Natural England Commissioned Report NECR189

A review of the beetles of Great Britain: Ground Beetles (Carabidae)

Species Status No.25

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NATURAL ENGLAND

Foreword

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

Background

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

This report was commissioned to update the national status of ground beetles using IUCN methodology for assessing threat. It covers all species of Carabidae in Great Britain, identifying those that are rare and/or under threat as well as non-threatened and non-native species.

Reviews for other invertebrate groups will follow.

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Further information
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by the Invertebrate Inter Agency Working Group.

1.1 The Species Status project

The Species Status project is a recent initiative, providing up-to-date assessments of the threat status of taxa using the internationally accepted Red List guidelines developed by the International Union for Conservation of Nature (IUCN) (IUCN, 2012a; 2012b; IUCN Standards and Petitions Subcommittee, 2013, 2014). It is the successor to the JNCC's Species Status Assessment project (http://jncc.defra.gov.uk/page-3352) which ended in 2008. This publication is one in a series of reviews to be produced under the auspices of the new project.

Under the Species Status project, the UK's statutory nature conservation agencies, specialist societies and NGOs will initiate, resource and publish Red Lists and other status reviews of selected taxonomic groups for Great Britain which will then be submitted to JNCC for accreditation (http://jncc.defra.gov.uk/page-1773). All publications will explain the rationale for the assessments made. The approved threat statuses will be entered into the JNCC database of species conservation designations (http://jncc.defra.gov.uk/page-3408) and will be published by the agencies or by JNCC.

1.2 The status assessments

This review adopts the procedures recommended for the regional application of the IUCN threat assessment guidelines (http://www.iucnredlist.org/technical-documents/red-list-documents). Section 3 and Appendix 1 provide further details. This is a two-step process, the first identifying the taxa threatened in the region of interest using information on the status of the taxa of interest in that region (IUCN, 2001), the second amending the assessments where necessary to take into account interaction with populations of the taxon in neighbouring regions (IUCN Standards and Petitions Subcommittee, 2013). In addition, but as a separate exercise, the standard GB system of assessing rarity, based solely on distribution, is used alongside the IUCN system.

1.3 Species status and conservation action

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

2 Introduction

This Species Status Review covers the beetles (Coleoptera) of the family Carabidae, also known as ground beetles or carabids. The review will assess each species and assign conservation statuses using (i) IUCN Red List categories (IUCN, 2012b) and (ii) GB Rarity Status categories. Infra-specific taxa will not be assessed; the subspecies concept is little used by British coleopterists and most species are monotypic within Britain, though there are a few carabids species which occur here as two recognisable subspecies. Beetle names used in this review follow Duff's (2012a) *Checklist of beetles of the British Isles*, except where stated.

2.1 GEOGRAPHICAL COVERAGE

Geographically, the review covers Great Britain, comprising England, Scotland and Wales. The Isle of Man has also been included. Northern Ireland and the Republic of Ireland are not included although for most British coleopterists, their sphere of interest covers the biogeographical unit of Britain and Ireland. The Channel Islands are also not included.

2.2 NATIVES AND NON-NATIVES

A native species is one which has arrived in Britain by natural means. Non-native species are thus those which have arrived in Britain exclusively by artificial means. The distinction is important to this review, as the resources for conserving carabid beetles, as for any other British wildlife, should be targeted at native species only.

The British beetle checklist (Duff, 2012a) makes no distinction between native and non-native species in the main list of "Extant or recently extinct native or naturalised species". Non-natives which have occurred in Britain without breeding are relegated to an appendix entitled "Non-established introductions". A further appendix lists "Species found as fossils in Quaternary sediments" but which have not been recorded as native in historic times; these species have not been included in this review.

Prior to this review, there had been no rigorous analysis of the British carabid fauna to determine which species are native and which non-native, so this formed part of the preparatory work for this review.

The following definition has been used to determine which species are native:

Species which are definitely or probably native components of the British fauna in recent history (beginning with Thomas Marsham's (1802) book "*Entomologia Britannica, sistens Insecta Britanniae indigena secundum Linneum deposita. Coleoptera*."). This includes species thought to be extinct as well as extant species. Also included are species which are believed to have occurred in Britain only as natural immigrants, i.e. reaching these shores alive probably as a result of natural dispersal by flight or drifting.

For the majority of species, the decision between native and non-native is straightforward. However, there are difficult cases, and these fall into four groups.

1. Long-established aliens can be very difficult to distinguish from natives. In recent years, British botanists have drawn a distinction between 'archaeophytes' (long-established aliens naturalised before 1500) and 'neophytes' (more recently arrived aliens). Many plants traditionally regarded as native (often 'weed' species) are now regarded as archaeophytes. A similar process could and should be carried out for the British beetle

fauna but the evidence would need to be assembled: when was the species first collected in Britain and has the species been identified from fossil remains in Quaternary sediments? It should be noted that the list of 'native' species included in this review is likely to include a number of 'archaeocoleopterans'.

2. For the majority of carabids, the English Channel probably presents an impassable barrier to dispersal. Thus natural colonisation from France into south-east England is probably a very rare event. Or at least that has been the conventional opinion held by most coleopterists on the subject; vertical-looking radar studies have now shown that there can be millions of insects airborne in British skies, at heights of several hundred metres, travelling tens or even hundreds of kilometres (Chapman *et al*., 2003). Carabid beetles form a component of this aerial biomass (Chapman *et al*., 2005). So, although it is usual to regard newly-arrived beetles as non-natives, this is not necessarily always the case. Species first detected on or near the south-east coast, rather than in urban areas or near ports, are more likely to be natural immigrants than artificial importations.
3. Extinction is a trait that tends to be associated with non-native species; though they may be able to establish temporarily in the wild in Britain, they are not well-adapted to conditions here and eventually become extinct. Distinguishing between extinct natives and extinct non-natives is especially problematic, particularly as the data associated with early beetle records is often very scant and unreliable by modern standards. In this review, the rationale for each decision has been outlined on a case-by-case basis. This includes the decision to treat *Carabus convexus* (listed as a non-established introduction by Duff (2012)) as an extinct native, a decision treated in more detail by Telfer and Hogan (in prep.).
4. A species may occur in Britain both as native and non-native populations. The Streaked Bombardier Beetle *Brachinus sclopeta* may belong in this category, having been recorded from several localities as an apparent native prior to 1830 and in 1928 but with populations in and around London's docklands, first detected in 2005, regarded by some authorities as non-native.

For this review, species have been assigned to one of four categories: Non-native, Probable Non-native, Probable Native or Native. For Probable Non-native and Probable Native species, an explanation is provided for the categorisation in the data spreadsheet and, where appropriate, in the species account.

2.3 PREVIOUS REVIEWS

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

The first published account of threatened British Coleoptera was included in the *British Red Data Books: 2. Insects* (Shirt, 1987). This listed 546 beetle species, amounting to 14.0% of the total British fauna then known (c. 3,900 species). 40 species of carabid beetle were included and their categorisation is shown in

Table 1

Table 1: The numbers of carabids allocated to each status category by Shirt (1987).

Status category	**Number of carabid species**
Category 1: Endangered	18 (including three "believed to be extinct")

Category 2: Vulnerable	5
Category 3: Rare	13 (including one also included in Category 5: Endemic)
Category 5: Endemic	1 (also included in Category 3 Rare)
Appendix: No post-1900 records	4

The species regarded as endemic in Shirt (1987), *Tachys edmondsi* Moore, 1956, was synonymised with a continental taxon by Coulon (2004) and is now correctly known as *T. obtusiusculus* (Jeannel, 1941). There are no longer any carabid species regarded as endemic to Britain.

2.3.2 A review of the scarce and threatened Coleoptera of Great Britain (1992 & 1994)

The publication of *A review of the scarce and threatened Coleoptera of Great Britain, part 1* (Hyman and Parsons, 1992) updated Shirt's (1987) Red Data Book for carabids and extended coverage to "Nationally Notable" species. The standard term "Nationally Scarce" is now preferred to the original. Nationally Scarce status was assigned to carabid species thought to occur in no more than 100 hectads[1] of the British national grid but not assigned to any of the RDB status categories. *A review of the scarce and threatened Coleoptera of Great Britain, part 2* (Hyman and Parsons, 1994) reviewed the remaining beetle families not covered by Part 1 but excluding the water beetles. The addenda and corrigenda to Part 2, includes information on 13 carabid species but made no changes to the statuses of any of them.

175 carabid species were covered by Hyman and Parsons (1992) and their categorisation is shown in Table 2.

Table 2: The numbers of carabids allocated to each status category by Hyman and Parsons (1992, 1994).

Status category	**Number of carabid species**
Extinct	6
Endangered	26
Vulnerable	4
Rare	16
Indeterminate	2
Insufficiently Known	1
Nationally Scarce (Na)	41
Nationally Scarce (Nb)	79

2.4 THE NEED FOR A NEW REVIEW

Over 20 years have passed since the publication of Hyman and Parsons (1992) and in that time there have been numerous changes which have made the conservation statuses

[1] a *hectad* is a 10 × 10 km grid square of the British national grid, often also called a 10-km square.

increasingly out of date and difficult to apply. Increasingly they have fallen out of use, and it is noteworthy in this respect that in neither of the two recent keys to British carabids (Luff (2007) and Duff (2012b)) are the Hyman and Parsons (1992) statuses given; both authors preferring to make their own statements on the commonness or rarity of each species.

Perhaps the most striking change since Hyman and Parsons (1992) has been the number of species which have either expanded their range and become commoner, or contracted and become rarer. For many species, these patterns of range change were revealed for the first time by the maps in the *Provisional atlas of the ground beetles of Britain* (Luff, 1998). Also, several species have been added to the British list since Hyman and Parsons (1992) and there has been one split (*Calathus melanocephalus* (Linnaeus, 1758) and *C. cinctus* Motschulsky, 1850 (Anderson and Luff, 1994)) meaning there are several species which have not previously had their British conservation status assessed. In some cases, new information has come to light which affects whether a species is judged to be native or non-native, extinct or extant, a natural immigrant or an importation, all of which are relevant to the assessment of conservation status. For a few rare species, a revised understanding of the identification criteria has led to a purge of records and a significant reassessment of conservation status.

The Hyman and Parsons (1992, 1994) reviews only mentioned those species which were allocated to a conservation status category (Table 2). In retrospect this was an oversight, as users of the reviews have been unable to determine whether omitted species had been (a) treated as native British species not meeting the RDB or Nationally Scarce criteria, (b) treated as non-native British species for which the review process was not applicable, or (c) not regarded as valid British species. The IUCN (2012b) categories include the “Least Concern”, “Not Evaluated” and ”Not Applicable” categories which will prevent further confusion in this area.

Finally, a new review was needed to apply the new IUCN categories and criteria, as described in the following section.

3 IUCN categories and criteria

3.1 SUMMARY OF THE 2001 THREAT CATEGORIES

A brief outline of the revised IUCN criteria and their application is given below. For a full explanation, see IUCN (2001), IUCN (2012a), IUCN Standards and Petitions Subcommittee (2013, 2014) and the IUCN web sites (http://www.iucnredlist.org/; www.iucn.org/). The definitions of the categories are given in Table 3 and the hierarchical relationships of the categories in Figure 1 (see also Appendix 1). The category *Extinct in the Wild* is not applicable to any British carabid and has not been applied in this review. All categories refer to the status in Great Britain (not globally).

Table 3: Definitions of IUCN threat categories (from IUCN (2001) with a more specific definition for regional extinction). Note that not Critically Endangered (Possibly Extinct) is not a separate category; Possibly Extinct is a "tag" that may be applied to species in the Critically Endangered category.

REGIONALLY EXTINCT (RE)
A taxon is Regionally Extinct when there is no reasonable doubt that the last individual in the region has died.

CRITICALLY ENDANGERED (POSSIBLY EXTINCT) (CR(PE))
A taxon is Critically Endangered (Possibly Extinct) when the best available evidence indicates that it is extinct in Britain but where there is a small chance that they may be extant.

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 1).

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 1).

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 1).

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 APPLICABLE (NA)
A taxon is Not Applicable when it is regarded as a non-native in Britain, or occurs solely as a natural vagrant.

NOT EVALUATED (NE)
A taxon is Not Evaluated when it is has not yet been evaluated against the criteria. (NB: this review evaluates all species of British carabid so this category has not been used).

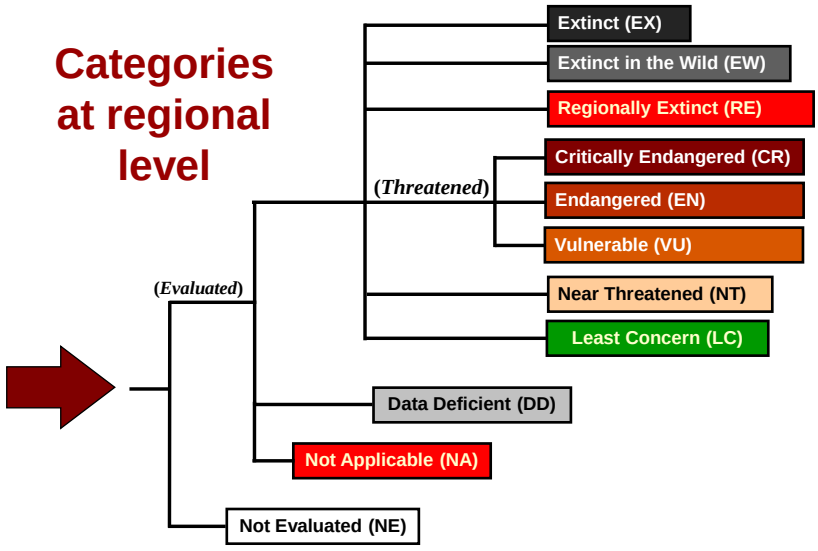

Figure 1: Hierarchical relationships of the categories. The Figure has been adapted from IUCN (2001).

Taxa listed as *Critically Endangered*, *Endangered* or *Vulnerable* are defined as Threatened (Red List) species. For each of these threat categories there is a set of five main criteria A-E, with a number of sub-criteria within A, B and C (and an additional sub-criterion in D for the *Vulnerable* category), any one of which qualifies a taxon for listing at that level of threat. The qualifying thresholds within the criteria A-E differ between threat categories and are summarised in Appendix 1.

3.2 NEAR THREATENED

IUCN (2001) recognised the value of a Near Threatened category to identify species that need to be kept under review to ensure that they have not become vulnerable to extinction. This category is used for species which have been evaluated against the criteria but do not qualify for a threatened category, although they may be close to qualifying or likely to qualify in the near future.

4 GB Rarity Status categories and criteria

At the national level, countries are permitted 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 Shirt (1987) and Hyman and Parsons (1992; 1994), namely: Endangered (RDB1), Vulnerable (RDB2), Rare (RDB3), Indeterminate (RDBi), Insufficiently Known (RDBK) and Extinct (RDB Appendix). 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 by Hyman and Parsons (1992; 1994).

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

Nationally Rare	Native carabid species which have not been recorded from more than 15 British hectads since 31st December 1979 and where there is reasonable confidence that exhaustive recording would not find them in more than 15 hectads. This category includes species which are probably extinct.
Nationally Scarce	Native carabid species which are not regarded as Nationally Rare AND which have not been recorded from more than 100 British hectads since 31st December 1979 and where there is reasonable confidence that exhaustive recording would not find them in more than 100 hectads.
None	Native carabid species which are not regarded as Nationally Rare or Nationally Scarce AND non-native carabid species.

The choice of 1980 as the start of the modern recording period for carabids is discussed in Section 5.3.

5 Methods and sources of information

The conservation statuses of all native and probably native British carabids were assessed by the author using the IUCN categories and criteria and the GB Rarity Status categories and criteria. Non-native and probably non-native species have been allocated to the Not Applicable (NA) category, following the guidance in IUCN (2012) *Guidelines for application of IUCN Red List criteria at regional and national levels*: "A taxon may be NA because it is not a wild population or not within its natural range in the region, or because it is a vagrant to the region".

The main sources of information used are detailed in Section 5.1. Throughout the process, specialist advice was sought as appropriate from a wide range of coleopterists and conservation professionals (see Acknowledgements).

The review is based on information available up to 18th April 2014. No attempt has been made to update the review to take into account additional information, such as newly discovered localities, received after this date.

5.1 SOURCES OF INFORMATION

The main source of data for this project was the Ground Beetle Recording Scheme. The Environmental Change Network dataset is also discussed. Additional records were available via the National Biodiversity Network (NBN) Gateway but very limited use was made of these datasets which frequently have not been made by or verified by an experienced carabid recorder.

5.1.1 The Ground Beetle Recording Scheme

The Ground Beetle Recording Scheme (GBRS) was started in 1971 by Martin Luff. Its primary aim from the outset was to collect and collate information on the distribution of carabid beetles in Britain since 1900, with the intention of mapping the distributions of all species at hectad resolution. This aim was achieved with the publication of Martin Luff's *Provisional atlas of the ground beetles (Coleoptera, Carabidae) of Britain* in 1998.

Later in 1998, the current author took over the role of GBRS Organiser from Martin Luff and inherited a database of a little over 140,000 records. The aims of the scheme have evolved to meet the needs and interests of modern biological recording. In addition to mapping distributions at hectad resolution, the GBRS also aims:

- To record distribution information at fine scale (up to 10 × 10 m) where possible;
- To record distributions afresh on at least an annual basis so as to track changing distributions over time; and
- To collect and collate records with full dates to allow increased understanding of the adult activity periods and life-cycles of British carabids.

The GBRS dataset is largely the result of *ad hoc* voluntary recording by coleopterists. Very few records have been collected specifically for the GBRS and there have been few efforts to fill blank squares on the map. The GBRS has passively received the records which coleopterists have generated in the pursuit of their interests, rather than actively encouraging recorders to target certain species or areas. Perhaps the most important effect the GBRS has had on carabid recording is to encourage recorders to generate full lists for all their fieldwork, recording not just the rarities but all the commoner species too.

Over time the detail included in GBRS records has improved. Earlier recording activities were focussed on producing maps at hectad resolution and some records were submitted with the barest minimum of information: a species name, a hectad grid reference and a date period which may have been as wide as “pre-1970” or “post-1969”. Even if a record was submitted with a more precise locality and an exact date, recorders may not have bothered to submit any subsequent records from the locality or from any other localities in the same hectad, considering these to be unnecessary duplication. Recorders in more recent years are more likely to submit records with more precise grid references, exact dates, and to submit numerous records of a species for the same locality.

It is important to be aware of the behaviour of recorders and the ways in which this has changed over time as this imposes some constraints on the analysis of the data.

For much of the period since 1998, the GBRS has taken a passive approach to collating records: welcoming any records received but rarely seeking or requesting records. Despite this, the GBRS database has more than doubled in size with over 200,000 additional records since 1998. Even with extensive assistance from the Biological Records Centre (BRC), the flow of records has frequently exceeded the scheme organiser’s capacity to collate, validate and verify incoming records. Validating and verifying records has been a major component of this status assessment project.

The initial aim of the GBRS was to map distributions since 1900. In later years, the scope has been expanded to include all carabid records from the historic period. The task of extracting earlier records from published sources and from museum collections is enormous and effort has generally been targeted at the most important early records: records of rare species or records from exceptional localities.

The geographical coverage of the GBRS is nominally the whole of Britain but in common with all biological recording activity, recording has been more intense in areas with denser populations of coleopterists; northern, western and upland Britain tend to be less thoroughly surveyed than lowland southern and eastern Britain.

Taxonomic biases also exist within the GBRS dataset such that larger, more readily identified, and more easily found species are better represented in the dataset than smaller species, difficult-to-identify species and elusive species.

The records have been fully validated by BRC and GBRS and verified by the author but a small proportion of errors will inevitably remain. For the purposes of this review, verification decisions have had to be made for many records of rare species. Verification categorises records as either acceptable, dubious or definitely erroneous using all available information and the judgement of the author.

For all the biases within the GBRS dataset and the consequent difficulties of analysing and interpreting the data, this is still a very important dataset and unquestionably the best and only dataset available with which to re-assess the conservation statuses of all British carabids.

5.1.2 The UK Environmental Change Network

The UK Environmental Change Network (ECN) began monitoring carabid beetles in 1993 using a standardised pitfall-trapping protocol which by 1999 was being replicated across twelve sites (Brooks *et al*., 2012). The ECN sites cover a wide area of the UK and encompass

a wide range of habitats and local climates. At each monitoring site, three transects were sampled, each consisting of ten pitfall traps placed at 10 m intervals. Samples were collected continuously from the beginning of May until early November in each year, synchronized across all sites.

Brooks *et al*. (2012) analysed the population trends of those species of carabids which were sufficiently well-represented in the ECN samples, using data for 1994 - 2008 for nine sites and for 1999 - 2008 for a further two sites. Overall trends were calculated for 68 species in total. Declines in population size of more than 30% were found for 26 carabid species, averaged over 10-year periods. For eight of these species, the decline was greater than 50%. Brooks *et al*. (2012) recognised that these figures could be evidence for threatened conservation status under IUCN criteria, "if representative of any wider trends outside the ECN".

Such monitoring and trend analysis will be essential to detect serious declines and fluctuations in widespread British carabids and to trigger conservation action. However, at present the coverage of the ECN is judged to be too narrow, and the time-series too short, to be able to reliably distinguish between localised population changes on the monitoring sites and nationwide trends.

5.2 EXTINCTION

Hyman and Parsons (1992, 1994) defined Extinct species as those which "have not been recorded since 1900". Certainly, with the passage of time the chances of a species being recorded again dwindle. But of the six carabids classified as Extinct by Hyman and Parsons (1992), two are now extant in Britain again (*Bembidion octomaculatum* and *Diachromus germanus*), and there are several other examples of carabids being rediscovered after periods of a few decades with no British records.

Where there is no reasonable doubt that the last individual in Britain has died, the Regionally Extinct (RE) status has been applied. IUCN Standards and Petitions Subcommittee (2014) states: "Listing of a species as Extinct requires that exhaustive surveys have been undertaken in all known or likely habitat throughout its historic range, at appropriate times (diurnal, seasonal, annual) and over a timeframe appropriate to its life cycle and life form". In this review, the Regionally Extinct status has been applied conservatively, to species with no British record in over 100 years and with no reasonable chance of surviving undetected to the present day.

The Critically Endangered (Possibly Extinct) CR(PE) status has been used more frequently than Regionally Extinct in this review. For those carabids given CR(PE) status, the year of last record falls between 1886 and 1973 and all are probably extinct. However, few have been the subject of much, if any, targeted survey since they were last recorded and a small but realistic chance remains that they survive undetected somewhere in Britain. In contrast to the Regionally Extinct species, the expenditure of effort on targeted survey for any of the CR(PE) species is recommended.

As the IUCN Guidelines point out, Critically Endangered (Possibly Extinct) is not a new status category, but Possibly Extinct is a tag that may be appended to species in the Critically Endangered category.

5.3 DATE CLASSES

A cut-off date of 1980 has been used to define modern and older records, specifically, modern ('post-1980') records are those made after 31st December 1979, and older ('pre-1980') records are those made before 1st January 1980. This date was chosen to divide the number of records of rarer carabids in the GBRS dataset (those with records from no more than 100 hectads in all years combined) into two nearly equal parts.

5.4 APPLICATION OF IUCN CRITERIA

5.4.1 Criterion A (population size reduction)

Criterion A (population size reduction) has not been used in this review.

The trends in population size from ECN data (Brooks *et al*., 2012) have been judged not to be reliably representative of nationwide trends for the purposes of this status assessment. However, with a longer run of data and, more especially, with data from a greater number of sites, the ECN dataset offers the potential to apply criterion A (population size reduction) to British carabids.

Analytical techniques for estimating absolute change in range size, while still correcting for the problematic biases in recording scheme data, are being evaluated and tested on GBRS data by Nick Isaac and colleagues at the Biological Records Centre, and could provide a practical means of quantifying carabid declines for future reviews.

5.4.2 Criterion B (Geographic range)

Criterion B allows for the estimation of geographic range in the form of either Extent of Occurrence (EOO) or Area of Occupancy (AOO).

Area of Occupancy (AOO)

Data on the distributions of British carabids has been collated by the national Ground Beetle Recording Scheme (GBRS) which from the outset aimed to map the occurrence of species in Britain at hectad resolution. GBRS data can thus be used to count the number of recorded hectads for each species for any time period. The most straightforward way to estimate the Area of Occupancy (AOO) of a species from the GBRS dataset would thus be to use the count of hectads. However, IUCN Standards and Petitions Subcommittee (2014) "recommend a scale of 4 km^2 cells [i.e. a single tetrad] as the reference scale" and the thresholds used to determine CR, EN or VU statuses reflect this scale.

For this review, it has been assumed, following guidance from IAWG, that invertebrates occupy on average 4 km^2 of each hectad from which they have been recorded. In most cases, each hectad represents a distinct location, in the IUCN sense of the term (IUCN Standards and Petitions Subcommittee, 2014); exceptions are discussed in the individual species accounts (Section 7). For the most widespread, abundant and habitat-generalist British species, this will be a less good assumption; some of them may be capable of occupying the majority of land within a hectad, up to 100 km^2. But for the rarer and more habitat-specialist species which are of most concern to the reviews, the assumption is more likely to be accurate. For some of the rarest species which are known to be restricted to specialised habitat, it may be possible to make more accurate estimates of AOO without recourse to this assumption.

Extent of Occurrence (EOO)

Extent of occurrence is much more difficult to calculate from GBRS data, even using the simplest approach of calculating the area of the minimum convex non-marine polygon containing all recorded grid squares. More importantly, it is considered that EOO will always be a poorer estimate of geographical range size than AOO for the rarer species of carabid which tend to have genuinely patchy distributions. Thus criterion B1 (geographic range in the form of EOO) has not been used in this review.

Continuing decline in AOO

Telfer *et al*. (2002) discussed the challenges of estimating change in AOO from recording scheme datasets. A "Change Index" was calculated from GBRS data, being an index of relative change in range size between 1900 - 1969 and 1970 - 1998. The Change Index was calculated for all carabid species except those occurring in four or fewer hectads in the early period, and a few which had been the subject of taxonomic splits.

It is important in the present context to note that the Change Index for each species is a relative measure: an index of its change in range size relative to the average trend for all carabid species. If the average trend across all carabids is for stable range size, then a Change Index of zero corresponds to a stable range size, a negative Change Index corresponds to a decline and a positive Change index corresponds to an increase in range size. However, it is possible that the average trend across all carabids is a decline, as suggested by the work of Brooks *et al*. (2012), or that the average trend is an increasing one, as suggested by preliminary analyses carried out at BRC (Nick Isaac, pers. comm., Jan. 2014).

For this review, it has been assumed that all carabids with a Change Index of less than -0.25 are in continuing decline. This is a somewhat arbitrary but highly conservative figure, by which 110 species of carabid out of the 300 for which a Change Index is available (36.7%) are considered to be declining.

For the 69 species of, mostly rare, carabid for which a Change Index was not available, a simple measure of change in AOO was used, referred to here as Raw Change. This was calculated as $(a-b)/a$ where a = number of recorded hectads from the pre-1980 period and b = number of recorded hectads from the post-1980 period, and expressed as a percentage.

Both the Change Index and the Raw Change percentage have been used with a degree of flexibility, rather than being applied as rigid determinants of continuing decline. Raw Change is a simple measure of change that is subject to several potential biases and was used with particular caution. The limitations of the Change Index are discussed by Telfer *et al*. (2002) but in this context the main issue is with species that have been recorded more efficiently in one time period than the other. For example, a rare species that has been the subject of thorough, targeted survey work in recent years (a scenario that applies to several BAP species) may appear to have increased according to the Change Index and Raw Change; expert judgement must be used to discount the effects of extra survey effort in the later period.

Extreme fluctuations in AOO

The GBRS dataset does not generally provide sufficient spatial and temporal resolution to detect extreme fluctuations in AOO. Consequently, criterion B2c (extreme fluctuations in AOO, etc.) has generally not been applicable for the purposes of this review, with a few exceptions.

The ECN network could be an increasingly important source of data on fluctuations in AOO for future reviews.

5.4.3 Criterion C (Small population size and decline)

Population size estimates are not available for the majority of British carabids. As a result, criterion C (small population size and decline) could not be used for the purposes of this review.

5.4.4 Criterion D (Very small or restricted population)

For the vast majority of British carabids the number of mature individuals is not known and cannot be estimated with reasonable confidence. The only exceptions were species which are probably extinct in Britain where a population size estimate of zero individuals can be made with reasonable confidence. These probably extinct species were thus categorised using criterion D (very small or restricted population) as Critically Endangered (< 50 mature individuals) and given the Possibly Extinct tag (see Section 5.2).

This criterion was also used to assign Vulnerable status under criterion D2 to species with a "restricted area of occupancy (typically AOO < 20 km^2) or number of locations (typically ≤ 5) with a plausible future threat that could drive the taxon to CR or EX in a very short time". In practice, most of the species known from 5 or fewer hectads but not qualifying under criterion B (i.e., not in continuing decline) could be judged to be facing plausible future threats.

5.4.5 Criterion E (quantitative analysis)

IUCN Standards and Petitions Subcommittee (2014) states: "To qualify under the E criterion a quantitative analysis such as a Population Viability Analysis (PVA) must be conducted to determine a species' probability of extinction over a given time period. For example, Critically Endangered E, would mean that the taxon has at least a 50% probability of going extinct in the wild in the next 10 years or three generations (whichever is longer)". No such quantitative analyses have been undertaken for British carabids and this criterion could not be used for the purposes of this review.

5.4.6 A practical key for assigning IUCN statuses to British carabids

Note that the key assumes that non-native species have already been assigned to the Not Applicable (NA) category, and that Extinct and Possibly Extinct species have also already been dealt with.

1a	A single modern locality of less than 10 km^2	2
1b	2 or more modern localities OR one of > 10 km^2	4
2a	Continuing decline AND/OR extreme fluctuations	3 (CR B2)
2b	NEITHER continuing decline NOR extreme fluctuations	4
3a	Continuing decline	CR B2ab
3b	Extreme fluctuations	CR B2ac
3c	Continuing decline AND extreme fluctuations	CR B2abc
4a	1 or 2 modern localities (or more than 2 but demonstrably < 10 km^2)	5
4b	3 or more modern localities totalling > 10 km^2	6
5a	BOTH continuing decline AND extreme fluctuations	CR B2bc
5b	NO continuing decline OR NO extreme fluctuations OR NEITHER	6
6a	5 or fewer modern hectads	7
6b	6 or more modern hectads	10
7a	Continuing decline AND/OR extreme fluctuations	8 (EN B2)
7b	NEITHER continuing decline NOR extreme fluctuations	9
8a	Continuing decline	EN B2ab
8b	Extreme fluctuations	EN B2ac
8c	Continuing decline AND extreme fluctuations	EN B2abc
9a	Plausible threat	VU D2
9b	No plausible threat	10
10a	125 or fewer modern hectads AND continuing decline AND extreme fluctuations	EN B2bc
10b	126 or more modern hectads OR no continuing decline OR no extreme fluctuations	11
11a	10 or fewer modern hectads	12
11b	11 or more modern hectads	13
12a	Continuing decline	VU B2ab
12b	Extreme fluctuations	VU B2ac
12c	NEITHER continuing decline NOR extreme fluctuations	13
13a	500 or fewer modern hectads AND continuing decline AND extreme fluctuations	VU B2bc
13b	501 or more modern hectads OR no continuing decline OR no extreme fluctuations	14
14a	Nearly or possibly assignable to one of the end groups above	NT
14b	Clearly not assignable to one of the end groups above	LC

For species which are not subject to extreme fluctuations, the following much simpler key may be used:

1a	Continuing decline	2
1b	NO continuing decline	4
2a	A single modern locality of less than 10 km^2	CR B2ab
2b	2 or more modern localities OR one of > 10 km^2	3
3a	5 or fewer modern hectads	EN B2ab
3b	6 - 10 modern hectads	VU B2ab
3c	11 or more modern hectads	5
4a	5 or fewer modern hectads AND plausible threat	VU D2
4b	6 or more modern hectads OR NO plausible threat	5
5a	Nearly or possibly assignable to one of the end groups above	NT
5b	Clearly not assignable to one of the end groups above	LC

Both keys make the simplifying assumption that none of the species under consideration has a "severely fragmented" AOO.

5.5 NEAR THREATENED (NT) AND THE AMBER LIST

After allocating NA, RE, CR(PE), CR, EN, VU and DD statuses, 299 species of carabid remained to be allocated to either LC or NT.

The guidelines for applying the Near Threatened category (IUCN Standards and Petitions Subcommittee, 2013) emphasise that a NT species should be close to meeting the criteria for Vulnerable status. Rather than give a formal definition, the recommended use of NT is demonstrated through numerous examples. Guided by those examples, British carabids are here regarded as Near Threatened where:

1. *The taxon meets the area requirements under criterion B for threatened (EOO < 20,000 km^2 and/or AOO < 2,000 km^2) and probably does not occur in more than 10 modern hectads (B2a), but is not declining, and cannot be certainly said to be undergoing extreme fluctuations.*
2. *The taxon meets the area requirements under criterion B for threatened (EOO < 20,000 km^2 and/or AOO < 2,000 km^2) and is declining (B2b ii), and probably occurs in 11 or 12 modern hectads (near B2a), but cannot be certainly said to be severely fragmented and/or undergoing extreme fluctuations.*
3. *The taxon meets the area requirements under criterion B for threatened (EOO < 20,000 km^2 and/or AOO < 2,000 km^2) and is declining (B2b ii), and probably occurs in 13, 14 or 15 modern hectads (near B2a), and can be shown to be vulnerable to a specific and realistic threat, but cannot be certainly said to be severely fragmented and/or undergoing extreme fluctuations.*

5.5.1 Meeting the area requirements

Of the 299 species assessed for LC or NT, 267 (89%) have been recorded from 500 or fewer hectads in the post-1980 period, thus potentially meeting the area requirement under criterion B2 for an AOO of < 2,000 km^2.

