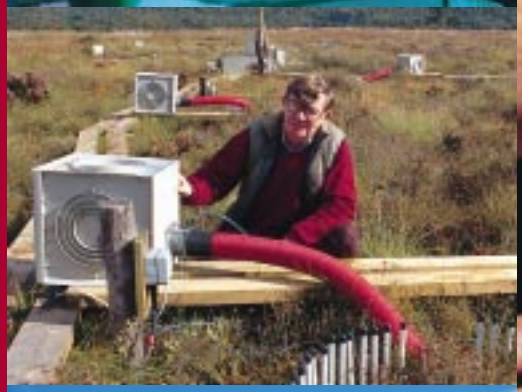
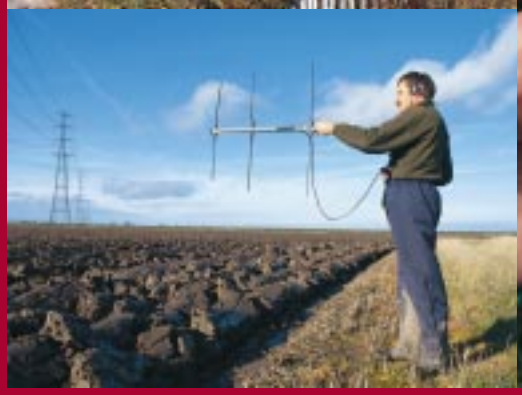
ENGLISH NATURE

Report Number
691

Saproxylic Invertebrate Survey, assessment and management recommendations of Calke Park, Derbyshire

English Nature Research Reports





working today
for nature tomorrow

English Nature Research Reports

Number 691

Saproxylic Invertebrate Survey, assessment and management recommendations of Calke Park, Derbyshire

Dr Keith N. A. Alexander BSc, PhD, FRES, MIEEM

Dan Abrahams (ed)
English Nature
Peak District & Derbyshire Team
Endcliffe, Deepdale Business Park
Ashford Road, Bakewell, Derbyshire DE45 1GT
Daniel.abrahams@english-nature.org.uk

ISSN 0967-876X

Cover note

Project officer	Dan Abrahams, Peak District & Derbyshire, Daniel.abrahams@english-nature.org.uk
Contractor(s) (where appropriate)	Dr Keith Alexander

This report should be cited as:
ALEXANDER, K.N.A., & ABRAHAMS, D., ed. 2006. Saproxylic Invertebrate Survey, assessment and management recommendations of Calke Park NNR, Derbyshire. *English Nature Research Reports*, No 691.
.

Acknowledgements

Many thanks to: Carl Hawke, National Trust Regional Nature Conservation Adviser for the East Midlands; Bill Cove, National Trust Head Warden, Calke Abbey Estate; Martyn Ainsworth for confirming the identity of the rare fungus *Ganoderma pfeifferi*; Derek Whitely for information on local status of rare Diptera; Brian Levey for confirming the identity of *Anaspis septentrionalis*.

Summary

Calke Park is an historic parkland known to be of considerable importance for invertebrate conservation. The site holds a large number of ancient oak trees as well as many other tree species including native lime, field maple, ash and beech. Many of these trees are in excess of 400 years old, with girths of up to 10m. It is one of the top British sites for its large numbers and variety of ancient trees. The outstanding nature conservation interests have been recognised by English Nature by designation of the richest areas as a Site of Special Scientific Interest (SSSI) and subsequent declaration as a National Nature Reserve (NNR). Trees and species of nature conservation importance however extend outside of these designated areas. The Park and surrounding land is also owned by the National Trust.

This document reports on a re-assessment of the assemblages of saproxylic invertebrates, based on new field survey carried out across the 2004 field season, with the objective of assessing their current condition, national importance and whether current management practices are sufficient to conserve the invertebrate fauna.

The survey found two additional Red Data Book beetle species - *Corticeus unicolor* and *Procraerus tibialis* - and six of nationally scarce status of which the most important is *Aplocnemus nigricornis*, a species not previously reported from Derbyshire. Important beetle species already known from the site were also found – eight nationally scarce species and two of British Red Data Book status – *Anaspis septentrionalis* and *Ernoporicus caucasicus*.

Thirteen key national beetle rarities are now known from the wider Calke Abbey parkland. The affinities of this fauna are with Sherwood Forest in particular and the northern fringes of the main Temperate broad-leaved old growth fauna of lowland Britain.

The saproxylic beetle fauna has been assessed in terms of its nature conservation importance using two established methodologies. The Index of Ecological Continuity (IEC) for the parkland is a minimum of 76, indicating a site of very high national importance, and the Site Quality Index (SQI) is 453 and also suggests national importance.

While falling slightly short of the currently recommended 80 for European significance, the IEC does place Calke Park as the eleventh most important site in Britain for saproxylic beetles and second only to Sherwood Forest in the northern half of Britain. Only one other site of this quality for old growth communities is in the care of the National Trust, Hatfield Forest in Essex.

It is also relevant that records from the wider Calke landscape do include a number of species which have so far not been found in the park itself but almost certainly occur there. The incorporation of these records into the Calke Park list results in an IEC of 84, which exceeds the threshold for European significance, and raises Calke to seventh place in GB importance, ahead of famous wood-pasture sites such as Burnham Beeches and Hatfield Forest.

Amongst the wood-decay Diptera, the Red Data Book hoverfly *Pocota personata* was discovered in the parkland outside of the current SSSI, and a good range of other nationally scarce and uncommon wood decay Diptera were also found. The known hoverfly fauna of the parkland now well exceeds the threshold for national nature conservation importance for this group alone. Six key national fly rarities are now known from the wider Calke Abbey

parkland. Unlike the Coleoptera, the affinities of this fauna are more with the southern old forests of New Forest and Windsor, with the rarer hoverflies not known from Sherwood Forest.

The parkland at Calke is also now shown to be of importance for wood-decay dependent solitary wasps and false scorpions, as well as epiphyte associated barkflies (Psocoptera).

The NNR section of Calke Park appears well-managed for nature conservation and is in favourable condition overall – although there are some problems locally which need addressing. It can be argued that Calke is the best managed parkland within the National Trust's ownership. Calke is the only park recorded as being in good ecological condition throughout (*Livestock Grazing in National Trust Parklands*, by Cox & Sanderson, 2001). The wider tenanted parkland, is however in much poorer condition for nature conservation.).

The key recommendations which arise from the new survey work and data analysis are as follows:

- The position of the NNR within the wider Calke Abbey Estate - with its treescapes expanding outwards from the NNR - needs to be recognised and it is recommended that all of this land is managed sympathetically for nature conservation and its tree populations actively conserved.
- The SSSI boundary should be reviewed to encompass areas currently outside the SSSI boundary that are deemed to be of special scientific interest.
- The livestock grazing management should be kept as extensive as possible throughout the parkland at Calke – not just in the NNR - and certain agricultural practices should not be permitted**.**
- The tree population dynamics should be investigated in the NNR and wider treescape, and be used to develop a tree recruitment plan which favours natural regeneration wherever feasible. Tree recruitment planning should favour both open-grown trees and denser wooded areas.
- No trees should be felled within the whole parkland area, nor their health and/or lives put at risk. If felling is deemed necessary it should be according to principles agreed by all interested parties. All dead trees should be retained *in situ*.
- There should be a presumption that all fallen and aerial deadwood be left *in situ* throughout the parkland – not just in the NNR - unless there is specified reason for doing otherwise, and agreed by all interested parties. Where displacement of deadwood is agreed to be unavoidable then it should be minimal.
- A monitoring protocol should be developed for Calke, to ensure tree health and recruitment is proceeding broadly to plan, and to relate this to the saproxylic invertebrate communities through a programme of repeat surveys.
- A programme of educational work should be developed by the Trust to ensure that everyone involved in the parkland is aware of the nature conservation issues, in broad terms at least, to ensure that good practice prevails.
- With the wider estate being such an integral part of the conservation of the special wood-decay habitat of Calke Park, it would be sensible to extend the tree and invertebrate surveys into the whole ownership of the Trust, and, indeed other neighbouring land owners.

Contents

1 Introduction

1.1 Background

Calke Park is an historic parkland known to be of importance for invertebrate conservation. It is known to support many nationally scarce and Red Data Book species. The park includes many ancient and veteran trees associated with areas of grassland. There are also areas of wetland which are also important for invertebrates.

The land-use history of the parkland at Calke is complex and includes areas of ancient woodland and wood-pasture. The site holds a large number of ancient oak trees as well as many other tree species including native lime, field maple, ash and beech. Many of these trees are in excess of 400 years old, with girths of up to 10m. It is one of the top British sites for its large numbers and variety of ancient trees.

The Calke Abbey Estate was transferred to the National Trust in 1985, prior to which its nature conservation interests were largely unrecognised. The Trust's Biological Survey Team were able to survey the estate during 1984 (the invertebrate ecologists were K.N.A. Alexander and D.K. Clements, and they were joined on one day by S.P. Garland, then with City Museum, Sheffield) and identified the historic parkland as the most important area of the estate for nature conservation and described it as being of outstanding quality and scientific interest (Clements and others 1984).

Specialist surveys of the wood-decay beetles were commissioned by the Trust in order to clarify the level of interest (Johnson, 1986 & Drane, 1986; supported by a grant from the British Ecological Society). Johnson (pers. comm.) - aided by some colleagues, including Peter Skidmore, John Burn and Ted Aubrook - continued recording the fauna in subsequent years. This work led to a clear demonstration of the importance of Calke Park in a GB context and Rickard Baranowski (in lit.) of Lund University (Sweden) – a leading European expert on saproxylic beetles - assessed the area as having "a great international value".

The hoverfly fauna was subsequently investigated by D. Whiteley of the City Museum, Sheffield, for a number of years from 1988, and he found many rare and scarce wood-decay species as well as interesting wetland species. He also carried out some recording of bees and wasps. He was assisted by members of the Sorby Invertebrate Group. More recently A. Godfrey has extended knowledge of the wood-decay Diptera fauna.

The outstanding nature conservation interests were recognised by English Nature in 1992 by designation of the richest areas as the Calke Park SSSI. A similar but slightly extended area was declared a National Nature Reserve in September 2004. However, trees and species of nature conservation importance extend outside of the designated areas.

1.2 Objective

To assess the assemblages of saproxylic invertebrates during the field season of 2004, in order to assess their current condition, national importance and whether current management practices are sufficient to conserve the invertebrate fauna.

2 Methodology

2.1 Dates and number of visits

The original proposal was for two days to be spent sampling in the park in late spring, high summer and autumn. In the event, the time available was extended to nine days and the earlier plans modified in response to local conditions and the prevalent weather. The dates of the visits were May 14 and 19, June 28 and 29, July 22, September 16, October 11 and 14, and November 18.

May and June proved to be largely settled, warm and sunny, and ideal for field survey work. The rest of the year was however largely unsettled and the surveys had necessarily to be carried out under less than ideal conditions. Some visits had to be abandoned part way through due to persistent heavy rain. Nonetheless it was felt that sufficient investigation was possible during the key seasons for the saproxylic invertebrates.

2.2 Sampling techniques

The main techniques used were as follows:

- beating lower canopy foliage and branches, using beating tray;
- sweep-netting vegetation beneath tree canopy;
- beating blossom on appropriate flowering shrubs, notably hawthorn and elder;
- tapping of fruiting wood-decay fungi over a net;
- hand search of fallen branch wood, investigating beneath loose bark and inside decayed heartwood, etc;
- visual inspection of tree trunks for resting invertebrates;
- inspection of accessible cavities in tree trunks and investigating within any accumulations of wood mould and other debris in cavities.

Wherever possible specimens encountered were identified in the field, retaining voucher specimens of the more critical species. Other specimens were taken away for inspection under microscope. Larvae and pupae were also retained for rearing through to the more readily identifiable adult stage. Much of the material retained for rearing had yet to emerge by the time this report was written. A supplement will be provided in due course.

2.3 Areas recorded

The area selected for survey by EN and NT in 2004 is much larger than the existing SSSI boundary, the main additional areas being the parkland lying to the south and east of the mansion as well as areas of tenanted farmland which extend beyond this as far as Calke village. The compartment map developed for the 1986 Johnson survey covers most of the area north and west of the mansion and which is now largely designated as an SSSI. The numbering system used in this Compartment Map was extended by the current contractor to cover the whole survey site (see Map 1).

Each compartment was described and assessed for the quality of its habitat for saproxylic invertebrates, and for the condition of that habitat.

A tree survey was planned for later in the year, including tagging. As it was important for the two surveys to use the same code numbers for individual trees of importance, the invertebrate contractor carried a set of tags, nails, hammer and handheld GPS with which to mark and locate such trees, and which data could later be incorporated into the tree survey. This approach worked very well.

3 The saproxylic invertebrate fauna

3.1 Introduction to fungal decay of wood

Very few invertebrates are able to feed directly on dead woody tissues, as the main components - cellulose and lignin - are difficult to digest. Most are therefore dependent on fungi and various micro-organisms to break down the wood into substances which are more accessible to invertebrate digestion. Heartwood decay fungi are especially important to invertebrates as they break down the central core of dead wood within living trees, thereby producing decaying wood habitat in large quantity while the tree is still alive and healthy – they rarely break down living tissues as their activity is held in check by the tree's living tissues. Other fungi are more opportunistic and exploit branches, roots, bark and eventually the trunks, as they die – for a variety of reasons.

Calke Park is especially rich in heartwood decay fungi. Species noted during the 2004 survey include *Fistulina hepatica*, *Ganoderma resinaceum*, *Grifola frondosa*, *Inonotus dryadeus*, and *Laetiporus sulphureus* on oak, *Ganoderma. adspersa*, *Ganoderma. pfeifferi* and *Inonotus. cuticularis* on beech, and *Inonotus. hispidus* on ash. Ted Green (pers. comm.) also reports the presence of *Piptoporus quercinus* on oak here, and *P. quercinus* was subsequently recorded in 2005 on two separate oak trees by Dr T. Lyons. *P. quercinus* and *G. pfeifferi* are nationally rare fungi, while *G. resinaceum*, *Grifola frondosa* and *I. cuticularis* are nationally uncommon species. Whilst all of these are characteristic of old growth. *G. pfeifferi* and *P. quercinus* are mainly found in the south and east of England but are known from one or two sites further north. *G. resinaceum* and *I. cuticularis* are also rare outside of the south. Calke Park is therefore a special place for heartwood decay fungi.

As trees mature and the canopy develops its full potential, then some of the lower boughs in the canopy become obsolete, over-shaded from above, and die. These occupy a special situation, sheltered from above and bathed in the moist atmosphere beneath the canopy, and protected from the harsher conditions which surround the tree. These aerial dead boughs are colonised by a wide range of fungi which exploit especially the more nutritious cambial layers. *Peniophora quercina* is a widespread and characteristic species of this situation and many wood-decay invertebrates are associated with its activity.

It is important to appreciate the great importance of open-grown trees. A tree given the space to develop its full potential will naturally generate the widest variety of wood-decay habitat and for the longest period of time. Also many associated species are warmth-loving and require well-lit trunks and boughs, both for the adults sunning, hunting and displaying on the outer wood surfaces, and for larvae developing within the decaying wood. Other species have requirements for shadier conditions.

The fauna of sites with a long history of large old open-grown trees are best termed "old growth" species as the expressions ancient woodland and ancient wood pasture have caused much confusion in people's minds with regard to the habitat associations of the species concerned (Alexander, 2004).

One further point to note in relation to the 1986 survey of the Calke Park saproxylic beetle fauna – and the designated SSSI boundaries which are based on it – is that at that time deadwood was being systematically cleared from the open parkland and some of it was transferred into the shelterbelts, out of sight. Thus the discovery of key species in decaying wood within shelterbelts does not necessarily imply that they originated there. Indeed, some at least are characteristic of open parkland trees, and their precise origin must remain unclear.

3.2 Saproxylic Coleoptera (beetles)

The Johnson (1986) survey noted 137 saproxylic beetle species in Calke Park and a few others have been added by other recorders. This has now been increased to 194 species in the course of the 2004 survey work (see Table 1 for the full list). The additional species include two of British Red Data Book status - *Corticeus unicolor* and *Procraerus tibialis*, and six of nationally scarce status of which the most important is *Aplocnemus nigricornis*, a species not previously reported from Derbyshire. Important species already known from the site were also found – eight nationally scarce species and two of British Red Data Book status – *Anaspis septentrionalis* and *Ernoporicus caucasicus*.

Thirteen key national rarities are now known from the wider Calke Abbey parkland. These are listed below in approximate order of importance, together with information on ecology and distribution (taken from Alexander 2002 plus updates):

Corticeus unicolor

- **Red Data Book Category 3 (Rare);** Grade 2 old growth indicator in Alexander (2004);
- A darkling beetle which feeds on the larvae of the ambrosia beetle *Hylecoetus dermestoides* and other wood borers in freshly dead or felled timber; known from birch, beech, oak and ash trunks and boughs;
- More or less confined to the north Midlands, with two distinct areas: Nottinghamshire/Derbyshire/S. Yorkshire and Cheshire, although almost certainly now extinct in latter area; site recently found in north Warwickshire, and the only other known Derbyshire locality is Hardwick Park;
- plentiful with *Hylecoetus* galleries beneath bark on old ash stump in 2004 (K.N.A. Alexander).

Micridium halidaii

- **Red Data Book Category K;** Grade 1 old growth indicator in Alexander (2004);
- a feather-winged beetle which has been found in red-rotten heartwood from inside hollow live oak; also under bark of dead oak; probably associated with mycelia of chicken-of-the-woods fungus *Laetiporus sulphureus*; a mould-feeder, living between the bark and sapwood of dead trees, where conditions are slightly moist and mouldy;
- only known from four GB sites: Windsor Great Park and Richmond Park in south-east, and Sherwood Forest and Calke Park in north;
- Compartment 5 (Deer's Cote Spinney) in 1986 (C. Johnson).

Anaspis septentrionalis = schilskyana

- **Red Data Book Category I;** Grade 1 old growth indicator in Alexander (2004);
- A jumping flower beetle of unclear identity; may just be a rare form of the Nationally Scarce *Anaspis thoracica* (Levey 2002);
- Larvae in midland England in half-dry red-rot of oak; adults on the most ancient oaks and attracted to hawthorn blossom; known from just four sites: Blenheim Park, Moccas Park, Sherwood Forest, and Calke Park;
- Also a population in Caledonian pine forest of Aviemore area;
- A generally rare N. European species;
- Found in "Calke Park" in 1988 (E. W. Aubrook) (Levey, 1996); also found in 2004 (K.N.A. Alexander).

Nemozoma elongatum

- **Red Data Book Category 3 (Rare);**
- Lives in the burrows of the bark beetles *Pteleobius vittatus* and *Leperisinus varius*, in recently dead thin-barked elm, ash and lime branches; mostly in old palings historically;
- South and East of Britain, as far north as Sherwood.
- "Calke Park" in 1986 (P. Skidmore).

Aplocnemus nigricornis

- **Nationally Scarce Category A;** Grade 2 old growth indicator in Alexander (2004);
- A soft-winged flower beetle, with larvae feeding on bark beetle (Scolytidae) larvae in freshly dead branches, and known from pear, oak, sycamore & pine; possibly some association with old hollowing oaks;
- Thin scattering of records throughout lowland southern Britain, extending into southern Scotland, but not previously known from Derbyshire;
- one netted in Compartment 3a (The Rookery) beneath ancient oaks, in 2004 (K.N.A. Alexander).

Mycetophagus populi

- **Nationally Scarce Category A;** Grade 2 old growth indicator in Alexander (2004); **s**tatus probably needs up-grading to Red Data Book;
- A hairy fungus beetle with larvae probably developing within fungal mycelia within decaying wood, although the favoured situations and conditions are not known. Adults overwinter beneath loose bark on wood and in soft moist decaying sapwood; attracted to fresh sap in spring;
- Known from a few sites across southern and eastern England as far north as Yorkshire; also a site in Lanarkshire;
- in Compartment 10 (Lodge Plantation) in 1986 (C. Johnson).

Ernoporicus caucasicus

- **Nationally Scarce Category A** (A.B.Drane, pers.comm.); Red Data Book Category 1 (Endangered) in Hyman & Parsons (1992); Grade 2 old growth indicator in Alexander (2004);
- Develops in the bark of dead small branches of lime, both native *Tilia cordata* and *T. platyphyllus*, as well as common lime *T. vulgaris*, but only in sites where the first two have been present historically; branches occupied range from 1.5 cm to 10 cm diameter;

- Widespread in Britain, from Merionethshire, Herefordshire and Gloucestershire across to East Anglia, and north into Yorkshire and Morecombe Bay area (A.B. Drane, pers.comm.);
- Noted in Compartments 1b (north side of Mere Pond), 2 and 6 (both sides of Thatch House Pond) in 1986 (C. Johnson); galleries in branches on trees in Cpt 1b, Cpt 2a and Cpt 6a in 2004 (K.N.A. Alexander).

Lymexylon navale

- **Red Data Book Category 2 (Vulnerable)**, but merits down-grading to Nationally Scarce Category A, based on recent records**;** Grade 2 old growth indicator in Alexander (2004);
- Larvae bore into heartwood of live and dead standing oaks and occasionally sweet chestnut, usually well above ground level, also in felled trunks or stumps, but always where bark has been damaged, drying out the underlying sapwood to some extent; feed on the cellulose, etc, not fungi;
- A clustered distribution in Britain, in West Midlands and south-east;
- Compartment 5 (Deer's Cote Spinney) in 1989 (C. Johnson); one netted in Compartment 3a (The Rookery) beneath ancient oak in 2004 (K.N.A. Alexander).

Mycetochara humeralis

- **Nationally Scarce Category A;** Grade 2 old growth indicator in Alexander (2004);
- A darkling beetle with larvae developing in old decaying, generally hollow trees, in wood mould beneath bird nests;
- mainly known from the the East Midlands, East Anglia and south-east;
- Compartment 5 (Deer's Cote Spinney) in 1989 (C. Johnson).

Procraerus tibialis

- **Nationally Scarce Category A** (Fowles and others 1999); Red Data Book Category 3 (Rare) in Hyman & Parsons (1992); Grade 1 old growth indicator in Alexander (2004);
- Larvae develop in decaying heartwood of oak, beech, ash and probably other trees; probably feed on the larvae of the weevils *Stereocorynes truncorum* and *Phloeophagus lignarius*;
- C & SE England, mainly Thames and Severn Basins, in ancient wood pastures; Sherwood Forest the northernmost British locality, and Kedleston Park the only other known site in Derbyshire;
- Compartment 1a (deer park); in hollow beech tree, 2004 (K.N.A. Alexander)

Cyanostolus aeneus

- **Nationally Scarce Category A;**
- Under bark on dead wood and in crevices in bark, usually on trunks or boughs lying in water or washed downstream, the wood saturated; probably a predator of bark beetles;
- a speciality of the hill country of N and W Britain, also in the Weald;
- Partially submerged beech trunk in Compartment 8 (Thatch House Pond) in 1986 (C. Johnson & A.B. Drane).

Aeletes atomarius

- **Nationally Scarce Category A** (Fowles and others 1999); Red Data Book Category 3 (Rare) in Hyman & Parsons (1992); Grade 1 old growth indicator in Alexander (2004);
- A hister beetle, usually living in burrows of lesser stag beetle *Dorcus parallelopipedus* in moist crumbly decaying heartwood, although also recorded with *Sinodendron cylindricum* and brown tree ant *Lasius brunneus*; feeds especially on larvae of other deadwood insects, also mites and springtails;
- has been found in decaying beech, ash, willow, and alder;
- mostly central England, as far north as Yorkshire;
- in Compartments 5 (Deer's Cote Spinney), 10 (Lodge Plantation) and 11 (Serpentine Wood) in 1986 (C.Johnson).

Dorcatoma serra

- **Nationally Scarce Category A;** Grade 2 old growth indicator in Alexander (2004);
- Develops in bracket fungi on broadleaved trees, especially the fibrous *Inonotus dryadeus* on old oaks;
- central and south-eastern England, reaching into the Welsh Marches;
- three in rotten fungus on an old beech in 1986 (A.B. Drane).

