

SAPROXYLIC INVERTEBRATE SURVEY OF PETWORTH DEER PARK



MARK G. TELFER

12TH NOVEMBER 2020

WITH MINOR REVISIONS: 20TH NOVEMBER 2020

AND FURTHER REVISIONS: 27TH JANUARY 2021

THIS REPORT WAS PRODUCED FOR BUGLIFE: THE INVERTEBRATE CONSERVATION TRUST

Dr. Mark G. Telfer MA (CANTAB), MCIEEM
10, Northall Road
Eaton Bray
DUNSTABLE
LU6 2DQ
mark.g.telfer@btinternet.com

This report should be quoted as:

Telfer, M.G. (2020). *Saproxyllic invertebrate survey of Petworth Deer Park*. Report to Buglife: the Invertebrate Conservation Trust.

Contents

1	SUMMARY	4
2	INTRODUCTION	5
2.1	PREVIOUS SURVEY WORK	5
2.2	AIMS	7
3	METHODS	7
3.1	SAMPLING METHODS	8
3.1.1	<i>Sampling for saproxyllic invertebrates.....</i>	<i>8</i>
3.1.2	<i>Autocatcher</i>	<i>9</i>
3.2	SUBTERRANEAN PITFALL TRAPS.....	9
3.3	AERIAL INTERCEPTION TRAPS	13
3.3.1	<i>Aerial interception trap: vane trap</i>	<i>14</i>
3.3.2	<i>Aerial interception trap: single 2 litre bottle.....</i>	<i>16</i>
3.4	TAXONOMIC COVERAGE	19
3.5	IDENTIFICATION	19
3.6	ANALYSIS.....	20
3.6.1	<i>Key species</i>	<i>20</i>
3.6.2	<i>Saproxyllic invertebrates.....</i>	<i>20</i>
3.7	CONSTRAINTS	22
4	RESULTS.....	22
4.1	OVERALL RESULTS AND KEY SPECIES ANALYSIS	22
4.2	SAPROXYLIC INVERTEBRATES	26
4.2.1	<i>Saproxyllic Quality Index.....</i>	<i>26</i>
4.2.2	<i>Index of Ecological Continuity.....</i>	<i>26</i>
4.3	KEY SPECIES ACCOUNTS	26
5	DISCUSSION	50
5.1	SITE ASSESSMENT IN A NATIONAL AND COUNTY CONTEXT.....	50
5.2	COMPARISON TO PREVIOUS SURVEYS.....	51
6	RECOMMENDATIONS	52
7	ACKNOWLEDGEMENTS.....	56
8	REFERENCES	56
	APPENDIX 1: BRITISH CONSERVATION STATUS CATEGORIES – DEFINITIONS.....	60
	APPENDIX 2: LIST OF INVERTEBRATES RECORDED AT PETWORTH DEER PARK IN 2020 BY MARK G. TELFER ..	64

1 Summary

- An invertebrate survey, focused on saproxylic invertebrates (species associated with dead and decaying wood, etc.), was carried out at Petworth Deer Park in 2020, repeating a similar survey carried out by the author in 2010.
- Fieldwork was conducted on four visits between 3rd June and 15th September 2020. Three subterranean pitfall traps and three aerial interception traps were operated throughout the period.
- The survey identified 366 species of invertebrate, with a focus on beetles as the key indicator group for saproxylic habitats: 234 species of beetle were recorded.
- Amongst the discoveries, the false click-beetle *Hylis cariniceps* was only known from four British individuals and is new to Sussex.
- 56 species (15.3% of the 366) are here regarded as 'Key Species' (i.e., with rare, scarce, threatened or near threatened conservation status). This is a very high percentage, indicating a site of national importance.
- The Saproxylic Quality Index (SQI) for Petworth Deer Park based on all surveys and other collated records to date is 569.2, based on 198 scoring species, the 27th highest British SQI and the 3rd highest Sussex SQI. This indicates a site of national importance, approaching international importance.
- The Index of Ecological Continuity (IEC) for Petworth Deer Park is 87 based on 59 species, including eight Grade 1 indicators of ecological continuity, the 17th highest British IEC and the highest of any Sussex site. This indicates a continuity of high quality deadwood habitats from ancient times to the present, and suggests a site of international importance.
- All the lines of evidence show that Petworth Deer Park is unquestionably a site of national importance for invertebrates, particularly for saproxylic invertebrates. It could be regarded as a site of international importance for saproxylic invertebrates.
- Petworth Deer Park has improved as a site for saproxylic invertebrates in the decade since it was last surveyed.
- Saproxylic invertebrates and their habitats might now be regarded as the most important feature of Petworth Park.
- It is recommended that a zone map of the Deer Park be drawn up, showing which areas will be managed principally to conserve the saproxylic fauna and which areas will be managed principally to maintain the designed Capability Brown landscape.
- Different management recommendations are discussed for each zone.

2 Introduction

The Petworth House and Park National Trust (NT) property includes a Deer Park of about 283 hectares surrounding the late 17th century Petworth House (Figure 1). Petworth's Deer Park and Pleasure Ground were landscaped between 1752 and 1763 by Lancelot 'Capability' Brown. Under the 3rd Earl of Egremont, landscaping works continued and expanded in the park in subsequent decades up to 1837. A deer park already existed before Capability Brown's landscaping works, having been established at Petworth in the 13th century for the Earl of Northumberland. The large herd of Fallow Deer which currently roams the park was reportedly hunted by King Henry VIII on his visit to Petworth in 1537. Prior to the establishment of a Deer Park in the 13th century, it is likely that the natural landscape was not dissimilar, with large herbivores grazing and browsing amongst scattered, mature, open-grown trees. Petworth is first mentioned in the Domesday Book of 1086 as an independent manor with 1000 acres of land including church, mill, meadow and wood.

Petworth Deer Park lies in the South Downs National Park in West Sussex, entirely within the grid square SU92 with a centroid at about SU967226. It is largely surrounded by farmland but with the village of Petworth to the south-east, and blocks of woodland to the north and north-west. It is less than 6 km from another important parkland at Cowdray Park to the west, less than 3 km from the ancient wood-pasture of Ebernoe Common to the north-north-east, and less than 4 km from the ancient wood-pasture of The Mens to the east. Parham Park is only a little more remote, at just under 11 km away to the south-east.

The author was commissioned by Buglife in 2020 to carry out a survey of 'saproxylic invertebrates' (defined below) at Petworth Deer Park. This work forms part of the Ancients of the Future project for Back from the Brink, led by Buglife.

'Saproxylic invertebrates' are often, and more loosely, referred to as 'deadwood invertebrates' but as the following definition shows, saproxylic species are often associated with features of damaged and decaying, but not dead, wood. Saproxylic invertebrates may be defined as those species 'dependent upon microhabitats associated largely with the processes of damage and decay in the bark and wood of trees and larger woody shrubs and climbers. This includes sap runs, fungal hyphae or fruiting bodies, rot holes, etc.

2.1 PREVIOUS SURVEY WORK

The most important group of saproxylic invertebrates is the beetles (Coleoptera) and the two site assessment indices (Saproxylic Quality Index (SQI) and Index of Ecological Continuity (IEC); described in detail in Section 3.6.2) are both calculated using data on saproxylic beetles. There have been two previous saproxylic invertebrate surveys of Petworth Deer Park, both of which focused on beetles.

The first survey of the saproxylic beetles and other invertebrates of Petworth Park was carried out by Jonty Denton over the course of 10 visits between July 2001 and June 2002 (Denton, 2002, 2003). In addition to standard field methods, bottle traps primed with a "fermenting 'sap' mix" were placed in hollows at the bases of two of the largest oaks. Denton (2002) used the results of this survey, plus a few earlier records from other coleopterists (dating back to 1988) to evaluate the habitat quality and historical continuity of Petworth Park for saproxylic beetles. He found Petworth Park to be the 47th best site in Britain (based on a SQI of 437.3) and to be a site of national importance for the conservation

Saproxyllic invertebrate survey of Petworth Deer Park

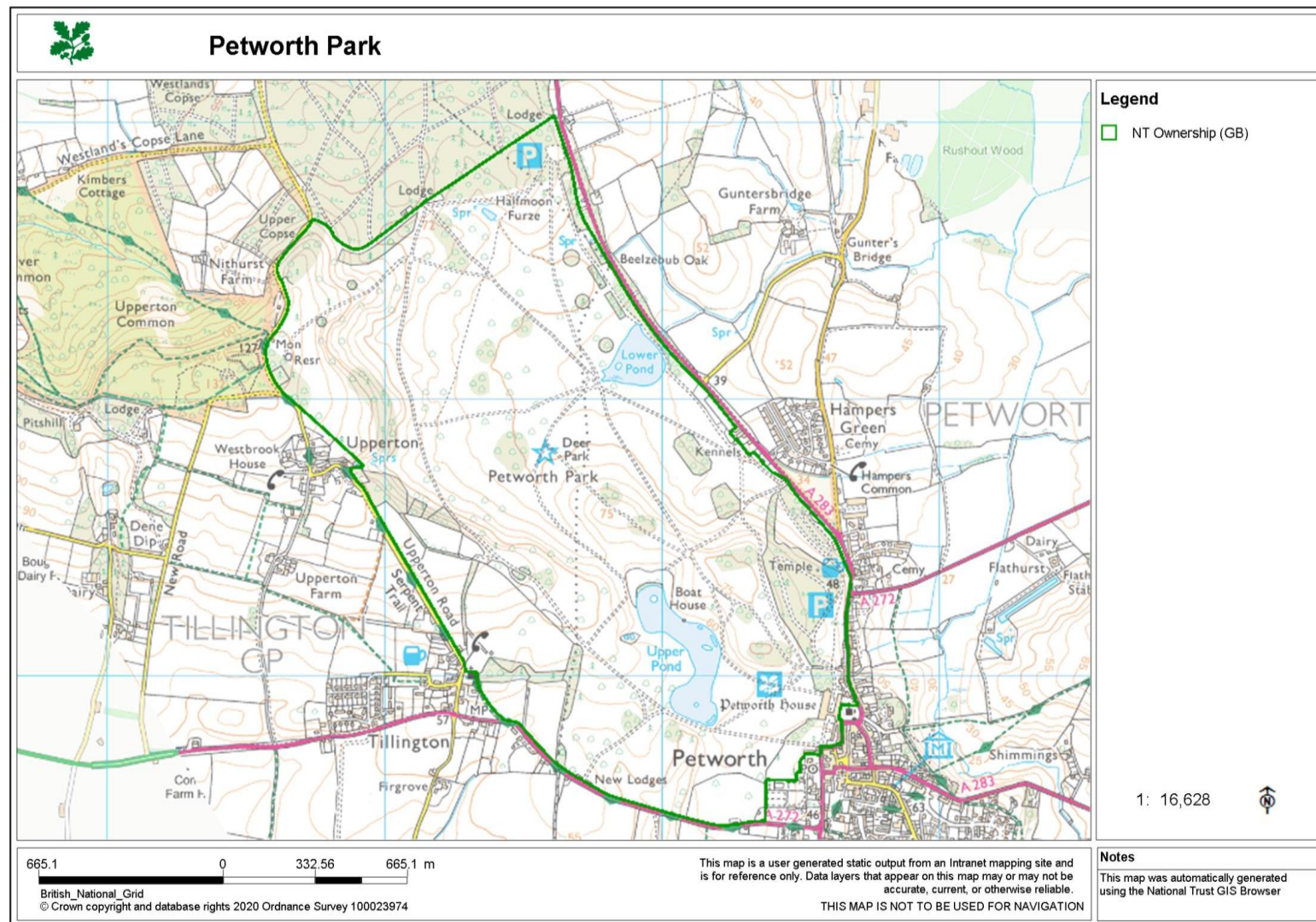


Figure 1: Map of Petworth House and Park, with the green outline defining the National Trust ownership.

of these invertebrates. As further sites have been surveyed and added to the rankings in subsequent years, Petworth Park has slipped down to 76th position in the rankings table¹.

The second such survey was carried out by the current author over the course of four visits between 5th May and 23rd August 2010. As well as using a wide range of more routine sampling methods, three subterranean pitfall traps were deployed at the roots of trees throughout the survey period (Telfer, 2010). This survey firmly established that Petworth is a site of national importance, even more so than had been recognised by Denton (2003), with an increased SQI of 475.9 (increased from 437.3); at the time of writing, this would place Petworth Park as the 59th best site in Britain. From the 2010 survey, Petworth's IEC increased from 49 to 60, indicating a nationally important, ancient site which has supported good habitats for saproxylic invertebrates over many centuries.

In addition to the surveys described above, Peter J. Hodge (*in litt.*, Jan. 2021) carried out a brief survey on 8th June 1988 at the behest of English Nature. The records from this survey have been entered at the Sussex Biodiversity Records Centre. Peter advises that his records include "several saproxylics not on your list including *Malthinus frontalis*, *Ochina ptinoides* and *Mycetophagus atomarius*."

2.2 Aims

The aim of this survey was to carry out a thorough survey of the saproxylic invertebrates of Petworth Deer Park, targeting saproxylic beetles especially, and using a range of sampling methods including aerial interception trapping and subterranean pitfall trapping. The results are to be used to assess the quality of the Deer Park for saproxylic invertebrates, drawing comparisons with previous surveys, and making management recommendations where appropriate.

3 Methods

Survey fieldwork was carried out over the course of four visits during 2020 (Table 1). All fieldwork was carried out by the author. On each occasion, entry to the Deer Park was through the Cow Yard tunnel.

Table 1: Dates of field survey work, with brief descriptions of each day's survey activities.

Date	Survey activities
3 rd June	Reconnaissance of the survey area by car, searching for potentially suitable locations for aerial interception traps and subterranean pitfall traps, and finding a suitable circuit of drivable tracks. Deployed 3 aerial interception traps and 3 subterranean pitfall traps. Carried out a rather limited amount of sampling by beating, sweeping and sieving.
25 th June	Serviced and re-set all 6 traps but this day was focused on sampling, using beating, sweeping, sieving and direct observation. Targeted many of the fallen trees and boughs noted on the previous visit.

¹ <https://khepri.uk/rankings/>; accessed 9th November 2020.

Date	Survey activities
17 th July	Serviced and re-set all 6 traps. Today's sampling covered some of the areas which were most productive on the previous visit as well as directing survey effort at places (Badger Copse) and habitats (limes, Sycamore bark, oak heartwood) deserving further coverage.
15 th September	Serviced and removed all 6 traps. An intention to target sampling at fungal fruiting bodies was rather stymied as there were few fungi in evidence, though samples were taken from Chicken-of-the-Woods, Beefsteak, <i>Ganoderma</i> , <i>Boletus</i> (?) and other toadstools. Effort was also targeted at the fauna which can be found by removing bark. While traveling between sampling areas, an Autocatcher was used to sample flying insects, though unfortunately there was little on the wing on this day.

3.1 SAMPLING METHODS

A range of active sampling techniques was used, as appropriate (Table 2), as well as trapping methods detailed below.

Table 2: Techniques employed on this survey to record invertebrates, and their target groups and target habitats.

Technique	Target groups	Target habitats
Sieving.	Handfuls of material are sieved over a tray to reveal their inhabitants. A good technique for a very wide range of invertebrates.	Deadwood, fungi, leaf-litter, etc.
Sweep-netting with a stout canvas net.	A wide range of beetles and other invertebrates.	Grassy habitats under and around trees.
Beating.	Beetles and other invertebrates on the branches, flowers and foliage of shrubs and trees.	Branches of trees and shrubs; living, decaying and dead.
Direct observation.	A wide range of beetles and other invertebrates.	All habitats, paying particular attention to nectar and pollen sources.

3.1.1 Sampling for saproxyllic invertebrates

Many saproxyllic invertebrates are rather hard to find and are best surveyed by an experienced entomologist deploying a wide range of techniques, some of which are standard techniques covered in Table 2, and others more specialised, some even specific to one or a few species.

At Petworth Deer Park, survey for saproxyllic invertebrates was by beating foliage, flowering shrubs and attached dead branches, sweep-netting under and around trees, examining

damaged, decaying and dead wood, standing, hanging and fallen, looking under bark, looking in cobwebs on trunks, looking for exit holes or larval workings, examining any rot-holes and sap-runs, investigating hollows, sieving red-rotten heartwood and other decaying wood substrates, and examining any fungal fruiting bodies associated with trees.

Yellow pan-traps baited with an artificial 'sap' concoction were used on the 25th June but yielded very little.

3.1.2 Autocatcher

The Autocatcher used by this survey derives from a German design (the 'Autokescher'). It is a large 'butterfly net' mounted on a car roof (Figure 2) which catches flying insects as the car drives around. The net is mounted on a bespoke, semi-circular steel rim, which is bolted to a roof bar. It can be used at up to at least 40 mph but is probably more effective at slower speeds and at Petworth Park, was used at up to about 15 mph. While traveling, the net fills with air and insects tend to accumulate in the toe of the net. After stopping the car, the Velcro strips securing the toe of the net can be quickly detached and then the contents can be examined and specimens pooted as necessary. There are very few Autocatchers in Britain and this is a rarely used sampling method in this country, but one which often yields invertebrates which are rarely seen by more conventional techniques.



Figure 2: The Autocatcher at Petworth Deer Park.

3.2 SUBTERRANEAN PITFALL TRAPS

Subterranean pitfall traps (Figure 3) are designed to catch invertebrates active in the soil between 5 and 35 cm deep. The subterranean pitfall traps used at Petworth by this survey

are a modified version of a design by Owen (1995). They are best operated at the decaying roots of veteran trees where they catch a rarely seen subterranean component of the saproxylic fauna. Subterranean saproxylics can give a very different perspective on a site from the above-ground fauna, being more suited to surviving periods of intensive management such as felling and clearance of deadwood. This is still a very poorly explored fauna in Britain.



