Report Number
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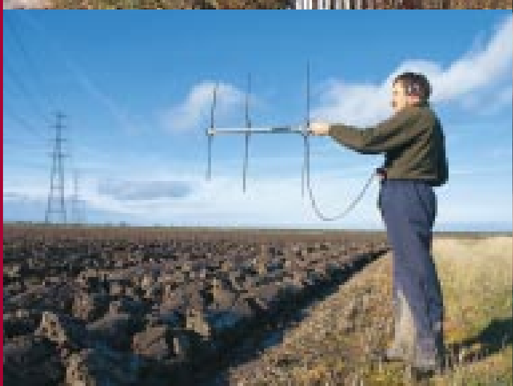

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Acknowledgements

Thanks are due to Jon Webb for initiating this project and to the many recorders who have made their species lists available over the years.

The formation of the Ancient Tree Forum has brought together a wide range of disciplines involved in tree management and conservation, and has led to important cross-fertilisation of ideas which have enhanced the ecological understanding of the relationships between tree and fungal biology, on the one hand, and saproxylic invertebrates, on the other. This has had tremendous benefits in promoting good conservation practices.

Summary

The saproxylic beetle Index of Ecological Continuity (IEC) was originally developed as a means of producing a simple statistic which could be used in grading a site for its significance to the conservation of saproxylic (wood-decay) beetles based on ecological considerations rather than rarity. The approach has received good recognition by the conservation agencies and several important sites have been designated as a result of this approach to interpreting site species lists as saproxylic assemblages of ecological significance.

The Index is based on a listing of the species thought likely to be the remnants of the saproxylic beetle assemblage of Britain's post-glacial wildwood, and which have survived through a history of wood pasture management systems in certain refugia. The list was published in 1986 and is in need of revision, recognising advances in knowledge of the ecology and particularly the population dynamics of those and other species. The list has now been updated - involving deletions, additions, upgrades and downgrades - to provide a more reliable statement of the range of saproxylic beetles which might be expected on a site with relatively good ecological continuity.

The revised list contains 180 of the 700 British native saproxylic beetles. The sampling methods appropriate to site surveys for these species are reviewed, and the listing of sites with the highest IEC values – sites of international, national or regional importance – has been updated. Ecological and conservation management factors which influence the IEC are also discussed.

Contents

1. Introduction

1.1 Indices of ecological continuity

1.1.1 Lichen assemblages

The first exploration of the use of species assemblages to develop an Index of Ecological Continuity was made by Francis Rose (Rose, 1974). He wanted to find a way of using site lists of epiphytic lichens to generate a meaningful and easy to use statistic, which could then be used in site assessment to promote site conservation.

Survey of a large number of British sites known to have had a long history of tree cover - in areas free from marked air pollution - revealed some interesting features of their epiphytic lichen communities. While sites subjected to coppice management, or known to have been replanted, have in general limited floras of the order of 30-50 taxa per square kilometre, old uneven-aged high forest of oak with glades may have as many as 110, and even up to 180, lichen taxa per square kilometre. Rose (1974) predicted that the total epiphytic lichen flora per square kilometre of the primeval mixed oak forests of Britain may well have been at least of the order of 120-150 taxa. He extended his studies across France and found that these basic principles hold true there too.

However, he also recognised that purely numerical comparisons of total lichen epiphytic floras are not the whole story. A wide range of ecological types of lichens may occur within a wooded site and different species may be there for different reasons. Rose (1974) therefore asked the question: can we detect any group, or groups, of indicator species particularly sensitive to change in the forest environment with time, whose presence or absence may indicate continuity, or otherwise, of the forest environment, and hence provide some evidence that particular sites really are long-established and relatively little altered with time.

His studies of sites across the less polluted areas of Britain and France revealed that:

- certain species of lichen and bryophyte epiphytes occur in all, or nearly all, woodlands containing standard oak or ash trees, whether these are old high forest, coppice-with-standards, or areas of mature oak plantations;
- a number of other lichen and bryophyte species are only normally found in mature, or old, stands of trees.

It can be very difficult to establish the past history of particular sites but, where it has been possible to do so, it has become clear that the latter sites are very old, probably primary woodlands, with strong evidence of some continuity of a high tree canopy (as opposed to coppice) since at least medieval times. Such sites are found in the following types of terrain:

- in the “ancient and ornamental woodlands” of the New Forest, an old Royal hunting forest that has remained, in part, open and free from active silvicultural management;
- in more fragmentary form in the relics of other Royal, or subject, deer forests, such as Savernake Forest, Wychwood Forest, and Cranborne Chase;
- in the wooded parts of deer parks established in medieval times or earlier;

- in more remote parts of Devon, western Wales, the Pennines, Lakeland, and west Scotland, in steep-sided ravines and on escarpments where active forestry has been at a minimum for reasons of remoteness or of topography.

There is good evidence that many medieval deer parks were formed from relic areas of the primeval wilderness, still existing at that time, and probably containing fragments at least of primary forest.

Rose was able to draw up a list of lichens and bryophytes that are found more or less frequently in such sites but not in other woodlands, that are "faithful" to these types of woodland. He whittled the list down to eliminate species which show some degree of restriction geographically within Britain, presumably due to climatic factors. This left him with a list of twenty lichens that are still widespread in lowland southern Britain in old forest areas, but which still became rarer northwards. He suggests that these species may be relics of the ancient forest epiphyte flora of Britain, and pointed out that Coleoptera and Hemiptera show a similar pattern and could be used as evidence of continuity of ancient forest conditions. This challenge was later taken up by Paul Harding with the assistance of a small group of experienced field coleopterists (see Section 1.1.2.1).

Rose saw these species as indicator species in two senses:

- as ecological indicators of the existence of a particular type of forest environment at the present time;
- as historical indicators of lack of environmental change, within certain critical limits, over a long period of time.

The reasons for the association with old forest areas were very much the conditions for the dispersal and colonisation throughout history. From early medieval times to the present day, the old forest areas became more and more fragmented, and those which remained became modified by various forms of management. The isolated scattered fragments that remained least modified would have provided habitats where many forest species could have survived, but as they were now surrounded by unfavourable terrain for colonisation, re-establishment in new plantings or regenerating woodlands would have become increasingly difficult. The general drying out of the landscape, due to agricultural practices in the last few hundred years must have played a part in this.

Rose (1974) went on to use his list of twenty lichens faithful to apparently old forest areas to attempt to calculate what he termed an "Index of Ecological Continuity". His approach was to calculate the percentage of these species which occur in particular sites to see if any meaningful data ensue. He recognised the risk of circular argument in such an exercise but tried to overcome this by testing the Index against sites where there is good historical documentation either of continuity or of change. He concluded that the IEC methodology could probably be improved upon, but that the principle seemed to work well, and offered a technique for assessment of continuity of forest environment, as opposed to continuity of some sort of woodland, in sites of unknown history that may be studied in the future. In modern terminology he had identified a suite of indicator species which could be used for the identification sites for Britain's surviving "old growth" communities and which are a high conservation priority.

1.1.2 Invertebrate assemblages

1.1.2.1 Mature Timber Habitat Project

Following this important work on epiphytes, the Nature Conservancy Council initiated a "Mature Timber Habitat" project which sought to identify the key sites across Britain for these relict old forest communities. Invertebrates were brought into the process and the first listing of invertebrates as indicators of the continuity of dead-wood habitats in ancient woodlands, particularly pasture-woodlands, included a long list of Coleoptera as well as various other invertebrates (Harding, 1977). The original list of Coleoptera was compiled in association with four suitably experienced coleopterists – AA Allen, FA Hunter, C Johnson and P Skidmore, who helped achieve a fairly well-balanced list of species with limited regional bias. Subsequently, Harding (1978) examined the occurrence of 99 species of Coleoptera (listed as Grades 1 and 2 in the earlier list) and demonstrated that many species are known almost exclusively from areas of ancient pasture-woodland. However, he considered that some species from the original list are too widespread to be considered reliable indicators of habitat continuity.

A revised list of 196 species was eventually published (Harding & Rose, 1986). This drew on new information supplied by C Johnson and PM Hammond, as well as published information and additional records from the period 1978-84. It was a list of mainly saproxylic species believed to be associated with dead-wood habitats in pasture-woodlands and is not, therefore, a comprehensive list of woodland indicator species. It was a national list for pasture-woodlands in lowland Britain, in which regional variations could be accommodated only to a limited extent. This published list was a tentative one, with many limitations, but it later enabled the development of an Index of Ecological Continuity for use with saproxylic Coleoptera (see Section 1.1.2.2.) and thereby made a considerable contribution to the conservation of old parklands and other types of ancient wood pastures.

The species were grouped according to the extent to which they have been consistently recorded from areas of ancient woodlands with continuity of dead-wood habitats, particularly in pasture-woodlands:

- Group 1: Species which are known to have occurred in recent times only in areas believed to be ancient woodland, mainly pasture-woodland;
- Group 2: Species which occur mainly in areas believed to be ancient woodland with abundant dead-wood habitats, but which also appear to have been recorded from areas that may not be ancient woodland or for which the locality data are imprecise;
- Group 3: Species which occur widely in wooded land, but which are collectively characteristic of ancient woodland with dead-wood habitats.

A few species were additionally noted as:

a: Insufficient information is available about the present distribution of these species to be certain that they belong to this group; *Euplectus brunneus*, *Laemophloeus monilis*, *Oxylaemus variolosus*, *Aderus brevicornis;*

b: occasionally imported in timber, etc; *Agrilus biguttatus*, *Uleiota planata;*

c: a leaf beetle not associated with timber or dead wood, but known to occur at the New Forest, Windsor Forest and Sherwood Forest, mainly on very old oaks; *Cryptocephalus querceti*.

1.1.2.2 The Index of Ecological Continuity applied to saproxylic beetles

Following on from this pioneering work on lichen and invertebrate assemblages, the next stage was obvious – to use the list of saproxylic beetles of pasture-woodlands (or wood pastures, as they are generally known today) to develop a parallel Index of Ecological Continuity. A system was accordingly proposed to a regional meeting of the Royal Entomological Society at Leicester in 1987 (Alexander, 1988; Harding & Alexander, 1994).

The 195 saproxylic species (the one non-saproxylic was omitted) listed in Harding & Rose (1986) and their gradings were used to form the basis of a scoring system, on a presence or absence basis, to interpret lists of species recorded at a site and to provide an evaluation of the site based on the species of saproxylic beetles recorded. The value of each of the three groupings is subjective of course, but it seemed reasonable to allocate a differential scoring system to reflect the higher value of Group 1 species in comparison to Group 3. Scores of 1, 2 or 3 were therefore allocated to Group 3, 2 and 1 species respectively. A simple 1, 2, and 3 was selected rather than any other mathematical sequence due to the subjectivity of the whole scheme, and also to keep the resulting statistics manageable.

A decision was taken to limit the time period for which records could be accepted. Initially 1945 was taken as the cut off point (Alexander, 1988) but this was later changed to 1950 (Harding & Alexander, 1994). The index is intended to be used in evaluation for nature conservation and therefore should reflect the current and recent past interest of the sites being considered. Many of the anecdotal records available for sites are historical. Including such records would bias the index to select sites which were important in the early 20th century, but many of which subsequently have been destroyed or severely degraded as relics of forest with old trees.

The Invertebrate Site Register project of the Nature Conservancy Council brought together a wealth of information, particularly species listings from all over Britain. This provided a huge short-cut to building up a picture of the IEC values derived from saproxylic beetles for a wide range of sites and enabled a site hierarchy to be developed and which could then form the basis of assessing sites for SSSI status. Many designations have followed.

The general paucity of records for many sites, and the absence of any systematic attempt to survey the beetles of a large number of sites, inevitably means that comparisons of one site with others are subject to considerable bias. However, it was felt to be important to incorporate this noisy data rather than imply that such sites were not important by their exclusion.

The original index values calculated in 1987 have been subject to ongoing revision as new records for sites have been incorporated and as previously unrecognised sites have been surveyed. Initially index values of 20 or more were identified as the most important sites of a national series (Harding & Alexander, 1994). This threshold was subsequently modified (Alexander, 1996) such that:

- >80 = international importance;

- >25 = national importance;
- >15 = regional importance.

Revision of the species listing is the next aspect in need of revision.

1.1.2.3 Recent developments

The last 15 years have seen considerable advances in knowledge of the saproxylic habitat and the invertebrate assemblage. In particular, the formation of the Ancient Tree Forum has brought together people from a wide variety of disciplines but with the common interest in old trees. The combination of specialists in tree structure and biology, fungi and fungal decay, and invertebrates enabled cross-fertilisation of ideas to an extent which had not previously been possible. A new understanding of the relationships between the trees, fungi and invertebrates has emerged, and which has led to serious challenges to conventional woodland ecology. English Nature has played a key part in this ancient tree renaissance through their Veteran Tree Initiative and subsequent research projects.

The Invertebrate Site Register project also stimulated much renewed recording effort and much new information has been generated.

The increasing development of ecological and entomological consultancies in response to demand for specialist support by the conservation organisations has been of especial importance. Relatively detailed studies are now regularly being commissioned on sites known or suspected to be of significance for saproxylic beetles. Increasingly previously poorly worked sites are being well documented, and there are now a large number of site reports covering saproxylic beetles. This is becoming a major resource of site data and greater efforts need to be made in order to ensure wider dissemination. Often the reports remain unpublished and unavailable to researchers.

Global climate change is proving to be a major influence on saproxylic beetle distribution and ecology. Certain species, long regarded as relict old forest species, have proved capable of expanding out from their few refugia as weather factors have begun to change and encourage larger scale dispersal, increasing the chances of colonisation of new sites where suitable habitat exists. *Agrilus biguttatus* is an excellent example. However, it has also become fashionable among certain entomologists to use such changes to criticise the indicator species approach and to assume that all new records derive from recent colonisation. In few cases has categorical evidence been found that the species concerned had not been present all along but had remained undetected.

Terminology has also provided a considerable cause of confusion. What is actually meant or intended by the terms “woodland” and “pasture-woodland”? – or wood pasture as the latter has increasingly become referred to following the development of the UK Biodiversity Action Plan. Saproxylic species are essentially dependent on the generation by woody plants of dead woody tissues which may then be broken down or decayed by fungi and other organisms. Tree density or tree frequency is not implicit in the term “saproxylic”. Saproxylic species include species which may develop on isolated trees - at one extreme - or on trees within dense moist shady closed-canopy woodland. Habitat continuity similarly does not imply closed-canopy woodland. Indicators of continuity of dead-wood habitats are not necessarily found in conventional “woodland” – indeed, un-grazed and closed canopy woodlands or woodlands which have been managed as coppices tend to be relatively species-poor in saproxylics. As Harding & Rose (1986) make clear, their beetle list is of indicators of continuity of dead-wood habitats particularly in wood pastures. Tree density is not implicit – wood pastures cover a wide range of habitat structures and compositions, from very open historic parklands through to more densely wooded areas. And yet the Harding & Rose (1986) beetle list has often been described as "indicators of ancient woodland", the latter term being strongly associated in the minds of many ecologists - and especially the public in general - with the old coppices. The entomological literature is unfortunately full of this misconception.

Recently the term "old growth" has become adopted from its North American origins and provides a more suitable, less confusing, terminology for these saproxylic beetle assemblages (Butler, Rose & Green, 2001; Alexander *et al*, 2003; Alexander & Butler, in press).

2. The list of saproxylic beetles indicative of continuity of saproxylic habitats

2.1 Criteria for inclusion

The basic criterion for inclusion of a particular species in the saproxylic continuity list is that species' known association with sites with a long and unbroken history of suitable saproxylic habitat. While this association has been described as a self-fulfilling prophesy, as a circular argument, support is available from a number of areas. Increasing knowledge of the fauna present in the post-glacial native forests, undisturbed by the activities of people, is the strongest evidence. But knowledge of the mobility of individual beetles and populations is also increasingly becoming available and providing support for the idea that a species living amongst continuous habitat is under little or no selective pressure for high mobility and the ability to cross large expanses of habitat – thus the species of undisturbed native forests will naturally have low mobility.

The concept of relatively undisturbed forest is the basis for the *urwaldtiere* fauna identified by Palm and others in Germany. However, this is another case of self-fulfilling prophesy and is based on human perceptions of what relatively undisturbed forests should look like in the modern landscape. Vera (2000) has recently challenged these concepts and Butler *et al* (2001) present a case for features of cultural landscapes – notably wood pastures – mimicking the features of the undisturbed native forests. They regard the surviving ancient wood pastures of the cultural landscape as Britain's (and Europe's) equivalent to the "old growth" described in North America – the native forests of that continent can justifiably be viewed as the cultural landscape of the native Americans, before European colonisation.