The affinities of this fauna are with Sherwood Forest in particular and the northern fringes of the main Temperate broad-leaved old growth fauna of lowland Britain. The Sherwood link is particularly apparent through *Corticeus unicolor*, *Micridium halidaii* and *Anaspis septentrionalis* (= *schilskyana)*. A north Midland character is contributed by *Ernoporicus caucasicus* and *Cyanostolus aeneus.*

Rare forms of old growth wood-decay beetles also appear to be a feature of some of the richest sites. The recent suggestion (Levey, 2002) that *Anaspis septentrionalis* (= *schilskyana)* may be a rare form of *A. thoracica* is significant in this respect as, whether or not it is a true species or a form, it is also a feature of Sherwood Forest. The individual of another beetle *Conopalpus testaceus* which was found in Calke Park in 2004 was of the rare form with metallic blue wing-cases, var. *vigorsi*, which is also a speciality of Sherwood Forest.

Calke Park supports a good representation of heartwood decay beetles. Key species present are *Plegaderus dissectus*, *Aeletes atomarius*, *Ptenidium gressneri*, *Micridium halidaii*, *Quedius scitus*, *Procraerus tibialis*, *Malthinus frontalis*, *Dorcatoma chrysomelina* and *D. flavicornis*, *Aplocnemus nigricornis*, *Prionychus ater*, *Mycetochara humeralis*, *Anaspis septentrionalis* and *Aderus oculatus*. A number of species known from Sherwood Forest are missing from this list – eg *Ptenidium turgidum*, *Microscydmus minimus*, *Batrisodes venustus* - and these species may just still be overlooked at Calke. *Anitys rubens*, for instance occurs in old hedgerow oaks on Southwood House Farm, Calke, and must be present in the park too. But it does seem reasonably certain that Calke does lack a few of the Sherwood specialities, notably the cardinal click beetle *Ampedus cardinalis* and the darkling beetle *Prionychus melanarius*, as it might be expected that these would have been detected by now.

The stag beetle *Lucanus cervus* – a Priority Species under the UK Biodiversity Action Plan – was reported "by Mr Garneys from Calke near Derby" (Fowler, 1890) and the record repeated in Clark's (1967) review of the British distribution of the species. No subsequent

records have been forthcoming despite recent appeals for records nationally by the People's Trust for Endangered Species. At present it must be assumed to be extinct in the area.

Interestingly, the 2004 survey has drawn attention to a lack of mature oaks at Calke Park. Trees with shaded-out lower boughs were difficult to find and the associated fauna relatively species-poor. The *Peniophora quercina* associated beetle *Phloiophilus edwardsi* is present in low numbers, but others such as *Abdera biflexuosa*, *Tetratoma desmaresti* and even the widespread *Orchesia undulata* have not yet been detected here, although are present at Kedleston and/or Hardwick Parks. Overall the wood-decay beetle fauna is of exceptional quality for a site in the north Midlands, but there is still plenty of scope for discovering further important species here, including more Sherwood Forest specialities.

The discovery of both *Palorus subdepressus* and *Tribolium castaneum* in decaying wood in Calke Park in 2004 are evidence of the impact of climate change on the faunal composition. Both have been known in Britain for a very long time but mainly as pests of stored food products such as grain. It is only in recent years that both have begun to be found in decaying wood in the open countryside.

Table 1 Full list of saproxylic Coleoptera known from Calke Park

Species	**Family**	**Dates**	**Status**
Bembidion harpaloides	Carabidae	1986	
Dromius quadrimaculatus	Carabidae	1984, 1986, 2004	
Dromius agilis	Carabidae	1986	
Dromius meridionalis	Carabidae	2004	
Dromius spilotus (quadrinotatus)	Carabidae	1986, 2004	
Plegaderus dissectus	Histeridae	1986	Nationally Scarce B
Abraeus perpusillus (globosus)	Histeridae	1986	
Abraeus granulum	Histeridae	1986	Nationally Scarce A
Aeletes atomarius	Histeridae	1986	RDB3
Gnathoncus nannetensis	Histeridae	1986	
Dendrophilus punctatus	Histeridae	1986	
Paromalus flavicornis	Histeridae	1984, 1986, 2004	
Nossidium pilosellum	Ptiliidae	1986	Nationally Scarce B
Ptenidium gressneri	Ptiliidae	1986	Nationally Scarce B
Micridium halidaii	Ptiliidae	1986	RDBK
Ptinella aptera	Ptiliidae	1986	
Ptinella errabunda	Ptiliidae	1986	
Pteryx suturalis	Ptiliidae	1986	
Anisotoma humeralis	Leiodidae	1986, 2004	
Anisotoma orbicularis	Leiodidae	1986	
Agathidium nigrinum	Leiodidae	1986	
Agathidium rotundatum	Leiodidae	1986	
Agathidium seminulum	Leiodidae	1986	
Agathidium varians	Leiodidae	1986	
Scaphisoma agaricinum	Staphylinidae: Scaphidiinae	1986	
Acrulia inflata	Staphylinidae: Omaliinae	1986	
Dropephylla ioptera	Staphylinidae: Omaliinae	1986	
Dropephylla vilis	Staphylinidae: Omaliinae	1986	

Species	Family	Dates	Status
Hapalaraea pygmaea	Staphylinidae: Omaliinae	1986	
Phloeonomus punctipennis	Staphylinidae: Omaliinae	1986	
Siagonium quadricorne	Staphylinidae: Piestinae	1984, 1986	
Atrecus affinis	Staphylinidae: Staphylininae	1986	
Gabrius splendidulus	Staphylinidae: Staphylininae	1986	
Quedius maurus	Staphylinidae: Staphylininae	1986	
Quedius microps	Staphylinidae: Staphylininae	1986	Nationally Scarce B
Quedius scitus	Staphylinidae: Staphylininae	1986	Nationally Scarce B
Quedius xanthopus	Staphylinidae: Staphylininae	2004	Nationally Scarce B
Sepedophilus testaceus	Staphylinidae: Tachyporinae	1986	Nationally Scarce B
Gyrophaena angustata	Staphylinidae: Aleocharinae	1986	Nationally Scarce B
Gyrophaena fasciata	Staphylinidae: Aleocharinae	1986	
Gyrophaena latissima	Staphylinidae: Aleocharinae	1986	
Gyrophaena minima	Staphylinidae: Aleocharinae	1986	
Gyrophaena nana	Staphylinidae: Aleocharinae	1986	
Homalota plana	Staphylinidae: Aleocharinae	1986	
Anomognathus cuspidatus	Staphylinidae: Aleocharinae	1986	
Leptusa fumida	Staphylinidae: Aleocharinae	1986	
Bolitochara lucida	Staphylinidae: Aleocharinae	1986	
Bolitochara obliqua	Staphylinidae: Aleocharinae	1986	
Autalia longicornis	Staphylinidae: Aleocharinae	1986	
Dinaraea aequata	Staphylinidae: Aleocharinae	1986	
Dinaraea linearis	Staphylinidae: Aleocharinae	1986	
Dadobia immersa	Staphylinidae: Aleocharinae	1986	
Atheta liturata	Staphylinidae: Aleocharinae	1986	
Phloeopora testacea	Staphylinidae: Aleocharinae	1986	
Bibloporus bicolor	Pselaphidae	1986	
Bibloporus minutus	Pselaphidae	1986	Nationally Scarce B

Species	Family	Dates	Status
Euplectus bonvouloiri rosae	Pselaphidae	1986	Nationally Scarce B
Euplectus fauveli	Pselaphidae	1986	Nationally Scarce B
Euplectus karsteni	Pselaphidae	1986	
Euplectus piceus	Pselaphidae	1986	
Prionocyphon serricornis	Scirtidae	1995	Nationally Scarce B
Lucanus cervus	Lucanidae	F&D (1913)	Nationally Scarce B; Partially Protected Species (Sale & Exchange); BAP Priority Species
Dorcus parallelepipedus	Lucanidae	1986, 2004	
Sinodendron cylindricum	Lucanidae	1984, 1986, 2004	
Agrilus laticornis	Buprestidae	2004	Nationally Scarce B
Agrilus biguttatus	Buprestidae	2004	Nationally Scarce A
Melasis buprestoides	Eucnemidae	1989	Nationally Scarce B
Denticollis linearis	Elateridae	1984, 1986, 2004	
Hemicrepidius hirtus	Elateridae	2004	
Stenagostus rhombeus	Elateridae	1984, 1986, 2004	
Ampedus balteatus	Elateridae	1986, 2004	
Procraerus tibialis	Elateridae	2004	RDB3
Melanotus villosus	Elateridae	1984, 1986, 1995, 2004	
Malthinus punctatus (flaveolus)	Cantharidae	2004	
Malthinus frontalis	Cantharidae	1986	Nationally Scarce B
Malthodes minimus	Cantharidae	2004	
Malthodes pumilus	Cantharidae	2004	
Megatoma undata	Dermestidae	1986, 2004	Nationally Scarce B
Ctesias serra	Dermestidae	1984, 1986, 1995, 2004	
Hedobia imperialis	Anobiidae	1986	Nationally Scarce B
Grynobius planus	Anobiidae	1986	
Xestobium rufovillosum	Anobiidae	1986, 2004	
Ernobius mollis	Anobiidae	1986	
Hemicoelus fulvicornis	Anobiidae	2004	
Anobium punctatum	Anobiidae	1986, 2004	
Ptilinus pectinicornis	Anobiidae	1986, 2004	
Dorcatoma chrysomelina	Anobiidae	1986	
Dorcatoma flavicornis	Anobiidae	2004	Nationally Scarce B
Dorcatoma serra	Anobiidae	1986	Nationally Scarce A
Ptinus fur	Anobiidae: Ptininae	1986	
Hylecoetus dermestoides	Lymexylidae	1986, 2004	Nationally Scarce B
Lymexylon navale	Lymexylidae	1989, 2004	RDB2
Phloiophilus edwardsi	Phloiophilidae	1989, 2004	Nationally Scarce B
Nemozoma elongatum	Trogossitidae	1986	RDB3
Tillus elongatus	Cleridae	1989	Nationally Scarce B
Thanasimus formicarius	Cleridae	1995, 2004	
Korynetes caeruleus	Cleridae	1986	Nationally Scarce B
Aplocnemus nigricornis	Melyridae	2004	Nationally Scarce A
Dasytes aeratus	Melyridae	1986	
Axinotarsus marginalis	Melyridae	2004	Recent Colonist
Axinotarsus ruficollis	Melyridae	2004	
Malachius bipustulatus	Melyridae	1986, 2004	
Sphindus dubius	Sphindidae	1986	Nationally Scarce B
Aspidiphorus orbiculatus	Sphindidae	1986	

Species	Family	Dates	Status
Epuraea pallescens (florea)	Nitidulidae	1986	
Epuraea silacea (deleta)	Nitidulidae	1986	
Epuraea unicolor	Nitidulidae	1986	
Rhizophagus bipustulatus	Rhizophagidae	1986, 2004	
Rhizophagus cribratus	Rhizophagidae	1989	
Rhizophagus dispar	Rhizophagidae	1984, 1986	
Rhizophagus parallelocollis	Rhizophagidae	2004	
Rhizophagus perforatus	Rhizophagidae	2004	
Cyanostolus aeneus	Rhizophagidae	1986	Nationally Scarce A
Pediacus dermestoides	Cucujidae	1986, 2004	
Cryptophagus dentatus	Cryptophagidae	1986, 2004	
Cryptophagus labilis	Cryptophagidae	1986	Nationally Scarce B
Cryptophagus pallidus	Cryptophagidae	1986	
Triplax aenea	Erotylidae	1984, 1986, 2004	
Triplax russica	Erotylidae	2004	Nationally Scarce B
Dacne bipustulata	Erotylidae	1986, 2004	
Dacne rufifrons	Erotylidae	1986	
Biphyllus lunatus	Biphyllidae	1989	
Cerylon ferrugineum	Cerylonidae	1984, 1986, 2004	
Cerylon histeroides	Cerylonidae	1984, 1986, 2004	
Mycetaea subterranea	Endomychidae	1986	
Symbiotes latus	Endomychidae	1986	Nationally Scarce B
Endomychus coccineus	Endomychidae	1986	
Orthoperus mundus	Corylophidae	1986	
Enicmus rugosus	Lathridiidae	1986	Nationally Scarce B
Enicmus testaceus	Lathridiidae	1986	
Dienerella elongata	Lathridiidae	1986	
Corticaria alleni	Lathridiidae	1986	Nationally Scarce B
Pseudotriphyllus suturalis	Mycetophagidae	1986, 2004	
Triphyllus bicolor	Mycetophagidae	1984	Nationally Scarce B
Litargus connexus	Mycetophagidae	2004	
Mycetophagus atomarius	Mycetophagidae	1986	
Mycetophagus multipunctatus	Mycetophagidae	1986, 2004	
Mycetophagus piceus	Mycetophagidae	1989	Nationally Scarce B
Mycetophagus populi	Mycetophagidae	1986	Nationally Scarce A
Mycetophagus quadripustulatus	Mycetophagidae	1984, 1986, 2004	
Octotemnus glabriculus	Ciidae	1986, 2004	
Cis alni	Ciidae	2004	
Cis bidentatus	Ciidae	1986	
Cis bilamellatus	Ciidae	1986, 2004	Naturalised
Cis boleti	Ciidae	1986, 2004	
Cis fagi	Ciidae	1986	
Cis hispidus	Ciidae	1986	
Cis nitidus	Ciidae	1986, 2004	
Cis vestitus	Ciidae	2004	
Tetratoma fungorum	Tetratomidae	1986, 2004	
Orchesia micans	Melandryidae	2004	Nationally Scarce B
Melandrya caraboides	Melandryidae	1986	Nationally Scarce B
Conopalpus testaceus	Melandryidae	1986, 2004	Nationally Scarce B
Bitoma crenata	Colydiidae	1984, 1986, 1995, 2004	
Eledona agricola	Tenebrionidae	1989, 2004	Nationally Scarce B
Tribolium castaneum	Tenebrionidae	2004	Naturalised
Palorus subdepressus	Tenebrionidae	2004	Naturalised

Species	Family	Dates	Status
Corticeus unicolor	Tenebrionidae	2004	RDB3
Tenebrio molitor	Tenebrionidae	1984	
Prionychus ater	Tenebrionidae	1986, 2004	Nationally Scarce B
Mycetochara humeralis	Tenebrionidae	1989	Nationally Scarce A
Ischnomera cyanea	Oedemeridae	1986, 2004	Nationally Scarce B
Pyrochroa serraticornis	Pyrochroidae	1986	
Rhinosimus planirostris	Salpingidae	1986, 2004	
Rhinosimus ruficollis	Salpingidae	1986	
Aderus oculatus	Aderidae	1986, 2004	Nationally Scarce B
Anaspis fasciata (humeralis)	Scraptiidae	1986, 2004	
Anaspis frontalis	Scraptiidae	1986, 2004	
Anaspis garneysi	Scraptiidae	2004	
Anaspis maculata	Scraptiidae	1986, 2004	
Anaspis regimbarti	Scraptiidae	1986, 2004	
Anaspis rufilabris	Scraptiidae	1986, 2004	
Anaspis septentrionalis	Scraptiidae	1988, 2004	RDBI
Stenocorus meridianus	Cerambycidae	1986, 1988	
Grammoptera ruficornis	Cerambycidae	1986, 2004	
Alosterna tabacicolor	Cerambycidae	1986, 1991	
Strangalia maculata	Cerambycidae	1986	
Phymatodes testaceus	Cerambycidae	1986, 2004	
Clytus arietis	Cerambycidae	1986, 1988	
Pogonocherus hispidus	Cerambycidae	2004	
Leiopus nebulosus	Cerambycidae	1986, 2004	
Stenostola dubia	Cerambycidae	1986, 1991	Nationally Scarce B
Tetrops praeusta	Cerambycidae	1989	
Platyrhinus resinosus	Anthribidae	1989	Nationally Scarce B
Magdalis ruficornis	Curculionidae	2004	
Euophryum confine	Curculionidae	1986, 2004	
Phloeophagus lignarius	Curculionidae	1986, 2004	
Hylesinus crenatus	Scolytidae	2004	
Hylesinus varius	Scolytidae	2004	
Scolytus intricatus	Scolytidae	1986, 2004	
Dryocoetes villosus	Scolytidae	1986, 2004	
Trypodendron domesticum	Scolytidae	1986, 2004	
Ernoporus caucasicus	Scolytidae	1986, 2004	Nationally Scarce A
Xyleborinus saxeseni	Scolytidae	1986	

3.3 Saproxylic Diptera (flies)

The earliest wood-decay Diptera records from Calke Park are a report of the Nationally Scarce hoverfly *Mallota cimbeciformis* from Ticknall Limeyards Reserve (pre 1986, F. Jackson), records from the 1984 National Trust Biological Survey and a 1986 list from Peter Skidmore, then of Doncaster Museum. Derek Whiteley and the Sorby Natural History Society recorders have contributed many hoverfly (Syrphidae) records.

The most effective way of recording wood-decay Diptera is by emergence trapping and Andy Godfrey has carried out some work of this type. The 2004 survey did not involve any use of static traps. Wood-decay Diptera were not very evident during 2004 but a number of important finds were made, especially amongst hoverflies and dolichopodids.

A total of 51 wood-decay Diptera are currently known from Calke Park (Table 2). These include four species of Red Data Book status and eight of nationally scarce status.

The key national rarities are listed below in approximate order of importance, together with information on ecology and distribution (taken from Alexander 2002 plus updates):

Caliprobola speciosa

- **Red Data Book Category 1 (Endangered);**
- A large and spectacular hoverfly, with larvae developing in decaying heartwood of old beech trees, especially large old stumps, extending underground in the roots;
- Primarily known from the New Forest and Windsor Great Park & Forest areas, but also an undated record from Needwood Forest in Staffordshire;
- reported in 1986 by John Burns, but not captured; Peter Skidmore considered the record to be reliable (D.K. Clements, in lit.).

Pocota personata

- **Red Data Book Category 2 (Vulnerable);**
- A bee-mimic hoverfly which develops in debris from wood-decay in cavities, especially in beech but also ash;
- scattered widely although very sparingly across lowland England, especially Windsor Forest and the New Forest, but with a few northern records, notably Duncombe Park, North Yorkshire; previously known from just one Derbyshire locality (D. Whiteley, pers. comm.) but also found in Kedleston Park this year;
- A female was found at a beech tree with water-saturated debris in a cavity within Compartment 16a (parkland south of the mansion and well outside of the current SSSI boundary), 2004 (K.N.A. Alexander).

Psilota anthracina

- **Red Data Book Category 2 (Vulnerable);**
- A hoverfly with larvae reported from sap runs on living oak trees on the Continent; adults attracted to hawthorn blossom;
- Restricted to sites with large numbers of ancient trees, such as Windsor Forest, the New Forest and Richmond Park, but known from as far north as Warwickshire and Derbyshire;
- a male recorded in 1990 (Whiteley, 1990), "feeding on very fresh hawthorn blossom, overhanging water in an area with a high concentration of dead timber, standing dead trees, and ancient parkland".

Rhipidia uniseriata

- **Red Data Book Category 3 (Rare);**
- A cranefly with larvae developing in dead and decaying timber in old broad-leaved woodland and hedgerows; reported from elm, beech, birch, and oak;
- Scattered through southern & Midland England;
- record in RECORDER print out from Derek Whiteley (via EN), dated 1996 (A. Godfrey).

Medetera melancholica

- **Red Data Book Category 3 (Rare);**
- The larvae of *Medetera* species are found in burrows of bark beetles and other beetles on whose larvae and pupae they feed; this particular species is poorly known but has been reared from pine as well as ash and grey alder elsewhere in Europe;
- The adults court, mate and catch prey on sunlit tree trunks and logs, and also walls and signposts; the range of trees used for egg-laying is narrower than that used for hunting food and courtship;
- Known from a few northern British localities;
- An individual which appears to be this species was found on the trunk of a dead standing oak in Compartment 1a (the deer park) in 2004 (K.N.A. Alexander).

Mallota cimbiciformis

- **Nationally Scarce;**
- Larvae develop in water-filled rot-holes of varying sizes and heights on a wide variety of small and large broad-leaves; puparia occur just above in drier detritus;
- Widely but sparingly across lowland England, but also known from North Wales and the Clyde Valley woods;
- "taken by Felicity Jackson some years ago (D. Whiteley, in lit. 1991); "Ticknall Limeyards is the only confirmed record, plus an unconfirmed record from the nearby Calke Park" (Whiteley, 1991).

Little ecological analysis of wood-decay fly faunas has been attempted, reflecting the more basic knowledge of much of the fauna in comparison to Coleoptera. Nonetheless some attempts have been made to use site lists of saproxylic hoverflies. Whiteley (1987) presented a graded list of "ancient woodland indicators" based on work by Alan Stubbs and Steve Falk. These included most of the saproxylic species – 35 species in total - the exceptions being the more widespread *Myathropa florea* and *Xylota segnis*. The Calke list of saproxylic hoverflies currently includes 13 of these, with one grade 1 species (species known to have occurred in recent times only in areas believed to be ancient woodland, mainly pasture-woodland) *Calliprobola speciosa* and five grade 2 species (species that occur mainly in areas believed to be ancient woodland with abundant deadwood habitats, but which also appear to have been recorded from areas that may not be ancient or for which locality data are imprecise): *Chalcosyrphus nemorum*, *Mallota cimbiciformis*, *Pocota personata*, *Psilota anthracina* and *Xylota florum*. If the Index of Ecological Continuity approach to site assessment (see following section) is applied to this list then an IEC of 20 results. Alexander (1995) is the only person to have taken the initiative to develop this approach for hoverflies and an IEC of 20 well exceeds the threshold for national nature conservation importance. While the approach merits considerable refinement – due to more recent advances in knowledge of the ecology of the species concerned – the assessment is unlikely to change.

Unlike the Coleoptera, the affinities of this fauna are more with the southern old forests of New Forest and Windsor, with the rarer hoverflies not known from Sherwood Forest.

Table 2 Full list of saproxylic Diptera known from Calke Park

Species	Family	Dates	Status
Dictenidia bimaculata	Tipulidae	1986	
Tipula irrorata	Tipulidae	1986	
Austrolimnophila ochracea	Limoniidae	1986	
Epiphragma ocellare	Limoniidae	1986	
Limonia phragmitidis (tripunctata)	Limoniidae	1986	
Neolimonia dumetorum	Limoniidae	1986	
Rhipidia uniseriata	Limoniidae	1996	RDB3
Orfelia fasciata	Keroplatidae	1986	
Orfelia nemoralis	Keroplatidae	1986	
Ptychoptera albimana	Ptychopteridae		
Sylvicola cinctus	Anisopodidae	1995, 1997	
Mycetobia pallipes	Mycetobiidae	1995	Nationally Scarce
Holoplagia richardsi	Scatopsidae	1997	
Metriocnemus cavicola	Chironomidae	1996	
Xylophagus ater	Xylophagidae	1984, 1989, 1995, 2004	
Ptiolina atra	Rhagionidae	1996	Nationally Scarce
Pachygaster atra	Stratiomyidae	1989	
Thereva nobilitata	Therevidae	2004	
Euthyneura myrtilli	Hybotidae	1986	
Oedalea stigmatella	Hybotidae	1986	
Medetera diadema	Dolichopodidae	2004	
Medetera melancholica	Dolichopodidae	2004	RDB3
Medetera pallipes	Dolichopodidae	2004	
Medetera saxatilis	Dolichopodidae	2004	
Medetera truncorum	Dolichopodidae	2004	
Systenus pallipes	Dolichopodidae	1995, 1997	Nationally Scarce
Systenus scholtzii	Dolichopodidae	1995, 1997	Nationally Scarce
Brachyopa insensilis	Syrphidae	1986, 1997	Nationally Scarce
Brachyopa sp		2004	
Brachypalpoides lentus	Syrphidae	1988	
Caliprobola speciosa	Syrphidae	1986	RDB1
Chalcosyrphus nemorum	Syrphidae	1989	
Criorhina berberina	Syrphidae	1988, 1989	
Criorhina floccosa	Syrphidae	1988, 2004	
Ferdinandea cuprea	Syrphidae	1986	
Mallota cimbiciformis	Syrphidae	pre1986	Nationally Scarce
Myathropa florea	Syrphidae	1984, 1997	
Pocota personata	Syrphidae	2004	RDB2
Psilota anthracina	Syrphidae	1990	RDB2
Sphegina clunipes	Syrphidae	1988-89	
Xylota florum	Syrphidae	1989	Nationally Scarce

Species	Family	Dates	Status
Xylota sylvarum	Syrphidae	1984, 1988-89, 1997	
Megamerina dolium	Megamerinidae	1986	Nationally Scarce
Lonchaea laticornis	Lonchaeidae	1997	
Peplomyza litura	Lauxaniidae	1986	
Clusiodes albimanus	Clusiidae	1986	
Clusiodes ruficollis (facialis)	Clusiidae	1986	
Gaurax fascipes	Chloropidae	1997	
Drosophila busckii	Drosophilidae	1995	
Phaonia pallida	Muscidae	1986	
Phaonia subventa	Muscidae	1986	

3.4 Other saproxylic invertebrates

A wide range of other invertebrates groups include species dependent on decaying wood. While Coleoptera and Diptera are pre-eminent, with in excess of 700 species each nationally, other important groups are the Hymenoptera and Lepidoptera. These are all much less well-studied at Calke Park but some recording has taken place. Table 3 lists the species concerned.

