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A survey of the Saproxylic Invertebrate Fauna of Old Cilgwyn in 2023

NRW Evidence Report No. 780

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Darparodd yr arolwg ail gofnod Cymreig o'r chwilen nitidwlaidd *Epuraea terminalis*, a gofnodwyd yn flaenorol ym Mharc Powis ym 1996, a thrydydd cofnod Cymreig o'r chwilen adenydd pluog *Ptenidium gressneri* (a welwyd ddiwethaf ym Mharc y Waun a Pharc Powis ym 1996) a'r chwilen grwydr *Thamiaraea cinnamomea* (Coedcae-bach ym 1994 a Sain Ffagan ym 1997). Mae'r chwilen grwydr *Euplectus mutator* fel arall wedi'i chyfyngu yng Nghymru i Dingestow Court, Gregynog a Choed Wyndcliff. Roedd chwilod saprosylig allweddol eraill yn cynnwys y chwilod crwydr *Dropephylla gracilicorni*, *Haploglossa gentilis*, *Phloeostiba planna* a *Placusa tachyporoides*, y chwilen fonotomid *Rhizophagus cribratus*, chwilen y tywyllwch ffug *Conopalpus testaceus* a'r chwilen lwydni *Enicmus brevicornis*. Darparodd yr arolwg hefyd drydydd lleoliad Cymreig ar gyfer y chwilen grwydr *Dropephylla koltzei* (a adnabyddir hefyd o Garn Gafallt a Gregynog), sydd wedi'i hollti'n ddiweddar oddi wrth *Dropephylla vilis,* er ei bod yn debygol o fod yn gyffredin yng Nghymru.

Cofnodwyd tri phryfyn saprosylig hefyd am y tro cyntaf yn Hen Gilgwyn – y pryfyn pigfain cyffredin *Xylophagus ater* a'r pryfed hofran *Brachypalpus laphriformis* a *Ferdinandea ruficornis.*

Roedd tri phrif gasgliad o infertebratau pren marw a nodwyd yn Hen Gilgwyn yn gysylltiedig â'r canlynol:

- pydredd rhuddin
- pydredd rhisgl a gwynnin
- cyrff hadol ffwngaidd

Dim ond elfen gymharol fach o'r casgliad o infertebratau saprosylig yn Hen Gilgwyn yw'r ffawna pydredd rhuddin, gyda dim ond naw rhywogaeth wedi'u cofnodi yn 2023, pob un ohonynt yn gysylltiedig â phydredd coch derw a achoswyd gan y ffwng ysgwydd felen *Laetiporus sulphureus*. Mae hyn yn adlewyrchiad o'r prinder coed goraeddfed a hynod ar y safle. Mae mwyafrif yr infertebratau saprosylig a ddarganfuwyd yn Hen Gilgwyn yn gysylltiedig â phydredd rhisgl a gwynnin, gyda 44 o rywogaethau wedi'u cofnodi yn 2023. Mae cynrychiolaeth arbennig o dda o rywogaethau sy'n gysylltiedig ag archwysiadau nodd, gan gynnwys y chwilod *Cryptarcha strigata*, *Epuraea terminalis*, *Phloeostiba planna*, *Placusa tachyporoides* a *Thamiaraea cinnamomea* a'r pryfed hofran *Ferdinandea ruficornis*, er gwaethaf diffyg rhediadau nodd amlwg. Mae naw rhywogaeth yn gysylltiedig

