Cyfoeth Naturiol Cymru
Natural Resources Wales

Saproxylic Invertebrate Survey of Wye Valley Woodlands Special Area of Conservation (SAC) in 2017

Keith N. A. Alexander

NRW Evidence Report No. 245

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1. Crynodeb Gweithredol

Bwriad y ddogfen hon yw ychwanegu at ein gwybodaeth gyfredol am y ffawna di-asgwrn-cefn saprosylig a geir ledled ACA Coetiroedd Dyffryn Gwy. Er gwaethaf statws y safle fel ACA, prin iawn yw'r wybodaeth am ffawna di-asgwrn-cefn saprosylig yr ACA. Gwyddys ei bod yn cynnal poblogaethau sylweddol o nifer o rywogaethau cenedlaethol anghyffredin a rhywogaethau dan fygythiad, ond hyd yma ni chynhaliwyd ond ymchwiliadau cyfyng o'r ffawna. *Ernoporus tiliae* a'r *Erotides cosnardi*, yw'r ddwy rywogaeth nodedig y gwyddys amdanynt yn yr ACA, y mae'r ddwy ohonynt yn Rhywogaethau o Brif Bwysigrwydd yn Lloegr ond heb eu cynnwys yn Adran 7 Deddf yr Amgylchedd (Cymru) 2016.

Y nod terfynol yw casglu rhestr dros dro o ffawna di-asgwrn-cefn saprosylig coetir ledled y Safleoedd o Ddiddordeb Gwyddonol Arbennig (SoDdGA) sy'n ffurfio rhan Cymru o ACA Coetiroedd Dyffryn Gwy. Lle bo'n bosibl, bydd ymdrechion cofnodi'n canolbwyntio ar nodi unrhyw rywogaethau saprosylig sy'n bwysig o ran cadwraeth genedlaethol neu leol. Bydd y gwaith hwn yn rhan gyntaf corff gwaith bwriadedig mwy a gynllunnir ar gyfer y blynyddoedd i ddod, gyda'r bwriad o gynhyrchu rhestr gynhwysfawr o infertebrata sydd o ddiddordeb ledled Coetiroedd Dyffryn Gwy. Bydd y rhestr hon yn y tymor hwy yn helpu'r broses o lunio canllawiau rheoli fel sail ar gyfer rheoli'r coetiroedd o fewn ACA Coetiroedd Dyffryn Gwy yn gynaliadwy ac, o bosibl, y dirwedd ehangach.

Archwiliwyd tri o'r SoDdGAoedd – Fiddlers Elbow; Coedwigoedd Pierce, Alcove a Piercefield; a Blackcliff/Wyndcliffe – yn ystod hydref 2017, a gwnaed nodiadau ar y ffawna saprosylig. Gan ddefnyddio technegau chwilio â llaw, canfuwyd cyfanswm o 39 o rywogaethau saprosylig o infertebrata, yn ogystal â rhywogaethau cysylltiedig â chynefinoedd eraill; ystyrir bod saith o'r rhywogaethau a ganfuwyd yn genedlaethol brin. Mae rhai o'r rhain yn fwyaf adnabyddus yng Nghymru o Sir Fynwy – *Diplocoelus fagi*, *Ernoporicus caucasicus* a *Platystomos albinus*.

Er bod rhestrau'r rhywogaethau'n rhy fach ar hyn o bryd ar gyfer cynnal dadansoddiadau gan ddefnyddio'r Mynegai Ansawdd Saprosylig, mae dadansoddiadau rhagbrofol yn awgrymu y gellir cymharu gwerthoedd y mynegai ansawdd saprosylig ar gyfer y ddau safle mwyaf – Coedwigoedd Pierce, Alcove a Piercefield; a Blackcliff/Wyndcliff – â rhai o'r safleoedd gorau yn y DU ar gyfer cynrychiolaeth rhywogaethau saprosylig prinnach.

Mae dadansoddiadau gan ddefnyddio'r Mynegai Dilyniant Ecolegol – o safbwynt hen dwf a dilyniant ecolegol yn hytrach na phrinder rhywogaethau – yn peri i ddarlun tra gwahanol ddod i'r fei. SoDdGA Coedwigoedd Pierce, Alcove & Piercefield yw'r mwyaf arwyddocaol o'r tri safle coetir, sydd, yn ôl pob tebyg, yn adlewyrchu ei leoliad wrth ochr parcdir hanesyddol Piercefield a'i grynhoad o goed hynafol – y nodwyd cyn belled yn ôl â 1994 eu bod yn safle o ddiddordeb arbennig oherwydd chwilod saprosylig. SoDdGA Blackcliff/Wyndcliff sydd nesaf, a dyma'r safle lle canfuwyd unig rywogaeth Gradd 2 y Mynegai Dilyniant Ecolegol yn ystod archwiliad 2017, sef y chwilen *Diplocoelus fagi*. Hefyd, yn ddiddorol, mae'r Mynegai Dilyniant Ecolegol cronnol ar gyfer rhan Cymru o ACA Coetiroedd Dyffryn Gwy bellach yn cyrraedd isafwerth o 29,

sy'n mynd y tu hwnt i'r trothwy ar gyfer pwysigrwydd cenedlaethol ar gyfer chwilod saprosylig.

Mae'r arolygon rhagarweiniol hyn wedi dangos bod ACA Coetiroedd Dyffryn Gwy o ddiddordeb mawr o bosib oherwydd infertebrata saprosylig ac yn darparu cyfiawnhad digonol ar gyfer cynnal arolygon parhaus, pan fo adnoddau'n caniatáu. Maent yn awgrymu mai ffactor allweddol yw helaethder y coetir yn yr ACA, er y gallai mannau unigol fod â diddordeb arbennig mwy lleoledig oherwydd rhywogaethau penodol sy'n brin ac o dan fygythiad. Caiff pwysigrwydd coed hynafol ei bwysleisio, yn ogystal â gwerth coed unigol sy'n tyfu yn yr awyr agored. Mae'r rhain yn arwyddocaol am eu bod yn awgrymu dull addasedig tuag at warchod rhywogaethau saprosylig yn yr ACA.

2. Executive Summary

This document aims to add to our current knowledge of the saproxylic invertebrate fauna found across the Wye Valley Woodlands SAC. Despite the designation remarkably little is known about the saproxylic invertebrate fauna of the SAC. It is known to support significant populations of a number of nationally rare and threatened species, but until now only limited investigation of the fauna had been carried out. The two outstanding species known from the SAC are the lime bark beetle *Ernoporus tiliae* and Cosnard's net-winged beetle *Erotides cosnardi*, both Species of Principal Importance in England but not included on Section 7 of the Environment (Wales) Act 2016.

The ultimate objective is to compile a provisional inventory of woodland saproxylic invertebrate fauna across the Sites of Special Scientific Interest (SSSI) that make up the Welsh side of the Wye Valley Woodland SAC. Where possible recording effort will focus on the identification of any saproxylic species of national or local conservation importance. These works will be the first phase of an intended larger body of work planned for the coming years aimed at producing a comprehensive inventory of invertebrate interest across the Wye Valley Woodlands. This inventory in the longer term will aid the process of drawing up management guidelines as a basis for the sustainable management of the woodlands within the Wye Valley Woodlands SAC and potentially the wider landscape.

Three of the SSSI's – Fiddlers Elbow; Pierce, Alcove & Piercefield Woods; and Blackcliff/Wyndcliff - were explored during autumn 2017 and notes made on the saproxylic fauna. Using hand-searching techniques, a total of 39 saproxylic species of invertebrate were found, as well as species associated with other habitats; seven of the species found have Nationally Scarce status. Some of these are best known in Wales from Monmouthshire: *Diplocoelus fagi*, *Ernoporicus caucasicus* and *Platystomos albinus*.

Although the species lists are currently too small for analysis using the Saproxylic Quality Index (SQI), trial analysis suggests that the SQI values for the two larger sites - Pierce, Alcove & Piercefield Woods; and Blackcliff/Wyndcliff – are comparable with some of the best sites in the UK for representation of rarer saproxylic species.

Analysis using the Index of Ecological Continuity (IEC) - from the point of view of old growth and ecological continuity rather than species rarity – results in the emergence of a very different picture. Pierce, Alcove & Piercefield Woods SSSI is the most significant of the three woodland sites, probably reflecting its position alongside the historic parkland of Piercefield and its concentration of veteran trees – identified as long ago as 1994 as of special interest for saproxylic beetles. Blackcliff/Wyndcliff SSSI, comes next, with the only IEC Grade 2 species found during the 2017 exploration, the beetle *Diplocoelus fagi*. Also, interestingly, the cumulative IEC for the Welsh section of the Wye Valley Woodlands SAC now reaches a minimum value of 29, exceeding the threshold for national significance for saproxylic beetles.