Table 3 Full list of other saproxylic invertebrates known from Calke Park

Species Identification	Family	Date	Status
Cylindroiulus punctatus	Diplopoda	2004	
Proteroiulus fuscus	Diplopoda	2004	
Chernes cimicoides	Pseudoscorpiones	1984, 2004	Local
Lamprochernes chyzeri	Pseudoscorpiones	2004	Local
Aradus depressus	Hemiptera: Aradidae	2004	Local
Xylocoris cursitans	Hemeiptera: Anthocoridae	1984, 2004	Local
Phaeostigma notata	Raphidioptera	1986	Local
Trichrysis cyanea	Hymenoptera: Chrysididae	1986, 1989, 2004	Local
Symmorphus gracilis	Hymenoptera: Eumenidae	1989	Widespread
Dipogon subintermedius	Hymenoptera: Pompilidae	2004	Local
Crossocerus cetratus	Hymenoptera: Sphecidae	1986, 1989, 2004	Local
Crossocerus dimidiatus	Hymenoptera: Sphecidae	1984	Widespread
Crossocerus megacephalus	Hymenoptera: Sphecidae	1988, 1989	Local
Crossocerus podagricus	Hymenoptera: Sphecidae	1989	Local
Crossocerus quadrimaculatus	Hymenoptera: Sphecidae	2004	Local
Ectemnius cavifrons	Hymenoptera: Sphecidae	1989	Widespread
Ectemnius cephalotes	Hymenoptera: Sphecidae	1989, 2004	Local
Ectemnius ruficornis	Hymenoptera: Sphecidae	1989	Nationally Scarce
Passaloecus corniger	Hymenoptera: Sphecidae	1984, 2004	Local
Pemphredon lugubris	Hymenoptera: Sphecidae	1989	Local
Stigmus solskyi	Hymenoptera: Sphecidae	2004	Local
Vespa crabro	Hymenoptera: Vespidae	1984, 1986, 2004	Local
Chelostoma florisomne	Hymenoptera: Megachilidae	1986	Local

3.4.1 Solitary wasps

Solitary wasps are especially notable at Calke Park, with sixteen species recorded so far. One of these, the digger wasp *Ectemnius ruficornis*, has nationally scarce status and was recorded here in 1989 by D. Whiteley. Like most of the wasps it only uses deadwood as a location for its nest burrows. It stocks its nests with hoverflies and other Diptera.

Solitary wasps were widespread and plentiful in Calke Park during the 2004 survey work, and at least seven species were identified of which four are new to the site list. This strongly suggests that further species are present and await discovery. Digger wasps (Sphecidae), ruby-tailed wasps (Chrysididae) and spider-hunting wasps (Pompilidae) were all prominent in association with open-grown trees with well-lit trunks.

3.4.2 False scorpions

Two species of false scorpion were found to be widespread in decaying wood in Calke Park during 2004: *Chernes cimicoides* and *Lamprochernes chyzeri*. Both are widespread in places with concentrations of large old open-grown trees in southern and eastern Britain, extending into the north Midlands. The Red Data Book species *Dendrochernes cyrneus* must be a possibility at Calke as it is well known in Sherwood Forest, but none could be found.

3.4.3 Snakeflies

The four British species of snakefly have larvae which feed on other invertebrates within decaying wood. Larvae are regularly to be found in Calke Park but so far only one adult has been found and identified: *Phaeostigma notata* in 1986, a widespread species across southern and eastern Britain.

4 The epiphyte fauna

The 2004 survey has demonstrated that Calke Park also supports a diverse epiphyte invertebrate assemblage. There is an excellent variety of bark flies (Psocoptera) – species which feed on the micro-flora encrusting bark and foliage. Fifteen species were noted from the year's recording. The national status of individual Psocoptera has not been formally assessed but one of the species concerned is scarce nationally and locally - *Loensia variegata* – and others are local species. Sites rich in species tend to be the same historic parklands and old wood pastures which are rich in old growth wood-decay invertebrates.

The tree trunks with a good sunny aspect within the park also support a large population of the uncommon jumping spider *Sitticus pubescens* as well as *Salticus cingulatus*, reflecting the variety of prey invertebrates active within the site.

5 Compartment description, habitat quality & condition assessment

5.1.1 Compartment 1a (deer enclosure north)

This area has a unique character within Calke Park. Mature and overmature oaks of a mainly high forest form occupy the western third and the central area is an open plain. More open-

grown form oaks are supporting the nationally scarce beetle *Phloiophilus edwardsi* which develops in the dead lower canopy branches on the trees. The close-cropped grassland includes scattered clumps of bracken. Standing dead oak trunks and fallen deadwood contribute to a rich wood-decay environment, and the open south-facing aspect makes it the most arid area of the park, favouring warmth-loving invertebrates, especially solitary wasps and jumping spiders. A specimen of what appears to be the Red Data Book doly fly *Medetera melancholica* was found on one such standing oak trunk.

Old horse chestnuts along the upper northern slopes are being hollowed by the fungus *Ganoderma adspersa* and offer diverse wood-decay habitats.

Mature beeches immediately above China House Pond are of special interest as one of the beeches is hollowing and supports a colony of the rare click beetle *Procraerus tibialis* – a species which is otherwise only known in Derbyshire from Kedleston Park and for which Sherwood Forest has been the northernmost British locality. Dead adults and fragments were found amongst debris accessible through a long narrow cavity in the trunk.

New plantings in individual tree cages are a strong feature of this area and are not as overcrowded as seen in other areas. Care will be needed however to ensure that they do not suffer from canopy competition to the extent that their form becomes less useful to wood-decay invertebrates.

Overall the condition of this area appears good for wood-decay interests. The more extreme grazing conditions caused by the enclosed deer herd are unrepresented elsewhere in the park and so this area caters for a specialist warmth-loving fauna. Such heavy grazing would be damaging if it extended throughout the parkland but, where confined to a single Compartment, it contributes additional structural variety.

Summary
Quality: High.
Condition: Favourable.

5.1.2 Compartment 1b

The slopes above Mere Pond include many ancient trees including native lime as well as oaks. Old limes have branches bored by the nationally scarce lime bark beetle *Ernoporicus caucasicus,* and the uncommon longhorn beetle *Pogonocherus hispidus* is also associated. Johnson (1986) reported the lime bark beetle in this area too. The lime blossom also attracts the uncommon leaf beetle *Orsodacne cerasi* which is thought to develop in the leaf petioles of hawthorn and other trees and shrubs in base-rich districts. The ancient oaks are supporting a wide variety of uncommon wood-decay beetles including the longhorn beetles *Phymatodes testaceus* and *Leiopus nebulosus*

Another feature of this compartment is an ancient oak which is enveloped within a developing hardwood plantation. Canopy competition from neighbouring trees is a big issue here and regular haloing and thinning will be need in order to conserve this tree.

Young oaks in individual tree cages are scattered though much of the compartment. Many are at 6m spacing and too close to each other to form open-grown trees. The numbers are overall

too great and will result in a dense even-aged high forest area of limited value for wood-decay invertebrates unless heavily thinned in the near future.

Bracken is an issue and is being managed by a cutting regime. Bramble is also developing but this is a valuable feature at the present levels, enabling natural regeneration of oak and other trees naturally protected from browsing. Oak and hawthorn seem to be regenerating well.

Summary
Quality: High.
Condition: Favourable.

5.1.3 Compartment 2a

This compartment continues the area of important ancient trees along the steep slopes above Mere Pond from Cpt 1b. Ancient native limes are an important feature again and some at least support the nationally scarce lime bark beetle *Ernoporicus caucasicus*. Johnson (1986) reported the lime bark beetle in this area too. Many of the ancient oaks are accompanied by old elder bushes which provide important sources of nectar and pollen for oak wood-decay beetles. Open-grown hawthorns support the uncommon twig-boring weevil *Magdalis ruficornis*.

Ancient oaks along the upper slope include what is believed to be the oldest oak in the park and has been named the Old Man of Calke.

Bracken is an issue here and is being cut where accessible to machinery.

Summary
Quality: High.
Condition: Favourable.

5.1.4 Compartment 2b

Compartment 2b contains a few important trees but is largely open grassland. The ancient oaks support breeding populations of the uncommon beetle *Xestobium rufovillosum*.

A sycamore tree with collapsed canopy in situ had well-developed fruiting of the bracket fungus *Polyporus squamosus* which was attracting the uncommon fungus beetle *Pseudotriphyllus suturalis*.

Summary
Quality: High.
Condition: Unfavourable.

5.1.5 Compartment 2c

A large open area of semi-natural grassland with trees largely concentrated along the northern side, especially mature high forest form beeches. One ancient beech in this belt has a hollowed trunk and a collapsed top. The interior shows signs of fire. It is grazed in autumn and early winter by longhorn cattle together with Cpts 1b and 2a.

Summary
Quality: High.
Condition: Unfavourable.

5.1.6 Compartment 3a (The Rookery)

The Rookery is one of the most important areas of Calke Park for nature conservation and is a key area of the NNR. It contains a major concentration of ancient oaks and hawthorns together with a large number of associated invertebrates, especially Red Data Book and nationally scarce species. The most notable finds in 2004 were the rare *Aplocnemus nigricornis, Lymexylon navale* and rare blue form of *Conopalpus testaceus*, as well as other nationally scarce species such as *Aderus oculatus*, *Agrilus laticornis*, *Ischnomera cyanea*, *Megatoma undata*, *Phloiophilus edwardsi*, and *Prionychus ater*. One oak tree with a major split and collapse has recently supported a large colony of the oak jewel beetle *Agrilus biguttatus*, a Sherwood Forest speciality which has been expanding its range in Britain in recent decades. Interestingly Johnson (1986) reported no rarities from this area.

The trees here are especially good for barkflies living on their boughs and a wide variety of species were noted, including the scarce *Loensia variegata*.

The unimproved grassland is left to grow tall and structurally varied during the summer months and this favours the uncommon humpback fly *Paracrocera orbiculis* a speciality of open semi-natural vegetation with a good aerial component which favours the spiders in which the larvae develop. The species is largely southern in distribution and uncommon this far north.

Summary
Quality: High.
Condition: Favourable.

5.1.7 Compartment 3b (trackside from Serpentine Wood to Middle Park

This small enclosure includes a number of important trees and the grassland appears largely semi-natural and undamaged by agricultural practices. The trees include a large ancient open-grown oak , and ancient alder along a small stream and an area of mature high forest form oaks of about 2m girth.

The single most important feature is the ancient oak. This is being undermined by rabbit burrows and fallen branchwood has been cut and stacked in the past. The trunk is excellent for web-cavities and larvae of the uncommon cobweb beetle *Ctesias serra* are abundant. There is also the lying hulk of another ancient tree on the slope below.

Summary
Quality: High.
Condition: Favourable.

5.1.8 Compartment 4 (west side of road in Deer's Cote Spinney)

This area combines mature high forest form oaks and older ancient oaks with some open areas. The gaps have been planted up in the past but most have fortunately failed. An open structure is desirable here in order to favour wood-decay interests.

Oak deadwood in this area was found to support the uncommon wood-decay beetle *Cerylon histeroides*.

Summary
Quality: High.
Condition: Favourable.

5.1.9 Compartment 5 (Deer's Cote Spinney)

Deer's Cote Spinney is one of the most important areas of Calke Park for nature conservation and is a key area of the NNR. It contains a major concentration of ancient oaks and hawthorns together with a large number of associated invertebrates, especially Red Data Book and nationally scarce species. Species noted in 2004 include the nationally scarce *Aderus oculatus*, *Phloiophilus edwardsi*, and *Quedius xanthopus*. This was found to be an important area by Johnson (1986) too and he reports the following rarities: *Abraeus granulum*, *Aeletes atomarius* and *Micridium halidaii*, none of which were found during 2004.

The combination of large amounts of large deadwood in an open sunny environment makes this a valuable area for solitary wasps. The spider-hunting wasp *Dipogon subintermedius* was present in good numbers in this compartment. The uncommon ruby-tailed wasp *Trichrysis cyanea* was also present together with the more widespread *Chrysis ignita*. One relatively young American red oak has been colonised by the uncommon decay fungus *Ganoderma resinaceum*. The brackets of this fungus provide important habitat for beetles including the unusual *Palorus subdepressus*.

The trees here are especially good for barkflies living on their boughs and a wide variety of species were noted, including the scarce *Loensia variegata*.

The pasture is largely semi-natural with much bracken. An interesting find here is the hunchback fly *Paracrocera orbiculus*, a speciality of open semi-natural vegetation with a good aerial component which favours the spiders in which the larvae develop. The species is largely southern in distribution and uncommon this far north.

Tree-planting has been carried out in areas in recent years, at 3m spacing in places, and these need thinning out before their form is affected by crown competition.

An area in the westernmost corner is very nutrient enriched (due to dredgings from the pond during 1969/70/71 according to Bill Cove), however, with much nettle developing now that bracken has been reduced by spraying.

Summary
Quality: High.
Condition: Favourable.

5.1.10 Compartment 6a (slopes above south side of Thatch House Pond)

The key find in this compartment is a collapsed old ash tree at the west end, the stump of which was supporting a colony of the nationally scarce ambrosia beetle *Hylecoetus dermestoides* together with its specialist predator the Red Data Book darkling beetle *Corticeus unicolor*. The latter is a Sherwood Forest speciality in Britain with few records away from that forest, with Hardwick Park the only other known Derbyshire locality.

An ancient lime tree is supporting a population of the nationally scarce lime bark beetle *Ernoporicus caucasicus*. Close by is an ancient field maple.

An old beech snag above the path from Betty's Pond Weir has extensive development of the bracket fungus *Ganoderma adspersa* and collapsed boughs left *in situ*. The boughs are being used by a large population of the uncommon false scorpion *Chernes cimicoides* which feeds on other small invertebrates beneath loose bark and in crevices in the wood.

The line of old horse chestnuts along the brow above Thatch House Pond potentially provides good habitat for wood-decay invertebrates, particularly Diptera. Some at least have been colonised by the important wood-decay fungus *Ganoderma adspersa*. One felled trunk section - left presumably as a rustic seat along the path-side – has been colonised by the nationally scarce ambrosia beetle *Hylecoetus dermestoides* and is therefore a potential site for the Red Data Book darkling beetle *Corticeus unicolor*.

Summary
Quality: High.
Condition: Favourable.

5.1.11 Compartment 6b

This is the large plain west from the main car park and includes a small number of important trees.

An ancient oak isolated out in the central plain supports the uncommon heartwood boring beetle *Xestobium rufovillosum* as well as nesting digger wasps (Sphecidae). A new oak has been planted just 3m from its base, within the drip-line of the ancient tree. While it is acknowledged that this was planted as a commemorative tree and as a future replacement tree for the ancient oak, if allowed to remain it will eventually kill the ancient oak through over-shading unless pollarded

An old sycamore just by the car park wall has the interesting feature of secondary hollowing of the heartwood and two species of heartwood decay fungi were fruiting from it this season: *Ganoderma adspersa* and *Polyporus squamosus*. The *Polyporus* brackets were attracting large numbers of the uncommon fungus beetle *Pseudotriphyllus suturalis* as well as other beetles.

Summary
Quality: Moderate.
Condition: Unfavourable.

5.1.12 Compartment 7 (margins of Betty's Pond)

This area was not investigated specifically, survey being concentrated in either Cpt 3 to the north or Cpt 5 to the south.

Summary
Quality: High.
Condition: Favourable.

5.1.13 Compartment 8 (margins of Thatch House and Mere Ponds)

This area was not investigated specifically, survey being concentrated in either Cpts 1b and 2a to the north or Cpts 6a and 12a to the south. The rare beetle *Cyanostolus aeneus* was found in wood lying in the ponds by both Johnson and Drane in 1986.

Summary
Quality: High.
Condition: Favourable.

5.1.14 Compartment 9 (Ticknell Park/Smarts Park)

Although dominated by the Lime Avenue, the nature conservation interest of this parkland area lies more with large open-grown parkland trees and hawthorns, and especially the concentration of old ash trees along its western flank. It was being grazed by cattle during the survey.

The west side (Cpt 9b) especially has important old ashes, oaks and hawthorns. This compartment, together with Cpt 15, holds the largest concentration of old ash trees in the survey area. These are being hollowed by the bracket fungus *Inonotus hispidus* which is supporting a population of the nationally scarce beetle *Orchesia micans*, which develops in the fruiting body of the fungus. A larva of a predatory stiletto fly (Therevidae) – assumed to be *Thereva nobilitata* - was also present and is presumably feeding on the beetle larvae. Fallen branches have been cleared away. An ancient field maple beneath a mature beech on the south-west corner of the pool is an important feature and merits some sensitive opening up of the beech canopy above for more light. Old hollies along the western side of the narrowing north area provide valuable nectar and pollen for insects. An old sweet chestnut held the uncommon cobweb beetle *Ctesias serra* and the false scorpion *Chernes cimicoides*. Hawthorn blossom was attracting the nationally scarce beetle *Ischnomera cyanea* and the uncommon hoverfly *Criorhina floccosa*.

The Lime Avenue (Cpt 9a) appears to be being managed sensitively. A fallen and uprooted tree has been re-erected and the crown reduced, and is responding well. Another has been largely cleared away but the main trunk left in situ. Although the native limes along the main valley within the NNR support an important population of the nationally scarce lime bark beetle *Ernoporicus caucasicus*, no signs of this beetle's activity have been found in the lime avenue. The old trees of the lime avenue have the potential to support important wood-decay habitats for invertebrates and the trees merit special nature conservation management. A long-term programme of crown reduction, to rejuvenate the old limes, may be advisable in order to retain this feature without loss of trees.

Summary
Quality: High.
Condition: Favourable.

5.1.15 Compartment 10 (Lodge Plantation)

The oldest trees in Lodge Plantation are ash and horse chestnut, plus a few sweet chestnut. There are also younger oak, hornbeam, and sycamore as well as elder and hawthorn. Johnson (1986) reported finding important wood-decay beetles here in beech and oak timber, most notably *Abraeus granulum* and *Mycetophagus populi*. It is clear from the composition of this area that this important timber had been dumped here after having been removed from elsewhere in the open parkland as part of tidying operations.

The ashes are being hollowed by the heartwood decay fungus *Inonotus hispidus* and the fungal brackets are supporting a population of the nationally scarce beetle *Orchesia micans*. An old hornbeam which overhangs the open parkland to the west has been colonised by a longhorn beetle with *Phymatodes* type larvae, possibly the rare *P. alni*.

Summary
Quality: High.
Condition: Favourable, declining.

5.1.16 Compartment 11 (Serpentine Wood)

This area of shelterbelt style plantation was not found to hold any species of interest during the survey period. Johnson (1986) reported finding important wood-decay beetles here in beech and oak timber, most notably *Abraeus granulum* and *Aeletes atomarius*. It seems likely that much of this important timber had been dumped here after having been removed from elsewhere in the open parkland as part of tidying operations.

Summary
Quality: Moderate.
Condition: Favourable, although uninspiring.

5.1.17 Compartment 12 (deer enclosure south)

The deer enclosure includes two section of parkland to the south of China House (12a) and Little Dogkennel Ponds (12b).

12a includes two ancient trees of great nature conservation importance. An oak, by the track above the pond, has extensive red-rotten heartwood and hollowing as well as well-developed web cavities under the trunk bark. A collapsed major bough lies alongside. An ash has largely lost its canopy and the trunk is hollowed and fragmented but the tree is live and vigorous. The uncommon cobweb beetle *Ctesias serra* and the ash bark beetle *Hylesinus crenatus* are associated. A top-collapsed ancient common lime on a steep bank above Mere Pond is being decayed by *Ganoderma aspersa* and the white-rotting heartwood has been colonised by lesser stag beetle *Dorcus parallelepipedus*. The trunk includes cavities which have been used by nesting jackdaws, creating inaccessible nest debris habitat of potential interest for wood-decay invertebrates.

The centre of this compartment has a group of large old horse chestnut trees with an ancient hollow sycamore in the centre. These trees provide valuable rot-holes for invertebrates, especially Diptera.

The far upper south-eastern area of 12b includes a group of ancient sweet chestnut trees with exposed heart-rot. Old sawn trunk sections are stacked amongst them, and a young birch tree has become established through being protected from deer browsing amongst the debris. The uncommon cobweb beetle *Ctesias serra* is associated.

Summary
Quality: High.
Condition: Unfavourable.

5.1.18 Compartment 13 (Middle Park)

This section is dominated by the large open area of grassland variously used for events and car parking, but the area does have significant interest: the fenced-out western fringe (13a), a wooded section at the southern end (13b) and a few valuable old trees lie along its eastern edge (13c).

The fenced area (13a) contains some older oak trees, developing young open-grown oaks, and scattered open hawthorns, amongst rank grasses and developing bramble patches. This area is currently good structurally but will eventually thicken up, with consequent loss of its present open structure and open-grown form trees and hawthorns. The ideal management would be to open it up periodically to maintain its open parkland structure.

Cpt 13b is a valuable area where fallen deadwood has been left *in situ* to a good extent, although there are signs of past chainsaw activity and stacking of cut wood. Mainly a stand of high forest form mature oaks, with a few old beech, a hawthorn and an old crab apple tree. A typical wood-decay fauna for a high forest stand, with the uncommon *Paromalus flavicornis*, *Stenagostus villosus* and *Scolytus intricatus* beetles. Cranefly larvae found in an old decayed beech stump have been kept for rearing.

In Cpt 13c, a substantial mature oak of about 4m girth (untagged) has lost a major bough but it has been removed.

Summary
Quality: Moderate.
Condition: Unfavourable.

5.1.19 Compartment 14 (enclosure east of Middle Lodge)

This compartment contains two features of nature conservation interest: a series of ancient sweet chestnuts inside the old park wall and a line of mature open-grown oaks cutting across the centre.

The chestnuts are hollowing and contain much red-rotten heartwood – an important habitat for wood-decay beetles. These trees have been badly damaged by bark-stripping in the past and one is now dead. No invertebrates of particular note were found but may well be present

deep within the trees. The uncommon beetle *Cerylon ferrugineum* was found in fallen branchwood.

The branch deadwood contains uncommon wood-decay invertebrates including the beetles *Stenagostus villosus* and *Scolytus intricatus*, and the awl-fly *Xylophagus ater*. One of the oaks has red-rotten heartwood exposed in an old lightning scar and the uncommon ground beetle *Laemostenus terricola* was found amongst debris within – this is a flightless species associated with nests and burrows of mammals and birds.