â chyrff hadol ffwngaidd, er ei bod yn debygol bod nifer llai oherwydd y diffyg ffyngau ysgwydd hadol a oedd yn bresennol yn ystod cyfnod yr arolwg.
Ar hyn o bryd, mae diffyg coed derw a rhywogaethau coed eraill goraeddfed a hynod yn Hen Gilgwyn, gyda'r mwyafrif i'w cael yn y parcdir agored yn unedau arolwg OC01, OC02, OC03 ac OC04. Dylai'r ardaloedd hyn (gan gynnwys y ffiniau o'u cwmpas) felly fod yn rhannau craidd o'r safle lle mae'r stoc o hen goed agored yn cael ei chynnal a'i chynyddu dros y tymor hwy. Dylai'r dderwen mes coesynnog barhau i fod y brif rywogaeth a hyrwyddir ar gyfer infertebratau saprosylig, ond byddai hefyd yn fuddiol cynyddu cynrychiolaeth coed llydanddail eraill megis ynn (yn dibynnu ar lefelau clefyd coed ynn), ffawydd a masarn. Dylid nodi a chadw coed canol oed i aeddfed, yn enwedig y rhai mewn sefyllfaoedd agored megis parcdir, gwrychoedd / ffiniau caeau ac ymylon coed, yn lle sbesimenau goraeddfed a hynod yn y tymor canolig i'r hirdymor. Dylid hefyd plannu a dethol coed derw iau ac amrywiaeth o rywogaethau coed eraill.

Dylid cadw eitemau mawr o bren marw sy'n sefyll ac wedi cwympo, ac yn enwedig y rhai sy'n deillio o goed goraeddfed neu hynod, yn y fan a'r lle. O bwysigrwydd arbennig mae boncyffion a changhennau derw marw mawr, yn enwedig y rhai sy'n dal i sefyll (bonion) neu sy'n dal i fod ymhell uwchlaw lefel y ddaear (ee canghennau marw yn y canopi neu'n hongian/gorffwys ar uchder o fwy na thua 2 fetr). Dylid cadw prysgwydd fel y ddraenen wen, y ddraenen ddu a'r ysgawen mewn sefyllfaoedd heulog a phlannu rhagor o sbesimenau, er mwyn darparu ffynonellau neithdar a phaill ar gyfer infertebratau saprosylig. Gellid teneuo cellïoedd o goetir â chanopi caeedig o fewn y SoDdGA ac ardaloedd cyfagos o'r ystâd i ffafrio unrhyw goed llydanddail canol oed, a gallai caniatáu i dda byw eu pori gynyddu'r adnodd o hen goed sydd wedi tyfu'n agored yn yr ardal dros y tymor hwy. Mewn sefyllfaoedd mwy agored, gallai tocio coed ifanc a chanol oed, yn enwedig rhywogaethau sy'n tyfu'n gyflymach fel ynn a masarn, helpu i gyflymu datblygiad nodweddion cynefinoedd pren marw.

Executive summary

A survey of the saproxylic invertebrate of Old Cilgwyn, part of Old Cilgwyn a Cae Heslop SSSI, was undertaken from May to September 2023 using a variety of manual techniques and vane traps. A total of 243 invertebrate species was recorded, including 68 saproxylic beetle species of which 32 species were found for the first time at Old Cilgwyn. The cumulative total of saproxylic beetle species which score as part of calculating the Revised Index of Ecological Continuity (RIEC) and Saproxylic Quality Index (SQI) now stands at 99, including 18 species which provide a **RIEC of 20**. The **SQI** for the 2023 survey is **291.2** based on 68 beetle species.

The survey provided a 2nd Welsh record of the nitidulid beetle *Epuraea terminalis*, previously recorded at Powis Park in 1996, and 3rd Welsh records of the featherwing beetle *Ptenidium gressneri* (last seen at Chirk Park and Powis Park in 1996) and the rove beetle *Thamiaraea cinnamomea (*Coedcae-bach in 1994 and St. Fagans in 1997). The rove beetle *Euplectus mutator* is otherwise restricted in Wales to Dingestow Court, Gregynog and Wyndcliff Wood. Other key saproxylic beetles included the rove beetles *Dropephylla gracilicornis*, *Haploglossa gentilis*, *Phloeostiba plana* and *Placusa tachyporoides*, the monotomid beetle *Rhizophagus cribratus*, the false darkling beetle *Conopalpus testaceus* and the mould beetle *Enicmus brevicornis*. The survey also provided a 3rd Welsh locality for the rove beetle *Dropephylla koltzei* (also known from Carn Gafallt and Gregynog), which has recently been split from *Dropephylla vilis*, although it is likely to be widespread in Wales.