Another problem has been the extreme localisation of entomological recording. Recorders have tended to concentrate their efforts on the more rewarding sites, so that their precious leisure time is not wasted on unproductive sites. Thus sites such as Windsor Great Park and Forest, the New Forest, and Epping Forest in the south, and Sherwood Forest in the north, have received considerably more recorder effort than any other sites. Thus it is inevitable that such sites will have the longest list of saproxylic beetles and also be amongst the very few known sites for many species. This bias in recording effort has been amply demonstrated by the recognition of many new nationally important sites in recent decades, notably Bredon Hill, Burnham Beeches and Ashtead Common in the south – sites with easy public access but virtually unknown to entomologists until recently. Northern examples include Duncombe Park and Grimsthorpe Park, both sites crossed by public rights of way. Of course the mobility of the early entomologists was also a limitation, the best known early sites often being close to large urban centres or to railway stations.

The criteria for inclusion in the saproxylic continuity list can therefore be listed as:

- species found in modern lowland England and Wales primarily in sites with evidence for continuity of suitable saproxylic habitats, from documentary or archaeological sources;
- species known from the fossil record to occur in the native forests which developed following the last glaciation and before people had a significant impact on forest structure;
- species of known or supposed low mobility, especially from a lack of evidence for ability to colonise newly suitable sites.

This still leaves a considerable degree of uncertainty and listings should always be regarded as provisional and not definitive. Research into site history, the fossil record, and species mobility are all active areas and are regularly generating new information which needs to be taken into account.

The list is not a single assemblage but rather an amalgam of assemblages. Species of shady closed-canopy forest are included as well as species requiring bright sunny situations with open-grown trees. Species requiring small branchwood are included as well as those requiring heartwood decay in large trunks. The list is therefore an artificial one from that point of view. What the species have in common is an apparent need for a long history of suitable conditions within a defined area, ie they are relatively immobile and do not normally manage to colonise unoccupied isolated areas within the modern fragmented landscape.

2.2 Apparent changes in mobility and distribution in response to climate change and other factors

The Harding and Rose (1986) list currently includes a number of species which – to modern eyes – should not be there. It is likely that any such listing will become out of date in the same way, and review should be built in to any site assessment system which is based on species assemblages. The review period needs to be practical, to be short enough to maintain the value of the approach, but not so frequent as to undermine confidence in the process. 10-15 years would appear to be a practical interval between successive reviews of the species listing.

Climate change has already resulted in some very noticeable changes in range and abundance of certain saproxylic species on the original listing. The most dramatic is the buprestid *Agrilus biguttatus* (named as *A. pannonicus* on the earlier list), which formerly had a classic old forest refuge distribution in Britain, best known from the New Forest, Windsor Great Park and Forest, and Sherwood Forest. An increase in its abundance in the early 1980s has been boosted by the great storms of the late 1980s and the recent appearance of oak dieback disease. It is now widespread across south-eastern England and new reports are regularly appearing to the north and west (Alexander, 2003). *Platypus cylindrus* is another species associated with the early stages in death and decay of oak trees which has similarly expanded in abundance and range, although perhaps less dramatically so.

Enicmus brevicornis (Lathridiidae) is an example of a species which has also expanded dramatically in recent decades, but this time apparently in direct response to the increased availability of a new feeding situation, sooty bark disease of sycamore. Other saproxylic beetles also appear to be benefiting from this disease.

The recent appearance of *Hylecoetus dermestoides* (Lymexylidae) at a few sites in south-east England has yet to be explained. This beetle is widespread across a large area of Britain between Yorkshire and central Wales, with a separate population in central and northern Scotland. Its appearance in a few sites in south-west Surrey in recent years most likely suggests casual importation in timber, although presumably involving aspect(s) which has (have) not occurred in the past.

These are just a few examples. It is generally difficult to determine cause and effect in changes in distribution and abundance, and often equally difficult to determine whether or not these are real changes to the beetle populations rather than just the result of recorder bias.

2.3 Changes due to increased recording effort

There are many factors which impact on recording effort. Increased mobility of entomologists and increasing amounts of leisure time are well-known to be expanding knowledge considerably. Improved communications through specialist literature and the Internet are also having a dramatic impact. Knowledge of the biology and ecology of some species has improved our understanding of the specialist recording techniques needed to find them in the field. The result has been a dramatic increase in records of those species independent of any changes in actual abundance or distribution in the field.

Research on larval habits and habitats is one particular area which has resulted in great improvements in knowledge of certain species. The D-shaped exit holes of *Agrilus* spp (Buprestidae) are now regularly sought out by coleopterists, although these are best supported by larval galleries and – preferably – confirmation with adult beetles. Another good example is *Prionocyphon serricornis* (Scirtidae) with its aquatic larvae in water-filled hollows and cavities in old trees.

2.4 Regional variation

Regional variation in the saproxylic beetle fauna has been covered in the continuity list to some extent by inclusion of a few species with a northern or western distribution, eg *Hylecoetus dermestoides*, *Saperda scalaris*, and *Rhopalomesites tardii*. The fauna is essentially a continental and Temperate one, reaching the edges of their ranges in Britain. The general problem that species-richness declines northwards and westwards in Britain is essentially unavoidable.

There are a number of possibilities whereby this could be reduced, but are mostly unsatisfactory. A reduction in the number of species included which have a marked restriction to the far south-east would be one option, but would undermine the value of the list as a statement of Britain's relict old forest saproxylic fauna. Increasing the individual score for species with a north-western distribution is another possibility, but would introduce a different type of bias into an already very subjective system.

In reality it is only the farthest northern and western counties which have cause for concern. The list of the highest scoring sites covers much of England and Wales, from Duncombe Park in the North York Moors across to Chirk and Powis Castle Parks in the Welsh Borders, across south Wales to Dinefwr Park in Carmarthenshire, and as far south-west as Whiddon Park in Devon. A case could be made for including one or more of the highest scoring sites from areas beyond this in the series of nationally important sites for this fauna. However, few of the species in the national continuity listing are to be found in these areas – by definition – and a better approach would be to develop regional continuity listings including a wider range of saproxylic beetles and to use these to develop regional indices. The best regional sites would then contribute to the series of nationally important sites.

The groundwork for much of these disadvantaged areas has already been carried out. Garland (1983) and Alexander (1993) are examples of where such an approach has been started – for the Yorkshire/ Derbyshire area and Cornwall, respectively, and these could usefully be updated. Reviews of the saproxylic faunas of the North East and Cumbria are also needed. The Countryside Council for Wales have also carried out an extensive review of the saproxylic beetle fauna of parkland sites in Wales (Hammond & Hine, 1994, and subsequent more detailed site surveys). Knowledge of this Temperate saproxylic beetle fauna is more limited in southern Scotland but much recording work has been carried out there by the late RA Crowson and a literature review would be a valuable starting point for bringing this area more formally into the IEC approach.

2.5 Current review

The full list of 700 native British saproxylic Coleoptera (Alexander, 2002) has been reviewed and the degree of association with sites with continuity of saproxylic habitats estimated (see Appendix 1). The estimation process draws mostly on published records for the species concerned and on personal knowledge of those species. Published records are all too often difficult to interpret as insufficient supporting information is provided on site details, particularly ecological history. Another important source of data is site survey reports and these were used, where readily available.

Few people have published comments on the composition of the original Harding & Rose (1986) list. This might be regarded as an endorsement of the list, but it also might just reflect a lack of interest in such ecological matters amongst most coleopterists, or, perhaps a reticence to become involved in what might be perceived as specialist or professional issues. Hammond & Harding (1991) are an exception and their views have been considered as part of the present revision. Other comments may exist amongst the literature but the review project didn't contain sufficient time for a full literature review.

A revised listing emerges from the revision (Table 1) with 23 of the original species deleted and nine additions. Eleven species were moved down a grade or two, while twelve species moved up in the grading. The changes are detailed separately in Table 2. This constitutes a fairly conservative review. The new species total is 180. It was felt that anything more radical was not warranted or desirable at this time.

However, a further selection of species has also been flagged up as possible inclusions in due course. Some of these appear sound propositions (marked in the final column of Appendix 1 as "Yes") and merit detailed investigation of their site associations. Others appear possible but the evidence is as yet weaker and these are marked with a question mark – these include a few species which featured on the original list but have now been deleted owing to the lack of strong evidence. These two categories of species would clearly be worth considering for inclusion in any regional IEC developments.

Table 1 Revised listing of saproxylic beetles used in the calculation of the Index of Ecological Continuity

Family	Genus	Species	Continuity grade	GB Status (1992)	Other names in common usage
Histeridae	*Plegaderus*	*dissectus*	2	NSB	
Histeridae	*Abraeus*	*granulum*	1	NSA	
Histeridae	*Aeletes*	*atomarius*	1	RDB3	
Ptiliidae	*Ptenidium*	*gressneri*	2	NS	
Ptiliidae	*Ptenidium*	*turgidum*	2	RDBK	
Ptiliidae	*Micridium*	*halidaii*	1	RDBK	
Ptiliidae	*Ptinella*	*limbata*	2	RDBK	
Scydmaenidae	*Eutheia*	*formicetorum*	1	RDB1	
Scydmaenidae	*Eutheia*	*linearis*	1	RDB1	
Scydmaenidae	*Stenichnus*	*bicolor*	3	None	
Scydmaenidae	*Stenichnus*	*godarti*	2	RDB3	
Scydmaenidae	*Microscydmus*	*minimus*	1	RDB3	
Scydmaenidae	*Microscydmus*	*nanus*	2	NS	
Scydmaenidae	*Euconnus*	*pragensis*	1	RDB1	
Scydmaenidae	*Scydmaenus*	*rufus*	3	RDB2	
Omaliinae	*Phyllodrepa*	*nigra*	1	RDBI	
Staphylininae	*Xantholinus*	*angularis*	2	NSA	
Staphylininae	*Velleius*	*dilatatus*	1	RDB1	
Staphylininae	*Quedius*	*aetolicus*	3	NSA	
Staphylininae	*Quedius*	*maurus*	3	None	
Staphylininae	*Quedius*	*microps*	3	NSB	
Staphylininae	*Quedius*	*scitus*	2	NSB	
Staphylininae	*Quedius*	*truncicola*	3	NSB	*ventralis*
Staphylininae	*Quedius*	*xanthopus*	3	NSB	
Aleocharinae	*Euryusa*	*optabilis*	2	RDBI	
Aleocharinae	*Euryusa*	*sinuata*	2	RDBI	
Aleocharinae	*Tachyusida*	*gracilis*	1	RDB1	
Pselaphidae	*Bibloporus*	*minutus*	2	NSB	
Pselaphidae	*Euplectus*	*nanus*	1	RDBI	
Pselaphidae	*Euplectus*	*punctatus*	1	RDB3	
Pselaphidae	*Plectophloeus*	*nitidus*	1	RDB2	
Pselaphidae	*Batrisodes*	*adnexus*	1	RDB1	*buqueti*
Pselaphidae	*Batrisodes*	*delaporti*	1	RDB1	
Pselaphidae	*Batrisodes*	*venustus*	1	NSA	
Scirtidae	*Prionocyphon*	*serricornis*	3	NSB	
Scarabaeidae	*Gnorimus*	*nobilis*	1	RDB2	
Scarabaeidae	*Gnorimus*	*variabilis*	1	RDB1	
Eucnemidae	*Melasis*	*buprestoides*	3	NSB	
Eucnemidae	*Microrhagus*	*pygmaeus*	3	RDB3	

Family	Genus	Species	Continuity grade	GB Status (1992)	Other names in common usage
Eucnemidae	*Eucnemis*	*capucina*	1	RDB1	
Throscidae	*Aulonothroscus*	*brevicollis*	1	RDB3	
Elateridae	*Lacon*	*querceus*	1	RDB1	
Elateridae	*Calambus*	*bipustulatus*	3	NSB	
Elateridae	*Limoniscus*	*violaceus*	1	RDB1	
Elateridae	*Stenagostus*	*rhombeus*	3	None	*villosus*
Elateridae	*Ampedus*	*cardinalis*	1	RDB2	
Elateridae	*Ampedus*	*cinnabarinus*	1	RDB3	
Elateridae	*Ampedus*	*elongantulus*	3	NSA	
Elateridae	*Ampedus*	*nigerrimus*	1	RDB1	
Elateridae	*Ampedus*	*pomorum*	3	NSB	
Elateridae	*Ampedus*	*quercicola*	1	NSB	*pomonae*
Elateridae	*Ampedus*	*ruficeps*	1	RDB1	
Elateridae	*Ampedus*	*rufipennis*	1	RDB2	
Elateridae	*Ischnodes*	*sanguinicollis*	2	NSA	
Elateridae	*Megapenthes*	*lugens*	1	RDB1	
Elateridae	*Procraeus*	*tibialis*	1	RDB3	
Elateridae	*Elater*	*ferrugineus*	1	RDB1	
Lycidae	*Pyropterus*	*nigroruber*	3	NSA	
Lycidae	*Platycis*	*cosnardi*	1	RDBI	
Lycidae	*Platycis*	*minutus*	3	NSB	
Cantharidae	*Malthodes*	*crassicornis*	1	RDB3	
Dermestidae	*Globicornis*	*rufitarsis*	1	RDB1	*nigripes*
Dermestidae	*Trinodes*	*hirtus*	1	RDB3	
Bostrichidae	*Lyctus*	*brunneus*	3	None	
Anobiidae	*Xestobium*	*rufovillosum*	3	None	
Anobiidae	*Gastrallus*	*immarginatus*	1	RDB1	
Anobiidae	*Dorcatoma*	*ambjoerni*	2	RDBK	
Anobiidae	*Dorcatoma*	*chrysomelina*	3	None	
Anobiidae	*Dorcatoma*	*dresdensis*	2	NSA	
Anobiidae	*Dorcatoma*	*flavicornis*	3	NSB	
Anobiidae	*Dorcatoma*	*serra*	2	NSA	
Anobiidae	*Anitys*	*rubens*	1	NSB	
Ptininae	*Ptinus*	*subpilosus*	2	NSB	
Lymexylidae	*Hylecoetus*	*dermestoides*	3	NSB	
Lymexylidae	*Lymexylon*	*navalis*	2	RDB2	
Phloiophilidae	*Phloiophilus*	*edwardsii*	3	NSB	
Trogossitidae	*Thymalus*	*limbatus*	2	NSB	
Cleridae	*Tillus*	*elongatus*	3	NSB	
Cleridae	*Opilo*	*mollis*	3	NSB	
Cleridae	*Thanasimus*	*formicarius*	3	None	
Cleridae	*Korynetes*	*caeruleus*	3	NSB	
Melyridae	*Aplocnemus*	*impressus*	2	NSB	*pini*
Melyridae	*Aplocnemus*	*nigricornis*	2	NSA	
Melyridae	*Hypebaeus*	*flavipes*	1	RDB1	
Nitidulidae	*Carpophilus*	*sexpustulatus*	3	None	
Nitidulidae	*Epuraea*	*angustula*	3	NSB	
Rhizophagidae	*Rhizophagus*	*nitidulus*	3	NSB	
Rhizophagidae	*Rhizophagus*	*oblongicollis*	1	RDB1	
Silvanidae	*Silvanus*	*bidentatus*	2	NSB	
Silvanidae	*Silvanus*	*unidentatus*	3	None	