Summary
Quality: Moderate.
Condition: Unfavourable.

5.1.20 Compartment 15 (Wimsy Park)

This compartment, lying between Ticknall Limeyards and the parkland, was not in the brief and was only visited briefly, at the end of a day, as an exploration of its potential. Its key feature is the number of mature and older ash trees around a derelict building, but there are also a number of other open-grown old trees as well as much old hawthorn locally. A few of the ash have reached an ancient stage, with trunk hollowing and retrenched canopy. Amongst the other trees are ancient oak, alder and field maple trees. The potential for wood-decay invertebrates is high.

Summary
Quality: Moderate.
Condition: Favourable (very brief visit).

5.1.21 Compartment 16 (parkland south and south-west of mansion)

This large area of open parkland contains many important open-grown trees as well as areas of high forest form trees. The grassland appears to have high residual nutrient levels and there are large areas of nettle growth locally, although no fertiliser has been used since 1997, and before that only organic fertiliser was used - pers comm. B Cove).

A key find here has been the Red Data Book wood-decay hoverfly *Pocota personata* which was found in association with a mature beech tree with an open cavity full of waterlogged wood-rot and other debris – a potential larval site for this hoverfly. An elytron of rhinoceros beetle *Sinodendron cylindricum* found in this cavity also suggests that this beetle is developing within the decaying heartwood within. This tree also has old brackets of the scarce wood-decay fungus *Inonotus cuticularis*. This fungus also occurs on another beech close by.

The large old sycamore on the brow of the valley, close to the road, has an excellent looking decay cavity where a major bough has ripped out in the recent past – the fallen bough itself has disappeared. The heartwood decay fungus *Polyporus squamosus* was fruiting prolifically during autumn 2004 and was attracting large numbers of the uncommon fungus beetle *Pseudotriphyllus suturalis* as well as more widespread species such as *Pediacus dermestoides*, *Triplax aenea*, *Mycetophagus quadripustulatus*, *Tetratoma fungorum*, *Quedius cruentus* and a *Cryptophagus* sp. This is clearly a very valuable tree.

Veteran trees alongside the dry valley include an oak with the uncommon decay fungus *Grifola frondosa*.

The high forest form woodland along the southern fringes and close by the park gate is of special interest for the presence of the rare heartwood decay fungus *Ganoderma pfeifferi* fruiting near the base of a mature beech tree.

Cpt 16b is a small enclosure on the east side of the church and contains important parkland oak trees. One ancient oak has collapsed main boughs stacked at its base, although the lop and top has been removed. Cavities in the base of this tree reveal red-rotten heartwood debris and hollowing. Accumulated debris beneath bark on the collapsed limb contains the nationally scarce beetle *Prionychus ater*.

Summary
Quality: High.
Condition: Unfavourable.

5.1.22 Compartment 17 (tenanted land not in National Trust direct management control)

Compartment 17 comprises a series of enclosures within tenanted farmland between the parkland and Calke village, and includes Brickkiln and Church Plantations. It is of interest for a number of ancient oak trees, some old ash trees and various other younger trees, which are all of value for wood-decay invertebrates. The farming is very intensive and shows no sign of sympathy towards the nature conservation interest of old trees in the Calke Park area.

A small clump of trees in Cpt 17a is in seriously declining health; it lies immediately west of Brickkiln Plantation. There is just one remaining live oak and an ailing common lime amidst dense nettle. A number of wood-decay invertebrates are associated including the uncommon doly fly *Medetera diadema*, which develops beneath freshly dead bark on tree trunks.

Brickkiln Plantation (Cpt 17f) is a dark shady wood of mature oak, beech and ash over elder, bramble and exotic shrubs, and of limited interest in its present condition.

There are a small number of ancient open-grown field oaks in Cpts 17b, 17c and 17d as well as a few mature oak and ash in the field boundaries. The nationally scarce darkling beetle *Eledona agricola* is associated with its host chicken-of-the-woods fungus *Laetiporus sulphureus* on one ancient oak in 17c.

Cpt 17d is used for hay making and includes an ancient oak inside its south-eastern edge. The tree is being hollowed by *Ganoderma adspersa* and the uncommon *G. resinaceum*. Older brackets of this fungus had been broken off from the trunk.

Summary
Quality: High.
Condition: Unfavourable.

5.1.23 Compartment 18 (west of Calke village) (tenanted land not in National Trust direct management control)

Compartment 18 includes a concentration of ancient open-grown oaks, probably left from former hedgerows. The north-west corner has a lying decaying ash trunk with its white-rotted heartwood occupied by lesser stag beetle *Dorcus parallelepipedus*.
Quality: High.
Condition: Unfavourable.

5.1.24 Compartment 19 (Home Farm enclosures)

The Home Farm enclosures include a large number of field and former hedgerow trees and including a few ancients. A good variety of wood-decay invertebrates are associated and of special interest here is the presence of the nationally scarce fungus beetle *Triplax russica*, probably developing here in brackets of *Inonotus hispidus* on the ash trees, although the one adult found was feeding at oyster fungus *Pleurotus* sp on a fallen sycamore trunk by the old quarry. This beetle is more usually associated with *Fomes* on birch in the Sherwood Forest area but this fungus has not been recorded at Calke – it is associated with *I. hispidus* on ash across southern England.

A large stump of a collapsed ash tree is supporting a population of the uncommon rhinoceros beetle *Sinodendron cylindricum*. Another ash close to the park wall has lost its main canopy (which has been removed) and the still live remaining trunk is being hollowed by *Inonotus hispidus*. Heartwood decay debris contains the nationally scarce beetle *Prionychus ater*.

A dead standing sweet chestnut appeared to have been killed by bark-stripping from livestock. The remaining bark on the trunk had been bored by the uncommon long-horn beetle *Phymatodes testaceus* which occurs in oaks elsewhere in the park.

Summary
Quality: High.
Condition: Unfavourable.

6 Index of Ecological Continuity and Species Quality Index for Coleoptera

Two systems have been devised for the relative assessment of site quality for nature conservation using saproxylic beetles: the Index of Ecological Continuity (revised in Alexander, 2004) and the Saproxylic Quality Index (Fowles, Alexander & Key, 1999).

6.1 Index of Ecological Continuity

The Index of Ecological Continuity has been used to identify Britain's most important sites for the saproxylic invertebrates of ancient trees and wood-pasture type habitats, and a hierarchical site table has been presented, ranking sites in order of importance (Table 5). The Index calculation is based on the presence or absence of a select list of beetle species (revised by Alexander, 2004). The species are graded according to their degree of association with Britain's remaining areas of old growth – mainly the old wood pastures and historic

parklands - and these grades are used as the basis for a scoring system. The total of these scores provides the Index.

The species in the qualifying list include many which are difficult to find on demand and so the Index may be built up over a number of years. Records from earlier recording therefore contribute to the Index. A control on old records is however imposed, with only post-1950 records being used in the calculation.

Experience has suggested that sites of national importance have an IEC in the range of 25-80 while IEC values of 15-24 are of regional importance (Alexander, 2004). Sites in excess of 80 are considered to be of European significance.

Table 4 lists the IEC qualifying species recorded from Calke Park.

Table 4 List of saproxylic Coleoptera qualifying for the Index of Ecological Continuity

Species	**Family**	**Dates**	**Status**	**IEC**
Plegaderus dissectus	Histeridae	1986	Nationally Scarce B	2
Abraeus granulum	Histeridae	1986	Nationally Scarce A	1
Aeletes atomarius	Histeridae	1986	RDB3	1
Ptenidium gressneri	Ptiliidae	1986	Nationally Scarce B	2
Micridium halidaii	Ptiliidae	1986	RDBK	1
Quedius maurus	Staphylinidae: Staphylininae	1986		3
Quedius microps	Staphylinidae: Staphylininae	1986	Nationally Scarce B	3
Quedius scitus	Staphylinidae: Staphylininae	1986	Nationally Scarce B	2
Quedius xanthopus	Staphylinidae: Staphylininae	2004	Nationally Scarce B	3
Bibloporus minutus	Pselaphidae	1986	Nationally Scarce B	2
Prionocyphon serricornis	Scirtidae	1995	Nationally Scarce B	3
Melasis buprestoides	Eucnemidae	1989	Nationally Scarce B	3
Stenagostus rhombeus	Elateridae	1984, 1986, 2004		3
Procraerus tibialis	Elateridae	2004	RDB3	1
Xestobium rufovillosum	Anobiidae	1986, 2004		3
Dorcatoma chrysomelina	Anobiidae	1986		3
Dorcatoma flavicornis	Anobiidae	2004	Nationally Scarce B	3
Dorcatoma serra	Anobiidae	1986	Nationally Scarce A	2
Hylecoetus dermestoides	Lymexylidae	1986, 2004	Nationally Scarce B	3
Lymexylon navale	Lymexylidae	1989, 2004	RDB2	2
Phloiophilus edwardsi	Phloiophilidae	1989, 2004	Nationally Scarce B	3
Tillus elongatus	Cleridae	1989	Nationally Scarce B	3
Thanasimus formicarius	Cleridae	1995, 2004		3
Korynetes caeruleus	Cleridae	1986	Nationally Scarce B	3
Aplocnemus nigricornis	Melyridae	2004	Nationally Scarce A	2
Pediacus dermestoides	Cucujidae	1986, 2004		3
Triplax russica	Erotylidae	2004	Nationally Scarce B	3
Biphyllus lunatus	Biphyllidae	1989		3
Symbiotes latus	Endomychidae	1986	Nationally Scarce B	3
Enicmus rugosus	Lathridiidae	1986	Nationally Scarce B	2
Corticaria alleni	Lathridiidae	1986	Nationally Scarce B	1
Pseudotriphyllus suturalis	Mycetophagidae	1986, 2004		3
Triphyllus bicolor	Mycetophagidae	1984	Nationally Scarce B	2
Mycetophagus atomarius	Mycetophagidae	1986		3
Mycetophagus piceus	Mycetophagidae	1989	Nationally Scarce B	2
Mycetophagus populi	Mycetophagidae	1986	Nationally Scarce A	2

Species	Family	Dates	Status	IEC
Melandrya caraboides	Melandryidae	1986	Nationally Scarce B	3
Conopalpus testaceus	Melandryidae	1986, 2004	Nationally Scarce B	3
Bitoma crenata	Colydiidae	1984, 1986, 1995, 2004		3
Eledona agricola	Tenebrionidae	1989, 2004	Nationally Scarce B	3
Corticeus unicolor	Tenebrionidae	2004	RDB3	2
Prionychus ater	Tenebrionidae	1986, 2004	Nationally Scarce B	3
Mycetochara humeralis	Tenebrionidae	1989	Nationally Scarce A	2
Ischnomera cyanea	Oedemeridae	1986, 2004	Nationally Scarce B	3
Aderus oculatus	Aderidae	1986, 2004	Nationally Scarce B	3
Anaspis septentrionalis	Scraptiidae	1988, 2004	RDBI	1
Phymatodes testaceus	Cerambycidae	1986, 2004		3
Platyrhinus resinosus	Anthribidae	1989	Nationally Scarce A	3
Trypodendron domesticum	Scolytidae	1986, 2004		3
Ernoporus caucasicus	Scolytidae	1986, 2004	Nationally Scarce A	2
Xyleborinus saxeseni	Scolytidae	1986		3

The calculated Index of Ecological Continuity for Calke Park presently stands at 76. While falling slightly short of the currently recommended 80 for European significance, it does place Calke Park as the eleventh most important site in Britain for saproxylic beetles and the second only to Sherwood Forest (with an IEC of 100) in the northern half of Britain. Only one other site of this quality for old growth communities is in the care of the National Trust, Hatfield Forest in Essex. Table 5 lists the top scoring British sites for the Index.

It is also relevant that the wider Calke estate does include a number of qualifying species which have so far not been found in the park itself but almost certainly occur there. *Anitys rubens* has been found in a hedgerow oak at Southwood House Farm, while Drane (1982) reports the presence of *Silvanus unidentatus*, *Lathridius consimilis* and *Ernoporicus fagi* in South Wood. The incorporation of these records into the Calke Park list results in an IEC of 84, which is beyond the threshold for European significance, and raises Calke to seventh place in GB importance.

Table 5 Index of Ecological Continuity figures above 65 (from Alexander, 2004)

Site	Site status	IEC
Windsor Great Park & Forest	SSSI	249
New Forest	SSSI	194
Moccas Park	NNR	125
Bredon Hill	NNR (part)	120
Sherwood Forest	SSSI	100
Epping Forest	SSSI	97
Calke Abbey Estate	*NNR (part)*	*84*
Burnham Beeches	SSSI	83
Richmond Park	SSSI	83
Hatfield Forest	NNR	78
Calke Park	*NNR (part)*	*76*
Ashtead Common	NNR	72
Hatchlands Park	not designated	72
Chirk Castle Park	SSSI	67
Knole Park	SSSI	67

6.2 Saproxylic Quality Index

The Saproxylic Quality Index (Fowles and others 1999) is a more recent development designed to take the whole saproxylic beetle fauna into account and to include some control of recording effort. The species are scored according to the level of their national status and on a geometric scale – from 1 point for common species through to 32 points for the rarest. The total of these scores is termed the Species Quality Score and the Species Quality Index is calculated by dividing this score by the number of qualifying saproxylic species recorded and then multiplying the result by one hundred.

The SQI calculation has certain provisos:

- a threshold of 40 qualifying species have been recorded from the site;
- the list should be complete, ie include all qualifying species recorded during surveys;
- the same attention should have been applied to recording common species as rare ones.

Table 6 provides the full list of saproxylic beetles known from Calke Park and indicates their values in the calculation of the SQI.

Table 6 Full list of saproxylic Coleoptera known from Calke Park indicating their values as used in the calculation of the Site Quality Index

Species	Family	Dates	Status	SQI
Plegaderus dissectus	Histeridae	1986	Nationally Scarce B	8
Abraeus perpusillus (globosus)	Histeridae	1986		4
Abraeus granulum	Histeridae	1986	Nationally Scarce A	8
Aeletes atomarius	Histeridae	1986	RDB3	16
Paromalus flavicornis	Histeridae	1984, 1986, 2004		2
Nossidium pilosellum	Ptiliidae	1986	Nationally Scarce B	8
Ptenidium gressneri	Ptiliidae	1986	Nationally Scarce B	8
Micridium halidaii	Ptiliidae	1986	RDBK	16
Ptinella aptera	Ptiliidae	1986		2
Pteryx suturalis	Ptiliidae	1986		2
Anisotoma humeralis	Leiodidae	1986, 2004		2
Anisotoma orbicularis	Leiodidae	1986		2
Agathidium nigrinum	Leiodidae	1986		2
Agathidium rotundatum	Leiodidae	1986		2
Agathidium seminulum	Leiodidae	1986		2
Agathidium varians	Leiodidae	1986		2
Scaphisoma agaricinum	Staphylinidae: Scaphidiinae	1986		2
Acrulia inflata	Staphylinidae: Omaliinae	1986		2
Dropephylla ioptera	Staphylinidae: Omaliinae	1986		1
Dropephylla vilis	Staphylinidae: Omaliinae	1986		1
Hapalaraea pygmaea	Staphylinidae: Omaliinae	1986		2
Phloeonomus punctipennis	Staphylinidae:	1986		2

Species	Family	Dates	Status	SQI
Siagonium quadricorne	Staphylinidae: Omaliinae	1984, 1986		2
Atrecus affinis	Staphylinidae: Piestinae	1986		1
Gabrius splendidulus	Staphylinidae: Staphylininae	1986		1
Quedius maurus	Staphylinidae: Staphylininae	1986		4
Quedius microps	Staphylinidae: Staphylininae	1986	Nationally Scarce B	8
Quedius scitus	Staphylinidae: Staphylininae	1986	Nationally Scarce B	8
Quedius xanthopus	Staphylinidae: Staphylininae	2004	Nationally Scarce B	4
Sepedophilus testaceus	Staphylinidae: Tachyporinae	1986	Nationally Scarce B	8
Gyrophaena angustata	Staphylinidae: Aleocharinae	1986	Nationally Scarce B	8
Gyrophaena fasciata	Staphylinidae: Aleocharinae	1986		8
Gyrophaena latissima	Staphylinidae: Aleocharinae	1986		2
Gyrophaena minima	Staphylinidae: Aleocharinae	1986		2
Homalota plana	Staphylinidae: Aleocharinae	1986		2
Anomognathus cuspidatus	Staphylinidae: Aleocharinae	1986		2
Leptusa fumida	Staphylinidae: Aleocharinae	1986		1
Bolitochara lucida	Staphylinidae: Aleocharinae	1986		2
Dinaraea aequata	Staphylinidae: Aleocharinae	1986		1
Dinaraea linearis	Staphylinidae: Aleocharinae	1986		2
Dadobia immersa	Staphylinidae: Aleocharinae	1986		2
Atheta liturata	Staphylinidae: Aleocharinae	1986		2
Phloeopora testacea	Staphylinidae: Aleocharinae	1986		1
Bibloporus bicolor	Pselaphidae	1986		2
Bibloporus minutus	Pselaphidae	1986	Nationally Scarce B	8
Euplectus bonvouloiri rosae	Pselaphidae	1986	Nationally Scarce B	8
Euplectus fauveli	Pselaphidae	1986	Nationally Scarce B	8
Euplectus karsteni	Pselaphidae	1986		2
Euplectus piceus	Pselaphidae	1986		2
Prionocyphon serricornis	Scirtidae	1995	Nationally Scarce B	8
Lucanus cervus	Lucanidae	F&D (1913)	Nationally Scarce B; Partially Protected Species (Sale & Exchange); BAP	

Species	Family	Dates	Status Priority Species	SQI
Dorcus parallelepipedus	Lucanidae	1986, 2004		2
Sinodendron cylindricum	Lucanidae	1984, 1986, 2004		2
Agrilus laticornis	Buprestidae	2004	Nationally Scarce B	8
Agrilus biguttatus	Buprestidae	2004	Nationally Scarce A	8
Melasis buprestoides	Eucnemidae	1989	Nationally Scarce B	4
Denticollis linearis	Elateridae	1984, 1986, 2004		1
Stenagostus rhombeus	Elateridae	1984, 1986, 2004		4
Ampedus balteatus	Elateridae	1986, 2004		2
Procraerus tibialis	Elateridae	2004	RDB3	16
Melanotus villosus	Elateridae	1984, 1986, 1995, 2004		1
Malthinus punctatus (flaveolus)	Cantharidae	2004		1
Malthinus frontalis	Cantharidae	1986	Nationally Scarce B	8
Malthodes minimus	Cantharidae	2004		1
Malthodes pumilus	Cantharidae	2004		2
Megatoma undata	Dermestidae	1986, 2004	Nationally Scarce B	8
Ctesias serra	Dermestidae	1984, 1986, 1995, 2004		4
Hedobia imperialis	Anobiidae	1986	Nationally Scarce B	8
Grynobius planus	Anobiidae	1986		2
Xestobium rufovillosum	Anobiidae	1986, 2004		4
Ernobius mollis	Anobiidae	1986		2
Hemicoelus fulvicornis	Anobiidae	2004		1
Anobium punctatum	Anobiidae	1986, 2004		1
Ptilinus pectinicornis	Anobiidae	1986, 2004		1
Dorcatoma chrysomelina	Anobiidae	1986		4
Dorcatoma flavicornis	Anobiidae	2004	Nationally Scarce B	8
Dorcatoma serra	Anobiidae	1986	Nationally Scarce A	16
Hylecoetus dermestoides	Lymexylidae	1986, 2004	Nationally Scarce B	4
Lymexylon navale	Lymexylidae	1989, 2004	RDB2	32
Phloiophilus edwardsi	Phloiophilidae	1989, 2004	Nationally Scarce B	8
Nemozoma elongatum	Trogossitidae	1986	RDB3	24
Tillus elongatus	Cleridae	1989	Nationally Scarce B	8
Thanasimus formicarius	Cleridae	1995, 2004		4
Korynetes caeruleus	Cleridae	1986	Nationally Scarce B	8
Aplocnemus nigricornis	Melyridae	2004	Nationally Scarce A	16
Dasytes aeratus	Melyridae	1986		2
Axinotarsus ruficollis	Melyridae	2004		4
Malachius bipustulatus	Melyridae	1986, 2004		1
Sphindus dubius	Sphindidae	1986	Nationally Scarce B	8
Aspidiphorus orbiculatus	Sphindidae	1986		2
Epuraea pallescens (florea)	Nitidulidae	1986		2
Epuraea silacea (deleta)	Nitidulidae	1986		1
Rhizophagus bipustulatus	Rhizophagidae	1986, 2004		1
Rhizophagus cribratus	Rhizophagidae	1989		2
Rhizophagus dispar	Rhizophagidae	1984, 1986		1
Rhizophagus parallelocollis	Rhizophagidae	2004		2
Rhizophagus perforatus	Rhizophagidae	2004		2
Cyanostolus aeneus	Rhizophagidae	1986	Nationally Scarce A	16

Species	Family	Dates	Status	SQI
Pediacus dermestoides	Cucujidae	1986, 2004		4
Cryptophagus dentatus	Cryptophagidae	1986, 2004		1
Cryptophagus labilis	Cryptophagidae	1986	Nationally Scarce B	8
Triplax aenea	Erotylidae	1984, 1986, 2004		2
Triplax russica	Erotylidae	2004	Nationally Scarce B	4
Dacne bipustulata	Erotylidae	1986, 2004		2
Dacne rufifrons	Erotylidae	1986		2
Biphyllus lunatus	Biphyllidae	1989		4
Cerylon ferrugineum	Cerylonidae	1984, 1986, 2004		2
Cerylon histeroides	Cerylonidae	1984, 1986, 2004		4
Mycetaea subterranea	Endomychidae	1986		2
Symbiotes latus	Endomychidae	1986	Nationally Scarce B	8
Endomychus coccineus	Endomychidae	1986		2
Orthoperus mundus	Corylophidae	1986		4
Enicmus rugosus	Lathridiidae	1986	Nationally Scarce B	8
Enicmus testaceus	Lathridiidae	1986		2
Corticaria alleni	Lathridiidae	1986	Nationally Scarce B	8
Pseudotriphyllus suturalis	Mycetophagidae	1986, 2004		4
Triphyllus bicolor	Mycetophagidae	1984	Nationally Scarce B	4
Litargus connexus	Mycetophagidae	2004		2
Mycetophagus atomarius	Mycetophagidae	1986		2
Mycetophagus multipunctatus	Mycetophagidae	1986, 2004		2
Mycetophagus piceus	Mycetophagidae	1989	Nationally Scarce B	4
Mycetophagus populi	Mycetophagidae	1986	Nationally Scarce A	16
Mycetophagus quadripustulatus	Mycetophagidae	1984, 1986, 2004		2
Octotemnus glabriculus	Ciidae	1986, 2004		1
Cis alni	Ciidae	2004		2
Cis bidentatus	Ciidae	1986		2
Cis boleti	Ciidae	1986, 2004		1
Cis fagi	Ciidae	1986		2
Cis hispidus	Ciidae	1986		4
Cis nitidus	Ciidae	1986, 2004		2
Cis vestitus	Ciidae	2004		2
Tetratoma fungorum	Tetratomidae	1986, 2004		2
Orchesia micans	Melandryidae	2004	Nationally Scarce B	4
Melandrya caraboides	Melandryidae	1986	Nationally Scarce B	4
Conopalpus testaceus	Melandryidae	1986, 2004	Nationally Scarce B	8
Bitoma crenata	Colydiidae	1984, 1986, 1995, 2004		4
Eledona agricola	Tenebrionidae	1989, 2004	Nationally Scarce B	4
Corticeus unicolor	Tenebrionidae	2004	RDB3	24
Prionychus ater	Tenebrionidae	1986, 2004	Nationally Scarce B	8
Mycetochara humeralis	Tenebrionidae	1989	Nationally Scarce A	16
Ischnomera cyanea	Oedemeridae	1986, 2004	Nationally Scarce B	4
Pyrochroa serraticornis	Pyrochroidae	1986		1
Rhinosimus planirostris	Salpingidae	1986, 2004		1
Rhinosimus ruficollis	Salpingidae	1986		1
Aderus oculatus	Aderidae	1986, 2004	Nationally Scarce B	8
Anaspis fasciata (humeralis)	Scraptiidae	1986, 2004		2
Anaspis frontalis	Scraptiidae	1986, 2004		1

Species	Family	Dates	Status	SQI
Anaspis rufilabris	Scraptiidae	1986, 2004		1
Anaspis septentrionalis	Scraptiidae	1988, 2004	RDBI	24
Stenocorus meridianus	Cerambycidae	1986, 1988		2
Grammoptera ruficornis	Cerambycidae	1986, 2004		1
Alosterna tabacicolor	Cerambycidae	1986, 1991		2
Strangalia maculata	Cerambycidae	1986		1
Phymatodes testaceus	Cerambycidae	1986, 2004		4
Clytus arietis	Cerambycidae	1986, 1988		1
Pogonocherus hispidus	Cerambycidae	2004		2
Leiopus nebulosus	Cerambycidae	1986, 2004		2
Stenostola dubia	Cerambycidae	1986, 1991	Nationally Scarce B	8
Tetrops praeusta	Cerambycidae	1989		2
Platyrhinus resinosus	Anthribidae	1989	Nationally Scarce B	4
Magdalis ruficornis	Curculionidae	2004		2
Phloeophagus lignarius	Curculionidae	1986, 2004		2
Hylesinus crenatus	Scolytidae	2004		2
Hylesinus varius	Scolytidae	2004		1
Scolytus intricatus	Scolytidae	1986, 2004		2
Dryocoetes villosus	Scolytidae	1986, 2004		2
Trypodendron domesticum	Scolytidae	1986, 2004		2
Ernoporus caucasicus	Scolytidae	1986, 2004	Nationally Scarce A	16
Xyleborinus saxeseni	Scolytidae	1986		4

The Calke list currently includes 168 qualifying species, which produce a Site Quality Score of 762 and a Site Quality Index of 453.