Three saproxylic flies were also recorded for the first time at Old Cilgwyn – the Common Awl-fly *Xylophagus ater* and the hoverflies *Brachypalpus laphriformis* and *Ferdinandea ruficornis.*

Three main dead wood invertebrate assemblages identified at Old Cilgwyn were associated with:

- heartwood decay;
- bark and sapwood decay
- fungal fruiting bodies.

The heartwood decay fauna makes up only a relatively small element of the total saproxylic invertebrate assemblage at Old Cilgwyn, with just nine species recorded in 2023, all of which are associated with oak red-rot caused by the Chicken of the Woods bracket fungus *Laetiporus sulphureus.* This is a reflection of the dearth of over-mature and veteran trees at the site. The majority of saproxylic invertebrates found at Old Cilgwyn are associated with bark and sapwood decay, with 44 species recorded in 2023. Species associated with sap exudations are particularly well represented including the beetles *Cryptarcha strigata*, *Epuraea terminalis*, *Phloeostiba plana, Placusa tachyporoides* and *Thamiaraea cinnamomea* and the hoverfly *Ferdinandea ruficornis*, despite a lack of obvious sap runs. Nine species are associated with fungal fruiting bodies, although numbers were likely to have been suppressed by the lack of fruiting brackets present through the survey period.

There is currently a lack of over-mature and veteran oaks and other tree species at Old Cilgwyn, with the majority found in the open parkland in survey units OC01, OC02, OC03 and OC04. These areas (including the boundaries around them) should therefore be the core parts of the site in which the stock of open-grown old trees is maintained and increased over the longer term. Pedunculate Oak should continue to be the main species promoted for saproxylic invertebrates but it would also be beneficial to increase the representation of other broadleaves such as Ash (depending upon levels of Ash Dieback), Beech and Sycamore. Mid-aged to mature trees, especially those in open situations such as parkland, hedgerows/field boundaries and wood edges should be identified and retained as replacements for existing over-mature and veteran specimens in the medium to long term. Planting and selection of younger oaks and a range of other tree species should also be carried out.

Large items of standing and fallen dead wood, and especially that derived from over-mature or veteran trees, should be retained *in situ.* Of particular importance are large dead oak trunks and branches, especially those that are still standing (snags) or are still situated well above ground level (e.g. dead branches in the canopy or hanging/resting at heights of greater than approximately 2 metres). Scrub such as Hawthorn, Blackthorn and Elder in sunny situations should be retained and further specimens planted, in order to provide nectar and pollen sources for saproxylic invertebrates. Stands of closed-canopy woodland within the SSSI and adjacent areas of the estate could be thinned to favour any mid-aged broadleaves, and allowing stock to graze them has the potential to increase the resource of open-grown old trees in the area over the longer term. In more open situations, pollarding of young to mid-aged trees, particularly faster-growing species such as Ash and Sycamore, could help to speed up the development of dead wood habitat features.

1. Introduction

This report details the findings of a survey of invertebrates associated with dead wood (saproxylic) habitats at the Old Cilgwyn a Cae Heslop Site of Special Scientific Interest (SSSI), which is hereafter referred to as 'Old Cilgwyn'. The site is located on the northern slopes of the Teifi valley at the southern edge of Ceredigion (Watsonian vice county VC46). The Afon Teifi marks the border between this county and Carmarthenshire (VC44) to the south of the river. Old Cilgwyn is situated approximately one kilometre to the northeast of the town of Newcastle Emlyn and an approximate central point of the SSSI is at SN316414. Its location is shown in Figure 1. The work has been carried out under contract to Natural Resources Wales (NRW) and forms part of their ongoing programme of monitoring ecological condition on Welsh SSSIs.

