situation but also more insidious changes such as a lack of new generations of veteran trees developing – for a variety of reasons – and also the widespread lack of understanding that open-grown trees are far more valuable for saproxylic beetles than close-grown trees. It is increasingly being appreciated that large old trees are a globally declining habitat feature (Lindenmayer *et al.*, 2012). At the current rate of loss, most of the wood pasture systems that were analysed by Gibbons *et al.* (2008) would lose all of their veteran trees within the next 90-180 years. Wood pastures continue to be treated as an anomalous habitat, with their inherent mosaic nature, and there is considerable pressure to change them into either woodland or grassland (Alexander, 2016).

Other important threats include:

- increased countryside hygiene and 'tidying up' which result in the removal of both standing and fallen deadwood;
- health and safety fellings based on a failure to understand tree and fungal biology and also tree strength;

- the failure to appreciate the considerable conservation value of mosaic habitats such as scrubby grassland and heath as well as open-grown trees;
- the failure to understand and conserve dynamic vegetation processes, such as expanding woody growth in grasslands and heaths; and
- the large scale loss of trees as a result of disease caused by introduced pests and pathogens.

Other rare and threatened Cerambycidae are directly dependent on living host trees and the ecology and conservation of these species are particularly poorly understood at present. The host trees often appear to be non-woodland trees and/or shrubs - the conservation movement in Britain has only recently begun to recognise the values of trees outside of woodlands (TOWs) and to address their conservation requirements. The basic principles appear to be the same as for saproxylics: age structure of potential hosts, total number of hosts, density pattern of hosts and continuity of suitable habitat.

8.8 Management and conservation

Some of the oldest nature reserves in Britain were created to protect their invertebrate fauna (e.g. Wicken Fen), however beetles are rarely amongst the primary reasons for the designation and protection of Sites of Special Scientific Interest (SSSI). 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 (SAC).

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

Loss and degradation of suitable habitat continues in undesignated sites. The populations of many beetle species with fragmented distributions are relicts of previously widespread populations, surviving in small patches of relatively undisturbed habitats after loss of the interconnecting habitats. For these species it is critical to maintain or restore connectivity of protected sites. Key issues include conserving and planting new hedgerow and in-field trees in order to restore the age structure of such tree systems, as well as restoring open coppice conditions in woodlands. Modern tree-planting schemes tend to focus on the creation of new woodlands, and the generation of individual trees that provide good quality habitat for longhorn beetles is all too often neglected. Many beetles require trees to survive long enough to develop into old age, to develop natural heart-rot, for spacing that encouarges good lateral branch development, etc. Such potential habitat trees are open-grown trees rather than trees planted at forestry densities. Within woodlands, longhorn beetles tend to favour the open conditions created by coppice-with-standards exploitation, requiring good sun-penetration to the ground and field layers. These are all key considerations when developing conservation plans for the less mobile beetle species. Other species are more mobile and often rely on dynamic ecological processes operating over areas larger than those normally covered by individual designated sites Management guidance for conserving tree populations that will conserve the saproxylic longhorn beetles is available in Read (2000) and Lonsdale (2013).

Much less appears to be known about the conservation management requirements of longhorn beetles which develop in field layer plants or in the soil. Maintenance of semi-natural conditions is the obvious starting point as soil-dwelling species are reliant on soil fungi which are lost through agricultural intensification and the herb layer species similarly are lost through conversion of herb- and species-rich pastures to grass monocultures.

It is very unusual for threatened cerambycids to have been the subject of detailed ecological research or even standardised monitoring, but these are referred to where such are known. More often the implementation of further survey or monitoring or a specific line of research is recommended.

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, especially when used alongside the more detailed guidance provided by Read (2000) and Lonsdale (2013).

8.9 Published sources

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

9 Acknowledgements

Allan Drewitt and Jon Webb (Natural England) commissioned the current review and the report was quality assured by an inter-agency working 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 & 2017; Alexander, Dodd & Denton, 2014; Hubble, 2014; Lee, 2015; Macadam, 2015; Lane & Mann, 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 biological recording nationally and locally through the data made available via the National Longhorn Beetle Recording Scheme and the NBN Gateway. It is not possible to list here every individual that has contributed to the data gathering.

The following people responded to a request for data on the yahoo group beetles-britishisles and the author would like to thank them for providing personal records or collated regional data: Tony Allen, Tristan Bantock, Max Barclay, Charlie Barnes, Roger Booth, Paul Brock, Dave Buckingham, Jon Cole, Martin Collier, Scotty Dodd, Andrew Duff, Adrian Dutton, Andy Foster, Harry Green, Trevor James, Harry Kenward, Steve Lane, Dave Murray, Adrian Mylward, Andrew Skinner, Don Stenhouse, Malcolm Storey, Richard Weddle (Glasgow Museums BRC database), and Dave Wilton. Many other recorders had already made their data available to the National Longhorn Beetle Recording Scheme and so that data was included in the data provided by Wil Heeney and Katy Potts. In addition, the following responded to specific requests for data on particular species: Paul Brock, Jon Cooter, Steve Covey, Mike Denton, Eric Fletcher, Mike Howe, Pete Kirby, Brian Levey, Martin Luff, Bruce Philp, Steve McWilliam, Mark Telfer, Clive Turner, and Stuart Warrington.

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10 Species listed by IUCN status category

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

Regionally Extinct
Dinoptera collaris (Linnaeus, 1758)
Obrium cantharinum (Linnaeus, 1767)
Plagionotus arcuatus (Linnaeus, 1758)

Critically Endangered
Anastrangalia sanguinolenta (Linnaeus, 1760)
Oberea oculata (Linnaeus, 1758)

Endangered
Pedostrangalia revestita (Linnaeus, 1767)

Vulnerable
Judolia sexmaculata (Linnaeus, 1758)

Near Threatened
Acanthocinus aedilis (Linnaeus, 1758)
Anoplodera sexguttata (Fabricius, 1775)
Saperda carcharias (Linnaeus, 1758)

Data Deficient
Lamia textor (Linnaeus, 1758)
Pogonocherus caroli Mulsant, 1863

11 Species listed by GB Rarity Status category

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

Nationally Rare
Grammoptera ustulata (Schaller, 1783)
Pedostrangalia revestita (Linnaeus, 1767)
Anastrangalia sanguinolenta (Linnaeus, 1761)
Anoplodera sexguttata (Fabricius, 1775)
Judolia sexmaculata (Linnaeus, 1758)
Stenurella nigra (Linnaeus, 1758)
Acanthocinus aedilis (Linnaeus, 1758)
Lamia textor (Linnaeus, 1758)
Pogonocherus caroli Mulsant, 1863
Pgonocherus fasciculatus (De Geer, 1775)

Oberea oculata (Linnaeus, 1758)

Nationally Scarce
Prionus coriarius (Linnaeus, 1758)
Rhagium inquisitor (Linnaeus, 1758)
Grammoptera abdominalis (Stephens, 1831)
Leptura aurulenta Fabricius, 1792
Stictoleptura scutellata (Fabricius, 1781)
Paracorymbia fulva (De Geer, 1775)
Gracilia minuta (Fabricius, 1781)
Glaphyra umbellatarum (von Schreber, 1759)
Poecilium alni (Linnaeus, 1767)
Mesoa nebulosa (Fabricius, 1781)
Saperda carcharius (Linnaeus, 1758)
Saperda populnea (Linnaeus, 1758)
Saperda scalaris (Linnaeus, 1758)
Stenostola dubia (Linnaeus, 1758)

Data Deficient
Leiopus linnei Wallin, Nylander & Kvamme, 2009

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**
Anastrangalia sanguinolenta	CR	B1B2ab(i,ii,iii,iv)
Oberea oculata	CR	B1B2ab(ii,iii)
Pedostrangalia revestita	EN	B2ab(ii,iii,iv)c
Judolia sexmaculata	VU	D2

13 List of Threatened, Nationally Rare and Nationally Scarce species

Table 9. List of Threatened, Nationally Rare and Nationally Scarce species
*species previously overlooked as long-term natives in Britain

Species name	Shirt (1987a)	Hyman (1992)	This review (IUCN Status)	This review (GB Rarity)
Prionus coriarius		Na		NS
Rhagium inquisitor		Nb		NS
Grammoptera abdominalis		Na		NS
Grammoptera ustulata	RDB3	RDB3		NR
Pedostrangalia revestita	RDB3	RDB1	EN	NR
Leptura aurulenta		Na		NS
Anastrangalia sanguinolenta		RDB3	CR	NR
Stictoleptura scutellata		Na		NS
Paracorymbia fulva		RDB3		NS
Anoplodera sexguttata	RDB3	RDB3	NT	NR
Judolia sexmaculata		Na	VU	NR
Stenurella nigra		Na		NR
Gracilia minuta		RDB2		NS
Glaphyra umbellatarum		Na		NS
Poecilius alni		Nb		NS
Mesosa nebulosa	RDB3	RDB3		NS
Lamia textor	RDB2	RDB1	DD	NR
*Pogonocherus caroli**	-	-	DD	NR
Pogonocherus fasciculatus		Nb		NR
Acanthocinus aedilis		Nb	NT	NR
*Leiopus linnei**	-	-		DD
Saperda carcharius		Na	NT	NS
Saperda populnea				NS
Saperda scalaris		Na		NS
Stenostola dubia		Nb		NS
Oberea oculata	RDB1	RDB1	CR	NR

14 Summary of IUCN Status for all taxa in this Review

Table 10 Summary of IUCN Status for all taxa in this Review

IUCN status category	No of Cerambycidae	Approx Percentage
Regionally Extinct	3	4%
Critically Endangered	2	2.5%
Endangered	1	1.5%
Vulnerable	1	1.5%
Near Threatened	3	4%
Least Concern	42	56%
Data Deficient	2	2.5%
Not Applicable	21	28%
Total	**75**	**100**

15 The data sheets

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

ACANTHOCINUS AEDILIS
The Timberman Beetle NEAR THREATENED

Order Coleoptera Family CERAMBYCIDAE

Acanthocinus aedilis (Linnaeus, 1758) syn *montanus* Serv.

Identification Duff (2016); immature stages in Duffy (1953).