Fowles and others (1999) suggest that an SQI of 500 is probably an appropriate threshold for assessing national importance. Calke Park therefore falls below this provisional threshold for national importance. However, Fowles at al (1999) were unable to present data for more than 14 sites with an SQI of 500 or more and it does seem likely that the threshold is set too high. Many sites which are nationally famous for their saproxylic beetles have SQI figures in the 300s and 400s. The Calke Park figure of 453 compares well with sites such as Donington Park, Leicestershire (447), Clumber Park, Nottinghamshire (392) and Grimsthorpe Park, Lincolnshire (387). Sherwood Forest has a SQI of 502 based on only 82 recorded species. In fact only eight sites listed have a species count as high as Calke Park. Table 7 provides the data on all sites with an SQI of 400 or greater in Fowles and others (1999).

Table 7 Site Quality Index scores above 400 (from Fowles and others 1999)

Site	Site Status	Number of qualifying saproxylic species	Site Quality Index
Windsor Great Park & Forest	SSSI	365	847
Richmond Park, Surrey	NNR/SSSI	235	642
Moccas Park, Herefordshire	NNR/SSSI	241	638
Croome Park, Worcestershire	None	107	621
Epping Forest, Essex	NNR/SSSI	256	598
Abernethy Forest, E. Inverness	SSSI	144	591
Ashtead Common, Surrey	NNR/SSSI	222	585
Parham Park, W. Sussex	SSSI	65	581
Arundel Park, W. Sussex	SSSI	131	542
Box Hill, Surrey	SSSI	226	527
Dunham Park, Manchester	SSSI	151	513

Site	Site Status	Number of qualifying saproxylic species	Site Quality Index
Black Wood of Rannoch	SSSI	75	513
Forest of Bere, Hampshire	SSSI	109	505
Sherwood Forest	NNR/SSSI	82	502
Mersham Hatch Estate, Kent	SSSI	115	488
Lullingstone Park, Kent	SSSI	105	486
Camborne Woods, Cambs	none	40	477
Staverton Park, Suffolk	SSSI	106	473
Monks Wood, Cambs	NNR/SSSI	157	462
Duncombe Park Estate, N Yorkshire	NNR/SSSI	117	457
Calke Park, Derbyshire	SSSI	168	453
Donington Park, Leics	SSSI	80	447
Buddon Wood, Leics	SSSI	125	444
Buxted Park, E. Sussex	SSSI	136	420
Stanford PTA, Norfolk	SSSI	136	416
Cobham Park, Kent	SSSI	90	410

7 Evaluation of saproxylic habitat quality, condition assessment and recommendations for future management

Habitat quality and condition for saproxylic invertebrates depend on a wide variety of factors but key aspects are site history, the current tree population, and the matrix of pasture in which the trees occur. Management of the tree population is probably the single most important factor.

7.1 Site characteristics

Larger sites hold more trees on average and support the richest faunas, as demonstrated by the IEC and SQI methodologies, which have picked out the larger sites – the older surviving and least modified medieval forests, chases, parklands and other wood pastures. Basically, the larger the site and the more trees it holds, then the richer the fauna and its greater viability. Habitat continuity is also an important factor – those sites with a medieval history or where the site has maintained a population of old trees for hundreds of years are likely to have a much richer invertebrate fauna. Tree density also has an impact as open-grown trees are the key type of tree for saproxylic Coleoptera and many saproxylic Diptera. Also a diverse tree age structure is essential so that new habitat is always coming on for each species, whatever its requirements. A wider range of tree species will naturally provide greater opportunities for the fauna, and not just species closely associated with one or a few tree species – often via the tree host requirements of the invertebrate's actual fungal host; some invertebrates require large hollowing trunks and so cannot use smaller tree or shrub species. Non-native tree species can also have an important role in extending the quality and quantity of habitats available – this can be especially important where the non-native is a faster growing tree on a site with age structure problems in the native trees.

It follows then that large expanses of habitat with open-grown trees and a diverse age structure should be the priority for conservation action.

The IEC analysis suggests that the smallest viable sites lie in the 60-70ha size class (Harding & Alexander, 1993; Alexander and others 1996). Smaller sites which are species-rich are very uncommon and may not actually be viable in isolation. The SSSI at Calke encompasses 64.6ha whilst the NNR is slightly larger at 79.67ha. The present NNR boundary encompasses most of the highest quality habitat but it cannot be considered large enough to be viable for all of the key species known to be present.

The position of the NNR within the wider Calke Park (192ha) and the Calke Abbey Estate(886ha) - with their landscapes of old trees expanding outwards from the NNR - needs to be recognised and it is recommended that all of this land is managed sympathetically for saproxylic invertebrates and other aspects of nature conservation, and its tree populations actively conserved.

It is further recommended that the SSSI boundary be expanded to encompass areas deemed to be of special scientific interest covered by the 2004 survey –providing a protected buffer zone to the NNR. This would provide a zoned expanse of high quality habitat with an area of special conservation importance within the central core of the legally protected area. **The National Trust should be invited to establish such a zoned plan, in discussion with English Nature, in advance of any changes in the designated boundaries**.

7.2 Land management

Some of the greatest threats to tree health and survival arise from the management of the land in which the tree stands, especially through activities which impact upon the root systems and the important mycorrhizal fungal connections.

In a site of such great nature conservation importance as Calke Park, nature conservation should have priority over other objectives.

An extensive grazing regime is essential to maintain the structure of the wood pasture habitat, at Calke, as elsewhere. Mechanical management is not a good substitute as it is incapable of interacting with the vegetation with the same precision, but it can be valuable to supplement the impacts of the livestock where necessary. The key issues widely applicable in wood pasture and parkland sites are detailed below (Read, 2000):

- relatively low stocking levels, to maintain vegetation structural diversity and to promote natural recruitment of open-grown trees and shrubs;
- careful choice of livestock, to avoid animals which:
    - congregate beneath tree canopy – causing soil compaction and nutrient enrichment over the roots,
    - damage tree bases by gnawing and kicking;
- avoid the routine use of antibiotics or other veterinary formulations, the residues of which in dung and urine might damage tree roots and mycorrhizal fungi;
- place any water troughs, supplementary feeds, etc, well away from any trees, providing supplementary shelter where necessary;
- avoid applications of fertilisers, farmyard manure, slurry, lime, etc, which each have detrimental impacts on tree health and associated communities;

- no other pasture management practices which are designed to improve grazing for the livestock, such as topping, which encourages grass growth at the expense of other plants, and involves the use of cutting vehicles over tree roots;
- no removal of boughs to facilitate vehicle access beneath canopies.

On balance, larger and heavier livestock – particularly beef cattle – create the better habitat mosaic for wood pasture interests, although combinations of cattle and sheep can be suitable too.

It is therefore recommended that the livestock grazing management is kept as extensive as possible throughout the parkland at Calke, and that agricultural practices – as outlined above – are not permitted. It has been demonstrated that managing the land and livestock in-hand (as is currently practiced in Calke Park - see below) is the most effective way of achieving good conservation practice (see *Livestock Grazing in National Trust Parklands*, by Cox & Sanderson, 2001).

The main expanse of parkland at Calke is currently grazed as one unit – ie Cpts 4, 5, 6, and 16a – using sheep and summer longhorn cattle. Cpt 5 (Deer's Cote Spinney) is fenced out using electric fencing as and when thought necessary. The sheep used are a herd of 70+ Portlands, held in-hand by the Trust, as part of the historic interest of Calke Park, and these are supplemented by longhorn cattle and sucklers belonging to one of the Estate tenants (B. Cove, pers.comm.). This basic set-up is excellent overall and only local tweaking is considered necessary.

Much of this land outside of the present SSSI appears more nutrient-rich, although no fertiliser has been applied on the Trust-managed land since 1997, and before that only organic fertiliser has been used since 1985. There is a scarcity of trees, locally poor tree health and damage to some tree bases by livestock gnawing which can be symptomatic of damaged swards, damaged soils and damaged tree roots. **It is recommended that the management of these areas be reviewed – particularly stocking numbers.**

The main problems with agricultural practices lie within the tenanted land outside the park, where the National Trust does not have direct management control.

7.3 Tree management

The tree survey data needs to be analysed to elucidate the population dynamics of the tree population across the site. The 2004 veteran tree survey results suggested that there is a large age class gap amongst open-grown oaks in the mature phase, in particular. A detailed appraisal of the data is needed in order to ascertain the desirable tree recruitment rates, to examine to what extent these are currently being met, and to develop plans for encouraging natural regeneration, supplemented by planting where necessary. Natural regeneration should always be preferred to planting as it optimises tree establishment and subsequent health, in relation to soil biota, as well as ensures an open-grown form from the start. Collection of acorns and their distribution into suitable areas is good practice and should be considered. Establishment will be greatest where the trees are protected by thorn bushes.

It is therefore recommended that the tree and shrub population dynamics be investigated in the NNR and wider treescape, and be used to develop a tree recruitment

plan which favours natural regeneration wherever feasible. Tree recruitment planning should favour both open-grown trees and denser wooded areas.

Tree planting is currently carried out by National Trust staff on a rolling programme, planting new trees close to existing stumps so that a good scatter is achieved (B. Cove, pers. comm.). A number of places were noted to have had trees planted at too high density however, too close to existing trees, and in valuable open areas. Although the necessary thinning is generally under way, tree-planting practices could usefully be reviewed to ensure that the aim is to produce large open-grown trees through the open parkland.

It is vitally important that as many of the existing trees remain alive and healthy as possible, to continue to develop the essential wood-decay habitats into their old age - a dead tree provides wood-decay habitats over a relatively short time span in comparison to a living tree. Most of the ancient and veteran trees appear to be in good health but examples were seen where ancient trees are being overcrowded by younger growth and threatened by over-shading, where a new tree has been established too close to an ancient tree and where they are being damaged by livestock.

No trees should be felled within the whole parkland area, nor their health and/or lives put at risk If felling is deemed necessary it should be according to principles agreed by all interested parties. Dead trees should be retained in situ.

There are few reasons for the complete felling of any tree. Routes can be modified to avoid potentially hazardous trees. Selective removal of potentially hazardous boughs may be necessary where moving the route is not an option. It needs to be recognised that all trees are valuable and should not be lost without very careful consideration.

Where important trees are threatened by adjoining younger growth then they should be gradually released, over a period of years – see *Veteran Trees – a guide to good management* (Read, 2000) for detailed advice. Haloing of old oaks is already in progress around the disused quarry in Deer's Cote Spinney (B. Cove, pers.comm.), but also needs to be carried out elsewhere on the estate.

Much of the adjacent land is within the ownership of the National Trust, although Severn Trent Water also own much of the land around Staunton Harold Reservoir. **The National Trust and adjacent or nearby landowners should be encouraged to create wood-pasture to "grow the biodiversity resource" out from the core area of the NNR. This is likely to be necessary to maintain the invertebrate assemblage in the long-term.**

7.4 Deadwood management

Fallen timber is best left where it falls, in order to maintain as natural a system as possible, leaving the items within their natural context, intact and not displaced. Timber lying in water can be essential for certain species – notably the beetle *Cyanostolus aeneus* which is known to be present in Calke Park. Taller vegetation can be valuable in protecting the timber from extremes of weather, but swamping within tall bracken, for instance, can be damaging as it shades the timber, hides it from potentially colonising insects, and creates a potential fire risk in the spring.

In the rare event of it being essential that fallen timber is moved, eg where it is obstructing an access route which cannot be moved, then the basic principles are to move it:

- sooner rather than later, before it has begun to attract and accumulate organisms which may develop in it;
- as intact as possible, as larger timber has the potential to support a greater variety of organisms than fragmented timber;
- as short a distance as possible, to optimise linkages of its contents with its tree of origin, to maximise the potential for colonisation from the parent tree;
- and leave in similar conditions to where it fell, eg light and humidity levels, such that any species already present are not lost through any changes.

It is recommended therefore that a presumption should be agreed that all fallen and aerial deadwood be left *in situ* unless there is good reason for doing otherwise, and agreed by all interested parties. Where displacement is agreed to be unavoidable then it should be minimal.

7.5 Survey and monitoring aspects

With a site as important as Calke Park it is important to monitor the impacts of land management, etc, on the condition of the habitat and the communities it supports. The simplest options are to monitor the population dynamics of the tree and shrub populations through periodic recording of tree health and recruitment. The timescales for such work need only be fairly infrequent, on a cycle of say 20-25 years, to ensure recruitment of age class cohorts, and to respond to any problems which may be detected – the advice of a suitably experience arborist should be sought on this point however.

Monitoring of the biological communities is more problematic as it could be labour intensive. A good option is to carry out repeat specialist surveys periodically, in order to detect any major changes that may be occurring and to consider their causes and any practical remedies which might be advisable. This work would most usefully be tied in with the tree health and recruitment monitoring programme as the one will inform the other.

With the wider estate being such an integral part of the conservation of the special wood-decay habitat of Calke Park, it would be sensible to extend the tree and invertebrate surveys into the whole ownership of the Trust and even into adjacent areas.

While the Coleoptera are the best known and understood group at Calke a case could be made to focus on them. However, knowledge of other saproxylic groups should ideally be built up too, and site assessment protocols developed for them. Further specialist Diptera survey involving emergence trapping would be a priority.

It is recommended therefore that a monitoring protocol is developed for Calke, to ensure tree health and recruitment is proceeding broadly to plan, to relate this to the saproxylic invertebrate communities through a programme of repeat surveys.

7.6 Awareness Raising

It is important that the nature conservation interests and management implications at Calke Park are broadly understood by all relevant people: staff , contractors and visitors. This may be achieved through a combination of educational talks, walks, leaflets and posters. For a conservation plan to succeed it needs support from all interest groups. Encouraging and targeting visitor interest may help with site monitoring and discouragement of damage such as breaking off of bracket fungi.

It is therefore recommended that a programme of educational work is developed by the Trust to ensure that everyone involved in the parkland is aware of the nature conservation issues, in broad terms at least, to ensure that good practice prevails.

References

ALEXANDER, K.N.A. 1996. Historic parks and pasture-woodlands: the National Trust resource and its conservation. *Biological Journal of the Linnean Society*, 56 (Suppl.), 155-175.

ALEXANDER, K.N.A. 2002. The invertebrates of living and decaying timber in Britain and Ireland – a provisional annotated checklist. *English Nature Research Reports*, No. 467.

ALEXANDER, K.N.A., GREEN, E.E., & KEY, R.S. 1996. The management of overmature tree populations for nature conservation - the basic guidelines. *In:* H.J. READ, ed. *Pollard and Veteran Tree Management II.* Corporation of London.

CLARK, J.T. 1967. The distribution of *Lucanus cervus* (L.) (Col., Lucanidae) in Britain. *Entomologists' Monthly Magazine*, 102 (1966), 199-204.

CLEMENTS, D.K., SCRUBY, M., & LUTLEY, W. 1984. *Calke Abbey, Derbyshire*. National Trust Biological Survey.

COX, J., & SANDERSON, N. 2001. *Livestock grazing in National Trust parklands – its impact on tree health and habitat.* Unpublished contract report to National Trust Estates Department, Cirencester.

DRANE, A.B. 1983. *Woodland Coleoptera Surveys 1982-83*. Nature Conservancy Council, East Midlands Region (unpublished contract report).

DRANE, A.B. 1986. *Coleoptera from Calke Abbey Park, Derbyshire, 1986*. Unpublished report for National Trust.

FOWLER, W.W. 1890. *Coleoptera of the British Islands*, 4, 5.

FOWLES, A.P., ALEXANDER, K.N.A., & KEY, R.S. 1999. The Saproxylic Quality Index: evaluating wooded habitats for the conservation of dead-wood Coleoptera. *The Coleopterist*, 8, 121-141.

HARDING, P.T., & ALEXANDER, K.N.A. 1993. The saproxylic invertebrates of historic parklands: progress and problems. *In:* K.J. KIRBY, & C.M. DRAKE, eds. Deadwood

matters: the ecology & conservation of saproxylic invertebrates in Britain. *English Nature Science* No.7.

JOHNSON, C. 1986. *Lignicolous beetle survey at Calke Park, 1986*. Unpublished report for National Trust.

LEVEY, B. 1996. *Anaspis septentrionalis* Champion, a senior synonym of *A. schilskyana* Csiki (Scraptiidae). *The Coleopteris*, 5(2), 58.

LEVEY, B. 2002. Are *Anaspis septentrionalis* Champion and *A. thoracica* (Linnaeus) (Scraptiidae) a single variable species. *The Coleopterist*, 11(1), 1-5.

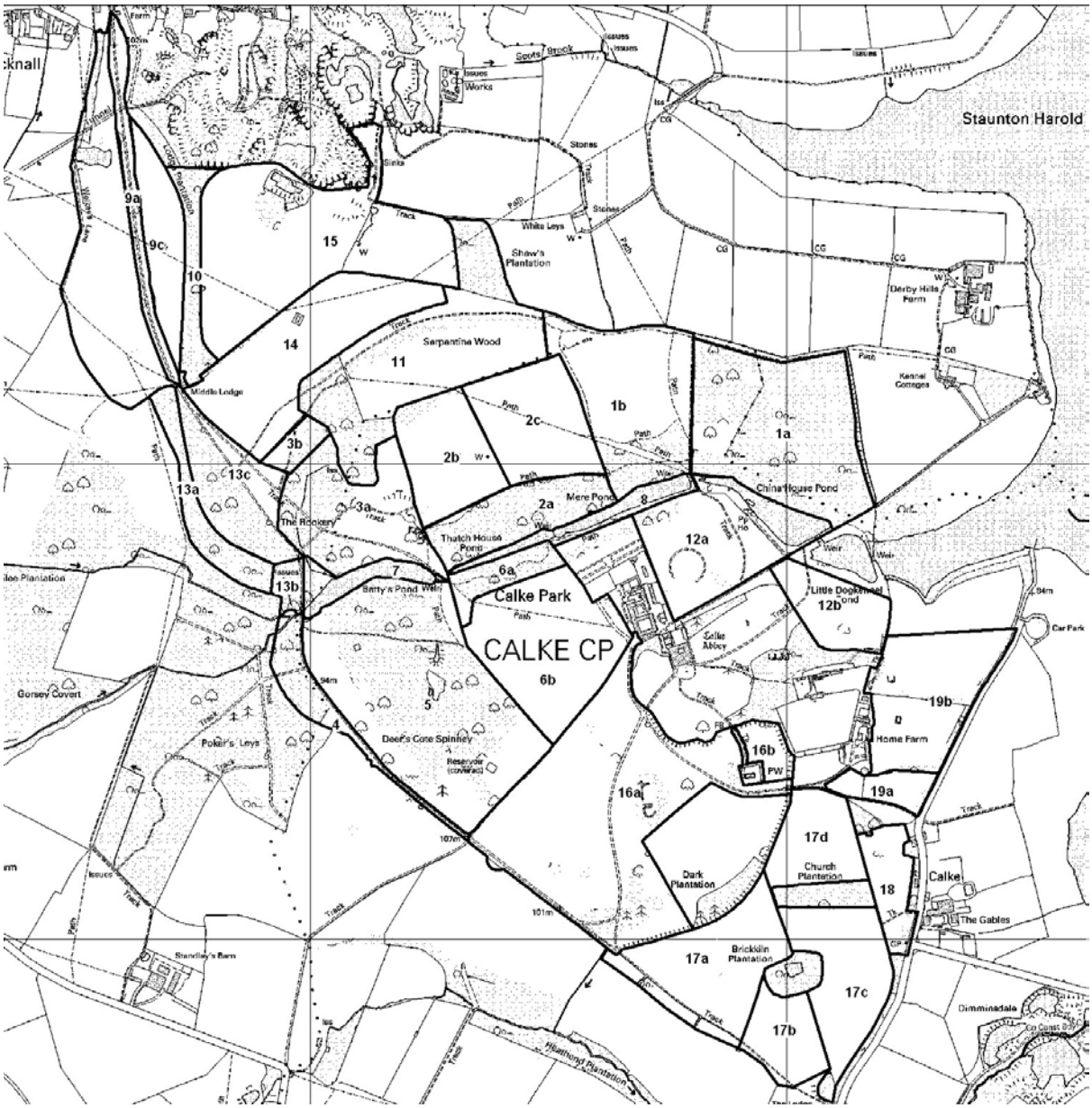
TWINN, P.F.G., & HARDING, P.T. 1999. *Provisional atlas of the longhorn beetles (Coleoptera, Cerambycidae) of Britain.* Monks Wood: Biological Records Centre.

WHITELEY, D. 1987. Hoverflies of the Sheffield Area and North Derbyshire. *Sorby Record Special Series*, No. 6, 1-56.

WHITELEY, D. 1990. *Psilota anthracina* – a remarkable new hoverfly for Derbyshire. *Journal of the Derbyshire Entomological Society*, 100, 10-11.

WHITELEY, D. 1991. Hoverfly surveys in South Derbyshire for the Derbyshire Red Data Book. *Journal of the Derbyshire Entomological Society***,** 101, 14-18.