Figure 3: Subterranean pitfall traps. The trap is buried with its top flush with the ground surface and capped so that invertebrates can only enter through the mesh sides of the trap.

The screw thread on the collecting bottle allows it to be retrieved and replaced without having to dig up the trap, using a screw-cap fixed to the end of a long rod.

Three subterranean pitfall traps were set at Petworth Deer Park on the first visit and retrieved on the final visit (3rd June to 15th September 2020). Subterranean pitfall traps locations are detailed in Table 3.

Table 3: Details of the subterranean pitfall trap locations.

Name	Description	Grid reference	Figures
Fallen Beech	Inside the hollow trunk of a veteran Beech that had snapped and fallen within the previous year.	SU9603023000	Figure 4
Beech Stump	Inside the hollow trunk of a long dead Beech.	SU9599822946	Figure 5, Figure 6
Oak Stump	Inside the hollow, red-rotten trunk of a veteran oak that had snapped and fallen within the previous year.	SU96682215	Figure 7, Figure 8



Figure 4: The Fallen Beech subterranean pitfall trap, arrowed.



Figure 5: This long-dead Beech was selected as a subterranean pitfall trap site.



Figure 6: The Beech Stump subterranean pitfall trap.



Figure 7: This recently fallen oak was selected as a subterranean pitfall trap site.



Figure 8: The Fallen Oak subterranean pitfall trap was set against the back wall of this hollow.

3.3 AERIAL INTERCEPTION TRAPS

Hung against the trunks and major boughs of veteran trees, these traps are excellent at targeting saproxylic invertebrates which fly into and out of hollows in trees, including many heartwood specialists.

Two designs of aerial interception trap were deployed at Petworth Deer Park: vane traps, formed from a pair of large interlocking Perspex vanes, and a bottle trap, made from a single 2 litre pop bottle. All traps were set at on the first visit and retrieved on the final visit (3rd June to 15th September 2020). Aerial interception trap locations are detailed in Table 4.

Table 4: Details of the aerial interception trap locations.

Name	Description	Grid reference	Trap type	Figures
Fallen Beech	Within the snapped trunk of a veteran Beech that had fallen within the previous year. The same tree on which a subterranean pitfall trap was set.	SU9603323003	vane	Figure 4, Figure 9
Fallen Oak	Against the trunk of an oak that had been uprooted and fallen within the previous year.	SU9637523162	vane	Figure 10, Figure 11

Name	Description	Grid reference	Trap type	Figures
Barrel Oak	Against a small, rather sappy, rothole into the enormous trunk of the Barrel Oak.	SU962228	bottle	Figure 14, Figure 15

3.3.1 Aerial interception trap: vane trap

Vane traps consist of a pair of vertically mounted clear Perspex vanes, slotted together to be perpendicular to each other, and suspended over a funnel (Figure 9, Figure 11). Flying insects which hit the vanes may fall down and be funnelled into the collecting bottle containing vehicle antifreeze as a killing agent and preservative.



Figure 9: Aerial interception (vane) trap on the Fallen Beech.



Figure 10: This fallen oak was selected as an aerial interception trap site.



Figure 11: Aerial interception (vane) trap on the Fallen Oak.

3.3.2 Aerial interception trap: single 2 litre bottle

The trap consists of a single 2 litre bottle (Figure 12). Two sections of nearly 180° are cut from opposite sides of the bottle and the resulting flaps joined together internally to present an interception surface (Figure 13). Any flying insects hitting this surface and dropping will end up in the diluted vehicle antifreeze in the bottom of the trap.



Figure 12: The aerial interception trap design used by this project.



Figure 13: Detail of the aerial interception trap, showing the internal surface of the trap. One aerial bottle trap was deployed at Petworth Deer Park, on a magnificent veteran oak referred to by Denton (2002) and Telfer (2010) as the Barrel Oak, SU962228 (Figure 14, Figure 15).



Figure 14: The Barrel Oak at Petworth Park.



Figure 15: Aerial bottle trap outside a small hole on the Barrel Oak.

3.4 TAXONOMIC COVERAGE

The survey aimed to cover all beetles (Coleoptera) but with a focus on the fauna of arboreal specialists and saproxyls. All adult beetles were identified to species with the exception of a few species-pairs (e.g., females of *Anotylus mutator/ sculpturatus*) where accurate identification is particularly problematic. No attempt was made to identify the species of the *Mocyta fungi* aggregate and only a few *Acrotrichis* specimens were attempted; both groups include parthenogenetic clades in which species limits are obscure.

Invertebrates from a number of other taxonomic groups were also identified, focusing on arboreal and saproxyl species, and are included in this survey report, but no attempt was made to be comprehensive in coverage of other groups.

3.5 IDENTIFICATION

Where practical, invertebrates were identified in the field but wherever the slightest doubt existed, one or more specimens were collected, or photographs taken, for more detailed scrutiny. To achieve rigorously accurate identifications, specimens were identified using the surveyor's own library and entomological collection. Selected specimens have been retained in the surveyor's personal collection as vouchers. Photographs of some of these voucher specimens are included in Section 4.3 of this report (Key Species accounts).

3.6 ANALYSIS

3.6.1 Key species

To assess the importance of the site for invertebrate conservation, the number and percentage of rare or scarce species found by this survey was calculated. Sites of greater importance support higher percentages of rare or scarce species, and this percentage is a useful starting point for assessing the overall importance of a site, in comparison to other sites surveyed using similar techniques.

A standard definition of 'rare or scarce' is essential to allow a fair comparison to be made between sites. For this analysis, species were only included which have been assigned an official rare or scarce conservation status as defined in the box below, and all such species are here called 'Key Species'.

Conservation status categories of invertebrates

A system of conservation statuses has been in use since the British Red Data Book for insects (Shirt, 1987), amended and supplemented by a series of JNCC Nature Conservation reviews. By this system, the rarest and most threatened British species are given one of the Red Data Book (RDB) statuses. Species which do not qualify as RDB but are nonetheless uncommon are given one of the Nationally Scarce statuses. The status categories and criteria of this first version are defined in Appendix 1.1.

A second version of British conservation statuses is now gradually replacing the first version. For butterflies, dragonflies, water beetles and some other groups, the most up-to-date British conservation statuses are based on the International Union for Conservation of Nature (IUCN) Red List categories and criteria (IUCN, 2001). This system places less emphasis on rarity and more on factors which suggest a risk of extinction (such as severe declines in range or population). The status categories and criteria of this second version are defined in Appendix 1.2.

A third version of British conservation statuses operates in parallel with the second and is a very simplified version of the first, having just two categories: Nationally Rare or Nationally Scarce. This version is defined in Appendix 1.3.

Key Species are here defined as Red Data Book and Nationally Scarce species from version 1, Threatened, Near Threatened and Data Deficient species from version 2, and Nationally Rare or Nationally Scarce species from version 3.

There are numerous examples of invertebrates which have been given a conservation status and have subsequently been found to be more widespread and abundant, either as a result of an actual increase in range or population size, or as a result of improved understanding by entomologists of how to find or identify them. Where the author regards the official conservation status to be out of date, this is indicated in the species accounts (Section 4.3).

3.6.2 Saproxyllic invertebrates

Damaged, decaying and dead trees and shrubs provide habitat for a large fauna of saproxyllic invertebrates. There are over 1,800 species of saproxyllic invertebrate in Britain (Alexander, 2002) and the fauna includes many species of conservation importance.

The best sites for saproxylic invertebrates are typically ancient parklands, wood-pastures or woodlands which provide both (a) a large population of mature and veteran trees with plentiful dead and decaying wood, and (b) a long and unbroken continuity of such habitat through history.

As noted above, in the section on previous survey work (Section 2.1), beetles are the key indicator group of saproxylic invertebrates, used in both the Saproxylic Quality Index (SQI) and the Index of Ecological Continuity (IEC), which are discussed further below.

Saproxylic Quality Index (SQI)

The Saproxylic Quality Index (Fowles *et al.*, 1999) is a scoring system designed to assist with the evaluation of the conservation significance of wooded habitats in Great Britain for saproxylic Coleoptera. The Index is calculated against a standard list of 598² saproxylic species (Fowles *et al.*, 1999) for which rarity scores, based on their known distribution, have been assigned. The sum of these rarity scores for a site list gives the Species Quality Score (SQS) and the Saproxylic Quality Index (SQI) is derived by dividing SQS by the number of contributing species. SQI provides a method for reducing the bias of observer effort but is dependent upon surveys recording information on all saproxylic species, not just the rarer elements. A threshold of 40 qualifying species is required before SQI can be calculated, to minimise the impact of recording a rare species in a small sample.

Index of Ecological Continuity (IEC)

Like SQI, the Index of Ecological Continuity (IEC) also aims to grade sites according to their conservation significance. The IEC approach is to assign scores to species according to the extent to which they have been consistently recorded from areas with a continuity of dead-wood habitats from ancient times to the present, particularly wood-pastures (Table 5). IEC was extensively revised by Alexander (2004) and under the revised 'IEC (2004)' there are 180 saproxylic beetles in the three categories tabulated below.

Table 5: The three categories of species used in the IEC and their scores.

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

² Excluding *Pseudovadonia livida* (Cerambycidae) which was included in the published list in error.

3.7 CONSTRAINTS

The coronavirus pandemic and the lockdown which commenced on 23rd March had some impacts on this project. Firstly, there was a substantial delay in giving the project the go-ahead which meant the first fieldwork visit did not take place until 3rd June, missing the whole of May (one of the best months for saproxylic invertebrate survey). Secondly, the original plan to engage NT volunteers, and perhaps also staff, to help with the setting and servicing of traps, was abandoned in favour of a much more covid-safe approach of the author carrying out all the fieldwork alone, but running slightly fewer traps. To compensate for the slightly reduced trapping programme, an additional (fourth) survey visit was carried out, enabling the traps to be operated for an additional two months until mid-September, and also on this latter visit, an Autocatcher was used to supplement the manual sampling on the day.

The ideal weather for an invertebrate survey is a season of typical weather; weather to which the invertebrate fauna is adapted, allowing populations to express their normal phenology and abundance. However, the 2020 fieldwork season experienced some extreme weather, notably a spring which was warmer, drier and much sunnier than average. May in particular was very dry, the driest May in England since 1862. From an entomologist's perspective, this seemed to have a strong detrimental impact on the numbers and diversity of invertebrates found on survey work in southern England from mid-May onwards.

4 Results

4.1 OVERALL RESULTS AND KEY SPECIES ANALYSIS

The survey identified 234 species of beetle out of a total invertebrate species list of 366 species (Appendix 2). In addition to beetles, the species list includes representatives of the following groups: woodlice, spiders, pseudoscorpions, mites, centipedes, millipedes, two-tailed bristletails, dragonflies, cockroaches, earwigs, bush-crickets, grasshoppers, barkflies, leafhoppers, planthoppers, bugs, wasps, ants, bees, lacewings, flies, moths, butterflies, slugs and snails.

Amongst the 366 species recorded by this survey, 56 species are here regarded as Key Species (using the criteria defined in Section 3.6.1). These 56 species comprise 15.3% of the total species list of 366, and are listed in Table 6.

All the Key Species are discussed further in the species accounts in Section 4.3 below.

Saproxyllic invertebrate survey of Petworth Deer Park

Table 6: The Key Species of invertebrate recorded by this survey. The table is ordered by conservation status category starting with the rarest/most threatened species.

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Insecta	Coleoptera	Bostrichidae	<i>Lyctus brunneus</i>	Brown Powder-post Beetle	LC, NR
Insecta	Coleoptera	Staphylinidae	<i>Batrissodes delaporti</i>	a pselaphine rove-beetle	RDB1
Insecta	Coleoptera	Eucnemidae	<i>Hylis cariniceps</i>	a false click-beetle	RDB1
Insecta	Coleoptera	Staphylinidae	<i>Scydmaenus rufus</i>	a scydmaenine rove-beetle	RDB2
Insecta	Coleoptera	Staphylinidae	<i>Trichonyx sulcicollis</i>	a pselaphine rove-beetle	RDB2
Insecta	Coleoptera	Elateridae	<i>Ampedus cardinalis</i>	a click-beetle	RDB2
Insecta	Coleoptera	Eucnemidae	<i>Microrhagus pygmaeus</i>	a false click-beetle	RDB3
Insecta	Coleoptera	Bothrideridae	<i>Oxylaemus variolosus</i>	a beetle	RDB3
Insecta	Coleoptera	Cryptophagidae	<i>Cryptophagus micaceus</i>	a beetle	RDBK
Insecta	Lepidoptera	Nymphalidae	<i>Apatura iris</i>	Purple Emperor	NT
Insecta	Lepidoptera	Nymphalidae	<i>Coenonympha pamphilus</i>	Small Heath	NT, S41 (research only)
Diplopoda	Julida	Julidae	<i>Cylindroiulus parisiorum</i>	a millipede	LC, NS
Insecta	Dictyoptera	Blattellidae	<i>Ectobius lapponicus</i>	Dusky Cockroach	LC, NS
Insecta	Coleoptera	Histeridae	<i>Aeletes atomarius</i>	a beetle	LC, NS
Insecta	Coleoptera	Staphylinidae	<i>Sepedophilus bipunctatus</i>	a rove-beetle	LC, NS
Insecta	Coleoptera	Cantharidae	<i>Rhagonycha lutea</i>	a soldier-beetle	LC, NS
Insecta	Coleoptera	Ptinidae	<i>Dorcatoma flavicornis</i>	a woodworm	LC, NS
Insecta	Coleoptera	Lymexylidae	<i>Lymexylon navale</i>	a beetle	LC, NS
Insecta	Coleoptera	Tetratomidae	<i>Hallomenus binotatus</i>	a false darkling beetle	LC, NS
Insecta	Coleoptera	Melandryidae	<i>Abdera biflexuosa</i>	a false darkling beetle	LC, NS
Insecta	Coleoptera	Mordellidae	<i>Tomoxia bucephala</i>	a tumbling flower-beetle	LC, NS
Insecta	Coleoptera	Mordellidae	<i>Variimorda villosa</i>	a tumbling flower-beetle	LC, NS
Insecta	Coleoptera	Tenebrionidae	<i>Helops caeruleus</i>	a darkling beetle	LC, NS
Insecta	Coleoptera	Salpingidae	<i>Lissodema denticollis</i>	a beetle	LC, NS
Insecta	Coleoptera	Scraptiidae	<i>Scraptia testacea</i>	a beetle	LC, NS

Saproxyllic invertebrate survey of Petworth Deer Park

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Insecta	Coleoptera	Scraptiidae	<i>Anaspis costai</i>	a beetle	LC, NS
Insecta	Diptera	Stratiomyidae	<i>Eupachygaster tarsalis</i>	Scarce Black	LC, NS
Insecta	Coleoptera	Staphylinidae	<i>Hypnogyra angularis</i>	a rove-beetle	Nationally Scarce (Na)
Insecta	Coleoptera	Silvanidae	<i>Uleiota planatus</i>	a beetle	Nationally Scarce (Na)
Insecta	Coleoptera	Laemophloeidae	<i>Notolaemus unifasciatus</i>	a beetle	Nationally Scarce (Na)
Insecta	Coleoptera	Curculionidae	<i>Taphrorychus bicolor</i>	a bark-beetle	Nationally Scarce (Na)
Insecta	Coleoptera	Curculionidae	<i>Ernoporicus fagi</i>	a bark-beetle	Nationally Scarce (Na)
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Lasius brunneus</i>	Brown Tree Ant	Nationally Scarce (Na)
Insecta	Hymenoptera: Aculeata	Vespidae	<i>Dolichovespula media</i>	Median Wasp	Nationally Scarce (Na)
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Pediopsis tiliae</i>	a leafhopper	Nationally Scarce (Nb)
Insecta	Coleoptera	Staphylinidae	<i>Trichophya pilicornis</i>	a rove-beetle	Nationally Scarce (Nb)
Insecta	Coleoptera	Nitidulidae	<i>Epuraea fuscicollis</i>	a beetle	Nationally Scarce (Nb)
Insecta	Coleoptera	Nitidulidae	<i>Epuraea guttata</i>	a beetle	Nationally Scarce (Nb)
Insecta	Coleoptera	Nitidulidae	<i>Cryptarcha strigata</i>	a beetle	Nationally Scarce (Nb)
Insecta	Coleoptera	Silvanidae	<i>Silvanus bidentatus</i>	a beetle	Nationally Scarce (Nb)
Insecta	Coleoptera	Cerylonidae	<i>Cerylon fagi</i>	a beetle	Nationally Scarce (Nb)
Insecta	Coleoptera	Curculionidae	<i>Strophosoma faber</i>	a weevil	Nationally Scarce (Nb)
Insecta	Coleoptera	Curculionidae	<i>Kyklioacalles roboris</i>	a weevil	Nationally Scarce (Nb)
Insecta	Coleoptera	Curculionidae	<i>Mecinus circulatus</i>	a weevil	Nationally Scarce (Nb)
Insecta	Coleoptera	Curculionidae	<i>Xyleborus dryographus</i>	a bark-beetle	Nationally Scarce (Nb)
Insecta	Coleoptera	Curculionidae	<i>Platypus cylindrus</i>	Oak Pin-hole Borer	Nationally Scarce (Nb)
Insecta	Lepidoptera	Sesiidae	<i>Synanthedon vespiformis</i>	Yellow-legged Clearwing	Nationally Scarce (Nb)
Insecta	Coleoptera	Staphylinidae	<i>Dropephylla gracilicornis</i>	a rove-beetle	Nationally Scarce
Insecta	Coleoptera	Staphylinidae	<i>Dexiogyia corticina</i>	a rove-beetle	Nationally Scarce
Insecta	Coleoptera	Staphylinidae	<i>Microdota excelsa</i>	a rove-beetle	Nationally Scarce
Insecta	Coleoptera	Staphylinidae	<i>Acrotona parens</i>	a rove-beetle	Nationally Scarce
Insecta	Coleoptera	Staphylinidae	<i>Gyrophana manca</i>	a rove-beetle	Nationally Scarce
Insecta	Coleoptera	Latridiidae	<i>Enicmus brevicornis</i>	a beetle	Nationally Scarce

Saproxyllic invertebrate survey of Petworth Deer Park

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Insecta	Coleoptera	Latridiidae	<i>Enicmus rugosus</i>	a beetle	Nationally Scarce
Insecta	Coleoptera	Latridiidae	<i>Corticaria alleni</i>	a beetle	Nationally Scarce
Insecta	Diptera	Tipulidae	<i>Ctenophora pectinicornis</i>	a long-palped crane fly	Nationally Scarce

4.2 SAPROXYLIC INVERTEBRATES

For the calculation of Saproxylic Quality Index and Index of Ecological Continuity in this section, the collated beetle list for Petworth Park has been used, based on the species recorded by Jonty Denton in 2001-02, by the author in 2010, by the current survey in 2020, and with a few supplementary records gleaned from Tony Allen, an expert coleopterist who has visited Petworth Park during 2020, and from Paul Whitby who kindly informed me that he had caught both Stag Beetle *Lucanus cervus* and Sawyer Beetle *Prionus coriarius* at his light trap in the garden of Shepherd's Lodge.