In practice, the largest modern hectad count which was regarded as providing evidence of an AOO of less than 2,000 km^2 was 213 for *Amara apricaria*. *A. apricaria* would only fail to meet the area requirement if it (i) occupied more than 9.4 km^2 per hectad on average, or (ii) occupied 4 km^2 per hectad on average but was under-recorded to the extent that it actually occurred in 500 hectads. Both eventualities are considered to be unlikely and thus *A. apricaria* is here regarded as meeting the area requirement under criterion B2 for Vulnerable. All the carabids with larger modern hectad counts, up to a count of 500, are regarded as probably or possibly meeting the area requirement under criterion B2. This is an appropriately conservative evaluation of the evidence, allowing for the possibility that species may occupy more than 4 km^2 per hectad on average, or that their modern hectads may be under-counted by as much as 57%.

Of the 267 species, 202 were regarded as meeting the area requirement.

5.5.2 Occurring in 10 or fewer hectads

Of the 202 species meeting the area requirement, 25 species have records from 10 or fewer modern hectads but are not declining. However, 7 of these species are regarded as probably occurring in more than 10 modern hectads, either because they are (i) expanding species for which the lag in recording time has yet to catch up with their true range, (ii) species associated with particularly under-recorded habitats and thus likely to occur in more hectads, or (iii) species occurring in particularly under-recorded parts of Britain and thus likely to occupy more hectads.

The remaining 18 species meet the criteria for Near Threatened in definition 1 above.

5.5.3 Continuing decline

Of the remaining 177 species, 64 are regarded as species in continuing decline (B2b) based on the criteria detailed in Section 5.4.2.

Of these 64 species, 16 probably occur in between 11 and 15 modern hectads (inclusive) and are thus near to the number of locations threshold (≤ 10 locations) for Vulnerable under B2a. All 16 meet the criteria for Near Threatened in either definition 2 or definition 3 above.

5.5.4 Severe fragmentation and extreme fluctuations

48 species remain (Table 4) which all meet the area requirements for threatened status under B2 using an appropriately conservative evaluation of the evidence, and which are all undergoing continuing decline. They range from scarce species such as *Anisodactylus poeciloides* recorded from 16 modern hectads to more widespread species such as *Amara apricaria* recorded from 213 modern hectads.

If any of these 48 species could be shown, with a reasonable degree of certainty, to occupy a severely fragmented range and/or to be undergoing extreme fluctuations, they would be assigned to a Threatened category under criterion B.

The assessment of these 48 species was the most contentious issue in the preparation of this review and the differing opinions were debated at considerable length. This section

attempts to provide a brief summary of the debate. Firstly, the definitions of "severely fragmented" and of "extreme fluctuations" are essential to understanding the debate.

Severely fragmented

IUCN Standards and Petitions Subcommittee (2013) gives the following definition: "*The phrase 'severely fragmented' refers to the situation in which increased extinction risks to the taxon results from the fact that most of its individuals are found in small and relatively isolated subpopulations (in certain circumstances this may be inferred from habitat information). These small subpopulations may go extinct, with a reduced probability of recolonization.*"

This definition could be taken to mean that any carabid which is restricted by ecological specialisation to habitats which occur in small and relatively isolated patches is severely fragmented. However, the guidelines further elaborate that "small" means "smaller than would be required to support a viable population" and that "isolated" means "isolated by distances several times greater than the (long-term) average dispersal distance of the taxon".

Extreme fluctuations

IUCN Standards and Petitions Subcommittee (2013) gives the following definition: "*Extreme fluctuations can be said to occur in a number of taxa where population size or distribution area varies widely, rapidly and frequently, typically with a variation greater than one order of magnitude (i.e., a tenfold increase or decrease).*"

Extreme fluctuations in this sense are most likely to be shown by carabids which are restricted by ecological specialisation to ephemeral (i.e., short-lived) habitat patches where ecological succession renders a patch unsuitable within a few years. A clear example is provided by *Sericoda quadripunctata* which inhabits burnt ground and is reported to remain on a site for no more than two years after burning (Larochelle and Larivière, 2003).

For the 48 species under consideration, and indeed for most British carabids, data are not available for the relationship between size of habitat patches and population viability nor for the long-term average dispersal distance of the species. Nor are numerical, time-series data available with which to estimate the magnitude or frequency of variation in population size or distribution area.

Thus there was agreement that evidence did not exist to confidently show any of the 48 species to be occupying a severely fragmented range nor to be undergoing extreme fluctuations. There was also agreement that if appropriate data were to have been gathered on fragmentation and fluctuations, some of the species could meet the criteria for Threatened or Near Threatened status.

Some were of the opinion that, in view of the lack of firm evidence for severe fragmentation and extreme fluctuation, all 48 species should be regarded as LC. The option of using the Data Deficient category was discussed but did not find favour as these species are no more nor less deficient in data than most other carabids.

The author's favoured option was (i) to regard those species which are known to be specialists of habitats that occur in discrete patches, which are usually geographically small and isolated as being *probably* severely fragmented; and (ii) to regard any species which depends on early-successional habitats that may remain suitable in any one location for only

a few generations, as *probably* undergoing extreme fluctuations, then (iii) to regard any of the 48 species which are probably severely fragmented and/or probably undergoing extreme fluctuations as Near Threatened. This approach would have seen 33 species assessed as Near Threatened (Table 4).

IAWG have favoured a compromise approach in which the same 33 species are assessed as of Least Concern but added to an "Amber List" of declining species that do not fit into the Near Threatened category. There is considerable uncertainty about what priority conservationists should attach to these species but it is clear that they should all be closely monitored and that the next status review of British carabids will need to consider these species in detail.

Table 4: The 48 declining species considered for Near Threatened. Those which have been regarded as potentially severely fragmented and/or as potentially undergoing extreme fluctuations have been added to the Amber List.

Species	**Post80 AOO**	**potentially severely fragmented**	**potentially undergoing extreme fluctuations**	**IUCN**	**Amber List**
Anisodactylus poeciloides	16	Yes		LC	Yes
Carabus clatratus	16			LC	
Calosoma inquisitor	17	Yes		LC	Yes
Licinus punctatulus	17	Yes		LC	Yes
Asaphidion pallipes	19	Yes	Yes	LC	Yes
Dyschirius impunctipennis	19	Yes	Yes	LC	Yes
Agonum sexpunctatum	20	Yes		LC	Yes
Poecilus lepidus	24	Yes	Yes	LC	Yes
Miscodera arctica	30	Yes		LC	Yes
Trechus fulvus	30	Yes		LC	Yes
Bembidion quadripustulatum	32	Yes	Yes	LC	Yes
Pterostichus longicollis	32	Yes		LC	Yes
Amara consularis	35	Yes	Yes	LC	Yes
Ophonus schaubergerianus	35	Yes	Yes	LC	Yes
Cillenus lateralis	39	Yes		LC	Yes
Ophonus azureus	41	Yes	Yes	LC	Yes
Oodes helopioides	41	Yes		LC	Yes
Bembidion pallidipenne	41	Yes	Yes	LC	Yes

Species	Post80 AOO	potentially severely fragmented	potentially undergoing extreme fluctuations	IUCN	Amber List
Bembidion maritimum	42	Yes		LC	Yes
Stenolophus teutonus	43	Yes		LC	Yes
Bembidion saxatile	44	Yes		LC	Yes
Brachinus crepitans	47	Yes		LC	Yes
Lebia chlorocephala	47	Yes		LC	Yes
Blethisa multipunctata	48	Yes		LC	Yes
Acupalpus exiguus	48	Yes		LC	Yes
Amara lucida	52	Yes	Yes	LC	Yes
Carabus nitens	53	Yes		LC	Yes
Amara fulva	62	Yes	Yes	LC	Yes
Pterostichus anthracinus	65	Yes		LC	Yes
Panagaeus bipustulatus	70	Yes		LC	Yes
Harpalus anxius	76		Yes	LC	Yes
Pterostichus macer	78			LC	
Badister sodalis	79	Yes		LC	Yes
Anthracus consputus	79			LC	
Dyschirius aeneus	85			LC	
Bembidion gilvipes	89			LC	
Laemostenus terricola	94			LC	
Chlaenius nigricornis	104			LC	
Clivina collaris	105			LC	
Pogonus chalceus	108			LC	
Carabus glabratus	113			LC	
Carabus arvensis	114			LC	
Calathus erratus	130		Yes	LC	Yes
Acupalpus meridianus	153			LC	
Microlestes maurus	155			LC	
Notiophilus rufipes	155			LC	
Broscus cephalotes	163			LC	
Amara apricaria	213		Yes	LC	Yes

5.5.5 The need for better evidence

It is to be hoped that future status assessments will be able to use better data on (i) the size and isolation of habitat patches to assess fragmentation, and (ii) the temporal variations of EOO, AOO, number of locations or number of individuals to assess fluctuations. Neither of these data requirements is currently well met by the GBRS. It is possible that data may exist within the extensive ecological literature on carabids, which, though it would not have been collected for the purpose of status assessment, may provide relevant evidence. More likely is that data will need to be collected specifically to address these evidence requirements.

6 Results

6.1 THE DATA SPREADSHEET

A major output of this Species Status Review is a spreadsheet which tabulates information for all species of British carabids as detailed in Table 5.

Table 5: Column headings and description of contents of the data spreadsheet generated by this review.

Column heading	Description of contents
taxseq	Sorting by taxseq (ascending) puts the spreadsheet into taxonomic sequence.
Species (scientific name)	The scientific name of the species, following Duff (2012).
old BRC	The 10-figure Biological Records Centre code, a database key unique to each species. Now superseded by "BRC CONCEPT".
BRC CONCEPT	The current 8-figure Biological Records Centre code, a database key unique to each species.
RECOMMENDED TVK	The current 16-figure National Biodiversity Network code, a database key unique to each species.
Conservation Status (Shirt, 1987)	The conservation status assigned by Shirt (1987). For any species not included in that book, 'None' is given.
Conservation Status (Hyman, 1992)	The conservation status assigned by Hyman and Parsons (1992). For any species not included in that review, 'None' is given.
Native or Non-native status	Non-native, Probable non-native, Probable native or Native.
Native rationale	A summary of the rationale used to assign native or non-native status.
England	Species recorded from England (including the Isle of Man) are indicated by 'E'.
Wales	Species recorded from Wales are indicated by 'W'.
Scotland	Species recorded from Scotland are indicated by 'S'.
AOO All	The Area Of Occupancy (AOO), measured as the number of recorded hectads in the GBRS database for all time. Hectads with only undated records are included in this total.

Column heading	Description of contents
Pre80 AOO	The AOO, measured as the number of recorded hectads in the GBRS database for dates preceding 1st January 1980.
Post80 AOO	The AOO, measured as the number of recorded hectads in the GBRS database for dates later than 31st December 1979.
Change Index	The Change Index was calculated from GBRS data by Telfer *et al*. (2002) and is an index of relative change in British AOO between 1900 - 1969 and 1970 - 1998.
Raw %Change	A simple measure of percentage change in AOO between the pre-1980 and post-1980 periods, calculated as (a-b)/a, where a = AOO Pre80 and b = AOO Post80.
IUCN	The IUCN status category assigned by this review, given in abbreviated form (CR, EN, VU, etc.).
IUCN Criteria	The criteria codes used to assign the IUCN status category.
IUCN Rationale	A summary of the rationale used in assessing the IUCN criteria and assigning the IUCN status category, as appropriate. For species with RE, CR(PE), CR, EN, VU and DD statuses, the entry in this column is the same as the 'Conservation status' entry in their species account.
GB Rarity	The GB Rarity Status category assigned by this review, given in abbreviated form: NR, NS or None.
GB Rarity Rationale	A summary of the rationale used in assigning the GB Rarity Status category, as appropriate.
Adult habitat	A coded entry indicating the habitat in which adults are mainly or exclusively to be found. Larval habitats can be probably be assumed to be the same, though much remains to be learnt about larvae. The codes are decoded in Appendix 2.
Name in Shirt (1987) where different	The scientific name used in Shirt (1987) where different.
Name in Hyman (1992) where different	The scientific name used in Hyman (1992) where different.

While every effort has been made to ensure the accuracy of data in columns England, Scotland, Wales, AOO All, AOO Pre80 and AOO Post80, there are inevitably errors and omissions in the information on which these data are based, which may affect the data spreadsheet.

6.1.1 Species tabulations

All species are tabulated in Appendix 3. The table is an excerpt of the data spreadsheet, ordered firstly by IUCN status category (RE, CR(PE), CR, EN, VU, DD, NT, LC, NA) and secondly by taxonomic sequence. For each species, the following information is given: Native or Non-native status, IUCN category, IUCN Criteria, GB Rarity, Conservation Status (Shirt, 1987), Conservation Status (Hyman, 1992), Name in Shirt (1987) where different, and Name in Hyman (1992) where different (see Table 5).

All species are also tabulated in Appendix 4, which contains all the same information as Appendix 3 but entirely in taxonomic sequence.

For convenience of reference, sections 6.1.2, 6.1.3, 6.1.4 and 6.1.5 present subsets of the data in Appendices 3 and 4.

6.1.2 Species listed by IUCN category

Here the Threatened, Data Deficient and Near Threatened species are listed in taxonomic order within status categories.

Regionally Extinct
Carabus convexus
Lebia marginata
Lebia scapularis
Critically Endangered (Possibly Extinct)
Dyschirius extensus
Pterostichus aterrimus
Agonum chalconotum
Harpalus cupreus
Ophonus subsinuatus
Acupalpus elegans
Chlaenius nitidulus
Critically Endangered
Sericoda quadripunctata
Agonum scitulum
Callistus lunatus
Endangered
Carabus monilis
Leistus montanus
Eurynebria complanata
Cicindela sylvatica
Dyschirius obscurus
Amara famelica
Amara nitida
Amara fusca
Amara quenseli

Harpalus melancholicus
Ophonus sabulicola
Ophonus stictus
Ophonus cordatus
Ophonus puncticollis
Bradycellus distinctus
Lebia cyanocephala
Lebia cruxminor
Philorhizus sigma
Drypta dentata
Vulnerable
Nebria livida
Cicindela hybrida
Cylindera germanica
Bembidion coeruleum
Bembidion testaceum
Bembidion humerale
Bracteon argenteolum
Tachys micros
Pogonus luridipennis
Harpalus honestus
Ophonus parallelus
Diachromus germanus
Scybalicus oblongiusculus
Panagaeus cruxmajor
Chlaenius tristis
Cymindis macularis
Data Deficient
Calosoma sycophanta
Bembidion inustum
Brachinus sclopeta
Near Threatened
Carabus intricatus
Nebria nivalis
Cicindela maritima
Elaphrus lapponicus
Dyschirius angustatus
Bembidion ephippium
Bembidion nigricorne
Bembidion virens
Bembidion fluviatile
Bembidion nigropiceum
Tachys obtusiusculus
Elaphropus walkerianus
Poecilus kugelanni
Agonum versutum
Amara strenua

Amara spreta
Amara infima
Curtonotus alpinus
Harpalus froelichii
Harpalus dimidiatus
Harpalus pumilus
Harpalus servus
Ophonus melletii
Ophonus laticollis
Anisodactylus nemorivagus
Acupalpus brunnipes
Acupalpus flavicollis
Acupalpus maculatus
Badister meridionalis
Philorhizus quadrisignatus
Philorhizus vectensis
Lionychus quadrillum
Cymindis axillaris
Polistichus connexus

6.1.3 Species listed by GB Rarity Status

Here the Nationally Rare and Nationally Scarce species are listed in taxonomic order within GB Rarity Status categories.

Nationally Rare
Omophron limbatum
Calosoma sycophanta
Carabus convexus
Carabus intricatus
Leistus montanus
Eurynebria complanata
Nebria livida
Pelophila borealis
Cicindela hybrida
Cicindela maritima
Cylindera germanica
Dyschirius angustatus
Dyschirius obscurus
Dyschirius extensus
Trechus rivularis
Thalassophilus longicornis
Bembidion semipunctatum
Bembidion virens
Bembidion coeruleum
Bembidion fluviatile
Bembidion testaceum
Bembidion inustum
Bembidion nigropiceum

Bembidion humerale
Bracteon argenteolum
Tachys obtusiusculus
Tachys micros
Elaphropus walkerianus
Pogonus luridipennis
Poecilus kugelanni
Pterostichus aterrimus
Sericoda quadripunctata
Agonum scitulum
Agonum gracilipes
Agonum chalconotum
Agonum versutum
Amara strenua
Amara famelica
Amara nitida
Amara spreta
Amara fusca
Amara infima
Amara quenseli
Curtonotus alpinus
Harpalus froelichii
Harpalus cupreus
Harpalus honestus
Harpalus melancholicus
Harpalus pumilus
Harpalus laevipes
Harpalus servus
Ophonus sabulicola
Ophonus stictus
Ophonus cordatus
Ophonus melletii
Ophonus parallelus
Ophonus puncticollis
Ophonus subsinuatus
Anisodactylus nemorivagus
Diachromus germanus
Scybalicus oblongiusculus
Bradycellus distinctus
Acupalpus brunnipes
Acupalpus elegans
Acupalpus flavicollis
Acupalpus maculatus
Badister meridionalis
Badister peltatus
Panagaeus cruxmajor
Chlaenius nitidulus

Chlaenius tristis
Callistus lunatus
Lebia cyanocephala
Lebia cruxminor
Lebia marginata
Lebia scapularis
Philorhizus quadrisignatus
Philorhizus sigma
Philorhizus vectensis
Lionychus quadrillum
Cymindis axillaris
Cymindis macularis
Drypta dentata
Brachinus sclopeta
Nationally Scarce
Calosoma inquisitor
Carabus clatratus
Carabus monilis
Carabus nitens
Nebria nivalis
Notiophilus aesthuans
Notiophilus quadripunctatus
Cicindela sylvatica
Elaphrus lapponicus
Elaphrus uliginosus
Blethisa multipunctata
Dyschirius thoracicus
Dyschirius impunctipennis
Dyschirius nitidus
Dyschirius politus
Dyschirius salinus
Miscodera arctica
Perileptus areolatus
Aepus marinus
Aepus robinii
Trechus fulvus
Trechus rubens
Blemus discus
Asaphidion flavipes
Asaphidion pallipes
Bembidion iricolor
Bembidion bipunctatum
Bembidion pallidipenne
Bembidion nigricorne
Bembidion obliquum
Bembidion ephippium
Bembidion prasinum

Bembidion geniculatum
Bembidion bualei
Bembidion lunatum
Bembidion maritimum
Bembidion monticola
Bembidion saxatile
Bembidion stephensii
Bembidion stomoides
Bembidion schuppelii
Bembidion fumigatum
Bembidion normannum
Bembidion quadripustulatum
Bembidion octomaculatum
Ocys quinquestriatus
Cillenus lateralis
Bracteon litorale
Tachys bistriatus
Tachys scutellaris
Elaphropus parvulus
Pogonus littoralis
Patrobus septentrionis
Poecilus lepidus
Pterostichus aethiops
Pterostichus longicollis
Pterostichus quadrifoveolatus
Pterostichus anthracinus
Pterostichus gracilis
Calathus ambiguus
Batenus livens
Agonum ericeti
Agonum nigrum
Agonum sexpunctatum
Zabrus tenebrioides
Amara curta
Amara lucida
Amara montivaga
Amara praetermissa
Amara consularis
Amara fulva
Amara equestris
Harpalus anxius
Harpalus attenuatus
Harpalus dimidiatus
Harpalus neglectus
Harpalus serripes
Harpalus smaragdinus
Harpalus tenebrosus

Ophonus azureus
Ophonus laticollis
Ophonus rupicola
Ophonus schaubergerianus
Anisodactylus poeciloides
Stenolophus skrimshiranus
Stenolophus teutonus
Bradycellus caucasicus
Bradycellus csikii
Dicheirotrichus obsoletus
Acupalpus exiguus
Anthracus consputus
Licinus depressus
Licinus punctatulus
Badister unipustulatus
Badister collaris
Badister dilatatus
Oodes helopioides
Panagaeus bipustulatus
Odacantha melanura
Masoreus wetterhallii
Lebia chlorocephala
Demetrias monostigma
Paradromius longiceps
Dromius angustus
Syntomus truncatellus
Cymindis vaporariorum
Polistichus connexus
Brachinus crepitans

6.1.4 Amber list species

Here the Amber List species are listed in alphabetical order.

Acupalpus exiguus
Agonum sexpunctatum
Amara apricaria
Amara consularis
Amara fulva
Amara lucida
Anisodactylus poeciloides
Asaphidion pallipes
Badister sodalis
Bembidion maritimum
Bembidion pallidipenne
Bembidion quadripustulatum
Bembidion saxatile
Blethisa multipunctata
Brachinus crepitans

Calathus erratus
Calosoma inquisitor
Carabus nitens
Cillenus lateralis
Dyschirius impunctipennis
Harpalus anxius
Lebia chlorocephala
Licinus punctatulus
Miscodera arctica
Oodes helopioides
Ophonus azureus
Ophonus schaubergerianus
Panagaeus bipustulatus
Poecilus lepidus
Pterostichus anthracinus
Pterostichus longicollis
Stenolophus teutonus
Trechus fulvus

6.1.5 Taxonomic list of Red Data Book and Nationally Scarce Species

Table 6: All the carabids which were allocated to a Red Data Book category by Shirt (1987) or to rare or scarce categories by Hyman (1992) or which have been allocated to a GB Rarity Status by this review are included in this table. The table is in taxonomic order.

Species (scientific name)	**Conservation Status (Shirt, 1987)**	**Conservation Status (Hyman, 1992)**	**IUCN Status**	**GB Rarity Status**
Omophron limbatum	RDB1	RDB1	LC	NR
Calosoma inquisitor	None	Nationally Scarce (Na)	LC	NS
Calosoma sycophanta	None	None	DD	NR
Carabus clatratus	None	Nationally Scarce (Na)	LC	NS
Carabus monilis	None	Nationally Scarce (Nb)	EN	NS
Carabus nitens	None	Nationally Scarce (Nb)	LC	NS
Carabus convexus	None	None	RE	NR
Carabus intricatus	RDB1	RDB1	NT	NR
Leistus montanus	RDB3	Nationally Scarce (Na)	EN	NR
Eurynebria complanata	None	Nationally Scarce (Na)	EN	NR
Nebria livida	None	Nationally Scarce (Na)	VU	NR
Nebria nivalis	RDB3	Nationally Scarce (Na)	NT	NS
Pelophila borealis	None	RDB3	LC	NR
Notiophilus aesthuans	None	Nationally Scarce (Nb)	LC	NS
Notiophilus quadripunctatus	None	Nationally Scarce (Nb)	LC	NS
Cicindela hybrida	RDB3	RDB2	VU	NR
Cicindela maritima	None	Nationally Scarce (Nb)	NT	NR
Cicindela sylvatica	None	Nationally Scarce (Na)	EN	NS
Cylindera germanica	RDB3	RDB3	VU	NR

Species (scientific name)	Conservation Status (Shirt, 1987)	Conservation Status (Hyman, 1992)	IUCN Status	GB Rarity Status
Elaphrus lapponicus	None	Nationally Scarce (Na)	NT	NS
Elaphrus uliginosus	None	Nationally Scarce (Nb)	LC	NS
Blethisa multipunctata	None	Nationally Scarce (Nb)	LC	NS
Dyschirius angustatus	RDB3	RDB3	NT	NR
Dyschirius obscurus	RDB1	RDB2	EN	NR
Dyschirius thoracicus	None	None	LC	NS
Dyschirius extensus	RDB3	RDB1	CR(PE)	NR
Dyschirius impunctipennis	None	Nationally Scarce (Nb)	LC	NS
Dyschirius nitidus	None	Nationally Scarce (Na)	LC	NS
Dyschirius politus	None	None	LC	NS
Dyschirius salinus	None	None	LC	NS
Miscodera arctica	None	Nationally Scarce (Nb)	LC	NS
Perileptus areolatus	None	Nationally Scarce (Na)	LC	NS
Aepus marinus	None	Nationally Scarce (Nb)	LC	NS
Aepus robinii	None	Nationally Scarce (Nb)	LC	NS
Trechus rivularis	RDB1	RDB3	LC	NR
Trechus fulvus	None	Nationally Scarce (Nb)	LC	NS
Trechus rubens	None	Nationally Scarce (Nb)	LC	NS
Trechus subnotatus	RDB1	RDB1	NA	None
Thalassophilus longicornis	None	Nationally Scarce (Na)	LC	NR
Blemus discus	None	Nationally Scarce (Nb)	LC	NS
Asaphidion flavipes	None	None	LC	NS
Asaphidion pallipes	None	Nationally Scarce (Nb)	LC	NS
Bembidion iricolor	None	None	LC	NS
Bembidion bipunctatum	None	Nationally Scarce (Nb)	LC	NS
Bembidion pallidipenne	None	Nationally Scarce (Nb)	LC	NS
Bembidion nigricorne	None	Nationally Scarce (Nb)	NT	NS
Bembidion obliquum	None	Nationally Scarce (Nb)	LC	NS
Bembidion semipunctatum	None	Nationally Scarce (Na)	LC	NR
Bembidion ephippium	None	Nationally Scarce (Na)	NT	NS
Bembidion prasinum	None	None	LC	NS
Bembidion virens	RDB1	RDB3	NT	NR
Bembidion coeruleum	None	None	VU	NR
Bembidion geniculatum	None	None	LC	NS
Bembidion bualei	None	None	LC	NS
Bembidion fluviatile	None	Nationally Scarce (Nb)	NT	NR
Bembidion lunatum	None	Nationally Scarce (Nb)	LC	NS
Bembidion maritimum	None	None	LC	NS
Bembidion monticola	None	Nationally Scarce (Nb)	LC	NS
Bembidion saxatile	None	Nationally Scarce (Nb)	LC	NS
Bembidion stephensii	None	None	LC	NS
Bembidion testaceum	None	Nationally Scarce (Nb)	VU	NR

Species (scientific name)	Conservation Status (Shirt, 1987)	Conservation Status (Hyman, 1992)	IUCN Status	GB Rarity Status
Bembidion stomoides	None	Nationally Scarce (Nb)	LC	NS
Bembidion inustum	None	None	DD	NR
Bembidion nigropiceum	None	Nationally Scarce (Na)	NT	NR
Bembidion gilvipes	None	Nationally Scarce (Nb)	LC	None
Bembidion schuppelii	None	Nationally Scarce (Na)	LC	NS
Bembidion clarkii	None	Nationally Scarce (Nb)	LC	None
Bembidion fumigatum	None	Nationally Scarce (Nb)	LC	NS
Bembidion normannum	None	None	LC	NS
Bembidion humerale	RDB1	RDB1	VU	NR
Bembidion quadripustulatum	None	Nationally Scarce (Nb)	LC	NS
Bembidion octomaculatum	RDB Appendix	Extinct	LC	NS
Ocys quinquestriatus	None	None	LC	NS
Cillenus lateralis	None	Nationally Scarce (Nb)	LC	NS
Bracteon argenteolum	None	RDBK	VU	NR
Bracteon litorale	None	Nationally Scarce (Nb)	LC	NS
Tachys bistriatus	None	Nationally Scarce (Nb)	LC	NS
Tachys obtusiusculus	RDB3 and RDB5	RDB1+Endemic	NT	NR
Tachys micros	RDB3	Nationally Scarce (Na)	VU	NR
Tachys scutellaris	RDB3	Nationally Scarce (Na)	LC	NS
Elaphropus parvulus	None	Nationally Scarce (Nb)	LC	NS
Elaphropus walkerianus	None	RDB1	NT	NR
Pogonus littoralis	None	Nationally Scarce (Nb)	LC	NS
Pogonus luridipennis	None	RDB3	VU	NR
Patrobus septentrionis	None	Nationally Scarce (Nb)	LC	NS
Poecilus kugelanni	None	RDB1	NT	NR
Poecilus lepidus	None	Nationally Scarce (Nb)	LC	NS
Pterostichus cristatus	None	Nationally Scarce (Nb)	NA	None
Pterostichus aethiops	None	Nationally Scarce (Nb)	LC	NS
Pterostichus longicollis	None	Nationally Scarce (Nb)	LC	NS
Pterostichus aterrimus	RDB1	RDB1	CR(PE)	NR
Pterostichus oblongopunctatus	None	Nationally Scarce (Nb)	LC	None
Pterostichus quadrifoveolatus	None	Nationally Scarce (Nb)	LC	NS
Pterostichus anthracinus	None	Nationally Scarce (Nb)	LC	NS
Pterostichus gracilis	None	Nationally Scarce (Nb)	LC	NS
Calathus ambiguus	None	Nationally Scarce (Nb)	LC	NS
Platyderus depressus	None	Nationally Scarce (Nb)	LC	None
Sericoda quadripunctata	None	RDB1	CR	NR
Batenus livens	None	Nationally Scarce (Nb)	LC	NS
Agonum scitulum	None	Nationally Scarce (Na)	CR	NR
Agonum ericeti	None	Nationally Scarce (Nb)	LC	NS

Species (scientific name)	Conservation Status (Shirt, 1987)	Conservation Status (Hyman, 1992)	IUCN Status	GB Rarity Status
Agonum gracilipes	None	Nationally Scarce (Na)	NA	NR
Agonum nigrum	None	Nationally Scarce (Nb)	LC	NS
Agonum chalconotum	RDB1	Extinct	CR(PE)	NR
Agonum sexpunctatum	None	Nationally Scarce (Na)	LC	NS
Agonum versutum	None	Nationally Scarce (Nb)	NT	NR
Zabrus tenebrioides	None	Nationally Scarce (Na)	LC	NS
Amara strenua	None	RDB3	NT	NR
Amara curta	None	Nationally Scarce (Nb)	LC	NS
Amara famelica	None	RDB3	EN	NR
Amara lucida	None	Nationally Scarce (Nb)	LC	NS
Amara montivaga	None	None	LC	NS
Amara nitida	None	Nationally Scarce (Na)	EN	NR
Amara spreta	None	Nationally Scarce (Nb)	NT	NR
Amara fusca	RDB2	RDB1	EN	NR
Amara infima	None	Nationally Scarce (Na)	NT	NR
Amara praetermissa	None	Nationally Scarce (Nb)	LC	NS
Amara quenseli	None	Nationally Scarce (Na)	EN	NR
Amara consularis	None	Nationally Scarce (Nb)	LC	NS
Amara fulva	None	Nationally Scarce (Nb)	LC	NS
Amara equestris	None	Nationally Scarce (Nb)	LC	NS
Curtonotus alpinus	RDB3	RDB3	NT	NR
Harpalus froelichii	None	RDB2	NT	NR
Harpalus anxius	None	None	LC	NS
Harpalus attenuatus	None	None	LC	NS
Harpalus cupreus	RDB1	RDB1	CR(PE)	NR
Harpalus dimidiatus	None	Nationally Scarce (Na)	NT	NS
Harpalus honestus	RDB1	RDB1	VU	NR
Harpalus melancholicus	None	RDB1	EN	NR
Harpalus neglectus	None	None	LC	NS
Harpalus pumilus	None	Nationally Scarce (Na)	NT	NR
Harpalus laevipes	None	Nationally Scarce (Na)	LC	NR
Harpalus serripes	None	Nationally Scarce (Nb)	LC	NS
Harpalus servus	None	Nationally Scarce (Nb)	NT	NR
Harpalus smaragdinus	None	Nationally Scarce (Nb)	LC	NS
Harpalus tenebrosus	None	Nationally Scarce (Na)	LC	NS
Ophonus ardosiacus	None	Nationally Scarce (Nb)	LC	None
Ophonus azureus	None	Nationally Scarce (Nb)	LC	NS
Ophonus sabulicola	None	RDB3	EN	NR
Ophonus stictus	None	RDB1	EN	NR
Ophonus cordatus	None	RDB3	EN	NR
Ophonus melletii	None	Nationally Scarce (Na)	NT	NR
Ophonus parallelus	None	RDB3	VU	NR

Species (scientific name)	Conservation Status (Shirt, 1987)	Conservation Status (Hyman, 1992)	IUCN Status	GB Rarity Status
Ophonus laticollis	None	Nationally Scarce (Na)	NT	NS
Ophonus puncticollis	None	RDB3	EN	NR
Ophonus rupicola	None	Nationally Scarce (Nb)	LC	NS
Ophonus schaubergerianus	None	Nationally Scarce (Nb)	LC	NS
Ophonus subsinuatus	None	None	CR(PE)	NR
Anisodactylus nemorivagus	None	Nationally Scarce (Na)	NT	NR
Anisodactylus poeciloides	None	RDB3	LC	NS
Diachromus germanus	RDB Appendix	Extinct	VU	NR
Scybalicus oblongiusculus	RDB1	None	VU	NR
Stenolophus skrimshiranus	None	Nationally Scarce (Na)	LC	NS
Stenolophus teutonus	None	Nationally Scarce (Nb)	LC	NS
Bradycellus caucasicus	None	None	LC	NS
Bradycellus csikii	RDB3	RDBi	LC	NS
Bradycellus distinctus	None	Nationally Scarce (Na)	EN	NR
Dicheirotrichus obsoletus	None	Nationally Scarce (Nb)	LC	NS
Acupalpus brunnipes	None	Nationally Scarce (Na)	NT	NR
Acupalpus elegans	RDB1	Extinct	CR(PE)	NR
Acupalpus exiguus	None	Nationally Scarce (Nb)	LC	NS
Acupalpus flavicollis	None	Nationally Scarce (Na)	NT	NR
Acupalpus maculatus	None	None	NT	NR
Anthracus consputus	None	Nationally Scarce (Nb)	LC	NS
Licinus depressus	None	Nationally Scarce (Nb)	LC	NS
Licinus punctatulus	None	Nationally Scarce (Na)	LC	NS
Badister meridionalis	None	RDBi	NT	NR
Badister unipustulatus	None	Nationally Scarce (Nb)	LC	NS
Badister collaris	None	RDB1	LC	NS
Badister dilatatus	None	Nationally Scarce (Nb)	LC	NS
Badister peltatus	None	Nationally Scarce (Na)	LC	NR
Oodes helopioides	None	Nationally Scarce (Nb)	LC	NS
Panagaeus bipustulatus	None	Nationally Scarce (Nb)	LC	NS
Panagaeus cruxmajor	RDB2	RDB1	VU	NR
Chlaenius nigricornis	None	Nationally Scarce (Nb)	LC	None
Chlaenius nitidulus	RDB1	RDB1	CR(PE)	NR
Chlaenius tristis	RDB1	RDB1	VU	NR
Callistus lunatus	RDB1	RDB1	CR	NR
Odacantha melanura	None	Nationally Scarce (Nb)	LC	NS
Masoreus wetterhallii	None	Nationally Scarce (Na)	LC	NS
Lebia chlorocephala	None	Nationally Scarce (Nb)	LC	NS
Lebia cyanocephala	None	RDB1	EN	NR
Lebia cruxminor	RDB1	RDB1	EN	NR
Lebia marginata	RDB Appendix	Extinct	RE	NR

Species (scientific name)	Conservation Status (Shirt, 1987)	Conservation Status (Hyman, 1992)	IUCN Status	GB Rarity Status
Lebia scapularis	RDB Appendix	Extinct	RE	NR
Demetrias imperialis	None	Nationally Scarce (Nb)	LC	None
Demetrias monostigma	None	Nationally Scarce (Nb)	LC	NS
Paradromius longiceps	RDB2	Nationally Scarce (Na)	LC	NS
Dromius angustus	None	None	LC	NS
Philorhizus quadrisignatus	RDB3	RDB1	NT	NR
Philorhizus sigma	RDB2	Nationally Scarce (Na)	EN	NR
Philorhizus vectensis	None	RDB3	NT	NR
Syntomus truncatellus	None	None	LC	NS
Lionychus quadrillum	RDB3	RDB3	NT	NR
Cymindis axillaris	None	Nationally Scarce (Na)	NT	NR
Cymindis macularis	None	RDB1	VU	NR
Cymindis vaporariorum	None	Nationally Scarce (Nb)	LC	NS
Polistichus connexus	RDB2	RDB2	NT	NS
Drypta dentata	RDB1	RDB1	EN	NR
Brachinus crepitans	None	Nationally Scarce (Nb)	LC	NS
Brachinus sclopeta	None	RDB1	DD	NR

6.1.6 Criteria used for assigning species to IUCN threatened categories

Table 7: All the carabids which have been allocated to a Threatened status by this review are included in this table, with the IUCN criteria that apply. The table is in taxonomic order.