Map 1 Survey boundary and compartments



Appendix 1 Detail of invertebrate records made in 2004

Species Identification	Family	Status	Assemblage	Cpt	Tree tag	Date	Collector	Determiner
Aderus oculatus	Col: Aderidae	Nb	saproxylic	Cpt 3a	9010	29/06/04	Alexander KNA	Alexander KNA
Aderus oculatus	Col: Aderidae	Nb	saproxylic	Cpt 3a	9011	29/06/04	Alexander KNA	Alexander KNA
Aderus oculatus	Col: Aderidae	Nb	saproxylic	Cpt 5	9069	22/07/04	Alexander KNA	Alexander KNA
Aderus oculatus	Col: Aderidae	Nb	saproxylic	Cpt 5	9097	22/07/04	Alexander KNA	Alexander KNA
Anobium punctatum	Col: Anobiidae	Widespread	saproxylic	Cpt 5	9070	22/07/04	Alexander KNA	Alexander KNA
Dorcatoma flavicornis	Col: Anobiidae	Very local	saproxylic	Cpt 3a		29/06/04	Alexander KNA	Alexander KNA
Hemicoelus fulvicornis	Col: Anobiidae	Local	saproxylic	Cpt 3a		29/06/04	Alexander KNA	Alexander KNA
Ptilinus pectinicornis	Col: Anobiidae	Widespread	saproxylic	Cpt 18		29/06/04	Alexander KNA	Alexander KNA
Ptilinus pectinicornis	Col: Anobiidae	Widespread	saproxylic	Cpt 1a		29/06/04	Alexander KNA	Alexander KNA
Ptilinus pectinicornis	Col: Anobiidae	Widespread	saproxylic	Cpt 2b	9064	28/06/04	Alexander KNA	Alexander KNA
Ptilinus pectinicornis	Col: Anobiidae	Widespread	saproxylic	Cpt 2b		28/06/04	Alexander KNA	Alexander KNA
Xestobium rufovillosum	Col: Anobiidae	Local	saproxylic	Cpt 1a	9035	19/05/04	Alexander KNA	Alexander KNA
Xestobium rufovillosum	Col: Anobiidae	Local	saproxylic	Cpt 1a	9038	19/05/04	Alexander KNA	Alexander KNA
Xestobium rufovillosum	Col: Anobiidae	Local	saproxylic	Cpt 1a		29/06/04	Alexander KNA	Alexander KNA
Xestobium rufovillosum	Col: Anobiidae	Local	saproxylic	Cpt 2a	9061	19/05/04	Alexander KNA	Alexander KNA
Xestobium rufovillosum	Col: Anobiidae	Local	saproxylic	Cpt 2a	9064	19/05/04	Alexander KNA	Alexander KNA
Xestobium rufovillosum	Col: Anobiidae	Local	saproxylic	Cpt 2a	9066	19/05/04	Alexander KNA	Alexander KNA
Xestobium rufovillosum	Col: Anobiidae	Local	saproxylic	Cpt 2a	9067	19/05/04	Alexander KNA	Alexander KNA
Xestobium rufovillosum	Col: Anobiidae	Local	saproxylic	Cpt 2b		19/05/04	Alexander KNA	Alexander KNA
Xestobium rufovillosum	Col: Anobiidae	Local	saproxylic	Cpt 3a	9002	14/05/04	Alexander KNA	Alexander KNA
Xestobium rufovillosum	Col: Anobiidae	Local	saproxylic	Cpt 3a	9006	14/05/04	Alexander KNA	Alexander KNA
Xestobium rufovillosum	Col: Anobiidae	Local	saproxylic	Cpt 5	9031	14/05/04	Alexander KNA	Alexander KNA
Xestobium rufovillosum	Col: Anobiidae	Local	saproxylic	Cpt 5	9078	28/06/04	Alexander KNA	Alexander KNA
Xestobium rufovillosum	Col: Anobiidae	Local	saproxylic	Cpt 5		16/09/04	Alexander KNA	Alexander KNA
Xestobium rufovillosum	Col: Anobiidae	Local	saproxylic	Cpt 6b	9068	19/05/04	Alexander KNA	Alexander KNA
Xestobium rufovillosum	Col: Anobiidae	Local	saproxylic	Cpt 9b	9122	11/10/04	Alexander KNA	Alexander KNA
Agrilus biguttatus	Col: Buprestidae	Na	saproxylic	Cpt 16b	9074	11/10/04	Alexander KNA	Alexander KNA
Agrilus biguttatus	Col: Buprestidae	Na	saproxylic	Cpt 1a		29/06/04	Alexander KNA	Alexander KNA
Agrilus biguttatus	Col: Buprestidae	Na	saproxylic	Cpt 1a		16/09/04	Alexander KNA	Alexander KNA
Agrilus biguttatus	Col: Buprestidae	Na	saproxylic	Cpt 3a		29/06/04	Alexander KNA	Alexander KNA
Agrilus laticornis	Col: Buprestidae	Nb	saproxylic	Cpt 3a	9007	29/06/04	Alexander KNA	Alexander KNA

Species Identification	Family	Status	Assemblage	Cpt	Tree tag	Date	Collector	Determiner
Cantharis cryptica	Col: Cantharidae	Widespread	canopy foliage	Cpt 3a		29/06/04	Alexander KNA	Alexander KNA
Cantharis cryptica	Col: Cantharidae	Widespread	canopy foliage	Cpt 5	9078	28/06/04	Alexander KNA	Alexander KNA
Cantharis decipiens	Col: Cantharidae	Widespread	canopy foliage	Cpt 2a	9059	19/05/04	Alexander KNA	Alexander KNA
Cantharis decipiens	Col: Cantharidae	Widespread	canopy foliage	Cpt 3a	9004	14/05/04	Alexander KNA	Alexander KNA
Cantharis decipiens	Col: Cantharidae	Widespread	canopy foliage	Cpt 9b		14/05/04	Alexander KNA	Alexander KNA
Cantharis lateralis	Col: Cantharidae	Widespread	field layer; wetland	Cpt 3a		29/06/04	Alexander KNA	Alexander KNA
Cantharis lateralis	Col: Cantharidae	Widespread	field layer; wetland	Cpt 5	9097	22/07/04	Alexander KNA	Alexander KNA
Cantharis nigra	Col: Cantharidae	Widespread	field layer; wetland	Cpt 17c		29/06/04	Alexander KNA	Alexander KNA
Cantharis nigra	Col: Cantharidae	Widespread	field layer; wetland	Cpt 18		29/06/04	Alexander KNA	Alexander KNA
Cantharis nigra	Col: Cantharidae	Widespread	field layer; wetland	Cpt 3a		29/06/04	Alexander KNA	Alexander KNA
Cantharis rufa	Col: Cantharidae	Local	foliage generally	Cpt 18		29/06/04	Alexander KNA	Alexander KNA
Cantharis thoracica	Col: Cantharidae	Local	field layer; wetland	Cpt 1a		29/06/04	Alexander KNA	Alexander KNA
Malthinus flaveolus	Col: Cantharidae	Widespread	saproxylic	Cpt 2a	9061	28/06/04	Alexander KNA	Alexander KNA
Malthinus flaveolus	Col: Cantharidae	Widespread	saproxylic	Cpt 6a	9085	28/06/04	Alexander KNA	Alexander KNA
Malthodes minimus	Col: Cantharidae	Widespread	saproxylic	Cpt 5		22/07/04	Alexander KNA	Alexander KNA
Malthodes pumilus	Col: Cantharidae	Local	saproxylic	Cpt 3a		29/06/04	Alexander KNA	Alexander KNA
Rhagonycha fulva	Col: Cantharidae	Widespread	field layer	Cpt 5	9097	22/07/04	Alexander KNA	Alexander KNA
Rhagonycha fulva	Col: Cantharidae	Widespread	field layer	Cpt 6a		28/06/04	Alexander KNA	Alexander KNA
Rhagonycha lignosa	Col: Cantharidae	Widespread	canopy foliage	Cpt 13a		14/05/04	Alexander KNA	Alexander KNA
Rhagonycha lignosa	Col: Cantharidae	Widespread	canopy foliage	Cpt 1b		28/06/04	Alexander KNA	Alexander KNA
Rhagonycha lignosa	Col: Cantharidae	Widespread	canopy foliage	Cpt 3a		29/06/04	Alexander KNA	Alexander KNA
Rhagonycha limbata	Col: Cantharidae	Widespread	field layer	Cpt 5		14/05/04	Alexander KNA	Alexander KNA
Rhagonycha limbata	Col: Cantharidae	Widespread	field layer	Cpt 5		22/07/04	Alexander KNA	Alexander KNA
Asaphidion sp	Col: Carabidae	Widespread	ground layer; damp	Cpt 9b	9121	11/10/04	Alexander KNA	Alexander KNA
Dromius meridionalis	Col: Carabidae	Widespread	epiphyte	Cpt 5	9078	28/06/04	Alexander KNA	Alexander KNA
Dromius quadrimaculatus	Col: Carabidae	Widespread	epiphyte	Cpt 2a	9059	19/05/04	Alexander KNA	Alexander KNA
Dromius quadrimaculatus	Col: Carabidae	Widespread	epiphyte	Cpt 3a		16/09/04	Alexander KNA	Alexander KNA

Species Identification	Family	Status	Assemblage	Cpt	Tree tag	Date	Collector	Determiner
Dromius quadrimaculatus	Col: Carabidae	Widespread	epiphyte	Cpt 5	9077	22/07/04	Alexander KNA	Alexander KNA
Dromius quadrimaculatus	Col: Carabidae	Widespread	epiphyte	Cpt 9b	9123	11/10/04	Alexander KNA	Alexander KNA
Dromius spilotus (quadrinotatus)	Col: Carabidae	Widespread	epiphyte	Cpt 1a		16/09/04	Alexander KNA	Alexander KNA
Laemostenus terricola	Col: Carabidae	Nb	nests & burrows	Cpt 14		14/05/04	Alexander KNA	Alexander KNA
Leiopus nebulosus	Col: Cerambycidae	Local	saproxylic	Cpt 1b	9052	19/05/04	Alexander KNA	Alexander KNA
Leiopus nebulosus	Col: Cerambycidae	Local	saproxylic	Cpt 5	9078	28/06/04	Alexander KNA	Alexander KNA
Phymatodes testaceus	Col: Cerambycidae	Local	saproxylic	Cpt 19b		29/06/04	Alexander KNA	Alexander KNA
Phymatodes testaceus	Col: Cerambycidae	Local	saproxylic	Cpt 1b	9051	19/05/04	Alexander KNA	Alexander KNA
Phymatodes testaceus	Col: Cerambycidae	Local	saproxylic	Cpt 3a		16/09/04	Alexander KNA	Alexander KNA
Phymatodes testaceus	Col: Cerambycidae	Local	saproxylic	Cpt 6a		16/09/04	Alexander KNA	Alexander KNA
Pogonocherus hispidus	Col: Cerambycidae	Local	saproxylic	Cpt 1b	9050	19/05/04	Alexander KNA	Alexander KNA
Grammoptera ruficornis	Col: Cerambycidae: Lepturinae	Widespread	saproxylic	Cpt 9b		14/05/04	Alexander KNA	Alexander KNA
Grammoptera ruficornis	Col: Cerambycidae: Lepturinae	Widespread	saproxylic	Cpt 9c		14/05/04	Alexander KNA	Alexander KNA
Cerylon ferrugineum	Col: Cerylonidae	Local	saproxylic	Cpt 14		14/05/04	Alexander KNA	Alexander KNA
Cerylon ferrugineum	Col: Cerylonidae	Local	saproxylic	Cpt 1a	9037	19/05/04	Alexander KNA	Alexander KNA
Cerylon ferrugineum	Col: Cerylonidae	Local	saproxylic	Cpt 3a		14/05/04	Alexander KNA	Alexander KNA
Cerylon ferrugineum	Col: Cerylonidae	Local	saproxylic	Cpt 5		16/09/04	Alexander KNA	Alexander KNA
Cerylon histeroides	Col: Cerylonidae	Local	saproxylic	Cpt 4	9100	22/07/04	Alexander KNA	Alexander KNA
Cerylon histeroides	Col: Cerylonidae	Local	saproxylic	Cpt 5	9017	14/05/04	Alexander KNA	Alexander KNA
Gastrophysa polygoni	Col: Chrysomelidae	Widespread	field layer	Cpt 5		14/05/04	Alexander KNA	Alexander KNA
Orsodacne cerasi	Col: Chrysomelidae	Local	canopy foliage	Cpt 1b	9050	19/05/04	Alexander KNA	Alexander KNA
Orsodacne cerasi	Col: Chrysomelidae	Local	canopy foliage	Cpt 1b	9056	19/05/04	Alexander KNA	Alexander KNA
Cis alni	Col: Ciidae	Local	saproxylic	Cpt 16a		19/05/04	Alexander KNA	Alexander KNA
Cis alni	Col: Ciidae	Local	saproxylic	Cpt 3a		29/06/04	Alexander KNA	Alexander KNA
Cis alni	Col: Ciidae	Local	saproxylic	Cpt 5	9017	22/07/04	Alexander KNA	Alexander KNA
Cis alni	Col: Ciidae	Local	saproxylic	Cpt 5		16/09/04	Alexander KNA	Alexander KNA
Cis bilamellatus	Col: Ciidae	Widespread	saproxylic	Cpt 6a	9083	28/06/04	Alexander KNA	Alexander KNA
Cis bilamellatus	Col: Ciidae	Widespread	saproxylic	Cpt 6a		16/09/04	Alexander KNA	Alexander KNA
Cis boleti	Col: Ciidae	Widespread	saproxylic	Cpt 19a		29/06/04	Alexander KNA	Alexander KNA
Cis nitidus	Col: Ciidae	Local	saproxylic	Cpt 12a	9045	19/05/04	Alexander KNA	Alexander KNA
Cis nitidus	Col: Ciidae	Local	saproxylic	Cpt 17d		11/10/04	Alexander KNA	Alexander KNA

Species Identification	Family	Status	Assemblage	Cpt	Tree tag	Date	Collector	Determiner
Cis nitidus	Col: Ciidae	Local	saproxylic	Cpt 3a		29/06/04	Alexander KNA	Alexander KNA
Cis nitidus	Col: Ciidae	Local	saproxylic	Cpt 5	9098	22/07/04	Alexander KNA	Alexander KNA
Cis nitidus	Col: Ciidae	Local	saproxylic	Cpt 5		16/09/04	Alexander KNA	Alexander KNA
Cis nitidus	Col: Ciidae	Local	saproxylic	Cpt 6a		16/09/04	Alexander KNA	Alexander KNA
Cis nitidus	Col: Ciidae	Local	saproxylic			28/06/04	Alexander KNA	Alexander KNA
Cis vestitus	Col: Ciidae	Local	saproxylic	Cpt 1a		16/09/04	Alexander KNA	Alexander KNA
Cis vestitus	Col: Ciidae	Local	saproxylic	Cpt 3a		16/09/04	Alexander KNA	Alexander KNA
Cis vestitus	Col: Ciidae	Local	saproxylic	Cpt 5		16/09/04	Alexander KNA	Alexander KNA
Cis vestitus	Col: Ciidae	Local	saproxylic	Cpt 6a	9083	16/09/04	Alexander KNA	Alexander KNA
Octotemnus glabriculus	Col: Ciidae	Widespread	saproxylic	Cpt 17d		11/10/04	Alexander KNA	Alexander KNA
Thanasimus formicarius	Col: Cleridae	Local	saproxylic	Cpt 1a	9035	19/05/04	Alexander KNA	Alexander KNA
Adalia 10-punctata	Col: Coccinellidae	Widespread	canopy foliage	Cpt 5	9070	22/07/04	Alexander KNA	Alexander KNA
Adalia 10-punctata	Col: Coccinellidae	Widespread	canopy foliage	Cpt 9b	9123	11/10/04	Alexander KNA	Alexander KNA
Exochomus quadripustulatus	Col: Coccinellidae	Widespread		Cpt 14		14/05/04	Alexander KNA	Alexander KNA
Halyzia 16-guttata	Col: Coccinellidae	Local		Cpt 3a	9004	14/05/04	Alexander KNA	Alexander KNA
Propylea 14-punctata	Col: Coccinellidae	Widespread	foliage generally	Cpt 3a	9004	14/05/04	Alexander KNA	Alexander KNA
Bitoma crenata	Col: Colydiidae	Local	saproxylic	Cpt 19a		29/06/04	Alexander KNA	Alexander KNA
Bitoma crenata	Col: Colydiidae	Local	saproxylic	Cpt 3a	9003	14/05/04	Alexander KNA	Alexander KNA
Bitoma crenata	Col: Colydiidae	Local	saproxylic	Cpt 3a		16/09/04	Alexander KNA	Alexander KNA
Bitoma crenata	Col: Colydiidae	Local	saproxylic	Cpt 5		16/09/04	Alexander KNA	Alexander KNA
Cryptophagus dentatus group	Col: Cryptophagidae	Widespread	saproxylic	Cpt 16a	9070	19/05/04	Alexander KNA	Alexander KNA
Cryptophagus dentatus group	Col: Cryptophagidae	Widespread	saproxylic	Cpt 16a	9135	11/10/04	Alexander KNA	Alexander KNA
Cryptophagus dentatus group	Col: Cryptophagidae	Widespread	saproxylic	Cpt 17c		29/06/04	Alexander KNA	Alexander KNA
Cryptophagus dentatus group	Col: Cryptophagidae	Widespread	saproxylic	Cpt 19b	9139	11/10/04	Alexander KNA	Alexander KNA
Cryptophagus dentatus group	Col: Cryptophagidae	Widespread	saproxylic	Cpt 6b	9096	11/10/04	Alexander KNA	Alexander KNA
Cryptophagus dentatus group	Col: Cryptophagidae	Widespread	saproxylic			28/06/04	Alexander KNA	Alexander KNA
Pediacus dermestoides	Col: Cucujidae	Local	saproxylic	Cpt 16a	9135	11/10/04	Alexander KNA	Alexander KNA
Pediacus dermestoides	Col: Cucujidae	Local	saproxylic	Cpt 3a		29/06/04	Alexander KNA	Alexander KNA

Species Identification	Family	Status	Assemblage	Cpt	Tree tag	Date	Collector	Determiner
Pediacus dermestoides	Col: Cucujidae	Local	saproxylic	Cpt 5	9079	16/09/04	Alexander KNA	Alexander KNA
Pediacus dermestoides	Col: Cucujidae	Local	saproxylic	Cpt 5		16/09/04	Alexander KNA	Alexander KNA
Pediacus dermestoides	Col: Cucujidae	Local	saproxylic	Cpt 6a		16/09/04	Alexander KNA	Alexander KNA
Rhynchaenus quercus	Col: Curculionidae	Widespread	canopy foliage	Cpt 2b	9065	28/06/04	Alexander KNA	Alexander KNA
Rhynchaenus quercus	Col: Curculionidae	Widespread	canopy foliage	Cpt 5	9069	22/07/04	Alexander KNA	Alexander KNA
Euophryum confine	Col: Curculionidae: Cossoninae	Widespread	saproxylic	Cpt 12a	9045	19/05/04	Alexander KNA	Alexander KNA
Euophryum confine	Col: Curculionidae: Cossoninae	Widespread	saproxylic	Cpt 13b		14/05/04	Alexander KNA	Alexander KNA
Euophryum confine	Col: Curculionidae: Cossoninae	Widespread	saproxylic	Cpt 1a	9037	19/05/04	Alexander KNA	Alexander KNA
Euophryum confine	Col: Curculionidae: Cossoninae	Widespread	saproxylic	Cpt 9b		14/05/04	Alexander KNA	Alexander KNA
Phloeophagus lignarius	Col: Curculionidae: Cossoninae	Local	saproxylic	Cpt 19b		29/06/04	Alexander KNA	Alexander KNA
Curculio glandium	Col: Curculionidae: Curculioninae	Widespread	canopy foliage	Cpt 5	9014	14/05/04	Alexander KNA	Alexander KNA
Curculio pyrrhoceras	Col: Curculionidae: Curculioninae	Widespread	canopy foliage	Cpt 13a		14/05/04	Alexander KNA	Alexander KNA
Curculio venosus	Col: Curculionidae: Curculioninae	Widespread	canopy foliage	Cpt 13b		14/05/04	Alexander KNA	Alexander KNA
Curculio venosus	Col: Curculionidae: Curculioninae	Widespread	canopy foliage	Cpt 5	9078	28/06/04	Alexander KNA	Alexander KNA
Curculio venosus	Col: Curculionidae: Curculioninae	Widespread	canopy foliage	Cpt 5	9014	14/05/04	Alexander KNA	Alexander KNA
Magdalis ruficornis	Col: Curculionidae: Mesoptiliinae	Local	saproxylic	Cpt 2a		19/05/04	Alexander KNA	Alexander KNA
Dryocoetinus villosus	Col: Curculionidae: Scolytinae	Local	saproxylic	Cpt 16b	9074	11/10/04	Alexander KNA	Alexander KNA
Dryocoetinus villosus	Col: Curculionidae: Scolytinae	Local	saproxylic	Cpt 3a	9011	29/06/04	Alexander KNA	Alexander KNA
Dryocoetinus villosus	Col: Curculionidae: Scolytinae	Local	saproxylic	Cpt 3a		16/09/04	Alexander KNA	Alexander KNA
Ernoporicus caucasicus	Col: Curculionidae: Scolytinae	RDB1/Na	saproxylic	Cpt 1b	9050	19/05/04	Alexander KNA	Alexander KNA

Species Identification	Family	Status	Assemblage	Cpt	Tree tag	Date	Collector	Determiner
Ernoporicus caucasicus	Col: Curculionidae: Scolytinae	RDB1/Na	saproxylic	Cpt 1b	9056	19/05/04	Alexander KNA	Alexander KNA
Ernoporicus caucasicus	Col: Curculionidae: Scolytinae	RDB1/Na	saproxylic	Cpt 2a	9059	19/05/04	Alexander KNA	Alexander KNA
Ernoporicus caucasicus	Col: Curculionidae: Scolytinae	RDB1/Na	saproxylic	Cpt 6a	9085	28/06/04	Alexander KNA	Alexander KNA
Hylesinus crenatus	Col: Curculionidae: Scolytinae	Local	saproxylic	Cpt 12a	9041	19/05/04	Alexander KNA	Alexander KNA
Leperisinus varius	Col: Curculionidae: Scolytinae	Widespread	saproxylic	Cpt 16a	9087	29/06/04	Alexander KNA	Alexander KNA
Leperisinus varius	Col: Curculionidae: Scolytinae	Widespread	saproxylic	Cpt 19b		11/10/04	Alexander KNA	Alexander KNA
Scolytus intricatus	Col: Curculionidae: Scolytinae	Local	saproxylic	Cpt 13b		14/05/04	Alexander KNA	Alexander KNA
Scolytus intricatus	Col: Curculionidae: Scolytinae	Local	saproxylic	Cpt 14		14/05/04	Alexander KNA	Alexander KNA
Scolytus intricatus	Col: Curculionidae: Scolytinae	Local	saproxylic	Cpt 1a		19/05/04	Alexander KNA	Alexander KNA
Scolytus intricatus	Col: Curculionidae: Scolytinae	Local	saproxylic	Cpt 2c		19/05/04	Alexander KNA	Alexander KNA
Scolytus intricatus	Col: Curculionidae: Scolytinae	Local	saproxylic	Cpt 3a	9003	14/05/04	Alexander KNA	Alexander KNA
Scolytus intricatus	Col: Curculionidae: Scolytinae	Local	saproxylic	Cpt 3a		29/06/04	Alexander KNA	Alexander KNA
Scolytus intricatus	Col: Curculionidae: Scolytinae	Local	saproxylic	Cpt 3a		16/09/04	Alexander KNA	Alexander KNA
Scolytus intricatus	Col: Curculionidae: Scolytinae	Local	saproxylic	Cpt 5	9078	28/06/04	Alexander KNA	Alexander KNA
Scolytus intricatus	Col: Curculionidae: Scolytinae	Local	saproxylic	Cpt 5	9078	22/07/04	Alexander KNA	Alexander KNA
Scolytus intricatus	Col: Curculionidae: Scolytinae	Local	saproxylic	Cpt 5	9079	28/06/04	Alexander KNA	Alexander KNA
Scolytus intricatus	Col: Curculionidae: Scolytinae	Local	saproxylic	Cpt 5	9079	22/07/04	Alexander KNA	Alexander KNA