Distribution An exclusively Scottish longhorn but is regularly exported southwards with timber movements; centred mainly in the older forests of the Scottish Highlands, but the beetle has also become established in some lowland counties from time to time (Kaufmann, 1992c), although no modern examples are known. “Rare in England and probably imported” (Fowler, 1890). Hunter (1962) notes from Rannoch, Rothiemurchus, Glenmore, Abernethy, Braemar and Glen Affric. Especially montane on the continent (Koch, 1989).

Habitat & Ecology Larvae develop for a couple of months in the inner bark of recently dead, standing and fallen stems and stumps of pine, sometimes spruce, and pupate in the wood. Males use the surface of fresh pine stumps as arenas to fight over females (Lindhe *et al.* 2010). Larvae and pupae are capable of resisting long periods of immersion in sea water. It seems that pupation happens twice annually; once in summer, August and September, when the adults emerge into the open to dry off, and again in October, in which event the pupa or the imago will over-winter *in situ*. Adults and lately ecloded beetles therefore appear as early as March in the following year (Kaufmann, 1991). Although the main emergence period is in August and September, adults have been found overwintering in their pupal cells, and adults have been found active in late April and early May at Rothiemurchus (Welch, 1972). However, Owen (1999) states that this species is to be seen on pine stumps and logs from March until late summer, most plentifully in June and July. It is abundant in the large pine forests of northern Europe and often taken far from trees, suggesting high mobility (Nilssen, 1993).

Status The AOO is of <140 km2; modern records are only from the core areas of the Caledonian pine forests, from just 14 hectads, but there are also old records from a further 21 hectads within the Scottish Highlands, suggesting a potential decline of 60%. Widely reported in the past outside of the native pine forests – presumably as a result of chance introductions with imported timber - but none recently suggesting a failure to establish outside of its native range. Near Threatened is recommended on the basis of B2 (AOO less than 500 km2), (b) continuing decline projected of (i) extent of occurrence, (ii) area of occupancy; (iii) area, extent and/or quality of habitat; and (iv) number of locations or subpopulations. Although stands of old growth pine are currently highly fragmented within the Caledonian pine forest area, the number of locations is currently too high for VU status to apply.

No sub-fossil remains have yet been found in Britain (Buckland & Buckland, 2006) but current understanding suggests a long-term native. Hyman (1992) assessed it as "Notable B". Although widely reported across England and Wales in the past, no current established breeding populations are known. A decrease in abundance is also suspected in Sweden, particularly in the north (Lindhe *et al.* 2010).

Threats The key threats are the current situation of fragmentation of old growth pine across the Caledonian pine forest area and the lack of specifically targeted conservation work to protect these from becoming engulfed within young growth pine (see section 8.5). While there is a clear need for diversification in the age structure in and around stands of old pine to provide next generation host trees, this beetle is associated with open pine forest and the host trees are large open-grown pines rather than high forest pines – so far as is known. Current conservation action in the region is targeted at removing grazing pressure – both domestic livestock and wild red deer – and encouraging the development of young pines. The result has been dense stands of young growth with little or no potential for the development of future granny pines – habitat quality is currently in decline as a direct result of this misguided conservation action.

Kaufmann (1992c) states that this beetle is in danger of being over-collected and has become scarce as a result, but collecting pressure today is relatively low and it is the beetle's population viability under the current forest management practices that is the real issue.

Management and Conservation The core areas of the Caledonian pine forest are mostly designated SSSI and the area is also subject to SAC and SPA designations. The stands of old growth pine are well-documented but do not appear to be subject to conservation action targeted specifically at their enhancement in short- or longer-term, but are treated as part of larger ecological units where grazing reduction is being given the top priority, apparently without due regard to the known old growth interests.

Published sources
Ehnström & Holmer (2007); Kaufmann (1992c); Lindhe, Jeppsson & Ehnstrom (2010); Owen (1999); Twinn & Harding (1999); Welch (1972).

ANASTRANGALIA SANGUINOLENTA
A longhorn beetle **CRITICALLY ENDANGERED B1, B2a,b (i, ii, iii,iv)**

Order COLEOPTERA **Family CERAMBYCIDAE**

Anastrangalia sanguinolenta (Linnaeus, 1761) also known as *Anoplodera sanguinolenta* (Twinn & Harding)

Identification Duff (2016). Larval morphology in Duffy (1953) and Švácha & Danilevsky (1989).

Distribution Largely confined in Britain today to the Speyside area of the eastern Highlands (Twinn & Harding, 1999), but known from East Anglia long before it was discovered in the Highlands. East Anglian records are very sporadic, mostly refer to single specimens, and none

have been reported to the various longhorn beetle recording schemes in the past 30 years or so. The lack of modern records from East Anglia suggest that the earlier records were the result of casual introductions and that it has never established a self-maintaining population in the region. In contrast, it has occurred regularly when sought in Speyside for some 50 years (Allen 1972).

The beetle is known throughout much of Europe although is sparse in western areas (Bense, 1995); widespread and common in the Nordic countries except close to mountains (Ehnström & Holmer, 2007).

Habitat & Ecology This beetle is associated with sun-exposed, decorticated and well-seasoned, standing or fallen, dead pine or spruce stems of substantial girth. The larvae develop for at least two years in the partially decayed heartwood and pupate in the wood. Suitable substrate can serve for decades. Owen (1991) reared the beetle from pupae found in the trunk of a fallen dead pine in Abernethy Forest; the trunk was without bark and had a well-weathered surface; estimated to have been dead for between 10 and 20 years; trunk diameter about 40cm and pupae in chambers arranged along the axis of the trunk 2-3cm under the surface of the wood on the side of the trunk which was exposed to the sun; emergence holes made by adults approximately round and 3-4mm in diameter; estimate 3-4 year development. These observations are very consistent with the author's (KA) own experiences with this species in Rothiemurchus Forest. The more northern and western Caledonian pine forest areas may be climatically too damp and shady for this warmth- and sun-loving species.

Adults are active from late June to late July, and are attracted to the white flowers of Asteraceae (Ehnström & Holmer, 2007); attracted to hogweed flowers (Harwood 1932) and *Epilobium angustifolium* (Lindhe *et al.*, 2010).

Status Modern records are only from the core areas of the Caledonian pine forests of Speyside, from just 5 hectads. There are also old records from a further 2 hectads within the Scottish Highlands, of which 1 from the Speyside area and 1 from Glen Affric. Other old records from East Anglia, South Yorkshire and Isle of Wight, are all presumed to be casual introductions through timber movement.

Critically Endangered is justified on the basis of B1 (EOO less than 100 $km^{2)}$ and B2 (AOO less than 500 km^2) and:
(a) stands of old growth pine are currently highly fragmented within the Caledonian pine forest area; the species has only been found in recent years within the Speyside Group of pine forests - at three locations: Abernethy, Rothiemurchus, and Glenmore Forests, although in reality the pine forest habitat here merges together as a single expanse, albeit with suitable old growth conditions highly fragmented within;
(b) continuing decline projected of (i) extent of occurrence, (ii) area of occupancy; (iii) area, extent and/or quality of habitat; and (iv) number of locations or subpopulations, all as a result of the current conservation approach of removing deer browsing/grazing and encouraging the widespread development of young growth pine without active management to encourage surviving old growth pine stands and without encouragement and protection of next generation old growth trees.
(c) extreme fluctuations may be apparent in the species' history in Speyside as the lack of early

records may suggest a period of very low population size, in contrast to the 1990-2018 period when it has been detected across five of the six hectads in the Speyside area where it has been known. However Allen (1973) appears to suggest a more stable population, and so extreme fluctuation may not be justifiable.

No subfossil evidence for presence in Britain (Buckland & Buckland, 2006) but the species is generally assumed to be a long-term native. RDB Rare (Hyman, 1992).

Threats The key threats are the current situation of fragmentation of old growth pine across the Caledonian pine forest area, and in Speyside in particular, and the lack of specifically targeted conservation work to protect these from becoming engulfed within young growth pine (see section 8.5). While there is a clear need for diversification in the age structure in and around stands of old pine to provide the next generation of host trees, this beetle is associated with open pine forest and the host trees are large open-grown pines rather than high forest pines. Current conservation action in the region is targeted at removing grazing pressure – both domestic livestock and wild red deer - and encouraging the development of young pines. The result has been dense stands of young growth with little or no potential for the development of future granny pines – habitat quality is currently in decline as a direct result of this misguided conservation action. The lying old dead pine trunks are now more likely to be engulfed in the shade of young growth pine and sun-warmed dead stems are increasingly threatened.

Management and Conservation The core areas of the Caledonian pine forest are mostly designated SSSI and the area is also subject to SAC and SPA designations. The stands of old growth pine are well-documented but do not appear to be subject to conservation action targeted specifically at their enhancement in short- or longer-term, but are treated as part of larger ecological units where grazing reduction is being given the top priority, apparently without due regard to the known old growth interests.

Published sources
Allen (1972); Duffy (1953); Ehnström & Holmer (2007); Harwood (1932); Kaufmann (1987); Lindhe, Jeppsson & Ehnstrom (2010); Owen (1991); Švácha & Danilevsky (1989).

ANOPLODERA SEXGUTTATA
Six-spotted Longhorn Beetle **NEAR THREATENED**

Order COLEOPTERA **Family CERAMBYCIDAE**

Anoplodera sexguttata (Fabricius, 1775); formerly known as *Leptura sexguttata*.

Identification Key to the adult beetle in Duff (2016). Larval morphology in Švácha & Danilevsky (1989).

Distribution Modern British records are from just six locations: Watersmeet Woods (Devon), Bardney Forest (Lincolnshire), New Forest (Hampshire), Savernake Forest (Wiltshire), the Castle Hill Deer Park and Windy Pits SSSI area of the Duncombe Park Estate in the North York Moors, and Nupend Wood, Fownhope, Herefordshire. The first five sites have had a succession

of observations and the species is clearly well-established in these; the status of the sixth remains unclear.