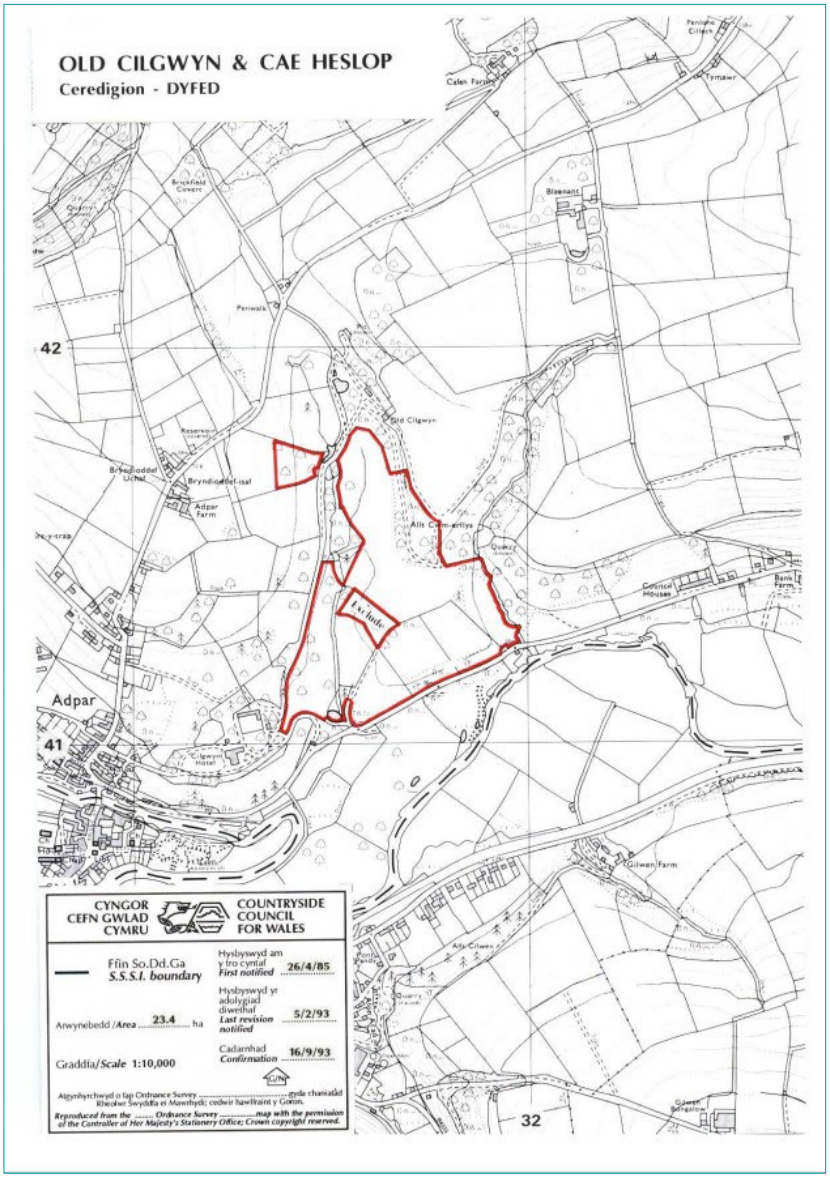

Figure 1. Location of Old Cilgwyn a Cae Heslop SSSI.

Old Cilgwyn comprises a diverse mosaic of grassland, wetland and woodland habitats. Most of the site is dominated by semi-improved grassland, with scattered old Pedunculate Oaks *Quercus robur* present both as field trees and in surrounding copses and hedges. Mature and veteran trees of other species are confined to a handful of Beech *Fagus sylvatica*, Sycamore *Acer pseudoplatanus* and lime *Tilia* sp. and one mature Tulip Tree *Liriodendron tulipifera*. Hedges and copses have a mix of native and planted species, chief amongst which are Hawthorn *Crataegus monogyna*, Blackthorn *Prunus spinosa*, Hazel *Corylus avellana*, Ash *Fraxinus excelsior* (showing clear evidence of Ash Dieback disease [ADB] *Chalara fraxinea*), Sycamore, and larch *Larix* sp. Wetter ground around the two streams that cross the site have some small stands of wet woodland dominated by Grey Willow *Salix cinerea* and Alder *Alnus glutinosa*.