Species (scientific name)	IUCN Category	IUCN Criteria
Carabus monilis	EN	B2ab ii,iv
Leistus montanus	EN	B2ab ii,iv
Eurynebria complanata	EN	B2b i,ii,iv c iv
Nebria livida	VU	B2ab i,ii,iv
Cicindela hybrida	VU	D2
Cicindela sylvatica	EN	B2ab i,ii,iv
Cylindera germanica	VU	D2
Dyschirius obscurus	EN	B2ab ii,iv
Dyschirius extensus	CR(PE)	D
Bembidion coeruleum	VU	D2
Bembidion testaceum	VU	B2ab ii,iv
Bembidion humerale	VU	D2
Bracteon argenteolum	VU	D2
Tachys micros	VU	D2
Pogonus luridipennis	VU	B2ab i,ii,iv
Pterostichus aterrimus	CR(PE)	D
Sericoda quadripunctata	CR	B2ab i,ii,iv c i,ii,iii
Agonum scitulum	CR	B2ab i,ii,iv
Agonum chalconotum	CR(PE)	D
Amara famelica	EN	B2ab ii,iv

Species (scientific name)	IUCN Category	IUCN Criteria
Amara nitida	EN	B2ab ii,iv
Amara fusca	EN	B2ab ii,iv
Amara quenseli	EN	B2ab ii,iv
Harpalus cupreus	CR(PE)	D
Harpalus honestus	VU	D2
Harpalus melancholicus	EN	B2ab i,ii,iv
Ophonus sabulicola	EN	B2ab i,ii,iv
Ophonus stictus	EN	B2ab i,ii,iv
Ophonus cordatus	EN	B2ab ii,iv
Ophonus parallelus	VU	B2ab i,ii,iv
Ophonus puncticollis	EN	B2ab ii,iv
Ophonus subsinuatus	CR(PE)	D
Diachromus germanus	VU	D2
Scybalicus oblongiusculus	VU	B2ac i,ii,iii
Bradycellus distinctus	EN	B2ab i,ii,iv
Acupalpus elegans	CR(PE)	D
Panagaeus cruxmajor	VU	B2ab i,ii,iv
Chlaenius nitidulus	CR(PE)	D
Chlaenius tristis	VU	D2
Callistus lunatus	CR	B2ab i,ii,iv
Lebia cyanocephala	EN	B2ab i,ii,iv
Lebia cruxminor	EN	B2ab ii,iv
Philorhizus sigma	EN	B2ab ii,iv
Cymindis macularis	VU	D2
Drypta dentata	EN	B2ab i,ii,iv

6.2 THE SPECIES ACCOUNTS: AN INTRODUCTION

Species accounts have been prepared for each of the RE, CR(PE), CR, EN, VU and DD species. Each account contains the following components.

6.2.1 The species name

Beetle names follow Duff's (2012a) *Checklist of beetles of the British Isles*, except where stated. The specific name is given, with authority and date, as well as any synonyms listed in Duff (2012a).

6.2.2 Identification

Where a species can be accurately and confidently identified using the standard identification works, no further information is provided in the species account. However, where there are known identification pitfalls, or where a more detailed identification treatment may be found in a different publication, this is described in the species account.

Martin Luff's (2007) Royal Entomological Society (RES) Handbook is the essential standard identification work for British Carabidae. It should be used in conjunction with the "Carabid Crib": a collation of corrections, clarifications and additions to the RES Handbook, downloadable from http://markgtelfer.co.uk/beetles/carabidae-ground-beetles/. Andrew Duff's (2012b) *Beetles of Britain and Ireland, volume 1* is a more concise work but many of

its keys are corrected and improved versions of those in Luff (2007). Finally, Carl Lindroth's (1974) RES Handbook was the predecessor to Luff (2007). Though somewhat outdated, it is still valuable for its more detailed treatment of identification characters and is well worth using as a supplement to Luff (2007) and Duff (2012b), especially as it has been made available as a free download (http://www.royensoc.co.uk/sites/default/files/Vol04_Part02.pdf).

Carabid larvae receive far less attention from coleopterists than adults but many of the British species may be identified using Luff's (1993) keys to the fauna of Fennoscandia and Denmark.

6.2.3 Native/Alien status

For this review, species have been assigned to one of four categories: Non-native, Probable Non-native, Probable Native or Native. Only Probable Native and Native species are included in the species accounts. For Probable Native species and some Native species, a rationale is given for the categorisation.

6.2.4 Distribution

A summary of the geographical distribution is provided for each species, distinguishing between the recorded distributions in the pre-1980 and post-1980 periods (see Section 5.3). For some of the species with very few records, it has been possible to provide details of all records whereas for more frequently recorded species, the distribution has been summarised by hectads or vice-counties as appropriate.

The geographical distribution of a species beyond Britain has rarely been mentioned, the exceptions being where data from elsewhere are directly pertinent to the status assessment.

6.2.5 Habitat and ecology

A concise account is given, focusing on providing the habitat and microhabitat information which one would need to be able to conduct survey or monitoring work on the species. In addition, any additional information on phenology, diurnal or nocturnal activity patterns, sampling techniques, prey or host associations which would assist a survey or monitoring exercise is included.

6.2.6 Conservation status

This section provides a discussion of the evidence with which the status assessment has been made: post-1980 hectad count, pre-1980 hectad count, data on decline, fragmentation, fluctuations and threats, as appropriate. It provides the rationale for the status assessment.

Frequent use is made of the abbreviations AOO (Area Of Occupancy) and EOO (Extent Of Occurrence) (see Section 5.4.2).

6.2.7 Threats

Some wide-scale processes could threaten any species of carabid. In the category of wide-scale processes, I include climate change, atmospheric pollution and atmospheric nutrient deposition. If there are any studies demonstrating a negative impact on any British carabid from these processes, I am not aware of them. In the case of climate change, one could reasonably speculate that an increase in mean annual temperature would threaten the

Arctic, Boreal and Alpine faunal elements, notably montane species such as *Nebria nivalis* which already live in the coldest places in the British Isles. However, climate change could involve more than simple 'global warming' and changes to the seasonality and predictability of sunniness, precipitation and freezing, as well as increasing storminess, could all have threatening implications for some carabids.

On coasts and rivers, more extreme events may pose a threat to the carabids which specialise in these habitats. Predicting the outcomes for any one species is very difficult though, and the example of *Nebria livida* will serve to illustrate the point. *N. livida* is a specialist on coastal soft-rock cliff habitat. In Norfolk, it no longer occurs eastward of Trimingham whereas it used to extend to Mundesley. That stretch of coastline has been defended and it seems obvious that the erection of the coastal defences caused the demise of *N. livida*. Thus *N. livida* requires actively eroding cliffs. However, there must also be a limit to how much erosion *N. livida* can withstand; it still needs stable habitat for the egg, larval and pupal stages that will not fall or be washed away, and likewise stable habitat in which to overwinter. If there is severe erosion causing local extinction at one site, or severe mortality, this is only a severe threat to *N. livida* if it cannot rapidly re-colonise the site from other nearby sites. Thus *N. livida* is threatened both by excessive coastal stabilisation and by excessive coastal erosion, and the degree of threat worsens as populations decline in number, size and their ability to emigrate to and colonise other sites.

Carabids, along with much of British wildlife, have suffered losses as a result of urbanisation, the intensification of agriculture and forestry, and the development of associated transport and utilities infrastructure. Habitat loss and degradation is not a new phenomenon, and Dawson (1856) bemoans the effects of drainage and 'cultivation' on carabids and their habitats. Development will continue to pose a threat to carabids into the future, even though at its most benign, development may attempt to fully mitigate for impacts on species and habitats.

Many carabids are threatened by ignorance. Entomologists know too little about the distribution, habitat requirements and ecology of rare carabids. Often when there is good information on a species, this has not been distilled into practical management recommendations for land managers. And all too often, even when it has, there are frequently failures in the chain of communication that prevent the recommendations being carried out in a satisfactory manner.

Carabids are also threatened by their relative lack of popularity compared to other taxonomic groups. Conservation is a democratic process in this respect with more popular groups receiving more research and survey effort, more conservation effort, and more funding.

There is enormous scope for individuals and institutions to make valuable contributions to understanding the distribution, habitats and ecology of the species covered by this status review; to work to lessen the negative impacts of development, agriculture and forestry on carabids; to convey practical management advice to those managing sites for wildlife and to help ensure that advice is correctly implemented; to work towards popularising the study of carabids (e.g., by making their identification easier) and to promote carabid conservation to a wider audience.

In the species accounts, a section on threats is only presented if there are specific factors which are known, or strongly suspected, to have negatively impacted the species in the past, or which can be predicted to have a negative impact in future.

7 The species accounts

The species accounts are given in alphabetical order of scientific name.

Acupalpus elegans **Critically Endangered (Possibly Extinct) D**

Order Coleoptera Family Carabidae

elegans (Dejean, 1829)

Identification. The external identification characters in the key to species of genus *Acupalpus* by Lindroth (1974) have been found to be unreliable; some British specimens of *A. parvulus* would key out as *A. elegans* (Plant and Drane, 1988). The same authors concluded that "males … can only be separated by critical examination of the aedeagus, whilst females cannot at present be determined", and provided details for identifying males, including illustrations of the range of variation in aedeagi of both species. The species is satisfactorily keyed by Luff (2007).

Native/Alien status. Native.

Distribution. The first British record was of two specimens captured by the Rev. Hamlet Clark, on the Isle of Sheppey, between Sheerness and Queenborough [East Kent], in May 1853 (Dawson, 1854). Plant and Drane (1988) published a thorough review of all British records of *A. elegans* in the recognition that its identification from *A. parvulus* was more problematic than previously thought. They concluded that, in Britain the species is only known with certainty from the Isle of Sheppey. In fact, all the Sheppey records appear to relate to just a few miles of coastline between Sheerness and Queenborough and from there to Kingsferry. Fowler (1887) also notes records from "banks of Thames towards Gravesend [West Kent] and Sheppy (Dr. Power)" (implying that Dr Power also encountered the species somewhere west of Sheppey), and from "Deal (W. West)"; these records are entirely credible but apparently not supported by extant, labelled specimens. Further detail of the Deal locality is provided by Walker (1900) who wrote: "Searching in damp places is also most remunerative, though the best of these, at the commencement of the sandhills close to the site of Sandown Castle [TR375543], has long been dried up, and several interesting species which used to occur there, such as *Anisodactylus poeciloides*, *Stenolophus elegans* [now *Acupalpus elegans*], and others, have not been taken for many years".

The last British record was from Sheppey in 1875, only 22 years after its discovery. However, a single male specimen was collected at Stoke Junction on the Isle of Grain [West Kent], just north across the Swale from the original Sheppey site, on 1st June 1952 by L.S. Whicher (1953). Though Plant and Drane (1988) regard this record as unproven, pending dissection of the specimen (whose whereabouts are unknown), it is highly likely that Whicher's determination, confirmed by A.A. Allen, was correct.

Habitat and ecology. Walker's (1900) description of the former *A. elegans* site at Deal, where it occurred with *Anisodactylus poeciloides* is revealing, since the habitat preferences of *A. poeciloides* in Britain have been well-studied in recent years through work under the "Action for Invertebrates" project. *A. poeciloides* is typically found on the gently-sloping margins of brackish or saline ditches and lagoons, on ground sparsely vegetated with pioneer halophytes, especially glassworts *Salicornia*. It is very likely that the habitat

preferences of *A. elegans* are similar to those of *A. poeciloides*. The account by Douglas (1857) of finding 21 specimens near Sheerness by searching under loosened bits of dried mud tends to confirm the affinity for lagoon margins. Like *A. poeciloides*, *A. elegans* is likely to feed at least in part on seeds.

Conservation status. The species is probably extinct in Britain: a population size estimate of zero individuals can be made with reasonable confidence (D). The intensification of survey effort on brackish/saline lagoon margins since the addition of *A. poeciloides* to the list of Biodiversity Action Plan Priority Species in 1994 has yielded many entomological discoveries but no records of *A. elegans*, and the chances of this species surviving unnoticed in Britain are very small.

Agonum chalconotum **Critically Endangered (Possibly Extinct) D**

Order Coleoptera Family Carabidae

*chalconotum (*Ménétries, 1832)
sahlbergii (Chaudoir, 1850)
sahlbergi auctt. (misspelling)
*archangelicum (*Sahlberg, J., 1874)

Identification. Similar to *A, muelleri* (Herbst, 1784) but lacking the colour contrast between fore-body and elytra. Further identification characters are given by Fowler (1886, 1887), Murphy (1918) and Lindroth (1960, 1974).

Native/Alien status. Probable Native. Lindroth (1960) presents an authoritative case for the species being a native in Britain but this was perhaps overlooked by Hyman and Parsons (1992) which stated that *A. chalconotum* was "a glacial relict species or possibly an accidental introduction" and by Luff (2007) which described it as a "possible former resident native". It is a remarkable species to have occurred in Britain given that its world range seems to otherwise cover two areas: (1) the northern coastline of European Russia from the White Sea (southern) coast of the Kola Peninsula eastwards to the Kanin Peninsula, and (2) southern Siberia with adjacent parts of northern Mongolia, eastwards to Kazakhstan. Fauna Europaea[2] also lists the species as present in Latvia.

Distribution. Known in Britain from only four old records. *Agonum chalconotum* was first collected in Britain by Mr Bishop in about 1864[3] "in some numbers on the edge of a sandy bank on the north side of the Clyde a few yards west of Dunglass Castle" (Murphy, 1918). Dunglass Castle is at NS437735 (Dunbartonshire VC99) on a stretch of the coast which has now been reclaimed and developed but there appears to be relatively natural coastline very nearby. Mr Henderson subsequently took a few specimens, presumably by visiting the same locality, and these found their way into Dr Sharp's collection, still as an unidentified *Agonum*. Fowler (1886) refers to these specimens (one male and two females) having been collected "about 20 years ago" which would place the date to 1866. It was Fowler who sorted out the identification of those three specimens and added *Agonum chalconotum* (as *Anchomenus Sahlbergi*) to the British (and European) list in his 1886 note.

[2] http://www.faunaeur.org/full_results.php?id=379336
[3] Murphy (1918) writing in 1917 refers to Mr Bishop having "met with the insect" "about 53 years ago".

J.E. Murphy (1918) then rediscovered *Agonum chalconotum* on the Clyde in May 1909, this time on the south shore in Renfrewshire (VC76), collecting a single specimen which he recognised as *Agonum chalconotum* some months later. He was able to return for a further search in 1914 and "succeeded in finding two female examples, under stones at a spot some distance from the river and quite a mile from where the first was procured". Sadly, Murphy (1918) gives no further detail of the locality. He does mention that on both occasions on which he found *Agonum chalconotum* specimens, they "were … in company with *parumpunctatus* [i.e. *Agonum muelleri*]". It has not been found alive in Britain since.

Habitat and ecology. Little is known of the habitats occupied in Britain. It has been found in numbers on "a sandy bank", and "under stones at a spot some distance from the river".

Conservation status. The species is probably extinct in Britain: a population size estimate of zero individuals can be made with reasonable confidence (D). Nevertheless, the author is not aware of any targeted attempt having been made to rediscover this species on the Clyde, and the possibility remains that the absence of records since 1914 reflects an absence of effort. The chances of a fortuitous rediscovery have diminished now that the latest RES Handbook (Luff, 2007) does not include *A. chalconotum*; specimens found nowadays would probably be overlooked as the common *A. muelleri* (Herbst, 1784).

Agonum scitulum **Critically Endangered B2ab i,ii,iv**

Order Coleoptera Family Carabidae

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scitulum (Dejean, 1828)

Identification. This species is keyed by Lindroth (1974), Luff (2007) and Duff (2012b). However, the distinctions from other members of *Agonum* subgenus *Europhilus* are subtle and comparative and none of the standard works can be relied on to give consistently accurate identifications. That at least is the author's view, having found that a large proportion of the specimens standing as *A. scitulum* in British collections have been misidentified. An identification guide to this difficult subgenus is in draft (Telfer, in prep.).

Native/Alien status. Native.

Distribution. The following distribution account is based solely on records for which the identification has been verified by the author. Some genuine records may have been omitted but more importantly, many erroneous records have been excluded.

Most British records of *A. scitulum* come from the banks of the River Thames from Kew (Surrey), downriver to Barnes (Surrey) and Hammersmith (Middlesex), with a nearby 19th century record from Lee Pit in West Kent (presumed to have been at or near TQ3974 and long since lost to urbanisation). The most recent record for this region was from Kew on 12th April 1910.

A. scitulum has also been recorded from the banks of the River Medway, from Maidstone, downriver to Aylesford, New Hythe, Eccles Island, Burham and the "Chatham district". The earliest Medway record was by J.J. Walker in 1880 for the "Chatham district". It was last recorded at Aylesford on 27th December 1985 by the late Eric Philp, and this is also the last confirmed record anywhere in Britain.

However, the British distribution of *A. scitulum* is not confined to the middle estuarine stretches of the Thames and the Medway. There are confirmed records for Chippenham

Fen, Cambridgeshire on 18th September 1965 (with another record from there in 1966 by Alex Williams) and Charmouth, Dorset on 6th May 1955.

Habitat and ecology. A wetland beetle, probably favouring wet woodland and well-vegetated marshes, particularly adjacent to tidal rivers. It might be expected to occur in similar habitats to *A. nigrum* Dejean, 1828, perhaps even *Bembidion maritimum* (Stephens, 1835) and *B. lunatum* (Duftschmid, 1812).

A striking feature of the records of *A. scitulum* is that all were made between 20th November and 6th May, except for one outlying date of 18th September. Clearly any attempt to re-find this species in Britain should concentrate on survey during the winter and spring.

Conservation status. There is only a single record, from a single locality in the modern period (B2a) and there is clear evidence of decline in AOO (B2b i,ii,iv). This is a Critically Endangered species but its true conservation status was obscured in the past by the preponderance of misidentified records.

This species qualifies as Critically Endangered under B2ab i,ii,iv as its current AOO is below 10 km^2 (B2), it now occurs in no more than 1 location (B2a), and it is in decline showing a reduction from 8 hectads (and perhaps as few as 4 locations) prior to 1980 to 1 hectad post-1980 (B2b i,ii,iv).

The author and others have made a significant effort to re-discover *A. scitulum* in recent decades, focusing on its Medway localities but also covering Chippenham Fen and the River Thames eyots (Peter Hammond, pers. comm.). Further survey efforts should continue to target the Medway sites and should also cover the stretch of natural Thames riverbank in the grounds of Syon House.

Amara famelica **Endangered B2ab ii,iv**

Order Coleoptera Family Carabidae

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*famelica (*Zimmermann, 1832)

Identification. This is unquestionably a difficult species to identify, from a difficult genus. It is one of a group of four species with extensively dark antennae (at most the two basal antennal segments pale) and the main confusion species within this group is *A. lunicollis*, a species with which *A. famelica* often occurs (Champion, 1896; Lane, 1999; Middlebrook, 2004). The most detailed reference for identification of species in genus *Amara* is Telfer (2012).

Native/Alien status. Native.

Distribution. *A. famelica* was added to the British list by Champion (1896) following a series of captures at Horsell Common and a further specimen from Chobham on 10th September 1876, both localities in Surrey. Over the period up to 1949, there were further records from Horsell Common and it was also found on Netley Heath and Oxshott Heath (Surrey) and at 'Crowthorne' (Berkshire), establishing the heathlands in this region as a core area for the species.

In the New Forest, South Hampshire, single specimens of *A. famelica* were found at Park Pale, Lyndhurst on 16th April 1967 and at Matley sand pit on 10th June 1972 (Appleton,

2004; Middlebrook, 2004). On the Dorset heaths, single specimens were pitfall trapped in September 1977 at Holt and Arne (Telfer and Heijermann, 2003).

Another, though somewhat looser, cluster of records comes from the English midlands where *A. famelica* has been recorded from Leicestershire (Loughborough (probably heathlands in the Charnwood Forest) on 17th October 1936 and 27th May 1937), from Warwickshire (Sutton Park on 15th June 1924 and 31st March 1997 (Lane, 1999)), and from Staffordshire (Cannock Chase: more than one specimen from around 1900 and a male and a female on 16th April 1949 (Lane, 1999)).

Further afield, the pre-1980 period also saw records from single localities in West Cornwall, East Sussex, North Essex, South-east Yorkshire, and from two localities in North-east Yorkshire. As far as is known, all these records relate to single individuals.

In the post-1980 period *A. famelica* is known from two localities: Sutton Park, Warwickshire as detailed above, and Thursley Common, Surrey where it was discovered by Scotty Dodd on 25th March 2011, and was seen again in the same area on 7th April 2011 (Denton, 2012) and in spring 2013 (A.J.W. Allen, *in litt.*, April 2013).

Habitat and ecology. Most *Amara* species are probably generalist seed-feeders, supplementing their diet by scavenging. *A. famelica* is a heathland specialist and has been recorded from areas of open, flat, disturbed or bare ground within sandy or gravelly lowland heathland. Most records are very early in the season (March and early April) so it may be under-recorded. Several of the records are of beetles initially seen on the wing and either netted or captured after landing. It has also been found under stones, under heather overlying bare ground, and seen running on heathland paths.

Conservation status. Recorded from only two localities in two widely separated hectads in the post-1980 period, despite substantial targeted survey effort (B2a). This species shows a long-term decline in AOO and that decline appears to be continuing (B2b ii,iv), hence Endangered status is appropriate.

This species qualifies as Endangered under B2ab ii,iv as its current AOO is below 500 km^2 (B2), it now occurs in five or fewer locations (B2a), and it is in decline with a large negative Change Index of -2.48 (B2b ii,iv).

Threats. The maintenance of patches of bare ground on heathland seems to be particularly important for this species, which is thus threatened by inappropriate management.

Amara fusca **Endangered B2ab ii,iv**

Order Coleoptera Family Carabidae

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fusca (Dejean, 1828)
complanata (Dejean, 1828)

Identification. This species is keyed by Lindroth (1974), Luff (2007) and Duff (2012b). Allen (1956) includes features for separation from the very similar *A. cursitans*. The most detailed reference for identification of species in genus *Amara* is Telfer (2012).

Native/Alien status. Native.

Distribution. *Amara fusca* was discovered at the Wangford roadside, West Suffolk (TL756836) on 6th September 1993 (Telfer and Eversham, 1994). Prior to this discovery, the

species had not been seen in Britain since 1942 (a single specimen at Swanley, West Kent) and all previous records appear to be prior to 1900. It has since been found at three other Breckland sites: Maidscross Hill (TL7282), Brandon *Artemisia* Reserve (TL778857) (Telfer and Eversham, 1994) and near Weeting (TL7691), West Norfolk (Collier and Lane, 2013).

Of the earlier records, "a considerable number of specimens were taken at Swansea" (Fowler, 1887) and many British museums hold specimens from this source, some with labels which make it clear that they were collected at Crymlyn Burrows, Glamorgan. A single specimen of *A. fusca* was collected on a post-industrial site in Newport docks (ST314842), Monmouthshire in 2008, the first Welsh record for over 150 years (Ramsay, 2011).

Other early records are from Doncaster (SW Yorkshire), Plumstead (either West Kent or East Norfolk; recorded by W. West), Newcastle (South Northumberland), Preston (West Lancs), Sussex and Scotland; none of these have been recently verified and given the difficulties that coleopterists have experienced with identification of *Amara*, it would not be surprising if all or most were misidentified.

Habitat and ecology. The Brandon Artemisia Reserve has proved to be the best site for the beetle in Britain. Here it can be reliably found in numbers after dark in September and early October by examining the flowering stems of *Artemisia campestris* L. (an Endangered (RDB1) plant in Britain (Perring and Farrell, 1983) known as the Breckland Mugwort or Field Wormwood). The beetles feed on the ripening seeds of *Artemisia campestris*, and the association with this plant is also known from Fenno-Scandia (Lindroth, 1986).

At the Wangford roadside and Maidscross Hill sites, the beetle was very strongly associated with Mugwort *Artemisia vulgaris*, a common plant which is thought to act as a secondary foodplant on these sites where *Artemisia campestris* has died out.

Preston *et al.* (2002) considered *Artemisia campestris* to be restricted to a few sites in the Brecks as a native but with alien occurrences at Crymlyn Burrows and elsewhere on the Glamorganshire coast of South Wales. There can be little doubt that *Amara fusca* was associated with *Artemisia* at Crymlyn Burrows and thus little doubt that both plant and beetle are native there. This is further supported by revised taxonomic opinion which holds either that the South Wales plants belong to *Artemisia campestris* subspecies *maritima* Arcangeli or should be regarded as a distinct species *A. crithmifolia* L., reportedly native from Denmark to Iberia. *A. crithmifolia* has also been discovered at Crosby sand-dunes in Lancashire (Andy Jones, *in litt*., March 2010)

Conservation status. *Amara fusca* has been recorded from only five British localities in three hectads since 1980, and has probably been lost from one of these (Wangford roadside due to levelling of the roadside bank for road safety reasons, coniferisation and unchecked vegetation succession). The original Newport site has been developed but *A. fusca* has been recorded post-development on a mitigation site designed specifically for it at Newport docks. Recent survey at Crymlyn Burrows targeted at *A. fusca* was unsuccessful. It shows a large decline in AOO (Raw Change = -62.5%) (B2b ii,iv). It is thus regarded as an Endangered species.

This species qualifies as Endangered under B2ab ii,iv as its current AOO is below 500 km^2 (B2), it now occurs in five or fewer locations (B2a), and it is in decline with a large negative Raw Change of -62.5% (B2b ii,iv).

Threats. *Artemisia campestris* is a perennial plant (as presumably is *A. crithmifolia*) but requires disturbed soil in which to germinate, thus maintaining appropriate levels of disturbance at an appropriate spatial scale is important for maintaining large, healthy populations of the plant, and thus of the beetle. Mowing and deer grazing have both had detrimental effects on beetle populations in the past by removing seed-bearing parts of the *Artemisia* plants. *Amara fusca* is thus threatened by inappropriate management.

Amara nitida **Endangered B2ab ii,iv**

Order Coleoptera Family Carabidae

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*nitida (*Sturm, 1825)

Identification. This is unquestionably a difficult species to identify, from a difficult genus. Records of *A. nitida* have frequently proved to be based on misidentifications. It is keyed by Lindroth (1974), Luff (2007) and Duff (2012b). The most detailed reference for identification of species in genus *Amara* is Telfer (2012).

Native/Alien status. Native.

Distribution. The following distribution account is based solely on records for which the identification has been verified by the author. Some genuine records may have been omitted but more importantly, many erroneous records have been excluded.

In the post-1980 period, there are verified records from Upper Teesdale (NY8630), Hamsterley Forest (NZ02) (both Co. Durham), Sotby Meadows (TF27, North Lincolnshire) and Swanton Novers Wood (TG03, West Norfolk).

In the earlier period, the verified records are for: Knowle (SP1775, Warwickshire) where it was collected in numbers between at least 1889 and 1900; near Pontrilas (SO23, Breconshire) on 19th November 1929; Lyme Regis (SY39, Dorset) by G.C. Champion who lived from 1851 to 1927; Montgomery (= Montgomeryshire?) in 1940 (Duff, 1992); Heston/Lampton (TQ17, Middlesex) in 1944 and/or 1945; and several specimens at Portsdown Hill (SU622067, South Hampshire) from 1973 - 1975 (Appleton, 2004).

Habitat and ecology. Most *Amara* species are probably generalist seed-feeders, supplementing their diet by scavenging, and typically occur in sunny, open habitats with an element of bare, disturbed ground. *A. nitida* seems to prefer relatively cool and shady habitats for an *Amara*, including hay-meadows with very little bare ground, an open, heathy woodland ride (at its Norfolk site) and in a coniferised area (Hamsterley Forest). However, the Portsdown Hill locality is a south-facing calcareous grassland slope where the beetles were found “by grubbing on a sunny bank” (Appleton, 2004).

Conservation status. There are verified records from only four hectads in the post-1980 period (B2a), and unverified records from three further hectads. There are only six hectads with verified records from the pre-1980 period but 15 more with records that remain unverified. The best interpretation of this evidence, assuming that about half of the unverified records are correctly identified, is that *A. nitida* is undergoing a substantial decline in AOO (B2b ii,iv).

This species qualifies as Endangered under B2ab ii,iv as its current AOO is below 500 km^2 (B2), it now occurs in five or fewer locations (B2a), and it is in decline showing a reduction

from between 6 and 21 hectads prior to 1980 to between 4 and 7 hectads post-1980 (B2b ii,iv).

Amara quenseli **Endangered B2ab ii,iv**

Order Coleoptera Family Carabidae

quenseli (Schönherr, 1806)
quenselii auctt. (misspelling)

Identification. Though *Amara* is a troublesome genus, *A. quenseli* is one of the more straightforward species to identify. The most detailed reference for identification of species in genus *Amara* is Telfer (2012).

Native/Alien status. Native.

Distribution. The core of this species' range is centred on the Cairngorms including Speyside and Deeside and with records from Banffshire, Elgin, South Aberdeenshire and East Inverness-shire. It is well known from the ancient moraine deposits along the Dorback Burn in Elgin and there are pre-1980 records from near the mouth of the Dorback Burn at Findhorn and Culbin (also Elgin). *A. quenseli* is also known from the island of Rhum.

Habitat and ecology. Most *Amara* species are probably generalist seed-feeders, supplementing their diet by scavenging. They typically require open vegetation on light soils (e.g., sand, gravel, chalk), bare ground, soil disturbance, and abundant seeds from a diverse flora of ruderal plants (i.e., weeds).

A. quenseli is not a montane species but has been recorded on moraines, riverbanks, road verges and sand dunes (Luff, 1998), presumably where there is substantial bare ground, maintained by frequent disturbance (such as river erosion and deposition).