4.2.1 Saproxylic Quality Index

Of the 598 qualifying SQI beetles, 198 species have now been recorded from Petworth Park, which has an SQI of 569.2. This places Petworth Park as the 27th best site for saproxylic invertebrates in Britain out of the 212 sites for which data have been submitted to the online SQI rankings (<http://khepri.uk/rankings/>).

Fowles *et al.* (1999) considered that a score of more than 590 indicated a site of international importance, and more than 500 of national importance.

4.2.2 Index of Ecological Continuity

Of the 180 saproxylic beetles in the IEC (2004) categories, 59 have been recorded from Petworth Park, including eight Grade 1 indicators (Table 7). The sum of their IEC (2004) scores is 87.

A score of more than 15 is considered to indicate a site of regional importance, more than 25 indicates a site of national importance and more than 80 a site of international importance (Alexander, 2004).

Table 7: IEC (2004) results for Petworth Deer Park.

Index of Ecological Continuity	Number of species	Score	Contribution to Index	IEC (2004)
Grade 1	8	× 3	= 24	
Grade 2	12	× 2	= 24	
Grade 3	39	× 1	= 39	
Total				87

4.3 KEY SPECIES ACCOUNTS

For each of the Key Species found by this survey, a short account is provided, describing the ecology and distribution of the species in Britain, followed by details of its occurrence during the current survey. Accounts are presented in the same order as in Table 6.

Lyctus brunneus (Coleoptera: Bostrichidae) Brown Powder-post Beetle, LC, NR

A saproxylic beetle which develops in the sapwood of large branches and trunks of oaks. Alexander (2014) observed that this species favours deadwood that has been killed catastrophically, for example by being wind-blown, felled or scorched. It is known from 15

ancient wood pasture and parkland sites in England and Scotland over the last 50 years (Alexander, 2014). Hyman and Parsons (1992) appear to have regarded this as a non-native species in Britain, and consequently did not assign it a conservation status.

On the current survey, singletons (Figure 16) were found in the aerial interception trap on the Fallen Oak in the 25th June and 15th September samples.



Figure 16: *Lyctus brunneus* from Petworth Park.

***Batrisodes delaporti* (Coleoptera: Staphylinidae) a pselaphine rove-beetle, RDB1**

This is a small beetle with a rather ant-like appearance. All three British species of *Batrisodes* are saproxylic and strongly associated with the nests of ants in decaying trees. *B. delaporti* lives within the decaying heartwood of veteran oaks associated with nests of Brown Tree Ant *Lasius brunneus*. It has long been known from the Windsor Forest area, Berkshire. It was recorded from Silwood Park (not far from Windsor) in 1964 (Mendel, 1991) and has more recently been discovered in the grounds of Chiswick House and at Richmond Park (Peter Hammond, pers. comm., c. 2010). Though of very restricted range, it is probably not uncommon where it occurs and has been reckoned to occur in the majority of well-established *L. brunneus* nests at Windsor (Mendel, 1991).

On the current survey, a male (Figure 17) was found in the subterranean pitfall trap on the Oak Stump from the 17th July sample. *Lasius brunneus* was also recorded from this subterranean pitfall trap. This appears to be the first record of *Batrisodes delaporti* for Sussex (confirmed by Peter J. Hodge, *in litt.*, Jan 2021) and the first record away from the mid-Thames region.



Figure 17: *Batrisodes delaporti* from Petworth Park.

***Hylis cariniceps* (Coleoptera: Eucnemidae) a false click-beetle, RDB1**

A saproxylic beetle associated with ancient Beech and probably other broad-leaved trees where larvae can develop in suitable decaying wood. This beetle is known from only four British specimens: a female near some old Beech trees at Mallard Wood, New Forest, South Hampshire in 1966; one on Brownsea Island, Dorset, 'post-1976' (Hyman and Parsons, 1992); one in a yellow water-trap near a large dead trunk of Crack Willow at Crewkerne, Somerset on 27th July 2002 (Parsons, 2008); and one near a standing dead ?Alder? at Withycombe Slade, New Forest, on 9th September 2010 (Harrison, 2012).

On the current survey, a female (Figure 18) was swept on 25th June beneath the canopy of a veteran oak growing within the southernmost of the three clumps north-east of the Upper Pond. This appears to be only the fifth British individual and the first record for Sussex (that it is a first for Sussex has been confirmed by Peter J. Hodge, *in litt.*, Jan 2021).



Figure 18: *Hylis cariniceps* from Petworth Park.

***Scydmaenus rufus* (Coleoptera: Staphylinidae) a scydmaenine rove-beetle, RDB2**

A small reddish beetle of ancient woodland and pasture-woodland. It is found under bark, and has been recorded from a wide range of tree species though favouring Beech, oaks and Sweet Chestnut. It can also be found in compost and manure heaps and presumably in both habitats it predated mites and other tiny invertebrates. Hyman and Parsons (1994) note records from seven vice-counties, and only four of those since 1970. However, this species has been expanding its range in recent years and has become a more frequent species in compost and manure heaps across southern England, such that it no longer merits RDB status.

On the current survey, one was found in the aerial interception trap on the Fallen Oak.

***Trichonyx sulcicollis* (Coleoptera: Staphylinidae) a pselaphine rove-beetle, RDB2**

This is Britain's largest pselaphine, though it is still a small beetle. It was recorded from a scatter of southern English vice-counties prior to 1970 but Hyman and Parsons (1994) only knew of post-1970 records from South Hampshire, West Sussex and Surrey. More recently, it has been recorded from both North Essex and South Essex (P.M. Hammond, pers. comm.), Buckinghamshire (Telfer and Hammond, 2007) and Ebernoe Common, West Sussex (Telfer, 2009). It is a rarely seen and little known species but lives at the roots of Beech trees where it is predatory, probably on smaller invertebrates such as mites and springtails.

On the current survey, 12 specimens were captured by the subterranean pitfall trap on the Fallen Beech, in the 17th July and 15th September samples.

***Ampedus cardinalis* (Coleoptera: Elateridae) a click-beetle, RDB2**

A superb black and pinkish-red click beetle. Develops exclusively in the red-rotten heartwood of old oaks, using the heartwood of smaller boughs as well as trunks. Restricted to old forests and ancient parks, mostly in the Thames basin with five other isolated sites scattered across southern Britain (Mendel and Clarke, 1996). This species is classed as a

Grade 1 Indicator of Ecological Continuity. *Ampedus cardinalis* is regarded as a Near Threatened species at a European scale by Nieto and Alexander (2010).

On the current survey, an elytron from a dead individual was found by sieving debris from the hollow of a colossal oak, NE of the Upper Pond (Figure 19).



Figure 19: Fragments of dead *Ampedus cardinalis* and *Helops caeruleus* were found in hollows on this colossal oak, perhaps the largest in the Park.

***Microrhagus pygmaeus* (Coleoptera: Eucnemidae) a false click-beetle, RDB3**

A saproxyllic beetle with larvae developing in wood of broad-leaved trees in a fairly advanced state of decay. It is very widely distributed in Britain up to north-west Scotland but represented throughout most of this range by a very thin scatter of sites. It is most frequent in Hampshire and Sussex (Alexander, 2002) and has been becoming increasingly frequent in recent times.

On the current survey, three males (Figure 20) were swept on 25th June beneath the canopy of a veteran oak growing within the southernmost of the three clumps north-east of the Upper Pond. The same sample also yielded a specimen of *Hylis cariniceps* (see above).



Figure 20: *Microrhagus pygmaeus* from Petworth Park.

***Oxyaemus variolosus* (Coleoptera: Bothrideridae) a beetle, RDB3**

An elongate and heavily punctate saproxylic beetle which is mostly associated with decaying wood in old trees where, like other related bothriderids, it is apparently a predator on other beetles. Compelling evidence that *O. variolosus*, like several other rarely encountered saproxylic species, is largely subterranean was obtained by Owen (2000) who trapped the remarkable total of 271 individuals using subterranean pitfalls beneath old trees at a range of woodland sites in southern England. In Owen's study, *O. variolosus* was found at each of the five sites (4 in Surrey and 1 in South Hampshire) investigated, and at the foot of 26 out of 58 oak trees. *O. variolosus* has been reported quite widely in southern England, from South Hampshire to West Kent and north to Huntingdonshire. There are post-1969 records for South Hampshire, Worcestershire and Huntingdonshire (Hyman and Parsons, 1992; Owen, 2000), Surrey (Owen, 2000; Denton, 2005), Middlesex (Denton, 2006), Berkshire (P.M. Hammond, unpublished) and Buckinghamshire (Telfer and Hammond, 2007) as well as earlier records from East Sussex and West Kent (Hyman and Parsons, 1992) and Oxfordshire (Walker, 1907?). In West Sussex, it has previously been found at Ebernoe Common, The Mens, Petworth Park and Cowdray Park (Telfer, 2009; 2010; 2011a; 2011b, 2012).

On the current survey, one (Figure 21) was in the subterranean pitfall trap on the Birch Stump, in the 15th September sample.



Figure 21: *Oxylaemus variolosus* from Petworth Park.

Figures 22 and 23 have been deleted in the version of 27th January 2021. They illustrated an unconfirmed record of the rove-beetle *Phloeopora concolor*, now retracted as a misidentification.

***Cryptophagus micaceus* (Coleoptera: Cryptophagidae) a beetle, RDBK**

A fairly distinctive *Cryptophagus* which appears only to have been found in saproxylic habitats, principally in association with the nests of Hornets *Vespa crabro* and other tree-nesting social wasps. It has also been recorded from bird's nest debris in a hollow tree, from sap runs, fungus on Beech and from decaying wood (Hyman and Parsons, 1994; Alexander, 2002) and branches (some dead) of oak (Johnson, 2008). Hyman and Parsons (1994) note records for six vice-counties: South Hampshire, Surrey, Berkshire, West Norfolk, Herefordshire and Derbyshire. Though still a rarity, in recent years, this has become a commoner species than when it was allocated RDBK status (Peter Hammond, pers. comm., Jan. 2012). It is now also known from the vice-counties of West Sussex, Middlesex, Buckinghamshire and East Norfolk (pers. obs.). It is regarded as a Grade 1 Indicator of Ecological Continuity (Alexander, 2004) though that is questionable for a species which is apparently expanding its range and colonising new sites.

On the current survey, there were 24 individuals in the aerial interception trap on the Barrel Oak, all from the 15th September sample.

***Apatura iris* (Lepidoptera: Nymphalidae) Purple Emperor, NT**

A magnificent butterfly which soars and flies powerfully around the tree tops. It is a woodland species, requiring well-wooded landscapes in which it can find willows (Goat, Grey or Crack) on which to lay its eggs. The British stronghold for Purple Emperors is in central-southern England, from which the species is currently expanding.

On the current survey, an adult was watched briefly flying around the canopy of an oak near the Split Oak on 25th June.

***Coenonympha pamphilus* (Lepidoptera: Nymphalidae) Small Heath, NT, S41 (research only)**

A rather small grassland butterfly with orange and brown markings. The Small Heath is one of the most widely distributed butterflies in Britain, with records from the vast majority of hectads. It inhabits grassland, favouring shorter swards of fine-leaved grasses on well-drained soils. The caterpillars feed on a variety of grasses including fescues *Festuca*, meadow-grasses *Poa* and bents *Agrostis* (Asher *et al.*, 2001). Small Heath is a Section 41 species, belonging to the group of Lepidoptera species which are still widespread and common though declining, and were formerly regarded as 'research-only' Biodiversity Action Plan species. Although its range has remained stable, many colonies have died out and the abundance of this butterfly at monitored sites has declined over recent decades. This triggered concern for the future of this species and was the reason for its addition to the BAP Priority Species list, but only for further research. On the basis of a long-term decline and a 10-year population decline of 29%, Fox *et al.* (2010) regarded this species as Near Threatened.

On the current survey, some were seen in the area NE of the Upper Pond on 25th June.

***Cylindroiulus parisiorum* (Julida: Julidae) a millipede, LC, NS**

A scarce millipede of parklands, orchards and woodlands where it is often found under bark or otherwise within rotting wood. There are also records from semi-natural grassland and from synanthropic sites, so it is clearly not always dependent on trees. Lee (2015) knew of records from only 22 hectads since 1990. Its British distribution is concentrated in the south-east of England, especially in the Thames basin, but extends very thinly to the far west of Cornwall and to Northumberland (Lee, 2006).

On the current survey, a male was found in the subterranean pitfall trap on the Beech Stump.

***Ectobius lapponicus* (Dictyoptera: Blattellidae) Dusky Cockroach, LC, NS**

Dusky Cockroach is a small, native species, found only outdoors and not to be confused with the various imported cockroach species which occur as pests in restaurant kitchens and other places. It inhabits a wide range of habitats, characterised by a mosaic of open, sunny vegetation, sheltered by scrub or trees. Thus it can be found in woodland rides, scrubby heathland or scrubby chalk downland, etc. (Marshall and Haes, 1988). Its range is centred on central-southern England, from Dorset to West Sussex and northwards to Berkshire, with a scatter of occurrences to the north and west.

On the current survey, a female was found in the aerial interception trap on the Barrel Oak, collected on 15th September.

***Aeletes atomarius* (Coleoptera: Histeridae) a beetle, LC, NS**

This is a tiny histerid, globular and resembling a large mite. It is found under bark or within rotten trunks, usually of Beech though with records from other broad-leaved trees including Ash, elms, oaks, Hornbeam and poplars (Lane, 2017). It has often been found in the tunnels

of the Lesser Stag Beetle *Dorcus parallelepipedus* and Rhinoceros Beetle *Sinodendron cylindricum* (both Lucanidae) though the association may be mere coincidence (Hyman and Parsons, 1992; Alexander, 2002). An association with the Brown Tree Ant *Lasius brunneus* has also been mooted. Hyman and Parsons (1992) list nine vice-counties with records of this species, all in England northwards to North-east Yorkshire. Alexander (2002) also notes Kent, it was first recorded from Surrey in 1997 (Denton, 2005), and Damant and Kirby (2005) add it to the Cambridgeshire list. More recently, Lane (2017) notes a doubling of recorded hectads for this species, and ascribes this to increased recorder effort and improved recording methods. It is regarded as a Grade 1 indicator of Ecological Continuity by Alexander (2004) but in view of the recent increase in known localities, this may no longer be valid.

On the current survey, nine were found by sieving densely-packed moist 'sawdust' from the hollow trunk of a collapsed Sycamore at SU95912288 (Figure 22, Figure 23) on 25th June.



Figure 22: Sycamore trunk from which *Aeletes atomarius* was sampled.



Figure 23: The collapsed Sycamore.

***Sepedophilus bipunctatus* (Coleoptera: Staphylinidae) a rove-beetle, LC, NS**

A very local rove-beetle of predominantly south-eastern distribution but with outlying records westwards to Herefordshire and northwards to Norfolk. Hammond (1972) mapped records from just 16 10-km squares. It is a species of rotten wood, mostly of willows but also of Beech and pines, favouring logs and tree stumps that are very moist if not wet (Hammond, 1972).

On the current survey, one was found amongst old and very well-rotted Beech deadwood.

***Rhagonycha lutea* (Coleoptera: Cantharidae) a soldier-beetle, LC, NS**

A predatory species of woodland, wood edges and scrub but restricted to open, well-structured examples of these habitats. It is scarce in Britain with a scatter of records across much of England and Wales and into south-west Scotland but with most records concentrated into central and south-eastern England.

On the current survey, two were found around the Barrel Oak on 3rd June.

***Dorcatoma flavicornis* (Coleoptera: Ptinidae) a woodworm, LC, NS**

A rather globular, black woodworm-type beetle. It is a saproxylic species, breeding in the red-rotten heartwood of oaks, and occasionally other broad-leaved trees. Alexander (2002) records an association with the Sulphur Polypore (or Chicken-of-the-Woods) fungus

Laetiporus sulphureus as the causer of the red-rot. It has a widely scattered distribution in southern Britain, extending northwards to Mid-west Yorkshire (Hyman and Parsons, 1992).