These preliminary surveys have demonstrated the great potential interest of the Wye Valley Woodlands SAC for saproxylic invertebrates and provide ample justification for continued survey, as resources permit. They suggest that it is the extent of the

woodland in the SAC that is a key factor, although individual areas may have more localised special interest for particular rare and threatened species. The importance of veteran trees is emphasised as well as the value of individual open-grown trees. These are significant as they suggest a modified approach to saproxylic conservation within the SAC.

3. Introduction

3.1. Aim

This contract aims to add to our current knowledge of the saproxylic invertebrate fauna found across the Wye Valley Woodlands SAC. To date, dedicated saproxylic invertebrate surveys have been undertaken within the SAC at both Livox Wood SSSI and Graig Wood SSSI (Whitehead, 2013a). In addition, saproxylic surveys have also been undertaken in the Penallt area at Pwl-Mawr (Whitehead, 2013b) and at 'Piercefield Park' as part of the CCW Parklands Survey (Hammond & Hine, 1994). More general invertebrate surveys have been undertaken in Graig Wood SSSI (Kirby, 2006). Lady Park Wood has also been subject to some preliminary exploration of invertebrate interests, commissioned by the former Nature Conservancy Council (Alexander, 1984; Gibbs, 1985). Some invertebrate surveys have also taken place independently on the English side, primarily by the Woodland Trust in Cadora Woods and at Little Doward (Kirby, 2000, 2002, 2004), as well as specialist surveys for a Species of Principal Importance in England - Cosnard's net-winged beetle *Erotides cosnardi* - on behalf of the Species Survival Trust (Telfer, 2015; Alexander, 2017).

The focus of the new surveys will be sites with little or no existing data, followed by those deemed likely to produce further records of conservation significance.

3.2. Objective

To compile over the course of the contract, a provisional inventory of woodland saproxylic invertebrate fauna across the Sites of Special Scientific Interest (SSSI) that make up the Welsh side of the Wye Valley Woodland SAC.

Where possible, recording effort will focus on the identification of any saproxylic species of national or local conservation importance. These works will be the first phase of an intended larger body of work planned for the coming years aimed at producing a more comprehensive inventory of invertebrate interest across the Wye Valley Woodlands. This inventory in the longer term will help to determine invertebrate conservation priorities (e.g. SSSI features) and aid the process of drawing up management guidelines as a basis for the sustainable management of the woodlands within the Wye Valley Woodlands SAC and potentially the wider landscape.

4. Methods

Rapid assessments of invertebrate faunas in structurally complex habitats relies a great deal on field experience and the expertise of the contractor to target potentially significant features for further investigation. Survey techniques are varied according to the situation and it will be up to the contractor to identify the most suitable methods to achieve a representative inventory of saproxylic invertebrate fauna for these woodlands.

The contract was for a minimum of 7 days of fieldwork, with the work to be carried out during the period September 2017 to March 2018. The approach taken was consistent with the guidance on invertebrate survey provided in Drake et al (2007). The basic features that need to be investigated are:

- Large old trunks of living trees, especially those with well-lit sunny areas, and both rough-barked and smooth-barked examples
    - Inspection for active invertebrates
    - Inspection of any sap-runs or other wet fluxes
    - Inspection of any emergence holes
    - Bark cavities
    - Trunk cavities – rot-holes
    - Trunk cavities - hollowing
- Aerial dead branches on living trees
- Aerial live branches
- Standing dead trunks
- Fallen trunks and boughs
- Fruiting fungi
- Targeted beating of blossom on flowering trees and shrubs
- Field layer sweeping for resting insects

More detail on these investigative techniques may be found in Drake *et al*. (2007). Ideally, these hand-search techniques should be supplemented by trapping. Flight interception trapping is becoming an increasingly popular methodology as it offers continuous recording, whereas a surveyor may only be on site for relatively short periods. It is especially valuable as trapping continues whatever the weather, whereas the visits by the surveyor may meet conditions less favourable for sampling. Trapping also appears to record many species elusive to hand search techniques, but due to the extreme localisation may also miss species more readily found by hand-searching. Ideally, the two techniques should be applied side-by-side. As the fieldwork being reported here took place for a short period only, and during the autumn and early winter periods, trapping was not included.

The strategy adopted for the fieldwork was a walkabout exploration of the sites, attempting to cover a wide range of areas across each site, targeting potentially interesting saproxylic habitats as these were encountered. This is a well-attested standard technique for invertebrate surveys although difficult to quantify in a scientific way.

The sites and dates chosen for field survey, in liaison with the NRW Project Officer, Rob Bacon, were:

- Fiddlers Elbow SSSI, 26th September
- Pierce, Alcove & Piercefield Woods SSSI, 27th September, 8th & 16th November
- Blackcliff/Wyndcliff SSSI, 28th September, 6th & 7th November.

Fiddlers Elbow SSSI is a possible site for the original discovery of the Endangered saproxylic beetle Cosnard's net-winged beetle *Erotides cosnardi* – see section 6 below.

Pierce, Alcove & Piercefield Woods SSSI is a large and varied area adjoining the historic parkland of Piercefield House.

Blackcliff/Wyndcliff SSSI is a large and varied area, managed by NRW.

5. Results

5.1. Fiddlers Elbow SSSI

Fiddlers Elbow SSSI comprises three woodlands (44.3ha) on the west-facing side of the Wye Valley Woodlands SAC. Survey focused on Priory Grove and Lady Grove (owned by The Woodland Trust); Garth Wood was not entered due to time constraints and access difficulty. The SSSI citation describes the area as coppice-with-standards woodland underlain by Devonian sandstones, with oak standards and small-leaved lime coppice, with areas of beech and hazel coppice. A deep stream valley cuts northwards down through the main valley side forming a re-entrant side-valley to the Wye, with Lady Grove on the eastern slopes and Priory Grove occupying the ridge between the stream and the main valley. Inspection of the Woodland Trust's Ancient Tree Inventory revealed a good number of veteran trees mapped within Priory Grove.

A striking feature of this SSSI is the series of large old beech coppice stools along the ridge of Priory Grove. The large old gnarled bases appear somewhere between coppice and pollard in form, having been cut well above ground level in the past. These appear to have some potential for heartwood-decay and rot-hole specialist saproxylic invertebrates but are also difficult to investigate. Flight interception trapping is probably the most effective way of sampling these trees although a public footpath follows the ridge line and interference of any traps might be a problem.

Oak standards appear to be more of a feature of the gentler slopes above the river towards the northern end of the wood, and appear more like high forest with a hazel understorey. The largest oak noted was measured at 2.20m gbh. Beech and lime standards in this area are less than 1.5m in girth. A single cherry tree was measured at 2.34m gbh. Overall the wood lacks large girth trees and so may be expected to be relatively poor in specialist heartwood-decay invertebrates.

Sampling found just a single species with Nationally Scarce status: the false darkling beetle *Orchesia minor* (Melandryidae), with three specimens typically knocked from standing dead hazel poles. The uncommon *Orchesia undulata* and the longhorn beetle *Pogonocherus hispidus* were also knocked from standing dead hazel poles, together with the more widespread narrow-waisted bark beetle *Salpingus planirostris* (Salpingidae). Fallen oak branches had been colonised by the oak bark beetle *Scolytus intricatus* and the uncommon awl-fly *Xylophagus ater*, a species characteristic of ancient woodland sites.

5.2. Pierce, Alcove and Piercefield Woods SSSI

This SSSI forms a long section of the steep east-facing side of the Wye Valley, extending from Chepstow in the south, through Castle Wood, Alcove Wood, Pierce Wood and Cave Wood, linking to Blackcliff/Wyndcliff SSSI to the north. The river has a sharp and dramatic meander here, with an Iron Age hillfort within the woodlands on the steep ridge formed inside the bend of the river. The woodland is backed by Piercefield Park which still retains a good range of large old veteran trees across the adjoining parkland. The woodland was also landscaped in the 18th century, as part of the picturesque landscape gardens surrounding the mansion of Piercefield.

The SSSI citation describes the woodland as mixed beech, yew and lime, with a relict coppice structure, and with some standards on steep slopes. It notes the transition

from acid to calcareous woodland types. The Ancient Tree Inventory only includes a few veteran trees, mainly along the Wye Valley Walk route along the upper slopes. Large old trees were actually found to be much more widespread than indicated and the area is clearly under-recorded for its veteran trees.