Conservation status. Recorded from only four hectads in the post-1980 period (B2a). The records suggest a substantial decline in AOO between the two periods and there is no reason to think that this decline is not continuing to the present (B2b ii,iv).

This species qualifies as Endangered under B2ab ii,iv as its current AOO is below 500 km^2 (B2), it now occurs in five or fewer locations (B2a), and it is in decline with a large negative Raw Change of -55.6% (B2b ii,iv).

Bembidion coeruleum **Vulnerable D2**

Order Coleoptera Family Carabidae

coeruleum (Audinet-Serville, 1821)
caeruleum of authors (misspelling)

That *coeruleum* is the original spelling, and 1821 the correct date, was established by Roger Booth in November 2013. This is the species listed as *caeruleum* Audinet-Serville, 1826 by Duff (2012).

Identification. This species was added to the British list by Telfer (2001a) which provides the most detailed identification text in the British literature. The species is keyed by Luff (2007) and Duff (2012b).

Native/Alien status. Probable Native. First discovered at Dungeness in 1989 with subsequent records indicating that it is now established but rare. Thought to have colonised Britain naturally (Telfer, 2001a).

Distribution. Known only from the margins of sand and gravel pits in one hectad at Dungeness, East Kent. Originally recorded (two specimens) from Brett's Pit, Dungeness (TR0119) in 1989, then about 15 specimens from near Boulderwall Farm (TR0619) in 1999, followed by singletons in 2000 and 2002. The 2000 record at least was from the north-western margin of the ARC pit, across the road from Boulderwall Farmhouse. The most recent record was of a singleton from the 'Honeypot', on the edge of Burrow's Pit (TR06771854) in 2009.

Habitat and ecology. Most of the beetle specialities of the Dungeness sand and gravel pits are associated with quicksand habitat at the margins, and it was in just such habitat that the 2000 individual was found, amongst large numbers of *Omophron limbatum* (300+) and *Dyschirius obscurus* (c. 40). The 'Honeypot' was also an area of quicksand, as probably was the Brett's Pit locality in 1989. However, it is noteworthy that the 1999 record of about 15 specimens was from "among rather big stones, but without vegetation" which suggests a different, drier habitat may be preferred to the quicksand margins.

The records in 1989 and 2000 were made during torchlight searching, the 2009 record was from a pitfall trap and the 1989 and 2002 records were made by daytime searching. Survey by torchlight is probably more effective for this species but it can be found by day.

Conservation status. There has been substantial survey effort at Dungeness since the occurrence of *B. coeruleum* was recognised (Telfer, 2001a), much of it targeted at finding *B. coeruleum*, or targeting the habitats in which *B. coeruleum* had been found. That only three further specimens have been found suggests that this is a species that occurs at low density, with a tenuously established British population (D2). This species qualifies under D2 as it is present in five or fewer locations and is subject to plausible future threats (see below).

Threats. Water margin habitats at Dungeness are vulnerable to uncontrolled fluctuations in water levels, to rapid succession, and to invasion by *Crassula helmsii* (Kirk) Cockayne. In the longer term, the cessation of aggregates extraction at Dungeness will end the supply of newly excavated, bare pit margins, though the RSPB is developing management techniques to maintain early-successional conditions on pit margins.

Bembidion humerale **Vulnerable D2**

Order Coleoptera Family Carabidae

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*humerale (*Sturm, 1825)

Native/Alien status. Native.

Distribution. *B. humerale* was a late discovery in Britain, being added to the British list by a 1975 publication (Luff, 1998). It has been recorded only from the two lowland oligotrophic peat-bogs of the Humberhead Peatlands National Nature Reserve: Thorne/Crowle Moors, and Hatfield Moors (South-west Yorkshire). Its specialist habitat requirements combined with biogeographic factors mean that it is unlikely to be found elsewhere in Britain.

Habitat and ecology. Although both its localities are relatively large, *B. humerale* occurs in quite restricted patches of moist, bare peat and on water margins within a matrix of wet heath and open birch woodland.

Conservation status. Recorded only from only two localities in the post-1980 period (largely contained within two hectads) and unlikely to be found elsewhere. There is no evidence that this species is declining but it is threatened by changes to the hydrological regime and by ecological succession at both its localities, which have been substantially altered by decades of commercial peat extraction (D2). This species qualifies under D2 as it is present in five or fewer locations and is subject to plausible future threats (see below).

Threats. This species is threatened by changes to the hydrological regime and by ecological succession at both its localities.

Bembidion inustum **Data Deficient**

Order Coleoptera Family Carabidae

inustum (Jacquelin du Val, 1857)

Native/Alien status. Native. Levey and Pavett (1999) regarded it as probably a long-established native of elusive habits that had previously evaded discovery and their interpretation is followed here. Nevertheless, Bates *et al*. (2005) state that "it would seem most likely that such a distinct species is a relatively recent arrival in Britain, rather than a long overlooked resident". Austin's (2014) record from a garden adds weight to this view. If *B. inustum* is recorded with increasing frequency over an increasing area, this would tend to vindicate the view of Bates *et al.* (2005) but it is too early to make that judgement.

Distribution. Only four individuals have ever been found in Britain, at Dinefwr Deer Park, Carmarthenshire and Llanover, Monmouthshire, both in 1996 (Levey and Pavett, 1999), on the Afon Tywi near Llandovery, Carmarthenshire in 2003 (Bates *et al*., 2005) and in a garden in Llandre, Ceredigion in 2014 (Austin, 2014).

Habitat and ecology. It appears, usually, to live close to running water with a preference for shaded areas. The species is probably nocturnal and partly subterranean. The first two British specimens were found using flight interception traps, the third was pitfall trapped on exposed riverine sediments. This species is probably very difficult to find by more conventional collecting techniques though the Llandre specimen was spotted alive and active. *B. inustum* may not be as rare as it appears.

Conservation status. Known from only four post-1980 hectads, each yielding a single specimen. It is impossible to judge whether this species is declining or not on the available data. There are no obvious threats to the known localities, nor to the habitat in general. Perhaps the main threat to this species is ignorance of its distribution, habitat and ecology; without further information, no conservation action can be taken.

Bembidion testaceum **Vulnerable B2ab ii,iv**

Order Coleoptera Family Carabidae

testaceum (Duftschmid, 1812)

Identification. *B. testaceum* is one of a number of similar species in subgenus *Ocydromus* with four paler spots on the elytra and it has not infrequently been recorded in error.

Native/Alien status. Native.

Distribution. This species has a northern and western distribution in Britain on exposed riverine sediments (ERS). This was "one of the most enigmatic and poorly researched beetle species associated with ERS" prior to the detailed review of its distribution and ecology carried out by Sadler *et al*. (2005).

There are post-1980 records from seven hectads on seven rivers, equating to seven locations: the Rivers Usk (ST39), Monnow (SO41), Teme (SO76 and SO85), Keekle (NY01?), South Tyne (NY76), and from the Devil's Water and River Tyne in NY96. The review by Sadler *et al*. (2005) found that there were records for a further 19 hectads from the earlier period. Despite a reasonable amount of recent fieldwork, there have been no post-1980 records from "a number of rivers in south-west Scotland (e.g., Nith and Clyde), Cumbria (e.g. Eden, Irthing), Wales (Wye and Taff), the Yorkshire Derwent and rivers in Devon (e.g., the Dart, Teign and Exe)".

Habitat and ecology. A specialist beetle of ERS in catchments with hard rock geology that erodes to produce coarse sandy sediments, though occasionally also occurring in analogous artificial habitats such as a gravel pit and a newly created river. It shows a strong association with unconsolidated, unvegetated sediment of varying sizes ranging from pebbles to cobbles overlying coarse and clean sands. Siltation is detrimental to its habitat (Sadler *et al*., 2005).

Conservation status. Recorded from only seven hectads in the post-1980 period (B2a). This species has declined substantially and there is no reason to think that that decline is not continuing to the present day (B2b ii,iv).

This species qualifies as Vulnerable under B2ab ii,iv as its current AOO is below 2,000 km^2 (B2), it now occurs in ten or fewerlocations (B2a), and it is in decline with a large negative Raw Change of -63.2% (B2b ii,iv).

Brachinus sclopeta **Data Deficient**

Order Coleoptera Family Carabidae

sclopeta (Fabricius, 1792)

Native/Alien status. Until 2005, this species would have been simple to classify as a probably extinct native, with no British record since one was collected at Beachy Head in 1928. Prior to that, there had been no British record since 1830.

In 2005, Richard Jones discovered a population of this beetle on an urban brownfield site in London's docklands at Silvertown, South Essex. Controversially, Jones (2006) argued that *B. sclopeta* had probably survived undetected in the Thames Estuary from the early 1800s (when it was recorded from near Margate, East Kent and reputedly from Southend, South

Essex) to its discovery at Silvertown. Since the 2005 discovery, *B. sclopeta* has been found at a further three sites at up to about 6 km distance.

These recent populations are probably non-native in origin. The discovery in the docklands is consistent with introduction by marine transport. The fauna of derelict sites at Silvertown consists of an extraordinarily high proportion of non-native species (e.g. Telfer (2013)), as one might expect of an urban dockland location. The discovery of four new localities in less than a decade is inconsistent with a species that is supposed to have persisted undetected in the Thames Estuary for 175 years. It is more likely that the population discovered at Silvertown in 2005 was accidentally introduced to Britain and has established and begun to expand.

However, there is an argument that the recent populations of *B. sclopeta* could be native in origin, if it is an exceptionally elusive or overlooked species which has persisted undetected in Britain during the long gaps between records. Thus the four London sites now known since 2005 could be either the result of a recent population increase, of a recent expansion from some undetected refugium, or of recently improved survey coverage. Despite the large numbers of non-native species colonising urban derelict sites, these sites also support important populations of native invertebrates, of which *B. sclopeta* may be one.

Distribution. The three earliest British records are undated but were made before Stephens (1828), all as single specimens: one in Devon, one "reputed to have been taken … at Southend" (South Essex), and one "supposed to have been found near Hastings" (East Sussex) (Dawson, 1854 [p. 21]). A small series was taken near Margate (East Kent) in 1830 (Fowler, 1887) (though earlier "said to have been captured in Norfolk" (Dawson, 1854 [p. 21])). Here I assume that the 1830 locality of "near Margate" is the same as the locality of Faversham listed by Stephens (1839); though the two places are about 25 miles apart, this may have qualified as "near" to naturalists of the 1830s. *B. sclopeta* was thus recorded from four localities in four vice-counties of southern England up to and including 1830.

A record of *B. sclopeta* from 1863, first reported as a rumour by Rye (1864), turned out to relate to one of four *Brachinus* specimens reportedly taken either at Wastdale (= Wasdale, Cumberland?) or Silverdale (West Lancashire) by Mr. Murton, and passed to Mr. Sidebotham of Manchester (Rye, 1866). Its identity remains uncertain but Rye (1866) was certain it was not a specimen of *B. sclopeta*. It is quite clear in retrospect that the specimens in question were of foreign provenance, and the mischief was also probably quite clear to E.C. Rye at the time.

There is a dubious undated record for Esher (Surrey) from about the end of the 19th century or the beginning of the 20th century (Allen, 1985). The only definite 20th century record is of a single specimen taken at Beachy Head (East Sussex) in 1928 (Allen, 1985).

B. sclopeta is fully winged and it has been suggested that the scattered early British records of single specimens may relate to primary natural immigrants rather than an established population. However, it was taken in numbers near Margate so can be regarded as having been breeding there at least.

Richard Jones' 2005 discovery was on a site adjacent to the Thames Barrier at Silvertown, South Essex (TQ414799). In 2010, the species was discovered on the nearby Victoria Dock site by Colin Plant Associates (2010). Beetles from both sites were translocated prior to development. The translocation from the Thames Barrier site definitely failed. Beetles were

translocated from the Victoria Dock site in 2012 and the receptor site yielded some *B. sclopeta* when monitored in 2014. However, it is not clear whether these individuals relate to the translocation effort or whether they have colonised the site from the Newham Dock site less than 500 m away to the east (Sarah Henshall, *in litt.*, March 2015). A further two sites have been discovered in the vicinity.

Habitat and ecology. *B. sclopeta* is presumed to be an ectoparasitoid of other species of carabid, as has been demonstrated for *B. crepitans* and other bombardier beetles (Saska and Honek, 2004). It is likely that they develop on the pupae of species of the genus *Amara*, and possible that they may also develop on species of *Ophonus* and *Harpalus*. In London, *B. sclopeta* has typically been found on the sloping banks of mounds of earth and construction debris, usually with sparse vegetation of ruderal plants and substantial bare ground. It tends to occur under larger, well-embedded objects. Jones (2006) gives a detailed description of the habitat and associated carabid species at the Thames Barrier site. At Victoria Dock, it has reportedly been found in company with *Ophonus melletii* (Heer).

Conservation status. The conservation status of *B. sclopeta* is contingent on the assessment of native/alien status, an assessment which IAWG regards as unresolved with respect to the London populations discovered from 2005 onwards. The appropriate status category is thus Data Deficient (DD).

Bracteon argenteolum **Vulnerable D2**

Order Coleoptera Family Carabidae

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argenteolum (Ahrens, 1812)

Native/Alien status. Probable Native. There is no reason to question the native status of this species in Northern Ireland, where it inhabited the silty draw-down zone on the shores of Lough Neagh (where it was last recorded in 1932 by G.W. Nicholson (Martin Luff, *in litt*., Feb. 2014)). Its two British localities have both been in similar habitats but created artificially by the industrial extraction of aggregates. The single individual found at Dungeness in 1987 was probably the result of natural immigration. The population discovered in the Suffolk Breckland in 2002-03 would represent an extraordinary feat of natural colonisation. There are observations of carabid beetles having been transported alive in building sand over short distances within Britain (David Nash, pers. comm.) but there is no evidence for a human pathway of introduction from the continent: thus the Cavenham population is also regarded as native.

Distribution. Known from only two British localities. A single, somewhat teneral, female specimen was found by Howard Mendel under a piece of wood on damp, bare sand on the southern margins of the ARC Pit (c. TR072192), Dungeness, East Kent on 15th August 1987 (Mendel, 1991). Though the species has not been recorded again at Dungeness despite considerable survey effort, the circumstances of the 1987 record suggest a locally bred specimen rather than a primary immigrant (Mendel, 1991).

David Nash (2003) discovered a second British locality when he found a single, dead specimen of *B. argenteolum* on “a disused sand extraction site near Cavenham, West Suffolk (TL77)” on 3rd September 2002. Access was arranged to survey the site on 19th August 2003 when a breeding population of *B. argenteolum* was confirmed (Nash, 2007). Since that date there has been no further access to the site for coleopterists.

Habitat and ecology. At Cavenham, the species was found to be reasonably common on wet, treacherous quicksand in an active sand quarry, where water, heavily-laden with silt, was piped onto the silt lagoon. The quicksand micro-habitat at Cavenham was also shared with *Omophron limbatum* (Fabricius, 1777) and *Bembidion pallidipenne* (Illiger, 1802), both species which Mendel (1991) noted as co-occurring with his specimen of *B. argenteolum*. The habitat requirements of *B. argenteolum* may be similar to those of *O. limbatum*, which requires fresh, fine, wet silty or sandy sediments, usually bare of vegetation, and which thrives in new gravel workings but declines within a few years as fine particles are eroded away to a more stable gravel substrate.

Conservation status. Though the species has been recorded from two localities in the modern period, it is probably extinct at Dungeness and if it persists at all at the Cavenham site, which is owned and managed by an aggregates company, it is extremely vulnerable to changes in management (D2). This species qualifies under D2 as it is present in five or fewer locations and is subject to plausible future threats.

The silt lagoons of working sand and gravel quarries are inevitably under-worked by coleopterists. Quarry owners may be reluctant to allow access to their sites because of the fear that protected species may be found, and because of safety concerns regarding fieldwork on quicksand. Thus it is possible that *B. argenteolum* survives, unrecorded, elsewhere in Britain.

Bradycellus distinctus **Endangered B2ab i,ii,iv**

Order Coleoptera Family Carabidae

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distinctus (Dejean, 1829)

Identification. This is one of the smaller and more non-descript carabids. It is similar to the much commoner *B. sharpi* (Joy, 1912). The two species known today as *sharpi* and *distinctus* were confused together under the name *distinctus* by British coleopterists until Joy (1912) described *sharpi* new to science and Sharp (1913) discovered that the true *distinctus* (Dejean, 1829) also occurred in Britain. Although Joy and Sharp resolved the taxonomic confusion, even over 80 years later Luff (1998) was unable to satisfactorily map the distribution of *distinctus* because of lingering confusion with *sharpi*. Erroneous records of *distinctus* are still not infrequent.

Native/Alien status. Native.

Distribution. A coastal species of southern England. In the post-1980 period, *B. distinctus* has been frequently recorded from Dungeness (TR01, East Kent), mostly or entirely from the RSPB reserve. Elsewhere, there are single accepted records from Man Sands (South Devon) in 1985, Blackgang (Isle of Wight) in 1982, Langdon Cliffs in 1983 and Sandwich Bay in 1987 (both East Kent). Other records from the period remain unverified.

Records from the earlier period are more widespread, extending into the south-west to West Cornwall and to Braunton and Lundy Island (both north Devon), and into East Anglia to Walberswick (East Suffolk).

Habitat and ecology. At Dungeness, *B. distinctus* is associated with disturbed, sandy ground supporting short, sparse and varied vegetation, often near water but in relatively dry

microhabitats. Similar habitats presumably yielded the Man Sands, Blackgang and Sandwich Bay records, whereas Langdon Cliffs is a coastal chalk cliff.

Older records appear to come from a broader range of habitats with Lundy Island and Paul (near Newlyn), West Cornwall offering relatively little habitat comparable to Dungeness.

Conservation status. In the post-1980 period, this species has been recorded from only five verified hectads, and Dungeness is probably the only locality where a targeted search for this species could be guaranteed with success (B2a). It has certainly undergone a decline in range (both AOO and EOO) over preceding decades and there is no reason to think that that decline is not continuing to the present day (B2b i,ii,iv).

This species qualifies as Endangered under B2ab i,ii,iv as its current AOO is below 500 km^2 (B2), it now occurs in five or fewer locations (B2a), and it is in decline showing a reduction from between 8 hectads prior to 1980 to 5 hectads post-1980 (B2b ii,iv) and a corresponding contraction in range (B2b i).

Our understanding of the distribution, habitat and ecology of *B. distinctus* in Britain remains somewhat clouded by identification uncertainties. This account has taken a fairly cautious approach to judging records but may still be partially based on erroneous records. It is hoped that Endangered status will provide a spur to coleopterists to resolve those uncertainties.

Callistus lunatus **Critically Endangered B2ab i,ii,iv**

Order Coleoptera Family Carabidae

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lunatus (Fabricius, 1775)

Native/Alien status. Native.

Distribution. This very distinctive species has been recorded from a scatter of sites on the chalk downland of south-east England. On the North Downs, it has been recorded from Box Hill and Mickleham Downs (TQ15, Surrey), Chipstead, Kingswood and Reigate (TQ25, Surrey), and Coulsdon (TQ35, Surrey) eastwards to Otford (TQ55) and Shoreham (TQ56) in West Kent, and to Brook and Wye (TR04), Alkham (TR24) and Folkestone Warren (TR23) in East Kent. Elsewhere, it is only known from Streatley (SU58) on the Berkshire Downs.

The Herbert Art Gallery and Museum, Coventry holds a specimen collected on 3rd July 1929 by A.H. Newton at "Montroe". There are Newton specimens of other species of beetle for Croyde (6th July) and Saunton (9th and 11th July) over the following week, so “Montroe” could be a mistranscription of Morthoe (now Mortehoe) in North Devon (c. SS4545). Alternatively, “Montroe” could refer to Montreaux Farm, Congresbury, Somerset, another county from which Newton collected and in which he could have stopped *en route* to Devon.

Records in recent decades have been very few, with the two most recent being a record from Druid’s Grove, near Box Hill (TQ1553) by K.C. Lewis on 25th August 1964, and a sighting at Juniper Top, Box Hill (TQ1852) by Keith Alexander in 1983. The 1983 individual was seen well but briefly before disappearing into the sward; although no specimen was captured, the circumstances of the sighting (a very distinctive beetle seen by an expert coleopterist familiar with the species from museum collections) mean that there should be no doubt about it.

This beetle, for its extremely attractive appearance and great rarity, has always been an iconic species and highly sought after by British beetle collectors. Correlated with its prize status, there are indications that some records have been kept secret, or that localities have been disseminated in only vague terms. Thus the dataset for this species may be missing some records but there is no credible indication of the species having been recorded in Britain since 1983.

Habitat and ecology. Favouring warm and dry calcareous grassland in Europe and probably especially so in England at the northern edge of its range. In France it can be found throughout the country but is very local, in lowlands and at moderate altitudes, especially in sandy or calcareous areas. It may be found under logs and stones, at the bases of trees, in stumps, under bark and in tufts of vegetation (du Chatenet, 2005). Turin (2000), writing of the Dutch fauna, reports that open, sunny places, bordered by a short, exposed vegetation mosaic, including thyme *Thymus* amongst other plants, are of essential importance for *C. lunatus*.

Conservation status. Known in the modern period from just a single individual seen at Box Hill, Surrey in 1983 (B2a). Formerly more widespread with records for 8 hectads. It clearly underwent a substantial decline in EOO and AOO in the 20th century and there is no reason to think that that decline is not continuing (B2b i,ii,iv). Many would say that this species is probably already extinct in Britain.

This species qualifies as Critically Endangered under B2ab i,ii,iv as its current AOO is below 10 km^2 (B2), it now occurs in no more than 1 location (B2a), and it is in decline showing a reduction from 8 hectads prior to 1980 to 1 hectad post-1980 (B2b i,ii,iv).

Calosoma sycophanta **Data Deficient**

Order Coleoptera Family Carabidae

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sycophanta (Linnaeus, 1758)

Native/Alien status. Probable Native. Most British records are of single adults and these are strongly believed to relate to natural immigrants rather than introductions, at least in large part (Fowler, 1887; Luff, 1988). The record by Miquel (2005) of at least two, probably several, individuals near Thetford, West Suffolk is the only evidence of a breeding population in Britain.

Distribution. In the 19th century, *C. sycophanta* was recorded as an immigrant "rather often" with most records from the coast of East Kent but also from East Sussex, the Isle of Wight and Plymouth (Fowler, 1887). It seems to have occurred as an immigrant much less frequently in the 19th century with only three records: from Dungeness, East Kent in 1963, St Ives, Huntingdonshire on 27th July 1987, and Thursley Common, Surrey in July 1992. The record at Dungeness is clearly attributable to immigration from the continent and fits the pattern described by Fowler (1887) but the inland occurrences in Surrey and St Ives are more unusual places for immigrants to be found and may relate to introduced individuals.

The breeding record was also from an inland site, "near St Edmund Way just south of the River Ouse … in Thetford Forest Park (TL8187)". Fragments of at least two, probably several, adults were found on 20th June 1997, having been predated, almost certainly by a fox. Following the belated publication of this record by Miquel (2005), efforts to locate the

species at the locality using a range of diurnal and nocturnal survey techniques have been unsuccessful (pers. obs.).

Habitat and ecology. *C. sycophanta* is a good climber and a strong flier and forages in the canopy of trees and shrubs where it preys on caterpillars, preferring processionary moths *Thaumetopoea* spp. (Thaumetopoeidae) and tussock moths (Lymantriidae). It has declined very sharply in Germany and neighbouring countries and its remaining forest localities are characterised by a low density of trees (Müller-Motzfeld, 2004).

Conservation status. It could be argued that the Thetford Forest record relates to an established native population, and that subsequent failures to record the species again imply a continuing decline and Critically Endangered status. However, the Thetford Forest record may relate to an introduction, and a further record from the same area would provide much stronger evidence of an established breeding population. Until further evidence is available, it seems best to assign this species to the Data Deficient category.

Carabus convexus **Regionally Extinct**

Order Coleoptera Family Carabidae

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convexus (Fabricius, 1775)

Native/Alien status. Probable Native. Listed as a non-established introduction by Duff (2012a). However, research by James Hogan has uncovered new data and a review of British records (Telfer and Hogan, in prep.) will recommend that *C. convexus* be regarded as a native species in Britain.

Information on the British records of this species is poor, though typical of its era. A single specimen was taken in Winstanley Park, Lancashire in 1836; a series (of at least three) was collected in Longmont Forest, Shropshire prior to 1828; and an undated specimen in the F.W. Hope collection at Oxford University Museum of Natural History (Hope lived from 1797 to 1862) was collected at Elham, East Kent. At least seven other (apparently) British specimens survive in various museum collections, probably from a range of localities.

Distribution. Known with certainty from Winstanley Park, Lancashire, Longmont Forest, Shropshire and Elham, East Kent. There is a specimen labelled “Penshurst”, West Kent in the Sidebotham collection at Manchester Museum. However, Sidebotham's rarer beetle discoveries are tainted with doubt, not least because of his frequent visits to France and confused specimen labelling (Darby, 2009).

Habitat and ecology. There is no direct information on the habitats of British records. On the continent, this species is generally characterised as a forest species, of thin, humid, deciduous and pine forests, forest clearings, parks and gardens. It is eurytopic and mesophilous in eastern Europe, becoming more stenotopic and thermophilic in the north and west. Of particular relevance to Britain, it occurred on warm limestone grasslands and extensively managed fields adjacent to woodland edges in the Netherlands, where it is now probably extinct (Turin *et al*., 2003).

Conservation status. It is inconceivable that such a large, easily found and easily identified carabid could survive undetected in Britain from 1836 to the present, so this species can be safely regarded as extinct.

Carabus monilis **Endangered B2ab ii,iv**

Order Coleoptera Family Carabidae

*monilis (*Fabricius, 1792)
*consitus (*sensu auctt. non Panzer, 1809)
*insularis (*Born, 1908)

Identification. The species should be identifiable with confidence using standard texts but a more detailed treatment is provided by Walters (2009).

Native/Alien status. Native.

Distribution. A widespread species of lowland Britain, extending only sparsely into south-west England and Wales. It reaches its northern limit in Cumberland and County Durham, with single records apiece. Lindroth (1974) and Luff (1998) both noted that *C. monilis* appeared to be in decline. In the post-1980 period, there are records from 64 hectads compared to 174 in the earlier period. These records are scattered seemingly throughout the range of the species, from East Kent to North Devon and northwards to Denbighshire and South-east Yorkshire.

Habitat and ecology. A species of a wide range of open habitats, with post-1980 localities including chalk grassland, limestone grassland, arable fields, garden lawns, village greens, abandoned pasture, seasonally flooded grassland, parkland, quarries and aggregates pits. Most sites appear to be on freely-draining mineral soils, and there is some evidence that it avoids permanently wet peaty ground adjacent to one of its localities. Short, compact turf may be important to allow foraging adults to cover enough ground. If there is any important common feature shared by the habitats at the surviving localities, it may be low (or zero) inputs of fertilisers and pesticides.

As both adult and larva, *C. monilis* is a generalist predator and scavenger of invertebrates including insect larvae, earthworms and molluscs and will also eat fruit (Turin *et al*., 2003).

Conservation status. Of the more widespread carabids, *C. monilis* has declined more than any other, with the lowest Change Index (-3.8) and a Raw Change of -63.4% based on the latest data, despite increased recording effort targeted at this species in recent decades (B2b ii, iv). There are records from 64 hectads in the post-1980 period, which, assuming an average occupancy of 4 km^2 per hectad, gives a total AOO for the period of 256 km^2 (EN B2), though with the continuing local extinctions during recent decades, the current AOO is likely to be much less than this (there are records from only 11 hectads during 2003-14).

This is a flightless species which disperses on foot. The records are very scattered throughout the former range with most localities separated by tens of kilometres leading to a fragmented distribution. That many of the remaining populations are non-viable is clear (a) from the massive decline and (b) from the ongoing decline of all three populations which the author has revisited to conduct targeted monitoring. This fragmentation is here regarded as posing a severely increased extinction risk (B2a).

C. monilis has a small world range in west central Europe (France, Switzerland, Germany, Belgium and the Netherlands, extending marginally into northern Spain and northern Italy). It has been noted as a declining species in Belgium, the Netherlands, Germany and Switzerland (Turin *et al*., 2003).

The principal hypothesis for the substantial decline in this species across most of its world range is that increased mortality due to pesticide use has led to local extinctions (e.g., Turin *et al*. (2003)). As a large, long-lived species, which scavenges dead insects, slugs and snails in both the larval and adult stages, it is clearly likely to scavenge prey killed by insecticides and molluscicides throughout its life. The hypothesis is eminently plausible but remains untested. If this hypothesis is correct, further decline in and fragmentation of the range of *C. monilis* seems likely except on sites which are free from insecticide use and well buffered from adjacent land where insecticides are applied.

Threats. Possibly threatened by the widespread use of fertilisers, insecticides and molluscicides.

Chlaenius nitidulus **Critically Endangered (Possibly Extinct) D**

Order Coleoptera Family Carabidae

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nitidulus (Schrank, 1781)
schrankii (Duftschmid, 1812)
schranki (mis-spelling)

Native/Alien status. Native.

Distribution. Only known from the coasts of Dorset, the Isle of Wight and East Sussex. The sole East Sussex record appears to be of one specimen from Kemp Town, Brighton collected by Dr Power (Fowler, 1887) on 4th November 1857 (GBRS database). Fowler (1887) also reported a record from "Luccombe Chine, Isle of Wight, in some numbers (G. Lewis)". I have no details of other records for the Isle of Wight but the existence of specimens from the Isle of Wight in the collections of W.A. Power and G.C. Champion may indicate that these gentlemen subsequently visited Lewis' locality and collected specimens of their own, or merely that they were given specimens by Lewis. Allen and Nicholson (1924) note that *C. nitidulus* was "thought to have become extinct since the disappearance of its old habitat in the Isle of Wight into the sea many years ago". The same authors reported their discovery of a population of *C. nitidulus* on the Dorset coast, apparently the first record for the county. Though Allen and Nicholson (1924) gave nothing away about the locality, it is now widely thought to have been near Charmouth, probably on Black Ven to the west of the town. The GBRS database holds records from Charmouth for subsequent years by H. Donisthorpe, E.C. Bedwell and P. Harwood. Though it has been reported that the last British record was made in 1930 (Shirt, 1987; Hyman and Parsons, 1992; Luff, 2007; Duff; 2012b), the last known British specimen was collected on 17th April 1933 by Philip Harwood.

Habitat and ecology. Restricted to damp seepages on coastal soft-rock cliffs. The two more commonly found British species of *Chlaenius* (*nigricornis* and *vestitus*) are strongly nocturnal in their activity and can be surveyed by torchlight, hunting over bare, damp substrates on water margins or seepages. Diurnal survey of the same areas must attempt to find the beetles by looking under logs and stones, searching in vegetation, or driving them from their resting places by trampling or splashing, and is substantially less effective. Fowler (1887) describes the species as being "found in damp places in moss, &c." and Lindroth (1974) similarly notes "among grasses and mosses in silty and damp places; coastal", both authors doubtless referring to the diurnal sheltering sites favoured by the beetles. Allen and Nicholson (1924) discovered "a few specimens of it running in the sunshine upon a patch of

wet sand … and eventually secured some twenty by scraping and digging in the mud cracks close by".

Conservation status. The species is probably extinct in Britain: a population size estimate of zero individuals can be made with reasonable confidence (D). Nevertheless, there is a chance that this species survives undetected somewhere on the coast of Britain. Allen and Nicholson (1924) noted "apparently it is exceedingly local, since we failed to find it in other places which appeared to us to be identical in character" and the very fact that it evaded discovery in Dorset until 1924 shows that this can be a difficult species to find. If *C. nitidulus* exhibits the same strongly nocturnal activity as its congeners, then torchlight survey of suitable habitat may be the best way to rediscover this species in Britain, though clearly the potential risks of nocturnal fieldwork on maritime cliffs make it unlikely that that theory will be tested.

Chlaenius tristis **Vulnerable D2**

Order Coleoptera Family Carabidae

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tristis (Schaller, 1783)
holosericeus (Fabricius, 1787)

Identification. This species is keyed by Luff (2007) and Duff (2012b). This is essentially a black *Chlaenius*, usually easily distinguished from others in the genus which are predominantly metallic green. However, confusion may occur with un-metallic specimens of *C. nigricornis* and Fowler (1887) recognised that some of the records known to him may have been thus misidentified.

Native/Alien status. Native.

Distribution. Fowler (1887) reported the following records: "Fen Ditton, Berks, and Whittlesea Mere [Huntingdonshire] (Stephens); Hornsea, Yorkshire, and Norfolk (Skrimshire); Mr. W. Garneys has recorded a specimen (doubtfully) from Repton. Dr. Power some years ago took twelve specimens at Burwell Fen [Cambridgeshire]". Hodge (1997) includes a detailed review of these and other early records including a record from Isleham, Cambridgeshire prior to 1856 and from "Reche Fen" (presumably Reach Fen, and possibly synonymous with Burwell Fen") on 21st May 1833. Although information on these 19th century records is typically scant, the latest English record appears to be from Burwell Fen by Dr Power which Hodge (1997) thought to be from the 1860s.