On the current survey, singletons were found by sweeping under oak canopy NE of the Upper Pond, and in the aerial interception trap on the Fallen Beech.

***Lymexylon navale* (Coleoptera: Lymexylidae) a beetle, LC, NS**

A very distinctive, very elongate beetle. Confined to ancient forest areas, where larvae bore into the heartwood of living and dead standing oaks, and occasionally Sweet Chestnut, usually well above ground level. It also inhabits felled trunks or stumps, but always where bark has been damaged, drying out the underlying sapwood to some extent. Local populations are often restricted to individual trees. For the post-1970 period Hyman and Parsons (1992) only knew of records from very few sites in just four vice-counties: South Hampshire, Surrey, Berkshire and Herefordshire. In more recent years, this species has been expanding its range in the Thames Basin and south-east England (Alexander, 2014) and has been recorded in Sussex on a few occasions, including at The Mens (Telfer, 2011a).

On the current survey, two females were found in the aerial interception trap on the Fallen Oak.

***Hallomenus binotatus* (Coleoptera: Tetratomidae) a false darkling beetle, LC, NS**

A saproxylic beetle, associated with a range of broad-leaved and coniferous species, where it develops in the fruiting bodies of bracket fungi, particularly in Chicken-of-the-Woods *Laetiporus sulphureus*. It is strongly associated with ancient woodland and wood-pasture sites. It is widespread in Britain, including Scotland but scattered and particularly scarce in the west. Alexander *et al.* (2014) note records from 96 hectads.

On the current survey, two were found by sieving quite fresh Chicken-of-the-Woods *Polyporus sulphureus* brackets growing on a very old oak stump (Figure 24).



Figure 24: Chicken-of-the-Woods growing on a very old oak stump.

***Abdera biflexuosa* (Coleoptera: Melandryidae) a false darkling beetle, LC, NS**

This beetle is thought to breed in dead or decaying branch-wood and twigs, with most records from oaks, but also Ash, limes and other broad-leaved tree species (Hyman and Parsons, 1992; Alexander, 2002). It is associated with ancient broad-leaved woodland and parkland. Widespread across southern and south-eastern Britain, westwards to Devon and Radnorshire, and northwards to Cheshire (Alexander, 2002).

On the current survey, one was beaten from oak branches NE of the Upper Pond.

***Tomoxia bucephala* (Coleoptera: Mordellidae) a tumbling flower-beetle, LC, NS**

A 'tumbling flower beetle'. Adult females lay their eggs in vacated woodworm tunnels in the exposed heartwood of standing trunks. Larvae then develop in the decaying timber, and have been recorded from Beech, Horse Chestnut and other broad-leaved trees. Confined to relict old forests of the southern- and eastern-most counties of England.

On the current survey, one was spotted on the trunk of a collapsed Sycamore at SU95912288 on 25th June.

***Variimorda villosa* (Coleoptera: Mordellidae) a tumbling flower-beetle, LC, NS**

Adults are usually seen at the flowers of thistles and Hogweed and it is possible that larval development may take place within the stems of coarse herbs such as these (a breeding microhabitat well known for other mordellids). However, *V. villosa* has been reported to

develop in decaying wood, including of poplars and willows, and females have been observed probing for oviposition sites on a Beech stump (Alexander *et al.*, 2014) and an old hawthorn stump (pers. obs.). It has been recorded from 41 10-km squares of England and Wales in the period 1990 to 2011, with records concentrated on chalk (Alexander *et al.*, 2014).

On the current survey, one was found in the aerial interception trap on the Fallen Beech.

***Helops caeruleus* (Coleoptera: Tenebrionidae) a darkling beetle, LC, NS**

This is a large and very striking metallic violet beetle. It is a saproxyllic beetle of late-stage tree decay, and so it is able to breed in seasoned timbers such as old railway sleepers, groynes and structural timbers in houses. It seems to prefer oak wood but can utilise a wide variety of species including pine. In natural situations (parkland, woodland and wood-pasture) it tends to be a coastal species, with scattered records across southern and eastern Britain.

On the current survey, fragments of dead adults (Figure 25) were found by sieving debris from hollows of three different veteran oaks NE of the Upper Pond, including the oak pictured in Figure 19.



Figure 25: Dead *Helops* from Petworth Park.

***Lissodema denticollis* (Coleoptera: Salpingidae) a beetle, LC, NS**

Until recently known as *Lissodema denticolle* and prior to that as *Lissodema quadripustulatum*. This is a predatory insect in both the adult and larval stages. It is a

saproxyllic species, usually found under bark or in crevices in rotting wood, and associated with a wide range of broad-leaved trees as well as being found on pine.

On the current survey, one was found by beating lime branches, NE of the Upper Pond.

***Scaptia testacea* (Coleoptera: Scaptiidae) a beetle, LC, NS**

All three British *Scaptia* species are rather small, flimsy, brown beetles. Adults appear to be very short-lived and probably do not feed as they are rarely found visiting flowers. Adults are typically found by beating foliage within a few feet of the red-rotten, hollowing oak trunk within which they have bred. This species is classed as a Grade 1 Indicator of Ecological Continuity. *S. testacea* is the most widespread of the trio but still largely restricted to south and south-east England with outlying records from Cumbria in the north and Herefordshire in the west (Hyman and Parsons, 1992; Alexander, 2002), though Alexander *et al.* (2014) note that the species has also been recorded, perhaps more recently, from Wales. Hyman and Parsons (1992) assigned this species to the RDB3 category but Alexander *et al.* (2014) downgraded it to NS, noting records from 16 10-km squares.

On the current survey, specimens were found in the aerial interception trap on the Barrel Oak on all three occasions that samples were collected, with seven specimens in total.

***Anaspis costai* (Coleoptera: Scaptiidae) a beetle, LC, NS**

Members of the genus *Anaspis* are readily found as adults by sampling from flowers, though most of the species are thought to spend their larval stage feeding in decaying wood. *A. costai* has been found on flowers of Hogweed, Angelica, Wild Privet, Elder and roses, and in association with oaks, apples, Hazel, Field Maple and Beech (pers. obs.) which may suggest that a range of broad-leaved trees and shrubs are used for breeding. It has been recorded from 49 10-km squares of England and Wales in the period 1990 to 2011 (Alexander *et al.*, 2014).

On the current survey, three specimens were found by sampling oaks in the clumps NE of the Upper Pond.

***Eupachygaster tarsalis* (Diptera: Stratiomyidae) Scarce Black, LC, NS**

A small, black soldierfly which appears to breed exclusively in tree rot-holes. A range of tree species have been noted as hosts including Beech, Ash, poplars, Scots Pine, oaks, apples and Walnut (Stubbs and Drake, 2001). It is known from ancient parklands (e.g., Windsor Great Park) and ancient wood-pasture sites (e.g., the New Forest) and from the ancient, wooded fen of Chippenham Fen, Cambridgeshire. Drake (2017) noted records from only 14 hectads in Britain since 1990 but deduced that this is an elusive and therefore under-recorded species, thus assigning it to NS rather than NR status.

On the current survey, one was found in the aerial interception trap on the Fallen Beech, and another was found by sieving densely-packed moist 'sawdust' from the hollow trunk of a collapsed Sycamore at SU95912288 on 25th June. This latter record seems remarkable, but the specimen was amongst much larger numbers of the common *Pachygaster atra* and the flies may have been paralysed prey items, dug out from the burrows of a wasp.

***Hypnogyra angularis* (Coleoptera: Staphylinidae) a rove-beetle, Nationally Scarce (Na)**

Recorded from woodland, pasture-woodland and orchards. This species has been found in damp wood-mould beneath the bark of trees, often in association with the nests of ants or birds. It has been found in an owl's nest in a hollow elm, and also recorded from Ash, oaks, apples and Horse Chestnut. It is widely distributed in south-east England northwards to Leicestershire and westwards to South Wales (Lott and Anderson, 2011).

On the current survey, one was found by sieving densely-packed moist 'sawdust' from the hollow trunk of a collapsed Sycamore at SU95912288 on 25th June and another was found within the Oak Stump (the subterranean pitfall trap site) on 17th July.

***Uleiota planatus* (Coleoptera: Silvanidae) a beetle, Nationally Scarce (Na)**

A very flattened beetle, adapted to living under bark, typically of Beech and Sweet Chestnut though also found on a range of other broad-leaved trees including Wych Elm, oaks, Silver Birch, Sycamore and Walnut (Hyman and Parsons, 1992). It has a south-eastern distribution in England, but with outlying records from Gloucestershire, Carmarthenshire, West Glamorgan, South Lancashire, Cumberland and Aberdeenshire (Hyman and Parsons, 1992; Alexander, 2002). This species has been spreading rapidly in the last couple of decades (Telfer and Hammond, 2007). In view of the expansion in range of this species, its conservation status should probably be downgraded.

On the current survey, six were found under bark from a log-stack near Kennel Lodges.

***Notolaemus unifasciatus* (Coleoptera: Laemophloeidae) a beetle, Nationally Scarce (Na)**

A flattened, saproxyllic beetle, typically found under the bark of Beech trees but also with records from oaks (including Turkey Oak) and Hornbeam (Hyman and Parsons, 1992). It occurs in southern England, northwards to Herefordshire, Worcestershire, Leicestershire and Derbyshire (Johnson, 2011). This appears to be a very rarely encountered beetle which may merit an elevated conservation status.

On the current survey, one (Figure 26) was found in the aerial interception trap on the Fallen Oak, in the 17th July sample.



Figure 26: *Notolaemus unifasciatus* from Petworth Park.

***Taphrorychus bicolor* (Coleoptera: Curculionidae) a bark-beetle, Nationally Scarce (Na)**

A bark-beetle developing principally in the smaller dead branches and twigs of Beech trees, occasionally on Hornbeam and only rarely associated with other tree species in Britain (though apparently with a wider host range on the continent) (Hyman and Parsons, 1992; Alexander, 2002). It has a very restricted southern distribution in Britain, having been recorded only from Dorset, South Hampshire, West Sussex, East Sussex, West Kent, Surrey, South Essex, Middlesex and Berkshire (Hyman and Parsons, 1992), as well as Hertfordshire and Buckinghamshire (pers. obs.).

On the current survey, one was found in the aerial interception trap on the Fallen Beech.

***Ernoporicus fagi* (Coleoptera: Curculionidae) a bark-beetle, Nationally Scarce (Na)**

A bark-beetle found mainly in freshly dead twigs, branches and boughs of Beech though also recorded from oaks and birches. Found in ancient woodlands and wood pastures and distributed through southern, central and eastern England and into Wales.

On the current survey, one was beaten from oak NE of the Upper Pond.

***Lasius brunneus* (Hymenoptera: Aculeata: Formicidae) Brown Tree Ant, Nationally Scarce (Na)**

A saproxylic ant, building nests within the decaying heartwood of a range of mostly broad-leaved trees. A species with an out of date conservation status which is now common.

On the current survey, quite frequent in association with oaks.

***Dolichovespula media* (Hymenoptera: Aculeata: Vespidae) Median Wasp, Nationally Scarce (Na)**

This wasp was first recorded in Britain from East Sussex in 1980 and was given Nationally Scarce (Na) status by Falk (1991a), at which time it was known from a little over 20 sites. In the subsequent years it has become a much commoner and more widespread species, extending to Scotland, and no longer merits any conservation status.

On the current survey, four were recorded in the aerial interception trap on the Barrel Oak.

***Pediopsis tiliae* (Hemiptera: Auchenorrhyncha: Cicadellidae) a leafhopper, Nationally Scarce (Nb)**

This species feeds on limes. Despite a recorded association with Small-leaved Lime *Tilia cordata*, it also occurs on Common Lime *Tilia xeuropaea* and on other planted lime trees. It is widely but patchily distributed in southern Britain westwards to Glamorgan and northwards to South Yorkshire (Kirby, 1992).

On the current survey, one was beaten from limes NE of the Upper Pond on 3rd June.

***Trichophya pilicornis* (Coleoptera: Staphylinidae) a rove-beetle, Nationally Scarce (Nb)**

A rove-beetle of wooded habitats, both broad-leaved and coniferous, including woodland, parkland and wooded fens. It has been found by sampling various microhabitats, including moss, sawdust, woodchip, leaf litter and a squirrel drey. It has a very widespread distribution throughout Britain, northwards to East Inverness-shire, but is very scattered within this range (Hyman and Parsons, 1994).

On the current survey, this species (Figure 27) was a constant in the three subterranean pitfall trap samples collected from the Fallen Beech, with eight specimens in total. These are apparently the first Sussex records since the 'VCH', i.e., the Victoria County History of Sussex (Fowler, 1905).



Figure 27: *Trichophya pilicornis* from Petworth Park.

***Epuraea fuscicollis* (Coleoptera: Nitidulidae) a beetle, Nationally Scarce (Nb)**

A species of parkland, wood-pasture and broad-leaved woodland. It is strongly associated with sap-runs on trunks, especially those generated by the feeding of Goat Moth *Cossus cossus* larvae on oaks. It has a widespread but scattered distribution in England excluding the south-west and East Anglia, and extending into south-west Scotland (Hyman and Parsons, 1994).

On the current survey, one (Figure 28) was found in the aerial interception trap on the Barrel Oak.



Figure 28: *Epuraea fuscicollis* from Petworth Park.

***Epuraea guttata* (Coleoptera: Nitidulidae) a beetle, Nationally Scarce (Nb)**

A species of parkland, wood-pasture and broad-leaved woodland. Like the closely-related *Epuraea fuscicollis* (above), it is strongly associated with sap-runs on trunks, especially those generated by the feeding of Goat Moth *Cossus cossus* larvae on oaks. It has a widespread but scattered distribution in England excluding the south-west and north-east (Hyman and Parsons, 1994).

On the current survey, one (Figure 29) was found in the aerial interception trap on the Barrel Oak.



Figure 29: *Epuraea guttata* from Petworth Park.

***Cryptarcha strigata* (Coleoptera: Nitidulidae) a beetle, Nationally Scarce (Nb)**

A saproxylic beetle, strongly associated with sap-runs on trunks of oaks and Ash, particularly where freshly-exposed sap is fermenting. It may also be found in association with the larval burrows of the Goat Moth *Cossus cossus*. It occurs in woodland and wood-pasture habitats. It has a widespread but scattered distribution in England, though Hyman and Parsons (1994) believed it not to have been recorded from either south-west or north-east England.

On the current survey, seven were recorded in the aerial interception trap on the Barrel Oak.

***Silvanus bidentatus* (Coleoptera: Silvanidae) a beetle, Nationally Scarce (Nb)**

Found under the sappy bark of deadwood of various broad-leaved trees but also of pine (Alexander, 2002), occurring in ancient broad-leaved woodlands and wood-pasture. It has been recorded from England northwards to Co. Durham and from a single site in south-western Scotland. Hyman and Parsons (1992) suggested that this species may be expanding its range.

On the current survey, single specimens were found under bark from a log-stack near Kennel Lodges, and from the aerial interception trap on the Fallen Oak.

***Cerylon fagi* (Coleoptera: Cerylonidae) a beetle, Nationally Scarce (Nb)**

This rather flattened beetle is usually found under bark though it may also be found within decaying wood. It is principally associated with oaks but also found on Beech and Ash. It has been found on the fruiting body of a slime-mould on a fallen oak bough (pers. obs.). This species has a wide distribution within Britain, northwards to Lanarkshire and westwards to Devon and Gwent but is more frequent in the south-east and very scattered elsewhere (Alexander, 2002).

On the current survey, one was found in the subterranean pitfall trap on the Oak Stump.

***Strophosoma faber* (Coleoptera: Curculionidae) a weevil, Nationally Scarce (Nb)**

A wingless, ground-dwelling weevil of heathland and sandy or acid grasslands, favouring more open swards with shorter turf. It is probably polyphagous on a wide range of herbs, including Sheep's-sorrel and Mouse-ear Hawkweed (Hyman and Parsons, 1994; Morris, 1997). It is widespread in Britain northwards to County Durham and Cumberland, though scattered within this range.

On the current survey, one was found NE of the Upper Pond.

***Kyklioacalles roboris* (Coleoptera: Curculionidae) a weevil, Nationally Scarce (Nb)**

A flightless weevil with a widespread but very scattered distribution across England, southern Scotland and Wales (Morris, 2002). It is associated with broad-leaved woodland, and thought (on very scant information) to breed in dead branches of oaks, though it has been recorded in association with Beech on the continent (Hyman & Parsons, 1992). More recently, it has been found to develop in tunnels under the thin bark of lime twigs (c. 1 cm diameter) (pers. obs.).

On the current survey, one was beaten from lime branches NE of the Upper Pond.

***Mecinus circulatus* (Coleoptera: Curculionidae) a weevil, Nationally Scarce (Nb)**

A ground-dwelling weevil of short, sandy or acid grassland, normally on the coast, where it feeds on Ribwort Plantain *Plantago lanceolata* and possibly other species of plantain (Morris, 2012). Peter J. Hodge (*in litt.*, Jan 2021) suggests that its occurrence appears to be linked to Buck's-horn Plantain *Plantago coronopus*. It has a widespread distribution in southern Britain northwards to Cheshire (Morris, 2012).

On the current survey, three were found by beating oak branches, or sweeping under oaks, NE of the Upper Pond (Figure 30).



Figure 30: *Mecinus circulatus* from Petworth Park.