The SSSI was found to be of significant interest for saproxylic invertebrates, with a number of notable features.

A key feature is the scatter of large old beech trees, some of which have sufficient girth to have been subject to heartwood decay and the formation of accumulations of loose wood mould in the base of large trunk cavities. Larvae of darkling beetles were found in two such beech snags above the Wye Valley Walk and samples have been retained for rearing. They are most probably the uncommon *Prionychus ater*, but Whitehead (2013a) reported the Nationally Scarce *P. melanarius* in Livox Wood and it is possible that another Nationally Scarce species *Pseudocistela ceramboides* might be present. Rearing the larvae through to the adult beetle is the only reliable means of identification currently available. All three require accumulations of loose wood mould in large girth trunks of broad-leaved trees.

The veteran horse chestnut trees across the upper slopes potentially provide similar heartwood decay habitats although no darkling beetle larvae could be found. These trees may also provide valuable sap-run habitats.

Riverflat sections at the base of the steep slopes are especially valuable for their old oak trees, many with an open-grown form over the riverside marshy grasslands, and aerial dead branches with typical decay fungi *Vuilleminia comedans* and *Peniophora quercina*. The uncommon minute fungus beetle *Cis vestitus* is associated with these aerial dead branches, and more interesting associates may also be present. Old hazels along here have standing dead poles which support the Nationally Scarce false darkling beetle *Orchesia minor*. Thickets of blackthorn scrub line some woodland edge sections and the heartwood decay fungus *Phellinus pomaceus* occurs with them. This is an important host fungus for one particular Nationally Scarce beetle *Dorcatoma dresdensis,* although none could be found on this occasion.

The old hill fort area of gentler ground above the steep slopes also provides some valuable features for saproxylic invertebrates. Larger girth trees provide rot-hole habitats which may be worth investigating using flight interception trapping. A collapsed oak had attracted the longhorn beetle *Phymatodes testaceus* and larvae of the flat bark beetle *Pediacus dermestoides* were present under the freshly dead bark sections. Another collapsed oak had attracted the Nationally Scarce beetle *Rhizophagus nitidulus* to the exposed sappy bark. Fallen lime stems were found to have been colonised by uncommon species, with an aggregation of the distinctive larvae of the net-winged beetle *Platycis minutus* discovered beneath bark on one trunk, together with larvae of the uncommon predatory awl-fly *Xylophagus ater*. Larvae of the black-headed cardinal beetle *Pyrochroa coccinea* were very frequent under bark on fallen tree trunks here. Larvae of the uncommon click beetle *Stenagostus rhombeus* were also present, although in very low numbers. An adult of the Nationally Scarce beetle *Oedemera femoralis* was also found amongst wood debris. This area also proved to be of interest for uncommon molluscs, with lapidary snail *Helicigona lapicida* on old beech trees along Piercefield Cliffs and ash-black slug *Limax cinereoniger*

amongst collapsed trees on the gentler southern slopes – both species are characteristic of ancient woodlands, the former only on base-rich rocky sites.

Castle Wood is notable for the large ancient oak pollard on the upper plateau strip. This tree has large cavities and would be a priority for flight interception trapping.

Overall, this SSSI contains large volumes of lying, old, small girth stems, but this type of decaying wood is primarily of interest for Diptera rather than Coleoptera, and is best sampled by trapping. It does also, however, contain more localised features which are of value for a wider range of taxa. Habitat features of this area – and elsewhere - that are of potential special interest for saproxylic invertebrates are:

- Large girth broad-leaved trees, with rot-holes and/or cavities, and bracket fungi – at least 2m girth, preferably larger so that the potential for heartwood decay is greater
- Fallen trunks within two years of death, with bark still closely attached, and especially where still sappy
- Young beech or sycamore with basal rot cavities caused by squirrel damage
- Old hazels with standing dead poles
- Large old oaks with lateral branches extending over marshy grassland on riverside flats
- Old blackthorn scrub with bracket fungus *Phellinus pomaceus*
- Unshaded hawthorns, elder, holly, with blossom available in spring and summer.

5.3. Blackcliff/Wyndcliff SSSI

Blackcliff/Wyndcliff SSSI forms a continuation of the Piercefield Woods and extends northwards along the Wye Valley towards Tintern. It comprises Lower Martridge and Lower Wyndcliff Woods below the road, with Upper Wyndcliff Wood above. Black Cliff Wood extends northwards in Tintern Community. Liveoaks Brake, below Black Cliff and between the road and the river was not entered; it belongs to the Crown Estate. Strips of woodland along the upper edge are in the separate ownership of Porthcasseg Farm. The SSSI citation describes the vegetation as high forest and old coppice-with-standards on Carboniferous Limestone, with relict beech coppice an important feature.

Lower Wyndcliff Wood was found to be of particular interest for saproxylic invertebrates. One particular stand of old hazels low down and close to the river was notable for two Nationally Scarce beetle species on standing dead stems: the fungus weevil *Platystomos albinus* and the false darkling beetle *Orchesia minor*. Another Nationally Scarce beetle *Diplocoelus fagi* was found on a fallen dead beech branch. A fallen dead lime branch of 15mm diameter was found with the characteristic emergence holes of the Nationally Scarce lime bark beetle *Ernoporicus caucasicus*, and found to contain five live examples. The area, however, mostly lacks large girth trees, with oak standards barely reaching 2m gbh, and just one large beech noted of 3.48m girth. The uncommon net-winged beetle *Platycis minutus* was noted here by Rob Bacon (pers. comm.) earlier in 2017.

The Porthcasseg Woods include a few large standards, especially close to the outer boundaries. A particularly notable large old open-grown beech of 4.79m girth stands by a footpath style not far from the Upper Wyndcliff car park and another beech of 3.78 stands by the outer boundary to the east and has rot-holes and aerial dead wood. The

latter in particular has potential for some interesting saproxylics and could be targeted for flight interception trapping. There are also ash and oak standards along the boundary further west. A fallen, well-rotted ash standard contained good numbers of the uncommon beetle *Scaphisoma agaricinum*.

The young beech plantation area is not without interest in its present condition. Squirrel damage is creating basal rot in many of the stems and potential habitat for false click beetles (Eucnemidae). The rare *Eucnemis capucina* was found in similar damaged beech at Symonds Yat earlier in the year. A single example of the Nationally Scarce slender slug *Malacolimax tenellus* was also seen here on an old stump.

5.4. Resumé of species of interest found during the 2017 surveys

A total of 36 species of saproxylic beetle were found together with one saproxylic Dipteran, a Hemipteran and a mollusc. Species with other habitat associations were also found incidentally, in the course of sampling. The 2017 data include seven species with Nationally Scarce status:

- *Diplocoelus fagi* (Coleoptera: Biphyllidae)
- *Ernoporicus caucasicus* (Coleoptera: Curculionidae: Scolytinae)
- *Malacolimax tenellus* (Mollusca)
- *Oedemera femoralis* (Coleoptera: Oedemeridae)
- *Orchesia minor* (Coleoptera: Melandryidae)
- *Platystomos albinus* (Coleoptera: Anthribidae)
- *Rhizophagus nitidulus* (Coleoptera: Monotomidae)

Strictly speaking, *E. caucasicus* has 'Endangered' status (Hyman, 1992) but more recent research has demonstrated that Nationally Scarce is the more appropriate status (Drane, 2005) and will be adopted once this group have been subject to a modern Species Status Review.

The larvae and adults of the beetle *Diplocoelus fagi* feed on fungi; until recently, it was exclusively associated with beech in Britain, the adults occurring under bark on deadwood, particularly the loose outer layer. In 1998, it was found in association with sooty bark disease on sycamore logs in the London area and since then the species has been found much more widely, exploiting this new habitat. The adults are moderately mobile and are attracted to bracket fungi for feeding, and overwinter in deadwood, including oak. It is associated with the fungus *Tubercularia confluens* in Scandinavia and with the Ascomycete *Biscogniauxia cinereolilacina* on lime. It is primarily known from ancient woodlands and wood pastures, although increasingly less so. The British distribution is centred on lowland central and south-eastern England, only just reaching into Wales. Welsh records are primarily from Monmouthshire, where it has been found in Prisk Wood (Graig Wood SSSI), Cwm Merddog (Silent Valley LNR) and Lady Park Wood. It is also known from Denbighshire (Chirk Park SSSI) and Montgomeryshire. One was found in Lower Wyndcliff Wood during the 2017 survey work.