Species Identification	Family	Status	Assemblage	Cpt	Tree tag	Date	Collector	Determiner
Scolytus intricatus	Col: Curculionidae: Scolytinae	Local	saproxylic	Cpt 5	9079	16/09/04	Alexander KNA	Alexander KNA
Scolytus intricatus	Col: Curculionidae: Scolytinae	Local	saproxylic	Cpt 5	9077	28/06/04	Alexander KNA	Alexander KNA
Scolytus intricatus	Col: Curculionidae: Scolytinae	Local	saproxylic	Cpt 5	9077	22/07/04	Alexander KNA	Alexander KNA
Trypodendron	Col: Curculionidae: Scolytinae	Local	saproxylic	Cpt 3a		16/09/04	Alexander KNA	Alexander KNA
Attagenus pellio	Col: Dermestidae	Widespread	saproxylic	Cpt 3b	9001	14/05/04	Alexander KNA	Alexander KNA
Ctesias serra	Col: Dermestidae	Nb/very local	saproxylic	Cpt 12a	9041	19/05/04	Alexander KNA	Alexander KNA
Ctesias serra	Col: Dermestidae	Nb/very local	saproxylic	Cpt 12b	9042	19/05/04	Alexander KNA	Alexander KNA
Ctesias serra	Col: Dermestidae	Nb/very local	saproxylic	Cpt 16a	9070	19/05/04	Alexander KNA	Alexander KNA
Ctesias serra	Col: Dermestidae	Nb/very local	saproxylic	Cpt 3a	9002	14/05/04	Alexander KNA	Alexander KNA
Ctesias serra	Col: Dermestidae	Nb/very local	saproxylic	Cpt 3b	9001	14/05/04	Alexander KNA	Alexander KNA
Ctesias serra	Col: Dermestidae	Nb/very local	saproxylic	Cpt 5	9031	14/05/04	Alexander KNA	Alexander KNA
Ctesias serra	Col: Dermestidae	Nb/very local	saproxylic	Cpt 9b		14/05/04	Alexander KNA	Alexander KNA
Megatoma undata	Col: Dermestidae	Nb	saproxylic	Cpt 3a	9009	14/05/04	Alexander KNA	Alexander KNA
Megatoma undata	Col: Dermestidae	Nb	saproxylic	Cpt 3a		29/06/04	Alexander KNA	Alexander KNA
Agriotes obscurus	Col: Elateridae	Widespread	field layer	Cpt 2a		19/05/04	Alexander KNA	Alexander KNA
Agriotes pallidulus	Col: Elateridae	Widespread	field layer	Cpt 3a		29/06/04	Alexander KNA	Alexander KNA
Agriotes pallidulus	Col: Elateridae	Widespread	field layer	Cpt 9c		14/05/04	Alexander KNA	Alexander KNA
Ampedus balteatus	Col: Elateridae	Local	saproxylic	Cpt 1b	9050	19/05/04	Alexander KNA	Alexander KNA
Ampedus balteatus	Col: Elateridae	Local	saproxylic	Cpt 3a	9006	14/05/04	Alexander KNA	Alexander KNA
Ampedus balteatus	Col: Elateridae	Local	saproxylic	Cpt 5	9023	14/05/04	Alexander KNA	Alexander KNA
Ampedus sp	Col: Elateridae	Local	saproxylic	Cpt 5	9022	14/05/04	Alexander KNA	Alexander KNA
Athous bicolor	Col: Elateridae	Widespread	field layer	Cpt 5	9016	22/07/04	Alexander KNA	Alexander KNA
Athous haemorrhoidalis	Col: Elateridae	Widespread	field layer	Cpt 9b		14/05/04	Alexander KNA	Alexander KNA
Athous haemorrhoidalis	Col: Elateridae	Widespread	field layer	Cpt 9c		14/05/04	Alexander KNA	Alexander KNA
Denticollis linearis	Col: Elateridae	Widespread	saproxylic	Cpt 3a	9003	14/05/04	Alexander KNA	Alexander KNA
Hemicrepidius hirtus	Col: Elateridae	Widespread	saproxylic	Cpt 1b	9084	28/06/04	Alexander KNA	Alexander KNA
Kibunea minuta	Col: Elateridae	Local	field layer	Cpt 16a	9070	19/05/04	Alexander KNA	Alexander KNA
Kibunea minuta	Col: Elateridae	Local	field layer	Cpt 1b	9052	19/05/04	Alexander KNA	Alexander KNA
Kibunea minuta	Col: Elateridae	Local	field layer	Cpt 3a		29/06/04	Alexander KNA	Alexander KNA
Melanotus villosus	Col: Elateridae	Widespread	saproxylic	Cpt 16b	9074	11/10/04	Alexander KNA	Alexander KNA

Species Identification	Family	Status	Assemblage	Cpt	Tree tag	Date	Collector	Determiner
Melanotus villosus	Col: Elateridae	Widespread	saproxylic	Cpt 17a		29/06/04	Alexander KNA	Alexander KNA
Melanotus villosus	Col: Elateridae	Widespread	saproxylic	Cpt 1a	9036	19/05/04	Alexander KNA	Alexander KNA
Melanotus villosus	Col: Elateridae	Widespread	saproxylic	Cpt 3a		16/09/04	Alexander KNA	Alexander KNA
Melanotus villosus	Col: Elateridae	Widespread	saproxylic	Cpt 4	9100	22/07/04	Alexander KNA	Alexander KNA
Melanotus villosus	Col: Elateridae	Widespread	saproxylic	Cpt 5	9078	28/06/04	Alexander KNA	Alexander KNA
Procraerus tibialis	Col: Elateridae	RDB3/Na	saproxylic	Cpt 1a	9038	19/05/04	Alexander KNA	Alexander KNA
Stenagostus rhombeus	Col: Elateridae	Very local	saproxylic	Cpt 13b		14/05/04	Alexander KNA	Alexander KNA
Stenagostus rhombeus	Col: Elateridae	Very local	saproxylic	Cpt 14		14/05/04	Alexander KNA	Alexander KNA
Stenagostus rhombeus	Col: Elateridae	Very local	saproxylic	Cpt 3a		14/05/04	Alexander KNA	Alexander KNA
Stenagostus rhombeus	Col: Elateridae	Very local	saproxylic	Cpt 3a		29/06/04	Alexander KNA	Alexander KNA
Stenagostus rhombeus	Col: Elateridae	Very local	saproxylic	Cpt 5	9079	16/09/04	Alexander KNA	Alexander KNA
Dacne bipustulata	Col: Erotylidae	Local	saproxylic	Cpt 19b		29/06/04	Alexander KNA	Alexander KNA
Dacne bipustulata	Col: Erotylidae	Local	saproxylic	Cpt 5	9032	14/05/04	Alexander KNA	Alexander KNA
Triplax aenea	Col: Erotylidae	Local	saproxylic	Cpt 16a	9135	11/10/04	Alexander KNA	Alexander KNA
Triplax aenea	Col: Erotylidae	Local	saproxylic	Cpt 16a		29/06/04	Alexander KNA	Alexander KNA
Triplax aenea	Col: Erotylidae	Local	saproxylic	Cpt 19b	9139	11/10/04	Alexander KNA	Alexander KNA
Triplax aenea	Col: Erotylidae	Local	saproxylic	Cpt 19b		29/06/04	Alexander KNA	Alexander KNA
Triplax aenea	Col: Erotylidae	Local	saproxylic	Cpt 19b		11/10/04	Alexander KNA	Alexander KNA
Triplax aenea	Col: Erotylidae	Local	saproxylic	Cpt 6b	9096	11/10/04	Alexander KNA	Alexander KNA
Triplax russica	Col: Erotylidae	Very local	saproxylic	Cpt 19b		29/06/04	Alexander KNA	Alexander KNA
histerid	Col: Histeridae			Cpt 1a	9038	19/05/04	Alexander KNA	Alexander KNA
Paromalus flavicornis	Col: Histeridae	Local	saproxylic	Cpt 13b		14/05/04	Alexander KNA	Alexander KNA
Paromalus flavicornis	Col: Histeridae	Local	saproxylic	Cpt 3a		14/05/04	Alexander KNA	Alexander KNA
Aridius bifasciatus	Col: Lathridiidae	Widespread	generalist	Cpt 16a		19/05/04	Alexander KNA	Alexander KNA
Aridius nodifer	Col: Lathridiidae	Widespread	generalist	Cpt 5		18/11/04	Alexander KNA	Alexander KNA
Corticaria impressa	Col: Lathridiidae	Widespread	generalist	Cpt 16a		19/05/04	Alexander KNA	Alexander KNA
Dienerella ruficollis	Col: Lathridiidae	Widespread	generalist	Cpt 16a	9070	19/05/04	Alexander KNA	Alexander KNA
Dienerella ruficollis	Col: Lathridiidae	Widespread	generalist	Cpt 16a		19/05/04	Alexander KNA	Alexander KNA
Enicmus transversus	Col: Lathridiidae	Widespread	generalist	Cpt 6b	9096	11/10/04	Alexander KNA	Alexander KNA
Anisotoma humeralis	Col: Leiodidae	Local	saproxylic	Cpt 6a	9083	28/06/04	Alexander KNA	Alexander KNA
Dorcus parallelepipedus	Col: Lucanidae	Local	saproxylic	Cpt 12a	9045	19/05/04	Alexander KNA	Alexander KNA
Dorcus parallelepipedus	Col: Lucanidae	Local	saproxylic	Cpt 18		29/06/04	Alexander KNA	Alexander KNA
Dorcus parallelepipedus	Col: Lucanidae	Local	saproxylic	Cpt 19b	9139	11/10/04	Alexander KNA	Alexander KNA

Species Identification	Family	Status	Assemblage	Cpt	Tree tag	Date	Collector	Determiner
Dorcus parallelepipedus	Col: Lucanidae	Local	saproxylic	Cpt 1a		29/06/04	Alexander KNA	Alexander KNA
Sinodendron cylindricum	Col: Lucanidae	Local	saproxylic	Cpt 16a	9071	11/10/04	Alexander KNA	Alexander KNA
Sinodendron cylindricum	Col: Lucanidae	Local	saproxylic	Cpt 19b		29/06/04	Alexander KNA	Alexander KNA
Hylecoetus dermestoides	Col: Lymexylidae	Nb/very local	saproxylic	Cpt 6a	9081	28/06/04	Alexander KNA	Alexander KNA
Hylecoetus dermestoides	Col: Lymexylidae	Nb/very local	saproxylic	Cpt 6a		22/07/04	Alexander KNA	Alexander KNA
Lymexylon navale	Col: Lymexylidae	RDB2	saproxylic	Cpt 3a	9010	29/06/04	Alexander KNA	Alexander KNA
Conopalpus testaceus v vigorsi	Col: Melandryidae	Nb	saproxylic	Cpt 3a		29/06/04	Alexander KNA	Alexander KNA
Orchesia micans	Col: Melandryidae	Nb/very local	saproxylic	Cpt 10	9133	11/10/04	Alexander KNA	Alexander KNA
Orchesia micans	Col: Melandryidae	Nb/very local	saproxylic	Cpt 9b		14/05/04	Alexander KNA	Alexander KNA
Aplocnemus nigricornis	Col: Melyridae	Na	saproxylic	Cpt 3a		29/06/04	Alexander KNA	Alexander KNA
Axinotarsis marginalis	Col: Melyridae	Widespread	saproxylic	Cpt 3a		29/06/04	Alexander KNA	Alexander KNA
Axinotarsis marginalis	Col: Melyridae	Widespread	saproxylic	Cpt 3a		29/06/04	Alexander KNA	Alexander KNA
Axinotarsus ruficollis	Col: Melyridae	Very local	saproxylic	Cpt 3a		29/06/04	Alexander KNA	Alexander KNA
Malachius bipustulatus	Col: Melyridae	Widespread	saproxylic	Cpt 3a		29/06/04	Alexander KNA	Alexander KNA
Malachius bipustulatus	Col: Melyridae	Widespread	saproxylic	Cpt 9b		14/05/04	Alexander KNA	Alexander KNA
Litargus connexus	Col: Mycetophagidae	Local	saproxylic	Cpt 5	9079	28/06/04	Alexander KNA	Alexander KNA
Litargus connexus	Col: Mycetophagidae	Local	saproxylic	Cpt 5		16/09/04	Alexander KNA	Alexander KNA
Mycetophagus multipunctatus	Col: Mycetophagidae	Local	saproxylic	Cpt 16a		29/06/04	Alexander KNA	Alexander KNA
Mycetophagus quadripustulatus	Col: Mycetophagidae	Local	saproxylic	Cpt 16a	9135	11/10/04	Alexander KNA	Alexander KNA
Mycetophagus quadripustulatus	Col: Mycetophagidae	Local	saproxylic	Cpt 16a		19/05/04	Alexander KNA	Alexander KNA
Mycetophagus quadripustulatus	Col: Mycetophagidae	Local	saproxylic	Cpt 16a		29/06/04	Alexander KNA	Alexander KNA
Mycetophagus quadripustulatus	Col: Mycetophagidae	Local	saproxylic	Cpt 19b		29/06/04	Alexander KNA	Alexander KNA
Mycetophagus quadripustulatus	Col: Mycetophagidae	Local	saproxylic	Cpt 19b		11/10/04	Alexander KNA	Alexander KNA
Mycetophagus quadripustulatus	Col: Mycetophagidae	Local	saproxylic	Cpt 2b		28/06/04	Alexander KNA	Alexander KNA
Pseudotriphyllus suturalis	Col: Mycetophagidae	Very local	saproxylic	Cpt 16a	9135	11/10/04	Alexander KNA	Alexander KNA
Pseudotriphyllus suturalis	Col: Mycetophagidae	Very local	saproxylic	Cpt 2b		28/06/04	Alexander KNA	Alexander KNA

Species Identification	Family	Status	Assemblage	Cpt	Tree tag	Date	Collector	Determiner
Pseudotriphyllus suturalis	Col: Mycetophagidae	Very local	saproxylic	Cpt 6b	9096	11/10/04	Alexander KNA	Alexander KNA
Pseudotriphyllus suturalis	Col: Mycetophagidae	Very local	saproxylic	Cpt 6b	9096	18/11/04	Alexander KNA	Alexander KNA
Ischnomera cyanea	Col: Oedemeridae	Nb/very local	saproxylic	Cpt 5	9014	14/05/04	Alexander KNA	Alexander KNA
Ischnomera cyanea	Col: Oedemeridae	Nb/very local	saproxylic	Cpt 9b		14/05/04	Alexander KNA	Alexander KNA
Phloiophilus edwardsi	Col: Phloiophilidae	Nb	saproxylic	Cpt 1a		16/09/04	Alexander KNA	Alexander KNA
Phloiophilus edwardsi	Col: Phloiophilidae	Nb	saproxylic	Cpt 3a		16/09/04	Alexander KNA	Alexander KNA
Phloiophilus edwardsi	Col: Phloiophilidae	Nb	saproxylic	Cpt 5		16/09/04	Alexander KNA	Alexander KNA
Phloiophilus edwardsi	Col: Phloiophilidae	Nb	saproxylic	Cpt 5		18/11/04	Alexander KNA	Alexander KNA
Phloiophilus edwardsi	Col: Phloiophilidae	Nb	saproxylic	Cpt 5	9028	16/09/04	Alexander KNA	Alexander KNA
Phloiophilus edwardsi	Col: Phloiophilidae	Nb	saproxylic	Cpt 6a	9083	16/09/04	Alexander KNA	Alexander KNA
Rhizophagus bipustulatus	Col: Rhizophagidae	Widespread	saproxylic	Cpt 2c		19/05/04	Alexander KNA	Alexander KNA
Rhizophagus parallelocollis	Col: Rhizophagidae	Local	saproxylic	Cpt 3a		29/06/04	Alexander KNA	Alexander KNA
Rhizophagus perforatus	Col: Rhizophagidae	Local	saproxylic	Cpt 5	9019	14/05/04	Alexander KNA	Alexander KNA
Rhinosimus planirostris	Col: Salpingidae	Widespread	saproxylic	Cpt 3a		16/09/04	Alexander KNA	Alexander KNA
Rhinosimus planirostris	Col: Salpingidae	Widespread	saproxylic	Cpt 5	9078	22/07/04	Alexander KNA	Alexander KNA
Rhinosimus planirostris	Col: Salpingidae	Widespread	saproxylic	Cpt 5		16/09/04	Alexander KNA	Alexander KNA
Rhinosimus planirostris	Col: Salpingidae	Widespread	saproxylic	Cpt 5	9070	22/07/04	Alexander KNA	Alexander KNA
Rhinosimus planirostris	Col: Salpingidae	Widespread	saproxylic	Cpt 5	9077	22/07/04	Alexander KNA	Alexander KNA
Anaspis frontalis	Col: Scraptidae	Widespread	saproxylic				Alexander KNA	Levey B
Anaspis garneysi	Col: Scraptidae	Widespread	saproxylic				Alexander KNA	Levey B
Anaspis thoracica f septentrionalis	Col: Scraptidae	Na/Nb	saproxylic				Alexander KNA	Levey B
Anaspis fasciata (humeralis)	Col: Scraptiidae	Local	saproxylic	Cpt 9b		14/05/04	Alexander KNA	Alexander KNA
Anaspis frontalis	Col: Scraptiidae	Widespread	saproxylic	Cpt 1b	9052	19/05/04	Alexander KNA	Alexander KNA
Anaspis frontalis	Col: Scraptiidae	Widespread	saproxylic			14/05/04	Alexander KNA	Alexander KNA
Anaspis maculata	Col: Scraptiidae	Widespread	saproxylic	Cpt 14		14/05/04	Alexander KNA	Alexander KNA
Anaspis maculata	Col: Scraptiidae	Widespread	saproxylic	Cpt 9b		14/05/04	Alexander KNA	Alexander KNA
Anaspis regimbarti	Col: Scraptiidae	Widespread	saproxylic	Cpt 9b		14/05/04	Alexander KNA	Alexander KNA
Anaspis regimbarti	Col: Scraptiidae	Widespread	saproxylic			14/05/04	Alexander KNA	Alexander KNA
Anaspis rufilabris	Col: Scraptiidae	Widespread	saproxylic			14/05/04	Alexander KNA	Alexander KNA
Nicrophorus sp	Col: Silphidae	Widespread	generalist	Cpt 5		14/05/04	Alexander KNA	Alexander KNA
Quedius cruentus	Col: Staphylinidae	Widespread	generalist	Cpt 16a	9135	11/10/04	Alexander KNA	Alexander KNA
Quedius cruentus	Col: Staphylinidae	Widespread	generalist	Cpt 5		16/09/04	Alexander KNA	Alexander KNA
Quedius xanthopus	Col: Staphylinidae	Nb/very local	saproxylic	Cpt 5		16/09/04	Alexander KNA	Alexander KNA

Species Identification	Family	Status	Assemblage	Cpt	Tree tag	Date	Collector	Determiner
Corticeus unicolor	Col: Tenebrionidae	RDB3	saproxylic	Cpt 6a	9081	28/06/04	Alexander KNA	Alexander KNA
Eledona agricola	Col: Tenebrionidae	Nb/very local	saproxylic	Cpt 17c		29/06/04	Alexander KNA	Alexander KNA
Eledona agricola	Col: Tenebrionidae	Nb/very local	saproxylic	Cpt 5	9022	14/05/04	Alexander KNA	Alexander KNA
Lagria hirta	Col: Tenebrionidae	Widespread	field layer	Cpt 1b		28/06/04	Alexander KNA	Alexander KNA
Lagria hirta	Col: Tenebrionidae	Widespread	field layer	Cpt 5	9077	22/07/04	Alexander KNA	Alexander KNA
Palorus subdepressus	Col: Tenebrionidae		saproxylic	Cpt 5		16/09/04	Alexander KNA	Alexander KNA
Prionychus ater	Col: Tenebrionidae	Nb	saproxylic	Cpt 16b	9074	11/10/04	Alexander KNA	Alexander KNA
Prionychus ater	Col: Tenebrionidae	Nb	saproxylic	Cpt 19b	9139	11/10/04	Alexander KNA	Alexander KNA
Prionychus ater	Col: Tenebrionidae	Nb	saproxylic	Cpt 1a		29/06/04	Alexander KNA	Alexander KNA
Prionychus ater	Col: Tenebrionidae	Nb	saproxylic	Cpt 3a	9003	14/05/04	Alexander KNA	Alexander KNA
Tribolium castaneum	Col: Tenebrionidae		saproxylic	Cpt 5	9079	28/06/04	Alexander KNA	Alexander KNA
Tribolium castaneum	Col: Tenebrionidae		saproxylic	Cpt 5		16/09/04	Alexander KNA	Alexander KNA
Tetratoma fungorum	Col: Tetratomidae	Local	saproxylic	Cpt 16a	9135	11/10/04	Alexander KNA	Alexander KNA
Tetratoma fungorum	Col: Tetratomidae	Local	saproxylic	Cpt 5		18/11/04	Alexander KNA	Alexander KNA
Trixagus obtusus	Col: Throscidae	Very local	soil	Cpt 5	9015	14/05/04	Alexander KNA	Alexander KNA
Paracrocera orbicularius	Dipt: Acroceridae	Very local	field layer	Cpt 3a	9007	29/06/04	Alexander KNA	Alexander KNA
Paracrocera orbicularius	Dipt: Acroceridae	Very local	field layer	Cpt 5	9078	28/06/04	Alexander KNA	Alexander KNA
Medetera diadema	Dipt: Dolichopodidae	Local	saproxylic	Cpt 17a		29/06/04	Alexander KNA	Alexander KNA
Medetera melancholica	Dipt: Dolichopodidae	RDB3	saproxylic	Cpt 1a		29/06/04	Alexander KNA	Alexander KNA
Medetera pallipes	Dipt: Dolichopodidae	Local	saproxylic	Cpt 5	9097	22/07/04	Alexander KNA	Alexander KNA
Medetera saxatilis	Dipt: Dolichopodidae	Local	saproxylic	Cpt 19b		29/06/04	Alexander KNA	Alexander KNA
Medetera saxatilis	Dipt: Dolichopodidae	Local	saproxylic	Cpt 5	9076	28/06/04	Alexander KNA	Alexander KNA
Medetera truncorum	Dipt: Dolichopodidae	Widespread	saproxylic	Cpt 6a		28/06/04	Alexander KNA	Alexander KNA
Rhagio tringarius	Dipt: Rhagionidae	Widespread	field layer	Cpt 14		14/05/04	Alexander KNA	Alexander KNA
Chorisops tibialis	Dipt: Stratiomyidae	Widespread	canopy foliage	Cpt 5	9069	22/07/04	Alexander KNA	Alexander KNA
Pachygaster atra	Dipt: Stratiomyidae	Widespread	saproxylic	Cpt 1a		29/06/04	Alexander KNA	Alexander KNA
Pachygaster atra	Dipt: Stratiomyidae	Widespread	saproxylic	Cpt 5	9069	22/07/04	Alexander KNA	Alexander KNA
Pachygaster atra	Dipt: Stratiomyidae	Widespread	saproxylic	Cpt 5	9070	22/07/04	Alexander KNA	Alexander KNA
Brachyopa sp	Dipt: Syrphidae	Very local	saproxylic	Cpt 3a	9009	14/05/04	Alexander KNA	Alexander KNA
Criorhina floccosa	Dipt: Syrphidae	Very local	saproxylic	Cpt 9b		14/05/04	Alexander KNA	Alexander KNA
Pocota personata	Dipt: Syrphidae	RDB2	saproxylic	Cpt 16a	9071	19/05/04	Alexander KNA	Alexander KNA
Thereva nobilitata	Dipt: Therevidae	Very local	saproxylic	Cpt 9b		14/05/04	Alexander KNA	Alexander KNA
Xylophagus ater	Dipt: Xylophagidae	Very local	saproxylic	Cpt 14		14/05/04	Alexander KNA	Alexander KNA