***Xyleborus dryographus* (Coleoptera: Curculionidae) a bark-beetle, Nationally Scarce (Nb)**

This is an ambrosia beetle: its tunnels become colonised by symbiotic ‘ambrosia’ fungi having been inoculated with fungal spores transported by the parents in their oral mycetangia, the specialized organs for fungal transport. This beetle is associated with oaks and Sweet Chestnut, and to a lesser extent with Beech and elms. It is distributed across southern Britain, in association with ancient parkland and wood-pasture.

On the current survey, one was found in the aerial interception trap on the Fallen Beech, one in the subterranean pitfall trap on the Oak Stump, and one by sampling from a recently fallen exotic *Quercus* sp.

***Platypus cylindrus* (Coleoptera: Curculionidae) Oak Pin-hole Borer, Nationally Scarce (Nb)**

An ‘ambrosia’ beetle, attacking freshly split, felled or damaged timber, attracted by the smell of fermenting sap. Adults bore galleries of tunnels deep into the heartwood, on the walls of which the ambrosia fungi develop, providing food for their larvae. Typically associated with oaks but also on Beech. Mostly occurring in ancient parklands, woodlands and wood-pastures with a preference for trees in sunny situations. Widespread in southern England and Wales but absent from the far south-west. Apparently expanding its range and abundance in recent years.

On the current survey, this was frequent in the aerial interception traps on the Fallen Oak and Fallen Beech, and was also found by examining oak deadwood elsewhere.

***Synanthedon vespiformis* (Lepidoptera: Sesiidae) Yellow-legged Clearwing, Nationally Scarce (Nb)**

This moth is strongly associated with oaks, though there are also records from elms, birches and cherries. Eggs are laid on cuts and wounds and the larvae then develop by feeding within the woody tissues, probably on bark and sapwood. It is normally recorded from parkland, open woodland and hedgerows. The distributional range covers most of England, northwards to Yorkshire, as well as South Wales (Waring and Townsend, 2003).

On the current survey, one was recorded in the aerial interception trap on the Barrel Oak.

***Dropephylla gracilicornis* (Coleoptera: Staphylinidae) a rove-beetle, Nationally Scarce**

A saproxylic rove-beetle found under bark and in decaying wood of broad-leaved trees, especially oaks (Alexander, 2002). It has also occasionally been found in reed *Phragmites* debris. Widely distributed in England and southern Scotland but of very scattered occurrence within that range.

On the current survey, one was found by beating branches of the Barrel Oak.

***Dexiogyia corticina* (Coleoptera: Staphylinidae) a rove-beetle, Nationally Scarce**

Scarce but widespread with records throughout England and into south-east Scotland. This beetle occurs in rotten wood of various broad-leaved tree species, including oaks, Beech, elms, limes, Alder and Ash (Hyman and Parsons, 1994). It may be found in woodland, pasture-woodland or in other wooded landscapes.

On the current survey, two females were found by sieving densely-packed moist 'sawdust' from the hollow trunk of a collapsed Sycamore at SU95912288 on 25th June.

***Microdota excelsa* (Coleoptera: Staphylinidae) a rove-beetle, Nationally Scarce**

There are 15 members of the genus *Microdota* in Britain and all are rather small and difficult rove-beetles, which may thus be rather poorly known and poorly recorded. *M. excelsa* has been recorded from broad-leaved woodland, pasture and sallow carr, so would appear to occupy quite a broad range of habitats. It has been found by sampling a range of microhabitats including carrion, grass cuttings, rotten toadstools, flood debris and the dung of horses, cows, sheep and dogs. It has a very widespread distribution in Britain northwards to East Inverness-shire though is of very scattered occurrence within this range (Hyman and Parsons, 1994).

On the current survey, a male (Figure 31) was found by sieving some foul-smelling, rotten *Boletus*(?) toadstools under Sweet Chestnuts (Figure 32) on 15th September. This is the first record for Sussex, confirmed by Peter J. Hodge (*in litt.*, Jan 2021).



Figure 31: *Microdota excelsa* from Petworth Park.



Figure 32: Well-rotten *Boletus*(?) under Sweet Chestnut canopy.

***Acrotona parens* (Coleoptera: Staphylinidae) a rove-beetle, Nationally Scarce**

This rove-beetle may be a saproxyllic species, with records from burnt stumps, and under bark of Beech and Sycamore, though also known from more generalist microhabitats such as oak leaf-litter, fern-stack litter and garden vegetable litter (Hyman and Parsons, 1994). Records are largely confined to southern and south-eastern England, with an outlier from North Wales. It has apparently increased in frequency since 1970 (Hyman and Parsons, 1994).

On the current survey, a female was found in the subterranean pitfall trap on the Fallen Beech in the 17th July sample, with a male (Figure 33) in the same trap in the 15th September sample.



Figure 33: *Acrotona parens* from Petworth Park.

***Gyrophana manca* (Coleoptera: Staphylinidae) a rove-beetle, Nationally Scarce**

This species breeds in the fruiting bodies of wood-decay fungi on trees. It is a widespread species in England and North Wales but occurs very locally within this range. It has been found in broad-leaved woodland, usually by examining fungi growing on trees, including Ash, elms, Beech, oaks and willows. Information on its host fungi in Britain appears to be very scant: seemingly only Dryad's Saddle fungus *Polyporus squamosus* has been recorded (Hyman and Parsons, 1994), though personal observations include *Trametes versicolor* and a *Pleurotus* species. Continental literature notes a much wider range of fungal hosts, mostly lignicolous fungi, including the following additional species: *Fomes fomentarius*, *Phellinus igniarius*, *Fomitopsis pinicola*, *Armillaria mellea* and *Bjerkandera adusta* (Dauphin, 2005).

On the current survey, six (Figure 34) were found on 15th September by sieving quite fresh Chicken-of-the-Woods *Polyporus sulphureus* brackets growing on a very old oak stump (Figure 24).



Figure 34: *Gyrophana manca* from Petworth Park.

***Enicmus brevicornis* (Coleoptera: Latridiidae) a beetle, Nationally Scarce**

This beetle is associated with the mouldy bark of Beech, birches, Ash and Sycamore, and appears to have become commoner and more widespread in recent years as a result of the spread of Sooty Bark Disease *Cryptostroma corticale* on Sycamore. It is found in central and southern England, and in Cumbria. Though considered to be a Grade 3 Indicator of Ecological Continuity by Alexander (2004), it is expanding its range to the extent that it no longer has any value as an indicator (Telfer and Hammond, 2007) and it is doubtful whether it should still be regarded as a Nationally Scarce species.

On the current survey, recorded from the aerial interception trap on the Fallen Beech.

***Enicmus rugosus* (Coleoptera: Latridiidae) a beetle, Nationally Scarce**

Principally associated with slime-moulds (Myxomycetes) and known from a wide range of broad-leaved and coniferous trees. It is widespread but very local in southern England north to Derbyshire. Though considered to be a Grade 2 Indicator of Ecological Continuity by Alexander (2004), it is expanding its range to the extent that it no longer has any value as an indicator (Telfer and Hammond, 2007) and it is doubtful whether this species should still be regarded as a Nationally Scarce species.

On the current survey, recorded from the aerial interception trap on the Fallen Oak, and by sieving densely-packed moist 'sawdust' from the hollow trunk of a collapsed Sycamore at SU95912288 on 25th June.

***Corticaria alleni* (Coleoptera: Latridiidae) a beetle, Nationally Scarce**

Usually found under loose dry bark, and also found in association with slime-moulds (Myxomycetes) and in dry, crumbly heartwood as well as a range of other microhabitats. Associated with areas of old, deciduous oak and beech woodland in South and south-east England with outlying records from Sherwood Forest, Nottinghamshire and East Inverness-shire.

On the current survey, a female (Figure 35) was found in the aerial interception trap on the Fallen Beech.



Figure 35: *Corticaria alleni* from Petworth Park.

***Ctenophora pectinicornis* (Diptera: Tipulidae) a long-palped crane fly, Nationally Scarce**

This large and brightly marked crane fly has a local and scattered distributed in Britain with most records in the south (NBN). It occurs in old broad-leaved woodland with mature decaying trees. The larvae are associated with rot-holes, developing in rotting wood, especially Beech (Falk, 1991b).

On the current survey, a female was recorded in the aerial interception trap on the Barrel Oak.

5 Discussion

This survey achieved the aim of carrying out a thorough survey of the saproxylic beetles and other invertebrates of Petworth Deer Park, generating a list of 234 species of beetle out of a total invertebrate species list of 366. When added to the other invertebrate data for the Park, this provides a solid dataset from which to make an accurate site assessment.

Compared to other sites which appear in the Saproxylic Quality Index rankings, i.e. other parklands, wood-pastures, woodlands and sites with trees generally, Petworth Deer Park can be considered to be a relatively well-surveyed site, having now had three surveys carried out targeted at saproxylic beetles and other saproxylic invertebrates.

Compared to the previous surveys of Petworth Deer Park, (Denton, 2002; Telfer, 2010), the current survey appears to have been the most thorough to date, with beetle species lists of 158, 127 and 234 respectively, reflecting the expanded scope of the 2020 survey relative to the 2010 survey, including a more prolonged and intensive trapping programme.

5.1 SITE ASSESSMENT IN A NATIONAL AND COUNTY CONTEXT

Petworth Deer park is unquestionably a site of national importance for invertebrates. This is clearly shown by the very high percentage of Key Species (15.3%), by the very high SQI of 569.2, and by the very high IEC of 87. The SQI would place Petworth Deer Park as the 27th best site in Britain in the rankings. The IEC would place the Park as the 17th best site in Britain.

Petworth Deer Park's importance at a national scale is further reinforced by the presence of several Nationally Rare or Red Data Book invertebrates. Petworth is the only site for the pselaphine beetle *Batrissodes delaporti* away from its cluster of mid-Thames localities, and is only the fifth site for the false click-beetle *Hylis cariniceps*.

With specific regard to the fauna of saproxylic invertebrates, there is a case for regarding Petworth Deer Park as a site of international importance, given that the SQI of 569.2 is approaching the threshold for international importance of 590, and given that the IEC of 87 exceeds the threshold for international importance of 80. To add weight to the case for international importance, it is worth noting that the Cardinal Click-beetle *Ampedus cardinalis* is regarded as a Near Threatened species at a European scale by Nieto and Alexander (2010); click-beetles being one of very few groups for which European scale status assessments have been published.

Within Sussex, Petworth Deer Park sits within a cluster of other nationally important sites, as noted in the Introduction. Petworth now appears to be the most thoroughly surveyed saproxylic site in Sussex, as indicated by the 198 SQI-scoring species recorded, much higher than for any other site (Table 8). Petworth has the third highest SQI, exceeded only by

Parham Park and Cowdray Park, and has the highest IEC of any Sussex site, considerably exceeding the second highest IEC of 70 for Cowdray Park (Table 8).

Table 8: SQI and IEC figures for Sussex sites listed in the online SQI rankings, where 'No. of species' is the number of SQI-scoring beetle species. The updated figures for Petworth Park have been included.

Site	County	No. of species	SQI	IEC	Survey Period
Parham Park	West Sussex	82	614.6	42	1983 - 2012
Cowdray Park	West Sussex	122	606.6	70	2011
Petworth Park	West Sussex	198	569.2	87	1988 - 2020
Arundel Park	West Sussex	131	543.5	54	< 1999
Ebernoe Common	West Sussex	142	510.6	56	< 2011
The Mens	West Sussex	140	475.7	54	< 2010
Buxted Park	East Sussex	136	422.1	43	< 1999
Eridge Park	East Sussex	81	342.0	24	< 1999
Norton Priory	West Sussex	54	235.2	4	2003

5.2 COMPARISON TO PREVIOUS SURVEYS

Petworth Deer Park appears to be a substantially better site for saproxyllic invertebrates in 2020 than it was in 2010. The best evidence in support of this statement comes from the SQI figures, which include a correction for survey effort, and show a substantial increase from 475.9 after the 2010 survey to 569.2 after the 2020 survey.

However, there are a number of potential biases which might act to inflate the 2020 SQI relative to the 2010 SQI. For example, the 2020 SQI would be higher (i) if the surveyor had become much better at finding and identifying rare saproxyllic beetles in the intervening decade, (ii) if the unusual weather of the 2020 field season made it much easier to find rare saproxyllic beetles, and/or (iii) if the mass furloughing of NT staff in 2020 meant that there was more deadwood left for longer, thus making it much easier to find rare saproxyllic beetles. Assessing to what extent these, and other, potential biases may have actually affected the SQI figures can only be a matter of judgement. Here, the best judgement is considered to be that (i) surveyor ability to find and identify beetles has improved, but not necessarily biased towards rare species, (ii) the delayed start of the survey in 2020 and the unusual weather probably made it harder to find rare saproxyllics, and (iii) there were greater sampling opportunities in 2020 thanks to the fallen trees and other deadwood but there is no good reason to think that this would lead to more rare species being found rather than more common species. Overall, the most objective judgement is that Petworth Deer Park has improved as a site for saproxyllic invertebrates in the decade since it was last surveyed.

A few concluding remarks may be worth making here, though they are based much more on experience than on hard evidence. Relative to the many other parklands that the author has sampled, fieldwork in Petworth Deer Park can feel very unproductive and it is very frequent to examine the beating tray, the sweep-net, or the sieving tray and to see little or nothing of interest. But persistence and diligence are well rewarded as periods of seemingly unproductive fieldwork are punctuated by discoveries of extremely rare beetles! The impression gained is that Petworth Deer Park is absolutely one of Britain's best parklands

for saproxylic invertebrates, but a site at which many species have been persisting in low numbers through an unfavourable period, and are not yet flourishing in optimal habitat conditions. The Key Species accounts provide some evidence to substantiate that impression, with most species being represented by only one or two specimens during the course of the survey.

6 Recommendations

The 2020 survey has found that Petworth Deer Park has improved as a site for saproxylic invertebrates in the decade since it was last surveyed, so this should be celebrated by the National Trust and all those who have contributed to the improvement should be congratulated.

Telfer (2010) recommended that 'In view of the national importance of Petworth Park for saproxylic invertebrates, management must change to place the habitats of saproxylic invertebrates amongst the top priority features of the site'. The 2020 survey has found Petworth Park to be of even greater importance in a national context, with an emerging case for regarding it as a site of international importance. It is thus recommended that the National Trust should reassess the prioritisation of saproxylic invertebrates and their habitats, which might now be regarded as the most important feature of Petworth Park.

There is potential for conflicting management objectives at Petworth Park, as with many other parklands, which aim to conserve an important fauna of saproxylics, as well as to maintain a Capability Brown landscape which is of great cultural and historic importance, and brings many visitors to the Park to admire its considerable beauty. The National Trust routinely has to find a balance between such potential conflicts. From a nature conservation perspective, it could readily be argued that the saproxylic fauna is more important than the Capability Brown landscape, given (i) that the fauna has been present for much longer, not just since the establishment of the first deer park in the 13th century, but probably dating back to the ancient wildwood, and (ii) the fauna is vulnerable to extinction and much more difficult to restore once lost. However, in practice, there should be enough space at Petworth Park to prioritise conserving the saproxylic fauna in some zones of the Park, and to prioritise maintaining the historic Capability Brown landscape in other zones.

It is recommended that a zone map of the Deer Park be drawn up, showing areas which will be managed principally to conserve the saproxylic fauna and areas which will be managed principally to maintain the designed Capability Brown landscape.

Within the saproxylic conservation zone, the following management is strongly recommended:

- Existing trees and shrubs to receive minimal management. The natural processes of tree-fall, breakage, decay and death shall be allowed to take their natural course as far as possible, with management intervention required only to ensure visitor safety and to maintain paths and tracks.

Within the landscape conservation zone, the following management is strongly recommended:

- Existing trees and shrubs may be managed principally with a view to maintaining the landscape. If the natural processes of tree-fall, breakage, decay and death can be

allowed to take their natural course, without management intervention, that is to be strongly encouraged. Where management intervention is necessary, e.g., to maintain key views, the detrimental impacts can be substantially mitigated by the following measures:

- not burning any wood (Figure 36);
- not taking any timber or firewood from the Park;
- any and all arisings from chainsaw operations that cannot be left *in situ* should be moved to a place where they can be left undisturbed, presumably within the saproxyllic conservation zone;
- minimal cutting and trimming of arisings (long lengths and large sections are much more valuable to fungi and invertebrates);
- where it is considered impractical to transport large volumes of brash and small branchwood, it would be much better to chip it and transport the chippings to a woodchip pile, than to burn it. Note that woodchip piles can provide excellent habitat for a range of saproxyllic species, and are best managed as large piles, regularly added to, and situated in an open, sunny spot.



Figure 36: Brash, apparently heaped up next to a bonfire site. It would be much better to stop burning and instead to start chipping such material and create a woodchip pile.

It is recognised that the complete cessation of timber operations and firewood removal from Petworth Park will not necessarily be quick or straightforward to achieve (Figure 37).

But it is important that an attempt is made to bring about the cessation of timber and firewood removal, even if it requires a phased approach over a period of years. As Table 8 shows, Petworth Park is the third worst site in Sussex from which to extract timber and firewood, in terms of the damaging impacts on saproxylic invertebrates.



Figure 37: Timber stack at Petworth Deer Park.

Petworth Park has large areas of treeless grassland. Where possible within the saproxylic conservation zone, and without compromising the landscape vistas, it is strongly recommended that more trees are planted. Planting is essential to provide new cohorts of trees, some of which will develop into the ancient trees of the future. Planting is also strongly recommended to increase the stock of trees, quite simply because more trees means more habitat for saproxylic invertebrates. Natural tree regeneration cannot be expected to happen alongside Petworth's Fallow Deer herd and so planting is the only solution. Those areas of the Park which are currently laid out as plantations can presumably be apportioned to the saproxylic conservation zone and should be re-purposed to develop open-grown, large-girth veteran trees (Figure 38). Planting should use local genotypes of native broad-leaved trees, principally oaks and Beech.