Family	Genus	Species	Continuity grade	GB Status (1992)	Other names in common usage
Silvanidae	*Uleiota*	*planata*	2	NSA	
Cucujidae	*Pediacus*	*depressus*	2	NSA	
Cucujidae	*Pediacus*	*dermestoides*	3	None	
Laemophloeidae	*Notolaemus*	*unifasciatus*	2	NSA	
Cryptophagidae	*Cryptophagus*	*micaceus*	1	RDBK	
Erotylidae	*Triplax*	*lacordairii*	3	RDB3	
Erotylidae	*Triplax*	*russica*	3	None	
Erotylidae	*Triplax*	*scutellaris*	3	RDB3	
Erotylidae	*Tritoma*	*bipustulata*	3	NSA	
Biphyllidae	*Biphyllus*	*lunatus*	3	None	
Biphyllidae	*Diplocoelus*	*fagi*	3	NSB	
Cerylonidae	*Cerylon*	*fagi*	2	NSB	
Endomychidae	*Symbiotes*	*latus*	3	NSB	
Lathridiidae	*Lathridius*	*consimilis*	1	NS	
Lathridiidae	*Enicmus*	*brevicornis*	3	NS	
Lathridiidae	*Enicmus*	*rugosus*	2	NS	
Lathridiidae	*Corticaria*	*alleni*	1	NS	
Mycetophagidae	*Pseudotriphyllus*	*suturalis*	3	None	
Mycetophagidae	*Triphyllus*	*bicolor*	2	None	
Mycetophagidae	*Mycetophagus*	*atomarius*	3	None	
Mycetophagidae	*Mycetophagus*	*piceus*	2	NSB	
Mycetophagidae	*Mycetophagus*	*populi*	2	NSA	
Mycetophagidae	*Mycetophagus*	*quadriguttatus*	2	NSA	
Ciidae	*Cis*	*coluber*	2	RDB3	
Tetratomidae	*Tetratoma*	*ancora*	3	NSB	
Tetratomidae	*Tetratoma*	*desmaresti*	3	NSA	
Melandryidae	*Hallomenus*	*binotatus*	3	NSB	
Melandryidae	*Orchesia*	*undulata*	3	None	
Melandryidae	*Anisoxya*	*fuscula*	3	NSA	
Melandryidae	*Abdera*	*biflexuosa*	3	NSB	
Melandryidae	*Abdera*	*quadrifasciata*	1	NSA	
Melandryidae	*Phloiotrya*	*vaudoueri*	2	NSB	
Melandryidae	*Hypulus*	*quercinus*	1	RDB2	
Melandryidae	*Melandrya*	*barbata*	1	RDB1	
Melandryidae	*Melandrya*	*caraboides*	3	NSB	
Melandryidae	*Conopalpus*	*testaceus*	3	NSB	
Mordellidae	*Tomoxia*	*bucephala*	3	NSA	
Mordellidae	*Mordellistena*	*neuwaldeggiana*	3	RDBK	
Colydiidae	*Synchita*	*humeralis*	3	NSB	
Colydiidae	*Synchita*	*separanda*	3	RDB3	
Colydiidae	*Cicones*	*variegata*	2	NSA	
Colydiidae	*Bitoma*	*crenata*	3	None	
Colydiidae	*Teredus*	*cylindricus*	1	RDB1	
Colydiidae	*Oxylaemus*	*variolosus*	2	RDB3	
Tenebrionidae	*Eledona*	*agricola*	3	NSB	
Tenebrionidae	*Corticeus*	*unicolor*	2	RDB3	
Tenebrionidae	*Prionychus*	*ater*	3	NSB	
Tenebrionidae	*Prionychus*	*melanarius*	1	RDB2	
Tenebrionidae	*Pseudocistela*	*ceramboides*	2	NSB	
Tenebrionidae	*Mycetochara*	*humeralis*	2	NSB	
Oedemeridae	*Ischnomera*	*caerulea*	1	RDB3	

Family	Genus	Species	Continuity grade	GB Status (1992)	Other names in common usage
Oedemeridae	*Ischnomera*	*cinerascens*	3	RDB2	
Oedemeridae	*Ischnomera*	*cyanea*	3	NSB	
Oedemeridae	*Ischnomera*	*sanguinicollis*	1	NSB	
Pyrochroidae	*Pyrochroa*	*coccinea*	3	NSB	
Aderidae	*Aderus*	*brevicornis*	1	RDB2	
Aderidae	*Aderus*	*oculatus*	3	NSB	
Scraptiidae	*Scraptia*	*fuscula*	1	RDB1	
Scraptiidae	*Scraptia*	*testacea*	1	RDB3	
Scraptiidae	*Anaspis*	*septentrionalis*	1	RDBI	*schilskyana*
Cerambycidae	*Prionus*	*coriarius*	3	NSA	
Cerambycidae	*Grammoptera*	*ustulata*	1	RDB3	
Cerambycidae	*Grammoptera*	*variegata*	3	NSA	
Cerambycidae	*Anoplodera*	*scutellata*	1	NSA	
Cerambycidae	*Anoplodera*	*sexguttata*	2	RDB3	
Cerambycidae	*Leptura*	*aurulenta*	3	NSA	
Cerambycidae	*Leptura*	*quadrifasciata*	3	None	
Cerambycidae	*Leptura*	*revestita*	2	RDB1	
Cerambycidae	*Pyrrhidium*	*sanguineum*	1	RDB2	
Cerambycidae	*Phymatodes*	*testaceus*	3	None	
Cerambycidae	*Mesosa*	*nebulosa*	2	RDB3	
Cerambycidae	*Saperda*	*scalaris*	3	NSA	
Anthribidae	*Platyrhinus*	*resinosus*	3	NSB	
Anthribidae	*Tropideres*	*sepicola*	1	RDB2	
Anthribidae	*Tropideres*	*niveirostris*	3	RDB2	
Anthribidae	*Platystomos*	*albinus*	3	NSB	
Rhynchophoridae	*Dryophthorus*	*corticalis*	1	RDB1	
Curculionidae	*Rhopalomesites*	*tardyi*	3	NSB	
Curculionidae	*Cossonus*	*parallelepipedus*	3	NSB	
Curculionidae	*Stereocorynes*	*truncorum*	1	NSA	
Curculionidae	*Trachodes*	*hispidus*	3	NSB	
Scolytinae	*Ernoporicus*	*caucasicus*	2	NSA	
Scolytinae	*Ernoporicus*	*fagi*	3	NSA	
Scolytinae	*Ernoporus*	*tiliae*	2	RDB1	
Scolytinae	*Xyleborinus*	*saxeseni*	3	None	
Scolytinae	*Xyleborus*	*dispar*	3	NSB	
Scolytinae	*Xyleborus*	*dryographus*	3	NSB	
Scolytinae	*Trypodendron*	*domesticum*	3	None	
Scolytinae	*Trypodendron*	*signatum*	3	NSB	
Platypodidae	*Platypus*	*cylindrus*	3	NSB	

Table 2 Changes in species used in IEC calculation

Family	Genus	Species	H&R (1986) grade	Revised continuity grade	Type of change
Scydmaenidae	*Microscydmus*	*nanus*	0	2	addition
Scarabaeidae	*Gnorimus*	*nobilis*	0	1	addition
Anobiidae	*Dorcatoma*	*ambjoerni*	0	2	addition
Mycetophagidae	*Mycetophagus*	*populi*	0	2	addition
Mycetophagidae	*Mycetophagus*	*quadriguttatus*	0	2	addition
Mordellidae	*Mordellistena*	*neuwaldeggiana*	0	3	addition
Oedemeridae	*Ischnomera*	*caerulea*	0	1	addition
Cerambycidae	*Leptura*	*sexguttata*	0	2	addition
Scolytidae	*Ernoporus*	*tiliae*	0	2	addition
Pselaphidae	*Euplectus*	*brunneus*	1a	0	deletion
Lucanidae	*Sinodendron*	*cylindricum*	3	0	deletion
Buprestidae	*Agrilus*	*biguttatus*	2b	0	deletion
Dermestidae	*Ctesias*	*serra*	3	0	deletion
Anobiidae	*Xyletinus*	*longitarsus*	3	0	deletion
Laemophloeidae	*Laemophloeus*	*monilis*	1a	0	deletion
Atomariinae	*Atomaria*	*lohsei*	1	0	deletion
Lathridiidae	*Dienerella*	*separanda*	2	0	deletion
Lathridiidae	*Corticaria*	*fagi*	1	0	deletion
Lathridiidae	*Corticaria*	*longicollis*	1	0	deletion
Tetratomidae	*Tetratoma*	*fungorum*	3	0	deletion
Colydiidae	*Colydium*	*elongatum*	1	0	deletion
Curculionidae	*Pentarthrum*	*huttoni*	3	0	deletion
Scolytidae	*Trypodendron*	*lineatum*	3	0	deletion
Scirtidae	*Prionocyphon*	*serricornis*	2	3	downgrade
Lycidae	*Pyropterus*	*nigroruber*	2	3	downgrade
Anobiidae	*Dorcatoma*	*chrysomelina*	2	3	downgrade
Lymexylidae	*Lymexylon*	*navale*	1	2	downgrade
Silvanidae	*Uleiota*	*planata*	1b	2	downgrade
Biphyllidae	*Diplocoelus*	*fagi*	2	3	downgrade
Lathridiidae	*Enicmus*	*brevicornis*	2	3	downgrade
Mordellidae	*Tomoxia*	*bucephala*	1	3	downgrade
Colydiidae	*Synchita*	*separanda*	1	3	downgrade
Oedemeridae	*Ischnomera*	*cinerascens*	1	3	downgrade
Scolytidae	*Ernoporus*	*caucasicus*	1	2	downgrade
Staphylininae	*Xantholinus*	*angularis*	3	2	upgrade
Staphylininae	*Quedius*	*scitus*	3	2	upgrade
Cantharidae	*Malthodes*	*crassicornis*	2	1	upgrade
Dermestidae	*Globicornis*	*rufitarsis*	2	1	upgrade
Trogossitidae	*Thymalus*	*limbatus*	3	2	upgrade
Melyridae	*Aplocnemus*	*impressus*	3	2	upgrade
Melyridae	*Aplocnemus*	*nigricornis*	3	2	upgrade
Cerylonidae	*Cerylon*	*fagi*	3	2	upgrade
Mycetophagidae	*Triphyllus*	*bicolor*	3	2	upgrade
Mycetophagidae	*Mycetophagus*	*piceus*	3	2	upgrade
Melandryidae	*Hypulus*	*quercinus*	2	1	upgrade
Tenebrionidae	*Mycetochara*	*humeralis*	3	2	upgrade

3. Sampling methods used for conducting surveys to ascertain the IEC

3.1 Introduction

Sampling for saproxylic beetles ideally needs a basic understanding of the processes of tree aging and wood decay, and how these relate to the particular breeding habits of the beetles concerned (see Alexander, 1999a, for an introduction, or Dajoz, 2000, for more detail). Knowledge of the behaviour of the adult stages is also important. The IEC beetle list includes species which cover the full range of decay succession as well as the full range of timber within the tree.

Intensive and expert recording, using an array of techniques, in all seasons (and preferably over several years) are virtual prerequisites in order to develop a complete or almost complete list of saproxylic beetles for a particular site (Hammond & Harding, 1991).

3.2 Remote sampling

Sampling methods which stand back from the tree and either attract the beetles to a trap or catch them incidentally as they fly between trees are good in that they cause no physical damage to the habitat. They do however tend to require specialist equipment: flight interception traps (FITs), malaise traps, pheromone or other baited traps, canopy fogging using insecticidal smokes, suction trapping, etc. These rely very little on an understanding of wood decay and may therefore lull recorders into a false sense of security – important habitat features may well be missed, notably species developing inside hollow trunks and in the subterranean roots.

Hammond & Harding (1991) provide comparative data on the IEC species found during an intensive survey in Richmond Park. Methods employed included flight interception trapping, insecticide fogging, and direct sampling from dead and dying wood and the fruiting bodies of wood-decay fungi. Each approach produced species not detected by the other techniques. They also provide data comparing the relative incidence of grade 1 and 2 species in malaise trap, FIT and fogging samples, and once again, show that the different techniques appear not to be equally successful at finding the different species and that many species have not so far been found using individual techniques. For example Dorcatoma chrysomelina has been taken by FIT and fogging but not in malaise traps, while Mesosa nebulosa has only been found in malaise traps - of the three sampling techniques. FITs do appear to be the most successful of the three techniques.

A key advantage of trapping techniques is that the return on effort tends to be very good – the traps may be left to gather material for long periods while the recorder is busy doing other things.

3.3 Traditional hand search sampling and the decay of wood

However, the traditional recording methods of an experienced field worker will still provide the longest lists given enough time - and this is where knowledge of tree biology and wood decay comes into its own. Combinations of more targeted trapping, such as suction sampling or emergence trapping, with hand searching and netting may also be very successful.

The trunk of the tree comprises the dead outer bark, the living inner bark, the cambium, the living outer woody tissues, and the dead inner woody tissues or heartwood. Very few beetles actually feed in the living tissues and even then usually only when the tree is unhealthy, declining and effectively almost dead. Thus there is no real reason for investigating the living parts of tree.

Heartwood decay is the single most important feature that needs to be understood by recorders. The central core of heartwood of mature or older trees comprises dead tissues. These generally contain chemical compounds laid down by the tree prior to the death of the cells and which resist or slow down fungal decay. Waste products may also be deposited. This heartwood may eventually be colonised by a specialist wood-decay fungus and degradation of the tissues initiated. Thus a succession begins, from sound un-decayed wood, through partially decayed wood, and fully decayed wood. The decay creates a cavity into which debris falls and accumulates. Often the cavity is used by birds for nesting or roosting, or bats for roosting, and this contributes further debris.

Heartwood decay fungi tend to begin in the base of the trunk and working upwards. Access to the cavities for recording purposes may not be possible but this does not mean that the trunk is not decaying internally or hollow. Certain fungi are only capable of decaying the cellulose in the wood, leaving the lignin as the familiar red-rot. Other fungi break down both compounds, taking the lignin first and leaving cellulose visible as what is known as white-rot. Red-rotted trees naturally contain greater volumes of debris than white-rotted trees, since the lignin debris accumulates in the former.

The heartwood decay fungi are able to fruit as the familiar bracket fungi wherever there is a gap in the surrounding ring of living tree tissues. Thus fruiting chicken-of-the-woods *Laetiporus sulphureus* testifies to the presence of red-rot within the heartwood of the trunk, and fruiting of the weeping polypore *Inonotus hispidus* to white-rot within the heartwood. Some fungi are very specific in their tree species hosts, others less so. Similarly, certain beetles which develop in bracket fungi and the decaying wood behind them are also very specific, while others are less so.

The trunk therefore potentially contains a wide array of features that warrant investigation for saproxylic beetles:

- loose outer bark with cavities behind, where:
    - cobweb beetles (Dermestidae) may inhabit the spider webs;
    - nocturnal beetles may be resting during the daylight activity period of most recorders;
    - fragments of dead beetles may have accumulated amongst other debris;
    - bark boring beetles may also be present in the bark itself;

- cavities into the hollow interior of older trees, giving access to the wood mould accumulating in the base, and also the inner trunk surfaces where specialist beetles may be present amongst the decaying and decayed wood;
- smaller cavities where decay has occurred following branch loss or other localised damage;
- fruiting bodies of wood-decay fungi, which may be attracting adult beetles for feeding or oviposition, or contain developing larvae;
- sap runs or other fluxes, which again may attract adults or contain larvae.

Branch loss, or other forms of damage to the trunk, may lead to localised fungal decay and cavity formation. The familiar “rot-hole” generally develops as a result of branch loss and colonisation by decay fungi which start to decay inwards. The term “rot hole” may also be applied to a completely different situation where water, leaves and other debris accumulate in branch forks, etc, and effectively become an aerial pond. The specialist fauna of these two situations does overlap in composition, although many of the “pond” type support a fauna of aquatic species rather than true decay species.

Lightning strikes may split the living ring of tree tissues, leaving an exposed strip of heartwood up the trunk. This provides access to the dead heartwood layers below and often to decayed heartwood within. A solid and intact strip does not necessarily mean that the tissues behind have not been decayed or hollowed.

Heartwood decay eventually proceeds into the branch wood of the tree canopy, and so the whole succession of beetles which follow the decay process may also be found up in the canopy.

Branches will mostly eventually die in situ or perhaps be ripped out in storms, or even dropped by the tree in periods of drought in order to reduce the area of transpiring foliage. Branches which die in situ do so exposed to the drying atmosphere all round, while those which fall will decay with part lying on the moist earth below. Different situations are exploited by different beetles.

The lower shorter branches of the canopy of a tree with full canopy expression tend to be shaded out by those above. These decay in a shady moist environment, protected from the drying air outside of the tree, and can be very productive for saproxylic beetles – lightly tapping these branches over a beating tray will dislodge any beetles present. Dead branches higher in the canopy will tend to be drier, exposed to hot sunshine during the high summer period, to frosts in the winter, and wind all year round. These support a different array of species – and are difficult to sample without the used of fogging techniques.

At the opposite extreme is the root system, with its network of large and small woody roots, and its own array of specialist wood-decay fungi. These are also difficult to sample for the associated beetle fauna.

A common problem for recorders is the wider availability of larval beetles than adults. In many species the decaying wood is where the larvae develop rather than where the adults are most likely to be found. The adult stage may be relatively short-lived, and in that time the beetle may need to gain energy for flight (from nectar, honeydew, or other sources), protein for egg-development (from pollen and other sources), mates and suitable sites for egg-laying.