The lime bark beetle *Ernoporicus caucasicus* develops beneath the thin bark of dead branches of lime, native *Tilia cordata* as well as common *T. vulgaris*, but perhaps only in sites where the former has been present historically; occupied branches range from 1.5cm to 8cm girth (A.B. Drane, pers.comm.). The beetles are found in galleries excavated within the partially decayed sapwood beneath the thin bark (KNAA, pers

obs). Populations are often restricted to one tree or a small group of trees; the species is shade tolerant. Evidence suggests that the species is a relict Wildwood species, hanging on in areas of old parkland and wood pasture, and even in coppiced ancient woodlands. The fungus or fungi responsible for producing the sapwood decay has not been identified. In Britain, the species is known from much of central and eastern England, extending into Wales in Monmouthshire – Drane (2005) notes it from Piercefield Cliffs, where it was found in some abundance, Black Cliff, Harpers & Lords Groves, Fiddlers Elbow, Lady Park Wood, Prisk Wood, and also away from the Wye Valley Woodlands SAC. Drane (2005) also notes it from Breconshire, and the species is also known from Merionethshire. It is clearly widespread in woodlands with native limes across much of south-east Wales and the Wye Valley Woodlands SAC may prove to be the most significant population in Britain. Adults were found in a fallen dead lime twig of 1.5cm girth in Lower Wyndcliff Wood during the 2017 surveys.

Slender slug *Malacolimax tenellus* feeds on fungi, especially but not exclusively those fruiting from dead and decaying timber; in Britain, it appears to require large rotting balks for moist shelter as well as feeding, although this may not be the case everywhere in its European range. The species is most strongly associated with ancient wood pastures, but does also occur in some ancient woodland systems, especially where extensive. Habitat scale may be very important as the species tends to live at relatively low density and large expanses of suitable habitat may be important in order to maintain viable populations. The species is very thinly scattered, but is known throughout much of Britain, with distinct concentrations in the Weald, the Chilterns, the Welsh Borders, North England and the Scottish Highlands. The latest Species Status Review (Seddon *et al*., 2014) comments that it is still widespread throughout its British range although the population is fragmented. Conchological Society field surveys over the last 10 years specifically for this species show recent new discoveries, although it is known to have declined in the previous 50 years. A single individual was seen in Upper Wyndcliff Wood during the 2017 survey.

The larvae of the beetle *Oedemera femoralis* develop in the old dead stems of various plants, so it is not a true saproxylic species, but facultative at most; larvae and pupae have been found in thick dead ivy stems in August and October. The adult beetle overwinters amongst dry dead wood and is especially associated with ivy blossom in the autumn and sallow the following spring. They fly at night and are attracted to light – many records arise from MV light trapping, from late May through to mid-August. It may be associated with calcareous districts in particular. Its British range is however distinctly southern and western, with concentrations along coastal districts and especially the lower Severn. Welsh populations are centred on Monmouthshire, Gower and Great Orme. One overwintering adult was found amongst woody debris above Piercefield Cliffs in November 2017. It was noted in Livox Wood by Whitehead (2013a).

The false darkling beetle *Orchesia minor* (Melandryidae) develops in the small fruiting bodies of a variety of wood-decay polypore fungi and possibly certain Ascomycetes, generally either on aerial dead branches or dead standing poles. It is especially known from permanently damp woodlands, in carr or gorge situations, although occurs more widely in moister western districts. It is regarded as a reliable marker of old growth conditions in Scotland and this may be the case more widely. Flight activity has been noted after dark in the autumn months. The species has been recorded across much of Britain, although rather sparingly, often with just a few known localities per county:

it was known from just eleven Welsh hectads when last assessed (Alexander *et al*., 2014). Nonetheless, it was found in all three woodland areas surveyed during autumn 2017, and may be expected to occur throughout the Wye Valley Woodlands SAC, especially where there are stands of old hazel.

Larvae of the fungus weevil *Platystomos albinus* develop in decaying branches of various broadleaved trees, especially beech, and may feed specifically on Ascomycete mycelium. It may be more associated with small girth woody stems than larger items and so stored coppice may form an important habitat type. Records tend to come from the larger expanses of ancient woodland and wood pasture. It tends to be a rare and elusive species, and is known from only about 30 hectads nationally in the past 25 years. The British distribution is distinctly southern and eastern, with concentrations in central southern England, the Soke of Peterborough, and the Severn Basin. In Wales, it has only been found in a few Monmouthshire sites and at Dinefwr Deer Park. Only old records are available for parts of its range, suggesting a significant decline in abundance and contraction in range. A single specimen was found with *Orchesia minor* in an area of old hazels in Lower Wyndcliff Wood.

The adults and larvae of the beetle *Rhizophagus nitidulus* live under sappy bark of freshly dead wood of various broad-leaved trees. It is widespread across southern and western Britain. Although currently Nationally Scarce (Notable B; Hyman, 1992), it seems likely that its status will be downgraded at the next review.

6. Discussion

6.1. Land-use history

The Wye Valley Woodlands SAC comprises a series of woodlands developed along the steep and often craggy slopes above the River Wye. Both sides of the river have historically formed part of major forest systems: the Forest of Dean on the Gloucestershire side and Wisewood (Peterken, 2008) or Wiesewood Chase (Saxton, 1577) on the Monmouthshire side. Peterken (2008) comments that, in the Middle Ages, Trellech and Llanishen formed a large clearing in a huge wood-pasture that stretched from Wentwood to Wyeswood and the outskirts of Penallt (Bradney, 1913; Courtney, 1983). Parts were clearly coppice with standards and a scatter of ancient trees. In 1581, commoners claimed rights of estovers, firebote, housebote, hedgebote, pannage, herbage and the right to dig lime to spread on their land in Wisewood (Bradney, 1913), which covered well over 400ha east of Trellech, and in 1697 it was 'formerly well stocked with red deer and timber' (Courtney, 1983). This semi-wilderness has since almost vanished. The wood-pastures of Earlswood and Coed Llifos became farmland with scattered woods; Wentwood, Chepstow Park, Fedw and the wood pastures near the Wye Gorge between the Angiddy and Whitebrook became coppices; Wyeswood thinned out to heathland; and all parts were reduced by assarting to form groups of small fields. When it was finally enclosed in 1810, Wisewood was open moorland with just a fringe of trees on the slopes down to the Wye. The woods, which mostly passed through the Beaufort estate into Crown ownership, were promoted to high forest, with beech and oak along the gorge and conifers elsewhere.

The woodlands designated as SSSI today show much evidence of management as coppice and/or coppice with standards, but little or no sign of former common wood-

pasture – the ancient oak pollards of Castle Wood (one live) and Alcove Wood (one fallen, dead) in the southern part of the Pierce, Alcove & Piercefield Woods SSSI may be the last remnants of the old commons.

When actively exploited for timber and wood products, the surviving woodlands would have been much more structurally diverse and dynamic, containing fresh young growth from cut stems as well as older stands due to be cut-over in the near future. Old growth conditions would have been largely confined to the more inaccessible cliffs. As woodland exploitation ceased, the system became increasingly dense with heavily-shaded understorey and field layers. Conditions have changed dramatically over time, from the natural forest structures – unfortunately undocumented and now largely unknowable – through various degrees of active exploitation, including coppice, coppice-with-standards, singling to high forest, and even extensive conversion to conifer crops, and then effectively to partial abandonment as the economics became unfavourable. The Piercefield section has also been subject to 18th century 'picturesque' landscaping – the historic Piercefield Picturesque Walk (1752-1772) - and other areas may have had ornamental plantings within the forestry units. Recent small-scale coppice restoration has taken place in certain reserve areas and some coniferised sections are being restored to native woodland cover.

The saproxylic invertebrate fauna appears to reflect this management history very precisely. The most interesting invertebrates found in recent years and as part of the present study are most typically associated with either standing deadwood in ancient coppice with standards woodlands, or fallen small-girth stems and branches, and are effectively a fauna of **maintained young growth**, with long ecological continuity of suitable dead stems of relatively small girth, rather than old growth forest with its large girth trees. An exception is Pierce Wood which has had the development of Piercefield Park alongside, with its history of large old open-grown trees in a wood-pasture type management system.