It has been known in the New Forest (Alexander, 2010a), Watersmeet Woods (Alexander, 2010b) and Bardney Forest (C. Barnes, pers. comm.) since the 19th Century. The discovery in Savernake as recently as 1972 is surprising – it was never reported in the old Marlborough College Natural History Society records (Darby, 2009). The Duncombe Park area population is also relatively recent although there is an older North York Moors record from elsewhere (R.J. Marsh, pers.comm.). The 2003 Herefordshire record (Cooter, 2004) is also surprising as this area has been studied extensively by the Woolhope Naturalists Field Club (Tomlin, 1950); this record may well have been the result of an accidental introduction with firewood or timber and merits further investigation.

A second location in the North York Moors (Gundale) has two reports, from 1960 and 1980, but it is not known if this population survives. A record from Talgarth Park in Merioneth dates from the 1960s (Skidmore & Johnson, 1969); no reports since. There are also a few miscellaneous older reports (Twinn & Harding, 1999), details not known in some cases.

The beetle is known across central and southern Europe, and into northern Africa (Algeria) (Ehnström & Holmer, 2007; Sama, 2002).

Habitat & Ecology A relict species of old forest areas (Skidmore & Johnson, 1969). The larvae seem to develop specifically in the dead wood of oak that has been decayed by the fungus *Hymenochaete rubiginosa* (Ehnström & Axelsson, 2002). This fungus is most often found fruiting on old, well-seasoned and decorticated oak stumps and lying oak deadwood in humid fairly shaded situations but may also be active in the old deadwood of standing living oak trees provided the dead heartwood is exposed externally to the air. The Castle Hill site still has areas of a more typical open wood pasture structure, and so shelter and shade may be more important in the south of Britain. Although Ehnström & Axelsson (2002) state that it is the decayed sapwood that is the larval habitat and that the type of decay is a red-rot, they were clearly unfamiliar with the biology of the host fungus. *Hymenochaete rubiginosa* is a heartwood decay fungus, decaying heartwood residues of old oak stumps (Rayner & Boddy, 1988). The resulting decay is a fine powdery material, red/brown in colour, but the result of a white-rot process rather than being a true red-rot (M. Ainsworth, pers. comm.). Adults are active for a limited period (5 to 6 weeks, but probably only 3 to 4 weeks in any one season) from late May until early July and favour open sunny areas flying actively to blossom in the field layer – they are known to be attracted to the white flowers of Meadowsweet, *Angelica*, *Valeriana* and *Thalictrum*.

Ecological continuity appears to be a key factor, the known sites all being ancient wood pastures or ancient woodland, and part of large complexes of suitable habitat. However, the sites are not necessarily species-rich in saproxylics. The host fungus is a relatively widespread species, but perhaps only rarely does it provide sufficient habitat at landscape scale.

Status With only six sites/areas having records during the last 25 years the species is clearly Nationally Rare and the restricted number of locations is so close to the threshold for Vulnerable (5 locations) that a status of Near Threatened is more appropriate than LC. Rarity itself is a threat

because of a greater vulnerability to stochastic events driving the species to extinction. Three Victorian sites have certainly been lost; other sites may just be under-recorded. There is no subfossil evidence for presence of the species in Britain (Buckland & Buckland, 2006) although it is generally assumed to be a long-established native.

Threats While shelter, a level of shade, and relatively stable, moderately humid conditions are thought to be important for the development of suitable fungal decay of large items of oak timber, increasing and deepening shade are thought to be damaging. The adult beetles are also sun-loving and have a requirement for sunny open areas within the overall forest structure. Known sites include both ancient wood pastures (although only one still actively so) and formerly actively managed ancient coppice-with-standards woodlands. Watersmeet Woods has been excluded from grazing management in recent decades; while this may have encouraged greater flowering of nectaring plants, it has also resulted in increasing shade development across the system. Savernake Forest has a similar recent history, with decades of no-grazing, but with some limited grazing restoration. The largest known site - and one with good continuity of suitable management practices (The New Forest) - is believed to hold a large and sustainable population, although no mapping of the beetle's occurrence has been attempted. The Castle Hill, Duncombe Park, population is also thought to be in good order at present although much of the extent of the ancient wood pasture has been subject to conifer afforestation in the past; there have been efforts in recent years to halo-release the surviving ancient oaks although the resulting structure is currently not sustainable as regeneration of the conifers is rampant.

Management and Conservation Watersmeet is an SSSI designated for its oak woodland – the citation does not mention any invertebrate interests; New Forest and Savernake Forest are also both SSSI and deadwood insects are specifically mentioned as key features of interest. The Castle Hill Deer Park and Windy Pits SSSI was primarily designated for its saproxylic beetles and *Anoplodera sexguttata* is specifically named in the site citation. Cocklode and College Woods form part of the Bardney Limewoods SSSI, although the citation does not acknowledge any saproxylic interests. The sites are however not necessarily managed with this species in mind and no monitoring is carried out.

Published sources
Alexander (2010a & b); Cooter (2004); Darby (2009); Ehnström & Axelsson (2002); Ehnström & Holmer (2007); Rayner & Boddy (1988); Skidmore & Johnson (1969); Tomlin (1950); Twinn & Harding (1999).

DINOPTERA COLLARIS
Red-collared longhorn beetle **REGIONALLY EXTINCT**
Order COLEOPTERA **Family CERAMBYCIDAE**

Dinoptera collaris (Linnaeus, 1758) also known as *Acmaeops collaris* and *Pachyta collaris* (Fowler, 1890)

Identification Duff (2016); immature stages in Duffy (1953).

Distribution Formerly widespread across lowland England but very localised within the Midlands and south-east, and best known from Kent (Hunter 1987). The GB strongholds were in Kent and the Wyre Forest area. The most recent records appear to be from Chattenden Woods, Kent, in 1949, and Stourport, Worcestershire in the same year (Duffy, 1953); G.H. Ashe and S.E.W. Carlier in 1938 may have been the last people to record the species from the Wyre Forest. Hyman (1992) refers to a post-1970? record from Cheshire but does not provide details; this record has been formally withdrawn by the Cheshire LRC as unverified (E. Fletcher, *pers. comm.*). The species is probably restricted to small isolated populations (Hunter 1987). "Once a common species, it has been so relentlessly collected in the past that it is now confined to a few isolated areas in the March counties" (Kaufmann, 1992b).

A widespread species on the continent, known from much of central and southern Europe (apart from south-west) (Bense 1995) and east to the Caucasus and Iran (Ehnström & Holmer 2007). Widely distributed in southern Sweden.

Habitat & Ecology In Britain the beetle is primarily associated with ancient broad-leaved woodlands which are under active coppice management, and perhaps only in landscapes rich in such woodland. It will breed in a wide range of broad-leaved tree species, although an association with sweet chestnut hop poles - as sometimes claimed - has not been substantiated. Areas of woodland on steep slopes on sandy soil appear to be favoured. The woodlands need to have areas where the sun penetrates to ground level and warms the soil – hence an association with active coppice and south-facing sandy slopes – as the larvae are very active on the woodland floor and the adults also feed at white blossom in full sunshine. The larvae are secondary inhabitants of the subcortical zone after exploitation by scolytines and other cerambycids.

Larvae were found by M.G. Fraser and E.A.J. Duffy crawling about under the loose dry bark of the exposed rotten roots of an old overturned stump of *Quercus* (Duffy, 1953); they are strange and unusual in general appearance, more like a malacoderm or Lepidopteran: greyish colour, conspicuous setae, long legs and anal pseudopod. They are extremely active, crawling about with the speed and ease of a typical lepidopteran larva; crawling about both on top and beneath the bark but also over the soil to other stumps. They are only found under the bark in the old galleries of other beetle larvae such as the longhorn *Clytus arietis*, apparently feeding on either the frass or fungal growth on the frass of the former larvae. In the late autumn the larva falls to the ground and enters the soil in which it constructs an earthen cocoon; here it overwinters and pupates the following April or May (Duffy 1953). Development takes two years (Ehnström & Holmer 2007). Kaufmann (1989) says it is principally associated with the decaying exposed roots and dead branches of oak trees; it has also been found in ash and aspen, and abroad in chestnut, but not so in England. Lindhe *et al.* (2010) associate it with deadwood on living apple trees in southern Sweden. Palm (1959) says it has been found in large numbers under loose bark of dry crab apple *Malus sylvestris* branches exposed to the sun and previously used by larvae of the bark beetle *Scolytus rugulosus*; also found beneath bark of aspen stems lying on ground.

The adults are sun-loving insects and are to be found on flowers (Hunter 1987) from April to July (Twinn & Harding, 1999). Flowers reported include hawthorn, apple, guelder rose, cow parsley and meadowsweet (Hyman 1992). Lindhe *et al.* (2010) associates it with apple trees in

Sweden.

Status The absence of records from the last 70 years suggests that this species is now extinct in Britain. It was well-known through the 19th century and into the 20th but there have been no authenticated records from suitable wild habitat since 1949. Although no subfossil evidence for its early presence in Britain has been forthcoming (Buckland & Buckland, 2006) it is generally assumed to have been a long-term native. Its status was assessed as Endangered by Hunter (1987) and Hyman (1992) although the species was almost certainly already extinct in Britain at the time.

The IUCN Red List of European Saproxylic Beetles (Dodelin *et al.*, 2017b) has assessed the species as Least Concern at a continental level since it is widespread and rather common, and its population trend is stable and the population size is large. In addition, there appear to be no major threats at the European scale. Locally, forestry activities can remove a significant part of the available breeding material, as can the decline of the traditional coppice management of woodlands. Its loss from Britain appears unique. The Swedish population, for example, appears to have been stable for 200 years, although may have increased during first half of 20th century (Lindhe *et al.*, 2010). This is in stark contrast to the British situation.

Threats It seems likely that this beetle's extinction may be linked with the abandonment of active coppicing in the woodlands across lowland England, and in the Wyre Forest and Kent in particular. This would have resulted in increased canopy density and shading - conditions unsuitable for both the larvae and adults. Hunter (1987) also suggested the removal of old oak hedges on field boundaries bordering woodland and the conversion of woodland to conifer plantations may be implicated. Kaufmann (1992b) is very clear that he considered specimen collecting by entomologists as a primary cause of loss in the UK, although this does seem unlikely. The species is doing well in southern Sweden for example, despite the beetle having a restricted range there and being on the very edge of its European range. The overall situation in Sweden appears comparable with that in Britain, except that the beetle population appears to be stable.