The only accepted British records subsequent to Fowler (1887) have been from Cors Geirch NNR, on the Lleyn peninsula of Caernarvonshire, where it was discovered in 1976 and was found to be widely distributed across the site in 2009 (Boyce, 2010).

The species still occurs at a few localities in the Republic of Ireland.

Habitat and ecology. At its former English sites, *C. tristis* probably occupied very wet fen and mire habitats, especially those where the groundwater is markedly calcareous. At Cors Geirch, "sites in which the species was present were generally very wet calcareous fen with moderately open vegetation and patches of bare peat and brown moss hummocks. No beetles were recorded in areas with tall fen habitats" (Boyce, 2010).

Conservation status. In the 19th century *C. tristis* was more widespread in southern and eastern England, though still very rare and had apparently become extinct in the region well

before the end of the century. It now occurs in only a single modern locality, Cors Geirch, of less than 10 km^2. Despite the pattern of local extinctions elsewhere in Britain, its range has probably been stable at Cors Geirch in recent decades. The maintenance of suitable habitat for *C. tristis* at Cors Geirch is dependent on suitable habitat management, either by the creation of scrapes to leave areas of bare, wet peat, or heavy grazing and poaching pressure exerted by ponies. Here *C. tristis* is regarded as Vulnerable (D2) on the basis that any change, lapse or cessation of management could quickly result in the species becoming Critically Endangered. This species qualifies under D2 as it is present in five or fewer locations and is subject to plausible future threats.

Cicindela hybrida **Vulnerable D2**

Order Coleoptera Family Carabidae

hybrida (Linnaeus, 1758)

Identification. There has been confusion between this species and *C. maritima*, partly from the two being regarded as conspecific varieties or subspecies in the early 20th century. There should be little scope for confusion using the texts available to coleopterists today. Identification is particularly well covered by Walters (2013).

Native/Alien status. Native.

Distribution. This species is restricted to coastal sand dunes in northwest England where it is now believed to occur in just two areas: the Sefton Coast of Merseyside and Drigg Dunes in Cumbria. There are old records from additional sites at Wallasey and Carnforth in Lancashire, and reportedly also from Walney Island, Cumbria in 1872. In both the Sefton coast and Drigg Dunes populations, numbers of adults indicate viable populations, with 280 adults recorded on the Sefton Coast over 31 visits from April to October 2010, and 1,570 adults recorded on Drigg Dunes over three visits during 2013 (Hewitt and Thomas, 2013).

Habitat and ecology. Most records are from mobile fore-dunes but *C. hybrida* may also be found along sandy tracks, on eroded fixed dunes, in 'blow-outs' and wherever there is extensive open sand (Judd, 2010). There are even records from sandy clearings in pine plantations on the Sefton coast. Judd (2010) provides extensive information on the autecology of this species.

Conservation status. *C. hybrida* is known from four hectads in the post-1980 period. Though it has been lost from some localities in the past, there is no evidence of a continuing decline into the modern period. However, *C. hybrida* is a vulnerable species (D2) requiring robust protection of its remaining sites from development pressures and from coastal engineering, as well as ongoing sympathetic habitat management and management of recreational pressures (Judd, 2010; Walters, 2013; Hewitt and Thomas, 2013). This species qualifies under D2 as it is present in five or fewer locations and is subject to plausible future threats (see below).

Threats. Development, coastal engineering, unsympathetic habitat management and unsympathetic management of recreational pressures. Presumably also foredune erosion due to changes in sand supply and stabilisation of fixed dunes.

Cicindela sylvatica	**Endangered B2ab i,ii,iv**
Order Coleoptera	Family Carabidae

sylvatica (Linnaeus, 1758)
silvatica auctt. (misspelling)

Identification. This should be a straightforward species to identify and is particularly well covered by Walters (2013). Nevertheless, doubtful records of *C. sylvatica* are surprisingly frequent, including from Scotland, perhaps as a result of confusion with the black variety *funebris* of *C. campestris* Linnaeus.

Native/Alien status. Native.

Distribution. The distribution of this species has been covered in detail by Dodd (2011a, 2011b): "currently … restricted to a narrow area of occupancy across the lowland heathland of southern England [with] confirmed sites in west Surrey, localised areas of [South and] North Hampshire and the Purbeck and Lulworth areas of Dorset". Dodd (2011a, 2011b) mapped all records of *C. sylvatica* at hectad scale showing many formerly occupied hectads within the same spread of southern heathland, extending into Berkshire (last recorded 1921) and West Sussex (last recorded 1993, successfully reintroduced in 2007). Outlying localities include North Lincolnshire (1843 - 1926), East Suffolk (1797), West Kent (1873) and West Gloucestershire (c. 1880 - 1900), as well as more or less dubious records from Cambridgeshire (pre-1887), East Kent (1884) and South Essex (pre-1900).

Habitat and ecology. *C. sylvatica* is a stenotopic species of patches of bare ground on drier, compact sandy soils within lowland heathland habitat. Localities include tracks, firebreaks and bare ground created by military training activities. Larvae and adults are opportunistic predators taking a wide range of invertebrate prey (Dodd, 2011b).

Conservation status. *C. sylvatica* has been recorded from 20 hectads in the post-1980 period. In six of these hectads, surveys have established with reasonable confidence that the species is locally extinct, indeed from two of them the extinction probably occurred in the earlier period as the only post-1980 records are probably erroneous. *C. sylvatica* was reintroduced to one of these hectads (Iping Common, East Sussex) in 2007 and has been successfully re-established. It has also been successfully introduced to Brentmoor Heath, Surrey. Thus the best current estimate is that this species occurs in 16 hectads, with an AOO certainly less than 500 km^2 (EN B2).

C. sylvatica has been declining during the 20th century, as shown by the large negative Change Index of -1.82, and a large negative Raw Change (B2b ii,iv). It was recorded from 38 hectads in the earlier period, now reduced to 14, plus two other hectads to which it has been introduced. There has been a corresponding decline in EOO, with local extinctions from several outlying counties (B2b i).

C. sylvatica would fit the criteria as an Endangered species under B2ab if it were a 'severely fragmented' species, by the IUCN definition of that term. A rigorous assessment of 'severe fragmentation' requires data on the size and viability of all populations, and data on the probability of gene flow between populations. Such data are not available even for *C. sylvatica*, one of the better studied species amongst Britain's rarer carabids. However, based on the best available data, the assessment by Scotty Dodd (*in litt*., March 2014) is that the Dorset metapopulation in six contiguous hectads is viable and with fairly good

connectivity between many localities. However, in the remainder of the range, in Hampshire and Surrey, representing 10 of the 16 occupied hectads (62.5%), many populations are small, isolated by considerable distances and separated by land which is highly unsuitable for dispersal (urban areas, major roads, conifer plantations, secondary woodland). Even within heathland sites, a maximum dispersal distance of only 192 m was found by Dodd (2011a). Furthermore, the chronology of extinctions of *C. sylvatica* from former localities is clearly correlated with urban expansions and major road construction. Thus, there is reasonable evidence for an increased extinction risk from severe fragmentation of *C. sylvatica* populations in the past, present and future (B2a) and the species is assessed as Endangered.

Threats. Cessation of current targeted conservation work, increased fragmentation of remaining localities, unsympathetic habitat management particularly relating to paths and tracks.

Cylindera germanica **Vulnerable D2**

Order Coleoptera Family Carabidae

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germanica (Linnaeus, 1758)

Identification. This is not a difficult species to identify but is particularly well covered by Walters (2013).

Native/Alien status. Native.

Distribution. The range of *C. germanica* in the post-1980 period extends along two stretches of the south coast of England: from Branscombe, South Devon eastwards to Eype's Mouth, Dorset, and on the soft cliffs of the Isle of Wight between Whale Chine and Blackgang Chine. Within this range, "about 24 colonies … are currently known" (Walters, 2013) though for the purposes of status assessment, the species could be regarded as occurring in only two locations.

In earlier times, *C. germanica* was also known from further afield: Llanstephan, Carmarthenshire in 1954, and Darenth Wood, Kent in the 19th century (Fowler, 1887; Else, 1993). There have also been some losses on the English south coast, from Swanage (Dorset) and Ryde (Isle of Wight) where the species was recorded in the 19th century but not since, and from Barton on Sea (South Hampshire) and Shanklin (Isle of Wight) where the beetle was recorded into the early decades of the 20th century but not since 1950 (Else, 1993). The paper by Else (1993) gives a thorough review of the records known at that time.

Habitat and ecology. *C. germanica* is associated with bare, damp, sparsely-vegetated ground near freshwater seepages on coastal landslips. The adult beetles are usually to be found on the lowest cliff terraces or at the base of the cliffs. The distinctive larval burrows can be numerous in the same habitats in which the adults are found.

Conservation status. In the post-1980 period, *C. germanica* has been recorded from only four hectads. Its geographic range has contracted in the past but appears currently to be stable. This species is considered to be Vulnerable because of the threats to its soft-rock cliff habitat, from coastal engineering, changing hydrology (referring to the water feeding the seepages on the cliff face), and from inappropriate land use inland of the eroding cliff face

(D2). This species qualifies under D2 as it is present in five or fewer locations and is subject to plausible future threats (see below).

Threats. Cliff stabilisation and sea defence work (Walters, 2013). Although most localities are unlikely to be directly threatened by coastal engineering works, the potential remains for indirect impacts from works elsewhere on the coast.

Cymindis macularis **Vulnerable D2**

Order Coleoptera Family Carabidae

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macularis (Mannerheim in Fischer von Waldheim, 1824)

Identification. The species should be identifiable with confidence using standard texts but Hammond (1982) provides additional identification pointers.

Native/Alien status. Native.

Distribution. Records are restricted to the Breckland of West Suffolk with only three localities in two hectads: Barton Mills and Icklingham Plains in TL77 and Thetford Warren Lodge (c. TL8484). The species was first recognised from Britain by Peter Hammond (1982) based on a single head found in a sample of pellets and droppings from an autumn roost of some 40 Stone-curlews *Burhinus oedicnemus* (Linnaeus) collected in September 1980 "near Icklingham". The birds' pellets and droppings may contain prey items captured several kilometres away. Subsequently, Alex Williams (1984) realised that he had collected *C. macularis* at Barton Mills on 20th June 1966, though his specimen had remained unidentified in the meantime. Williams (1984) recalled passing one or more spare specimens to A.M. Massee, his companion in the field that day. There is a specimen of *C. macularis* in the Massee collection (held by the British Entomological and Natural History Society) from Barton Mills in 1966 but dated (perhaps erroneously) 7th August. Finally, *C. macularis* was discovered in a small area of heathland adjacent to Thetford Warren Lodge. Records from this locality span the period 1989 to 2003.

Habitat and ecology. *C. macularis* is strongly associated with open habitats on sandy soils and probably also strongly favours the steppe-like climatic conditions of Breckland (Hammond, 1982). The Barton Mills record was "by grubbing at the roots of mixed plants growing on a bank of earth thrown up, perhaps a year previously [i.e. in 1965], when the canal was dredged" (Williams, 1984). Thetford Warren Lodge is a very unusual sandy heathland with mature, open-grown, dome-shaped heather *Calluna vulgaris* growing amongst bare ground, moss-carpets and lichen-carpets, as well as areas of close-grown heather and grassland areas. *C. macularis* has usually been found by lifting and looking under spreading heather plants. The four individuals seen between 2355 and 0150 on the hot and humid night of 18-19 August 2003 were all on the ground surface on a lightly-trampled path edge of very short moss and lichen heath (pers. obs.).

Conservation status. There are only two known post-1980 localities: Icklingham Plains and Thetford Warren Lodge. At Thetford Warren Lodge it appears to have become much harder to find than when it was first discovered there and has not been recorded there since 2003; this probably indicates a decline at that site. However, this is clearly also an elusive species so there can be no certainty that it is undergoing continuing decline in range. It is nevertheless a threatened species, vulnerable to inappropriate land management and

extrinsic factors such as nutrient deposition and climatic change (D2). This species qualifies under D2 as it is present in five or fewer locations and is subject to plausible future threats.

Diachromus germanus **Vulnerable D2**

Order Coleoptera Family Carabidae

germanus (Linnaeus, 1758)

Native/Alien status. Probable Native. A review of British records by Woodcock *et al*. (2003) found that it was an established species in Britain for much of the 19th century with records from 1816 to 1904, probably supplemented to some extent by natural immigrants. There were no further records until 2002 (Battle, East Sussex) since when there have been at least three more localities discovered in East Kent and East Sussex by 2013, and one on the Isle of Wight. This species appears now to have re-established in Britain, probably following natural immigration.

Distribution. The British records of *D. germanus* were thoroughly reviewed by Woodcock *et al*. (2003) who provide a distribution map. During 1816 to 1904, the species was recorded from six hectads in five vice-counties (West Cornwall, South Devon, Isle of Wight, East Sussex and East Kent). The species was rediscovered close to Sprays Wood (TQ71), near Battle, East Sussex on 10th September 2002 (Woodcock *et al*., 2003). A single individual was found at Graveney Marshes (TR0464), near Faversham, East Kent on 30th March 2009 (Harrison, 2010). On 24th June 2013, one was found at The Moor Hill, Hawkhurst (TQ7640229769), East Kent, and the following day, one was found at Peasmarsh, in the Rother Valley of East Sussex, at TQ892240.

Habitat and ecology. On the continent, *D. germanus* has been found in meadows and in arable fields (Woodcock *et al*., 2003). The adults feed at least partly on pollen and seeds and may be expected to share similar general habitat preferences to species of *Harpalus* and *Ophonus,* occurring in open habitats with an element of bare and disturbed ground favouring the growth of a range of ruderal plants. Recent British records come from suction sampling in a former arable field in its second year of set-aside, from sweep-netting in long grass in mixed farmland, from sweep-netting on coastal cliff-top grassland, and from a reed-choked dyke at the edge of an arable field.

Conservation status. There were no records between 1904 and 2002. Following its rediscovery at Battle, East Sussex in 2002 (Woodcock *et al*., 2003) there have been at least three more localities discovered in East Kent and East Sussex by 2013. Although a continuation of the current trend for expansion of EOO and AOO seems likely, there is a plausible threat of another extinction, as happened in the early 20th century (D2). This species qualifies under D2 as it is present in five or fewer locations and is subject to plausible future threats.

Drypta dentata **Endangered B2ab i,ii,iv**

Order Coleoptera Family Carabidae

dentata (Rossi, 1790)
emarginata (Olivier, 1790)

Native/Alien status. Native.

Distribution. In the 19th century this species was recorded from scattered coastal localities from the Medway in north Kent round to Lyme Regis, Dorset, including records from West Kent, East Kent, East Sussex, South Hampshire and the Isle of Wight (Fowler, 1887). By contrast, 20th century records have been restricted to Dorset, the Isle of Wight and South Hampshire. The sole Hampshire record from the 20th century was from Highcliffe to Milford Cliffs SSSI by A.E. Gardner at some date in the 1960s (data from the Invertebrate Site Register). On the Isle of Wight, *Drypta* was found at Luccombe Chine in the early decades of the 20th century, and was discovered at Whitecliff Bay in 1987, being seen there again in 1988 (Appleton, 2004). There appear to be no subsequent records from the Isle of Wight, despite a targeted search at Whitecliff Bay (pers. obs.). In Dorset, it was recorded from the Lyme Regis and Charmouth area up to about 1945 but not since; from Brownsea Island in 1977 and still present in 2007 (Salmon, 2009); and at Eype undercliffs from 1989 onwards. At the latter locality it has been recorded quite frequently.

Habitat and ecology. Found amongst Common Reed *Phragmites australis* (Cav.) Trin. ex Steud. in damp seepages on soft-rock cliffs. All of nine adults found on 4th May 2002 at Eype undercliffs were found by searching amongst reed (pers. obs.). In these undercliff situations, reed may grow in quite small, sparse patches over areas of accreting silt, otherwise bare of vegetation. *D. dentata* is a predatory species and has been observed hunting by climbing up and down reed stems and leaves, and has been seen to catch and consume a nymphal leafhopper Auchenorrhyncha (pers. obs.).

Conservation status. Known from three post-1980 hectads (B2a). The species has experienced a large historic decline in AOO and EOO. Since 1980 it seems to have been lost from the Isle of Wight and is thus regarded here as a species in continuing decline (B2b i,ii,iv).

This species qualifies as Endangered under B2ab ii,iv as its current AOO is below 500 km^2 (B2), it now occurs in five or fewer locations (B2a), its range has contracted (B2b i) and it is in decline with a large negative Raw Change of -57.1% (B2b ii,iv).

Dyschirius extensus **Critically Endangered (Possibly Extinct) D**

Order Coleoptera Family Carabidae

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extensus (Putzeys, 1846)
elongatulus (Dawson, 1856)

Native/Alien status. Native.

Distribution. Reliably known only from two localities: Deal, East Kent (TR35 and/or TR36), and Clacton-on-Sea/ St Osyth/ Colne Estuary, North Essex (TM01 and/or TM11). The first British record was reported by Dawson (1856): “Two examples were captured by Mr. Syme, in April, 1855, on a damp spot of ground near Sandown Castle, Deal [TR375543], beneath stones, in company with a number of *D. salinus*” Schaum, 1843. Fowler (1887) also notes records from Shoreham and Lancing (both West Sussex) and from near Folkestone (East Kent), all of which are likely also to be correct. The last British record was in 1940 from Deal and Luff (1998) already felt that this species "may now be extinct in Britain".

Habitat and ecology. *D. extensus* appears to be typical of *Dyschirius* species in inhabiting damp, consolidated, sandy or silty ground, generally bare or very sparsely-vegetated, where it lives in burrows and preys on species of the staphylinid genus *Bledius* to at least some

extent. In the case of *D. extensus*, it has only been found on the coast in Britain, whereas other species of *Dyschirius* may occur in freshwater habitats. Dawson (1856) notes an occurrence "in company with a number of *D. salinus*". Fowler (1887) reports an observation "in company with *Bledius tricornis* (Herbst, 1784), not molesting the *Bledius*, but devouring ants which abounded in the vicinity". Walker (1900) gives valuable insight into the habitat at Deal, as follows: "Searching in damp places is also most remunerative, though the best of these, at the commencement of the sandhills close to the site of Sandown Castle, has long been dried up, and several interesting species which used to occur there, such as *Anisodactylus poeciloides*, *Stenolophus elegans* [now *Acupalpus elegans*], and others, have not been taken for many years. It was here, too, that *Dyschirius extensus* Putz. (= *elongatulus* Daws.), still one of the rarest of our British Carabidae, was discovered as British in 1854, but this has been more recently taken by myself and others under rejectamenta in saline spots near the First Battery".

Conservation status. The species is probably extinct in Britain: a population size estimate of zero individuals can be made with reasonable confidence (D). Nevertheless, there remains a chance that this species may yet be rediscovered in Britain, as demonstrated by Dawson's (1856) comments on the original capture: "It was captured (I would observe) not in a new and unexplored locality, but on a spot of damp ground frequently and carefully searched in previous years, by myself and others, and one which I had indicated to Mr. Syme as being a favourite resort of the Dyschirii. In the very same hollow and beneath the very stones which had in those previous years been found to yield a good harvest of insects (though not perhaps at that precise season), this new British *Dyschirius* unexpectedly made its appearance. And I seize upon this fact as offering a fresh inducement to Entomologists by no means to relax their efforts in the examination of known and frequented localities, under the impression that their stores of species must have been exhausted, nor to confine their labours to one or two particular seasons of the year, since even in such places, as it is seen, novelties may eventually turn up to reward their assiduity".

Dyschirius obscurus **Endangered B2ab ii,iv**

Order Coleoptera Family Carabidae

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obscurus (Gyllenhal, 1827)

Identification. Separation from *D. thoracicus* has proved to be more problematic than allowed for by Lindroth (1974) and Luff (2007). Tunnelling in sand abrades the surface of *Dyschirius* such that dull individuals of *thoracicus* are not uncommon and have often been mistaken for *obscurus*, though in the latter the dull appearance is caused by microsculpture rather than scratches. The key by Duff (2012) separates these two species well.

Native/Alien status. Native.

Distribution. None of the records of *D. obscurus* from Norfolk and Suffolk are now regarded as acceptable following the review by Collier and Lane (2013). Some have been shown to be worn specimens of *D. thoracicus* which resemble the dull appearance of *D. obscurus*, and the same identification pitfall is presumed to explain all the remaining records.

Acceptable records of *D. obscurus* come from two adjacent hectads at Dungeness (East Kent), from nearby Rye Harbour (East Sussex) and from Maidstone and Aylesford in

northern East Kent. *D. obscurus* was first recorded at Rye Harbour in 1969 (Shephard, 1970) and soon after was detected at Lydd (Dungeness) and Aylesford.

The GBRS database holds no records for the Aylesford hectad since 1972, none for Rye Harbour in the modern period and none for Dungeness since 2005. The species is probably extinct at Aylesford and probably under-reported at Rye Harbour. At Dungeness, repeated survey of some of its former sites has failed to find it since 2005 so it is certainly a species in decline at Dungeness, if not locally extinct.

D. obscurus also occurs on the fine, sandy beaches of Lough Neagh in Northern Ireland.

Habitat and ecology. Requires damp, fine sand on beaches or pit margins. It builds tunnels in the sand and probably favours the combination of particle size and moisture content which allows stable tunnels to be constructed. In common with others of the genus, *D. obscurus* has a close predatory association with species of the staphylinid genus *Bledius*, notably *B.* fergussoni Joy, 1912. *D. obscurus* may occur alongside other carabids with similarly specialist habitat requirements including *Bracteon argenteolum*, *Omophron limbatum* and *Bembidion pallidipenne*.

Conservation status. This species appears to occur at no more than two localities (B2a) and to be undergoing a continuing decline in AOO (B2b ii,iv), hence Endangered status is appropriate. If the absence of more recent records from Rye Harbour and Dungeness is not the result of under-recording, as assumed here, then Critically Endangered status would be appropriate.

This species qualifies as Endangered under B2ab ii,iv as its current AOO is below 500 km^2 (B2), it now occurs in five or fewer locations (B2a), and it is in decline with a large negative Raw Change of -50.0% (B2b ii,iv).

Threats. Water margin habitats at Dungeness are vulnerable to uncontrolled fluctuations in water levels, to rapid succession, and to invasion by *Crassula helmsii* (Kirk) Cockayne. In the longer term, the cessation of aggregates extraction at Dungeness will end the supply of newly excavated, bare pit margins, though the RSPB is developing management techniques to maintain early-successional conditions on pit margins.

Eurynebria complanata **Endangered B2b i,ii,iv c iv**

Order Coleoptera Family Carabidae

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complanata (Linnaeus, 1767)

Native/Alien status. Native.

Distribution. Nearly all the recorded localities are from the beaches of the Bristol Channel (in the widest sense) extending westwards to Broad Haven on the Pembrokeshire coast and Bude on the north coast of East Cornwall, and reaching up the channel as far as Barry Island on the Glamorganshire coast and Brean on the North Somerset coast. Further afield, the only other record is from Barmouth, Merionethshire on 1st July 1913.

In the post-1980 period, it has been recorded from 10 hectads in South Wales (in Pembrokeshire, Carmarthenshire and Glamorganshire) and from just two hectads in south-west England (Braunton Burrows (SS43) and Berrow Dunes (ST25)). Though regularly reported from Braunton Burrows throughout the latter half of the 20th century, it was last

recorded there on 26th June 2002 and several coleopterists have reported its apparent absence where once it could be reliably found. The last record for Berrow was in 1994 where "it is believed to have become extinct … following council beach-cleaning operations" (Duff and Boyce, 2010). There have been similar reports of the absence of *E. complanata* from former sites in South Wales, including Pembrey Burrows, Kenfig and Crymlyn Burrows (all localities with post-1980 records) by coleopterists who had personally found the species easily and reliably at those sites in the past (Steve Bolchover and Steve McWilliam via the beetles-britishisles email group, August 2013). It is now therefore known from only seven locations and is declining fast. Monitoring of *E. complanata* on the Castlemartin coast of Pembrokeshire in 2007 failed to find the species at Freshwater West, another locality with post-1980 records, and recorded a population reduction of "some concern" at Frainslake Sands (Gibbs, 2008).

On the east coast of Ireland, there appear to have been no records of *E. complanata* since 2006 but here the absence of records may merely reflect an absence of survey effort (Roy Anderson, pers. comm., 2014). In Britain, there is an emerging picture of local extinctions throughout the species range corroborated by several different observers. A survey of all recent sites is required to establish the current distribution of this species.

Habitat and ecology. By day *E. complanata* is typically, perhaps even exclusively, found sheltering beneath large debris on the strandlines of broad sandy beaches which back onto sand dunes. Gibbs (2008) showed a clear preference in *E. complanata* for sheltering under plastic items (e.g., large plastic drums, plastic fishing crates) rather than wooden items, and found that *E. complanata* sheltered under debris between 3 and 15 m from the dunes. Gibbs (2008) trialled nocturnal survey for *E. complanata* but only saw a single adult, which was "hunting between its daytime refuge and the pioneer dunes close behind the beach". Access for the beetles into the dunes seems to be important: the gently-sloping front of an accreting dune would allow beetles to walk into the dunes whereas the small cliff-face of a dune front that is being eroded backwards may present a significant barrier to movement.

Conservation status. Known from seven locations and declining. There is evidence of a long-term decline and contraction of range in *E. complanata* comparing the pre- and post-1980 periods (B2b i, ii, iv). The decline is continuing, with further sudden losses since 1980, including from large sites under conservation management. Monitoring work on the population at Frainslake Sands, reported by Gibbs (2008) shows annual counts varying from 314 to 17 adults, suggesting that this species also undergoes extreme fluctuations that place each population at risk of local extinction (B2c iv). With an estimated British AOO of 48 km^2 (substantially less than 500 km^2), this is an Endangered species.

This species qualifies as Endangered under B2b i,ii,iv c iv as its current AOO is below 500 km^2 (B2), it is in decline with a reduction from at least 15 locations prior to 1980 to seven current locations (B2b ii,iv) with a substantial contraction in range (B2b i), and it undergoes extreme fluctuations in numbers of adults (B2c iv).

Threats. Beach-cleaning has been implicated in the loss of the population at Berrow (Duff and Boyce, 2010). The removal or burning of driftwood could also threaten this species.

Harpalus cupreus **Critically Endangered (Possibly Extinct) D**

Order Coleoptera Family Carabidae

cupreus (Dejean, 1829)

Native/Alien status. Probable Native. Lindroth (1974) appears to have been the first to query whether this species is native to Britain, presumably on the basis of its small geographic range and its extinction. Here it is regarded as a probably extinct, probably native species with a small historical range.

Distribution. The first British record of this species was "on shores of Thames, below Gravesend" (Stephens, 1839), though Fowler (1887) stated that "this may have been in error" and subsequent authors have followed Fowler's opinion. From the late 19th century, this species was found to be established at widely scattered localities on the Isle of Wight (Ryde, Cowes and Sandown (Fowler, 1887); also Bembridge and Alverstone (Hyman and Parsons, 1992)). It was last recorded on 10th July 1914 at Sandown and there has been no subsequent British record.

Habitat and ecology. There appears to be little published information on habitats used in Britain; Lindroth (1974) notes “found repeatedly about the edges of a field at Sandown” and Luff (1998) notes “it occurred on arable land and in field margins”. By analogy to other members of the genus *Harpalus*, it probably favours dry, well-insolated sites on light chalky or sandy soils, with frequent soil disturbance creating a friable substrate, and supporting a diverse range of ruderal plants producing abundant seed.

Conservation status. The species is probably extinct in Britain: a population size estimate of zero individuals can be made with reasonable confidence (D). Nevertheless, the author is not aware of any targeted attempt having been made to rediscover this species on the Isle of Wight, and the possibility remains that the absence of records since 1914 reflects an absence of survey effort.

Harpalus honestus **Vulnerable D2**

Order Coleoptera Family Carabidae

honestus (Duftschmid, 1812)
ignavus (Duftschmid, 1812)

Identification. This species was regarded as a variety of Sturm, 1818 by early British authors including Fowler (1887). Its treatment as a distinct species was settled by Allen (1965).

Native/Alien status. Native. At its sole extant site (St Bees Head), *H. honestus* is here regarded as probably native, although Luff *et al*. (1997) argued that “it seems unlikely, to put it mildly, that *H. honestus* has been present and undetected on the Cumbrian coast since detailed recordings of our beetle fauna started”, and thus that “the most probable origin of the present population would seem to be via the nearby port of Whitehaven”. However, the author favours the view that *H. honestus* occurs as an isolated native population on the south-facing soft-rock cliff slippages in the southern part of St Bees Head, over 6 km distant from Whitehaven docks. Since its discovery, this population has persisted but remains restricted to this small area of specialised natural habitat. It seems increasingly

likely that it has persisted here since the beginnings of beetle recording, unseen or unrecognised until 1994.

Distribution. There were no British records of this species for much of the 20th century until it was discovered on sandy cliff slippages at St Bees Head, Cumberland on 22nd May 1994 (Luff *et al*., 1997). It has continued to be reported from this area by the occasional visiting coleopterist.

Until its discovery at St Bees Head, the species had been known only from southern England. Allen (1965) reviewed the British records and concluded that there were only two of which he could be confident: three collected on the chalk-hills at Streatley, Berkshire in August 1905, and a female from Charlton, West Kent from about 1795. Lindroth (1972) also reviewed British records of *H. honestus* and confirmed Allen's opinion. Luff *et al*. (1997) also discuss previous British records of *H. honestus* and conform to the view that the only confirmed records are for Streatley and Charlton.

Luff (1998) mapped *H. honestus* as occurring in three additional hectads in Oxfordshire and five hectads on the south-west coast from South Somerset to the south coast of East Cornwall, including the Isles of Scilly. All of these records pre-date the reviews by Allen (1965) and Lindroth (1972) and should thus be regarded as doubtful. The Oxfordshire records were apparently compiled by J.M. Campbell, and given that they were not included in the atlas of Oxfordshire Carabidae (Whitton and Campbell, 1991) it seems clear that they would have been best omitted from the national atlas.

There are additional doubtful records of *H. honestus* from the New Forest, South Hampshire, Wicken Fen, Cambridgeshire, Box Hill, Surrey and Foxhall, Suffolk for which it would be desirable to seek confirmation one way or the other.

Habitat and ecology. At St Bees head, the beetles occur on eroding patches of cliff-face and amongst eroded sand and stones at the base of the cliff. They have been found under mats of Sea Campion *Silene maritima*. By analogy to other members of the genus, it is likely that they feed predominantly upon seeds and prefer open habitats with bare, disturbed ground that promote the growth and seeding of ruderal plants.

Conservation status. This species occurs in a single modern locality of less than 10 km^2. It has always been a very rare beetle in Britain. There is no evidence that the range or population size at St Bees Head is other than stable so the species does not qualify for Critically Endangered or Endangered. However, there are plausible threats to the species from coastal dynamics and vegetation succession which mean that it is Vulnerable (D2). This species qualifies under D2 as it is present in five or fewer locations and is subject to plausible future threats.

Harpalus melancholicus **Endangered B2ab i,ii,iv**

Order Coleoptera Family Carabidae

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melancholicus (Dejean, 1829)

Native/Alien status. Native.

Distribution. Prior to 1980, this species was recorded from a scatter of mostly coastal localities in southern England and South Wales from the following vice-counties: Glamorgan, North Somerset, West Cornwall (2 localities), "Plymouth" (South Devon or East Cornwall),

Dorset, the Isle of Wight, East Kent, West Kent, South Essex and Oxfordshire. A few of these records were made in the 1950s and 1960s but there were no British records from 1964 until the discovery of a new locality at Stackpole Warren, Pembrokeshire, in July 1992 (Harrison, 1994). There has been at least one successful attempt to re-find the species at Stackpole Warren though it has only been seen in ones and twos. The only other locality from the post-1980 period is Bewl Water Sussex Wildlife Trust Reserve, where one was captured at a light trap at TQ683337 on the West Kent/East Sussex border on the night of 12th/13th August 2003. The Bewl Water specimen could indicate a local population but may have been dispersing from further afield, or could even have been an immigrant from the continent.

Habitat and ecology. At Stackpole Warren, *H. melancholicus* has been found "under stones on more or less bare sand with *Thymus* sp., in an area of sand dunes where the limestone bedrock formed an exposed outcrop" (Harrison, 1994).

Conservation status. *H. melancholicus* has been recorded from only two British localities in the post-1980 period (B2a). At one of these (Stackpole) it is certainly established (though searches in the past decade have failed to find it) but at Bewl Water only a single individual has been recorded and could relate to a migrant. This species has experienced a substantial historical decline in range which may be continuing into the modern period (B2b i,ii,iv).

This species qualifies as Endangered under B2ab i,ii,iv as its current AOO is below 500 km^2 (B2), it now occurs in five or fewer locations (B2a), and it is in decline with a large negative Change Index of -0.85 (B2b ii,iv) and a substantial contraction of range (B2b i).

Lebia cruxminor **Endangered B2ab ii,iv**

Order Coleoptera Family Carabidae

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cruxminor (Linnaeus, 1758)

Native/Alien status. Native.

Distribution. The Red Data Book (Shirt, 1987) noted that "the only post-1970 records are from Bodmin Moor, Cornwall and Ditchling Common, East Sussex (1984)". It seems that the Bodmin Moor record was from 1972 by K.C. Side. *L. cruxminor* was recorded at Ditchling Common again in 1988, and these were the only post-1980 records until the species was discovered near Dolgellau (Merionethshire) in 2008 and at Fontmell Down, Dorset the following year (Bantock and Bantock, 2009).