6.2. Existing knowledge of saproxylic invertebrates in the Wye Valley

Fowles (1994) comments that the general level of invertebrate recording in South Wales woodlands is extraordinarily poor and the Invertebrate Site Register has only been able to identify two sites – the Lower Wye Valley woods and the Oxwich woods on Gower – as being of regional or national significance for invertebrate conservation. He additionally comments that this clearly undervalues the overall potential of the Region's woods and the collation of further information will eventually lead to a more realistic appraisal. He goes on to say Wales is generally poor in over-mature woodlands and there are no significant sites known in the Region. This lack of information was subsequently addressed by the Welsh Parklands invertebrate survey which culminated in specialist survey of the sites considered to have the greatest potential (Hammond & Hine, 1994). Piercefield Park was one of the sites identified for this follow-up survey.

Although coleopterists in the early part of the 20th century recorded many interesting beetles associated with saproxylic habitats in Gwent, there is little site-specific information available today to assist with the identification of important localities (Fowles, 1994). Two key nationally rare saproxylic beetles have long been known from the area - the net-winged beetle *Erotides cosnardi* and the click beetle *Ampedus cinnabarinus*.

The globally rare net-winged beetle *Erotides cosnardi* (Lycidae) was discovered new to Britain between Monmouth and Staunton in 1944, although the particular breeding site was not identified at the time (Airy Shaw, 1944). Subsequent investigation of the data recorded at the time suggests that the original site was either Fiddlers Elbow SSSI or part of Highmeadow Woods where they lie adjacent to York Cottage (Alexander, 2017). It should be noted that the original site was in Monmouthshire. Since then, the species has been found in adjoining Gloucestershire and Herefordshire (Alexander, 2014b), and a separate population has been found in the Arundel Forest area of West Sussex (Alexander, 2014a). The species has recently been assessed as Endangered in Britain (Alexander, 2014a). Its ecology remains unclear, other than that it is presumed to develop in white-rotten heartwood of broad-leaved trees within large expanses of suitable habitat.

Old records of the impressive black and red saproxylic click beetle *Ampedus cinnabarinus* in east Gwent have been confirmed in recent years through its rediscovery by Horton (records dated 1980, 1989) and it was found in Piercefield Park by Hammond & Hyne (1994). The larvae develop in the dead and decaying timber of various broad-leaved trees, mainly in heart-rot, but also under bark on rotten limbs; they are omnivorous. Nationally, the species is best known from three key areas: the Forest of Dean, the New Forest, and – interestingly – West Sussex (Mendel & Clarke, 1996); it has also been found in Moccas Park very recently.

The rare lime bark beetle *Ernoporus tiliae* has also been found in the Wye Valley Woods recently, in a single tree at Lower Wyndcliff Car Park (Drane, 2005). Like *Ernoporicus caucasicus*, this develops in freshly dead lime branches. It is associated with larger stands of lime than *E. caucasicus* and is less shade-tolerant, occurring at woodland edges, in glades and along rides (A.B. Drane, pers. comm.). This is the only modern record for the species for the whole of Wales, although Drane suggests that its thermophilic habitat requirements may mean that it is more difficult to find on demand and it might be more widespread within the SAC.

Both *Erotides cosnardi* and *Ernoporus tiliae* are Species of Principal Importance in England, although they are not included in Section 7 of the Environment (Wales) Act 2016.

Lady Park Wood has been subject to a brief exploratory survey (Alexander, 1984) and two nationally scarce saproxylic beetle species were found: *Diplocoelus fagi* and *Tillus elongatus*, both associated with older beech. Further work was subsequently carried out by Gibbs (1985) with a particular emphasis on Diptera. The only Nationally Scarce saproxylic species found was *Eustalomyia vittipes*, a species which develops within the nests of digger wasps (Sphecidae) in decaying wood.

The most significant saproxylic species found by P.F. Whitehead during surveys in 2013 was the Nationally Scarce darkling beetle *Prionychus melanarius*, in Livox Wood. The Lower Severn Basin is the national stronghold for this species but this is the first time it has been found in the Wye Valley Woodlands and Wales as a whole. It is also known from smaller populations in three other British loci: West Sussex, Sherwood Forest and Staverton Park (Suffolk). The larvae develop in wood mould inside cavities in hollow veteran trees. See also 5.2. above.

Piercefield Park is especially notable due to its population of open-grown veteran trees. In addition to the nationally rare *Ampedus cinnabarinus*, Hammond and Hine (1994) also found a good range of other species which require large old veteran trees, notably the old oak species *Anitys rubens, Dorcatoma chrysomelina, D. flavicornis* and *Trypodendron signatum*.

6.3. Site assessment using Saproxylic Quality Index

Two systems have been devised for the relative assessment of site quality for nature conservation using saproxylic beetles: the Index of Ecological Continuity (revised in Alexander, 2004) – see 6.4 below - and the Saproxylic Quality Index (Fowles *et al*., 1999).

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

The SQI calculation has certain provisos:

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

Fowles *et al*. (1999) suggest that an SQI of 500 is probably an appropriate threshold for assessing national importance. However, Fowles *et al*. (1999) were unable to present data for more than 14 sites with an SQI of 500 or more and it does seem likely that the threshold is set much too high. Many sites which are nationally famous for their saproxylic beetles have SQI figures in the 300s and 400s.

The SQI approach is of particular use in comparing a series of datasets from a single site – the IEC is less useful for this as the list of qualifying species is intended to be built up over time. It can be instructive to see how the SQI figures have changed over time in relation to changes in site management. The control on recorder effort makes the SQI approach particularly useful for site condition monitoring.

Unfortunately, only 36 species of saproxylic beetle were found during the 2017 surveys, and so – strictly – the SQI should not be applied. However, SQI values have been calculated to illustrate how the system works and to compare the three sites and compare them with previous surveys within the Wye Valley Woodlands SAC (Table 1).

In Table 1, the sites have been ordered with lowest SQI first, through to the highest value. None of the SQI values reach the threshold value of 500 for national significance but, as indicated above, this threshold is probably set too low. Any site achieving a SQI of 300 or more places a site amongst the best quality sites across Britain. Thus the best sites are Livox Wood, Piercefield Woods, and Blackcliff/Wyndcliff. Piercefield

Park, with its veteran trees, is not significantly better in this respect. Effectively the SQI is an index of rarity values rather than 'site quality'.

Table 1: Saproxylic Quality Score & Index for Wye Valley Woodlands

Site name	Date of survey	Saproxylic Quality Score	Number of qualifying species	Saproxylic Quality Index
Graig Wood	2013	28	14	200
Pwl-Mawr	2013	50	21	238
Fiddlers Elbow	2017	25	10	250
Piercefield Woods	2017	68	23	295
Blackcliff/Wyndcliff	2017	59	16	368
Piercefield Park	1994	108	27	400
Livox Wood	2013	79	18	438
All sites combined	-	299	73	409

6.4. Site assessment using Index of Ecological Continuity

The Index of Ecological Continuity has been used to identify Britain's most important sites for the saproxylic invertebrates of ancient trees and wood-pasture type habitats, and a hierarchical site table has been developed. The Index calculation is based on the presence or absence of a select list of beetle species (revised by Alexander, 2004). The species are graded according to their degree of association with Britain's remaining areas of old growth – mainly the old wood pastures and historic parklands - and these grades are used as the basis for a scoring system. The total of these scores provides the Index.

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

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

Table 2: Index of Ecological Continuity for Wye Valley Woodlands.

Site name	Date of survey	Grade 1 species	Grade 2 species	Grade 3 species	IEC
Pwl-Mawr	2013			1	1
Fiddlers Elbow	2017			2	2
Graig Wood	2013			3	3
Livox Wood	2013	1		4	7
Piercefield Woods	2017			7	7
Blackcliff/Wyndcliff	2017		2	4	8
Piercefield Park	1994	2		7	11
All sites combined	**-**	**3**	**2**	**16**	**29**

By analysing the data from the point of view of old growth and ecological continuity, a very different picture emerges. Piercefield Park, with its veteran open-grown trees, immediately stands out as the most important site, with two Grade 1 species and an IEC of 11 (Table 2). Piercefield Woods is continuous with the park and is the richest of the woodland sites. Blackcliff/Wyndcliff, comes next, with the only Grade 2 species, and Livox Wood stands out for the only Grade 1 species outside of the park site. Also, interestingly, the cumulative IEC for the Welsh section of the Wye Valley Woodlands SAC reaches an IEC of 29 and is of national significance. These IEC values are all minimum values, of course, as the IEC is a cumulative index, and so further survey work may potentially boost the values.