The value of sampling tree and shrub blossom for the flying adult stage is well known amongst coleopterists. A wide range of flowering trees and shrubs may be used, especially Rosaceae, but also holly, elder, privet, etc. Flowers in the field layer tend to be less productive but should not be ignored. Hogweed and meadowsweet are particularly favoured by certain adult beetles which develop in decaying wood.

Identification keys which deal with larval beetles are much less available at present than for adult beetles. In many cases it is easiest to attempt to rear the larvae – in samples of the larval habitat - although this may take a long time. Rearing from bracket fungi can be very productive. Clearly the bracket needs to have been on site for sufficiently long to be colonised by beetles and so it is generally best to collect parts of old brackets for rearing. This has the additional advantage of not removing these fruiting bodies before their spores have been expelled.

The feeding signs of larvae or adult beetles may sometimes provide sufficient clues about the identity of the species concerned for recording purposes, but this tends to be the exception rather than the rule. The D-shaped exit holes of the buprestid *Agrilus* spp are a good case in point provided the host tree or shrub species is properly identified. The round exit holes of deathwatch beetle *Xestobium rufovillosum* in exposed heartwood on oak trunks can be identified with experience. The oval exit holes of the oak longhorn *Phymatodes testaceus* can similarly be recognised with experience. The distinctive galleries of many Scolytidae beneath bark are relatively well documented.

Any recording which involves breaking open decaying wood or bracket fungi, or removal of samples, obviously needs to be carried out with due regard to the needs of conservation. Guidelines are available from a variety of sources - English Nature's *Species Conservation Handbook* includes a specialist code for dead wood sampling (Key, 1994) and the Amateur Entomologists' Society have also published guidance, eg Key (1991).

Non-destructive specialist sampling techniques have been the focus of some extremely useful work by J.A. Owen. The Owen emergence trap (Owen, 1989 & 1992) combines a tent with a Malaise trap collecting device, so that items of known history and/or content can be kept under near-natural conditions and species present as larvae are reared through and collected as the adult stage. The items of decaying wood are unaffected and can be replaced where originally found and still intact. Branch portions torn off from old parkland oak trees in a storm have been studied over a period of four years (Owen, 1992). Similarly Alexander (1994 and 1999b) has compared the fauna of branchwood of oak, ash, field maple and hornbeam blown out in the same storm, and compared oak branch sections of the same age but left in different conditions of sun and shade.

Owen (1999 & 2000) has also developed subterranean pitfall traps for the study of root saproxylics and other soil beetles. Jansson & Antonsson (2003) report on their interesting work in Sweden involving mounting small window traps on branches within the tree canopy and placing pitfall traps amongst the debris in tree cavities. They have also been hanging buckets of wood-decay debris in the canopy to entice heartwood decay beetles to colonise a situation where they are more readily studied.

While surveys for saproxylic beetles should preferably be as all encompassing as possible – to provide data for Site Quality Index (see next section) as well as IEC if for no other reason – the new list of qualifying species for the IEC can be used to promote targeted surveys.

Since the IEC is best calculated on records from a series of recording visits to a particular site, a checklist can be a useful tool for drawing attention to species which might be present but which have not yet been noted. For this reason the new listing is provided in checklist form as Appendix 2.

4. Use of the IEC in site assessment for conservation

The Index of Ecological Continuity was originally developed as a means of producing a simple statistic which could be used in grading a site for its significance to nature conservation, based on ecological considerations rather than rarity (Section 1.1.2.2). The approach has received good recognition by the conservation agencies and several important sites have been designated as a result of this approach to interpreting site species lists as saproxylic assemblages of ecological significance.

Rather than develop a radically new approach, the decision was taken to retain the basic approach taken by Harding & Rose (1986) in allocating a grade to the degree of association, and in the existing scoring mechanism (Alexander 1988; Harding & Alexander, 1994). The basic IEC approach has withstood the test of time reasonably well. Only one alternative approach has subsequently been developed and the two complement each other to some extent.

The Site Quality Index (Fowles *et al*, 1999) requires a full site list and effectively calculates the proportion of the fauna that is rare, irrespective of the reason for their rarity. For it to function properly, it requires the inclusion of all common and widespread saproxylic species. Sites with complete but short lists are also excluded. Difficulties in applying this index may therefore occur when surveys of the fauna of ancient trees generate short lists of albeit important relict old forest species, eg Forthampton Oaks (Alexander, 2002b). The IEC focuses primarily on relict old forest or old growth assemblages and rather than all saproxylic species. The species concerned are also generally of significant interest to coleopterists and so records tend to enter the literature. It does however depend on a series of survey visits – covering all the seasons of beetle activity and preferably over a number of years – in order to build up a realistic IEC value for a particular site.

The IEC figures for the key national series of sites for this saproxylic fauna have been recalculated and the new hierarchical list is provided in Table 3. One site has been omitted - Arundel Park in West Sussex - as this site was devastated as a result of 1987 great storm and the clear-up which followed. The site has not subsequently been re-surveyed for saproxylic beetles but is believed to be capable of supporting a much reduced fauna.

The threshold figures for assessing international, national and regional importance (see 1.1.1.2) remain appropriate.

Table 3 Revised listing of the British sites with the highest IEC values

Site name	Vice County	Revised Index
International importance (IEC = 80+)		
Windsor Great Park & Forest	Berkshire	249
New Forest	S. Hampshire	194
Moccas Park	Herefordshire	125
Bredon Hill	Worcestershire	120
Sherwood Forest	Nottinghamshire	100
Epping Forest	S. Essex	97
Burnham Beeches	Buckinghamshire	83
Richmond Park	Surrey	83
National importance (IEC = 25-79)		
Hatfield Forest	N. Essex	78
Ashtead Common	Surrey	72
Hatchlands Park	Surrey	72
Chirk Castle Park	Denbighshire	67
Knole Park	W. Kent	67
Calke Park	Derbyshire	66
Croome Park	Worcestershire	63
Powis Castle Park	Montgomeryshire	63
Wimpole Park	Cambridgeshire	63
Esher Commons	Surrey	62
Clumber Park	Nottinghamshire	61
Hainault Forest	S. Essex	61
Monk's Wood	Huntingdonshire	61
Duncombe Park Estate	NE Yorkshire	59
Blenheim Park	Oxfordshire	55
Wytham Park & Woods	Berkshire	55
Dinefwr Park	Carmarthenshire	54
Savernake Forest	N. Wiltshire	52
Bookham Common	Surrey	49
Staverton Park	E. Suffolk	49
Hatch Park	W. Kent	48
Trentham Park & King's Wood	Staffordshire	48
Dunham Massey Park	Cheshire	47
Kedleston Park	Derbyshire	45
Petworth Park	W. Sussex	45
Stanford PTA	W. Norfolk	44
Lullingstone Park	W. Kent	43
Grimsthorpe Park	S. Lincolnshire	42
Cobham Park & Woods	W. Kent	40
Forest of Dean	W. Gloucestershire	39
Llanover Park	Monmouthshire	39
Croft Castle Park	Herefordshire	38
Icklingham Plain	W. Suffolk	38
Parham Park	W. Sussex	37
Ashridge Estate	Hertfordshire	36
Thorndon Park	S. Essex	35
West Walk, Forest of Bere	S. Hampshire	34
Box Hill Estate	Surrey	33
Buxted Park	W. Sussex	33

Site name	Vice County	Revised Index
Cirencester Park Woods	E. Gloucestershire	32
Attingham Park	Shropshire	31
Studley Royal Park & Skell Valley	Yorkshire	31
Thursley Common	Surrey	31
Cannock Chase: Brocton Coppice, Haywood Park & Shugborough Park	Staffordshire	30
Whiddon Deer Park	S. Devon	30
Donnington Park	Leicestershire	29
Brampton Bryan Park	Herefordshire	28
Rockingham Castle Park	Northamptonshire	28
Shrubland Park	E. Suffolk	28
Stockton's Wood, Speke	S. Lancashire	28
Ashton Court Estate	N. Somerset	27
Chatsworth Park	Derbyshire	27
Hardwick Hall Park	Derbyshire	27
Brockhampton Park	Herefordshire	26
Hanbury Hall Park	Worcestershire	25
Mottisfont Abbey Woods	S. Hampshire	25
Regional importance (IEC = 15-24)		
Lower River Weaver Woods	Cheshire	24
Nettlecombe Park	S. Somerset	24
Panshanger Park	Hertfordshire	24
Slindon Park Woods	W. Sussex	24
Walcot Park	Shropshire	23
Farnham Castle Park	Surrey	22
Bradgate Park	Leicestershire	20
Forthampton Oaks	W. Gloucestershire	20

5. Ecological and conservation management factors which affect the IEC

The species listing used for calculation of the IEC is a selection of the total saproxylic beetle fauna of Britain, informed partly by knowledge of the saproxylic fauna of the post-glacial wildwood and partly by the current degree of association with those sites believed to be the least disturbed by human activities and which therefore most closely approximate to the structures and composition of the Wildwood. Vera (2000) has recently provided an analysis of what the structure and composition of the wildwood might have been and the role of large herbivores in driving the inherent dynamism of the vegetation.

The saproxylic beetle fauna effectively encompasses the whole range of wood-decay conditions produced by large old open-grown trees plus areas of closed canopy high forest, as well as all stages in between.

As described earlier, a high proportion of these relict old forest – or old growth – species are naturally poor at colonising over large distances and especially across unsuitable terrain. They have not previously needed to develop mechanisms for long-distance mobility, having evolved under conditions of continuous temperate forest – with its mosaic of open and closed canopy conditions.

Each individual relict site will have had a different history of post-glacial development and subsequent land-use by people, albeit subtly in some cases but much more dramatically in others. The composition of the surviving saproxylic beetle fauna speaks for itself in terms of the wood-decay habitats which have had greatest ecological continuity there over time. Thus a site which today is especially rich in heartwood decay species is presumed to have had a relatively long and unbroken history of sufficient numbers of large old open-grown trees and conditions which enable the development of such trees. The most suitable conservation management approach on such sites is clearly to maintain systems which promote the development of large open-grown trees. In some sites the fauna will also suggest which trees need to be the predominant species, or - at least – a significant presence. In Britain, the anobiid *Gastrallus immarginatus* is largely dependent on the availability of concentrations of ancient open-grown field maples – it develops in the trunk bark – and would not be expected on sites lacking a significant presence of such trees. Basically, it is extremely important that the site fauna is reasonably well documented and its features analysed before a conservation plan is developed. It would be all too easy to omit the need to promote the establishment of new generations of field maple, for example.

An understanding of the processes which lead to the formation of hollowing and the special heart-wood decay conditions required by key saproxylic beetles - such as violet click beetle *Limoniscus violaceus* – is also essential. At present, it is thought that heartwood decay proceeds most successfully in open-grown trees developing within extensive wood pasture systems where tree health is not being compromised by modern intensive commercial agricultural practices and where the tree is also not being damaged by other factors such as limb removal to aid access or reduce shading of the forage below.

Other rare and threatened species require wood-decay to proceed under more shaded conditions, notably certain false click beetles Eucnemidae. The presence of such species on a site clearly suggests the need for conservation management which promotes a more closed canopy high forest structure - locally at least.

Large herbivores - of the right type and in the right numbers – are needed to create and maintain the structure of wood pastures (Vera, 2000) and hence to conserve the special saproxylic beetle fauna present.

It follows therefore that the IEC values – once based on an adequate level of species recording – can be affected by conservation management practices. It would be difficult to envisage a situation where conservation management could increase the IEC value, other than by extension of the site and linking it up with neighbouring sites which might support species previously absent from the original site. A more likely scenario is declining IEC values following unsympathetic management. A good example is the impact of loss of sufficient grazing in old wood pastures with populations of ancient trees. Secondary woodland begins to develop and eventually engulfs the old trees, shading the trunks and reducing the warm conditions required by many saproxylic beetles, gradually causing extinctions in the short term, but eventually causing enormous losses as open grown trees disappear from the system altogether – the existing trees become out-competed by over-shading younger trees and die prematurely and new ones cannot develop under the new closed canopy conditions. Grazing by large herbivores is the key management issue which needs to be addressed on sites with surviving old growth saproxylic beetle communities.

At a smaller scale, the removal of standing and/or fallen dead and decaying wood reduces the availability of habitat for those species which require it and may push species below viable population levels. The same is true of damage to bracket fungi – generally from ill-informed ideas of tree sanitation – the regular loss of breeding habitat may push the fungus-breeding beetles below viable population levels. The end result is extinctions of IEC species and declining IEC values.

Successful conservation requires the maintenance of the widest range of wood-decay situations at site level, and preferably increased extent of habitat, especially where this results in re-establishing linkages with other areas with surviving old growth species.

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Appendix 1. Full listing of British native saproxylic beetles, with assessment of degree of association with ecological continuity

Family/ Sub-family	Genus	Species	Other names in common usage	GB Status (1992)	BAP status	H&R (1986) grade	Revised continuity grade	Change to H&R (1986)	Possible additions
Carabidae	*Bembidion*	*harpaloides*		None	None	0	0	No	
Carabidae	*Dromius*	*quadrimaculatus*		None	None	0	0	No	
Carabidae	*Dromius*	*agilis*		None	None	0	0	No	
Carabidae	*Dromius*	*angustus*		None	None	0	0	No	
Carabidae	*Dromius*	*meridionalis*		None	None	0	0	No	
Carabidae	*Dromius*	*spilotus*	*quadrinotatus*	None	None	0	0	No	
Carabidae	*Dromius*	*quadrisignatus*		RDB1	Priority	0	0	No	?
Histeridae	*Plegaderus*	*dissectus*		NSB	None	2	2	No	
Histeridae	*Plegaderus*	*vulneratus*		Naturalised	None	0	0	No	
Histeridae	*Abraeus*	*perpusillus*	*globosus*	None	None	0	0	No	Yes
Histeridae	*Abraeus*	*granulum*		NSA	None	1	1	No	
Histeridae	*Aeletes*	*atomarius*		RDB3	None	1	1	No	
Histeridae	*Gnathoncus*	*buyssoni*		NSA	None	0	0	No	
Histeridae	*Gnathoncus*	*nannetensis*		None	None	0	0	No	
Histeridae	*Gnathoncus*	*nanus*		None	None	0	0	No	
Histeridae	*Gnathoncus*	*schmidti*		None	None	0	0	No	
Histeridae	*Dendrophilus*	*punctatus*		None	None	0	0	No	
Histeridae	*Paromalus*	*flavicornis*		None	None	0	0	No	Yes
Histeridae	*Paromalus*	*parallelepipedus*		RDB1	None	0	0	No	?
Histeridae	*Epierus*	*comptus*		RDBK	None	0	0	No	?
Ptiliidae	*Nossidium*	*pilosellum*		NS	None	0	0	No	?
Ptiliidae	*Ptenidium*	*formicetorum*		None	None	0	0	No	
Ptiliidae	*Ptenidium*	*gressneri*		NS	None	2	2	No	
Ptiliidae	*Ptenidium*	*turgidum*		RDBK	None	2	2	No	
Ptiliidae	*Oligella*	*intermedia*		RDBK	None	0	0	No	?
Ptiliidae	*Micridium*	*halidaii*		RDBK	None	1	1	No	
Ptiliidae	*Plitium*	*subvariolosum*		None	None	0	0	No	?