The modern distribution contrasts strikingly with the description given by Fowler (1887). Although described as "very rare" and frequently only found as single examples, Fowler (1887) lists seven localities in Kent and Surrey, one in Sussex, a further four elsewhere in southern and south-western England plus records from three Scottish districts.

Habitat and ecology. *L. cruxminor* has a parasitic association with the leaf-beetle *Galeruca tanaceti* Linnaeus. Allen and Mellon (2010) observed three individuals in County Fermanagh, Northern Ireland on 7th September 2009 while quartering large areas of habitat in search of the larval webs of the Marsh Fritillary butterfly *Euphydryas aurinia* (Rottemburg). Well in excess of 150 *G. tanaceti* were observed during this fieldwork. The foodplant of both *G. tanaceti* and Marsh Fritillary was Devil's-bit Scabious *Succisa pratensis*, and although *G. tanaceti* may be associated with other host plants in Britain (Cox, 2007), it is likely that

L. cruxminor is strongly associated with Devil's-bit Scabious growing in purple moor-grass *Molinia caerulea* (L.) Moench. rush pasture, fen meadow or dry calcareous grassland.

Conservation status. Known from only three widely-scattered localities in the post-1980 period (B2a). Though rarely found and clearly rather elusive, the evidence suggests that this species has declined in AOO during the twentieth century and there is no reason to think that decline is not continuing (B2b ii,iv).

This species qualifies as Endangered under B2ab ii,iv as its current AOO is below 500 km^2 (B2), it now occurs in five or fewer locations (B2a), and it is in decline with a large negative Raw Change of -78.6% (B2b ii,iv).

Lebia cyanocephala **Endangered B2ab i,ii,iv**

Order Coleoptera Family Carabidae

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cyanocephala (Linnaeus, 1758)

Native/Alien status. Native.

Distribution. Recorded from a thin scatter of sites in south-east England in Dorset, South Hampshire, Surrey, West Kent, Hertfordshire, Berkshire and Buckinghamshire. In recent decades, the only records have been from Surrey: Chipstead in 1951; the Parish Field, Thursley Common on 28th September 1987 (Denton, 1988) and subsequently up till at least 2002 (Denton, 2005); and from Witley Common in 1988 (Denton, 2005).

Also known from at least three sites on the Isle of Man, though seemingly not recorded there since 1905.

Habitat and ecology. This species is widely presumed to be a larval ectoparasitoid on one or more species of leaf-beetle (Chrysomelidae) but Turin (2000) and other authors state that no host is known and that the larva is undescribed. However, Hyman and Parsons (1992) stated that *Chrysolina hyperici* (Forster) (Chrysomelidae) is a host (without providing a source for this information) and Denton (1998) repeated this statement since *C. hyperici* had been abundant nearby in the July and August preceding his discovery of *L. cyanocephala* at Thursley. Most subsequent records of *L. cyanocephala* from the Surrey localities have been by searching in patches of St-John's-wort *Hypericum* (the host plant of *C. hyperici*) and thus the association with *C. hyperici* as the host is highly probable, even though it has not been proven by rearing. *C. hyperici* is a leaf-beetle which feeds on St-John's-worts *Hypericum* spp. in diverse open habitats including woodland, marshes, heaths, dunes and, perhaps especially, calcareous grasslands (Cox, 2007). *L. cyanocephala* could occur in any of the habitats from which its host is recorded.

Conservation status. With only two modern mainland localities in a single hectad (B2a) and a long-term, continuing decline in AOO (B2b i,ii,iv), this is an Endangered species. *L. cyanocephala* has also been recorded from the Isle of Man where, with no record since 1905, it may be regarded as Critically Endangered (Possibly Extinct).

This species qualifies as Endangered under B2ab i,ii,iv as its current AOO is below 500 km^2 (B2), it now occurs in five or fewer locations (B2a), and it is in decline with a large negative Change Index of -1.13 (B2b ii,iv) and a substantial contraction of range (B2b i).

Lebia marginata **Regionally Extinct**

Order Coleoptera Family Carabidae

marginata (Geoffroy in Fourcroy, 1785)
haemorrhoidalis (Fabricius, 1787)

Native/Alien status. Probable Native. Known in Britain from only two old records, both reported by Fowler (1887): "Netley, Shropshire, on broom, [recorded by] Rev. F. W. Hope", and "a specimen taken by Mr. Sidebotham, near Devizes", Wiltshire. However, Sidebotham's rarer beetle discoveries are tainted with doubt, not least because of his frequent visits to France and confused specimen labelling (Darby, 2009). It was probably with this in mind that Fowler (1887) wrote, "the species … is very doubtfully indigenous". Here, mainly on the strength of Hope's Shropshire record, the species is regarded as probably native.

Distribution. Only two British localities are known: “Netley, Shropshire, on broom” and "near Devizes", Wiltshire. A hand-written annotation by Charles MacKechnie-Jarvis in the author's copy of Fowler (1887) notes that the Devizes specimen was taken at "Town Hill".

Habitat and ecology. The Netley record was “on broom”. On the continent, usually recorded from flowering shrubs, notably apple and pear in central Europe (Müller-Motzfeld, 2004) and in France most frequently on hawthorn, broom, willows and alder, as well as from low-growing plants (du Chatenet, 2005). Like others in the genus, *L. marginata* probably develops as an ectoparasitoid on larvae and pupae of leaf-beetles in the subfamilies Galerucinae and Chrysomelinae.

Conservation status. With no record since Hope's time (Hope lived from 1797 to 1862), this species is almost certainly now extinct in Britain.

Lebia scapularis **Regionally Extinct**

Order Coleoptera Family Carabidae

scapularis (Geoffroy in Fourcroy, 1785)
turcica (Fabricius, 1787)

Native/Alien status. Probable Native. Known in Britain from only three old records. One from "Zoological Gardens, Regent's Park", London, Middlesex (Stephens, 1839) has generally been ignored, presumably as a probably non-native occurrence. Six specimens were collected at Oakhampton Park, near Wiveliscombe, South Somerset (c. ST0929) prior to 1827. A single specimen was collected "in a clearing near Guestling", East Sussex on 30th April 1883 (Hodge, 1996). The Somerset and Sussex records are remote from any obvious source of introduction and strongly suggest that this is a native species.

Distribution. Only two probably native British localities are known: Oakhampton Park, near Wiveliscombe, South Somerset (c. ST0929) and "in a clearing near Guestling", East Sussex. A record from "Zoological Gardens, Regent's Park", London, Middlesex is presumed to relate to a non-native occurrence.

Habitat and ecology. The Guestling specimen was captured from a birch *Betula* stump (Hodge, 1996). On the continent, this species is known to be a larval parasitoid on the pupa of *Xanthogaleruca luteola* (Müller, O.F., 1766) (Lindroth, 1974; Müller-Motzfeld, 2004; du

Chatenet, 2005), an elm-feeding chrysomelid beetle only found in Britain as recently as 1978 (Buckland and Skidmore, 1999). It may also parasitise other related hosts: *Galerucella lineola* (Fabricius, 1781) has been reported.

Conservation status. With no British record since 1883, this species is almost certainly now extinct in Britain.

Leistus montanus **Endangered B2ab ii,iv**

Order Coleoptera Family Carabidae

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montanus (Stephens, 1827)
subspecies *rhaeticus* (Heer, 1837)

Identification. This species is keyed by Lindroth (1974), Luff (2007) and Duff (2012b). Confusion with the common *L. spinibarbis* is not infrequent, often because the existence of red-legged specimens of *L. spinibarbis* is not mentioned by the standard identification texts. One of the records mapped by Luff (1998) (for the island of Raasay) has since proved to be based on a mis-identification (Richard Moore, *in litt*., Feb. 2014). The identification guide to genus *Leistus* by Walters (2010) gives a detailed and reliable treatment.

Native/Alien status. Native.

Distribution. A montane species occurring in North Wales (Cadair Idris, Snowdonia, Eglwyseg), the Lake District, the Cairngorms, and widely in western Scotland from Arran, Clyde Isles, in the south to Stac Pollaidh, Inverpolly NNR, West Ross in the north. It has been recorded from the islands of South Uist and Harris (Outer Hebrides), Rhum (North Ebudes) and, as already noted above, Arran.

Since 1980 there appear to have been only two British records: one individual from a gully which runs down from the Langdale Pikes into Mickleden valley, Westmorland (NY274070) on 12th October 2008, a site where the species had been previously recorded in 1970 (Allen, 2008); and one on 27th April 2007 at Eglwyseg (SJ223472), Denbighshire by Merfyn Rogers (Bryan Formstone, *in litt*., Feb. 2014). Although this species (and the carabid fauna of montane habitats in general) is certainly under-recorded, it has been searched for at a few of its known sites without success, and it seems very likely that the species is undergoing a decline in AOO.

Recent surveys of montane habitats in Ireland suggest that *L. montanus* is declining there (Stephen McCormack, pers. comm., Feb. 2014) and similar factors could be operating in its British range.

Habitat and ecology. It occurs in freely draining habitats such as scree slopes and shingle banks (Luff, 1998). Allen (2008) found a specimen under a small stone in a dry part at the edge of the main area of scree in a gully. Merfyn Rogers' specimen was found under a stone at the edge of limestone scree. Species of *Leistus* are predatory, feeding on springtails Collembola.

Conservation status. With two modern localities (B2a) and a continuing decline in geographic range (B2b ii,iv), this species is Endangered.

This species qualifies as Endangered under B2ab ii,iv as its current AOO is below 500 km^2 (B2), it now occurs in five or fewer locations (B2a), and it is in decline with a large negative Raw Change of -88.2% (B2b ii,iv).

Nebria livida **Vulnerable B2ab i,ii,iv**

Order Coleoptera Family Carabidae

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livida (Linnaeus, 1758)
lateralis (Fabricius, 1787)
sabulosa (Fabricius, 1787)

Native/Alien status. Native.

Distribution. Primarily a species of eroding soft-rock cliffs on the east coast of England, but also with a few inland records from analogous habitats. In the post-1980 period it has been recorded from the coasts of North-east Yorkshire (Hunt and Boulby Cliffs (NZ71), Cayton Bay (TA08)), South-east Yorkshire (Barmston (TA15), Fraisthorpe (TA16)), and East Norfolk (Weybourne, West Runton and East Runton (TG14), between Cromer and Overstrand (TG24), and between Overstrand and Trimingham (TG24 and TG23)). There are two inland records from the period: from Flixton Sand Pit, Homersfield (TM2986, East Suffolk) where the beetle was found in 1985-86 but where the habitat has since been destroyed; and from a sand and gravel quarry at Gransmoor (TA1159, South-east Yorkshire) in 1993 (Constantine, 1993).

N. livida was rather more widespread in the earlier period, with records north of the Wash extending northwards to Saltburn (NZ62, North-east Yorkshire) and southwards to Cleethorpes in North Lincolnshire. The Norfolk range extended eastwards to Mundesley. Inland, *N. livida* was recorded from Cannock Chase and the Norton Reservoir (now known as Chasewater) at Brownhills (both Staffordshire).

Habitat and ecology. Found on eroding coastal soft-rock cliffs, particularly in the vicinity of freshwater seepages. This species typically hides deeply within cracks and crevices in the clay cliff-face during the day and may be found by splitting blocks of clay away from the cliff. By night, the beetles may be seen foraging out in the open on bare ground, often where freshwater seepages fan across the upper beach rather than on the cliff-face itself. It should be noted at this point that survey work for this species, especially at night, is a hazardous undertaking and should only be undertaken following suitable safety precautions.

Nocturnal surveys in Norfolk by Telfer (2006a) found *N. livida* in spots that (i) were entirely bare of vegetation, (ii) had fairly clean surfaces, not cluttered with rubble, (iii) had fairly uniform clayish substrates with cracks and crevices, and few stones or flints, and (iv) were often damp, sometimes but not always actually wet.

Inland sites appear to provide analogous habitat in artificial sand and gravel pits, where bare cliff-faces have been exposed.

Conservation status. A declining species with 14 hectads recorded in the pre-1980 period and only 8 hectads in the post-1980 period (B2ab i,ii,iv). The habitat in one of the post-1980 hectads (Flixton Sand Pit) has been destroyed. There is good evidence for a continuing decline, with no records from coastal sites north of The Wash since a 1985 record from Cayton Bay (one of the sites where a targeted survey for *N. livida* in 2006 drew a blank

(Telfer, 2006b)). In Norfolk, since 2000 there have been records from West Runton, Overstrand and between Sidestrand and Trimingham (Telfer, 2006a).

This species qualifies as Vulnerable under B2ab i,ii,iv as its current AOO is below 2,000 km^2 (B2), it now occurs in ten or fewer locations (B2a), and it is in decline with a large negative Change Index of -0.54 (B2b ii,iv) and a substantial contraction of range (B2b i).

The habitat of this species is also considered to be threatened by coastal engineering to prevent erosion in some localities, by the risk of increased erosion rates caused in other localities, by changing hydrology (referring to the water feeding the seepages on the cliff face), and from inappropriate land use inland of the eroding cliff face.

Threats. Threatened both by excessive coastal stabilisation and by excessive coastal erosion, by pollution of water flowing from the cliff-face, and by trees, shrubs and building materials eroding from the cliff-top and changing the habitat of the cliff-face. For a more detailed discussion of the potential threats to this species, see Section 6.2.7.

Ophonus cordatus **Endangered B2ab ii,iv**

Order Coleoptera Family Carabidae

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cordatus (Duftschmid, 1812)

Identification. This is a difficult genus but *O. cordatus* is one of the more straightforward species to identify and is keyed by Lindroth (1974), Luff (2007) and Duff (2012b). The work by Sciaky (1986) is an invaluable reference for the identification of *Ophonus*.

Native/Alien status. Native.

Distribution. The localities where this species has been found are almost entirely coastal and restricted to a scatter of sites between Seaton (South Devon) and Sandwich (East Kent). In the post-1980 period, there have been records from only five localities: Portsdown, South Hampshire on 11th September 1983 (Appleton, 2004); Sandwich Bay, East Kent on 10th May 1987; Red Cliff (SZ6285), Isle of Wight on 7th May 1988; Beachy Head, East Sussex on 30th August 1989; and Bulford Driving Range, Salisbury Plain on 30th August 1996.

Habitat and ecology. In general, *Ophonus* species favour open habitats on light, friable sandy or chalky soils, with an element of bare and disturbed ground favouring the growth of a range of ruderal plants. They feed on seeds and some species are particularly associated with seeds of umbellifers Apiaceae. Following its discovery near Deal (i.e. at Sandwich) by Dawson (1854) “at the roots of the tall wiry grass which grows on the sand-hills”, i.e. Marram *Ammophila arenaria* (L.) Link, there were further records “at the roots of the coarse grass” and “under rejectamenta … in hollows” (Dawson, 1856). There appears to have been little published since about the habitats of *O. cordatus* in Britain but its sites include calcareous sandy grassland (Sandwich), chalk cliffs (Beachy Head, and presumably Red Cliff (though the latter locality also includes red sand cliffs)) and chalk grassland heavily disturbed by military training activities (Bulford Driving Range).

Conservation status. This species was recorded from four localities (in four different hectads) during the 1980s, then only a single individual was recorded in the 1990s (B2a). It has not been seen in Britain since 30th August 1996 despite targeted search effort by the author and others at at least four of the five post-1980 localities. This species has declined in AOO throughout the 20th century and that decline appears to have continued into the post-

1980 period (B2b ii,iv). Comprehensive targeted surveys are required to establish whether this species still persists in Britain.

This species qualifies as Endangered under B2ab ii,iv as its current AOO is below 500 km^2 (B2), it now occurs in five or fewer locations (B2a), and it is in decline with a large negative Raw Change of -50.0% (B2b ii,iv).

Ophonus parallelus **Vulnerable B2ab i,ii,iv**

Order Coleoptera Family Carabidae

parallelus (Dejean, 1829)
*melleti (*sensu Jeannel, 1942) non (Heer, 1837/8)
*zigzag (*sensu auctt. Brit. non Costa, 1882)

Identification. This species is keyed by Lindroth (1974), Luff (2007) and Duff (2012b). However, differentiation of females and undissected males from *O. melletii* is very difficult and the more detailed treatment by Lindroth (1972) should be consulted. The work by Sciaky (1986) is also an invaluable reference for this difficult genus.

Native/Alien status. Native.

Distribution. All post-1980 records have been from coastal localities in South-east England from Ventnor (Isle of Wight) to Brighton Marina, Beachy Head and Rye Harbour (East Sussex), and Dungeness and Folkestone Warren (East Kent). The most recent record is that from the cliff-top above Brighton Marina on 6th May 2008 by John Paul. Numerous attempts to find the species again at this locality have not been successful (Paul, 2013).

In the earlier period, *O. parallelus* was more widespread with inland records from the Oxford district, and coastal records extending westwards to Portland Bill, Dorset, and up the east coast to Orford Ness and Dunwich in East Suffolk, including localities on the north coasts of both Kent vice-counties and on the coast of South Essex.

Habitat and ecology. In general, *Ophonus* species favour open habitats on light, friable sandy or chalky soils, with an element of bare and disturbed ground favouring the growth of a range of ruderal plants. They feed on seeds and some species are particularly associated with seeds of umbellifers Apiaceae. At Dunwich, *O. parallelus* was found under litter at the base of the shingle ridge. At Brighton Marina, the beetle was found under a stone on a patch of disturbed earth where a concrete fence post had been dug in on the cliff edge.

Conservation status. Recorded from only 6 hectads in the post-1980 period: 3 in the 1980s, none in the 1990s and then three different hectads since 2000 (B2a). This species was formerly much more widespread and with records from 19 hectads in the pre-1980 period. It has thus declined substantially in AOO and EOO and the decline is probably continuing into the modern period (B2b i,ii,iv).

This species qualifies as Vulnerable under B2ab ii,iv as its current AOO is below 2,000 km^2 (B2), it now occurs in ten or fewer locations (B2a), and it is in decline with a large negative Raw Change of -68.4% (B2b ii,iv) and a substantial contraction of range (B2b i).

Ophonus puncticollis **Endangered B2ab ii,iv**

Order Coleoptera Family Carabidae

puncticollis (Paykull, 1798)

Identification. This species is keyed by Lindroth (1974), Luff (2007) and Duff (2012b). A large proportion of the specimens examined by the author in British collections have proved to be misidentified. A similar situation prevailed when Sharp (1912) wrote "nearly all the specimens named *puncticollis* in our collections are really *rectangulus* Th." (= *puncticeps* Stephens). The work by Sciaky (1986) is an invaluable reference for this difficult genus.

Native/Alien status. Native.

Distribution. The following distribution account is based solely on records for which the identification has been verified by the author. Inevitably some genuine records will have been omitted but, more importantly, many erroneous records have been excluded.

O. puncticollis is known from Coulsdon (near Caterham) and Guildford (both Surrey), Downe (near Biggin Hill, West Kent) and Cholsey, Berkshire (Sharp, 1912). On 30th May 1985, one was found at Rodborough Common, Gloucestershire and on 30th April 1989, one was found on the Devil's Ditch in TL5764, Cambridgeshire. There have been no subsequent British records.

If all the available records of this species were to be accepted, there would be records from 29 hectads in the pre-1980 period and from four in the post-1980 period.

Habitat and ecology. In general, *Ophonus* species favour open habitats on light, friable sandy or chalky soils, with an element of bare and disturbed ground favouring the growth of a range of ruderal plants. They feed on seeds and some species are particularly associated with seeds of umbellifers Apiaceae. The Devil's Ditch specimen was taken "in moss" on calcareous grassland; sieving moss can be a good way to find *Ophonus* specimens in the early season, either sheltering or perhaps still hibernating.

Conservation status. This species is known with certainty from two localities in the post-1980 period, with two further localities having unverified records (B2a). Although the distributional trends of this species are obscured by the preponderance of unverified records in the dataset, it does appear to be in continuing decline of AOO (B2b ii,iv).

This species qualifies as Endangered under B2ab ii,iv as its current AOO is below 500 km^2 (B2), it now occurs in five or fewer locations (B2a), and it is in decline showing a reduction from between 4 and 29 hectads prior to 1980 to between 2 and 4 hectads post-1980 (B2b ii,iv).

Ophonus sabulicola **Endangered B2ab i,ii,iv**

Order Coleoptera Family Carabidae

sabulicola (Panzer, 1796)

Identification. There was certainly some confusion between *O. sabulicola* and *O. stictus* in the early part of the 20th century but the standard texts available to today's coleopterists should allow accurate identification. The work by Sciaky (1986) is an invaluable reference for this genus.

Native/Alien status. Native.

Distribution. Prior to 1980, this species was recorded from a scatter of mostly coastal localities in southern England and South Wales from the following vice-counties: Glamorgan, East Cornwall, Dorset, North Hampshire, East Sussex, East Kent, West Kent, Surrey, South Essex, North Essex, Hertfordshire and Cambridgeshire.

Since 1980, it has been recorded once at Guston, East Kent, in 1983 and has been recorded repeatedly from Hythe Roughs, East Kent up to at least 2004.

Habitat and ecology. In general, *Ophonus* species favour open habitats on light, friable sandy or calcareous soils, with an element of bare and disturbed ground favouring the growth of a range of ruderal plants. They feed on seeds and some species are particularly associated with seeds of umbellifers Apiaceae. At Hythe Roughs, *O. sabulicola* occurs on the steep, eroding face of a chalk escarpment and has been found by grubbing around the base of Alexanders *Smyrnium olusatrum* L., suggesting that the beetles may feed on the seeds of this plant (pers. obs.). In France, *O. sabulicola* is active at dusk or at night, feeding on the umbels of wild carrot while the fruits are still green, and sheltering under stones by day (du Chatenet, 2005).

Conservation status. This species is known from only two localities in the post-1980 period (B2a). It has experienced a substantial historical decline and this appears to have continued into the modern period in which all records since 1983 have come from a single locality (B2b i,ii,iv).

This species qualifies as Endangered under B2ab i,ii,iv as its current AOO is below 500 km^2 (B2), it now occurs in five or fewer locations (B2a), and it is in decline with a large negative Raw Change of -87.5% (B2b ii,iv) and a substantial contraction of range (B2b i).

Ophonus stictus **Endangered B2ab i,ii,iv**

Order Coleoptera Family Carabidae

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*stictus (*Stephens, 1828)
obscurus (Fabricius, 1792) non (Müller, O.F., 1776)
monticola (Dejean, 1829)

Identification. Specimens of *O. stictus* have been confused with *O. ardosiacus* (Lutshnik); the identification characters are briefly discussed by Phillips and Evans (1996). The work by Sciaky (1986) is an invaluable reference for this genus.

Native/Alien status. Native.

Distribution. The core area for this species is the oolitic limestone region of Northamptonshire and Leicestershire where *O. stictus* has been recorded from several quarries: Ketton Quarry in June 1944 and May 1945, Barrowden in August 1945, Althop Quarry in May 1946, an old limestone quarry alongside Bedford Purlieus Wood, near Wansford on 3rd June 1956, another quarry nearer to Wansford on 9th September 1956, a disused limestone quarry near Old Sulehay Forest on 29th April 1984, and Geeston Quarry on 27th September 1988 and in June 1995 (Phillips and Evans, 1996; Henson, 1997).

On the chalk of Cambridgeshire, there are old records of *O. stictus* from the Devil's Ditch, Newmarket Heath, Fleam Dyke, St John's College in Cambridge and the Gog Magog Hills.

The last Cambridgeshire record was on the Roman Road in the Gog Magog Hills on 5th June 1951 (Twinn, 1952).

Further afield, there are two records from the Cotswolds: 9 individuals collected by W.B. Davis on 30th August 1919 on spoil dumped from the excavation of the canal tunnel under Hailey Wood on the border of East and West Gloucestershire (Atty, 1983) and one from Sapperton (which lies at one end of that same tunnel) in 1913 in the collection of P. de la Garde in Exeter Museum (John Walters, *in litt*., Feb. 2014); and records from Colchester, North Essex by P. Harwood in 1902 and 1905; old records from the Oxford district; and an old unconfirmed record from Abbotsbury, Dorset. There is an unconfirmed record of a single specimen from Bishop's Itchington Quarry, Warwickshire, in 1988 (Lane *et al*., 2002).

Habitat and ecology. In general, *Ophonus* species favour open habitats on light, friable sandy or calcareous soils, with an element of bare and disturbed ground favouring the growth of a range of ruderal plants. They feed on seeds and some species are particularly associated with seeds of umbellifers Apiaceae. British specimens of *O. stictus* have been found by hand-collecting and by pitfall-trapping. At Geeston Quarry, *O. stictus* was found at least 40 years after major quarrying had ceased, by which time the quarry sustained a mix of ruderal vegetation and hawthorn scrub. One of the specimens was pitfall-trapped in vegetation dominated by Wild Strawberry *Fragaria vesca*, Sheep's-fescue *Festuca ovina* and bramble *Rubus fruticosus* agg. (Phillips and Evans, 1996). In France, *O. stictus* is active at dusk or at night, feeding on the umbels of wild carrot and parsnip while the fruits are still green, and sheltering under stones by day (du Chatenet, 2005).

Conservation status. This species is known from only two localities in the post-1980 period (B2a). It has experienced a substantial historical decline and this appears to have continued into the modern period, in which there have been no records since 1995 despite targeted searching at several of its known localities (B2b i,ii,iv).

This species qualifies as Endangered under B2ab i,ii,iv as its current AOO is below 500 km^2 (B2), it now occurs in five or fewer locations (B2a), and it is in decline with a large negative Change Index of -1.09 (B2b ii,iv) and a substantial contraction of range (B2b i).

Ophonus subsinuatus **Critically Endangered (Possibly Extinct) D**

Order Coleoptera Family Carabidae

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subsinuatus (Rey, 1886)

Identification. This species is keyed by Luff (2007), with a more detailed identification treatment provided by Telfer (2001). The work by Sciaky (1986) is an invaluable reference for this difficult genus.

Native/Alien status. Probable Native. Known from three British, or reputedly British, specimens, one collected between the late 1850s and 1872, with no locality data (and possibly not collected in Britain), and two collected at Portland, Dorset, in 1886. This is probably a native species but it is possible that the Portland specimens result from an introduction, perhaps in ballast brought from foreign ports by ships collecting a cargo of Portland limestone.

Distribution. The species is known with certainty in Britain only from Portland, Dorset, where J.J. Walker collected two specimens, a male in September 1886, and a female in the

same year. The identity of the three British specimens, all held by the Natural History Museum, London, was only recognised in c.1989 and only published as an addition to the British list in 2001. No further records have been reported since that time but a critical examination of small *Ophonus* subgenus *Metophonus* specimens in other British museum collections could well yield further records.

Habitat and ecology. There is no information about the habitats from which the British specimens were found. Sciaky (1986) reports that *O. subsinuatus* tends to be found in humid, lowland sites. However, for a British population on the northern edge of the species' range, an ecological shift towards sites with warmer and sunnier micro-climates might be expected. In general, *Ophonus* species favour open habitats on light, friable sandy or calcareous soils, with an element of bare and disturbed ground favouring the growth of a range of ruderal plants. They feed on seeds and some species are particularly associated with seeds of umbellifers Apiaceae. In the Portland vicinity, the species might be searched for either on the limestone cliffs and in quarries on the Isle of Portland itself, or on the coastal sand and shingle habitats of Chesil Beach.

Conservation status. The species is probably extinct in Britain: a population size estimate of zero individuals can be made with reasonable confidence (D). Nevertheless, very little survey effort has been targeted at this species in the Portland vicinity since it was recognised as a British species, and this is a particularly neglected genus of British beetles; the possibility remains that this species could be rediscovered in Britain.

Panagaeus cruxmajor **Vulnerable B2ab i,ii,iv**

Order Coleoptera Family Carabidae

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cruxmajor (Linnaeus, 1758)

Identification. Confusion is possible with *P. bipustulatus*. The report of a record from Wicken Fen in 2008 was an error (Warrington, 2009).

Native/Alien status. Native.

Distribution. In the post-1980 period, this species has been recorded from (i) coastal dune systems at Tywyn Burrows (Carmarthenshire) and the Saltfleetby-Theddlethorpe NNR (North Lincolnshire), (ii) river banks or flood debris at Salehurst on the River Rother (East Sussex) and at Maytham Wharf and Potman's Heath on tributaries of the Rother in East Kent, and (iii) from a loose cluster of wetlands in northern England at Whisby Nature Reserve (South Lincolnshire), near Alkborough (North Lincolnshire) (Hammond and Merritt, 2011), at Blacktoft Sands RSPB reserve (South-west Yorkshire) (across the River Trent from Alkborough), and at Wheldrake Ings (South-east Yorkshire).

In former decades, *P. cruxmajor* was much more widely distributed with records from at least 18 hectads extending from East Kent to North Devon and with numerous records from the fens of Cambridgeshire and Huntingdonshire, from which area the species has not been recorded since 1957 (Warrington, 2009).

Habitat and ecology. This rare and enigmatic beetle must have some specialised habitat requirements but it is difficult to deduce the common factors shared by all its known sites. In Ireland it occurs in very wet, well-vegetated fens with large annual fluctuations in water levels, and no doubt such conditions would have supported the beetle in the Fens in

decades past. But *P. cruxmajor* clearly also persists in the largely agricultural landscape of the Rother catchment, and in dune-slack wetlands.

Near Alkborough, *P. cruxmajor* was initially found by pond-netting shallowly-flooded grass mats around the edge of a borrow-pit (Hammond and Merritt, 2011), and was recorded again by pitfall trapping at the edge of the pond amongst patchy Sea Club-rush *Bolboschoenus maritimus* (L.) Palla over mats of Creeping Bent *Agrostis stolonifera* L., and by looking under pieces of wood in the same area. At Blacktoft Sands, *P. cruxmajor* was pitfall trapped in an area of willow scrub and fen grazed by ponies. The Whisby NR individual flew in and landed on a flower head alongside an *Agapanthia villosoviridescens* (De Geer) which was being photographed.

Older records include one from "dry salt-marsh" at South Woodham, South Essex.

The rather specialised mouthparts, particularly the rather *Cychrus*-like palps, suggest a specialised predator of molluscs but no published information on diet has been found.

Conservation status. *P. cruxmajor* has been recorded from eight localities in seven hectads in the post-1980 period (B2a). It is clearly an elusive species but also appears to be subject to large fluctuations in population size at sites where repeated surveys have been undertaken. This species was formerly more widespread and has clearly declined in both area and extent of range; this is apparent in the data despite more intensive targeted recording effort in the post-1980 period. There is no reason to think that the decline is not continuing (B2b i,ii,iv).

This species qualifies as Vulnerable under B2ab i,ii,iv as its current AOO is below 2,000 km^2 (B2), it now occurs in ten or fewer locations (B2a), and it is in decline with a large negative Change Index of -1.33 (B2b ii,iv) and a substantial contraction of range (B2b i).

Philorhizus sigma **Endangered B2ab ii,iv**

Order Coleoptera Family Carabidae

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sigma (Rossi, 1790)

Native/Alien status. Native.

Distribution. Recorded from a wide scatter of sites in England, from South Hampshire and West Sussex on the south coast, to the Fens of Huntingdonshire and Cambridgeshire, Oulton Broad in East Suffolk, and from several sites further north in Nottinghamshire and North-east, South-west and Mid-west Yorkshire, northwards to Cumberland. There is also a plausible record from Wheatfen Broad (East Norfolk) in 1950 but the recorder (E.A. Ellis) omitted this species from a list of the beetles of Wheatfen he collated in 1983, and no specimen can be traced (Martin Collier, *in litt*., March 2014). In the post-1980 period, records come from only five sites: Elland Gravel Pits and Inkle Moor (near Thorne) (both SW Yorkshire), Askham Bog (Mid-W Yorkshire), Misson Line Bank (Nottinghamshire) and Amberley Wildbrooks (West Sussex).

Habitat and ecology. *Philorhizus* species generally inhabit grasslands where they forage within the grass canopy. *P. sigma* is restricted to wet grassland. At Inkle Moor it occurs in a tussocky fen meadow. At Amberley Wildbrooks it is thought to be associated with Greater Tussock-sedge *Carex paniculata* L.

Conservation status. Recorded from only five hectads in the post-1980 period (B2a). This species underwent a substantial decline in AOO during the 20th century and there is no evidence to suggest that that decline is not continuing (B2b ii,iv).

This species qualifies as Endangered under B2ab ii,iv as its current AOO is below 500 km^2 (B2), it now occurs in five or fewer locations (B2a), and it is in decline with a large negative Raw Change of -64.3% (B2b ii,iv).

Pogonus luridipennis **Vulnerable B2ab i,ii,iv**

Order Coleoptera Family Carabidae

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luridipennis (Germar, 1822)

Native/Alien status. Native.

Distribution. In the post-1980 period, known from five localities (Holme, Brancaster, Titchwell, Holkham Gap and Salthouse) in four hectads on the North Norfolk coast; three localities (Rimac area, Gibraltar Point and Seacroft Road lagoon, Skegness) in three hectads on the North Lincolnshire coast, and a single Dorset locality (Eype Mouth). The Holkham Gap specimen was collected on sand flats and may have been a dispersing individual, as may the single specimen caught at a light trap at Eype Mouth. Salthouse was a reliable locality for *P. luridipennis* for many years with a run of records from 1976 to 1993 since when it has only been found once more, in July 2001.