Management and Conservation Much of the Wyre Forest is now SSSI and NNR and many of the Kent woodlands are designated as SSSIs; active coppice-cutting has also resumed in many areas. However, the beetle appears to have been lost. What little is known about its ecology suggests that the species is not very mobile and is unlikely to re-colonise Britain from the continent naturally.

Published sources Bense (1995); Buckland & Buckland (2006); Dodelin *et al*. (2017b); Duff (2016); Duffy (1953); Ehnström & Holmer (2007); Fowler (1890); Hunter (1987); Hyman (1992); Kaufmann (1989 & 1992b); Lindhe *et al.* (2010); Palm (1959); Twinn & Harding (1999).

JUDOLIA SEXMACULATA
Three-banded Longhorn **VULNERABLE**
D2
Order Coleoptera **Family CERAMBYCIDAE**

Judolia sexmaculata (Linnaeus, 1758). Previously known as *Pachyta sexmaculata*

Identification Duff (2016). Larval morphology in Duffy (1953) & Švácha & Danilevsky (1989).

Distribution Boreomontane. Bense (1995) shows it widespread across the boreal conifer forests of northern Europe but more localized in montane conifer forests of central Europe from the Alps eastwards, with more isolated records from central France and the eastern Pyrenees. Sama (2002) adds Siberia, eastward to Japan; he mentions unconfirmed records from North America.

Primarily known in the UK from the eastern-most Caledonian pine forest relicts but Twinn & Harding (1999) also show older records farther west. Also occasionally introduced at least temporarily to sites further south. Speyside has long been known as the core area for the British population but there are also records from Deeside and Tayside. The status of the species outside of Speyside is unclear as records tend to be on-offs, in areas with no previous evidence for established populations.

Habitat & Ecology Larvae develop for two years under the basal bark and in the wood below of dead standing and fallen spruce *Picea* and pine *Pinus* feeding in the decaying sapwood below ground level (Lindhe et al 2010); also in rotting stumps (Bense, 1995); they pupate in a shallow earthen cell near host tree's roots; found especially in shady situations. Bense (1995) adds *Larix*, *Abies*, *Populus* and *Tilia* as host trees; Bily & Mehl (1989) also say that it is occasionally found in broadleaved trees, including *Alnus*; no data on size classes of utilized stumps and trunks appear to be available. The term 'large' is rarely if ever used by recorders and so size class may not be important. Adults are attracted to white flowers for feeding in June and July, into early August (Lindhe et al 2010); hogweed & rowan (Harwood, 1933). Associated with ancient woodland in Britain (Rejzek, 2006).

Status Vulnerable D2. AOO < 2,000km^2 (and probably EOO <20,000km^2?), and 5 locations. Only reported from 10 hectads in the period 1990-2018 and four of these as single, one-off records outside of the currently accepted native range and from areas where not previously known. These appear to be casual introductions. The core population appears be centred on the Speyside area of the Cairngorms National Park, where there has been a long history of presence and five current hectads out of eight historic tetrads; there are also a few modern records from eastern Perthshire but only old records from Deeside. A small number of old records from western Highland areas and one modern one from conifer plantations on the Moray Firth are difficult to interpret. The core area is represented by just five modern hectads. An increasingly scarce and rare beetle, perhaps a relict species of the ancient Caledonian forest fauna (Kaufmann 1989). Near Threatened at EU28 scale although LC at full European scale (IUCN, 2016).

Threats Threatened by logging of larger pine trees in native forest areas and lack of recruitment of next generation veteran pines, although able to develop in cut stumps and roots.

Management and Conservation The core areas of the Caledonian pine forest are mostly designated SSSI and the area is also subject to SAC and SPA designations. The stands of old growth pine are well-documented but do not appear to be subject to conservation action targeted specifically at their enhancement in short- or longer-term but are treated as part of larger ecological units where grazing reduction is being given the top priority, apparently without due regard to the known old growth interests.

Published sources
Bense (1995); Bílý & Mehl (1989); Harwood (1933); Kaufmann (1989); Rejzek (2006); Twinn & Harding (1999).

OBEREA OCULATA
Eyed Longhorn **CRITICALLY ENDANGERED**
B1 B2ab(ii,iii)
Order Coleoptera **Family CERAMBYCIDAE**

Oberea oculata (Linnaeus, 1758)

Identification Duff (2016); immature stages in Duffy (1953).

Distribution Only known in Britain as an established breeding species from the Isle of Ely and the Cambridgeshire Fens. Wicken Fen was the only known breeding location in Britain for at least the last century and possibly for the last 150 years but the beetle has not been reported here since 1983. Modern records come from just a short section of the River Cam at Upware, to the west of Wicken Fen, including a small patch of willow carr.

The few records from elsewhere in the country are old ones which have not been repeated and appear to arise from either chance introductions or transcription errors (Kaufmann, 1992a; Booth & Cheesman, 1998; Twinn & Harding, 1999). It does seem feasible however that the species might still remain overlooked in other fenland sites in the south-east of England, such as Romney Marsh where one was taken in 1883, and The Hundred Foot Washes near Downham Market where one was taken in 1888, and perhaps even in Oxfordshire where one was taken in 1819.

Known throughout the whole of the Palaearctic region (Booth & Cheesman, 1998).

Habitat & Ecology The eggs are laid on the smooth bark of twigs and slender stems of living healthy bushes, and the larva bores a straight gallery in the pith channel 30cm or more in length, or in sapwood in wider stems (Duffy, 1953). An accumulation of ejected frass clinging to the twigs is the only external indication that larvae are present (Shirt, 1987b) although Lindhe *et al*. (2010) state that egg-laying females gnaw halfway through the shoot, which causes characteristic wilting of the tops. Larvae develop for two years. The preferred host appears to be *Salix* spp, particularly Osier *Salix viminalis*. The pupa forms within the stem during the period June to September; imagines emerge in June and may be seen until September, the best month being August, especially if the weather is hot and sultry, when the beetles fly round the host tree above

head height. Adults feed on the underside of *Salix* leaves (Lindhe *et al.*, 2010); a very wary beetle which hides beneath leaves when approached (Kaufmann, 1992a).

Nothing appears to have been documented about the situation of occupied host bushes, the density of bushes in the vicinity, whether open-grown bushes or dense stands are preferred, age structure, etc., which makes conservation management impossible to determine.

Status Has been recorded as a British insect since the end of the 18th century, but a decline occurred prior to about 1850, no doubt associated with the draining of the fens (Booth & Cheesman, 1998). While there is no subfossil evidence for its earlier presence in Britain (Buckland & Buckland, 2006) it is generally accepted as a native species. The adults have a short flight period and are very retiring, except in hot and sunny weather. A special search by experienced recorders is required to demonstrate their presence, which means that it is conceivable that undiscovered colonies might well occur in suitable places. However, the British population has been assessed as Endangered (Shirt, 1987; Hyman, 1992), and the loss of the main Wicken Fen colony and the precarious survival of just one small colony suggests that Vulnerable (D2) should be the minimum status at present. In reality the data available suggests that Critically Endangered would be more appropriate under criterion B2, with an AOO <10km2, (a) severely fragmented and currently known from just one small and fragile location, and (b) continuing decline projected in (ii) area of occupancy, (iii) extent and quality of habitat. The EoO is less than $10km^2$ also, therefore B1 applies as well.

This species is listed under section 41 of the 2006 Natural Environment & Rural Communities (NERC) Act as a Species of Principal Importance for the conservation of biodiversity. This provision makes it a statutory duty on planning authorities and other decision makers to consider these species when carrying out their duty to further the conservation of biodiversity. It is unclear to what extent this theoretical protection is being acted upon.

The species is not covered by the *IUCN Red List of European Saproxylic Beetles* as the species is not strictly saproxylic, but herbivorous. Elsewhere in Europe, the species may have lost some ground in northern Sweden, but the abundance in the south seems to have been quite stable (Lindhe *et al.*, 2010). It may be that the rarity in Britain is atypical.

Threats So over-collected during the 19th century and the earlier decades of the 20th century that it is now highly vulnerable and on the endangered list (Kaufmann, 1992a). While the threat from fenland drainage may now have receded, active management may be required to ensure continued availability of the healthy young shoots required for larval development. The Wicken Fen colony may have been lost through successional changes in the willow stands and a lack of active management targeted at the beetle.

Management and Conservation The Upware site appears not to be protected by any legislation but appears to sit between two SSSIs along the River Cam: Upware South Pit SSSI is a geological site just to the north, and the Cam Washes SSSI to the south which is a wildfowl and waders site on seasonally flooded pastures. Wicken Fen lies about 1km to the east. So, while the surrounding landscape has some legal protection it would appear that the only known colony of this rare species has none.

Wicken Fen was acquired by the National Trust piecemeal from 1899 onwards, chiefly through gifts from Mr C.H. Verrall, the Hon Charles Rothschild and others in order to protect its rare insects. It was also designated SSSI from 1951 and is currently a National Nature Reserve. Despite this level of apparent protection, the colony of *Oberea oculata* became extinct. Successional changes on the fen may have been the primary cause, with less young willow growth becoming available. The National Trust does now appear to be actively managing the fen in the hope of the species recolonizing from the Upware colony.

Published sources Booth & Cheesman (1998); Ehnström & Holmer (2007); Kaufmann (1992a); Lindhe *et al.* (2010); Shirt (1987b).

OBRIUM CANTHARINUM

REGIONALLY EXTINCT

Order Coleoptera **Family CERAMBYCIDAE**

Obrium cantharinum (Linnaeus, 1767)
Identification Duff (2016). Larval morphology in Duffy (1953) & Švácha & Danilevsky (1989).

Distribution Has primarily been taken in a fairly circumscribed region north of the Thames. That area embraces Epping and Hainault Forests, besides some tracts of ancient wood, formerly the parklands of private estates: Wanstead Park and Dagnam Priory. It is from the Essex localities, Wanstead House in particular, that numbers were once found in some quantity. It has not recurred for about 60 years. "Freely in a Kentish orchard", around the 1910s, Prof. Theobald to AM Massee; near Brighton & Hastings (Kaufmann, 1985).