Family/ Sub-family	Genus	Species	Other names in common usage	GB Status (1992)	BAP status	H&R (1986) grade	Revised continuity grade	Change to H&R (1986)	Possible additions
Ptiliidae	*Ptinella*	*aptera*		None	None	0	0	No	?
Ptiliidae	*Ptinella*	*cavelli*		Naturalised	None	0	0	No	
Ptiliidae	*Ptinella*	*denticollis*		NS	None	0	0	No	?
Ptiliidae	*Ptinella*	*errabunda*		Naturalised	None	0	0	No	
Ptiliidae	*Ptinella*	*limbata*		RDBK	None	2	2	No	
Ptiliidae	*Ptinella*	*taylorae*		Naturalised	None	0	0	No	
Ptiliidae	*Pteryx*	*suturalis*		None	None	0	0	No	?
Leiodidae	*Anisotoma*	*humeralis*		None	None	0	0	No	
Leiodidae	*Anisotoma*	*orbicularis*		None	None	0	0	No	
Leiodidae	*Amphicyllis*	*globus*		None	None	0	0	No	
Leiodidae	*Agathidium*	*confusum*		RDBI	None	0	0	No	
Leiodidae	*Agathidium*	*nigrinum*		None	None	0	0	No	
Leiodidae	*Agathidium*	*nigripenne*		None	None	0	0	No	
Leiodidae	*Agathidium*	*rotundatus*		None	None	0	0	No	
Leiodidae	*Agathidium*	*seminulum*		None	None	0	0	No	
Leiodidae	*Agathidium*	*varians*		None	None	0	0	No	
Leiodidae	*Nemadus*	*colonoides*		None	None	0	0	No	
Scydmaenidae	*Eutheia*	*formicetorum*		RDB1	None	1	1	No	
Scydmaenidae	*Eutheia*	*linearis*		RDB1	None	1	1	No	
Scydmaenidae	*Neuraphes*	*plicicollis*		NS	None	0	0	No	?
Scydmaenidae	*Stenichnus*	*bicolor*		None	None	3	3	No	
Scydmaenidae	*Stenichnus*	*godarti*		RDB3	None	1	2	No	
Scydmaenidae	*Microscydmus*	*minimus*		RDB3	None	1	1	No	
Scydmaenidae	*Microscydmus*	*nanus*		NS	None	0	2	Yes	
Scydmaenidae	*Euconnus*	*pragensis*		RDB1	None	1	1	No	
Scydmaenidae	*Scydmaenus*	*rufus*		RDB2	None	3	3	No	
Scaphidiinae	*Scaphisoma*	*agaricinum*		None	None	0	0	No	
Scaphidiinae	*Scaphisoma*	*assimile*		RDBI	None	0	0	No	
Scaphidiinae	*Scaphisoma*	*boleti*		NSB	None	0	0	No	
Scaphidiinae	*Scaphidium*	*quadrimaculatum*		None	None	0	0	No	
Proteininae	*Megarthrus*	*hemipterus*		NSA	None	0	0	No	?

Family/ Sub-family	Genus	Species	Other names in common usage	GB Status (1992)	BAP status	H&R (1986) grade	Revised continuity grade	Change to H&R (1986)	Possible additions
Omaliinae	*Phyllodrepoidea*	*crenata*		NSB	None	0	0	No	Yes
Omaliinae	*Acrulia*	*inflata*		None	None	0	0	No	Yes
Omaliinae	*Phyllodrepa*	*nigra*		RDBI	None	1	1	No	
Omaliinae	*Dropephylla*	*gracilicornis*		NS	None	0	0	No	
Omaliinae	*Dropephylla*	*devillei*	*grandiloqua*	None	None	0	0	No	Yes
Omaliinae	*Dropephylla*	*heeri*		NS	None	0	0	No	
Omaliinae	*Dropephylla*	*ioptera*		None	None	0	0	No	
Omaliinae	*Dropephylla*	*vilis*		None	None	0	0	No	
Omaliinae	*Hapalaraea*	*pygmaea*		None	None	0	0	No	
Omaliinae	*Phloeonomus*	*punctipennis*		None	None	0	0	No	
Omaliinae	*Phloeonomus*	*pusillus*		None	None	0	0	No	
Omaliinae	*Phloeostiba*	*lapponica*		None	None	0	0	No	
Omaliinae	*Phloeostiba*	*plana*		None	None	0	0	No	Yes
Omaliinae	*Xylostiba*	*monilicornis*		NS	None	0	0	No	
Omaliinae	*Xylodromus*	*testaceus*		RDB1	None	0	0	No	Yes
Omaliinae	*Coryphium*	*angusticolle*		None	None	0	0	No	Yes
Piestinae	*Siagonium*	*quadricorne*		None	None	0	0	No	
Phloeocharinae	*Phloeocharis*	*subtillissima*		None	None	0	0	No	
Staphylininae	*Atrecus*	*affinis*		None	None	0	0	No	
Staphylininae	*Nudobius*	*lentus*		None	None	0	0	No	
Staphylininae	*Xantholinus*	*angularis*		NSA	None	3	2	Yes	
Staphylininae	*Philonthus*	*subuliformis*		None	None	0	0	No	Yes
Staphylininae	*Gabrius*	*splendidulus*		None	None	0	0	No	
Staphylininae	*Velleius*	*dilatatus*		RDB1	None	1	1	No	
Staphylininae	*Quedius*	*aetolicus*		NSA	None	3	3	No	
Staphylininae	*Quedius*	*assimilis*	*fulgidus*	None	None	0	0	No	?
Staphylininae	*Quedius*	*brevicornis*		NSB	None	0	0	No	
Staphylininae	*Quedius*	*maurus*		None	None	3	3	No	
Staphylininae	*Quedius*	*microps*		NSB	None	3	3	No	
Staphylininae	*Quedius*	*plagiatus*		None	None	0	0	No	
Staphylininae	*Quedius*	*scitus*		NSB	None	3	2	Yes	

Family/ Sub-family	Genus	Species	Other names in common usage	GB Status (1992)	BAP status	H&R (1986) grade	Revised continuity grade	Change to H&R (1986)	Possible additions
Staphylininae	*Quedius*	*truncicola*	*ventralis*	NSB	None	3	3	No	
Staphylininae	*Quedius*	*xanthopus*		NSB	None	3	3	No	
Trichophyinae	*Trichophya*	*pilicornis*		NSB	None	0	0	No	
Tachyporinae	*Sepedophilus*	*bipunctatus*		NSB	None	0	0	No	
Tachyporinae	*Sepedophilus*	*constans*		NS	None	0	0	No	
Tachyporinae	*Sepedophilus*	*littoreus*		None	None	0	0	No	
Tachyporinae	*Sepedophilus*	*lusitanicus*		None	None	0	0	No	
Tachyporinae	*Sepedophilus*	*testaceus*		NS	None	0	0	No	Yes
Tachyporinae	*Tachinus*	*bipustulatus*		RDB1	None	0	0	No	?
Tachyporinae	*Tachinus*	*lignorum*		NS	None	0	0	No	?
Aleocharinae	*Cypha*	*imitator*		RDBK	None	0	0	No	?
Aleocharinae	*Cypha*	*seminulum*		RDBK	None	0	0	No	
Aleocharinae	*Holobus*	*apicatus*	*Oligota*	NS	None	0	0	No	
Aleocharinae	*Gyrophaena*	*affinis*		None	None	0	0	No	
Aleocharinae	*Gyrophaena*	*angustata*		NS	None	0	0	No	
Aleocharinae	*Gyrophaena*	*bihamata*		None	None	0	0	No	
Aleocharinae	*Gyrophaena*	*congrua*		NS	None	0	0	No	
Aleocharinae	*Gyrophaena*	*fasciata*		None	None	0	0	No	
Aleocharinae	*Gyrophaena*	*gentilis*		None	None	0	0	No	
Aleocharinae	*Gyrophaena*	*joyi*		NS	None	0	0	No	
Aleocharinae	*Gyrophaena*	*latissima*		None	None	0	0	No	
Aleocharinae	*Gyrophaena*	*lucidula*		NS	None	0	0	No	
Aleocharinae	*Gyrophaena*	*minima*		None	None	0	0	No	
Aleocharinae	*Gyrophaena*	*munsteri*		RDBK	None	0	0	No	
Aleocharinae	*Gyrophaena*	*nana*		None	None	0	0	No	
Aleocharinae	*Gyrophaena*	*poweri*		RDBK	None	0	0	No	
Aleocharinae	*Gyrophaena*	*pseudonana*		RDBI	None	0	0	No	
Aleocharinae	*Gyrophaena*	*pulchella*		RDBK	None	0	0	No	
Aleocharinae	*Gyrophaena*	*rousi*		RDBI	None	0	0	No	
Aleocharinae	*Gyrophaena*	*strictula*		NS	None	0	0	No	
Aleocharinae	*Placusa*	*complanata*		Unclear	None	0	0	No	

Family/ Sub-family	Genus	Species	Other names in common usage	GB Status (1992)	BAP status	H&R (1986) grade	Revised continuity grade	Change to H&R (1986)	Possible additions
Aleocharinae	*Placusa*	*depressa*		NS	None	0	0	No	
Aleocharinae	*Placusa*	*pumilio*		None	None	0	0	No	
Aleocharinae	*Placusa*	*tachyporoides*		NS	None	0	0	No	
Aleocharinae	*Homalota*	*plana*		None	None	0	0	No	
Aleocharinae	*Anomognathus*	*cuspidatus*		None	None	0	0	No	
Aleocharinae	*Cyphea*	*curtula*		Unclear	None	0	0	No	
Aleocharinae	*Silusa*	*rubiginosa*		NS	None	0	0	No	
Aleocharinae	*Thecturota*	*marchii*		None	None	0	0	No	
Aleocharinae	*Leptusa*	*fumida*		None	None	0	0	No	
Aleocharinae	*Leptusa*	*norvegica*		NS	None	0	0	No	
Aleocharinae	*Leptusa*	*pulchella*		None	None	0	0	No	Yes
Aleocharinae	*Euryusa*	*optabilis*		RDBI	None	2	2	No	
Aleocharinae	*Euryusa*	*sinuata*		RDBI	None	2	2	No	
Aleocharinae	*Tachyusida*	*gracilis*		RDB1	None	1	1	No	
Aleocharinae	*Bolitochara*	*bella*		None	None	0	0	No	
Aleocharinae	*Bolitochara*	*lucida*		None	None	0	0	No	
Aleocharinae	*Bolitochara*	*mulsanti*		NS	None	0	0	No	
Aleocharinae	*Bolitochara*	*obliqua*		None	None	0	0	No	
Aleocharinae	*Bolitochara*	*pulchra*		NS	None	0	0	No	
Aleocharinae	*Bolitochara*	*reyi*		RDBI	None	0	0	No	?
Aleocharinae	*Autalia*	*impressa*		None	None	0	0	No	
Aleocharinae	*Autalia*	*longicornis*		None	None	0	0	No	
Aleocharinae	*Notothecta*	*confusa*		NS	None	0	0	No	
Aleocharinae	*Dinaraea*	*aequata*		None	None	0	0	No	
Aleocharinae	*Dinaraea*	*linearis*		None	None	0	0	No	
Aleocharinae	*Paranopleta*	*inhabilis*		RDBK	None	0	0	No	
Aleocharinae	*Dadobia*	*immersa*		None	None	0	0	No	
Aleocharinae	*Atheta*	*autumnalis*		RDBK	None	0	0	No	
Aleocharinae	*Atheta*	*consanguinea*		RDBK	None	0	0	No	
Aleocharinae	*Atheta*	*hybrida*		RDBK	None	0	0	No	
Aleocharinae	*Atheta*	*laevicauda*		RDBK	None	0	0	No	

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Aleocharinae	*Atheta*	*liturata*		None	None	0	0	No	
Aleocharinae	*Atheta*	*picipes*		NS	None	0	0	No	
Aleocharinae	*Atheta*	*pilicornis*		NS	None	0	0	No	
Aleocharinae	*Atheta*	*subglabra*		None	None	0	0	No	
Aleocharinae	*Atheta*	*taxiceroides*		None	None	0	0	No	
Aleocharinae	*Thamiaraea*	*cinnamomea*		None	None	0	0	No	
Aleocharinae	*Thamiaraea*	*hospita*		NS	None	0	0	No	
Aleocharinae	*Zyras*	*cognatus*		RDBK	None	0	0	No	
Aleocharinae	*Zyras*	*funestus*		None	None	0	0	No	
Aleocharinae	*Zyras*	*haworthi*		NSA	None	0	0	No	
Aleocharinae	*Zyras*	*laticollis*		None	None	0	0	No	
Aleocharinae	*Zyras*	*lugens*		NS	None	0	0	No	
Aleocharinae	*Phloeodroma*	*concolor*		RDBI	None	0	0	No	
Aleocharinae	*Phloeopora*	*bernhaueri*		None	None	0	0	No	
Aleocharinae	*Phloeopora*	*corticalis*		NS	None	0	0	No	
Aleocharinae	*Phloeopora*	*nitidiventris*		Unclear	None	0	0	No	
Aleocharinae	*Phloeopora*	*testacea*		None	None	0	0	No	
Aleocharinae	*Amarochara*	*bonnairei*		RDBI	None	0	0	No	?
Aleocharinae	*Oxypoda*	*recondita*		None	None	0	0	No	
Aleocharinae	*Oxypoda*	*vittata*		None	None	0	0	No	
Aleocharinae	*Stichoglossa*	*semirufa*		RDBI	None	0	0	No	?
Aleocharinae	*Ischnoglossa*	*obscura*		None	None	0	0	No	Yes
Aleocharinae	*Ischnoglossa*	*prolixa*		None	None	0	0	No	
Aleocharinae	*Ischnoglossa*	*turcica*		None	None	0	0	No	
Aleocharinae	*Dexiogyia*	*corticina*		NS	None	0	0	No	Yes
Aleocharinae	*Thiasophila*	*inquilana*		NS	None	0	0	No	
Aleocharinae	*Haploglossa*	*gentilis*		None	None	0	0	No	
Pselaphidae	*Bibloporus*	*bicolor*		None	None	0	0	No	
Pselaphidae	*Bibloporus*	*minutus*		NSB	None	2	2	No	
Pselaphidae	*Euplectus*	*bescidicus*		RDBK	None	0	0	No	
Pselaphidae	*Euplectus*	*bonvouloiri rosae*		NSB	None	0	0	No	?

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Pselaphidae	*Euplectus*	*brunneus*		RDB1	None	1a	0	Yes	?
Pselaphidae	*Euplectus*	*fauveli*		NSB	None	0	0	No	?
Pselaphidae	*Euplectus*	*infirmus*		None	None	0	0	No	
Pselaphidae	*Euplectus*	*kirkbyi*		NS	None	0	0	No	?
Pselaphidae	*Euplectus*	*nanus*		RDBI	None	1	1	No	
Pselaphidae	*Euplectus*	*piceus*		None	None	0	0	No	
Pselaphidae	*Euplectus*	*punctatus*		RDB3	None	1	1	No	
Pselaphidae	*Plectophloeus*	*nitidus*		RDB2	None	1	1	No	
Pselaphidae	*Trichonyx*	*sulcicollis*		RDB2	None	2	0	Yes	?
Pselaphidae	*Batrisodes*	*adnexus*	*buqueti*	RDB1	None	1	1	No	
Pselaphidae	*Batrisodes*	*delaporti*		RDB1	None	1	1	No	
Pselaphidae	*Batrisodes*	*venustus*		NSA	None	1	1	No	
Scirtidae	*Prionocyphon*	*serricornis*		NSB	None	2	3	Yes	
Eucinetidae	*Eucinetus*	*meridionalis*		None	None	0	0	No	
Clambidae	*Clambus*	*nigriclavis*		None	None	0	0	No	
Clambidae	*Clambus*	*pallidulus*		RDBK	None	0	0	No	
Clambidae	*Clambus*	*punctulum*		None	None	0	0	No	
Lucanidae	*Lucanus*	*cervus*		NSB	Priority	0	0	No	
Lucanidae	*Dorcus*	*parallelepipedus*		None	None	0	0	No	
Lucanidae	*Sinodendron*	*cylindricum*		None	None	3	0	Yes	
Scarabaeidae	*Saprosites*	*mendax*		Naturalised	None	0	0	No	
Scarabaeidae	*Oxythyrea*	*funesta*		Unclear	None	0	0	No	
Scarabaeidae	*Trichius*	*fasciatus*		None	None	0	0	No	
Scarabaeidae	*Trichius*	*zonatus*		Vagrant	None	0	0	No	
Scarabaeidae	*Gnorimus*	*nobilis*		RDB2	Priority	0	1	Yes	
Scarabaeidae	*Gnorimus*	*variabilis*		RDB1	Grouped	1	1	No	
Buprestidae	*Melanophila*	*acuminata*		None	None	0	0	No	
Buprestidae	*Anthaxia*	*nitidula*		RDB1	None	0	0	No	
Buprestidae	*Anthaxia*	*quadripunctata*		Introduction	None	0	0	No	
Buprestidae	*Agrilus*	*angustulus*		NSB	None	0	0	No	
Buprestidae	*Agrilus*	*laticornis*		NSB	None	0	0	No	