Figure 38: Perfect open-grown oaks at Petworth Park, with hemispherical canopy.

Many saproxylic insects feed on nectar and pollen to some extent as adults. Thus, in addition to the deadwood habitat, it is valuable to have flower-rich grassland and especially valuable to have flowering shrubs. Hawthorns are a particularly valuable source of nectar and pollen in season for many invertebrates, as are Dogwood, Spindle, Wayfaring-tree, whitebeams, Rowan, Blackthorn and others. Unfortunately, as previously noted by Telfer (2010), flowers and flowering shrubs are very scarce in the Park, and likely to be a limiting factor for some invertebrates. As well as planting the ancient trees of the future, a shrub planting programme is recommended, providing a scatter of mature, open-grown hawthorns and other native shrubs across the Park.

It is a curious feature of British nature conservation that many nationally important parkland sites, including Petworth Park, are not designated as Sites of Special Scientific Interest (SSSI) for their veteran trees and the assemblages of invertebrates, fungi, lichens and other wildlife which depend on them. In the case of Petworth Park, it was designated as a SSSI in 1980 when it was described as 'an ancient deer park with old trees bearing a relict lichen flora' but was subsequently de-notified, reportedly because Dutch Elm Disease ravaged the elm population on which many of the lichens lived. There seems little doubt that Petworth Park would qualify for re-designation as a SSSI, and SSSI designation should be encouraged as a means of giving recognition to the Park's importance for wildlife, and mobilising conservation resources.

Petworth Park is the central site of a remarkable cluster of important parkland and wood-pasture sites, detailed in the Introduction. The top six Sussex sites ranked by SQI (Table 8) all

lie within an 11 km radius of Petworth Park except for Arundel Park which is a little more distant to the south. While a site like Petworth Park is nationally, or even internationally, important in its own right, this cluster of sites must collectively qualify as an internationally important landscape area for saproxyllic invertebrates and the populations of ancient and veteran trees on which they depend. The owners and managers of all these sites could liaise to recognise the shared importance of these sites, collaborate to conserve their species and habitats across all the sites, and seek opportunities to expand and improve habitat connectivity across the South Downs landscape.

7 Acknowledgements

I would like to thank Emma Parnwell, Ian Leatherbarrow and Jamie Robins who each took a turn at managing this project, with Ian being at the helm during the difficult period around the start of lockdown and the beginning of fieldwork. I would also like to thank the following: Martyn Burkinshaw for hosting my visits and ensuring I could get into, around and out of the Park on every visit; Peter Hodge for providing a list of the beetles of Sussex and answering various queries; Tony Allen for sharing his beetle records from the Park; Paul Whitby for news of Stag Beetles and Sawyer Beetles in his light trap; Jo Hodgkins for providing a map of the Park; and Keith Alexander for a copy of the 1980 designation for Petworth Park SSSI. In the version of 27th January 2021, an unconfirmed record of *Phloeopora concolor* was retracted after receiving expert advice from Andrew Duff, Roger Booth and Volker Assing, for which I am most grateful.

8 References

- Alexander, K.N.A. (2002). *The invertebrates of living and decaying timber in Britain and Ireland. A provisional annotated checklist*. English Nature Research Reports, number 467. Peterborough: English Nature.
- Alexander, K.N.A. (2004). *Revision of the Index of Ecological Continuity as used for saproxyllic beetles*. English Nature Research Reports, number 574. Peterborough: English Nature.
- Alexander, K.N.A. (2014). *A review of the scarce and threatened beetles of Great Britain. Buprestidae, Cantharidae, Cleridae, Dasytidae, Drilidae, Lampyridae, Lycidae, Lymexylidae, Malachiidae, Phloiophilidae and Trogossitidae*. Species Status number 16. Natural England Commissioned Reports number 134. Natural England.
- Alexander, K.N.A., Dodd, S. and Denton, J. (2014). *A review of the scarce and threatened beetles of Great Britain. The darkling beetles and their allies. Aderidae, Anthicidae, Colydiidae, Melandryidae, Meloidae, Mordellidae, Mycetophagidae, Mycteridae, Oedemeridae, Pyrochroidae, Pythidae, Ripiphoridae, Salpingidae, Scraptiidae, Tenebrionidae & Tetratomidae (Tenebrionoidea less Ciidae)*. Species Status number 18. Natural England Commissioned Reports number 148. Natural England.
- Asher, J., Warren, M., Fox, R., Harding, P., Jeffcoate, G. and Jeffcoate, S. (2001). *The millennium atlas of butterflies in Britain and Ireland*. Oxford: Oxford University Press.
- Damant, S. and Kirby, P. (2005). Oasis in an arable desert: the rich saproxyllic Coleoptera fauna of Wimpole Park, Cambridgeshire. *The Coleopterist*, **14**, 51 - 63.

- Dauphin, P. (2005). *Les Gyrophaena (Coléoptères Staphylinidae) et les champignons*. Feuilletés Linnéens: entomologie. Bordeaux: Société Linnéenne de Bordeaux.
- Denton, J. (2002). *Survey of the saproxylic Coleoptera and other invertebrates from Petworth Park, West Sussex, 2001-2*. Unpublished survey report to the National Trust.
- Denton, J. (2003). The saproxylic Coleoptera of Petworth Park, West Sussex. *The Coleopterist*, **12**, 89 - 96.
- Denton, J. (2005). *The beetles of Surrey: a checklist*. Woking: Surrey Wildlife Trust.
- Denton, J. (2006). The saproxylic Coleoptera of Bushy Park, Middlesex. *Bulletin of the Amateur Entomologists' Society*, **65**, 18 - 28.
- Drake, C.M. (2017). *A review of the status of Larger Brachycera flies of Great Britain. Acroceridae, Asilidae, Athericidae, Bombyliidae, Rhagionidae, Scenopinidae, Stratiomyidae, Tabanidae, Therevidae, Xylomyidae*. Species Status number 29. Natural England Commissioned Reports number 192. Natural England.
- Falk, S. (1991a). *A review of the scarce and threatened bees, wasps and ants of Great Britain*. Research and survey in nature conservation, number 35. Peterborough: Nature Conservancy Council.
- Falk, S. (1991b). *A review of the scarce and threatened flies of Great Britain (part 1)*. Research and survey in nature conservation, number 39. Peterborough: Nature Conservancy Council.
- Fowler (1905). Coleoptera: beetles. Pp. 136 - 164 in Page, W. (ed.) *The Victoria History of the County of Sussex. Volume 1: Natural History, Geology, pre-medieval Archaeology, the Domesday survey, and Political History*. London: Victoria County History.
- Fowles, A.P., Alexander, K.N.A. and Key, R.S. (1999). The Saproxylic Quality Index: evaluating wooded habitats for the conservation of dead-wood Coleoptera. *The Coleopterist*, **8**, 121 - 141.
- Fox, R., Warren, M.S., Brereton, T.M., Roy, D.B. and Robinson, A. (2010). A new Red List of British butterflies. *Insect Conservation and Diversity*, **4**, 159 - 172.
- Hammond, P.M. (1972). Notes on British Staphylinidae 3. The British species of *Sepedophilus* Gistel (*Conosomus* auctt.). *Entomologist's monthly magazine*, **108**, 130 - 165.
- Harrison, T.D. (2012). A fourth British record for *Hylis cariniceps* (Reitter) (Eucnemidae). *The Coleopterist*, **21**, 49.
- Hyman, P.S. (revised by Parsons, M.S.) (1992). *A review of the scarce and threatened Coleoptera of Great Britain. Part 1*. UK Nature Conservation, number 3. Peterborough: Joint Nature Conservation Committee.
- Hyman, P.S. (revised by Parsons, M.S.) (1994). *A review of the scarce and threatened Coleoptera of Great Britain. Part 2*. UK Nature Conservation, number 12. Peterborough: Joint Nature Conservation Committee.
- IUCN (2001). *IUCN Red List Categories and Criteria: version 3.1. Prepared by the IUCN Species Survival Commission*. Gland, Switzerland: International Union for Conservation of Nature.

- Johnson, C. (2008). Saproxyllic Coleoptera from Calke, Chatsworth, Hardwick and Kedleston Parks, Derbyshire, 1881-1999. *The Coleopterist*, **17**, 23 - 41.
- Johnson, C. (2011). Saproxyllic Coleoptera from Calke, Hardwick and Kedleston Parks, Derbyshire: additional records including eleven new to the county list. *The Coleopterist*, **20**, 9 - 13.
- Kirby, P. (1992). *A review of the scarce and threatened Hemiptera of Great Britain*. UK Nature Conservation number 2. Peterborough: Joint Nature Conservation Committee.
- Lane, S.A. (2017). *A review of the status of the beetles of Great Britain. The clown beetles and false clown beetles - Histeridae and Sphaeritidae*. Species Status number 32. Natural England Commissioned Reports number 235. Natural England.
- Lee, P. (2006). *Atlas of the millipedes (Diplopoda) of Britain and Ireland*. Sofia: Pensoft.
- Lee, P. (2015). *A review of the millipedes (Diplopoda), centipedes (Chilopoda) and woodlice (Isopoda) of Great Britain*. Species Status no. 23. Natural England Commissioned Report number 186. Natural England.
- Lott, D. and Anderson, R. (2011). *The Staphylinidae (rove beetles) of Britain and Ireland, Parts 7 & 8: Oxyporinae, Steninae, Euaesthetinae, Pseudopsinae, Paederinae, Staphylininae*. Handbooks for the identification of British insects, volume 12, part 7 [sic]. St Albans: Royal Entomological Society.
- Marshall, J.A. and Haes, E.C.M. (1988). *Grasshoppers and allied insects of Great Britain and Ireland*. Colchester: Harley Books.
- Mendel, H. (1991). *Batrisodes adnexus* (Hampe) (*B. buqueti* auctt. Brit.) and *B. delaporti* (Aubé) (Col.: Pselaphidae) in Britain. *Entomologist's record and journal of variation*, **103**, 293 - 296.
- Mendel, H. and Clarke, R.E. (1996). *Provisional atlas of the click beetles (Coleoptera: Elateroidea) of Britain and Ireland*. Ipswich: Ipswich Borough Council Museums.
- Morris, M.G. (1997). *Broad-nosed weevils. Coleoptera: Curculionidae (Entiminae)*. Handbooks for the identification of British insects, volume 5, part 17a. London: Royal Entomological Society.
- Morris, M.G. (2002). *True weevils (part I). Coleoptera: Curculionidae (subfamilies Raymondionyminae to Smicronychinae)*. Handbooks for the identification of British insects, volume 5, part 17b. London: Royal Entomological Society.
- Morris, M.G. (2012). *True weevils (part III) (Coleoptera: Curculioninae, Baridinae, Orobittidinae)*. Handbooks for the identification of British insects, volume 5, part 17d. St Albans: Royal Entomological Society.
- Nieto, A. and Alexander, K.N.A. (2010). *European Red List of Saproxyllic Beetles*. Luxembourg: Publications Office of the European Union.
- Owen, J.A. (1995). A pitfall trap for repetitive sampling of hypogean arthropod faunas. *Entomologist's record and journal of variation*, **107**, 225 - 228.
- Owen, J.A. (2000). Beetles occurring underground at the roots of old trees. *Entomologist's gazette*, **51**, 239 - 256.

- Parsons, A.J. (2008). *Hylis cariniceps* (Reitter) (Eucnemidae) in Somerset. *The Coleopterist*, **17**, 82.
- Shirt, D.B. (ed.) (1987). *British Red Data Books: 2. Insects*. Peterborough: Nature Conservancy Council.
- Stubbs, A.E. and Drake, M. (2001). *British soldierflies and their allies*. Reading: British Entomological and Natural History Society.
- Telfer, M.G. (2009). *A survey of the saproxylic invertebrates of Ebernoe Common, Sussex*. Unpublished survey report to Sussex Wildlife Trust.
- Telfer, M.G. (2010). *A survey of the saproxylic invertebrates of Petworth Park, Sussex*. Unpublished survey report to the National Trust.
- Telfer, M.G. (2011a). *A survey of the saproxylic invertebrates of The Mens, Sussex*. Version 3: 22nd March 2011. Unpublished survey report to Sussex Wildlife Trust on behalf of the West Weald Landscape Partnership.
- Telfer, M.G. (2011b). *Oxyaemus cylindricus* (Creutzer in Panzer) (Bothrideridae) rediscovered in Britain. *The Coleopterist*, **20**, 45 - 50.
- Telfer, M.G. (2012). *A survey of the saproxylic invertebrates of Cowdray Park*. Unpublished survey report to the West Weald Landscape Partnership in partnership with the Cowdray Estate.
- Telfer, M.G. and Hammond, P.M. (2007). The saproxylic beetles of Langley Park, Buckinghamshire. *The Coleopterist*, **16**, 53 - 70.
- Walker, J.J. (1907?). *A preliminary list of the Coleoptera observed in the neighbourhood of Oxford from 1819 to 1907*. Ashmolean Natural History Society Report for 1906, pp. 51 - 100.
- Waring, P. and Townsend, M. (2003). *Field guide to the moths of Great Britain and Ireland*. Hook: British Wildlife Publishing.

Appendix 1: British Conservation Status Categories – Definitions

1.1 Status Categories and Criteria Version 1 (Shirt, 1987)

These status categories and criteria were introduced for British insects by Shirt (1987) and received some modifications by later authors (e.g. Hyman and Parsons (1992, 1994)).

Red Data Book category EXTINCT

Definition Species which were formerly native to Britain but have not been recorded since 1900.

Red Data Book category 1, Endangered

Definition Species in danger of extinction and whose survival is unlikely if causal factors continue to operate. Endangered species either (a) occur as only a single population within one 10-km square, or (b) only occur in especially vulnerable habitats, or (c) have been declining rapidly or continuously for twenty years or more to the point where they occur in five or fewer 10-km squares, or (d) may already have become extinct.

Red Data Book category 2, Vulnerable

Definition Species which are likely to move into the Endangered category in the near future if causal factors continue to operate. Vulnerable species are declining throughout their range or occupy vulnerable habitats.

Red Data Book category 3, Rare

Definition Species which occur in small populations and although not currently either Endangered or Vulnerable are at risk. Rare species exist in 15 or fewer 10-km squares, or are more widespread than this but dependent on small areas of especially vulnerable habitat.

Red Data Book category I, Indeterminate

Note: Best written as 'RDBi' rather than 'RDBI' as the latter is easily confused with 'RDB1' (Endangered).

Definition Species considered to be either Endangered, Vulnerable or Rare but with insufficient information to say which.

Red Data Book category K, Insufficiently Known

Definition Species suspected to merit either Endangered, Vulnerable, Rare or Indeterminate status but lacking sufficient information. Species included in this category may have only recently been discovered in Britain, or may be very poorly recorded for a variety of reasons.

Nationally Scarce Category A, Na.

Definition Species which do not fall within Red Data Book categories but which are nonetheless uncommon in Great Britain and thought to occur in 30 or fewer (typically between 16 and 30) 10-km squares of the National Grid, or for less well-recorded groups, in seven or fewer vice-counties.

Nationally Scarce Category B, Nb.

Definition Species which do not fall within Red Data Book categories but which are nonetheless uncommon in Great Britain and thought to occur in between 31 and 100 10-km

squares of the National Grid, or for less well-recorded groups, between eight and twenty vice-counties.

Nationally Scarce, N.

Definition Species which do not fall within Red Data Book categories but which are nonetheless uncommon in Great Britain. This status category has been used where information has not been sufficient to allocate a species to either Na or Nb. These species are thought to occur in between 16 and 100 10-km squares of the National Grid.

1.2 Status Categories and Criteria Version 2 (IUCN, 2001)

These later status categories and criteria are based on IUCN Red List Categories and Criteria version 3.1 (IUCN, 2001) and have been applied to British butterflies, dragonflies, water beetles and an increasing number of other invertebrate groups.

Critically Endangered (CR)

A taxon is Critically Endangered when the best available evidence indicates that it is facing an **extremely high** risk of extinction in the wild.

Endangered (EN)

A taxon is Endangered when the best available evidence indicates that it is facing a **very high** risk of extinction in the wild.

Vulnerable (VU)

A taxon is Vulnerable when the best available evidence indicates that it is facing a **high** risk of extinction in the wild.

N.B.: Species belonging to the above three categories may be collectively referred to as **Threatened**.

Data Deficient (DD)

A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate.

The DD category effectively replaces the Indeterminate (RDBi) and Insufficiently Known (RDBK) categories of the earlier version.

Near Threatened (NT)

A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.

Least Concern (LC)

A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.

Not Applicable (NA)

A taxon is Not Applicable when it is either regarded as a non-native in Britain or occurs solely as a natural vagrant.

1.3 Status Categories and Criteria Version 3 (GB Rarity Status)

These status categories and criteria operate in parallel with version 2 and are defined specifically for use in Britain where they provide some continuity with version 1, allowing the continued use of “rare and scarce” species for site assessment purposes.

Nationally Rare (NR)

Native species which have not been recorded from more than 15 British hectads in recent decades and where there is reasonable confidence that exhaustive recording would not find them in more than 15 hectads. This category includes species which are probably extinct.

Nationally Scarce (NS)

Native species which are not regarded as Nationally Rare AND which have not been recorded from more than 100 British hectads in recent decades and where there is reasonable confidence that exhaustive recording would not find them in more than 100 hectads.