A central European species extending as far west as southeast England and north into southern Sweden and Finland but more-or-less absent from the Mediterranean region (Bense, 1995).

Habitat & Ecology Larvae develop for one to two years and pupate in or under very dry bark of dead branches and stems of aspen (Ehnström & Holmer 2007; Lindhe *et al.*, 2010). Occasionally in *Salix, Rosa, Quercus* (Bense, 1995). Adults often visit white flowers; found June and July (Kaufmann, 1985). Prefers drying aspen trees, exposed to the sun, about 15-20cm thick with thin bark. Larvae gnaw irregular, weaving galleries between bark and wood, eating mainly the bark when young but later the sapwood, where the galleries tend to be flat. Pupation usually at the end of a hook-shaped chamber, 4-5cm long. Development usually 1 year but can last 2 years in cold summers (Palm 1959)

Status Not reported in Britain since the late 1920s (Kaufmann, 1992b). Extinct in Hyman (1992) – a record from Bovey Tracey in South Devon (Perkins, 1929) is atypical for its known British range but might suggest periodic incursions from across the English Channel and short-term establishment. The record says it emerged from a decayed birch stump in a lane (Kaufmann, 1985). No subfossil evidence for presence in Britain (Buckland & Buckland, 2006). Reported from a number of sites in the 19th century; the date of the earliest record is unclear although the species was known to Stephens (1839). In Sweden, on balance, the species probably expanded

and increased its abundance in the south-east during the second half of the 20th century (Lindhe *et al*., 2010).

The species has been assessed as Least Concern at a European level (Nieto *et al*., 2010). The UK is the only country where it has become extinct. Elsewhere the population is believed to be stable and no significant threats have been identified.

Threats A potential cause of extinction of the Epping Forest population may have been increasing shade as grazing was steadily abandoned over time.

Management and Conservation Not relevant unless the species is rediscovered or re-colonises Britain. The precise causes of the extinction are not known.

Published sources Duffy (1953); Ehnström & Holmer (2007); Kaufmann (1985 & 1992b); Lindhe *et al.* (2010); Nieto *et al.* (2010); Švácha & Danilevsky (1989); Twinn & Harding (1999).

PEDOSTRANGALIA REVESTITA
Black and red longhorn beetle **ENDANGERED**
B2ab(ii,iii,iv)c
Order Coleoptera **Family CERAMBYCIDAE**

Pedostrangalia revestita (Linnaeus, 1767) syn. *fuscicornis* (Marsham, 1802)

Identification Duff (2016). Larval morphology in Švácha & Danilevsky (1989); Duffy (1953) had no material available for description.

Distribution Only known in Britain from a very restricted area of England (Twinn & Harding, 1999), with modern records from just four locations:
Monks Wood NNR, Hunts, one seen walking on low vegetation about 25cm off the ground, 3.vi.2016 & 30.v.2017, Frank Porch (via Longhorn Beetle Recording Scheme, but not known from here previously despite it being a very well-recorded site);
New Forest (SU3005, i.e. Hollands Wood), 30.vi.2013, Peter Wilson – verified by Paul Brock; earlier records from this forest are: i) beaten off oak, June 1908, A. Ford (Kaufmann 1997); and ii) one taken in June 1917 by C. Gulliver (Fowler, 1922); the latter record is given as 'Brockenhurst' (SO20) in the NBN Atlas;
Wappenbury Wood Nature Reserve (SP37), Warwickshire, one live on the ground near some isolated dead trees in parkland, 14.vi.1996 (Forsythe, 1997);
Ashtead Common (TQ15), Surrey, 7.vi.2000 (Menzies, 2001).
Sites with no modern records are as follows: Harewood Forest, Hampshire; Hankley Common & Coombe Wood, Kingston, Surrey; Windsor Forest, Berkshire; Gamlingay area, Cambridgeshire; Hainault Forest, Essex; Darenth Wood & Birch Wood, Kent; Colney-hatch Wood, Middlesex.

The species is endemic to Europe and occurs widely across the Temperate zone, extending south to the Mediterranean (Bense, 1995); a record from Transcaucasia needs confirmation (Sama 2002); extremely rare and very local in Sweden and Denmark (Ehnström & Holmer 2007); in the

Iberian peninsula only in the northern half (Vives 2001). Has become rarer and more localized on the Continent (Freude et al, 1969). Assessed as Vulnerable across its European range (Calix *et al.* 2018).

Habitat & Ecology Rejzek (2006) described this species as perhaps Britain's most difficult longhorn to find. The adults are short-lived (about two weeks at most) and so precise timing is required. They appear when temperatures first exceed 20 degrees Celsius, which has usually been towards the end of May or slightly later – but is likely to change with climate change. It is thermophilous and consequently the preferred habitats are oaks growing on south-facing slopes or sunny woodland edges. Especially attractive to the beetle are old stunted oaks with plenty of wounds and dead branches still attached to the living trees. The adults will sit on the leaves and in the late afternoon, when the temperature is high enough, they will fly quickly around the tree canopies. Only at this time can they be seen easily and captured on the wing. The adults hardly ever visit flowers. It is very polyphagous but oak is preferred; larvae feed in relatively moist red-rotten wood in close contact with living tissue, such as the bases of dead branches surrounded by living callus development as the healthy tree produces fresh woody tissues around the wound. The pupal cell as well as the larval galleries are filled with typical long red wood fibres created by the larvae. The larvae develop for two to three years and pupate in the moist, rotten wood.

Rejzek (2006) also associates it with 'ancient woodland' although - more strictly - it is associated with veteran trees in relatively open situations such as woodland edges or open ride-sides as well as ancient wood pastures and parklands – in the past actively managed ancient woodlands might have provided suitable habitat but much ancient woodland has been abandoned through recent decades, partly through misguided hypotheses about minimum intervention being the best way of conserving their ecological processes. Minimum intervention management – which results in closed canopy conditions - would be disastrous to species such as this.

In Britain the beetle is associated especially with oak but also cherry (Kaufmann, 1988, 1992b & 1997). In Sweden the beetle is mostly restricted to elm species, rarely oak (Lindhe *et al.*, 2010). The primary host tree in the Czech Republic (and probably in the UK) is oak, and to a lesser extent beech; elm is more important in Scandinavia. Sama (2002) says it is polyphagous on broadleaved trees, preferably *Quercus, Populus,* and *Ulmus.* The key heartwood decay fungi are presumably *Laetiporus sulphureus* (in oak and cherry) and *Fistulina hepatica* (oak) in Britain but *Rigidoporus ulmarius* (elm) in Sweden.

Status Endangered: the AOO is less than 500 km^2; highly fragmented; modern records from just 4 hectads, old records from a further 12; no recent records from Harewood Forest (last reported in 1974); no modern records from Windsor Forest & Great Park; suggests a major decline in an already highly localized species; AOO declining, habitat quality in long-term decline; number of locations declining; extreme fluctuations apparent with records very erratic, and hence it qualifies as Endangered under criteria B2ab(ii,iii,iv)c. Also meets criteria for Vulnerable under D2. This species seems to be verging on extinction in Britain. While it is important to acknowledge that this beetle appears to be very difficult to detect on demand – like so many other species – the species status review has to rely primarily on positive data.

No subfossil evidence for presence in Britain has yet been found (Buckland & Buckland, 2006)

but the species is generally accepted as a native. Kaufmann (1988) described this as one of the very rarest of the British Cerambycidae, single examples of which occur unexpectedly at long, infrequent intervals; and (1992a) commented that: 'very few records of this extraordinarily rare and elusive beetle exist; it is unquestionably a native beetle which turns up singly like a jack-in-the-box when least expected'. It was known to late 18th century entomologists (Martyn, 1792) and so has been in Britain for a long time; published evidence shows that it was slightly less uncommon during the early part of the 19th century; by early Victorian times already a rare and prized species (Kaufmann, 1997). RDB (Endangered) (Hyman, 1992).

The *IUCN Red List of European Saproxylic Beetles* has assessed this beetle as Vulnerable across it whole European range (Dodelin *et al.*, 2017a). The overall population size is suspected to already have decreased by more than 30% since 1960, partly because of the Dutch elm disease (*Ophiostoma novo-ulmi*), together with the removal of suitable veteran trees. This species has declined as a result of the reduction in complexity/diversity of the landscape resulting in loss of old and veteran trees from otherwise suitable open forests, farmland and urbanised areas. This conversion has not only resulted in fewer suitable habitats, but also in longer distances between the remaining favourable stands of old trees.

Threats Dutch Elm Disease will have removed elm as a potential host tree in Britain, although none of the few British records have been associated with that species – the bracket fungus which causes red rot in elm was *Rigidiporus ulmarius*. Oak has also been subject to many problems over the past few decades and many potentially suitable host trees have been lost and at a landscape scale – 'Acute Oak Decline' is the latest expression being applied to declining health and early death of mature oak trees, although this appears to be more of a consequence of damaged soils leaving trees less able to maintain their defences to pathogens. Loss of veteran oaks in the wider countryside, and canopy closure in enclosed woodlands and wood pastures, will both be making the landscape increasingly unsuitable for the species.

Management and Conservation The key British site is the New Forest – mostly SSSI and a National Park - which continues to very occasionally generate new records. No assessment of habitat quality has been attempted however and the species' survival may be precarious even here. The other three recent records are strange in that they are all from sites with no previous history for this species: Monks Wood NNR, Ashtead Common NNR and Wappenbury Wood nature reserve. All are managed as nature reserves and Ashtead Common (City of London) in particular is managed with veteran tree interests very strongly recognized.

Published sources Allen (1973 & 1993); Appleton (2004); Bense (1995); Buckland & Buckland (2006); Calix *et al.* (2018); Dodelin *et al.* (2017a); Duff (2016); Duffy (1953); Ehnström & Holmer (2007); Forsythe (1997); Fowler (1922); Harwood (1910); Hellrigl (1986); Kaufmann (1988, 1992b & 1997); Lindhe *et al.* (2010); Martyn (1792); Menzies (2001); Norman (1844); Rejzek (2006); Rye (1863); Sama (2002); Švácha & Danilevsky (1989); Twinn & Harding (1999); Vives (2001).