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Buprestidae	*Agrilus*	*biguttatus*	*pannonicus*	NSA	None	2b	0	Yes	
Buprestidae	*Agrilus*	*sinuatus*		NSA	None	0	0	No	
Buprestidae	*Agrilus*	*sulcicollis*		Recently Established	None	0	0	No	
Buprestidae	*Agrilus*	*viridis*		NSA	None	0	0	No	Yes
Eucnemidae	*Melasis*	*buprestoides*		NSB	None	3	3	No	
Eucnemidae	*Hylis*	*cariniceps*		RDB1	None	0	0	No	
Eucnemidae	*Hylis*	*olexai*		RDB3	None	0	0	No	
Eucnemidae	*Epiphanus*	*cornutus*		None	None	0	0	No	
Eucnemidae	*Microrhagus*	*pygmaeus*		RDB3	None	3	3	No	
Eucnemidae	*Eucnemis*	*capucina*		RDB1	Grouped	1	1	No	
Throscidae	*Aulonothroscus*	*brevicollis*		RDB3	None	1	1	No	
Elateridae	*Lacon*	*querceus*		RDB1	Grouped	1	1	No	
Elateridae	*Calambus*	*bipustulatus*		NSB	None	3	3	No	
Elateridae	*Denticollis*	*linearis*		None	None	0	0	No	
Elateridae	*Limoniscus*	*violaceus*		RDB1	Priority	1	1	No	
Elateridae	*Diacanthous*	*undulatus*		NSB	None	0	0	No	
Elateridae	*Stenagostus*	*rhombeus*	*villosus*	None	None	3	3	No	
Elateridae	*Ampedus*	*balteatus*		None	None	0	0	No	Yes
Elateridae	*Ampedus*	*cardinalis*		RDB2	None	1	1	No	
Elateridae	*Ampedus*	*cinnabarinus*		RDB3	None	1	1	No	
Elateridae	*Ampedus*	*elongantulus*		NSA	None	3	3	No	
Elateridae	*Ampedus*	*nigerrimus*		RDB1	Grouped	1	1	No	
Elateridae	*Ampedus*	*nigrinus*		NSB	None	0	0	No	
Elateridae	*Ampedus*	*pomorum*		NSB	None	3	3	No	
Elateridae	*Ampedus*	*quercicola*	*pomonae*	NSB	None	1	1	No	
Elateridae	*Ampedus*	*ruficeps*		RDB1	Grouped	1	1	No	
Elateridae	*Ampedus*	*rufipennis*		RDB2	Grouped	1	1	No	
Elateridae	*Ampedus*	*sanguinolentus*		NSA	None	0	0	No	
Elateridae	*Ischnodes*	*sanguinicollis*		NSA	None	2	2	No	
Elateridae	*Megapenthes*	*lugens*		RDB1	Grouped	1	1	No	
Elateridae	*Procraeus*	*tibialis*		RDB3	None	1	1	No	

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Elateridae	*Elater*	*ferrugineus*		RDB1	Grouped	1	1	No	
Elateridae	*Melanotus*	*villosus*		None	None	0	0	No	
Lycidae	*Pyropterus*	*nigroruber*		NSA	None	2	3	Yes	
Lycidae	*Platycis*	*cosnardi*		RDBI	None	1	1	No	
Lycidae	*Platycis*	*minutus*		NSB	None	3	3	No	
Cantharidae	*Malthinus*	*balteatus*		NSB	None	0	0	No	
Cantharidae	*Malthinus*	*punctatus*	*flaveolus*	None	None	0	0	No	
Cantharidae	*Malthinus*	*frontalis*		NSB	None	0	0	No	Yes
Cantharidae	*Malthinus*	*seriepunctatus*		None	None	0	0	No	
Cantharidae	*Malthodes*	*crassicornis*		RDB3	None	2	1	Yes	
Cantharidae	*Malthodes*	*dispar*		None	None	0	0	No	
Cantharidae	*Malthodes*	*fibulatus*		NSB	None	0	0	No	
Cantharidae	*Malthodes*	*flavoguttatus*		None	None	0	0	No	
Cantharidae	*Malthodes*	*fuscus*		None	None	0	0	No	
Cantharidae	*Malthodes*	*guttifer*		NSB	None	0	0	No	
Cantharidae	*Malthodes*	*lobatus*		Unclear	None	0	0	No	
Cantharidae	*Malthodes*	*marginatus*		None	None	0	0	No	
Cantharidae	*Malthodes*	*maurus*		NSB	None	0	0	No	
Cantharidae	*Malthodes*	*minimus*		None	None	0	0	No	
Cantharidae	*Malthodes*	*mysticus*		None	None	0	0	No	
Cantharidae	*Malthodes*	*pumilus*		None	None	0	0	No	?
Dermestidae	*Globicornis*	*rufitarsis*	*nigripes*	RDB1	None	2	1	Yes	
Dermestidae	*Megatoma*	*undata*		NSB	None	0	0	No	
Dermestidae	*Ctesias*	*serra*		NSB	None	3	0	Yes	
Dermestidae	*Trinodes*	*hirtus*		RDB3	None	1	1	No	
Bostrichidae	*Lyctus*	*brunneus*		None	None	3	3	No	
Bostrichidae	*Lyctus*	*cavicollis*		Naturalised	None	0	0	No	
Bostrichidae	*Lyctus*	*linearis*		NSB	None	0	0	No	
Bostrichidae	*Lyctus*	*planicollis*		Naturalised	None	0	0	No	
Bostrichidae	*Lyctus*	*sinensis*		Naturalised	None	0	0	No	
Anobiidae	*Hedobia*	*imperialis*		NSB	None	0	0	No	

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Anobiidae	*Grynobius*	*planus*		None	None	0	0	No	
Anobiidae	*Dryophilus*	*pusillus*		Naturalised	None	0	0	No	
Anobiidae	*Ochina*	*ptinoides*		None	None	0	0	No	
Anobiidae	*Xestobium*	*rufovillosum*		None	None	3	3	No	
Anobiidae	*Ernobius*	*abietis*		Vagrant?	None	0	0	No	
Anobiidae	*Ernobius*	*angusticollis*		Vagrant?	None	0	0	No	
Anobiidae	*Ernobius*	*gigas*		Naturalised	None	0	0	No	
Anobiidae	*Ernobius*	*mollis*		None	None	0	0	No	
Anobiidae	*Ernobius*	*nigrinus*		None	None	0	0	No	
Anobiidae	*Ernobius*	*pini*		Naturalised	None	0	0	No	
Anobiidae	*Gastrallus*	*immarginatus*		RDB1	Priority	1	1	No	
Anobiidae	*Hemicoelus*	*fulvicornis*		None	None	0	0	No	
Anobiidae	*Hemicoelus*	*nitidus*		RDBI	None	0	0	No	?
Anobiidae	*Anobium*	*inexpectatum*		NSB	None	0	0	No	
Anobiidae	*Anobium*	*punctatum*		None	None	0	0	No	
Anobiidae	*Hadrobregmus*	*denticollis*		NSB	None	0	0	No	
Anobiidae	*Priobium*	*carpini*		Naturalised	None	0	0	No	
Anobiidae	*Ptilinus*	*pectinicornis*		None	None	0	0	No	
Anobiidae	*Xyletinus*	*longitarsus*		RDB2	None	3	0	Yes	?
Anobiidae	*Dorcatoma*	*ambjoerni*		RDBK	None	0	2	Yes	
Anobiidae	*Dorcatoma*	*chrysomelina*		None	None	2	3	Yes	
Anobiidae	*Dorcatoma*	*dresdensis*		NSA	None	2	2	No	
Anobiidae	*Dorcatoma*	*flavicornis*		NSB	None	3	3	No	
Anobiidae	*Dorcatoma*	*serra*		NSA	None	2	2	No	
Anobiidae	*Anitys*	*rubens*		NSB	None	1	1	No	
Ptininae	*Ptinus*	*fur*		None	None	0	0	No	
Ptininae	*Ptinus*	*lichenum*		RDB3	None	0	0	No	
Ptininae	*Ptinus*	*palliatus*		NSA	None	3	0	Yes	
Ptininae	*Ptinus*	*pilosus*		Vagrant?	None	0	0	No	
Ptininae	*Ptinus*	*subpilosus*		NSB	None	2	2	No	
Lymexylidae	*Hylecoetus*	*dermestoides*		NSB	None	3	3	No	

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Lymexylidae	*Lymexylon*	*navalis*		RDB2	None	1	2	Yes	
Phloiophilidae	*Phloiophilus*	*edwardsii*		NSB	None	3	3	No	
Trogossitidae	*Nemozoma*	*elongatum*		RDB3	None	0	0	No	
Trogossitidae	*Thymalus*	*limbatus*		NSB	None	3	2	Yes	
Cleridae	*Tillus*	*elongatus*		NSB	None	3	3	No	
Cleridae	*Opilo*	*mollis*		NSB	None	3	3	No	
Cleridae	*Thanasimus*	*formicarius*		None	None	3	3	No	
Cleridae	*Paratillus*	*carus*		Naturalised	None	0	0	No	
Cleridae	*Korynetes*	*caeruleus*		NSB	None	3	3	No	
Melyridae	*Aplocnemus*	*impressus*	*pini*	NSB	None	3	2	Yes	
Melyridae	*Aplocnemus*	*nigricornis*		NSA	None	3	2	Yes	
Melyridae	*Dasytes*	*aeratus*		None	None	0	0	No	
Melyridae	*Dasytes*	*niger*		NSA	None	0	0	No	
Melyridae	*Dasytes*	*plumbeus*		NSB	None	0	0	No	
Melyridae	*Dasytes*	*puncticollis*		NSB	None	0	0	No	
Melyridae	*Hypebaeus*	*flavipes*		RDB1	Grouped	1	1	No	
Melyridae	*Axinotarsus*	*marginalis*		Recently Established	None	0	0	No	
Melyridae	*Axinotarsus*	*ruficollis*		None	None	0	0	No	
Melyridae	*Sphinginus*	*lobatus*		RDBK	None	0	0	No	
Melyridae	*Malachius*	*aeneus*		RDB3	None	0	0	No	
Melyridae	*Malachius*	*bipustulatus*		None	None	0	0	No	
Melyridae	*Anthocomus*	*fasciatus*		None	None	0	0	No	
Sphindidae	*Sphindus*	*dubius*		NSB	None	0	0	No	
Sphindidae	*Aspidiphorus*	*orbiculatus*		None	None	0	0	No	
Nitidulidae	*Soronia*	*grisea*		None	None	0	0	No	
Nitidulidae	*Soronia*	*punctatissima*		None	None	0	0	No	
Nitidulidae	*Amphotis*	*marginata*		RDBK	None	0	0	No	
Nitidulidae	*Cryptarcha*	*strigata*		NSB	None	0	0	No	
Nitidulidae	*Cryptarcha*	*undata*		NSB	None	0	0	No	
Nitidulidae	*Glischrochilus*	*hortensis*		None	None	0	0	No	
Nitidulidae	*Glischrochilus*	*quadriguttatus*		None	None	0	0	No	

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Nitidulidae	*Glischrochilus*	*quadripunctatus*		None	None	0	0	No	
Nitidulidae	*Pityophagus*	*ferrugineus*		None	None	0	0	No	
Nitidulidae	*Carpophilus*	*sexpustulatus*		None	None	3	3	No	
Nitidulidae	*Epuraea*	*aestiva*		None	None	0	0	No	
Nitidulidae	*Epuraea*	*angustula*		NSB	None	3	3	No	
Nitidulidae	*Epuraea*	*biguttata*		None	None	0	0	No	
Nitidulidae	*Epuraea*	*distincta*		NSA	None	0	0	No	
Nitidulidae	*Epuraea*	*fuscicollis*		NSB	None	0	0	No	?
Nitidulidae	*Epuraea*	*guttata*		NSB	None	0	0	No	?
Nitidulidae	*Epuraea*	*limbata*		None	None	0	0	No	
Nitidulidae	*Epuraea*	*longula*		NSB	None	0	0	No	
Nitidulidae	*Epuraea*	*marseuli*	*pusilla*	None	None	0	0	No	
Nitidulidae	*Epuraea*	*melanocephala*		None	None	0	0	No	
Nitidulidae	*Epuraea*	*melina*		None	None	0	0	No	
Nitidulidae	*Epuraea*	*neglecta*		RDBI	None	0	0	No	?
Nitidulidae	*Epuraea*	*pallescens*	*florea*	None	None	0	0	No	
Nitidulidae	*Epuraea*	*rufomarginata*		None	None	0	0	No	
Nitidulidae	*Epuraea*	*silacea*	*deleta*	None	None	0	0	No	
Nitidulidae	*Epuraea*	*thoracica*		NS	None	0	0	No	
Nitidulidae	*Epuraea*	*unicolor*		None	None	0	0	No	
Nitidulidae	*Epuraea*	*variegata*		RDBK	None	0	0	No	
Rhizophagidae	*Rhizophagus*	*bipustulatus*		None	None	0	0	No	
Rhizophagidae	*Rhizophagus*	*cribratus*		None	None	0	0	No	
Rhizophagidae	*Rhizophagus*	*depressus*		None	None	0	0	No	
Rhizophagidae	*Rhizophagus*	*dispar*		None	None	0	0	No	
Rhizophagidae	*Rhizophagus*	*ferrugineus*		None	None	0	0	No	
Rhizophagidae	*Rhizophagus*	*grandis*		Introduction	None	0	0	No	
Rhizophagidae	*Rhizophagus*	*nitidulus*		NSB	None	3	3	No	
Rhizophagidae	*Rhizophagus*	*oblongicollis*		RDB1	None	1	1	No	
Rhizophagidae	*Rhizophagus*	*parallelocollis*		None	None	0	0	No	
Rhizophagidae	*Rhizophagus*	*perforatus*		None	None	0	0	No	

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Rhizophagidae	*Rhizophagus*	*picipes*		NSA	None	0	0	No	?
Rhizophagidae	*Cyanostolus*	*aeneus*		NSA	None	0	0	No	
Silvanidae	*Silvanus*	*bidentatus*		NSB	None	2	2	No	
Silvanidae	*Silvanus*	*unidentatus*		None	None	3	3	No	
Silvanidae	*Silvanoprus*	*fagi*		RDB1	None	0	0	No	?
Silvanidae	*Uleiota*	*planata*		NSA	None	1b	2	Yes	
Cucujidae	*Pediacus*	*depressus*		NSA	None	2	2	No	
Cucujidae	*Pediacus*	*dermestoides*		None	None	3	3	No	
Laemophloeidae	*Laemophloeus*	*monilis*		RDB1	None	1a	0	Yes	?
Laemophloeidae	*Cryptolestes*	*confusus*		Unclear	None	0	0	No	?
Laemophloeidae	*Cryptolestes*	*duplicatus*		None	None	0	0	No	
Laemophloeidae	*Cryptolestes*	*ferrugineus*		None	None	0	0	No	Yes
Laemophloeidae	*Cryptolestes*	*spartii*		NSA	None	0	0	No	
Laemophloeidae	*Notolaemus*	*unifasciatus*		NSA	None	2	2	No	
Cryptophagidae	*Henoticus*	*serratus*		None	None	0	0	No	
Cryptophagidae	*Cryptophagus*	*acuminatus*		None	None	0	0	No	
Cryptophagidae	*Cryptophagus*	*angustus*		NS	None	0	0	No	
Cryptophagidae	*Cryptophagus*	*confusus*		RDBK	None	0	0	No	?
Cryptophagidae	*Cryptophagus*	*dentatus*		None	None	0	0	No	
Cryptophagidae	*Cryptophagus*	*falcozi*		RDBI	None	0	0	No	Yes
Cryptophagidae	*Cryptophagus*	*fallax*		RDBI	None	0	0	No	
Cryptophagidae	*Cryptophagus*	*intermedius*		RDBK	None	0	0	No	
Cryptophagidae	*Cryptophagus*	*labilis*		NS	None	0	0	No	Yes
Cryptophagidae	*Cryptophagus*	*micaceus*		RDBK	None	1	1	No	
Cryptophagidae	*Cryptophagus*	*pallidus*		None	None	0	0	No	
Cryptophagidae	*Cryptophagus*	*ruficornis*		NS	None	0	0	No	
Cryptophagidae	*Cryptophagus*	*scanicus*		?	None	0	0	No	
Cryptophagidae	*Micrambe*	*bimaculata*		RDBK	None	0	0	No	
Atomariinae	*Caenoscelis*	*sibirica*		Unclear	None	0	0	No	
Atomariinae	*Atomaria*	*lohsei*		Naturalised	None	1	0	Yes	
Atomariinae	*Atomaria*	*morio*		RDBK	None	0	0	No	