Appendix 2: List of invertebrates recorded at Petworth Deer Park in 2020 by Mark G. Telfer

Key Species are listed in **red text**. The table is in taxonomic sequence. Full details of all records generated by this project are held in a computer database by the author that may be consulted if required to provide further information such as precise localities, grid references, quantity, sex and life-stage.

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Malacostraca	Isopoda	Trichoniscidae	<i>Haplophthalmus danicus</i>	a woodlouse	LC
Malacostraca	Isopoda	Oniscidae	<i>Oniscus asellus</i>	Common Shiny Woodlouse	LC
Malacostraca	Isopoda	Porcellionidae	<i>Porcellio dilatatus</i>	a woodlouse	LC
Malacostraca	Isopoda	Porcellionidae	<i>Porcellio scaber</i>	Common Rough Woodlouse	LC
Arachnida	Araneae	Dysderidae	<i>Harpactea hombergi</i>	a spider	LC
Arachnida	Araneae	Oonopidae	<i>Oonops pulcher</i>	a spider	LC
Arachnida	Araneae	Linyphiidae	<i>Diplostyla concolor</i>	a spider	LC
Arachnida	Araneae	Araneidae	<i>Nuctenea umbratica</i>	a spider	LC
Arachnida	Pseudoscorpiones	Chernetidae	<i>Lamprochernes nodosus</i>	Knotty Shining Claw	None
Arachnida	Pseudoscorpiones	Chernetidae	<i>Chernes cimicoides</i>	Common Tree-cherne	None
Arachnida	Acari	Eriophyidae	<i>Eriophyes tiliae</i>	a mite	None
Chilopoda	Geophilomorpha	Geophilidae	<i>Geophilus flavus</i>	a centipede	LC
Chilopoda	Lithobiomorpha	Lithobiidae	<i>Lithobius forficatus</i>	a centipede	LC
Diplopoda	Chordeumatida	Chordeumatidae	<i>Chordeuma proximum</i>	a millipede	LC
Diplopoda	Julida	Nemasomatidae	<i>Nemasoma varicorne</i>	a millipede	LC
Diplopoda	Julida	Blaniulidae	<i>Proteroiulus fuscus</i>	a millipede	LC
Diplopoda	Julida	Blaniulidae	<i>Blaniulus guttulatus</i>	Spotted Snake-millipede	LC
Diplopoda	Julida	Julidae	<i>Cylindroiulus britannicus</i>	a millipede	LC
Diplopoda	Julida	Julidae	<i>Cylindroiulus parisiorum</i>	a millipede	LC, NS
Diplopoda	Polydesmida	Polydesmidae	<i>Polydesmus coriaceus</i>	a flat-backed millipede	LC
Diplopoda	Polydesmida	Polydesmidae	<i>Brachydesmus superus</i>	a flat-backed millipede	LC

Saproxyllic invertebrate survey of Petworth Deer Park

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Insecta	Diplura	Campodeidae	<i>Campodea lankesteri</i>	a two-tailed bristletail	None
Insecta	Odonata	Coenagriidae	<i>Ischnura elegans</i>	Blue-tailed Damselfly	LC
Insecta	Odonata	Coenagriidae	<i>Enallagma cyathigerum</i>	Common Blue Damselfly	LC
Insecta	Odonata	Aeshnidae	<i>Aeshna grandis</i>	Brown Hawker	LC
Insecta	Odonata	Aeshnidae	<i>Aeshna mixta</i>	Migrant Hawker	LC
Insecta	Odonata	Aeshnidae	<i>Anax imperator</i>	Emperor Dragonfly	LC
Insecta	Odonata	Libellulidae	<i>Orthetrum cancellatum</i>	Black-tailed Skimmer	LC
Insecta	Odonata	Libellulidae	<i>Sympetrum striolatum</i>	Common Darter	LC
Insecta	Dictyoptera	Blattellidae	<i>Ectobius lapponicus</i>	Dusky Cockroach	LC, NS
Insecta	Dermaptera	Forficulidae	<i>Forficula auricularia</i>	Common Earwig	LC
Insecta	Orthoptera	Meconematidae	<i>Meconema thalassinum</i>	Oak Bush-cricket	LC
Insecta	Orthoptera	Phaneropteridae	<i>Leptophyes punctatissima</i>	Speckled Bush-cricket	LC
Insecta	Orthoptera	Acrididae	<i>Chorthippus brunneus</i>	Field Grasshopper	LC
Insecta	Orthoptera	Acrididae	<i>Chorthippus parallelus</i>	Meadow Grasshopper	LC
Insecta	Psocoptera	Ectopsocidae	<i>Ectopsocus petersi</i>	a barkfly	None
Insecta	Psocoptera	Stenopsocidae	<i>Graphopsocus cruciatus</i>	a barkfly	None
Insecta	Hemiptera: Sternorrhyncha	Aphididae	<i>Eucallipterus tiliae</i>	Common Lime Aphid	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Ledra aurita</i>	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Iassus lanius</i>	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Pediopsis tiliae</i>	a leafhopper	Nationally Scarce (Nb)
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Anaceratagallia ribauti</i>	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Deltocephalus pulicaris</i>	a leafhopper	None

Saproxyllic invertebrate survey of Petworth Deer Park

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Allygus mixtus</i>	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Allygus modestus</i>	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cixiidae	<i>Tachycixius pilosus</i>	a lacehopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cixiidae	<i>Cixius nervosus</i>	a lacehopper	None
Insecta	Hemiptera: Auchenorrhyncha	Delphacidae	<i>Conomelus anceps</i>	a planthopper	None
Insecta	Hemiptera: Heteroptera	Tingidae	<i>Tingis cardui</i>	a lacebug	None
Insecta	Hemiptera: Heteroptera	Microphysidae	<i>Loricula elegantula</i>	a bug	None
Insecta	Hemiptera: Heteroptera	Microphysidae	<i>Loricula pselaphiformis</i>	a bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Campyloneura virgula</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Deraeocoris ruber</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Liocoris tripustulatus</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Miridius quadrivirgatus</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Miris striatus</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Pinalitus cervinus</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Acetropis gimmerthalii</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Pithanus maerkelii</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Heterotoma planicornis</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Pilophorus perplexus</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Lopus decolor</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Orthonotus rufifrons</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Phylus melanocephalus</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Plagiognathus arbustorum</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Anthocoridae	<i>Anthocoris confusus</i>	a flower bug	None

Saproxyllic invertebrate survey of Petworth Deer Park

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Insecta	Hemiptera: Heteroptera	Anthocoridae	<i>Anthocoris nemorum</i>	a flower bug	None
Insecta	Hemiptera: Heteroptera	Anthocoridae	<i>Temnostethus gracilis</i>	a flower bug	None
Insecta	Hemiptera: Heteroptera	Anthocoridae	<i>Buchananiella continua</i>	a flower bug	None
Insecta	Hemiptera: Heteroptera	Anthocoridae	<i>Cardiastethus fasciiventris</i>	a flower bug	None
Insecta	Hemiptera: Heteroptera	Anthocoridae	<i>Xylocoris cursitans</i>	a flower bug	None
Insecta	Hemiptera: Heteroptera	Berytidae	<i>Berytinus minor</i>	a stiltbug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Cymus clavicolus</i>	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Metopoplax ditomoides</i>	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Drymus brunneus</i>	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Peritrechus lundii</i>	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Rhopalidae	<i>Myrmus miriformis</i>	a rhopalid bug	LC
Insecta	Hemiptera: Heteroptera	Pentatomidae	<i>Pentatoma rufipes</i>	Red-legged Shieldbug	LC
Insecta	Coleoptera	Carabidae	<i>Carabus violaceus</i>	Violet Ground Beetle	LC
Insecta	Coleoptera	Carabidae	<i>Leistus rufomarginatus</i>	a ground beetle	LC
Insecta	Coleoptera	Carabidae	<i>Notiophilus biguttatus</i>	a ground beetle	LC
Insecta	Coleoptera	Carabidae	<i>Notiophilus rufipes</i>	a ground beetle	LC
Insecta	Coleoptera	Carabidae	<i>Bembidion lunulatum</i>	a ground beetle	LC
Insecta	Coleoptera	Carabidae	<i>Stomis pumicatus</i>	a ground beetle	LC
Insecta	Coleoptera	Carabidae	<i>Pterostichus madidus</i>	a ground beetle	LC
Insecta	Coleoptera	Carabidae	<i>Abax parallelepipedus</i>	a ground beetle	LC
Insecta	Coleoptera	Carabidae	<i>Dromius quadrimaculatus</i>	a ground beetle	LC
Insecta	Coleoptera	Carabidae	<i>Calodromius spilotus</i>	a ground beetle	LC
Insecta	Coleoptera	Histeridae	<i>Abraeus perpusillus</i>	a beetle	LC
Insecta	Coleoptera	Histeridae	<i>Plegaderus dissectus</i>	a beetle	LC
Insecta	Coleoptera	Histeridae	<i>Aeletes atomarius</i>	a beetle	LC, NS
Insecta	Coleoptera	Histeridae	<i>Dendrophilus punctatus</i>	a beetle	LC
Insecta	Coleoptera	Histeridae	<i>Paromalus flavicornis</i>	a beetle	LC

Saproxyllic invertebrate survey of Petworth Deer Park

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Insecta	Coleoptera	Ptiliidae	<i>Ptenidium laevigatum</i>	a featherwing beetle	None
Insecta	Coleoptera	Ptiliidae	<i>Ptinella aptera</i>	a featherwing beetle	None
Insecta	Coleoptera	Leiodidae	<i>Agathidium seminulum</i>	a beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Scydmaenus rufus</i>	a scydmaenine rove-beetle	RDB2
Insecta	Coleoptera	Staphylinidae	<i>Dropephylla gracilicornis</i>	a rove-beetle	Nationally Scarce
Insecta	Coleoptera	Staphylinidae	<i>Omalius septentrionis</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Bibloporus bicolor</i>	a pselaphine rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Euplectus karstenii</i>	a pselaphine rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Batrissodes delaporti</i>	a pselaphine rove-beetle	RDB1
Insecta	Coleoptera	Staphylinidae	<i>Trichonyx sulcicollis</i>	a pselaphine rove-beetle	RDB2
Insecta	Coleoptera	Staphylinidae	<i>Phloeocharis subtilissima</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Sepedophilus bipunctatus</i>	a rove-beetle	LC, NS
Insecta	Coleoptera	Staphylinidae	<i>Sepedophilus marshami</i>	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	<i>Tachyporus hypnorum</i>	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	<i>Tachyporus nitidulus</i>	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	<i>Tachyporus solutus</i>	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	<i>Tachyporus tersus</i>	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	<i>Tachinus rufipes</i>	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	<i>Mycetoporus lepidus</i>	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	<i>Lordithon lunulatus</i>	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	<i>Trichophya pilicornis</i>	a rove-beetle	Nationally Scarce (Nb)
Insecta	Coleoptera	Staphylinidae	<i>Habrocerus capillaricornis</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Myllaena brevicornis</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Dexiogyia corticina</i>	a rove-beetle	Nationally Scarce
Insecta	Coleoptera	Staphylinidae	<i>Phloeopora sp. (scribae?)</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Phloeopora testacea</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Callicerus rigidicornis</i>	a rove-beetle	None

Saproxyllic invertebrate survey of Petworth Deer Park

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Insecta	Coleoptera	Staphylinidae	<i>Aloconota gregaria</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Amischa analis</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Amischa decipiens</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Amischa nigrofusca</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Alaobia gagatina</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Alaobia sodalis</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Geostiba circellaris</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Microdota excelsa</i>	a rove-beetle	Nationally Scarce
Insecta	Coleoptera	Staphylinidae	<i>Microdota minuscula</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Mocyta fungi</i> agg.	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Datomicra canescens</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Atheta crassicornis</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Atheta harwoodi</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Atheta oblita</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Acrotona muscorum</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Acrotona parens</i>	a rove-beetle	Nationally Scarce
Insecta	Coleoptera	Staphylinidae	<i>Thamiaraea cinnamomea</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Aleochara sparsa</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Gyrophana manca</i>	a rove-beetle	Nationally Scarce
Insecta	Coleoptera	Staphylinidae	<i>Homalota plana</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Anomognathus cuspidatus</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Leptusa ruficollis</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Bolitochara tecta</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Placusa pumilio</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Oligota punctulata</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Oligota pusillima</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Siagonium quadricorne</i>	a rove-beetle	None

Saproxyllic invertebrate survey of Petworth Deer Park

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Insecta	Coleoptera	Staphylinidae	<i>Carpelimus corticinus</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Anotylus nitidulus</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Anotylus rugosus</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Anotylus sculpturatus</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Anotylus tetracarinatus</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Paederus littoralis</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Lobrathium multipunctum</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Bisnius subuliformis</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Gabrius splendidulus</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Ocypus olens</i>	Devil's Coach-horse	None
Insecta	Coleoptera	Staphylinidae	<i>Othius subuliformis</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Atrecus affinis</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Gyrophypnus angustatus</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Hypnogyra angularis</i>	a rove-beetle	Nationally Scarce (Na)
Insecta	Coleoptera	Lucanidae	<i>Dorcus parallelipipedus</i>	Lesser Stag Beetle	LC
Insecta	Coleoptera	Scarabaeidae	<i>Aphodius ater</i>	a dung beetle	LC
Insecta	Coleoptera	Buprestidae	<i>Agrilus laticornis</i>	a jewel beetle	LC
Insecta	Coleoptera	Buprestidae	<i>Agrilus biguttatus</i>	Oak Jewel Beetle	LC
Insecta	Coleoptera	Buprestidae	<i>Agrilus sinuatus</i>	Hawthorn Jewel Beetle	LC
Insecta	Coleoptera	Eucnemidae	<i>Hylis cariniceps</i>	a false click-beetle	RDB1
Insecta	Coleoptera	Eucnemidae	<i>Microrhagus pygmaeus</i>	a false click-beetle	RDB3
Insecta	Coleoptera	Throscidae	<i>Trixagus leseigneuri</i>	a beetle	None
Insecta	Coleoptera	Throscidae	<i>Trixagus obtusus</i>	a beetle	None
Insecta	Coleoptera	Elateridae	<i>Athous haemorrhoidalis</i>	a click-beetle	None
Insecta	Coleoptera	Elateridae	<i>Ampedus balteatus</i>	a click-beetle	None
Insecta	Coleoptera	Elateridae	<i>Ampedus cardinalis</i>	a click-beetle	RDB2
Insecta	Coleoptera	Elateridae	<i>Panspaeus guttatus</i>	a click-beetle	None

Saproxyllic invertebrate survey of Petworth Deer Park

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Insecta	Coleoptera	Elateridae	<i>Melanotus castanipes/villosus</i>	a click-beetle	None
Insecta	Coleoptera	Lycidae	<i>Platycis minutus</i>	a net-winged beetle	LC
Insecta	Coleoptera	Cantharidae	<i>Cantharis livida</i>	a soldier-beetle	LC
Insecta	Coleoptera	Cantharidae	<i>Cantharis pallida</i>	a soldier-beetle	LC
Insecta	Coleoptera	Cantharidae	<i>Cantharis rustica</i>	a soldier-beetle	LC
Insecta	Coleoptera	Cantharidae	<i>Rhagonycha nigriventris</i>	a soldier-beetle	LC
Insecta	Coleoptera	Cantharidae	<i>Rhagonycha fulva</i>	a soldier-beetle	LC
Insecta	Coleoptera	Cantharidae	<i>Rhagonycha lutea</i>	a soldier-beetle	LC, NS
Insecta	Coleoptera	Cantharidae	<i>Malthinus flaveolus</i>	a soldier-beetle	LC
Insecta	Coleoptera	Cantharidae	<i>Malthinus seriepunctatus</i>	a soldier-beetle	LC
Insecta	Coleoptera	Dermestidae	<i>Ctesias serra</i>	Cobweb Beetle	LC
Insecta	Coleoptera	Dermestidae	<i>Anthrenus fuscus</i>	a carpet beetle	LC
Insecta	Coleoptera	Bostrichidae	<i>Lyctus brunneus</i>	Brown Powder-post Beetle	LC, NR
Insecta	Coleoptera	Ptinidae	<i>Xestobium rufovillosum</i>	Death-watch Beetle	LC
Insecta	Coleoptera	Ptinidae	<i>Anobium punctatum</i>	The Woodworm	LC
Insecta	Coleoptera	Ptinidae	<i>Hemicoelus fulvicornis</i>	a woodworm	LC
Insecta	Coleoptera	Ptinidae	<i>Dorcatoma chrysomelina</i>	a woodworm	LC
Insecta	Coleoptera	Ptinidae	<i>Dorcatoma flavicornis</i>	a woodworm	LC, NS
Insecta	Coleoptera	Lymexylidae	<i>Lymexylon navale</i>	a beetle	LC, NS
Insecta	Coleoptera	Melyridae	<i>Dasytes aeratus</i>	a beetle	LC
Insecta	Coleoptera	Melyridae	<i>Axinotarsus marginalis</i>	a malachite beetle	NA
Insecta	Coleoptera	Kateretidae	<i>Brachypterus glaber</i>	a nettle pollen beetle	None
Insecta	Coleoptera	Kateretidae	<i>Brachypterus urticae</i>	a nettle pollen beetle	None
Insecta	Coleoptera	Kateretidae	<i>Kateretes rufilabris</i>	a pollen beetle	None
Insecta	Coleoptera	Nitidulidae	<i>Epuraea fuscicollis</i>	a beetle	Nationally Scarce (Nb)
Insecta	Coleoptera	Nitidulidae	<i>Epuraea guttata</i>	a beetle	Nationally Scarce (Nb)
Insecta	Coleoptera	Nitidulidae	<i>Meligethes aeneus</i>	Common Pollen Beetle	None