PLAGIONOTUS ARCUATUS
The Great Wasp Beetle **REGIONALLY EXTINCT**
Order Coleoptera **Family CERAMBYCIDAE**

Plagionotus arcuatus (Linnaeus, 1758) *Clytus arcuatus* in Fowler (1890)
Identification Duff (2016). Larval morphology in Duffy (1953) & Švácha & Danilevsky (1989).

Distribution This beetle was confined to southern and eastern England; a number of northern localities are recorded but they were obviously introductions, imported in logs and other timber. Convincing records of the species as an erstwhile indigenous species are confined to Essex, Kent and Middlesex (Kaufmann, 1992b). The only convincing records suggesting this species to be a former resident emanate from Epping Forest and Highgate Woods (A.A. Allen, in Hyman, 1992). Already rare by the time of Fowler (1890) with only Greenwich and Loughton given as additional localities to those in Stephens (1830).

Widespread across continental Europe, extending into North Africa (Bense, 1995). Present and locally common in coastal regions of northern France, Belgium, the Netherlands, Germany, Denmark and even Norway (Rejzek, 2006)

Habitat & Ecology Larvae develop for two years under bark and in the outer sapwood of recently dead branches and stems of oak, occasionally other hardwoods, and pupate in the wood or in thick bark (Lindhe *et al*. 2010). Pupation occurs in spring. The imago emerges in May and is found in the open until July, either resting on host trees or their branches on the ground. They are very active, flying readily in sunshine and are sometimes found browsing on flower heads (Kaufmann, 1992b; Ehnström & Holmer, 2007)

Status Known from at least the second half of the 18th century and still present in the 1870s but not since. The poet George Crabbe (1795), lists it as flying in the woods below Belvoir, Leicestershire. Stephens (1830) found several in Hertfordshire and gives other localities, notably Chislehurst, where it was abundant (Kaufmann, 1992b). Although there is no subfossil evidence for presence in Britain (Buckland & Buckland, 2006) the species has been widely accepted as an extinct native.

The species has been assessed as Least Concern in the IUCN Red List of European Saproxylic Beetles. Its abundance in Sweden has probably increased considerably throughout the 20th century, and the positive trend seems to date to well before that (Lindhe *et al.* 2010). This suggests that the cause of its extinction in Britain may be unique.

Threats Kaufmann (1992b) maintains that the Hainault Forest population was almost certainly wiped out by collectors, with Dr W.J. Bond in particular collecting over 200 examples, not to mention a great number of larvae and pupae; dates 1829 and 1836. Thereafter notes, other than importations, are few and far between. It was still to be found in the 1870s but not since (Kaufmann, 1992b).

Management and Conservation The cause or causes of its local extinct remain obscure. It appears to predate the general decline in active coppice management. It is also surprising that it has not

re-established given its frequency in the forests of northern France.

Published sources Duff (2016); Duffy (1953); Ehnström & Holmer (2007); Kaufmann (1992b); Lindhe *et al.* (2010); Rejzek (2006); Švácha & Danilevsky (1989).

SAPERDA CARCHARIAS
The Large Poplar Longhorn **NEAR THREATENED**

Order Coleoptera **Family CERAMBYCIDAE**

Saperda carcharias (Linnaeus, 1758) syn *punctata* DeGeer; formerly placed in genus *Anaerea*

Identification Duff (2016); larval morphology in Duffy (1953) & Švácha & Danilevsky (1989).

Distribution According to Kaufmann (1991), the British distribution is centred on three distinct zones, one Highland Scotland, another ranging across central and northern England, and the third covering some Home Counties, East Anglia and the Fens. However, the mapping provided by Twinn & Harding (1999) indicates two main centres: eastern England and Scottish Highlands, the English records appearing more as a single distribution pattern rather than two. The English range is centred on the fen district but the species has been recorded, albeit rarely and rather erratically, as far afield as Kent, West Wales, Lancashire and North Yorkshire. Most recent English records are from the fen district.

An intensive study of the species in the Scottish Highlands was made in 2000 and 2001, as part of research into the saproxylic fauna of aspen (MacGowan & Begg, 2002); the longhorn was found in 12 hectads.

Habitat The larvae develop over two to four years and pupate in the wood of basal parts of living stems of aspen and of introduced *Populus* species, occasionally willow. It is said to prefer shaded stands of its host trees. A considerable amount of frass and wood fibre are ejected from the active tunnel entrances that are formed as an enlargement of the oviposition site. Scottish sites are typically aspen, birch and juniper stands on relatively fertile, well-drained morainic deposits or steep-sided river gorges (MacGowan & Begg, 2002). The circumference of inhabited trees were found to be within the range 13 – 187cm CBH, with a mean circumference of 47.4cm; the females were selecting for small trees, with thinner bark. The height of the tunnel entrances above ground level lay with the range 1 – 19cm, the mean being 7.19cm. Most tunnel entrances were found to be at the edge of the stand, next to open ground (MacGowan & Begg, 2002).

Adult beetles are active mainly at dusk and at night; they are attracted to light. They feed on the leaves of young aspens during July and August (Lindhe et al, 2010).

Status Near Threatened (B1, B2a,b (I,ii,iii,iv). Reported from 18 hectads (1990-2018) but previously known from 60, a marked decline in range, particularly apparent across England. The number of recently reported locations is not far from ‘10 or fewer’ (Vulnerable) and some authors have suggested a genuine decline, citing over-collecting. There is no subfossil evidence

for presence of this beetle in Britain (Buckland & Buckland, 2006) but it is generally regarded as a long-established native.

Threats Has become very scarce due to over-collecting (Kaufmann, 1991).

Management and Conservation Many of the known sites lie within designated SSSIs but the beetle species and its specialist habitat requirements are rarely mentioned as a reason for designation. Conservation of its aspen host has been receiving much recent attention in the Scottish Highlands as a direct result of the Malloch Society's concerns for the future of the local aspen stands.

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Appendix 1: Summary Table - An alphabetical list of the longhorn – Cerambycidae (note: more information is included in the accompanying Excel spreadsheet)

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

Species Name	GB IUCN Status (2018)	Qualifying criteria	Rationale	GB Rarity status (2018)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2018	AoO (tetrads) 1990-2018	No. of Locations 1990-2018
Acanthocinus aedilis	NT		Modern records are only from the core areas of the Caledonian pine forests. Modern records from just 14 hectads, but old records from a further 21 within the Scottish Highlands, suggesting a potential decline of 60%. Widely reported in the past outside of the native pine forests – presumably as a result of chance introductions with imported timber - but none recently, suggesting a failure to establish outside of its native range. EOO less than 100km^2 indicates CR. However, the number of locations exceeds the threshold under D2, there is no evicence of extreme population fluctuations and although stands of old growth pine are currently highly fragmented within the Caledonian pine forest area, they are not considered severely fragmented. Given a continuing decline is projected for (i) extent of occurrence, (ii) area of occupancy; (iii) area, extent and/or quality of habitat; and (iv) number of locations or subpopulations, a status of Near Threatened is appropriate.	NR	E	S	W	71	14	12	
Aegosoma scabricorne	NA		A central European species, with populations as close as Normandy. One taken at moth trap on Dorset coast in 2013; no evidence for resident breeding population.		E			0	1	0	

Species Name	GB IUCN Status (2018)	Qualifying criteria	Rationale	GB Rarity status (2018)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2018	AoO (tetrads) 1990-2018	No. of Locations 1990-2018
Agapanthia cardui	NA		Recent arrival in Britain via Channel Tunnel. Population recently detected at mouth of M20 Channel Tunnel at Folkestone, Kent, 2017 and 2018. Widespread in southern and central Europe.		E			0	1	0	
Agapanthia villosoviridescens	LC		No perceived threats specific to this species. Has been steadily spreading westwards and northwards from its strongholds in East Anglia and the East Midlands.		E		W	98	307	61	
Alosterna tabacicolor	LC		No perceived threats specific to this species. Widespread across much of southern Britain, but with a suggestion of declining records.		E	S	W	237	199	74	
Anaglyptus mysticus	LC		No perceived threats specific to this species. The species is widespread across much of southern Britain with no indication of a recent decline.		E		W	184	187	75	
Anastrangalia sanguinolenta	CR	B1, B2a,b (i, ii, iii,iv)	The AOO is of <50 km^2; modern records are only from the core areas of the Caledonian pine forests of Speyside. Modern records from just 5 hectads, but there are old records from a further 2 hectads within the Scottish Highlands, of which 1 from the Speyside area and 1 from Glen Affric. Other old records from East Anglia, South Yorkshire and Isle of Wight, are all presumed to be casual introductions through timber movement. Endangered is justified on the basis of EOO and AOO less than 100km^2 and (a) the species has only been found in recent years within the Speyside Group of pine forests - at three locations: Abernethy, Rothiemurchus, and Glenmore Forests, although in reality the pine forest habitat here merges together as a single expanse, albeit with suitable old growth conditions highly fragmented within; (b) continuing decline projected of (i) extent of occurrence, (ii) area of occupancy; (iii) area, extent and/or quality of habitat; and (iv) number of locations or subpopulations, all as a result of	NR	E	S		8	5	4	

Species Name	GB IUCN Status (2018)	Qualifying criteria	Rationale	GB Rarity status (2018)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2018	AoO (tetrads) 1990-2018	No. of Locations 1990-2018
			the current conservation approach of removing deer browsing/grazing and encouraging the widespread development of young growth pine without active management to encourage surviving old growth pine stands and without encouragement and protection of next generation old growth trees; (c) extreme fluctuations may be apparent in the species' history in Speyside as the lack of early records may suggest a period of very low population size, in contrast to the 1990-2018 period when it has been detected across five of the six hectads in the Speyside area where it has been known. However Allen (1973) appears to suggest a more stable population, and so extreme fluctuation may not be justifiable.								
Anoplodera sexguttata	NT		Despite having an apparently very small AoO (less than 500 km^2) there are no perceived threats, populations are not known to fluctuate, are not severely fragmented and there is no reliable evidence of decline. Only six sites/areas have records during the last 25 years. Three old sites certainly lost; other sites may just be under-recorded. Key sites are The New Forest, Savernake Forest, Castle Hill SSSI (Duncombe Park), Watersmeet Woods (National Trust) and the Lincolnshire Limewoods. With occurrence at only six locations, just above the threshold for VU, an assessment of NT is appropriate. Nationally Rare appears to be the correct status.	NR	E		W	17	11	8	6
Arhopalus ferus	NA		An introduction; a central European conifer forest species first detected in Britain in the New Forest in 1902. After a period of expansion recent indications are that the beetle is now becoming scarcer, more localized, and less commonly encountered than *A. rusticus*.		E			39	5	2	