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Atomariinae	*Atomaria*	*pulchra*		None	None	0	0	No	
Atomariinae	*Atomaria*	*puncticollis*		RDBK	None	0	0	No	
Atomariinae	*Atomaria*	*umbrina*		NS	None	0	0	No	
Erotylidae	*Triplax*	*aenea*		None	None	3	0	Yes	?
Erotylidae	*Triplax*	*lacordairii*		RDB3	None	3	3	No	
Erotylidae	*Triplax*	*russica*		None	None	3	3	No	
Erotylidae	*Triplax*	*scutellaris*		RDB3	None	3	3	No	
Erotylidae	*Tritoma*	*bipustulata*		NSA	None	3	3	No	
Erotylidae	*Dacne*	*bipustulata*		None	None	0	0	No	
Erotylidae	*Dacne*	*rufifrons*		None	None	0	0	No	
Biphyllidae	*Biphyllus*	*lunatus*		None	None	3	3	No	
Biphyllidae	*Diplocoelus*	*fagi*		NSB	None	2	3	Yes	
Cerylonidae	*Cerylon*	*fagi*		NSB	None	3	2	Yes	
Cerylonidae	*Cerylon*	*ferrugineum*		None	None	0	0	No	Yes
Cerylonidae	*Cerylon*	*histeroides*		None	None	0	0	No	Yes
Endomychidae	*Symbiotes*	*latus*		NSB	None	3	3	No	
Endomychidae	*Endomychus*	*coccineus*		None	None	0	0	No	
Corylophidae	*Orthoperus*	*mundus*		None	None	0	0	No	
Corylophidae	*Orthoperus*	*aequalis*	*nitidulus*	None	None	0	0	No	
Corylophidae	*Orthoperus*	*nigrescens*		None	None	0	0	No	
Lathridiidae	*Stephostethus*	*alternans*		Unclear	None	0	0	No	
Lathridiidae	*Cartodere*	*constricta*		None	None	0	0	No	
Lathridiidae	*Lathridius*	*consimilis*		NS	None	1	1	No	
Lathridiidae	*Enicmus*	*brevicornis*		NS	None	2	3	Yes	
Lathridiidae	*Enicmus*	*fungicola*		NS	None	0	0	No	
Lathridiidae	*Enicmus*	*rugosus*		NS	None	2	2	No	
Lathridiidae	*Enicmus*	*testaceus*		None	None	0	0	No	
Lathridiidae	*Dienerella*	*elongata*		None	None	0	0	No	
Lathridiidae	*Dienerella*	*separanda*		None	None	2	0	Yes	?
Lathridiidae	*Corticaria*	*alleni*		NS	None	1	1	No	
Lathridiidae	*Corticaria*	*dubia*		None	None	0	0	No	

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Lathridiidae	*Corticaria*	*fagi*		RDBI	None	1	0	Yes	?
Lathridiidae	*Corticaria*	*linearis*		NS	None	0	0	No	?
Lathridiidae	*Corticaria*	*longicollis*		RDBK	None	1	0	Yes	?
Lathridiidae	*Melanophthalma*	*suturalis*		None	None	0	0	No	
Mycetophagidae	*Pseudotriphyllus*	*suturalis*		None	None	3	3	No	
Mycetophagidae	*Triphyllus*	*bicolor*		None	None	3	2	Yes	
Mycetophagidae	*Litargus*	*connexus*		None	None	0	0	No	
Mycetophagidae	*Mycetophagus*	*atomarius*		None	None	3	3	No	
Mycetophagidae	*Mycetophagus*	*multipunctatus*		None	None	0	0	No	
Mycetophagidae	*Mycetophagus*	*piceus*		NSB	None	3	2	Yes	
Mycetophagidae	*Mycetophagus*	*populi*		NSA	None	0	2	Yes	
Mycetophagidae	*Mycetophagus*	*quadriguttatus*		NSA	None	0	2	Yes	
Mycetophagidae	*Mycetophagus*	*quadripustulatus*		None	None	0	0	No	Yes
Mycetophagidae	*Eulagius*	*filicornis*		Naturalised	None	0	0	No	
Ciidae	*Octotemnus*	*glabriculus*		None	None	0	0	No	
Ciidae	*Sulcacis*	*affinis*		None	None	0	0	No	
Ciidae	*Sulcacis*	*bicornis*		NSB	None	0	0	No	
Ciidae	*Cis*	*alni*		None	None	0	0	No	
Ciidae	*Cis*	*bidentatus*		None	None	0	0	No	
Ciidae	*Cis*	*bilamellatus*		Naturalised	None	0	0	No	
Ciidae	*Cis*	*boleti*		None	None	0	0	No	
Ciidae	*Cis*	*coluber*		RDB3	None	2	2	No	
Ciidae	*Cis*	*fagi*		None	None	0	0	No	?
Ciidae	*Cis*	*festivus*		NSB	None	0	0	No	
Ciidae	*Cis*	*hispidus*		None	None	0	0	No	
Ciidae	*Cis*	*lineatocribratus*		NSB	None	0	0	No	
Ciidae	*Cis*	*micans*		None	None	0	0	No	
Ciidae	*Cis*	*nitidus*		None	None	0	0	No	
Ciidae	*Cis*	*punctulatus*		None	None	0	0	No	
Ciidae	*Cis*	*pygmaeus*		None	None	0	0	No	
Ciidae	*Cis*	*setiger*		None	None	0	0	No	

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Ciidae	*Cis*	*vestitus*		None	None	0	0	No	
Ciidae	*Ennearthron*	*cornutum*		None	None	0	0	No	
Tetratomidae	*Tetratoma*	*ancora*		NSB	None	3	3	No	
Tetratomidae	*Tetratoma*	*desmaresti*		NSA	None	3	3	No	
Tetratomidae	*Tetratoma*	*fungorum*		None	None	3	0	Yes	?
Melandryidae	*Hallomenus*	*binotatus*		NSB	None	3	3	No	
Melandryidae	*Orchesia*	*micans*		NSB	None	0	0	No	Yes
Melandryidae	*Orchesia*	*minor*		NSB	None	0	0	No	Yes
Melandryidae	*Orchesia*	*undulata*		None	None	3	3	No	
Melandryidae	*Anisoxya*	*fuscula*		NSA	None	3	3	No	
Melandryidae	*Abdera*	*biflexuosa*		NSB	None	3	3	No	
Melandryidae	*Abdera*	*flexuosa*		NSB	None	0	0	No	Yes
Melandryidae	*Abdera*	*quadrifasciata*		NSA	None	1	1	No	
Melandryidae	*Abdera*	*triguttata*		NSA	None	0	0	No	
Melandryidae	*Phloiotrya*	*vaudoueri*		NSB	None	2	2	No	
Melandryidae	*Hypulus*	*quercinus*		RDB2	None	2	1	Yes	
Melandryidae	*Melandrya*	*barbata*		RDB1	None	1	1	No	
Melandryidae	*Melandrya*	*caraboides*		NSB	None	3	3	No	
Melandryidae	*Conopalpus*	*testaceus*		NSB	None	3	3	No	
Melandryidae	*Osphya*	*bipunctata*		RDB3	None	0	0	No	
Mordellidae	*Tomoxia*	*bucephala*		NSA	None	1	3	Yes	
Mordellidae	*Mordellochroa*	*abdominalis*		None	None	0	0	No	
Mordellidae	*Mordellistena*	*humeralis*		RDBK	None	0	0	No	?
Mordellidae	*Mordellistena*	*neuwaldeggiana*		RDBK	None	0	3	Yes	
Rhipiphoridae	*Metoecus*	*paradoxus*		None	None	0	0	No	
Colydiidae	*Synchita*	*humeralis*		NSB	None	3	3	No	
Colydiidae	*Synchita*	*separanda*		RDB3	None	1	3	Yes	
Colydiidae	*Cicones*	*undatus*		None	None	0	0	No	
Colydiidae	*Cicones*	*variegata*		NSA	None	2	2	No	
Colydiidae	*Bitoma*	*crenata*		None	None	3	3	No	
Colydiidae	*Endophloeus*	*markovichianus*		RDB1	None	0	0	No	Yes

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Colydiidae	*Langelandia*	*anophthalma*		RDB3	None	0	0	No	
Colydiidae	*Colydium*	*elongatum*		RDB3	None	1	0	Yes	?
Colydiidae	*Aulonium*	*trisulcum*		NSA	None	0	0	No	
Colydiidae	*Pycnomerus*	*fuliginosus*		Naturalised	None	0	0	No	
Colydiidae	*Teredus*	*cylindricus*		RDB1	None	1	1	No	
Colydiidae	*Oxylaemus*	*variolosus*		RDB3	None	2a	2	No	
Tenebrionidae	*Eledona*	*agricola*		NSB	None	3	3	No	
Tenebrionidae	*Palorus*	*subdepressus*		None	None	0	0	No	
Tenebrionidae	*Diaperus*	*boleti*		RDB2	None	0	0	No	
Tenebrionidae	*Scaphidema*	*metallicum*		NSB	None	0	0	No	
Tenebrionidae	*Platydema*	*violaceum*		RDB1	None	0	0	No	
Tenebrionidae	*Alphitophagus*	*bifasciatus*		None	None	0	0	No	
Tenebrionidae	*Alphitobius*	*diaperinus*		None	None	0	0	No	
Tenebrionidae	*Alphitobius*	*laevigatus*		None	None	0	0	No	
Tenebrionidae	*Corticeus*	*bicolor*		None	None	0	0	No	
Tenebrionidae	*Corticeus*	*fraxini*		Naturalised	None	0	0	No	
Tenebrionidae	*Corticeus*	*linearis*		None	None	0	0	No	
Tenebrionidae	*Corticeus*	*unicolor*		RDB3	None	2	2	No	
Tenebrionidae	*Tenebrio*	*molitor*		None	None	0	0	No	
Tenebrionidae	*Helops*	*caeruleus*		NSB	None	0	0	No	Yes
Tenebrionidae	*Cylindrinotus*	*laevioctostriatus*		None	None	0	0	No	
Tenebrionidae	*Prionychus*	*ater*		NSB	None	3	3	No	
Tenebrionidae	*Prionychus*	*melanarius*		RDB2	None	1	1	No	
Tenebrionidae	*Gonodera*	*luperus*		None	None	0	0	No	
Tenebrionidae	*Pseudocistela*	*ceramboides*		NSB	None	2	2	No	
Tenebrionidae	*Mycetochara*	*humeralis*		NSB	None	3	2	Yes	
Tenebrionidae	*Uloma*	*culinaris*		Unclear	None	0	0	No	
Oedemeridae	*Nacerdes*	*melanura*		None	None	0	0	No	
Oedemeridae	*Ischnomera*	*caerulea*		RDB3	None	0	1	Yes	
Oedemeridae	*Ischnomera*	*cinerascens*		RDB2	None	1	3	Yes	
Oedemeridae	*Ischnomera*	*cyanea*		NSB	None	3	3	No	

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Oedemeridae	*Ischnomera*	*sanguinicollis*		NSB	None	1	1	No	
Pyrochroidae	*Pyrochroa*	*coccinea*		NSB	None	3	3	No	
Pyrochroidae	*Pyrochroa*	*serraticornis*		None	None	0	0	No	
Pyrochroidae	*Schizotus*	*pectinicornis*		NSA	None	0	0	No	Yes
Salpingidae	*Lissodema*	*cursor*		NSA	None	0	0	No	
Salpingidae	*Lissodema*	*denticolle*	*quadripustulata*	NSB	None	0	0	No	
Salpingidae	*Rabocerus*	*foveolatus*		NSA	None	0	0	No	
Salpingidae	*Rabocerus*	*gabrieli*		NSB	None	0	0	No	
Salpingidae	*Salpingus*	*castaneus*		None	None	0	0	No	
Salpingidae	*Salpingus*	*ater*		None	None	0	0	No	
Salpingidae	*Salpingus*	*reyi*		None	None	0	0	No	
Salpingidae	*Vincenzellus*	*ruficollis*		None	None	0	0	No	
Salpingidae	*Rhinosimus*	*planirostris*		None	None	0	0	No	
Salpingidae	*Rhinosimus*	*ruficollis*		None	None	0	0	No	
Aderidae	*Aderus*	*brevicornis*		RDB2	None	1a	1	No	
Aderidae	*Aderus*	*oculatus*		NSB	None	3	3	No	
Aderidae	*Aderus*	*populneus*		NSB	None	0	0	No	Yes
Scraptiidae	*Scraptia*	*fuscula*		RDB1	None	1	1	No	
Scraptiidae	*Scraptia*	*testacea*		RDB3	None	1	1	No	
Scraptiidae	*Anaspis*	*costai*		None	None	0	0	No	
Scraptiidae	*Anaspis*	*fasciata*	*humeralis*	None	None	0	0	No	
Scraptiidae	*Anaspis*	*frontalis*		None	None	0	0	No	
Scraptiidae	*Anaspis*	*garneysi*		None	None	0	0	No	
Scraptiidae	*Anaspis*	*lurida*		None	None	0	0	No	
Scraptiidae	*Anaspis*	*maculata*		None	None	0	0	No	
Scraptiidae	*Anaspis*	*melanostoma*		RDBK	None	0	0	No	?
Scraptiidae	*Anaspis*	*pulicaria*		None	None	0	0	No	
Scraptiidae	*Anaspis*	*regimbarti*		None	None	0	0	No	
Scraptiidae	*Anaspis*	*rufilabris*		None	None	0	0	No	
Scraptiidae	*Anaspis*	*septentrionalis*	*schilskyana*	RDBI	None	1	1	No	
Scraptiidae	*Anaspis*	*thoracica*		NSA	None	0	0	No	Yes

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Cerambycidae	*Prionus*	*coriarius*		NSA	None	3	3	No	
Cerambycidae	*Arhopalus*	*rusticus*		None	None	0	0	No	
Cerambycidae	*Arhopalus*	*tristis*	*ferus*	Naturalised	None	0	0	No	
Cerambycidae	*Asemum*	*striatum*		None	None	0	0	No	
Cerambycidae	*Tetropium*	*castaneum*		Naturalised	None	0	0	No	
Cerambycidae	*Tetropium*	*gabrieli*		Naturalised	None	0	0	No	
Cerambycidae	*Rhagium*	*bifasciatum*		None	None	0	0	No	
Cerambycidae	*Rhagium*	*mordax*		None	None	0	0	No	
Cerambycidae	*Stenocorus*	*meridianus*		None	None	0	0	No	
Cerambycidae	*Acmaeops*	*collaris*		RDB1	None	0	0	No	?
Cerambycidae	*Grammoptera*	*holomelina*		None	None	0	0	No	
Cerambycidae	*Grammoptera*	*ruficornis*		None	None	0	0	No	
Cerambycidae	*Grammoptera*	*ustulata*		RDB3	None	1	1	No	
Cerambycidae	*Grammoptera*	*variegata*		NSA	None	3	3	No	
Cerambycidae	*Alosterna*	*tabacicolor*		None	None	0	0	No	
Cerambycidae	*Anoplodera*	*fulva*		RDB3	None	0	0	No	
Cerambycidae	*Anoplodera*	*rubra*		Naturalised	None	0	0	No	
Cerambycidae	*Anoplodera*	*sanguinolenta*		RDB3	None	0	0	No	
Cerambycidae	*Anoplodera*	*scutellata*		NSA	None	1	1	No	
Cerambycidae	*Anoplodera*	*sexguttata*		RDB3	None	0	2	Yes	
Cerambycidae	*Judolia*	*cerambyciformis*		None	None	0	0	No	
Cerambycidae	*Leptura*	*aurulenta*		NSA	None	3	3	No	
Cerambycidae	*Leptura*	*maculata*		None	None	0	0	No	
Cerambycidae	*Leptura*	*melanura*		None	None	0	0	No	
Cerambycidae	*Leptura*	*nigra*		NSA	None	0	0	No	?
Cerambycidae	*Leptura*	*quadrifasciata*		None	None	3	3	No	
Cerambycidae	*Leptura*	*revestita*		RDB1	None	2	2	No	
Cerambycidae	*Trinophyllum*	*cribratum*		Naturalised	None	0	0	No	
Cerambycidae	*Gracilia*	*minuta*		RDB2	None	0	0	No	
Cerambycidae	*Obrium*	*brunneum*		Naturalised	None	0	0	No	
Cerambycidae	*Nathrius*	*brevipennis*		Naturalised	None	0	0	No	