In the earlier period, *P. luridipennis* was more widely distributed with a scatter of records for the Severn Estuary where it has not been recorded since 1943, for the south coast from Weymouth (Dorset) to Lymington (South Hampshire) where it was last recorded in 1977, from Camber, Rye Harbour and Winchelsea (East Sussex) where it was last recorded in the 1960s, and from the Thames Estuary where it was last recorded in 1912. It was also recorded a little more widely on the Norfolk and Lincolnshire coasts.

Habitat and ecology. Published habitat information for this species in Britain includes "on clayish seashores, mostly in marshes under seaweed" (Lindroth, 1974) and "coastal habitats, particularly saltmarshes" (Luff, 1998). However, more recent evidence shows that *P. luridipennis* has much more specialised habitat requirements, for the bare or very sparsely-vegetated margins of lagoons which are only rarely inundated by seawater. *P. luridipennis* seems to spend the day more deeply buried than other carabids with which it is found (such as *P. chalceus* (Marsham) and *Dicheirotrichus* species), suggesting that nocturnal survey may be a more efficient technique.

Conservation status. Known from nine localities in the post-1980 period in eight hectads (B2a). The dynamic nature of the coastal habitat occupied by this species means that some of these localities are probably no longer suitable for the beetle and the true area of occupancy in any one year may be substantially smaller. There have been substantial losses in range over the past century and there is evidence for more recent losses on the Norfolk coast, hence this is regarded as a species in continuing decline (B2b i,ii,iv).

This species qualifies as Vulnerable under B2ab i,ii,iv as its current AOO is below 2,000 km^2 (B2), it now occurs in ten or fewer locations (B2a), and it is in decline with a large negative Change Index of -0.80 (B2b ii,iv) and a substantial contraction of range (B2b i).

P. luridipennis depends in the long-term on dynamic coastal processes to some extent to regenerate new saline lagoon habitat but it is also vulnerable in the short-term to catastrophic coastal flooding and erosion. The east coast of England has recently been subject to extraordinary flooding and erosion as a result of the tidal surge of December 2013. Whether *P. luridipennis* maintains a sufficiently robust meta-population in Norfolk and Lincolnshire to survive such an event and to colonise any suitable habitat newly created is highly uncertain.

Pterostichus aterrimus **Critically Endangered (Possibly Extinct) D**

Order Coleoptera Family Carabidae

aterrimus (Herbst, 1784)

Native/Alien status. Native.

Distribution. Formerly recorded from Whittlesea Mere, Huntingdonshire, from Wicken Fen and other places in the Cambridgeshire fens, and from the Norfolk Broads. It declined during the 19th century such that Fowler (1887) was able to write "I do not know of any record of its capture for many years past". It appears to have been recorded at Stalham in the Norfolk Broads in 1910 but there has been no subsequent record from East Anglia. A population was discovered at "Bishops Dyke close to Denny Wood" in the New Forest in 1969 with subsequent records from this locality up to 1973 (Appleton, 2004), since when there has been no further British record despite intensive targeted searches of the New Forest locality. In recent decades, this beetle has been discovered at several new localities in Ireland, particularly in Northern Ireland, with at least 15 Irish localities now known (Anderson *et al*., 2000; pers. obs.).

Habitat and ecology. It is a relatively easy species to find in suitable habitat. Anderson *et al*. (2000) state: "… this is an extremely hygrophilous species, and confined to particular kinds of wet humus soils in eutrophic or mesotrophic fens. There are no records for raised or blanket (ombrotrophic) bogs, except where peat-cutting has brought about the regeneration of fen conditions. In the absence of human interference, it appears able to exist only in the early successional stages of raised bog formation, before contact with mineral-rich ground water is lost".

Conservation status. Within the species' British range there may no longer be any recently cut-over bogs, or early-successional raised bogs to provide suitable habitat, though there are eutrophic and mesotrophic fens, and thus the species is probably extinct in Britain. A population size estimate of zero individuals can be made with reasonable confidence (D). However, given that it appears to have remained undetected in the New Forest until 1969, there is a possibility that it may be recorded again in Britain.

Scybalicus oblongiusculus **Vulnerable B2ac i,ii,iii**

Order Coleoptera Family Carabidae

oblongiusculus (Dejean, 1829)

Identification. A reasonably distinctive species though confusion has occurred with members of *Ophonus* subgenus *Ophonus sensu stricto*.

Native/Alien status. Probable Native. A rather late discovery in Britain, first collected in 1878 near Portland, Dorset and established in scattered sites between there and St Aldhelm's Head for some decades until the last record from near Portland Bill in 1951. Lindroth (1974) stated "no doubt originally introduced". Regarded as “a former introduction, now presumed extinct” by Shirt (1987). Not included by Hyman and Parsons (1992), presumably treating the species as non-native. Luff (1998) was explicit about the species being an "introduction". It is now perhaps better appreciated that some Mediterranean invertebrates extend northwards in the Oceanic or Suboceanic zones of western Europe, including *Eurynebria complanata* (Linnaeus), *Bembidion iricolor* Bedel, *Bradycellus distinctus* (Dejean) and *Dicheirotrichus obsoletus* (Dejean) among the carabids. The occurrence of *S. oblongiusculus* in southern England is entirely consistent with its natural Mediterranean Suboceanic distribution and it is regarded here as probably native.

Distribution. *S. oblongiusculus* was recorded from a stretch of Dorset coastline between 1878 and 1951, covering at least four hectads. There was no further British record until 19th June 1998 when K.C. Lewis recorded the species in Kew Gardens, Surrey, a record treated as problematic by Denton (2005). The species was then collected at Ebbsfleet, East Kent on 27th July 2000 (though the identity of the specimen was not established until 2012) (Philp, 2012). Following its discovery in South Essex in 2002 (Hammond and Harvey, 2008), it has been recorded from localities in five hectads in South Essex and one locality in West Kent.

Habitat and ecology. Hammond and Harvey (2008) describe *S. oblongiusculus* as a grassland species, favouring well-drained soils and well-insolated situations in Britain, typically provided by early-successional habitats on brownfield sites. Several specimens have been found by searching at the roots of fennel *Foeniculum vulgare* Mill. and it is reasonable to suppose that the beetles feed on fennel seeds, possibly including climbing the plants at night to feed on unripe seeds.

Conservation status. This species has been recorded from 7 hectads in the post-1980 period (B2a) and may be increasing its range. However, the earlier disappearance of this species from its entire Dorset range is clear evidence of an elevated vulnerability to local and regional extinction and the species is here considered to be prone to extreme fluctuations in AOO and EOO (B2c i,ii,iii) and thus Vulnerable.

This species qualifies as Vulnerable under B2ac i,ii,iii as its current AOO is below 2,000 km^2 (B2), it now occurs in ten or fewer locations (B2a), and it undergoes extreme fluctuations in EOO, AOO and number of locations (B2c i,ii,iii).

Sericoda quadripunctata **Critically Endangered B2ab i,ii,iv c i,ii,iii**

Order Coleoptera Family Carabidae

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quadripunctata (De Geer, 1774)

Native/Alien status. Native.

Distribution. Fowler (1887) knew of only one British record, of a singleton taken “many years ago” at Long Benton (= Longbenton), Newcastle-on-Tyne (South Northumberland). The GBRS database holds records from the 20th century for several hectads in Berkshire and Surrey, with outlying records from West Kent, Dorset, NE Yorkshire, Westmorland and East Inverness-shire. The most recent British record is for Windsor (SU97) (presumably Berkshire) in May 1980 by Prof. J.A. Owen.

Habitat and ecology. *S. quadripunctata* is strongly attracted to fires on heathland and in coniferous forest, where it is frequently found under pieces of burnt wood or under the bark of trees damaged by fire. Harwood (1922) discovered several specimens "under the bark of a fallen beech" in Kent on 26th September 1922, and subsequently found *S. quadripunctata* in some numbers in an area where "a good many pine-trees had been felled, and the tops piled in heaps and burnt; the beetles were found among the charred remains and under stones and chips in the vicinity. A large tract of fir-wood was felled during the war, and the ground still shows signs of having been burnt, thus affording a good breeding-ground for these beetles". Harwood (1922) also found *Pterostichus angustatus* in some numbers, another carabid noted for its association with burnt areas. Johnson's (1963) specimen from Abernethy Forest was "running across a partly burnt pine stump" and G.H. Ashe's 1943 specimen from a similar area was also "from burnt wood". There is evidence of long-distance flight dispersal ability in *S. quadripunctata*, and evidence that it remains on a site for no more than two years after burning (Larochelle and Larivière, 2003).

Conservation status. A single record from 1980 is the only record in the modern period (B2a). A substantial decline in AOO is apparent from the earlier decades of the twentieth century (B2b i,ii,iv), and it is also apparent that this species is prone to extreme fluctuations in geographic range, having been extremely rare in the nineteenth century (B2c i,ii,iii).

This species qualifies as Critically Endangered under B2ab i,ii,iv c i,ii,iii as its current AOO is below 10 km^2 (B2), it now occurs in in no more than 1 location (B2a), it is in decline with a large negative Change Index of -2.21 (B2b ii,iv), a substantial contraction of range (B2b i), and it undergoes extreme fluctuations in EOO, AOO and number of locations (B2c i,ii,iii).

It is possible that British records of *S. quadripunctata* may partly relate to long-range dispersers from the continent, though as it is also a rare species in its continental European range, there is little chance that further immigration to Britain will lift the species from its Critically Endangered status.

Threats. Insufficient burning. Rapid control and suppression of any wildfires that do occur.

Tachys micros **Vulnerable D2**

Order Coleoptera Family Carabidae

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micros (Fischer von Waldheim, 1828)
gregarius (Chaudoir, 1846)

Identification. Misidentifications of this species have been quite frequent, the main confusion being with pale-coloured examples of *T. bistriatus* (Hammond, 2002). Expert opinion should be sought for any specimens of *T. micros* from outside the confirmed range.

Native/Alien status. Native.

Distribution. This species is known from a stretch of coastline measuring a little over 10 km from the South Devon coastline west of Lyme Regis (SY3391) to the cliffs east of Eype's Mouth (SY4590). There have been frequent records from both hectads in this range in the post-1980 period.

Further afield, the species was formerly known from Fairlight Glen undercliffs, east of Hastings (East Sussex) but has not been reported from there since 1974. It was discovered at Porth Neigwl, Caernarvonshire in 1990 by Prof. J.A. Owen. In his review of UK tachyine

beetles, Hammond (2002) saw some pale *Tachys bistriatus* specimens from the Sussex locality that had been erroneously determined as *T. micros*; he cautioned that it would be worth checking specimens from both Sussex and Caernarvonshire.

Habitat and ecology. Restricted to the undercliffs of coastal soft-rock cliffs in Britain. It may be found on bare, damp sediments of sand, silt or clay and can be common in these microhabitats. In common with other *Tachys* species, *T. micros* is often seen on the surface only after being disturbed by trampling or splashing, and will quickly run into cracks in the ground. All the British localities are on south-facing cliffs and the species may have a requirement for well-insolated habitat.

Conservation status. There are post-1980 records from only three hectads. Though there is no evidence of a decline, this species is considered to be Vulnerable (D2) because of the threats to its soft-rock cliff habitat, from coastal engineering, changing hydrology (referring to the water feeding the seepages on the cliff face), and from inappropriate land use inland of the eroding cliff face. This species qualifies under D2 as it is present in five or fewer locations and is subject to plausible future threats (see below).

Threats. Although most localities are unlikely to be directly threatened by coastal engineering works, the potential remains for indirect impacts from works elsewhere on the coast.

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Appendix 1. Summary of IUCN Criteria

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

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

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

(a) direct observation

(b) an index of abundance appropriate to the taxon

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

(d) actual or potential levels of exploitation

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

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

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

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

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

AND at least 2 of the following:			
(a) Severely fragmented, **OR**			
Number of locations	= 1	≤ 5	≤ 10
(b) Continuing decline observed, estimated, inferred or projected in any of: **(i)** extent of occurrence; **(ii)** area of occupancy; **(iii)** area, extent and/or quality of habitat; **(iv)** number of locations or subpopulations; **(v)** number of mature individuals.			
(c) Extreme fluctuations in any of: **(i)** extent of occurrence; **(ii)** area of occupancy; **(iii)** number of locations or subpopulations; **(iv)** number of mature individuals.			
C. Small population size and decline			
Number of mature individuals	< 250	< 2,500	< 10,000
AND at least one of C1 or C2:			
C1. An observed, estimated or projected continuing decline of at least (up to a maximum of 100 years in future):	25% in 3 years or 1 generation (whichever is longer)	20% in 5 years or 2 generations (whichever is longer)	10% in 10 years or 3 generations (whichever is longer)
(up to a max. of 100 years in future)			
C2. An observed, estimated, inferred or projected continuing decline **AND** at least 1 of the following 3 conditions:			
(a i) Number of mature individuals in each subpopulation:	≤ 50	≤ 250	≤ 1,000
or			
(a ii) % of mature individuals in one subpopulation =	90–100%	95–100%	100%
(b) Extreme fluctuations in the number of mature individuals.			

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

Appendix 2. Habitat Codes

The following coded habitat classification was used to assign each carabid to a habitat category and, where possible, a habitat sub-category.

HABITAT CATEGORY		HABITAT SUB-CATEGORY	
DW	Saproxylic	DW1	heartwood decay
		DW2	bark & sapwood decay
		DW3	fungal fruiting bodies
		DW4	epiphyte fauna
		DW5	other (free field)
AC	Arboreal Canopy	AC1	other (free field)
FL	Field layer	FL1	bare ground
		FL2	rich flower resource
		FL3	scrub edge
		FL4	restricted host plants
		FL5	restricted animal hosts and prey
		FL6	exposed sea cliffs
		FL7	hollow stems and galleries in dead wood
		FL8	damp/shaded field layer
		FL9	montane
		FL10	other (free field)
SA	Saprophagous	SA1	fungi
		SA2	carrion
		SA3	dung
		SA4	vegetation litter
WE	Wetland	WE1	wetland edge: sand
		WE2	wetland edge: shingle
		WE3	wetland edge: mud
		WE4	plant litter
		WE5	emergent vegetation
		WE6	sphagnum
		WE7	reedbeds and reed litter
		WE8	shallow water
		WE9	peat
		WE10	carr
		WE11	other (free field)
CO	Coastal	CO1	upper saltmarsh
		CO2	beach
		CO3	estuarine

HABITAT CATEGORY		HABITAT SUB-CATEGORY	
AQ	Aquatic	AQ1	high water quality
		AQ2	brackish water
		AQ3	running
		AQ4	standing
		AQ5	temporary water
		AQ6	vegetated
		AQ7	open
		AQ8	other (free field)

Appendix 3. All species, listed by status category

All species, ordered firstly by IUCN status category (RE, CR(PE), CR, EN, VU, DD, NT, LC, NA) and secondly by taxonomic sequence. For further detail on the information within each column, refer to Table 5.

Species (scientific name)	**Native or Non-native status**	**IUCN Category**	**IUCN Criteria**	**GB Rarity**	**Conservation Status (Shirt, 1987)**	**Conservation Status (Hyman, 1992)**	**Name in Shirt (1987) where different**	**Name in Hyman (1992) where different**
Carabus convexus	PN	RE		NR	None	None	not in Shirt (1987)	not in Hyman (1992)
Lebia marginata	PN	RE		NR	RDB Appendix	Extinct	same	same
Lebia scapularis	PN	RE		NR	RDB Appendix	Extinct	same	same
Dyschirius extensus	N	CR(PE)	D	NR	RDB3	RDB1	same	same
Pterostichus aterrimus	N	CR(PE)	D	NR	RDB1	RDB1	same	same
Agonum chalconotum	PN	CR(PE)	D	NR	RDB1	Extinct	*Agonum sahlbergi*	*Agonum sahlbergi*
Harpalus cupreus	PN	CR(PE)	D	NR	RDB1	RDB1	same	same
Ophonus subsinuatus	PN	CR(PE)	D	NR	None	None	not in Shirt (1987)	not in Hyman (1992)
Acupalpus elegans	N	CR(PE)	D	NR	RDB1	Extinct	same	same
Chlaenius nitidulus	N	CR(PE)	D	NR	RDB1	RDB1	same	same
Sericoda quadripunctata	N	CR	B2ab i,ii,iv c i,ii,iii	NR	None	RDB1	not in Shirt (1987)	*Agonum quadripunctatum*
Agonum scitulum	N	CR	B2ab i,ii,iv	NR	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Callistus lunatus	N	CR	B2ab i,ii,iv	NR	RDB1	RDB1	same	same
Carabus monilis	N	EN	B2ab ii,iv	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Leistus montanus	N	EN	B2ab i,ii,iv	NR	RDB3	Nationally Scarce (Na)	same	same
Eurynebria complanata	N	EN	B2b i,ii,iv c iv	NR	None	Nationally Scarce (Na)	not in Shirt (1987)	*Nebria complanata*

Species (scientific name)	**Native or Non-native status**	**IUCN Category**	**IUCN Criteria**	**GB Rarity**	**Conservation Status (Shirt, 1987)**	**Conservation Status (Hyman, 1992)**	**Name in Shirt (1987) where different**	**Name in Hyman (1992) where different**
Cicindela sylvatica	N	EN	B2ab i,ii,iv	NS	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Dyschirius obscurus	N	EN	B2ab i,ii,iv	NR	RDB1	RDB2	same	same
Amara famelica	N	EN	B2ab i,ii,iv	NR	None	RDB3	not in Shirt (1987)	same
Amara nitida	N	EN	B2ab i,ii,iv	NR	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Amara fusca	N	EN	B2ab i,ii,iv	NR	RDB2	RDB1	same	same
Amara quenseli	N	EN	B2ab i,ii,iv	NR	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Harpalus melancholicus	N	EN	B2ab i,ii,iv	NR	None	RDB1	not in Shirt (1987)	same
Ophonus sabulicola	N	EN	B2ab i,ii,iv	NR	None	RDB3	not in Shirt (1987)	*Harpalus sabulicola*
Ophonus stictus	N	EN	B2ab i,ii,iv	NR	None	RDB1	not in Shirt (1987)	*Harpalus obscurus*
Ophonus cordatus	N	EN	B2ab i,ii,iv	NR	None	RDB3	not in Shirt (1987)	*Harpalus cordatus*
Ophonus puncticollis	N	EN	B2ab i,ii,iv	NR	None	RDB3	not in Shirt (1987)	*Harpalus puncticollis*
Bradycellus distinctus	N	EN	B2ab i,ii,iv	NR	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Lebia cyanocephala	N	EN	B2ab i,ii,iv	NR	None	RDB1	not in Shirt (1987)	same
Lebia cruxminor	N	EN	B2ab i,ii,iv	NR	RDB1	RDB1	same	same
Philorhizus sigma	N	EN	B2ab i,ii,iv	NR	RDB2	Nationally Scarce (Na)	*Dromius sigma*	*Dromius sigma*
Drypta dentata	N	EN	B2ab i,ii,iv	NR	RDB1	RDB1	same	same
Nebria livida	N	VU	B2ab i,ii,iv	NR	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Cicindela hybrida	N	VU	D2	NR	RDB3	RDB2	same	same
Cylindera germanica	N	VU	D2	NR	RDB3	RDB3	*Cicindela germanica*	*Cicindela germanica*

Species (scientific name)	Native or Non-native status	IUCN Category	IUCN Criteria	GB Rarity	Conservation Status (Shirt, 1987)	Conservation Status (Hyman, 1992)	Name in Shirt (1987) where different	Name in Hyman (1992) where different
Bembidion coeruleum	PN	VU	D2	NR	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion testaceum	N	VU	B2ab i,ii,iv	NR	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Bembidion humerale	N	VU	D2	NR	RDB1	RDB1	same	same
Bracteon argenteolum	PN	VU	D2	NR	None	RDBK	not in Shirt (1987)	*Bembidion argenteolum*
Tachys micros	N	VU	D2	NR	RDB3	Nationally Scarce (Na)	same	same
Pogonus luridipennis	N	VU	B2ab i,ii,iv	NR	None	RDB3	not in Shirt (1987)	same
Harpalus honestus	N	VU	D2	NR	RDB1	RDB1	same	same
Ophonus parallelus	N	VU	B2ab i,ii,iv	NR	None	RDB3	not in Shirt (1987)	*Harpalus parallelus*
Diachromus germanus	PN	VU	D2	NR	RDB Appendix	Extinct	same	same
Scybalicus oblongiusculus	PN	VU	B2ac i,ii,iii	NR	RDB1	None	same	not in Hyman (1992)
Panagaeus cruxmajor	N	VU	B2ab i,ii,iv	NR	RDB2	RDB1	same	same
Chlaenius tristis	N	VU	D2	NR	RDB1	RDB1	same	same
Cymindis macularis	N	VU	D2	NR	None	RDB1	not in Shirt (1987)	same
Calosoma sycophanta	PN	DD		NR	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion inustum	N	DD		NR	None	None	not in Shirt (1987)	not in Hyman (1992)
Brachinus sclopeta	N	DD		NR	None	RDB1	not in Shirt (1987)	same
Carabus intricatus	N	NT	B2a	NR	RDB1	RDB1	same	same
Nebria nivalis	N	NT	B2a? B2b iii?	NS	RDB3	Nationally Scarce (Na)	same	same
Cicindela maritima	N	NT	B2b i,ii	NR	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Elaphrus lapponicus	N	NT	B2a	NS	None	Nationally Scarce (Na)	not in Shirt (1987)	same

Species (scientific name)	**Native or Non-native status**	**IUCN Category**	**IUCN Criteria**	**GB Rarity**	**Conservation Status (Shirt, 1987)**	**Conservation Status (Hyman, 1992)**	**Name in Shirt (1987) where different**	**Name in Hyman (1992) where different**
Dyschirius angustatus	N	NT	B2a	NR	RDB3	RDB3	same	same
Bembidion ephippium	N	NT	B2b i	NS	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Bembidion nigricorne	N	NT	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Bembidion virens	N	NT	B2a	NR	RDB1	RDB3	same	same
Bembidion fluviatile	N	NT	B2b ii	NR	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Bembidion nigropiceum	N	NT	B2b ii	NR	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Tachys obtusiusculus	N	NT	B2a	NR	RDB3 and RDB5	RDB1+Endemic	*Tachys edmondsi*	*Tachys edmondsi*
Elaphropus walkerianus	N	NT	B2a	NR	None	RDB1	not in Shirt (1987)	*Tachys walkerianus*
Poecilus kugelanni	N	NT	B2b i,ii	NR	None	RDB1	not in Shirt (1987)	*Pterostichus kugelanni*
Agonum versutum	N	NT	B2b i	NR	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Amara strenua	N	NT	B2b ii	NR	None	RDB3	not in Shirt (1987)	same
Amara spreta	N	NT	B2a	NR	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Amara infima	N	NT	B2a	NR	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Curtonotus alpinus	N	NT	B2a	NR	RDB3	RDB3	*Amara alpina*	*Amara alpina*
Harpalus froelichii	N	NT	B2a	NR	None	RDB2	not in Shirt (1987)	*Harpalus froelichi*
Harpalus dimidiatus	N	NT	B2b ii	NS	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Harpalus pumilus	N	NT	B2a	NR	None	Nationally Scarce (Na)	not in Shirt (1987)	*Harpalus vernalis*

Species (scientific name)	**Native or Non-native status**	**IUCN Category**	**IUCN Criteria**	**GB Rarity**	**Conservation Status (Shirt, 1987)**	**Conservation Status (Hyman, 1992)**	**Name in Shirt (1987) where different**	**Name in Hyman (1992) where different**
Harpalus servus	N	NT	B2a	NR	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Ophonus melletii	N	NT	B2b ii	NR	None	Nationally Scarce (Na)	not in Shirt (1987)	*Harpalus melleti*
Ophonus laticollis	N	NT	B2b ii	NS	None	Nationally Scarce (Na)	not in Shirt (1987)	*Harpalus punctatulus*
Anisodactylus nemorivagus	N	NT	B2a	NR	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Acupalpus brunnipes	N	NT	B2a	NR	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Acupalpus flavicollis	N	NT	B2b ii	NR	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Acupalpus maculatus	PN	NT	B2a	NR	None	None	not in Shirt (1987)	not in Hyman (1992)
Badister meridionalis	N	NT	B2a	NR	None	RDBi	not in Shirt (1987)	same
Philorhizus quadrisignatus	N	NT	B2a	NR	RDB3	RDB1	*Dromius quadrisignatus*	*Dromius quadrisignatus*
Philorhizus vectensis	N	NT	B2b ii	NR	None	RDB3	not in Shirt (1987)	*Dromius vectensis*
Lionychus quadrillum	N	NT	B2a	NR	RDB3	RDB3	same	same
Cymindis axillaris	N	NT	B2b ii	NR	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Polistichus connexus	N	NT	B2b ii	NS	RDB2	RDB2	*Polystichus connexus*	same
Omophron limbatum	N	LC		NR	RDB1	RDB1	same	same
Calosoma inquisitor	N	LC	B2b ii	NS	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Carabus clatratus	N	LC		NS	None	Nationally Scarce (Na)	not in Shirt (1987)	same

Species (scientific name)	Native or Non-native status	IUCN Category	IUCN Criteria	GB Rarity	Conservation Status (Shirt, 1987)	Conservation Status (Hyman, 1992)	Name in Shirt (1987) where different	Name in Hyman (1992) where different
Carabus arvensis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Carabus granulatus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Carabus nemoralis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Carabus nitens	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Carabus glabratus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Carabus problematicus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Carabus violaceus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Cychrus caraboides	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Leistus rufomarginatus	PN	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Leistus spinibarbis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Leistus fulvibarbis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Leistus ferrugineus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Leistus terminatus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Nebria brevicollis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Nebria salina	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Nebria rufescens	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Pelophila borealis	N	LC		NR	None	RDB3	not in Shirt (1987)	same
Notiophilus aesthuans	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Notiophilus aquaticus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Notiophilus biguttatus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Notiophilus germinyi	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Notiophilus palustris	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)

Species (scientific name)	Native or Non-native status	IUCN Category	IUCN Criteria	GB Rarity	Conservation Status (Shirt, 1987)	Conservation Status (Hyman, 1992)	Name in Shirt (1987) where different	Name in Hyman (1992) where different
Notiophilus quadripunctatus	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Notiophilus rufipes	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Notiophilus substriatus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Cicindela campestris	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Loricera pilicornis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Elaphrus cupreus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Elaphrus uliginosus	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Elaphrus riparius	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Blethisa multipunctata	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Dyschirius thoracicus	N	LC		NS	None	None	not in Shirt (1987)	not in Hyman (1992)
Dyschirius aeneus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Dyschirius globosus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Dyschirius impunctipennis	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Dyschirius luedersi	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Dyschirius nitidus	N	LC	B2b ii	NS	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Dyschirius politus	N	LC		NS	None	None	not in Shirt (1987)	not in Hyman (1992)
Dyschirius salinus	N	LC		NS	None	None	not in Shirt (1987)	not in Hyman (1992)
Clivina collaris	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Clivina fossor	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Broscus cephalotes	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)

Species (scientific name)	Native or Non-native status	IUCN Category	IUCN Criteria	GB Rarity	Conservation Status (Shirt, 1987)	Conservation Status (Hyman, 1992)	Name in Shirt (1987) where different	Name in Hyman (1992) where different
Miscodera arctica	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Perileptus areolatus	N	LC		NS	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Aepus marinus	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Aepus robinii	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Trechus rivularis	N	LC		NR	RDB1	RDB3	same	same
Trechus secalis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Trechus fulvus	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Trechus obtusus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Trechus quadristriatus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Trechus rubens	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Thalassophilus longicornis	N	LC		NR	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Blemus discus	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	*Trechus discus*
Trechoblemus micros	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Asaphidion curtum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Asaphidion flavipes	N	LC		NS	None	None	not in Shirt (1987)	not in Hyman (1992)
Asaphidion pallipes	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Asaphidion stierlini	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion aeneum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)

Species (scientific name)	Native or Non-native status	IUCN Category	IUCN Criteria	GB Rarity	Conservation Status (Shirt, 1987)	Conservation Status (Hyman, 1992)	Name in Shirt (1987) where different	Name in Hyman (1992) where different
Bembidion biguttatum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion guttula	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion iricolor	N	LC		NS	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion lunulatum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion mannerheimii	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion punctulatum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion bipunctatum	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Bembidion pallidipenne	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Bembidion lampros	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion properans	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion dentellum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion obliquum	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Bembidion semipunctatum	N	LC		NR	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Bembidion varium	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion prasinum	N	LC		NS	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion atrocaeruleum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion geniculatum	N	LC		NS	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion tibiale	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion bualei	N	LC		NS	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion bruxellense	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion decorum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion deletum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)

Species (scientific name)	Native or Non-native status	IUCN Category	IUCN Criteria	GB Rarity	Conservation Status (Shirt, 1987)	Conservation Status (Hyman, 1992)	Name in Shirt (1987) where different	Name in Hyman (1992) where different
Bembidion femoratum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion lunatum	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Bembidion maritimum	N	LC	B2b ii	NS	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion monticola	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Bembidion saxatile	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Bembidion stephensii	N	LC		NS	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion tetracolum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion illigeri	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion stomoides	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Bembidion gilvipes	N	LC		None	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Bembidion schuppelii	N	LC		NS	None	Nationally Scarce (Na)	not in Shirt (1987)	*Bembidion schueppeli*
Bembidion assimile	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion clarkii	N	LC		None	None	Nationally Scarce (Nb)	not in Shirt (1987)	*Bembidion clarki*
Bembidion fumigatum	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Bembidion minimum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion normannum	N	LC		NS	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion quadrimaculatum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)

Species (scientific name)	**Native or Non-native status**	**IUCN Category**	**IUCN Criteria**	**GB Rarity**	**Conservation Status (Shirt, 1987)**	**Conservation Status (Hyman, 1992)**	**Name in Shirt (1987) where different**	**Name in Hyman (1992) where different**
Bembidion quadripustulatum	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Bembidion doris	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion articulatum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion octomaculatum	N	LC		NS	RDB Appendix	Extinct	same	same
Bembidion obtusum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Ocys harpaloides	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Ocys quinquestriatus	N	LC		NS	None	None	not in Shirt (1987)	not in Hyman (1992)
Cillenus lateralis	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	*Bembidion laterale*
Bracteon litorale	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	*Bembidion litorale*
Tachys bistriatus	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Tachys scutellaris	N	LC		NS	RDB3	Nationally Scarce (Na)	same	same
Elaphropus parvulus	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	*Tachys parvulus*
Pogonus chalceus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Pogonus littoralis	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Patrobus assimilis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Patrobus atrorufus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Patrobus septentrionis	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Stomis pumicatus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)

Species (scientific name)	**Native or Non-native status**	**IUCN Category**	**IUCN Criteria**	**GB Rarity**	**Conservation Status (Shirt, 1987)**	**Conservation Status (Hyman, 1992)**	**Name in Shirt (1987) where different**	**Name in Hyman (1992) where different**
Poecilus cupreus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Poecilus lepidus	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	*Pterostichus lepidus*
Poecilus versicolor	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Pterostichus aethiops	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Pterostichus madidus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Pterostichus longicollis	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Pterostichus macer	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Pterostichus niger	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Pterostichus adstrictus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Pterostichus oblongopunctatus	N	LC		None	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Pterostichus quadrifoveolatus	PN	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	*Pterostichus angustatus*
Pterostichus melanarius	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Pterostichus anthracinus	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Pterostichus gracilis	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Pterostichus minor	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Pterostichus nigrita	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Pterostichus rhaeticus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Pterostichus vernalis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Pterostichus diligens	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)

Species (scientific name)	Native or Non-native status	IUCN Category	IUCN Criteria	GB Rarity	Conservation Status (Shirt, 1987)	Conservation Status (Hyman, 1992)	Name in Shirt (1987) where different	Name in Hyman (1992) where different
Pterostichus strenuus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Abax parallelepipedus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Calathus rotundicollis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Calathus ambiguus	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Calathus cinctus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Calathus erratus	N	LC	B2b ii	None	None	None	not in Shirt (1987)	not in Hyman (1992)
Calathus fuscipes	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Calathus melanocephalus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Calathus micropterus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Calathus mollis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Laemostenus terricola	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Synuchus vivalis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Platyderus depressus	N	LC		None	None	Nationally Scarce (Nb)	not in Shirt (1987)	*Platyderus ruficollis*
Olisthopus rotundatus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Anchomenus dorsalis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Paranchus albipes	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Oxypselaphus obscurus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Batenus livens	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	*Agonum livens*
Agonum fuliginosum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Agonum gracile	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Agonum micans	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Agonum piceum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)

Species (scientific name)	Native or Non-native status	IUCN Category	IUCN Criteria	GB Rarity	Conservation Status (Shirt, 1987)	Conservation Status (Hyman, 1992)	Name in Shirt (1987) where different	Name in Hyman (1992) where different
Agonum thoreyi	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Agonum emarginatum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Agonum ericeti	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Agonum marginatum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Agonum muelleri	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Agonum nigrum	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Agonum sexpunctatum	N	LC	B2b ii	NS	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Agonum viduum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Platynus assimilis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Zabrus tenebrioides	N	LC		NS	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Amara plebeja	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Amara aenea	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Amara communis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Amara convexior	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Amara curta	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Amara eurynota	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Amara familiaris	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Amara lucida	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Amara lunicollis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Amara montivaga	PN	LC		NS	None	None	not in Shirt (1987)	not in Hyman (1992)