Species Name	GB IUCN Status (2018)	Qualifying criteria	Rationale	GB Rarity status (2018)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2018	AoO (tetrads) 1990-2018	No. of Locations 1990-2018
Arhopalus rusticus	LC		No perceived threats specific to this widespread species and no evidence of a recent decline.		E	S	W	76	152	26	
Aromia moschata	LC		No perceived threats specific to this widespread species and no evidence of a recent decline.		E	S	W	135	105	39	
Asemum striatum	LC		No perceived threats specific to this species. Originally a Scottish pine forest species; very widely introduced and established across GB but sparingly recorded; almost certainly under-recorded due to association with pine forestry. Although only documented from 72 hectads between 1990 and 2017, there is reasonable confidence that exhaustive recording would find it in more than 100.		E	S	W	137	72	22	
Callidium violaceum	NA		Importation. Primarily found in Britain in softwood construction timber such as summer houses, garden seats, pergolas, palisades, etc. Appears to have disappeared with trend towards improved chemical treatment of imported products.		E	S	W	61	0	0	
Cerambyx cerdo	NA		Only known with certainty from the sub-fossil record (approx. 4000 before present) and known only as casual importations in the historic period.		E		W	Not collated	20	0	
Cerambyx scopolii	NA		May have occurred until the early 1900s although the evidence for its presence as a long-term British resident has recently been assessed as 'not overwhelming'; reliably known only as casual importations in the historic period. No subfossil evidence.		E			Not collated	1	0	
Clytus arietis	LC		No perceived threats specific to this widespread species and no evidence of a recent decline.		E	S	W	519	574	291	

Species Name	GB IUCN Status (2018)	Qualifying criteria	Rationale	GB Rarity status (2018)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2018	AoO (tetrads) 1990-2018	No. of Locations 1990-2018
Dinoptera collaris	RE		Always very localised in Britain, there have been no reports for over 50 years. The most recent reports were from Kent.		E			24	0	0	
Glaphyra umbellatarum	LC		No perceived threats specific to this species. Neither EOO nor AOO approach the thresholds for consideration as Threatened under Criterion B and there is no evidence of a recent decline.	NS	E		W	43	47	10	
Gracilia minuta	LC		While often regarded as an introduction into GB with trade goods, there is subfossil evidence for its presence in GB dating back to the Bronze Age. Range may have contracted in 20th century – there were very few records after 1970 (Hyman, 1992) but about 20 hectads have been added since then indicating a strong recovery.	NS	E	S	W	69	26	6	
Grammoptera abdominalis	LC		No perceived threats specific to this species. The ease with which new records have been achieved in recent years – and especially from new hectads - suggest under-recording rather than a significant decline in range. More people know how to find it today – it needs to be reared from dead lateral oak branches.	NS	E		W	48	26	7	
Grammoptera ruficornis	LC		No perceived threats specific to this widespread species and no evidence of a recent decline.		E	S	W	579	638	344	
Grammoptera ustulata	LC		Despite having an apparently very small AOO (less than 2,000 km^2) there are no perceived threats, populations are not known to fluctuate or to be fragmented and there is no reliable evidence of decline. The number of locations exceeds 10. Still readily findable in its three main stronghold areas in southern England. No credible threats have been identified.	NR	E			16	14	7	

Species Name	GB IUCN Status (2018)	Qualifying criteria	Rationale	GB Rarity status (2018)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2018	AoO (tetrads) 1990-2018	No. of Locations 1990-2018
Hylotrupes bajalis	NA		Established importation. In building timbers and therefore under-recorded by entomologists; some outdoor reports in recent years.		E		W	20	2	1	
Judolia sexmaculata	VU	D2	AOO < 2,000km^2 (and probably EOO <20,000km^2), and five locations, but with no reliable evidence for decline - under-recording suspected – and no evidence for extreme fluctuations. The occurrence at only five locations suggests that an assessment of Vulnerable is appropriate. Only reported from 10 hectads in the period 1990-2018 and four of these as single, one-off records outside of the currently accepted native range and from areas where not previously known. These appear to be casual introductions. The core population appears be centred on the Speyside area of the Cairngorms National Park, where there has been a long history of presence and five current hectads out of eight historic tetrads; there are also a few modern records from eastern Perthshire but only old records from Deeside. A small number of old records from western Highland areas and one modern one from conifer plantations on the Moray Firth are difficult to interpret. The core area is represented by just five modern hectads. An increasingly scarce and rare beetle (Kaufmann 1989).	NR	E	S		14	10	3	5
Lamia textor	DD		Very under-recorded due to its habits; the larvae develop for two to four years in the roots or basal living stems of various willow species and aspen; adults crepuscular; very few recorders are familiar enough with the species to be able to find it on demand, so a long history of under-recording. Modern records from just three areas, old records more widely but including sites where might still be present so DD appears appropriate. No information available on any threats specific to known locations.	NR	E	S	W	14	4	0	3

Species Name	GB IUCN Status (2018)	Qualifying criteria	Rationale	GB Rarity status (2018)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2018	AoO (tetrads) 1990-2018	No. of Locations 1990-2018
Leiopus linnei	LC		No perceived threats specific to this species. Only recently recognised amongst *L. nebulosus (s. lat.)* but proving to be widespread in eastern and south-eastern England. DD appears appropriate as a temporary measure of GB Rarity status until its true frequency can be determined.	DD	E			7	20	0	
Leiopus nebulosus s. str.	LC		No perceived threats specific to this species. As it is proving to be the more widespread of the two species there is reasonable confidence that exhaustive recording would find it in more than 100 hectads.		E	S	W	4	31	1	
Leiopus nebulosus s. lat.	LC		No perceived threats specific to this widespread species pair and no evidence of a recent decline.		E	S	W	309	252	94	
Leptura aurulenta	LC		No perceived threats specific to this species. Remains widespread within its very restricted range within southern and south-western Britain. No evidence for a recent decline.	NS	E		W	30	49	14	
Leptura quadrifasciata	LC		No perceived threats specific to this widespread species. No apparent change in range or abundance.		E	S	W	261	298	105	
Lepturobosca virens	NA		Temporarily established population in Forest of Dean in late 19C. A boreo-alpine conifer forest species		E			1	0	0	
Mesosa nebulosa	LC		Despite having an apparently very small AoO (less than 2,000 km^2) there are no perceived threats, it is not considered severely fragmented, populations are not known to fluctuate and there is no reliable evidence of decline. The number of locations exceeds 10. Eleven of the recent hectad records are from previously unknown areas which suggests under-recording. It is a difficult species to find on demand; the ecology is poorly understood.	NS	E			31	17	6	
Molorchus minor	NA		Introduction with conifer forestry and now established across much of lowland England, extending into Wales.		E		W	101	49	7	

Species Name	GB IUCN Status (2018)	Qualifying criteria	Rationale	GB Rarity status (2018)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2018	AoO (tetrads) 1990-2018	No. of Locations 1990-2018
Nathrius brevipennis	NA		Although records date back into 19th Century, assumed to be an importation with trade goods from southern Europe.		E	S	W	23	5	1	
Oberea oculata	CR	B1,B2ab(ii, iii)	AOO less than 10km^2, (a) severely fragmented and currently known from just one small and fragile location (extends into two hectads by a few metres) and (b) continuing decline projected in (ii) area of occupancy, (iii) extent and quality of habitat. The EoO is less than 10km^2 also, therefore B1 applies as well.	NR	E			11	2	2	1
Obrium brunneum	NA		Accidentally introduced non-native. Since its first record from Dorset the species has spread rather slowly west and east, but with no published records from north of the Thames.		E			13	20	2	
Obrium cantharinum	RE		Has primarily been taken in a restricted region in and around Epping and Hainault Forests, but not reported here since the late 1920s. Other records widely scattered and mostly old, often from synanthropic situations, suggesting casual imports. A 2000 record from a hospital in Inverness. Periodic incursions from across the English Channel and short-term establishment cannot be ruled out.		E	S	W	14	1	0	
Pachytodes cerambyciformis	LC		No perceived threats specific to this widespread species and no evidence for a recent decline.		E	S	W	165	171	59	
Paracorymbia fulva	LC		No perceived threats specific to this species. The species appears to be locally strong in South Wiltshire (VC8) and in the Solent Basin of South Hampshire (VC10); the populations are doing well at present and expanding, although its recent appearance across the Midlands may suggest assisted movement.	NS	E		W	13	38	3	
Pedostrangalia revestita	EN	B1,B2ab(ii, iii,iv)c	EoO and AoO of less than 40 km^2; highly fragmented, modern records from just 4 hectads, old records from a further 12; suggests a major decline in an already highly	NR	E			13	4	1	4

Species Name	GB IUCN Status (2018)	Qualifying criteria	Rationale	GB Rarity status (2018)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2018	AoO (tetrads) 1990-2018	No. of Locations 1990-2018
			localized species; AoO declining; habitat quality (veteran oaks with red-rotten heartwood) in long-term decline; number of locations declining; extreme fluctuations apparent with records very erratic. Also meets criteria for Vulnerable under D2. Note very difficult species to find.								
Phymatodes testaceus	LC		No perceived threats specific to this species. Clear evidence for recent expansion in range westwards.		E	S	W	113	189	50	
Phytoecia cylindrica	LC		No perceived threats specific to this widespread species, and no evidence of a recent decline.		E		W	92	164	30	
Plagionotus arcuatus	RE		Last reported in wild from 19th century. Best known from a restricted area of the east Midlands and south-east England, other records almost certainly due to casual importations with timber.		E		W	13	0	0	
Poecilium alni	LC		No perceived threats specific to this widespread species and no evidence for a recent decline. Under-recorded through widespread unfamiliarity with specialist habitat requirements.	NS	E		W	77	67	13	
Poecilium lividum	NA		An introduced species but seemed to establish a synanthropic breeding colony at one location for at least 10 years: breeding in wooded barrel hoops at Reading between 1894 and 1905. There are also old specimens from the New Forest in entomological collections but with no habitat data.		E			2	0	0	
Pogonocherus caroli	DD		Although only two locations known, it has only recently been detected in Britain, is presumably overlooked, and no plausible threat has been suggested.	NR		S		0	2	0	
Pogonocherus fasciculatus	LC		Despite having an apparently very small AoO (<2,000 km^2) there are no perceived threats, it is not considered severely fragmented, populations are not known to fluctuate and there is no reliable evidence of decline. The AOO is too large for qualification of VU under D2.The species is very	NR	E	S		35	9	2	