Saproxyllic invertebrate survey of Petworth Deer Park

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Insecta	Coleoptera	Nitidulidae	<i>Meligethes nigrescens</i>	a pollen beetle	None
Insecta	Coleoptera	Nitidulidae	<i>Cryptarcha strigata</i>	a beetle	Nationally Scarce (Nb)
Insecta	Coleoptera	Monotomidae	<i>Rhizophagus ferrugineus</i>	a beetle	None
Insecta	Coleoptera	Monotomidae	<i>Rhizophagus perforatus</i>	a beetle	None
Insecta	Coleoptera	Monotomidae	<i>Rhizophagus cribratus</i>	a beetle	None
Insecta	Coleoptera	Silvanidae	<i>Uleiota planatus</i>	a beetle	Nationally Scarce (Na)
Insecta	Coleoptera	Silvanidae	<i>Silvanus bidentatus</i>	a beetle	Nationally Scarce (Nb)
Insecta	Coleoptera	Silvanidae	<i>Silvanus unidentatus</i>	a beetle	None
Insecta	Coleoptera	Laemophloeidae	<i>Cryptolestes duplicatus</i>	a beetle	None
Insecta	Coleoptera	Laemophloeidae	<i>Cryptolestes ferrugineus</i>	a beetle	None
Insecta	Coleoptera	Laemophloeidae	<i>Notolaemus unifasciatus</i>	a beetle	Nationally Scarce (Na)
Insecta	Coleoptera	Cryptophagidae	<i>Cryptophagus lycoperdi</i>	a beetle	None
Insecta	Coleoptera	Cryptophagidae	<i>Cryptophagus micaceus</i>	a beetle	RDBK
Insecta	Coleoptera	Cryptophagidae	<i>Cryptophagus punctipennis</i>	a beetle	None
Insecta	Coleoptera	Cryptophagidae	<i>Atomaria nigrirostris</i>	a beetle	None
Insecta	Coleoptera	Bothrideridae	<i>Oxyaemus variolosus</i>	a beetle	RDB3
Insecta	Coleoptera	Cerylonidae	<i>Cerylon fagi</i>	a beetle	Nationally Scarce (Nb)
Insecta	Coleoptera	Cerylonidae	<i>Cerylon ferrugineum</i>	a beetle	None
Insecta	Coleoptera	Coccinellidae	<i>Rhyzobius lophanthae</i>	a ladybird	None
Insecta	Coleoptera	Coccinellidae	<i>Scymnus rubromaculatus</i>	a ladybird	None
Insecta	Coleoptera	Coccinellidae	<i>Psyllobora vigintiduopunctata</i>	22-spot Ladybird	None
Insecta	Coleoptera	Coccinellidae	<i>Propylea quattuordecimpunctata</i>	14-spot Ladybird	None
Insecta	Coleoptera	Coccinellidae	<i>Harmonia axyridis</i>	Harlequin Ladybird	None
Insecta	Coleoptera	Coccinellidae	<i>Adalia decempunctata</i>	10-spot Ladybird	None
Insecta	Coleoptera	Coccinellidae	<i>Coccinella septempunctata</i>	7-spot Ladybird	None
Insecta	Coleoptera	Coccinellidae	<i>Tytthaspis sedecimpunctata</i>	16-spot Ladybird	None

Saproxyllic invertebrate survey of Petworth Deer Park

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Insecta	Coleoptera	Corylophidae	<i>Sericoderus brevicornis</i>	a beetle	None
Insecta	Coleoptera	Latridiidae	<i>Enicmus brevicornis</i>	a beetle	Nationally Scarce
Insecta	Coleoptera	Latridiidae	<i>Enicmus histrio</i>	a beetle	None
Insecta	Coleoptera	Latridiidae	<i>Enicmus rugosus</i>	a beetle	Nationally Scarce
Insecta	Coleoptera	Latridiidae	<i>Enicmus testaceus</i>	a beetle	None
Insecta	Coleoptera	Latridiidae	<i>Enicmus transversus</i>	a beetle	None
Insecta	Coleoptera	Latridiidae	<i>Latridius porcatus</i>	a beetle	None
Insecta	Coleoptera	Latridiidae	<i>Cartodere bifasciata</i>	a beetle	None
Insecta	Coleoptera	Latridiidae	<i>Cartodere nodifer</i>	a beetle	None
Insecta	Coleoptera	Latridiidae	<i>Corticaria alleni</i>	a beetle	Nationally Scarce
Insecta	Coleoptera	Latridiidae	<i>Corticarina minuta</i>	a beetle	None
Insecta	Coleoptera	Latridiidae	<i>Corticarina similata</i>	a beetle	None
Insecta	Coleoptera	Latridiidae	<i>Corticinara gibbosa</i>	a beetle	None
Insecta	Coleoptera	Mycetophagidae	<i>Mycetophagus quadripustulatus</i>	a beetle	LC
Insecta	Coleoptera	Ciidae	<i>Cis bilamellatus</i>	a beetle	None
Insecta	Coleoptera	Ciidae	<i>Cis fagi</i>	a beetle	None
Insecta	Coleoptera	Ciidae	<i>Cis castaneus</i>	a beetle	None
Insecta	Coleoptera	Ciidae	<i>Cis pygmaeus</i>	a beetle	None
Insecta	Coleoptera	Ciidae	<i>Cis vestitus</i>	a beetle	None
Insecta	Coleoptera	Ciidae	<i>Octotemnus glabriculus</i>	a beetle	None
Insecta	Coleoptera	Tetratomidae	<i>Hallomenus binotatus</i>	a false darkling beetle	LC, NS
Insecta	Coleoptera	Melandryidae	<i>Abdera biflexuosa</i>	a false darkling beetle	LC, NS
Insecta	Coleoptera	Mordellidae	<i>Tomoxia bucephala</i>	a tumbling flower-beetle	LC, NS
Insecta	Coleoptera	Mordellidae	<i>Variimorda villosa</i>	a tumbling flower-beetle	LC, NS
Insecta	Coleoptera	Zopheridae	<i>Pycnomerus fuliginosus</i>	a beetle	NA
Insecta	Coleoptera	Zopheridae	<i>Synchita undata</i>	a beetle	LC

Saproxyllic invertebrate survey of Petworth Deer Park

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Insecta	Coleoptera	Zopheridae	<i>Bitoma crenata</i>	a beetle	LC
Insecta	Coleoptera	Tenebrionidae	<i>Helops caeruleus</i>	a darkling beetle	LC, NS
Insecta	Coleoptera	Tenebrionidae	<i>Nalassus laevioctostriatus</i>	a darkling beetle	LC
Insecta	Coleoptera	Pyrochroidae	<i>Pyrochroa coccinea</i>	Black-headed Cardinal Beetle	LC
Insecta	Coleoptera	Salpingidae	<i>Lissodema denticollis</i>	a beetle	LC, NS
Insecta	Coleoptera	Salpingidae	<i>Salpingus planirostris</i>	a beetle	LC
Insecta	Coleoptera	Scraphiidae	<i>Scraphia testacea</i>	a beetle	LC, NS
Insecta	Coleoptera	Scraphiidae	<i>Anaspis garneysi</i>	a beetle	LC
Insecta	Coleoptera	Scraphiidae	<i>Anaspis lurida</i>	a beetle	LC
Insecta	Coleoptera	Scraphiidae	<i>Anaspis maculata</i>	a beetle	LC
Insecta	Coleoptera	Scraphiidae	<i>Anaspis regimbarti</i>	a beetle	LC
Insecta	Coleoptera	Scraphiidae	<i>Anaspis costai</i>	a beetle	LC, NS
Insecta	Coleoptera	Cerambycidae	<i>Rutpela maculata</i>	Black-and-yellow Longhorn	LC
Insecta	Coleoptera	Chrysomelidae	<i>Luperus longicornis</i>	a leaf-beetle	LC
Insecta	Coleoptera	Chrysomelidae	<i>Phyllotreta vittula</i>	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	<i>Longitarsus luridus</i>	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	<i>Longitarsus parvulus</i>	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	<i>Longitarsus pratensis</i>	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	<i>Neocrepidodera transversa</i>	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	<i>Chaetocnema arida</i>	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	<i>Chaetocnema hortensis</i>	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	<i>Psylliodes chrysocephala</i>	a flea-beetle	LC
Insecta	Coleoptera	Apionidae	<i>Ceratapion gibbirostre</i>	a weevil	None
Insecta	Coleoptera	Apionidae	<i>Protapion fulvipes</i>	White Clover Seed Weevil	None
Insecta	Coleoptera	Apionidae	<i>Perapion curtirostre</i>	a weevil	None
Insecta	Coleoptera	Apionidae	<i>Perapion marchicum</i>	a weevil	None

Saproxyllic invertebrate survey of Petworth Deer Park

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Insecta	Coleoptera	Apionidae	<i>Apion haematodes</i>	a weevil	None
Insecta	Coleoptera	Apionidae	<i>Ischnopterapion loti</i>	a weevil	None
Insecta	Coleoptera	Raymondionymidae	<i>Ferreria marqueti</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Phyllobius argentatus</i>	Silver-green Leaf Weevil	None
Insecta	Coleoptera	Curculionidae	<i>Polydrusus cervinus</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Exomias araneiformis</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Exomias pellucidus</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Strophosoma faber</i>	a weevil	Nationally Scarce (Nb)
Insecta	Coleoptera	Curculionidae	<i>Strophosoma melanogrammum</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Sitona hispidulus</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Euophryum confine</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Phloeophagus lignarius</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Acalles misellus</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Kyklioacalles roboris</i>	a weevil	Nationally Scarce (Nb)
Insecta	Coleoptera	Curculionidae	<i>Ceutorhynchus pallidactylus</i>	Cabbage Stem Weevil	None
Insecta	Coleoptera	Curculionidae	<i>Nedyus quadrimaculatus</i>	Small Nettle Weevil	None
Insecta	Coleoptera	Curculionidae	<i>Curculio glandium</i>	Acorn Weevil	None
Insecta	Coleoptera	Curculionidae	<i>Archarius pyrrhoceras</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Tychius picirostris</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Mecinus circulator</i>	a weevil	Nationally Scarce (Nb)
Insecta	Coleoptera	Curculionidae	<i>Mecinus pascuorum</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Mecinus pyraeter</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Orchestes hortorum</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Orchestes fagi</i>	Beech Leaf-miner Weevil	None
Insecta	Coleoptera	Curculionidae	<i>Orchestes pilosus</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Scolytus intricatus</i>	a bark-beetle	None

Saproxyllic invertebrate survey of Petworth Deer Park

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Insecta	Coleoptera	Curculionidae	<i>Dryocoetes villosus</i>	a bark-beetle	None
Insecta	Coleoptera	Curculionidae	<i>Taphrorychus bicolor</i>	a bark-beetle	Nationally Scarce (Na)
Insecta	Coleoptera	Curculionidae	<i>Xyleborus dryographus</i>	a bark-beetle	Nationally Scarce (Nb)
Insecta	Coleoptera	Curculionidae	<i>Xyleborinus saxesenii</i>	a bark-beetle	None
Insecta	Coleoptera	Curculionidae	<i>Cyclorhipidion bodoanum</i>	a bark-beetle	None
Insecta	Coleoptera	Curculionidae	<i>Ernoporicus fagi</i>	a bark-beetle	Nationally Scarce (Na)
Insecta	Coleoptera	Curculionidae	<i>Platypus cylindrus</i>	Oak Pin-hole Borer	Nationally Scarce (Nb)
Insecta	Hymenoptera: Aculeata	Bethylidae	<i>Cephalonomia formiciformis</i>	a solitary wasp	None
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Lasius alienus sens. str.</i>	an ant	None
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Lasius brunneus</i>	Brown Tree Ant	Nationally Scarce (Na)
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Lasius mixtus</i>	an ant	None
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Lasius niger sens. str.</i>	an ant	None
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Temnothorax nylanderii</i>	an ant	None
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Myrmica rubra</i>	an ant	None
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Myrmica ruginodis</i>	an ant	None
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Stenamma debile</i>	an ant	None
Insecta	Hymenoptera: Aculeata	Pompilidae	<i>Anoplius nigerrimus</i>	a spider-hunting wasp	None
Insecta	Hymenoptera: Aculeata	Vespidae	<i>Dolichovespula media</i>	Median Wasp	Nationally Scarce (Na)
Insecta	Hymenoptera: Aculeata	Vespidae	<i>Vespa crabro</i>	The Hornet	None
Insecta	Hymenoptera: Aculeata	Vespidae	<i>Vespula germanica</i>	German Wasp	None
Insecta	Hymenoptera: Aculeata	Vespidae	<i>Vespula vulgaris</i>	Common Wasp	None
Insecta	Hymenoptera: Aculeata	Apidae	<i>Apis mellifera</i>	Honey Bee	None
Insecta	Hymenoptera: Aculeata	Apidae	<i>Bombus hortorum</i>	Small Garden Bumblebee	None
Insecta	Hymenoptera: Aculeata	Apidae	<i>Bombus terrestris</i>	Buff-tailed Bumblebee	None
Insecta	Neuroptera	Hemerobiidae	<i>Micromus variegatus</i>	a brown lacewing	None
Insecta	Neuroptera	Hemerobiidae	<i>Micromus angulatus</i>	a brown lacewing	None
Insecta	Diptera	Tipulidae	<i>Ctenophora pectinicornis</i>	a long-palped crane fly	Nationally Scarce

Saproxyllic invertebrate survey of Petworth Deer Park

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Insecta	Diptera	Rhagionidae	<i>Rhagio tringarius</i>	Marsh Snipefly	LC
Insecta	Diptera	Stratiomyidae	<i>Eupachygaster tarsalis</i>	Scarce Black	LC, NS
Insecta	Diptera	Stratiomyidae	<i>Pachygaster atra</i>	Dark-winged Black	LC
Insecta	Diptera	Stratiomyidae	<i>Pachygaster leachii</i>	Yellow-legged Black	LC
Insecta	Diptera	Asilidae	<i>Machimus cingulatus</i>	Brown Heath Robberfly	LC
Insecta	Diptera	Dolichopodidae	<i>Sciapus platypterus</i>	a long-headed fly	LC (Drake, 2018)
Insecta	Diptera	Lonchopteridae	<i>Lonchoptera lutea</i>	a lonchopterid fly	LC
Insecta	Diptera	Syrphidae	<i>Myathropa florea</i>	a hoverfly	LC
Insecta	Diptera	Lonchaeidae	<i>Lonchaea serrata</i>	a lance fly	None (Falk, Ismay & Chandler, 2016)
Insecta	Diptera	Opomyzidae	<i>Opomyza germinationis</i>	an opomyzid fly	None (Falk, Ismay & Chandler, 2016)
Insecta	Diptera	Tachinidae	<i>Eriothrix rufomaculata</i>	a parasitic fly	None (Falk, Pont & Chandler, 2005)
Insecta	Lepidoptera	Psychidae	<i>Luffia lapidella</i>	Grey Bagworm	None
Insecta	Lepidoptera	Sesiidae	<i>Synanthedon vespiformis</i>	Yellow-legged Clearwing	Nationally Scarce (Nb)
Insecta	Lepidoptera	Oecophoridae	<i>Carcina quercana</i>	Long-horned Flat-body	None
Insecta	Lepidoptera	Tortricidae	<i>Archips xylosteana</i>	Variegated Golden Tortrix	None
Insecta	Lepidoptera	Crambidae	<i>Chrysoteuchia culmella</i>	Garden Grass-veneer	None
Insecta	Lepidoptera	Pyrilidae	<i>Aphomia sociella</i>	Bee Moth	None
Insecta	Lepidoptera	Pieridae	<i>Colias croceus</i>	Clouded Yellow	LC
Insecta	Lepidoptera	Pieridae	<i>Pieris brassicae</i>	Large White	LC
Insecta	Lepidoptera	Lycaenidae	<i>Lycaena phlaeas</i>	Small Copper	LC
Insecta	Lepidoptera	Lycaenidae	<i>Celastrina argiolus</i>	Holly Blue	LC
Insecta	Lepidoptera	Nymphalidae	<i>Apatura iris</i>	Purple Emperor	NT
Insecta	Lepidoptera	Nymphalidae	<i>Vanessa atalanta</i>	Red Admiral	LC
Insecta	Lepidoptera	Nymphalidae	<i>Melanargia galathea</i>	Marbled White	LC
Insecta	Lepidoptera	Nymphalidae	<i>Pyronia tithonus</i>	Gatekeeper	LC

Saproxyllic invertebrate survey of Petworth Deer Park

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Insecta	Lepidoptera	Nymphalidae	<i>Maniola jurtina</i>	Meadow Brown	LC
Insecta	Lepidoptera	Nymphalidae	<i>Coenonympha pamphilus</i>	Small Heath	NT, S41 (research only)
Insecta	Lepidoptera	Lymantriidae	<i>Orgyia antiqua</i>	Vapourer	None
Insecta	Lepidoptera	Noctuidae	<i>Leucania comma</i>	Shoulder-striped Wainscot	S41 (research only)
Insecta	Lepidoptera	Noctuidae	<i>Dypterygia scabriuscula</i>	Bird's Wing	None
Insecta	Lepidoptera	Noctuidae	<i>Apamea monoglypha</i>	Dark Arches	None
Insecta	Lepidoptera	Noctuidae	<i>Colocasia coryli</i>	Nut-tree Tussock	None
Gastropoda	Pulmonata	Arionidae	<i>Arion (Kobeltia) intermedius</i>	Hedgehog Slug	LC
Gastropoda	Pulmonata	Discidae	<i>Discus rotundatus</i>	Rounded Snail	LC