6.5. How should saproxylic habitat be assessed?

An interest in measuring deadwood volumes has developed amongst foresters who appear to believe that merely increasing deadwood volumes - in managed woodland systems and in the direction of the volumes measured in perceived examples of 'old growth forest' - is all that is needed to restore saproxylic biodiversity to 'natural' levels. However, the evidence that is available actually suggests that - at site level - increasing deadwood volume and variety will only result in better expression of the fauna already present and will not automatically attract species that are not there in the first place – species-richness will not increase significantly. This is because species which have been eliminated by past intensive exploitation of the wood resources tend to have relatively low mobility and are unlikely to successfully cross large expanses of unsuitable habitat. At landscape scale, however, there is better opportunity to increase species-richness, as species populations may be more viable at that scale and there is a greater probability of expansion of those populations and dispersal to neighbouring sites.

Increasing deadwood volumes also fails to address a wide range of requirements for saproxylic species-richness. It is saproxylic quality that is the key factor rather than deadwood volume. There needs to be a large diversity of size in individual deadwood items, with large girth timber the most valuable. There also needs to be a dynamic succession, from freshly dead material through to old decaying wood, all stages being available at all times in order to sustain populations of specialist invertebrates. The larger items of deadwood also provide scope for smaller features which may be of considerable significance, such as rot-holes formed where lateral branches have died and fallen away. Lateral branch development is primarily a feature of open-grown trees and so tree density factors are important. Basically, saproxylic habitat is extremely complex and measurements of deadwood volumes alone do not provide enough information for assessing site quality.

Old growth saproxylic invertebrates are the least mobile species of all. This is almost certainly because the fauna developed under continuous old growth conditions which developed following the last Ice Age. There was no need to develop high mobility capabilities under continuous habitat availability. These species have been disadvantaged by human exploitation of wood resources, which has resulted in increased young growth habitat – where sustainably managed for wood products - at the expense of old growth. Young growth species tend to be more mobile than old growth species. The reasons seem obvious – young growth develops into old growth over a few centuries if left unexploited, and so young growth species need to be able to locate disturbances to old growth across the landscape and such disturbances may

have been very patchy in nature before people began to have a significant impact on woodland structure.

Old growth conditions appear to require the development of large, old open-grown trees, in order to provide the specialist heart-rot and hollowing habitat, as well as the lower crown aerial deadwood habitat provided by extensive lateral branch structures which become increasingly shaded out by the developing high crown of the trees. Open space is a clear requirement for the development of large open-grown trees. Under high forest conditions, trees tend to grow more crowded and under greater competition for light, with the consequence that lateral branch development tends to be of very restricted occurrence. Natural crown retrenchment with aging tends to be fatal to the tree under closed canopy conditions, as neighbouring younger trees out-compete the aging trees for light and increasingly over-shadow them.

Steep slopes may complicate this broad picture however, allowing greater lateral branch development, especially over rocky crags, and enabling aging trees to survive crown retrenchment to some extent (A. Sverdrup-Thyggeson, pers. comm.). Thus, gorge woodlands tend to be richer in old growth saproxylic invertebrates than plain woodlands.

As Peterken (2008, p167) has pointed out, the great majority of Wye Valley trees are less than 100 years old. Either they were planted after the foundation of the Forestry Commission in 1919, or they grew up after the last coppicing between 60 and 100 years ago. Since they generally date from immediately after a felling, most stands are strongly even aged at canopy level. Most coppices contain two age classes: the former underwood dates from the last cutting, and the former standards generally date from the nineteenth century. Conversion of coppices to high forest by singling the stools also seems to have been widespread. Cutting of coppice at a variety of heights from flush with the ground to over 2m above the ground appears to have been widespread along the gorge, and the remains of this practice can still be seen in the stub trees of Cadora Woods (Peterken, 2008, p155) and elsewhere, e.g. Pierce Wood. The end result of such practices and changes is that large girth trees are today exceptionally rare through the woodlands, and this has important implications for saproxylic invertebrates.

Stands of closed-canopy high forest woodland also tend to act as a barrier to movement across the landscape.

Overall, it is the following dimensions of trees in the landscape which determine species-richness and abundance, rather than deadwood volumes:

- Age structure of trees
- Total number of trees
- Diversity of tree density, with open-grown trees as well as closed-canopy stands
- Continuity over time

7. Recommendations

The 2017 surveys are intended to be part of a larger project to improve documentation of the saproxylic invertebrate fauna of the Wye Valley Woodlands SAC. The results

have been impressive and informative and so it is recommended that further survey take place, especially expanding the seasonal coverage. The most productive time of year for surveying saproxylic invertebrates is the mid-May to mid-June period, although there are many specialist species which are best found in high summer or autumn. It would also be invaluable to supplement direct search techniques with standardised and targeted trapping. Flight interception trapping has become the European standard approach for scientific studies on saproxylic insects.

The surveys and subsequent analysis have highlighted the especial significance of veteran trees and open-grown trees, both features which are scarce and localised across the SAC. It is therefore suggested that these features should feature more strongly in the conservation plans for these woodlands in the future. These have historic precedence through the earlier wood pasture history of sections of the SAC area. They need not become prominent features of the main woodlands, but rather be encouraged and maintained around the margins and in specified patches. The Piercefield Park historic landscape is a particular feature of significant and special interest for its veteran trees and its conservation management should ideally be better integrated into the SAC. The ancient oak pollard in Castle Wood also should be subject to an individual tree management plan, addressing any need for halo-clearance to reduce competition around its crown.

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10. Appendix 1: Full species lists from 2017 surveys.

Site name	Order	Family	Species Identification	Status
Blackcliff/Wyndcliff SSSI	Chilopoda	Lithobiidae	Lithobius variegatus	
Blackcliff/Wyndcliff SSSI	Coleoptera	Anthribidae	Platystomos albinus	NS
Blackcliff/Wyndcliff SSSI	Coleoptera	Biphyllidae	Diplocoelus fagi	NS
Blackcliff/Wyndcliff SSSI	Coleoptera	Buprestidae	Agrilus biguttatus	
Blackcliff/Wyndcliff SSSI	Coleoptera	Carabidae	Agonum assimile	
Blackcliff/Wyndcliff SSSI	Coleoptera	Carabidae	Agonum ruficorne	
Blackcliff/Wyndcliff SSSI	Coleoptera	Carabidae	Ocys tachysoides	
Blackcliff/Wyndcliff SSSI	Coleoptera	Chrysomelidae	Oomorphus concolor	
Blackcliff/Wyndcliff SSSI	Coleoptera	Ciidae	Cis boleti	
Blackcliff/Wyndcliff SSSI	Coleoptera	Ciidae	Octotemnus glabriculus	
Blackcliff/Wyndcliff SSSI	Coleoptera	Cucujidae	Pediacus dermestoides	
Blackcliff/Wyndcliff SSSI	Coleoptera	Curculionidae	Euophyrum confine	
Blackcliff/Wyndcliff SSSI	Coleoptera	Curculionida	Strophosoma melanogramma	
Blackcliff/Wyndcliff SSSI	Coleoptera	Elateridae	Denticollis linearis	
Blackcliff/Wyndcliff SSSI	Coleoptera	Elateridae	Melanotus castanipes	
Blackcliff/Wyndcliff SSSI	Coleoptera	Lucanidae	Sinodendron cylindricum	
Blackcliff/Wyndcliff SSSI	Coleoptera	Melandryidae	Orchesia minor	NS
Blackcliff/Wyndcliff SSSI	Coleoptera	Pyrochroidae	Pyrochroa sp	
Blackcliff/Wyndcliff SSSI	Coleoptera	Scaphidiinae	Scaphisoma agaricinum	
Blackcliff/Wyndcliff SSSI	Coleoptera	Scolytinae	Ernoporicus caucasicus	NS
Blackcliff/Wyndcliff SSSI	Coleoptera	Scolytinae	Hylesinus crenatus	
Blackcliff/Wyndcliff SSSI	Coleoptera	Staphylinidae	Atrecus affinis	
Blackcliff/Wyndcliff SSSI	Coleoptera	Staphylinidae	Bolitobius trinotatus	
Blackcliff/Wyndcliff SSSI	Diplopoda	Staphylinidae	Cylindroiulus punctatus	
Blackcliff/Wyndcliff SSSI	Diplopoda	Staphylinidae	Glomeris marginata	
Blackcliff/Wyndcliff SSSI	Diplopoda	Staphylinidae	Nanogona polydesmoides	
Blackcliff/Wyndcliff SSSI	Diplopoda	Staphylinidae	Proteroiulus fuscus	
Blackcliff/Wyndcliff SSSI	Diptera	Xylophagidae	Xylophagus ater	
Blackcliff/Wyndcliff SSSI	Heteroptera	Aradidae	Aneurus avenius	
Blackcliff/Wyndcliff SSSI	Hymenoptera	Vespidae	Vespa crabro	