Species Name	GB IUCN Status (2018)	Qualifying criteria	Rationale	GB Rarity status (2018)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2018	AoO (tetrads) 1990-2018	No. of Locations 1990-2018
			under-recorded due to its native range being the Caledonian pine forests. Many of the old hectads are outside of its native range and presumably reflect casual introductions, so the hectad data provide a false picture.								
Pogonocherus hispidulus	LC		No perceived threats specific to this widespread species and no evidence of a recent decline.		E	S	W	184	162	34	
Pogonocherus hispidus	LC		No perceived threats specific to this widespread species and no evidence of a recent decline.		E	S	W	188	226	71	
Prionus coriarius	LC		This species has a large EOO and AOO. The data suggests that most of the core areas supporting the species continue to do so; there appears to be no robust evidence for any decline in range, although there is a distinct lack of modern records across much of the Midlands. Possibly increasingly scarce locally. Under-recorded due to crepuscular activity. There ia a need for targeted surveying across the Midlands sites to clarify its status there.	NS	E		W	123	72	24	
Pseudovadonia livida	LC		Widespread in south and southeast England. No perceived threats specific to this species. Possible decline in Midlands area.		E		W	116	199	61	
Pyrrhidium sanguineum	LC		Difficult to assess as the original British breeding areas were only discovered relatively recently, in an area previously poorly recorded (the Wales/England border counties). The species is also regularly found in firewood logs purchased from dealers and undoubtedly gets moved around the country to a considerable extent. Its recent appearance across much of England is almost certainly as a result of movements of firewood, with increasing interest in wood-burning stoves – the range in Britain has recently increased more than tenfold. The total number of occupied hectads has more than doubled in the past 30 years and the		E	S	W	18	43	8	

Species Name	GB IUCN Status (2018)	Qualifying criteria	Rationale	GB Rarity status (2018)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2018	AoO (tetrads) 1990-2018	No. of Locations 1990-2018
			trend is expected to continue into the foreseeable future. There is now reasonable confidence that exhaustive recording would find them in more than 100 hectads today. It is a common species on the near Continent.								
Rhagium bifasciatum	LC		No perceived threats specific to this widespread species and no evidence of a recent decline.		E	S	W	467	472	199	
Rhagium inquisitor	LC		No perceived threats specific to this species. A species of Caledonian pine forest (and locally in England, Wales and southern Scotland perhaps as an adventive only) it remains common and widespread within this restricted range No reliable evidence for a recent decline.	NS	E	S		33	24	8	
Rhagium mordax	LC		No perceived threats specific to this widespread species and no evidence of a recent decline.		E	S	W	464	474	219	
Rutpela maculata	LC		Widespread in England and Wales. No perceived threats specific to this species and no evidence of a recent decline.		E	S	W	474	625	307	
Saperda carcharias	NT		Widely scattered records from England, Wales and north and central Scotland. Despite having an apparently very small AoO (less than 2,000 km^2) there are no perceived threats, populations are not known to fluctuate and there is no reliable evidence of a recent decline. The number of locations exceeds 10. An intensive study of the species in the Scottish Highlands was made in 2000 and 2001, as part of research into the saproxylic fauna of aspen, and it was found in 12 hectads, considerably increasing our knowledge of the species locally and doubling the number of known occupied hectads. English records are mainly focused on	NS	E	S	W	60	18	6	

Species Name	GB IUCN Status (2018)	Qualifying criteria	Rationale	GB Rarity status (2018)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2018	AoO (tetrads) 1990-2018	No. of Locations 1990-2018
			The Fens and East Anglia generally, and appear to have declined but this most probably at least partly reflects under-recording although some authors have suggested a genuine decline, citing over- collecting. The species will use introduced poplars and even willow and so it is difficult to see where any threat might lie. More information is needed on its breeding habits in England, to guide recording effort. Given the possibility of a genuine decline a status of NT is considered appropriate.								
Saperda populnea	LC		Widespread in central and southeast England. Despite having an apparently very small AoO (but greater than 2,000 km^2) there are no perceived threats, it is not considered severely fragmented, populations are not known to fluctuate and there is no reliable evidence of recent decline. The number of locations exceeds 10. The apparent decline in records almost certainly reflects under- recording. The species develops in small and inconspicuous galls in living stems of aspen, willows, etc., and the adult is very elusive, making the species difficult to detect by casual recorders. The recent records are thinly scattered across much of its known range so no range contraction is suspected.	NS	E	S	W	125	34	14	
Saperda scalaris	LC		Widely scattered records from Wales and central England to northern Scotland. Despite having an apparently very small AoO (but greater than 2,000 km^2) there are no perceived threats, populations are not known to fluctuate and there is no reliable evidence of recent decline. The number of locations exceeds 10. Extensively collected by coleopterists in 19th century and urbanization destroyed many breeding sites in the Manchester area, but still appears widespread throughout rest of known range. An elusive species, under-recorded. Larvae develop in the inner bark of recently dead	NS	E	S	W	65	24	7	

Species Name	GB IUCN Status (2018)	Qualifying criteria	Rationale	GB Rarity status (2018)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2018	AoO (tetrads) 1990-2018	No. of Locations 1990-2018
			stems of various broadleaved trees, most often birch and oak, but also wild apple, rowan, willow and alder, and pupate in the wood. Adults are nocturnal and feed on the leaves of the host trees.								
Semanotus russicus	NA		Introduction; a male and female emerged from cut logs of moribund Lawson's cypress in Berkshire, 2007.		E			0	1	0	
Stenocorus meridianus	LC		Widespread in central and southern England. No perceived threats specific to this species. No obvious changes in range and no evidence of a recent decline.		E		W	295	281	115	
Stenostola dubia	LC		No perceived threats specific to this species with a large EOO and AOO and no evidence of a recent decline. The single Scottish site has not been confirmed in recent decades.	NS	E	S	W	74	58	15	
Stenurella melanura	LC		Widespread in southeast England. No perceived threats specific to this species and no evidence of a recent decline.		E		W	201	256	110	
Stenurella nigra	LC		Despite having an apparently very small AoO (less than 2,000 km^2) there are no perceived threats, populations are not known to fluctuate and there is no reliable evidence of a recent decline. Although only recorded from 8 hectads in the period 1990-2018, these are from a wide area within the known range (EOO greater than 20,000km^2), and include sites where not previously known. It appears to have always been this rarely found. The data suggests a very elusive species. It is difficult to understand why its habitat – aerial dead, decaying thin branches - might be under particular threat at present.	NR	E		W	35	8	2	
Stictoleptura cordigera	NA		A southern European species. Discovered at Hackney Marshes in 2014 and may represent an introduced and established population		E			0	1	0	

Species Name	GB IUCN Status (2018)	Qualifying criteria	Rationale	GB Rarity status (2018)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2018	AoO (tetrads) 1990-2018	No. of Locations 1990-2018
Stictoleptura rubra	LC		A species of conifer forests across southern and central Europe. It was first taken in Britain at Horsford, E. Norfolk in 1918 and became well-established and locally common in the Brecks and has since spread extensively across southern and eastern Britain.		E	S	W	20	102	13	
Stictoleptura scutellata	LC		No perceived threats specific to this species. Has become increasingly abundant in recent decades and its range is expanding.	NS	E			22	36	14	
Strangalia attenuata	NA		A few casual old records only; no evidence for a resident population		E			3	0	0	
Tetropium castaneum	NA		Imported mainly from northern Europe in softwoods used by the building industry, predominantly so during the post WWII years of reconstruction. Although found in the lowlands, it is more typically a montane species.		E	S		4	6	0	
Tetropium fuscum	NA		Native range across northern Europe and northern Asia; introduced into Britain.		E	S		1	3	0	
Tetropium gabrieli	NA		Native to the larch forests of the Swiss Alps; introduced into Britain.		E	S	W	92	14	4	
Tetrops praeustus	LC		Widespread in southern England. No perceived threats specific to this species and no evidence of a recent decline.		E		W	209	202	68	
Tetrops starkii	NA		Only recently detected in Britain, from 1991 onwards. New sites continue to be found and a recent colonization does seem the most likely explanation for its sudden appearance. No old specimens have been found in Museum collections.		E			0	8	0	

Species Name	GB IUCN Status (2018)	Qualifying criteria	Rationale	GB Rarity status (2018)	Presence in England	Presence in Scotland	Presence in Wales	AoO (hectads) <1990	AoO (hectads) 1990-2018	AoO (tetrads) 1990-2018	No. of Locations 1990-2018
Trinophylum cribratum	NA		Imported into England from India.		E			7	4	1	
Xylotoles griseus	NA		New Zealand Fig Longhorn. Discovered breeding in a garden in the settlement of Westward Ho!, North Devon, in 2014.		E			0	1	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): (up to a max. of 100 years in future)	25% in 3 years or 1 generation (whichever is longer)	20% in 5 years or 2 generations (whichever is longer)	10% in 10 years or 3 generations (whichever is longer)
C2. An observed, estimated, inferred or projected continuing decline **AND** at least 1 of the following 3 conditions:			
(a i) Number of mature individuals in each subpopulation:	≤ 50	≤ 250	≤ 1,000
or			
(a ii) % of mature individuals in one subpopulation =	90–100%	95–100%	100%
(b) Extreme fluctuations in the number of mature individuals.			
D. Very small or restricted population			
Either: Number of mature individuals	< 50	< 250	**D1.** < 1,000
D2. *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