Species (scientific name)	Native or Non-native status	IUCN Category	IUCN Criteria	GB Rarity	Conservation Status (Shirt, 1987)	Conservation Status (Hyman, 1992)	Name in Shirt (1987) where different	Name in Hyman (1992) where different
Amara ovata	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Amara similata	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Amara tibialis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Amara bifrons	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Amara praetermissa	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Amara apricaria	N	LC	B2b ii	None	None	None	not in Shirt (1987)	not in Hyman (1992)
Amara consularis	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Amara fulva	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Amara equestris	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Curtonotus aulicus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Curtonotus convexiusculus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Harpalus affinis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Harpalus anxius	N	LC	B2b ii	NS	None	None	not in Shirt (1987)	not in Hyman (1992)
Harpalus attenuatus	N	LC		NS	None	None	not in Shirt (1987)	not in Hyman (1992)
Harpalus latus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Harpalus neglectus	N	LC		NS	None	None	not in Shirt (1987)	not in Hyman (1992)
Harpalus laevipes	N	LC		NR	None	Nationally Scarce (Na)	not in Shirt (1987)	*Harpalus quadripunctatus*
Harpalus rubripes	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Harpalus rufipalpis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)

Species (scientific name)	**Native or Non-native status**	**IUCN Category**	**IUCN Criteria**	**GB Rarity**	**Conservation Status (Shirt, 1987)**	**Conservation Status (Hyman, 1992)**	**Name in Shirt (1987) where different**	**Name in Hyman (1992) where different**
Harpalus serripes	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Harpalus smaragdinus	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Harpalus tardus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Harpalus tenebrosus	N	LC		NS	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Harpalus rufipes	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Ophonus ardosiacus	N	LC		None	None	Nationally Scarce (Nb)	not in Shirt (1987)	*Harpalus ardosiacus*
Ophonus azureus	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	*Harpalus azureus*
Ophonus puncticeps	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Ophonus rufibarbis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Ophonus rupicola	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	*Harpalus rupicola*
Ophonus schaubergerianus	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	*Harpalus schaubergerianus*
Anisodactylus binotatus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Anisodactylus poeciloides	N	LC	B2b ii	NS	None	RDB3	not in Shirt (1987)	same
Stenolophus mixtus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Stenolophus skrimshiranus	N	LC		NS	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Stenolophus teutonus	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Bradycellus caucasicus	N	LC		NS	None	None	not in Shirt (1987)	not in Hyman (1992)
Bradycellus csikii	PN	LC		NS	RDB3	RDBi	same	same

Species (scientific name)	**Native or Non-native status**	**IUCN Category**	**IUCN Criteria**	**GB Rarity**	**Conservation Status (Shirt, 1987)**	**Conservation Status (Hyman, 1992)**	**Name in Shirt (1987) where different**	**Name in Hyman (1992) where different**
Bradycellus harpalinus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bradycellus ruficollis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bradycellus sharpi	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bradycellus verbasci	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Dicheirotrichus gustavii	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Dicheirotrichus obsoletus	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Trichocellus cognatus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Trichocellus placidus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Acupalpus dubius	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Acupalpus exiguus	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Acupalpus meridianus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Acupalpus parvulus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Anthracus consputus	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	*Acupalpus consputus*
Licinus depressus	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Licinus punctatulus	N	LC	B2b ii	NS	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Badister bullatus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Badister sodalis	N	LC	B2b ii	None	None	None	not in Shirt (1987)	not in Hyman (1992)
Badister unipustulatus	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Badister collaris	N	LC		NS	None	RDB1	not in Shirt (1987)	*Badister anomalus*

Species (scientific name)	Native or Non-native status	IUCN Category	IUCN Criteria	GB Rarity	Conservation Status (Shirt, 1987)	Conservation Status (Hyman, 1992)	Name in Shirt (1987) where different	Name in Hyman (1992) where different
Badister dilatatus	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Badister peltatus	N	LC	B2a	NR	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Oodes helopioides	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Panagaeus bipustulatus	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Chlaenius nigricornis	N	LC		None	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Chlaenius vestitus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Odacantha melanura	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Masoreus wetterhallii	N	LC		NS	None	Nationally Scarce (Na)	not in Shirt (1987)	*Masoreus wetterhalli*
Lebia chlorocephala	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Demetrias imperialis	N	LC		None	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Demetrias atricapillus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Demetrias monostigma	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Paradromius linearis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Paradromius longiceps	N	LC		NS	RDB2	Nationally Scarce (Na)	*Dromius longiceps*	*Dromius longiceps*
Dromius agilis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Dromius angustus	N	LC		NS	None	None	not in Shirt (1987)	not in Hyman (1992)

Species (scientific name)	Native or Non-native status	IUCN Category	IUCN Criteria	GB Rarity	Conservation Status (Shirt, 1987)	Conservation Status (Hyman, 1992)	Name in Shirt (1987) where different	Name in Hyman (1992) where different
Dromius meridionalis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Dromius quadrimaculatus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Calodromius spilotus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Philorhizus melanocephalus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Philorhizus notatus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Syntomus foveatus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Syntomus obscuroguttatus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Syntomus truncatellus	N	LC		NS	None	None	not in Shirt (1987)	not in Hyman (1992)
Microlestes maurus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Microlestes minutulus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Cymindis vaporariorum	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Brachinus crepitans	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Carabus auratus	A	NA		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Carabus cancellatus	-	NA		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Trechus subnotatus	A	NA		None	RDB1	RDB1	same	same
Bembidion callosum	A	NA		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Elaphropus quadrisignatus	A	NA		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Porotachys bisulcatus	A	NA		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Pterostichus cristatus	A	NA		None	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Abax parallelus	A	NA		None	None	None	not in Shirt (1987)	not in Hyman (1992)

Species (scientific name)	Native or Non-native status	IUCN Category	IUCN Criteria	GB Rarity	Conservation Status (Shirt, 1987)	Conservation Status (Hyman, 1992)	Name in Shirt (1987) where different	Name in Hyman (1992) where different
Sphodrus leucophthalmus	A	NA		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Laemostenus complanatus	A	NA		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Agonum gracilipes	PN	NA		NR	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Agonum lugens	-	NA		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Amara anthobia	PA	NA		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Amara cursitans	A	NA		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Harpalus griseus	PA	NA		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Harpalus calceatus	PA	NA		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Stenolophus comma	A	NA		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Perigona nigriceps	A	NA		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Somotrichus unifasciatus	A	NA		None	None	None	not in Shirt (1987)	not in Hyman (1992)

Appendix 4. All species, listed in taxonomic sequence

All species, ordered by taxonomic sequence. For further detail on the information within each column, refer to Table 5.

Species (scientific name)	Native or Non-native status	IUCN Category	IUCN Criteria	GB Rarity	Conservation Status (Shirt, 1987)	Conservation Status (Hyman, 1992)	Name in Shirt (1987) where different	Name in Hyman (1992) where different
Omophron limbatum	N	LC		NR	RDB1	RDB1	same	same
Calosoma inquisitor	N	LC	B2b ii	NS	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Calosoma sycophanta	PN	DD		NR	None	None	not in Shirt (1987)	not in Hyman (1992)
Carabus clatratus	N	LC		NS	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Carabus arvensis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Carabus granulatus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Carabus monilis	N	EN	B2ab ii,iv	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Carabus nemoralis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Carabus auratus	A	NA		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Carabus cancellatus	-	NA		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Carabus nitens	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Carabus convexus	PN	RE		NR	None	None	not in Shirt (1987)	not in Hyman (1992)
Carabus glabratus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Carabus problematicus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Carabus intricatus	N	NT	B2a	NR	RDB1	RDB1	same	same
Carabus violaceus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Cychrus caraboides	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Leistus montanus	N	EN	B2ab i,ii,iv	NR	RDB3	Nationally Scarce (Na)	same	same

Species (scientific name)	Native or Non-native status	IUCN Category	IUCN Criteria	GB Rarity	Conservation Status (Shirt, 1987)	Conservation Status (Hyman, 1992)	Name in Shirt (1987) where different	Name in Hyman (1992) where different
Leistus rufomarginatus	PN	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Leistus spinibarbis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Leistus fulvibarbis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Leistus ferrugineus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Leistus terminatus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Eurynebria complanata	N	EN	B2b i,ii,iv c iv	NR	None	Nationally Scarce (Na)	not in Shirt (1987)	*Nebria complanata*
Nebria livida	N	VU	B2ab i,ii,iv	NR	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Nebria brevicollis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Nebria salina	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Nebria nivalis	N	NT	B2a? B2b iii?	NS	RDB3	Nationally Scarce (Na)	same	same
Nebria rufescens	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Pelophila borealis	N	LC		NR	None	RDB3	not in Shirt (1987)	same
Notiophilus aesthuans	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Notiophilus aquaticus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Notiophilus biguttatus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Notiophilus germinyi	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Notiophilus palustris	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Notiophilus quadripunctatus	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Notiophilus rufipes	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Notiophilus substriatus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Cicindela campestris	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)

Species (scientific name)	Native or Non-native status	IUCN Category	IUCN Criteria	GB Rarity	Conservation Status (Shirt, 1987)	Conservation Status (Hyman, 1992)	Name in Shirt (1987) where different	Name in Hyman (1992) where different
Cicindela hybrida	N	VU	D2	NR	RDB3	RDB2	same	same
Cicindela maritima	N	NT	B2b i,ii	NR	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Cicindela sylvatica	N	EN	B2ab i,ii,iv	NS	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Cylindera germanica	N	VU	D2	NR	RDB3	RDB3	*Cicindela germanica*	*Cicindela germanica*
Loricera pilicornis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Elaphrus cupreus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Elaphrus lapponicus	N	NT	B2a	NS	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Elaphrus uliginosus	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Elaphrus riparius	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Blethisa multipunctata	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Dyschirius angustatus	N	NT	B2a	NR	RDB3	RDB3	same	same
Dyschirius obscurus	N	EN	B2ab i,ii,iv	NR	RDB1	RDB2	same	same
Dyschirius thoracicus	N	LC		NS	None	None	not in Shirt (1987)	not in Hyman (1992)
Dyschirius aeneus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Dyschirius extensus	N	CR(PE)	D	NR	RDB3	RDB1	same	same
Dyschirius globosus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Dyschirius impunctipennis	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Dyschirius luedersi	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Dyschirius nitidus	N	LC	B2b ii	NS	None	Nationally Scarce (Na)	not in Shirt (1987)	same

Species (scientific name)	Native or Non-native status	IUCN Category	IUCN Criteria	GB Rarity	Conservation Status (Shirt, 1987)	Conservation Status (Hyman, 1992)	Name in Shirt (1987) where different	Name in Hyman (1992) where different
Dyschirius politus	N	LC		NS	None	None	not in Shirt (1987)	not in Hyman (1992)
Dyschirius salinus	N	LC		NS	None	None	not in Shirt (1987)	not in Hyman (1992)
Clivina collaris	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Clivina fossor	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Broscus cephalotes	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Miscodera arctica	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Perileptus areolatus	N	LC		NS	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Aepus marinus	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Aepus robinii	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Trechus rivularis	N	LC		NR	RDB1	RDB3	same	same
Trechus secalis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Trechus fulvus	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Trechus obtusus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Trechus quadristriatus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Trechus rubens	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Trechus subnotatus	A	NA		None	RDB1	RDB1	same	same
Thalassophilus longicornis	N	LC		NR	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Blemus discus	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	*Trechus discus*
Trechoblemus micros	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)

Species (scientific name)	Native or Non-native status	IUCN Category	IUCN Criteria	GB Rarity	Conservation Status (Shirt, 1987)	Conservation Status (Hyman, 1992)	Name in Shirt (1987) where different	Name in Hyman (1992) where different
Asaphidion curtum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Asaphidion flavipes	N	LC		NS	None	None	not in Shirt (1987)	not in Hyman (1992)
Asaphidion pallipes	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Asaphidion stierlini	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion aeneum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion biguttatum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion guttula	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion iricolor	N	LC		NS	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion lunulatum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion mannerheimii	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion punctulatum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion bipunctatum	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Bembidion pallidipenne	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Bembidion nigricorne	N	NT	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Bembidion lampros	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion properans	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion dentellum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion obliquum	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Bembidion semipunctatum	N	LC		NR	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Bembidion varium	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)

Species (scientific name)	Native or Non-native status	IUCN Category	IUCN Criteria	GB Rarity	Conservation Status (Shirt, 1987)	Conservation Status (Hyman, 1992)	Name in Shirt (1987) where different	Name in Hyman (1992) where different
Bembidion ephippium	N	NT	B2b i	NS	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Bembidion prasinum	N	LC		NS	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion virens	N	NT	B2a	NR	RDB1	RDB3	same	same
Bembidion atrocaeruleum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion coeruleum	PN	VU	D2	NR	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion geniculatum	N	LC		NS	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion tibiale	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion bualei	N	LC		NS	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion bruxellense	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion decorum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion deletum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion femoratum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion fluviatile	N	NT	B2b ii	NR	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Bembidion lunatum	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Bembidion maritimum	N	LC	B2b ii	NS	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion monticola	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Bembidion saxatile	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Bembidion stephensii	N	LC		NS	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion testaceum	N	VU	B2ab i,ii,iv	NR	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Bembidion tetracolum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)

Species (scientific name)	Native or Non-native status	IUCN Category	IUCN Criteria	GB Rarity	Conservation Status (Shirt, 1987)	Conservation Status (Hyman, 1992)	Name in Shirt (1987) where different	Name in Hyman (1992) where different
Bembidion callosum	A	NA		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion illigeri	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion stomoides	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Bembidion inustum	N	DD		NR	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion nigropiceum	N	NT	B2b ii	NR	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Bembidion gilvipes	N	LC		None	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Bembidion schuppelii	N	LC		NS	None	Nationally Scarce (Na)	not in Shirt (1987)	*Bembidion schueppeli*
Bembidion assimile	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion clarkii	N	LC		None	None	Nationally Scarce (Nb)	not in Shirt (1987)	*Bembidion clarki*
Bembidion fumigatum	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Bembidion minimum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion normannum	N	LC		NS	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion humerale	N	VU	D2	NR	RDB1	RDB1	same	same
Bembidion quadrimaculatum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion quadripustulatum	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Bembidion doris	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion articulatum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bembidion octomaculatum	N	LC		NS	RDB Appendix	Extinct	same	same

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Bembidion obtusum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Ocys harpaloides	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Ocys quinquestriatus	N	LC		NS	None	None	not in Shirt (1987)	not in Hyman (1992)
Cillenus lateralis	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	*Bembidion laterale*
Bracteon argenteolum	PN	VU	D2	NR	None	RDBK	not in Shirt (1987)	*Bembidion argenteolum*
Bracteon litorale	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	*Bembidion litorale*
Tachys bistriatus	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Tachys obtusiusculus	N	NT	B2a	NR	RDB3 and RDB5	RDB1+Endemic	*Tachys edmondsi*	*Tachys edmondsi*
Tachys micros	N	VU	D2	NR	RDB3	Nationally Scarce (Na)	same	same
Tachys scutellaris	N	LC		NS	RDB3	Nationally Scarce (Na)	same	same
Elaphropus parvulus	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	*Tachys parvulus*
Elaphropus quadrisignatus	A	NA		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Elaphropus walkerianus	N	NT	B2a	NR	None	RDB1	not in Shirt (1987)	*Tachys walkerianus*
Porotachys bisulcatus	A	NA		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Pogonus chalceus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Pogonus littoralis	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Pogonus luridipennis	N	VU	B2ab i,ii,iv	NR	None	RDB3	not in Shirt (1987)	same
Patrobus assimilis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)

Species (scientific name)	**Native or Non-native status**	**IUCN Category**	**IUCN Criteria**	**GB Rarity**	**Conservation Status (Shirt, 1987)**	**Conservation Status (Hyman, 1992)**	**Name in Shirt (1987) where different**	**Name in Hyman (1992) where different**
Patrobus atrorufus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Patrobus septentrionis	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Stomis pumicatus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Poecilus cupreus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Poecilus kugelanni	N	NT	B2b i,ii	NR	None	RDB1	not in Shirt (1987)	*Pterostichus kugelanni*
Poecilus lepidus	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	*Pterostichus lepidus*
Poecilus versicolor	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Pterostichus cristatus	A	NA		None	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Pterostichus aethiops	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Pterostichus madidus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Pterostichus longicollis	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Pterostichus aterrimus	N	CR(PE)	D	NR	RDB1	RDB1	same	same
Pterostichus macer	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Pterostichus niger	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Pterostichus adstrictus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Pterostichus oblongopunctatus	N	LC		None	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Pterostichus quadrifoveolatus	PN	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	*Pterostichus angustatus*
Pterostichus melanarius	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)

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Pterostichus anthracinus	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Pterostichus gracilis	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Pterostichus minor	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Pterostichus nigrita	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Pterostichus rhaeticus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Pterostichus vernalis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Pterostichus diligens	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Pterostichus strenuus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Abax parallelepipedus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Abax parallelus	A	NA		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Sphodrus leucophthalmus	A	NA		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Calathus rotundicollis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Calathus ambiguus	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Calathus cinctus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Calathus erratus	N	LC	B2b ii	None	None	None	not in Shirt (1987)	not in Hyman (1992)
Calathus fuscipes	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Calathus melanocephalus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Calathus micropterus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Calathus mollis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Laemostenus complanatus	A	NA		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Laemostenus terricola	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Synuchus vivalis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)

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Platyderus depressus	N	LC		None	None	Nationally Scarce (Nb)	not in Shirt (1987)	*Platyderus ruficollis*
Olisthopus rotundatus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Sericoda quadripunctata	N	CR	B2ab i,ii,iv c i,ii,iii	NR	None	RDB1	not in Shirt (1987)	*Agonum quadripunctatum*
Anchomenus dorsalis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Paranchus albipes	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Oxypselaphus obscurus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Batenus livens	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	*Agonum livens*
Agonum fuliginosum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Agonum gracile	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Agonum micans	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Agonum piceum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Agonum scitulum	N	CR	B2ab i,ii,iv	NR	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Agonum thoreyi	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Agonum emarginatum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Agonum ericeti	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Agonum gracilipes	PN	NA		NR	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Agonum lugens	-	NA		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Agonum marginatum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Agonum muelleri	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)

Species (scientific name)	**Native or Non-native status**	**IUCN Category**	**IUCN Criteria**	**GB Rarity**	**Conservation Status (Shirt, 1987)**	**Conservation Status (Hyman, 1992)**	**Name in Shirt (1987) where different**	**Name in Hyman (1992) where different**
Agonum nigrum	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Agonum chalconotum	PN	CR(PE)	D	NR	RDB1	Extinct	*Agonum sahlbergi*	*Agonum sahlbergi*
Agonum sexpunctatum	N	LC	B2b ii	NS	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Agonum versutum	N	NT	B2b i	NR	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Agonum viduum	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Platynus assimilis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Zabrus tenebrioides	N	LC		NS	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Amara plebeja	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Amara strenua	N	NT	B2b ii	NR	None	RDB3	not in Shirt (1987)	same
Amara aenea	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Amara anthobia	PA	NA		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Amara communis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Amara convexior	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Amara curta	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Amara eurynota	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Amara famelica	N	EN	B2ab i,ii,iv	NR	None	RDB3	not in Shirt (1987)	same
Amara familiaris	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Amara lucida	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Amara lunicollis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Amara montivaga	PN	LC		NS	None	None	not in Shirt (1987)	not in Hyman (1992)

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Amara nitida	N	EN	B2ab i,ii,iv	NR	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Amara ovata	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Amara similata	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Amara spreta	N	NT	B2a	NR	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Amara tibialis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Amara bifrons	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Amara cursitans	A	NA		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Amara fusca	N	EN	B2ab i,ii,iv	NR	RDB2	RDB1	same	same
Amara infima	N	NT	B2a	NR	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Amara praetermissa	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Amara quenseli	N	EN	B2ab i,ii,iv	NR	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Amara apricaria	N	LC	B2b ii	None	None	None	not in Shirt (1987)	not in Hyman (1992)
Amara consularis	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Amara fulva	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Amara equestris	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Curtonotus alpinus	N	NT	B2a	NR	RDB3	RDB3	*Amara alpina*	*Amara alpina*
Curtonotus aulicus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Curtonotus convexiusculus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)

Species (scientific name)	Native or Non-native status	IUCN Category	IUCN Criteria	GB Rarity	Conservation Status (Shirt, 1987)	Conservation Status (Hyman, 1992)	Name in Shirt (1987) where different	Name in Hyman (1992) where different
Harpalus froelichii	N	NT	B2a	NR	None	RDB2	not in Shirt (1987)	*Harpalus froelichi*
Harpalus affinis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Harpalus anxius	N	LC	B2b ii	NS	None	None	not in Shirt (1987)	not in Hyman (1992)
Harpalus attenuatus	N	LC		NS	None	None	not in Shirt (1987)	not in Hyman (1992)
Harpalus cupreus	PN	CR(PE)	D	NR	RDB1	RDB1	same	same
Harpalus dimidiatus	N	NT	B2b ii	NS	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Harpalus honestus	N	VU	D2	NR	RDB1	RDB1	same	same
Harpalus latus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Harpalus melancholicus	N	EN	B2ab i,ii,iv	NR	None	RDB1	not in Shirt (1987)	same
Harpalus neglectus	N	LC		NS	None	None	not in Shirt (1987)	not in Hyman (1992)
Harpalus pumilus	N	NT	B2a	NR	None	Nationally Scarce (Na)	not in Shirt (1987)	*Harpalus vernalis*
Harpalus laevipes	N	LC		NR	None	Nationally Scarce (Na)	not in Shirt (1987)	*Harpalus quadripunctatus*
Harpalus rubripes	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Harpalus rufipalpis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Harpalus serripes	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Harpalus servus	N	NT	B2a	NR	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Harpalus smaragdinus	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Harpalus tardus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Harpalus tenebrosus	N	LC		NS	None	Nationally Scarce (Na)	not in Shirt (1987)	same

Species (scientific name)	**Native or Non-native status**	**IUCN Category**	**IUCN Criteria**	**GB Rarity**	**Conservation Status (Shirt, 1987)**	**Conservation Status (Hyman, 1992)**	**Name in Shirt (1987) where different**	**Name in Hyman (1992) where different**
Harpalus griseus	PA	NA		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Harpalus rufipes	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Harpalus calceatus	PA	NA		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Ophonus ardosiacus	N	LC		None	None	Nationally Scarce (Nb)	not in Shirt (1987)	*Harpalus ardosiacus*
Ophonus azureus	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	*Harpalus azureus*
Ophonus sabulicola	N	EN	B2ab i,ii,iv	NR	None	RDB3	not in Shirt (1987)	*Harpalus sabulicola*
Ophonus stictus	N	EN	B2ab i,ii,iv	NR	None	RDB1	not in Shirt (1987)	*Harpalus obscurus*
Ophonus cordatus	N	EN	B2ab i,ii,iv	NR	None	RDB3	not in Shirt (1987)	*Harpalus cordatus*
Ophonus melletii	N	NT	B2b ii	NR	None	Nationally Scarce (Na)	not in Shirt (1987)	*Harpalus melleti*
Ophonus parallelus	N	VU	B2ab i,ii,iv	NR	None	RDB3	not in Shirt (1987)	*Harpalus parallelus*
Ophonus laticollis	N	NT	B2b ii	NS	None	Nationally Scarce (Na)	not in Shirt (1987)	*Harpalus punctatulus*
Ophonus puncticeps	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Ophonus puncticollis	N	EN	B2ab i,ii,iv	NR	None	RDB3	not in Shirt (1987)	*Harpalus puncticollis*
Ophonus rufibarbis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Ophonus rupicola	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	*Harpalus rupicola*
Ophonus schaubergerianus	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	*Harpalus schaubergerianus*
Ophonus subsinuatus	PN	CR(PE)	D	NR	None	None	not in Shirt (1987)	not in Hyman (1992)
Anisodactylus binotatus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Anisodactylus nemorivagus	N	NT	B2a	NR	None	Nationally Scarce (Na)	not in Shirt (1987)	same

Species (scientific name)	Native or Non-native status	IUCN Category	IUCN Criteria	GB Rarity	Conservation Status (Shirt, 1987)	Conservation Status (Hyman, 1992)	Name in Shirt (1987) where different	Name in Hyman (1992) where different
Anisodactylus poeciloides	N	LC	B2b ii	NS	None	RDB3	not in Shirt (1987)	same
Diachromus germanus	PN	VU	D2	NR	RDB Appendix	Extinct	same	same
Scybalicus oblongiusculus	PN	VU	B2ac i,ii,iii	NR	RDB1	None	same	not in Hyman (1992)
Stenolophus comma	A	NA		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Stenolophus mixtus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Stenolophus skrimshiranus	N	LC		NS	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Stenolophus teutonus	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Bradycellus caucasicus	N	LC		NS	None	None	not in Shirt (1987)	not in Hyman (1992)
Bradycellus csikii	PN	LC		NS	RDB3	RDBi	same	same
Bradycellus distinctus	N	EN	B2ab i,ii,iv	NR	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Bradycellus harpalinus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bradycellus ruficollis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bradycellus sharpi	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Bradycellus verbasci	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Dicheirotrichus gustavii	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Dicheirotrichus obsoletus	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Trichocellus cognatus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Trichocellus placidus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Acupalpus brunnipes	N	NT	B2a	NR	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Acupalpus dubius	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Acupalpus elegans	N	CR(PE)	D	NR	RDB1	Extinct	same	same

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Acupalpus exiguus	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Acupalpus flavicollis	N	NT	B2b ii	NR	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Acupalpus meridianus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Acupalpus parvulus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Acupalpus maculatus	PN	NT	B2a	NR	None	None	not in Shirt (1987)	not in Hyman (1992)
Anthracus consputus	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	*Acupalpus consputus*
Licinus depressus	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Licinus punctatulus	N	LC	B2b ii	NS	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Badister bullatus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Badister meridionalis	N	NT	B2a	NR	None	RDBi	not in Shirt (1987)	same
Badister sodalis	N	LC	B2b ii	None	None	None	not in Shirt (1987)	not in Hyman (1992)
Badister unipustulatus	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Badister collaris	N	LC		NS	None	RDB1	not in Shirt (1987)	*Badister anomalus*
Badister dilatatus	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Badister peltatus	N	LC	B2a	NR	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Oodes helopioides	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Panagaeus bipustulatus	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same

Species (scientific name)	Native or Non-native status	IUCN Category	IUCN Criteria	GB Rarity	Conservation Status (Shirt, 1987)	Conservation Status (Hyman, 1992)	Name in Shirt (1987) where different	Name in Hyman (1992) where different
Panagaeus cruxmajor	N	VU	B2ab i,ii,iv	NR	RDB2	RDB1	same	same
Chlaenius nigricornis	N	LC		None	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Chlaenius nitidulus	N	CR(PE)	D	NR	RDB1	RDB1	same	same
Chlaenius tristis	N	VU	D2	NR	RDB1	RDB1	same	same
Chlaenius vestitus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Callistus lunatus	N	CR	B2ab i,ii,iv	NR	RDB1	RDB1	same	same
Perigona nigriceps	A	NA		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Odacantha melanura	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Masoreus wetterhallii	N	LC		NS	None	Nationally Scarce (Na)	not in Shirt (1987)	*Masoreus wetterhalli*
Lebia chlorocephala	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Lebia cyanocephala	N	EN	B2ab i,ii,iv	NR	None	RDB1	not in Shirt (1987)	same
Lebia cruxminor	N	EN	B2ab i,ii,iv	NR	RDB1	RDB1	same	same
Lebia marginata	PN	RE		NR	RDB Appendix	Extinct	same	same
Lebia scapularis	PN	RE		NR	RDB Appendix	Extinct	same	same
Somotrichus unifasciatus	A	NA		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Demetrias imperialis	N	LC		None	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Demetrias atricapillus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Demetrias monostigma	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Paradromius linearis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)

Species (scientific name)	**Native or Non-native status**	**IUCN Category**	**IUCN Criteria**	**GB Rarity**	**Conservation Status (Shirt, 1987)**	**Conservation Status (Hyman, 1992)**	**Name in Shirt (1987) where different**	**Name in Hyman (1992) where different**
Paradromius longiceps	N	LC		NS	RDB2	Nationally Scarce (Na)	*Dromius longiceps*	*Dromius longiceps*
Dromius agilis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Dromius angustus	N	LC		NS	None	None	not in Shirt (1987)	not in Hyman (1992)
Dromius meridionalis	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Dromius quadrimaculatus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Calodromius spilotus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Philorhizus melanocephalus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Philorhizus notatus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Philorhizus quadrisignatus	N	NT	B2a	NR	RDB3	RDB1	*Dromius quadrisignatus*	*Dromius quadrisignatus*
Philorhizus sigma	N	EN	B2ab i,ii,iv	NR	RDB2	Nationally Scarce (Na)	*Dromius sigma*	*Dromius sigma*
Philorhizus vectensis	N	NT	B2b ii	NR	None	RDB3	not in Shirt (1987)	*Dromius vectensis*
Syntomus foveatus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Syntomus obscuroguttatus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Syntomus truncatellus	N	LC		NS	None	None	not in Shirt (1987)	not in Hyman (1992)
Microlestes maurus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Microlestes minutulus	N	LC		None	None	None	not in Shirt (1987)	not in Hyman (1992)
Lionychus quadrillum	N	NT	B2a	NR	RDB3	RDB3	same	same
Cymindis axillaris	N	NT	B2b ii	NR	None	Nationally Scarce (Na)	not in Shirt (1987)	same
Cymindis macularis	N	VU	D2	NR	None	RDB1	not in Shirt (1987)	same

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Cymindis vaporariorum	N	LC		NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Polistichus connexus	N	NT	B2b ii	NS	RDB2	RDB2	*Polystichus connexus*	same
Drypta dentata	N	EN	B2ab i,ii,iv	NR	RDB1	RDB1	same	same
Brachinus crepitans	N	LC	B2b ii	NS	None	Nationally Scarce (Nb)	not in Shirt (1987)	same
Brachinus sclopeta	N & PA?	DD		NR	None	RDB1	not in Shirt (1987)	same

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Ophonus laticollis	P26	P30	P35	P107	P137					
Ophonus melletii	P26	P27	P34	P53	P107	P137				
Ophonus parallelus	P25	P27	P34	P37	P78	P95	P105	P137		
Ophonus puncticollis	P25	P27	P35	P37	P79	P104	P137			
Ophonus rupicola	P30	P35	P118	P137						
Ophonus sabulicola	P25	P27	P34	P37	P79	P104	P137			
Ophonus schaubergerianus	P19	P30	P31	P35	P118	P137				
Ophonus stictus	P25	P27	P34	P37	P80	P104	P137			
Ophonus subsinuatus	P24	P27	P35	P37	P81	P96	P103	P137		
Panagaeus bipustulatus	P20	P30	P31	P35	P120	P139				
Panagaeus cruxmajor	P25	P27	P35	P37	P82	P93	P97	P105	P140	
Paradromius longiceps	P30	P36	P120	P141						
Patrobus septentrionis	P29	P33	P113	P131						
Pelophila borealis	P26	P31	P108	P124						
Perileptus areolatus	P28	P32	P110	P126						
Philorhizus quadrisignatus	P26	P28	P36	P107	P141					
Philorhizus sigma	P25	P28	P36	P37	P83	P104	P141			
Philorhizus vectensis	P26	P28	P36	P107	P141					
Poecilus kugelanni	P25	P27	P33	P106	P131					
Poecilus lepidus	P19	P29	P31	P33	P114	P131				
Pogonus littoralis	P29	P33	P113	P130						
Pogonus luridipennis	P25	P27	P33	P36	P84	P105	P130			
Polistichus connexus	P26	P30	P36	P107	P142					
Pterostichus aethiops	P29	P33	P114	P131						
Pterostichus anthracinus	P20	P29	P31	P33	P114	P132				
Pterostichus aterrimus	P24	P27	P33	P36	P85	P103	P131			
Pterostichus gracilis	P29	P33	P114	P132						
Pterostichus longicollis	P19	P29	P31	P33	P114	P131				
Pterostichus quadrifoveolatus	P29	P33	P114	P131						
Scybalicus oblongiusculus	P25	P27	P35	P37	P85	P93	P95	P105	P138	
Sericoda quadripunctata	P18	P24	P27	P33	P36	P86	P103	P133		
Stenolophus skrimshiranus	P30	P35	P118	P138						
Stenolophus teutonus	P20	P30	P31	P35	P118	P138				
Syntomus truncatellus	P30	P36	P121	P141						
Tachys bistriatus	P29	P33	P88	P113	P130					
Tachys obtusiusculus	P25	P27	P33	P106	P130					
Tachys micros	P25	P27	P33	P36	P87	P105	P130			
Tachys scutellaris	P29	P33	P113	P130						
Thalassophilus longicornis	P26	P32	P110	P126						
Trechus fulvus	P19	P28	P31	P32	P110	P126				
Trechus rivularis	P26	P32	P110	P126						
Trechus rubens	P28	P32	P110	P126						
Zabrus tenebrioides	P29	P34	P116	P134						