Species Identification	Family	Status	Assemblage	Cpt	Tree tag	Date	Collector	Determiner
Xylophagus ater	Dipt: Xylophagidae	Very local	saproxylic	Cpt 1a		16/09/04	Alexander KNA	Alexander KNA
Xylophagus ater	Dipt: Xylophagidae	Very local	saproxylic	Cpt 5		18/11/04	Alexander KNA	Alexander KNA
Xylophagus ater	Dipt: Xylophagidae	Very local	saproxylic	Cpt 5	9077	22/07/04	Alexander KNA	Alexander KNA
Anthocoris nemorum	Hem: Anthocoridae	Widespread	canopy foliage	Cpt 13a		14/05/04	Alexander KNA	Alexander KNA
Anthocoris nemorum	Hem: Anthocoridae	Widespread	canopy foliage	Cpt 13b		14/05/04	Alexander KNA	Alexander KNA
Xylocoris cursitans	Hem: Anthocoridae	Local	saproxylic	Cpt 3a	9003	14/05/04	Alexander KNA	Alexander KNA
Xylocoris cursitans	Hem: Anthocoridae	Local	saproxylic	Cpt 5	9079	28/06/04	Alexander KNA	Alexander KNA
Xylocoris cursitans	Hem: Anthocoridae	Local	saproxylic	Cpt 5		16/09/04	Alexander KNA	Alexander KNA
Aradus depressus	Hem: Aradidae	Local	saproxylic	Cpt 5		14/05/04	Alexander KNA	Alexander KNA
Iassus lanio	Hem: Cicadellidae	Widespread	canopy foliage	Cpt 5	9078	28/06/04	Alexander KNA	Alexander KNA
Kermes	Hem: Coccoidea	Widespread		Cpt 1a		16/09/04	Alexander KNA	Alexander KNA
Loricula elegantula	Hem: Microphysidae	Widespread	epiphyte	Cpt 3a		29/06/04	Alexander KNA	Alexander KNA
Deraeocoris lutescens	Hem: Miridae	Widespread	canopy foliage	Cpt 3a		29/06/04	Alexander KNA	Alexander KNA
Dryophilocoris flavoquadrimaculatus	Hem: Miridae	Widespread	canopy foliage	Cpt 13a		14/05/04	Alexander KNA	Alexander KNA
Harpocera thoracica	Hem: Miridae	Widespread	canopy foliage	Cpt 13a		14/05/04	Alexander KNA	Alexander KNA
Phylus melanocephalus	Hem: Miridae	Widespread	canopy foliage	Cpt 3a		29/06/04	Alexander KNA	Alexander KNA
Chrysis angustula	Hym: Chrysididae	Widespread	saproxylic	Cpt 5	9080	28/06/04	Alexander KNA	Alexander KNA
Trichrysis cyanea	Hym: Chrysididae	Local	saproxylic	Cpt 5	9080	28/06/04	Alexander KNA	Alexander KNA
Dipogon subintermedius	Hym: Pompilidae	Local	saproxylic	Cpt 2b		28/06/04	Alexander KNA	Alexander KNA
Dipogon subintermedius	Hym: Pompilidae	Local	saproxylic	Cpt 3a		29/06/04	Alexander KNA	Alexander KNA
Dipogon subintermedius	Hym: Pompilidae	Local	saproxylic	Cpt 3a		29/06/04	Alexander KNA	Alexander KNA
Dipogon subintermedius	Hym: Pompilidae	Local	saproxylic	Cpt 5	9079	28/06/04	Alexander KNA	Alexander KNA
Dipogon subintermedius	Hym: Pompilidae	Local	saproxylic	Cpt 5		16/09/04	Alexander KNA	Alexander KNA
Dipogon subintermedius	Hym: Pompilidae	Local	saproxylic	Cpt 5	9021	28/06/04	Alexander KNA	Alexander KNA
Dipogon subintermedius	Hym: Pompilidae	Local	saproxylic	Cpt 5	9075	28/06/04	Alexander KNA	Alexander KNA
Dipogon subintermedius	Hym: Pompilidae	Local	saproxylic	Cpt 5	9076	28/06/04	Alexander KNA	Alexander KNA
Crossocerus quadrimaculatus	Hym: Sphecidae	Local	saproxylic	Cpt 1a		29/06/04	Alexander KNA	Alexander KNA
Crossocerus cetratus	Hym: Sphecidae	Local	saproxylic			29/06/04	Alexander KNA	Alexander KNA
Ectemnius continuus	Hym: Sphecidae	Local	saproxylic	Cpt 1a		29/06/04	Alexander KNA	Alexander KNA
Passaloecus corniger	Hym: Sphecidae	Local	saproxylic	Cpt 6b	9068	28/06/04	Alexander KNA	Alexander KNA
Stigmus solskyi	Hym: Sphecidae	Local	saproxylic	Cpt 1a		29/06/04	Alexander KNA	Alexander KNA
Trypoxylon clavicerum	Hym: Sphecidae					28/06/04	Alexander KNA	Alexander KNA

Species Identification	Family	Status	Assemblage	Cpt	Tree tag	Date	Collector	Determiner
Vespa crabro	Hym: Vespidae	Local	saproxylic	Cpt 16a		29/06/04	Alexander KNA	Alexander KNA
Vespa crabro	Hym: Vespidae	Local	saproxylic	Cpt 1a		19/05/04	Alexander KNA	Alexander KNA
Meconema thalassinum	Orthoptera	Widespread	canopy foliage	Cpt 1a		29/06/04	Alexander KNA	Alexander KNA
Meconema thalassinum	Orthoptera	Widespread	canopy foliage	Cpt 2b	9064	28/06/04	Alexander KNA	Alexander KNA
Meconema thalassinum	Orthoptera	Widespread	canopy foliage	Cpt 3a		29/06/04	Alexander KNA	Alexander KNA
Meconema thalassinum	Orthoptera	Widespread	canopy foliage	Cpt 5	9078	28/06/04	Alexander KNA	Alexander KNA
Meconema thalassinum	Orthoptera	Widespread	canopy foliage	Cpt 5	9078	22/07/04	Alexander KNA	Alexander KNA
Meconema thalassinum	Orthoptera	Widespread	canopy foliage	Cpt 5		28/06/04	Alexander KNA	Alexander KNA
Amphigerontia bifasciata	Psocoptera	Local	epiphyte	Cpt 5	9078	22/07/04	Alexander KNA	Alexander KNA
Amphigerontia contaminata	Psocoptera	Local	epiphyte	Cpt 5	9078	28/06/04	Alexander KNA	Alexander KNA
Caecilius flavidus	Psocoptera	Widespread	epiphyte	Cpt 17d		11/10/04	Alexander KNA	Alexander KNA
Caecilius flavidus	Psocoptera	Widespread	epiphyte	Cpt 3a		16/09/04	Alexander KNA	Alexander KNA
Caecilius flavidus	Psocoptera	Widespread	epiphyte	Cpt 5	9069	22/07/04	Alexander KNA	Alexander KNA
Ectopsocus briggsi	Psocoptera	Widespread	epiphyte	Cpt 13b		14/05/04	Alexander KNA	Alexander KNA
Ectopsocus briggsi	Psocoptera	Widespread	epiphyte	Cpt 17d		11/10/04	Alexander KNA	Alexander KNA
Ectopsocus petersi	Psocoptera	Widespread	epiphyte	Cpt 3a		16/09/04	Alexander KNA	Alexander KNA
Ectopsocus petersi	Psocoptera	Widespread	epiphyte	Cpt 5	9078	28/06/04	Alexander KNA	Alexander KNA
Ectopsocus petersi	Psocoptera	Widespread	epiphyte	Cpt 5	9078	22/07/04	Alexander KNA	Alexander KNA
Ectopsocus petersi	Psocoptera	Widespread	epiphyte	Cpt 5	9079	28/06/04	Alexander KNA	Alexander KNA
Ectopsocus petersi	Psocoptera	Widespread	epiphyte	Cpt 5		14/05/04	Alexander KNA	Alexander KNA
Elipsocus hyalinus	Psocoptera	Widespread	epiphyte	Cpt 3a	9003	14/05/04	Alexander KNA	Alexander KNA
Elipsocus hyalinus	Psocoptera	Widespread	epiphyte	Cpt 3a	9009	14/05/04	Alexander KNA	Alexander KNA
Elipsocus hyalinus	Psocoptera	Widespread	epiphyte	Cpt 5	9078	28/06/04	Alexander KNA	Alexander KNA
Elipsocus hyalinus	Psocoptera	Widespread	epiphyte	Cpt 5	9079	28/06/04	Alexander KNA	Alexander KNA
Elipsocus hyalinus	Psocoptera	Widespread	epiphyte	Cpt 5	9070	22/07/04	Alexander KNA	Alexander KNA
Elipsocus hyalinus	Psocoptera	Widespread	epiphyte	Cpt 5	9077	22/07/04	Alexander KNA	Alexander KNA
Graphopsocus cruciatus	Psocoptera	Widespread	epiphyte	Cpt 17d		11/10/04	Alexander KNA	Alexander KNA
Graphopsocus cruciatus	Psocoptera	Widespread	epiphyte	Cpt 5	9069	22/07/04	Alexander KNA	Alexander KNA
Loensia variegata	Psocoptera	Local	epiphyte	Cpt 3a		16/09/04	Alexander KNA	Alexander KNA
Loensia variegata	Psocoptera	Local	epiphyte	Cpt 5	9078	22/07/04	Alexander KNA	Alexander KNA
Loensia variegata	Psocoptera	Local	epiphyte	Cpt 5	9028	16/09/04	Alexander KNA	Alexander KNA
Mesopsocus unipunctatus	Psocoptera	Widespread	epiphyte	Cpt 5	9078	28/06/04	Alexander KNA	Alexander KNA
Mesopsocus unipunctatus	Psocoptera	Widespread	epiphyte	Cpt 5	9069	22/07/04	Alexander KNA	Alexander KNA

Species Identification	Family	Status	Assemblage	Cpt	Tree tag	Date	Collector	Determiner
Mesopsocus unipunctatus	Psocoptera	Widespread	epiphyte	Cpt 5	9070	22/07/04	Alexander KNA	Alexander KNA
Peripsocus didymus	Psocoptera	Widespread	epiphyte	Cpt 5	9078	28/06/04	Alexander KNA	Alexander KNA
Peripsocus didymus	Psocoptera	Widespread	epiphyte	Cpt 5	9079	28/06/04	Alexander KNA	Alexander KNA
Peripsocus milleri	Psocoptera	Local	epiphyte	Cpt 2c		19/05/04	Alexander KNA	Alexander KNA
Peripsocus subfasciatus	Psocoptera	Local	epiphyte	Cpt 1b	9046	28/06/04	Alexander KNA	Alexander KNA
Peripsocus subfasciatus	Psocoptera	Local	epiphyte	Cpt 5	9078	28/06/04	Alexander KNA	Alexander KNA
Peripsocus subfasciatus	Psocoptera	Local	epiphyte	Cpt 5	9078	22/07/04	Alexander KNA	Alexander KNA
Peripsocus subfasciatus	Psocoptera	Local	epiphyte	Cpt 5	9079	28/06/04	Alexander KNA	Alexander KNA
Peripsocus subfasciatus	Psocoptera	Local	epiphyte	Cpt 5	9079	16/09/04	Alexander KNA	Alexander KNA
Peripsocus subfasciatus	Psocoptera	Local	epiphyte	Cpt 5	9017	22/07/04	Alexander KNA	Alexander KNA
Philotarsus parviceps	Psocoptera	Local	epiphyte	Cpt 3a		16/09/04	Alexander KNA	Alexander KNA
Philotarsus parviceps	Psocoptera	Local	epiphyte	Cpt 5	9079	16/09/04	Alexander KNA	Alexander KNA
Philotarsus parviceps	Psocoptera	Local	epiphyte	Cpt 5	9028	16/09/04	Alexander KNA	Alexander KNA
Philotarsus parviceps	Psocoptera	Local	epiphyte	Cpt 5	9069	22/07/04	Alexander KNA	Alexander KNA
Philotarsus parviceps	Psocoptera	Local	epiphyte	Cpt 5	9070	22/07/04	Alexander KNA	Alexander KNA
Philotarsus parviceps	Psocoptera	Local	epiphyte	Cpt 5	9077	22/07/04	Alexander KNA	Alexander KNA
Psococerastis gibbosa	Psocoptera	Local	epiphyte	Cpt 5	9069	22/07/04	Alexander KNA	Alexander KNA
Stenopsocus immaculatus	Psocoptera	Widespread	epiphyte	Cpt 6a	9085	28/06/04	Alexander KNA	Alexander KNA
Raphidia	Raphidioptera	Local	saproxylic	Cpt 3a		16/09/04	Alexander KNA	Alexander KNA
Salticus cingulatus	Araneae	Local	epiphyte	Cpt 1a		19/05/04	Alexander KNA	Haigh DJR
Sitticus pubescens	Araneae	Local	epiphyte	Cpt 1a		29/06/04	Alexander KNA	Haigh DJR
Nuctenea umbratica	Araneae	Widespread		Cpt 16a	9138	11/10/04	Alexander KNA	Alexander KNA
Nuctenea umbratica	Araneae	Widespread		Cpt 17c		11/10/04	Alexander KNA	Alexander KNA
Nuctenea umbratica	Araneae	Widespread		Cpt 5	9079	28/06/04	Alexander KNA	Alexander KNA
Chernes cimicoides	Pseudoscorpiones	Local	saproxylic	Cpt 3a	9003	14/05/04	Alexander KNA	Alexander KNA
Chernes cimicoides	Pseudoscorpiones	Local	saproxylic	Cpt 5	9079	22/07/04	Alexander KNA	Alexander KNA
Chernes cimicoides	Pseudoscorpiones	Local	saproxylic	Cpt 5	9022	14/05/04	Alexander KNA	Alexander KNA
Chernes cimicoides	Pseudoscorpiones	Local	saproxylic	Cpt 6a	9083	28/06/04	Alexander KNA	Alexander KNA
Chernes cimicoides	Pseudoscorpiones	Local	saproxylic	Cpt 9b		14/05/04	Alexander KNA	Alexander KNA
Lamprochernes chyzeri	Pseudoscorpiones	Local	saproxylic	Cpt 6a	9081	28/06/04	Alexander KNA	Alexander KNA
Oniscus asellus	Oniscoidea	Widespread	generalist	Cpt 13b		14/05/04	Alexander KNA	Alexander KNA
Porcellio scaber	Oniscoidea	Widespread	generalist	Cpt 13b		14/05/04	Alexander KNA	Alexander KNA
Porcellio scaber	Oniscoidea	Widespread	generalist	Cpt 1a		19/05/04	Alexander KNA	Alexander KNA

Species Identification	Family	Status	Assemblage	Cpt	Tree tag	Date	Collector	Determiner
Porcellio scaber	Oniscoidea	Widespread	generalist	Cpt 3a		14/05/04	Alexander KNA	Alexander KNA
Cylindroiulus punctatus	Diplopoda	Widespread	saproxylic	Cpt 1a		19/05/04	Alexander KNA	Alexander KNA
Cylindroiulus punctatus	Diplopoda	Widespread	saproxylic	Cpt 3a		14/05/04	Alexander KNA	Alexander KNA
Proteroiulus fuscus	Diplopoda	Widespread	saproxylic	Cpt 13b		14/05/04	Alexander KNA	Alexander KNA
Limax marginatus	Mollusca	Widespread	epiphyte	Cpt 13b		14/05/04	Alexander KNA	Alexander KNA
Limax marginatus	Mollusca	Widespread	epiphyte	Cpt 3a		14/05/04	Alexander KNA	Alexander KNA
Fistulina hepatica	Fungi	Widespread	saproxylic	Cpt 16a	9070	19/05/04	Alexander KNA	Alexander KNA
Fistulina hepatica	Fungi	Widespread	saproxylic	Cpt 16a	9137	11/10/04	Alexander KNA	Alexander KNA
Fistulina hepatica	Fungi	Widespread	saproxylic	Cpt 18		11/10/04	Alexander KNA	Alexander KNA
Fistulina hepatica	Fungi	Widespread	saproxylic	Cpt 6a		16/09/04	Alexander KNA	Alexander KNA
Ganoderma adspersa	Fungi	Widespread	saproxylic	Cpt 12a	9045	19/05/04	Alexander KNA	Alexander KNA
Ganoderma adspersa	Fungi	Widespread	saproxylic	Cpt 17d		29/06/04	Alexander KNA	Alexander KNA
Ganoderma adspersa	Fungi	Widespread	saproxylic	Cpt 1a		19/05/04	Alexander KNA	Alexander KNA
Ganoderma adspersa	Fungi	Widespread	saproxylic	Cpt 2b	9033	19/05/04	Alexander KNA	Alexander KNA
Ganoderma adspersa	Fungi	Widespread	saproxylic	Cpt 5	9096	22/07/04	Alexander KNA	Alexander KNA
Ganoderma adspersa	Fungi	Widespread	saproxylic	Cpt 5	9098	22/07/04	Alexander KNA	Alexander KNA
Ganoderma adspersa	Fungi	Widespread	saproxylic	Cpt 6a	9083	28/06/04	Alexander KNA	Alexander KNA
Ganoderma adspersa	Fungi	Widespread	saproxylic	Cpt 6a	9083	16/09/04	Alexander KNA	Alexander KNA
Ganoderma pfeifferi	Fungi	Rare	saproxylic	Cpt 16a	9088	29/06/04	Alexander KNA	Ainsworth M
Ganoderma resinaceum	Fungi	Very local	saproxylic	Cpt 17d		11/10/04	Alexander KNA	Alexander KNA
Ganoderma resinaceum	Fungi	Very local	saproxylic	Cpt 5		16/09/04	Alexander KNA	Alexander KNA
Grifola frondosa	Fungi	Very local	saproxylic	Cpt 16a	9136	11/10/04	Alexander KNA	Alexander KNA
Inonotus cuticularis	Fungi	Very local	saproxylic	Cpt 16a	9071	19/05/04	Alexander KNA	Alexander KNA
Inonotus cuticularis	Fungi	Very local	saproxylic	Cpt 16a	9072	19/05/04	Alexander KNA	Alexander KNA
Inonotus dryadeus	Fungi	Local	saproxylic	Cpt 16a	9136	11/10/04	Alexander KNA	Alexander KNA
Inonotus hispidus	Fungi	Widespread	saproxylic	Cpt 10	9128	11/10/04	Alexander KNA	Alexander KNA
Inonotus hispidus	Fungi	Widespread	saproxylic	Cpt 10	9133	11/10/04	Alexander KNA	Alexander KNA
Inonotus hispidus	Fungi	Widespread	saproxylic	Cpt 15		16/09/04	Alexander KNA	Alexander KNA
Inonotus hispidus	Fungi	Widespread	saproxylic	Cpt 9b	9121	11/10/04	Alexander KNA	Alexander KNA
Inonotus hispidus	Fungi	Widespread	saproxylic	Cpt 9b	9125	11/10/04	Alexander KNA	Alexander KNA
Inonotus hispidus	Fungi	Widespread	saproxylic	Cpt 9b		14/05/04	Alexander KNA	Alexander KNA
Laetiporus sulphureus	Fungi	Widespread	saproxylic	Cpt 4	9100	22/07/04	Alexander KNA	Alexander KNA
Laetiporus sulphureus	Fungi	Widespread	saproxylic	Cpt 5	9069	19/05/04	Alexander KNA	Alexander KNA

Species Identification	Family	Status	Assemblage	Cpt	Tree tag	Date	Collector	Determiner
Peniophora quercina	Fungi	Widespread	saproxylic	Cpt 5	9028	16/09/04	Alexander KNA	Alexander KNA
Polyporus squamosus	Fungi	Widespread	saproxylic	Cpt 16a		29/06/04	Alexander KNA	Alexander KNA
Polyporus squamosus	Fungi	Widespread	saproxylic	Cpt 5	9096	22/07/04	Alexander KNA	Alexander KNA
Polyporus squamosus	Fungi	Widespread	saproxylic	Cpt 6b	9096	11/10/04	Alexander KNA	Alexander KNA

ENGLISH NATURE

Research Information Note

English Nature Research Reports, No. 691

Saproxylic Invertebrate Survey, assessment and management recommendations of Calke Park, Derbyshire

Report Authors: Dr Keith N. A. Alexander & D Abrahams (ed) 2006

Keywords: saproxylic, invertebrates, wood-pasture, parkland

Introduction

Calke Park is an historic parkland known to be of considerable importance for invertebrate conservation. . The outstanding nature conservation interests have been recognised by English Nature by designation of the richest areas as a Site of Special Scientific Interest (SSSI) and subsequent declaration as a National Nature Reserve (NNR). This document assessed the saproxylic invertebrate assemblage in order to assess their current condition, national importance and whether current management practices are sufficient to conserve the invertebrate fauna.

What was done

A saproxylic invertebrate survey was carried out through the field season of 2004. This survey included areas of parkland outside the SSSI and NNR boundaries. The saproxylic invertebrate assemblage was assessed in order to ascertain the current condition, national importance and whether current management practices are sufficient to conserve the invertebrate fauna.

Results and conclusions

The survey found two additional Red Data Book beetle species - *Corticeus unicolor* and *Procraerus tibialis* - and six of nationally scarce status of which the most important is *Aplocnemus nigricornis*, a species not previously reported from Derbyshire. Important beetle species already known from the site were also found – eight nationally scarce species and two of British Red Data Book status – *Anaspis septentrionalis* and *Ernoporicus caucasicus*.

Thirteen key national beetle rarities are now known from the wider Calke Abbey parkland. The affinities of this fauna are with Sherwood Forest in particular and the northern fringes of the main Temperate broad-leaved old growth fauna of lowland Britain.

Continued …

The saproxylic beetle fauna was assessed in terms of its nature conservation importance using two established methodologies. The Index of Ecological Continuity (IEC) for the parkland is a minimum of 76, indicating a site of very high national importance, and the Site Quality Index (SQI) is 453 and also suggests national importance.

While falling slightly short of the currently recommended 80 for European significance, the IEC does place Calke Park as the eleventh most important site in Britain for saproxylic beetles and second only to Sherwood Forest in the northern half of Britain. Only one other site of this quality for old growth communities is in the care of the National Trust, Hatfield Forest in Essex.

It is also relevant that records from the wider Calke landscape do include a number of species which have so far not been found in the park itself but almost certainly occur there. The incorporation of these records into the Calke Park list results in an IEC of 84, which exceeds the threshold for European significance, and raises Calke to seventh place in GB importance, ahead of famous wood-pasture sites such as Burnham Beeches and Hatfield Forest.

English Nature's viewpoint

The results suggest that Calke Park is of high national, and probably international importance for its saproxylic invertebrate assemblage. The current management practices on much of the site are sympathetic with maintaining this interest in the short-medium term. However, wood-pasture creation on adjacent land may be essential to maintain the invertebrate interest in the long-term. In addition, further survey on the wider Calke Abbey estate with its treescape extending out from the parkland should be carried out to establish the importance of this resource.

Selected references

ALEXANDER, K.N.A. 1996. Historic parks and pasture-woodlands: the National Trust resource and its conservation. *Biological Journal of the Linnean Society*, 56 (Suppl.), 155-175.

ALEXANDER, K.N.A. 2002. The invertebrates of living and decaying timber in Britain and Ireland – a provisional annotated checklist. *English Nature Research Reports*, No. 467.

FOWLES, A.P., ALEXANDER, K.N.A., & KEY, R.S. 1999. The Saproxylic Quality Index: evaluating wooded habitats for the conservation of dead-wood Coleoptera. *The Coleopterist,* 8, 121-141.

Further information

English Nature Research Reports and their *Research Information Notes* are available to download from our website: www.english-nature.org.uk

For a printed copy of the full report, or for information on other publications on this subject, please contact the Enquiry Service on 01733 455100/101/102 or e-mail enquiries@english-nature.org.uk

ENGLISH NATURE

English Nature is the Government agency that champions the conservation of wildlife and geology throughout England.

This is one of a range of publications published by:
External Relations Team
English Nature
Northminster House
Peterborough PE1 1UA

www.english-nature.org.uk

Cover printed on Character Express, post consumer waste paper, ECF.

ISSN 0967-876X

Cover designed and printed by Status Design & Advertising, 2M, 5M, 5M.

Front cover photographs:
Top left: Using a home-made moth trap.
Peter Wakely/English Nature 17,396
Middle left: Co_2 experiment at Roudsea Wood and Mosses NNR, Lancashire.
Peter Wakely/English Nature 21,792
Bottom left: Radio tracking a hare on Pawlett Hams, Somerset.
Paul Glendell/English Nature 23,020
Main: Identifying moths caught in a moth trap at Ham Wall NNR, Somerset.
Paul Glendell/English Nature 24,888