Site name	Order	Family	Species Identification	Status
Blackcliff/Wyndcliff SSSI	Mollusca		Aegopinella pura	
Blackcliff/Wyndcliff SSSI	Mollusca		Arion subfuscus	
Blackcliff/Wyndcliff SSSI	Mollusca		Arion vulgaris	
Blackcliff/Wyndcliff SSSI	Mollusca		Balea sarsii	
Blackcliff/Wyndcliff SSSI	Mollusca		Cepaea nemoralis	
Blackcliff/Wyndcliff SSSI	Mollusca		Clausilia bidentata	
Blackcliff/Wyndcliff SSSI	Mollusca		Cochlodina laminata	
Blackcliff/Wyndcliff SSSI	Mollusca		Discus rotundatus	
Blackcliff/Wyndcliff SSSI	Mollusca		Lehmannia marginata	
Blackcliff/Wyndcliff SSSI	Mollusca		Limax cinereoniger	
Blackcliff/Wyndcliff SSSI	Mollusca		Limax maximus	
Blackcliff/Wyndcliff SSSI	Mollusca		Malacolimax tenellus	NS
Blackcliff/Wyndcliff SSSI	Mollusca		Merdigera obscura	
Blackcliff/Wyndcliff SSSI	Mollusca		Oxychilus alliarius	
Blackcliff/Wyndcliff SSSI	Mollusca		Zenobiella subrufescens	
Blackcliff/Wyndcliff SSSI	Oniscidea		Oniscus asellus	
Blackcliff/Wyndcliff SSSI	Oniscidea		Porcellio scaber	
Fiddlers Elbow SSSI	Araneae		Diaea dorsata	
Fiddlers Elbow SSSI	Coleoptera	Carabidae	Agonum assimile	
Fiddlers Elbow SSSI	Coleoptera	Carabidae	Dromius quadimaculatus	
Fiddlers Elbow SSSI	Coleoptera	Carabidae	Ocys tachysoides	
Fiddlers Elbow SSSI	Coleoptera	Cerambycidae	Pogonocherus hispidus	
Fiddlers Elbow SSSI	Coleoptera	Cerambycidae	Rhagium mordax	
Fiddlers Elbow SSSI	Coleoptera	Ciidae	Cis boleti	
Fiddlers Elbow SSSI	Coleoptera	Ciidae	Octotemnus glabriculus	
Fiddlers Elbow SSSI	Coleoptera	Curculionidae	Euophryum confine	
Fiddlers Elbow SSSI	Coleoptera	Elateridae	Melanotus castanipes	
Fiddlers Elbow SSSI	Coleoptera	Melandryidae	Orchesia minor	NS
Fiddlers Elbow SSSI	Coleoptera	Melandryidae	Orchesia undulata	
Fiddlers Elbow SSSI	Coleoptera	Pyrochroidae	Pyrochroa sp	
Fiddlers Elbow SSSI	Coleoptera	Salpingidae	Salpingus planirostris	

Site name	Order	Family	Species Identification	Status
Fiddlers Elbow SSSI	Coleoptera	Scolytinae	Hylesinus varius	
Fiddlers Elbow SSSI	Coleoptera	Scolytinae	Scolytus intricatus	
Fiddlers Elbow SSSI	Coleoptera	Staphylinidae	Bolitobius trinotatus	
Fiddlers Elbow SSSI	Diplopoda	Staphylinidae	Cylindroiulus punctatus	
Fiddlers Elbow SSSI	Diplopoda	Staphylinidae	Nanogona polydesmoides	
Fiddlers Elbow SSSI	Diptera	Xylophagidae	Xylophagus ater	
Fiddlers Elbow SSSI	Mollusca		Arion subfuscus	
Fiddlers Elbow SSSI	Mollusca		Cepaea nemoralis	
Fiddlers Elbow SSSI	Mollusca		Clausilia bidentata	
Fiddlers Elbow SSSI	Mollusca		Cochlodina laminata	
Fiddlers Elbow SSSI	Mollusca		Lehmannia marginata	
Fiddlers Elbow SSSI	Mollusca		Zenobiella subrufescens	
Fiddlers Elbow SSSI	Oniscidea		Oniscus asellus	
Pierce, Alcove & Piercefield Woods SSSI	Araneae		Diaea dorsata	
Pierce, Alcove & Piercefield Woods SSSI	Araneae		Episinus angulatus	
Pierce, Alcove & Piercefield Woods SSSI	Araneae		Nuctenea umbratica	
Pierce, Alcove & Piercefield Woods SSSI	Coleoptera	Carabidae	Agonum thoreyi	
Pierce, Alcove & Piercefield Woods SSSI	Coleoptera	Carabidae	Laemostenus terricola	
Pierce, Alcove & Piercefield Woods SSSI	Coleoptera	Cerambycidae	Phymatodes testaceus	
Pierce, Alcove & Piercefield Woods SSSI	Coleoptera	Cerambycidae	Rhagium mordax	
Pierce, Alcove & Piercefield Woods SSSI	Coleoptera	Cerylonidae	Cerylon ferrugineum	
Pierce, Alcove & Piercefield Woods SSSI	Coleoptera	Chrysomelidae	Cryptocephalus pusillus	
Pierce, Alcove & Piercefield Woods SSSI	Coleoptera	Ciidae	Cis bilamellatus	
Pierce, Alcove & Piercefield Woods SSSI	Coleoptera	Ciidae	Cis vestitus	
Pierce, Alcove & Piercefield Woods SSSI	Coleoptera	Ciidae	Octotemnus glabriculus	
Pierce, Alcove & Piercefield Woods SSSI	Coleoptera	Colydiidae	Pycnomerus fuliginosus	
Pierce, Alcove & Piercefield Woods SSSI	Coleoptera	Cucujidae	Pediacus dermestoides	
Pierce, Alcove & Piercefield Woods SSSI	Coleoptera	Curculionidae	Euophryum confine	
Pierce, Alcove & Piercefield Woods SSSI	Coleoptera	Elateridae	Denticollis linearis	
Pierce, Alcove & Piercefield Woods SSSI	Coleoptera	Elateridae	Melanotus castanipes	
Pierce, Alcove & Piercefield Woods SSSI	Coleoptera	Elateridae	Stenagostus rhombeus	

Site name	Order	Family	Species Identification	Status
Pierce, Alcove & Piercefield Woods SSSI	Coleoptera	Histeridae	Paromalus flavicornis	
Pierce, Alcove & Piercefield Woods SSSI	Coleoptera	Lucanidae	Sinodendron cylindricum	
Pierce, Alcove & Piercefield Woods SSSI	Coleoptera	Melandryidae	Orchesia minor	NS
Pierce, Alcove & Piercefield Woods SSSI	Coleoptera	Monotomidae	Rhizophagus nitidulus	NS
Pierce, Alcove & Piercefield Woods SSSI	Coleoptera	Oedemeridae	Oedemera femorata	NS
Pierce, Alcove & Piercefield Woods SSSI	Coleoptera	Pyrochroidae	Pyrochroa coccinea	
Pierce, Alcove & Piercefield Woods SSSI	Coleoptera	Salpingidae	Vincenzellus ruficollis	
Pierce, Alcove & Piercefield Woods SSSI	Coleoptera	Scaphidiinae	Scaphidium quadrimaculatum	
Pierce, Alcove & Piercefield Woods SSSI	Coleoptera	Scolytinae	Hylesinus crenatus	
Pierce, Alcove & Piercefield Woods SSSI	Coleoptera	Scolytinae	Leperesinus varius	
Pierce, Alcove & Piercefield Woods SSSI	Coleoptera	Scolytinae	Scolytus intricatus	
Pierce, Alcove & Piercefield Woods SSSI	Coleoptera	Staphylinidae	Leptusa pulchella	
Pierce, Alcove & Piercefield Woods SSSI	Coleoptera	Staphylinidae	Proteinus brachypterus	
Pierce, Alcove & Piercefield Woods SSSI	Coleoptera	Staphylinidae	Atrecus affinis	
Pierce, Alcove & Piercefield Woods SSSI	Coleoptera	Tenebrionidae	Prionychus sp	
Pierce, Alcove & Piercefield Woods SSSI	Diplopoda		Cylindroiulus punctatus	
Pierce, Alcove & Piercefield Woods SSSI			Nanogona polydesmoides	
Pierce, Alcove & Piercefield Woods SSSI			Nanogona polydesmoides	
Pierce, Alcove & Piercefield Woods SSSI	Diptera	Xylophagidae	Xylophagus ater	
Pierce, Alcove & Piercefield Woods SSSI	Hymenoptera	Formicidae	Lasius brunneus	NS
Pierce, Alcove & Piercefield Woods SSSI	Mollusca		Aegopinella nitidula	
Pierce, Alcove & Piercefield Woods SSSI			Arion subfuscus	
Pierce, Alcove & Piercefield Woods SSSI			Arion vulgaris	
Pierce, Alcove & Piercefield Woods SSSI			Clausilia bidentata	
Pierce, Alcove & Piercefield Woods SSSI			Cochlodina laminata	
Pierce, Alcove & Piercefield Woods SSSI			Deroceras reticulatus	
Pierce, Alcove & Piercefield Woods SSSI			Discus rotundatus	
Pierce, Alcove & Piercefield Woods SSSI			Helicigona lapicida	
Pierce, Alcove & Piercefield Woods SSSI			Lehmannia marginata	
Pierce, Alcove & Piercefield Woods SSSI			Limax cinereoniger	
Pierce, Alcove & Piercefield Woods SSSI			Limax maximus	