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Cerambycidae	*Molorchus*	*minor*		Naturalised	None	0	0	No	
Cerambycidae	*Molorchus*	*umbellatarum*		NSA	None	0	0	No	
Cerambycidae	*Aromia*	*moschata*		NSB	None	0	0	No	
Cerambycidae	*Hylotrupes*	*bajulus*		Naturalised	None	0	0	No	
Cerambycidae	*Callidium*	*violaceum*		Naturalised	None	0	0	No	
Cerambycidae	*Pyrrhidium*	*sanguineum*		RDB2	None	1	1	No	
Cerambycidae	*Poecilium*	*alni*		NSB	None	0	0	No	Yes
Cerambycidae	*Phymatodes*	*testaceus*		None	None	3	3	No	
Cerambycidae	*Clytus*	*arietis*		None	None	0	0	No	
Cerambycidae	*Anaglyptus*	*mysticus*		NSB	None	0	0	No	
Cerambycidae	*Lamia*	*textor*		RDB1	None	0	0	No	
Cerambycidae	*Mesosa*	*nebulosa*		RDB3	None	2	2	No	
Cerambycidae	*Pogonocherus*	*fasciculatus*		NSB	None	0	0	No	
Cerambycidae	*Pogonocherus*	*hispidulus*		None	None	0	0	No	
Cerambycidae	*Pogonocherus*	*hispidus*		None	None	0	0	No	
Cerambycidae	*Leiopus*	*nebulosus*		None	None	0	0	No	
Cerambycidae	*Saperda*	*carcharias*		NSA	None	0	0	No	
Cerambycidae	*Saperda*	*populnea*		None	None	0	0	No	
Cerambycidae	*Saperda*	*scalaris*		NSA	None	3	3	No	
Cerambycidae	*Oberea*	*oculata*		RDB1	Priority	0	0	No	
Cerambycidae	*Stenostola*	*dubia*		NSB	None	0	0	No	Yes
Cerambycidae	*Tetrops*	*praeusta*		None	None	0	0	No	
Cerambycidae	*Tetrops*	*starkii*		RDBK	None	0	0	No	
Anthribidae	*Platyrhinus*	*resinosus*		NSB	None	3	3	No	
Anthribidae	*Platystomos*	*albinus*		NSB	None	3	3	No	
Anthribidae	*Tropideres*	*sepicola*		RDB2	None	1	1	No	
Anthribidae	*Dissoleucas*	*niveirostris*		RDB2	None	3	3	No	
Anthribidae	*Choragus*	*sheppardi*		NSA	None	0	0	No	
Dryophthoridae	*Dryophthorus*	*corticalis*		RDB1	Grouped	1	1	No	
Curculionidae	*Cossonus*	*linearis*		NSA	None	0	0	No	
Curculionidae	*Cossonus*	*parallelepipedus*		NSB	None	3	3	No	

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Curculionidae	*Rhopalomesites*	*tardyi*		NSB	None	3	3	No	
Curculionidae	*Pselactus*	*spadix*		NSB	None	0	0	No	
Curculionidae	*Pseudophloeophagus*	*aeneopiceus*		None	None	0	0	No	
Curculionidae	*Stereocorynes*	*truncorum*		NSA	None	1	1	No	
Curculionidae	*Euophryum*	*confine*		Naturalised	None	0	0	No	
Curculionidae	*Euophryum*	*rufum*		Naturalised	None	0	0	No	
Curculionidae	*Pentarthrum*	*huttoni*		None	None	3	0	Yes	
Curculionidae	*Phloeophagus*	*lignarius*		None	None	0	0	No	
Curculionidae	*Cryptorhynchus*	*lapathi*		NSB	None	0	0	No	
Curculionidae	*Acalles*	*misellus*	*turbatus*	None	None	0	0	No	
Curculionidae	*Acalles*	*ptinoides*		NSB	None	0	0	No	
Curculionidae	*Acalles*	*roboris*		NSB	None	0	0	No	
Curculionidae	*Magdalis*	*armigera*		None	None	0	0	No	
Curculionidae	*Magdalis*	*barbicornis*		NSA	None	0	0	No	
Curculionidae	*Magdalis*	*carbonaria*		NSB	None	0	0	No	
Curculionidae	*Magdalis*	*cerasi*		NSB	None	0	0	No	
Curculionidae	*Magdalis*	*duplicata*		NSA	None	0	0	No	
Curculionidae	*Magdalis*	*memnonia*		Naturalised	None	0	0	No	
Curculionidae	*Magdalis*	*phlegmatica*		NSA	None	0	0	No	
Curculionidae	*Magdalis*	*ruficornis*		None	None	0	0	No	
Curculionidae	*Hylobius*	*abietis*		None	None	0	0	No	
Curculionidae	*Pissodes*	*castaneus*		None	None	0	0	No	
Curculionidae	*Pissodes*	*pini*		None	None	0	0	No	
Curculionidae	*Trachodes*	*hispidus*		NSB	None	3	3	No	
Scolytinae	*Scolytus*	*intricatus*		None	None	0	0	No	
Scolytinae	*Scolytus*	*laevis*		None	None	0	0	No	
Scolytinae	*Scolytus*	*mali*		NSB	None	0	0	No	
Scolytinae	*Scolytus*	*multistriatus*		None	None	0	0	No	
Scolytinae	*Scolytus*	*pygmaeus*		Unclear	None	0	0	No	
Scolytinae	*Scolytus*	*ratzeburgi*		NSB	None	0	0	No	
Scolytinae	*Scolytus*	*rugulosus*		None	None	0	0	No	

Family/ Sub-family	Genus	Species	Other names in common usage	GB Status (1992)	BAP status	H&R (1986) grade	Revised continuity grade	Change to H&R (1986)	Possible additions
Scolytinae	*Scolytus*	*scolytus*		None	None	0	0	No	
Scolytinae	*Pityophthorus*	*pubescens*		None	None	0	0	No	
Scolytinae	*Cryphalus*	*asperatus*		Naturalised	None	0	0	No	
Scolytinae	*Ernoporicus*	*caucasicus*		NSA	None	1	2	Yes	
Scolytinae	*Ernoporicus*	*fagi*		NSA	None	3	3	No	
Scolytinae	*Ernoporus*	*tiliae*		RDB1	Priority	0	2	Yes	
Scolytinae	*Trypophloeus*	*binodulus*		None	None	0	0	No	
Scolytinae	*Crypturgus*	*subcribrosus*		Naturalised	None	0	0	No	
Scolytinae	*Dryocoetes*	*autographus*		Naturalised	None	0	0	No	
Scolytinae	*Dryocoetinus*	*alni*		NSA	None	0	0	No	
Scolytinae	*Dryocoetinus*	*villosus*		None	None	0	0	No	
Scolytinae	*Lymantor*	*coryli*		RDB1	None	0	0	No	?
Scolytinae	*Taphrorychus*	*bicolor*		NSA	None	0	0	No	y
Scolytinae	*Ips*	*sexdentatus*		None	None	0	0	No	
Scolytinae	*Ips*	*typographus*		None	None	0	0	No	
Scolytinae	*Orthotomicus*	*erosus*		Naturalised	None	0	0	No	
Scolytinae	*Orthotomicus*	*laricis*		None	None	0	0	No	
Scolytinae	*Orthotomicus*	*suturalis*		None	None	0	0	No	
Scolytinae	*Pityogenes*	*bidentatus*		None	None	0	0	No	
Scolytinae	*Pityogenes*	*chalcographus*		None	None	0	0	No	
Scolytinae	*Pityogenes*	*quadridens*		NSA	None	0	0	No	
Scolytinae	*Pityogenes*	*trepanatus*		NSA	None	0	0	No	
Scolytinae	*Xyleborinus*	*saxeseni*		None	None	3	3	No	
Scolytinae	*Xyleborus*	*dispar*		NSB	None	3	3	No	
Scolytinae	*Xyleborus*	*dryographus*		NSB	None	3	3	No	
Scolytinae	*Trypodendron*	*domesticum*		None	None	3	3	No	
Scolytinae	*Trypodendron*	*lineatum*		None	None	3	0	Yes	
Scolytinae	*Trypodendron*	*signatum*		NSB	None	3	3	No	
Scolytinae	*Hylesinus*	*crenatus*		None	None	0	0	No	
Scolytinae	*Hylesinus*	*oleiperda*		None	None	0	0	No	
Scolytinae	*Kissophagus*	*hederae*		NSB	None	0	0	No	

Family/ Sub-family	Genus	Species	Other names in common usage	GB Status (1992)	BAP status	H&R (1986) grade	Revised continuity grade	Change to H&R (1986)	Possible additions
Scolytinae	*Leperesinus*	*orni*		NSB	None	0	0	No	
Scolytinae	*Leperesinus*	*varius*		None	None	0	0	No	
Scolytinae	*Pteleobius*	*vittatus*		None	None	0	0	No	
Scolytinae	*Hylastes*	*angustatus*		Naturalised	None	0	0	No	
Scolytinae	*Hylastes*	*ater*		Naturalised	None	0	0	No	
Scolytinae	*Hylastes*	*attenuatus*		Naturalised	None	0	0	No	
Scolytinae	*Hylastes*	*brunneus*		None	None	0	0	No	
Scolytinae	*Hylastes*	*cunicularius*		Naturalised	None	0	0	No	
Scolytinae	*Hylastes*	*opacus*		None	None	0	0	No	
Scolytinae	*Hylurgops*	*palliatus*		Naturalised	None	0	0	No	
Scolytinae	*Phloeosinus*	*thujae*		Naturalised	None	0	0	No	
Scolytinae	*Polygraphus*	*poligraphus*		Naturalised	None	0	0	No	
Scolytinae	*Tomicus*	*minor*		RDB3	None	0	0	No	
Scolytinae	*Tomicus*	*piniperda*		None	None	0	0	No	
Scolytinae	*Dendroctonus*	*micans*		Naturalised	None	0	0	No	
Platypodidae	*Platypus*	*cylindrus*		NSB	None	3	3	No	
Platypodidae	*Platypus*	*parallelus*		RDBI	None	0	0	No	

Appendix 2. Checklist of saproxylic Coleoptera used in the calculation of the IEC

Histeridae		*Microrhagus pygmaeus*	3	Phloiophilidae		*Corticaria alleni*	1	Pyrochroidae	
Plegaderus dissectus	2	*Eucnemis capucina*	1	*Phloiophilis edwardsi*	3	Mycetophagidae		*Pyrochroa coccinea*	3
Abraeus granulum	1	Throscidae		Trogositidae		*Pseudotriphyllus suturalis*	3	Aderidae	
Aeletes atomarius	1	*Aulonothroscus brevicollis*	1	*Thymalus limbatus*	2	*Triphyllus bicolor*	2	*Aderus brevicornis*	1
Ptiliidae		Elateridae		Cleridae		*Mycetophagus atomarius*	3	*Aderus oculatus*	3
Ptenidium gressneri	2	*Lacon querceus*	1	*Tillus elongatus*	3	*Mycetophagus piceus*	2	Scraptiidae	
Ptenidium turgidum	2	*Calambus bipustulatus*	3	*Opilo mollis*	3	*Mycetophagus populi*	2	*Scraptia fuscula*	1
Micridium halidaii	1	*Limoniscus violaceus*	1	*Thanasimus formicarius*	3	*Mycetophagus quadriguttatus*	2	*Scraptia testacea*	1
Ptinella limbata	2	*Stenagostus rhombeus*	3	*Korynetes caeruleus*	3	Ciidae		*Anaspis septentrionalis*	1
Scydmaenidae		*Ampedus cardinalis*	1	Melyridae		*Cis coluber*	2	Cerambycidae	
Eutheia formicetorum	1	*Ampedus cinnabarinus*	1	*Aplocnemus impressus*	2	Tetratomidae		*Prionus coriarius*	3
Eutheia linearis	1	*Ampedus elongantulus*	3	*Aplocnemus nigricornis*	2	*Tetratoma ancora*	3	*Grammoptera ustulata*	1
Stenichnus bicolor	3	*Ampedus nigerrimus*	1	*Hypebaeus flavipes*	1	*Tetratoma desmaresti*	3	*Grammoptera variegata*	3
Stenichnus godarti	2	*Ampedus pomorum*	3	Nitidulidae		Melandryidae		*Anoplodera scutellata*	1
Microscydmus minimus	1	*Ampedus quercicola*	1	*Carpophilus sexpustulatus*	3	*Hallomenus binotatus*	3	*Anoplodera sexguttata*	2
Microscydmus nanus	2	*Ampedus ruficeps*	1	*Epuraea angustula*	3	*Orchesia undulata*	3	*Leptura aurulenta*	3
Euconnus pragensis	1	*Ampedus rufipennis*	1	Rhizophagidae		*Anisoxya fuscula*	3	*Leptura quadrifasciata*	3
Scydmaenus rufus	3	*Ischnodes sanguinicollis*	2	*Rhizophagus nitidulus*	3	*Abdera biflexuosa*	3	*Leptura revestita*	2
Staphylinidae		*Megapenthes lugens*	1	*Rhizophagus oblongicollis*	1	*Abdera quadrifasciata*	1	*Pyrrhidium sanguineum*	1
Phyllodrepa nigra	1	*Procraerus tibialis*	1	Silvanidae		*Phloiotrya vaudoueri*	2	*Phymatodes testaceus*	3
Xantholinus angularis	2	*Elater ferrugineus*	1	*Silvanus bidentatus*	2	*Hypulus quercinus*	1	*Mesosa nebulosa*	2
Velleius dilatatus	1	Lycidae		*Silvanus unidentatus*	3	*Melandrya barbata*	1	*Saperda scalaris*	3
Quedius aetolicus	3	*Pyropterus nigroruber*	3	*Uleiota planata*	2	*Melandrya caraboides*	3	Anthribidae	
Quedius maurus	3	*Platycis cosnardi*	1	Cucujidae		*Conopalpus testaceus*	3	*Platyrhinus resinosus*	3
Quedius microps	3	*Platycis minutus*	3	*Pediacus depressus*	2	Mordellidae		*Platystomos albinus*	3
Quedius scitus	2	Cantharidae		*Pediacus dermestoides*	3	*Tomoxia bucephala*	3	*Tropideres sepicola*	1
Quedius truncicola	3	*Malthodes crassicornis*	1	Laemophloidae		*Mordellistena neuwaldeggiana*	3	*Dissoleucas niveirostris*	3
Quedius xanthopus	3	Dermestidae		*Notolaemus unifasciatus*	2	Colydiidae		Rhynchophoridae	
Euryusa optabilis	2	*Globicornis rufitarsis*	1	Cryptophagidae		*Synchita humeralis*	3	*Dryophthorus corticalis*	1
Euryusa sinuata	2	*Trinodes hirtus*	1	*Cryptophagus micaceus*	1	*Synchita separanda*	3	Curculionidae	
Tachyusida gracilis	1	Bostrichidae		Erotylidae		*Cicones variegata*	2	*Cossonus parallelepipedus*	3
Bibloporus minutus	2	*Lyctus brunneus*	3	*Triplax lacordairii*	3	*Bitoma crenata*	3	*Rhopalomesites tardyi*	3
Euplectus nanus	1	Anobiidae		*Triplax russica*	3	*Teredus cylindrus*	1	*Stereocorynes truncorum*	1

Euplectus punctatus	1	*Xestobium rufovillosum*	3	*Triplax scutellaris*	3	*Oxylaemus variolosus*	2	*Trachodes hispidus*	3
Plectophloeus nitidus	1	*Gastrallus immarginatus*	1	*Tritoma bipustulata*	3	Tenebrionidae		Scolytinae	
Batrisodes adnexus	1	*Dorcatoma ambjoerni*	2	Biphyllidae		*Eledona agricola*	3	*Ernoporicus caucasicus*	2
Batrisodes delaporti	1	*Dorcatoma chrysomelina*	3	*Biphyllus lunatus*	3	*Corticeus unicolor*	2	*Ernoporicus fagi*	3
Batrisodes venustus	1	*Dorcatoma dresdensis*	2	*Diplocoelus fagi*	3	*Prionychus ater*	3	*Ernoporus tiliae*	2
Scirtidae		*Dorcatoma flavicornis*	3	Cerylonidae		*Prionychus melanarius*	1	*Xyloborinus saxeseni*	3
Prionocyphon serricornis	3	*Dorcatoma serra*	2	*Cerylon fagi*	2	*Pseudocistela ceramboides*	2	*Xyloborus dispar*	3
Scarabaeidae		*Anitys rubens*	1	Endomychidae		*Mycetochara humeralis*	2	*Xyloborus dryographus*	3
Gnorimus nobilis	1	*Ptinus subpilosus*	2	*Symbiotes latus*	3	Oedemeridae		*Trypodendron domesticum*	3
Gnorimus variabilis	1	Lymexylidae		Lathridiidae		*Ischnomera caerulea*	1	*Trypodendron signatum*	3
Eucnemidae		*Hylecoetus dermestoides*	3	*Lathridius consimilis*	1	*Ischnomera cinerascens*	3	Platypodidae	
Melasis buprestoides	3	*Lymexylon navale*	2	*Enicmus brevicornis*	3	*Ischnomera cyanea*	3	*Platypus cylindrus*	3
				Enicmus rugosus	2	*Ischnomera sanguinicollis*	1		

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