Site name	Order	Family	Species Identification	Status
Pierce, Alcove & Piercefield Woods SSSI			Oxychilus alliarius	
Pierce, Alcove & Piercefield Woods SSSI			Zenobiella subrufescens	
Pierce, Alcove & Piercefield Woods SSSI	Oniscidea		Oniscus asellus	
Pierce, Alcove & Piercefield Woods SSSI			Porcellio scaber	
Pierce, Alcove & Piercefield Woods SSSI			Trichoniscus pusillus	

11. Appendix 2: List of saproxylic species with IEC and SQI status within the Wye Valley Woodlands.

	Checklist of Beetles of the British Isles Duff 2012	SQI Score	IEC Score (2004 with updates)	Piercefield Woods	Black Cliff & Wyndcliff	Fiddlers Elbow	Graig Wood	Livox Wood	Pwl-Mawr	Piercefield Park
Histeridae	Paromalus flavicornis	2		2017						
Ptliidae	Ptenidium errabunda	0								1994
Leiodidae	Agathidium nigripenne	2							2013	
Staphylinidae	Dropephylla koltzei (vilis)	1								1994
Staphylinidae	Phloeonomus punctipennis	2						2013		1994
Staphylinidae	Phloeocharis subtilissima	2						2013		
Staphylinidae	Sepedophilus bipunctatus	8								1994
Staphylinidae	Sepedophilus testaceus	8						2013		1994
Staphylinidae	Dinaraea aequata	1					2013			
staphylinidae	Bolitochara bella	0								1994
Staphylinidae	Bolitochara obliqua	0						2013	2013	
Staphylinidae	Leptusa fumida	1					2013		2013	1994
Staphylinidae	Leptusa pulchella	2		2017					2013	
Staphylinidae	Leptusa ruficollis	1								1994
Staphylinidae	Gyrophaena affinis	0								1994
Staphylinidae	Gyrophaena gentilis	0							2013	
Staphylinidae	Dexiogyia corticina	8								1994
Staphylinidae	Ischnoglossa prolixa	2								1994
Scaphidiidae	Scaphidium quadrimaculatum	2		2017						1994
Scaphidiidae	Scaphisoma agaricinum	2			2017				2013	1994
Staphylinidae	Atrecus affinis	1		2017	2017			2013	2013	
Staphylinidae	Gabrius splendidulus	1					2013		2013	1994
Staphylinidae	Quedius microps	8	1				2013	2013		
Lucanidae	Lucanus cervus	8							2013	
Lucanidae	Dorcus parallelipipedus	2						2013	2013	1994
Lucanidae	Sinodendron cylindricum	2		2017	2017			2013	2013	
Buprestidae	Agrilus biguttatus	8			2017					

Elateridae	Denticollis linearis	1		2017	2017		2013	2013		
Elateridae	Stenagostus rhombeus	4	1	2017					2013	
Elateridae	Ampedus cinnabarinus	16	3							1994
Elateridae	Melanotus castanipes	1		2017	2017	2017	2013	2013	2013	1994
Lycidae	Platycis minuta	8	1	2017	2017					
Cantharidae	Malthodes guttifer	8							2013	
Ptinidae	Grynobius planus	2							2013	
Ptinidae	Xestobium rufovillosum	4	1							1994
Ptinidae	Hemicoelus fulvicornis	1							2013	
Ptinidae	Anobium punctatum	1								1994
Ptinidae	Ptilinus pectinicornis	1					2013		2013	
Ptinidae	Dorcatoma chrysomelina	4	1							1994
Ptinidae	Dorcatoma flavicornis	8	1							1994
Ptinidae	Anitys rubens	8	3							1994
Monotomidae	Rhizophagus bipustulatus	1						2013		
Monotomidae	Rhizophagus nitidulus	4	1	2017						
Cucujidae	Pediacus dermestoides	4	1	2017	2017		2013			
Cryptophagidae	Cryptophagus scanicus	0					2013			
Biphyllidae	Diplocoelus fagi	8	2		2017					
Cerylonidae	Cerylon ferrugineum	2		2017				2013	2013	
Endomychidae	Symbioles latus	8	1							1994
Ciidae	Octotemnus glabriculus	1		2017	2017			2013		
Ciidae	Orthocis alni	2								1994
Ciidae	Cis bidentatus	2								1994
Ciidae	Cis bilamellatus	0		2017				2013		1994
Ciidae	Cis boleti	1			2017	2017		2013		1994
Ciidae	Cis castaneus (nitidus)	2								1994
Ciidae	Cis fagi	2							2013	
Ciidae	Cis submicans (micans)	4							2013	
Ciidae	Cis vestitus	2		2017						
Melandryidae	Orchesia minor	8		2017	2017	2017				
Melandryidae	Orchesia undulata	4	1			2017		2013		
Colydiidae	Pycnomerus fuliginosus	0		2017						

Tenebrionidae	Prionychus ater	8	1	2017 (unconfirmed)						
Tenebrionidae	Prionychus melanarius	32	3					2013		
Tenebrionidae	Gonodera luperus	2					2013			
Pyrochroidae	Pyrochroa coccinea	4	1	2017	2017	2017	2013	2013		1994
Pyrochroidae	Pyrochroa serraticornis	1					2013			
Salpingidae	Vincenzellus ruficollis	2		2017						
Salpingidae	Salpingus planirostris	1				2017				
Cerambycidae	Rhagium mordax	1		2017		2017	2013		2013	1994
Cerambycidae	Grammoptera ruficornis	1					2013			
Cerambycidae	Rutpela maculata	1							2013	
Cerambycidae	Phymatodes testaceus	4	1	2017						
Cerambycidae	Clytus arietis	1					2013			
Cerambycidae	Pogonocherus hispidus	2				2017				
Anthibidae	Platyrhinus resinosus	4	1					2013		
Anthibidae	Platystomos albinus	8	1		2017					
Curculionidae	Euophryum confine	0		2017	2017	2017		2013	2013	1994
Scolytinae	Scolytus intricatus	2		2017		2017				
Scolytinae	Ernoporicus caucasicus	16	2		2017					
Scolytinae	Dryocoetes villosus	2						2013	2013	
Scolytinae	Trypodendron signatum	8	1							1994
Scolytinae	Hylesinus crenatus	2		2017	2017					
Scolytinae	Hylesinus varius	1		2017		2017				
	Saproxylic Quality Score	**299**		**68**	**59**	**25**	**28**	**79**	**50**	**108**
	No of qualifying species	**73**		**23**	**16**	**10**	**14**	**18**	**21**	**27**
	Site Quality Index	**409**		**295**	**368**	**250**	**200**	**438**	**238**	**400**
	Index of Ecological Continuity		**29**	**7**	**8**	**2**	**3**	**7**	**1**	**11**

12. Appendix 3: Data Archive Appendix

The data archive contains:

[A] The final report in Microsoft Word and Adobe PDF formats.

[B] Species records, which are held on the NRW Recorder 6 database.

Metadata for this project is publicly accessible through Natural Resources Wales' Library Catalogue http://libcat.naturalresources.wales or http://catllyfr.cyfoethnaturiol.cymru by searching 'Dataset Titles'. The metadata is held as record no 121295.

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