On steeper ground and in the Cae Heslop hayfield there are stands of species-rich mesotrophic grassland characterised by Crested Dog's-tail *Cynosurus cristatus*, Sweet Vernal-grass *Anthoxanthum odoratum*, Common Knapweed *Centaurea nigra*, Meadow Vetchling *Lathyrus pratensis*, Rough Hawkbit *Leontodon hispidus* and Betony *Stachys officinalis*. In the southeastern corner of the site, the grassland has a high cover of Bracken *Pteridium aquilinum* and a large population of the locally uncommon Cowslip *Primula veris*. The large central valley also has some stands of marshy grassland with rushes *Juncus* spp., Purple Moor-grass *Molinia caerulea* and wetland forbs such as Devil's-bit Scabious *Succisa pratensis* and Greater Bird's-foot Trefoil *Lotus corniculatus*.

The SSSI is notified for neutral grassland, a population of the Hornet Robberfly *Asilus crabroniformis* and for its saproxylic invertebrate assemblage. An assessment of the tree condition of 63 oak and one lime in Old Cilgwyn was made in March 1992 (Fowles & Chater, 1992; Table 1). Deadwood features included exposed heartrot (13 trees), redrot (1), rot holes (7) and bracket fungi (3).

Table 1. Age class of trees at Old Cilgwyn in 1992 (Fowles & Chater, 1992).

Girth (metres)	Broad age class	Number of trees	% of total tree population	Approximate age range (years)
0 - 1.5	Young (1) to Mature (2)	9	14%	4 - 80
1.61 - 3.0	Mature (1) to Fully Mature (2)	25	39%	80 - 150
3.1 – 4.5	Fully Mature (1) to Early Ancient (2)	24	38%	150 - 250
4.6 – 5.0	Early Ancient (1) to Ancient (2)	2	3%	250 - 300
5+	Ancient (1 and 2)	1	2%	300+
Stumps	n/a	3	5%	n/a

A review of the saproxylic beetles of Ceredigion highlights records of *Dromius agilis*, *Dromius quadrinotatus*, *Litargus connexus* and *Triplax aenea* from Old Cilgwyn (Boyce, 1988). The tree assessment visit on 29th March 1992 lists 24 saproxylic beetles including *Aleochara stichai*, *Dacne bipustulata*, *Orthoperus nigrescens*, *Phloeopora corticalis, Platypus cylindrus* and *Soronia grisea* (Fowles & Chater, 1992). A field meeting of the Dyfed Invertebrate Group on 7th June 1992 recorded *Enicmus testaceus* and *Orthoperus nigrescens* (Fowles, 1993). As part of the rapid assessment of saproxylic sites across Wales, Old Cilgwyn was visited on 6th and 29th July 1994 with 24 saproxylic beetle species associated with 100 mature and over-mature trees, 18 of which were new to the site

including *Ctesias serra* and *Pyrochroa coccinea* (Hammond & Hine, 1994). Old Cilgwyn was ranked as a Grade 3 site.

Old Cilgwyn supports two saproxylic beetle species which have very restricted Welsh distributions (Table 2), and it is critical that every effort is made to maintain populations here.

Table 2. Saproxylic invertebrates with important populations at Old Cilgwyn in a Welsh context.

Species	Order	Microhabitat	Welsh localities
Aleochara stichai	Coleoptera	fungal fruiting bodies	Carn Gafallt, Chirk Park, Coed Cymerau, **Old Cilgwyn**, Powis Park, Torrent Walk
Phloeopora corticalis	Coleoptera	sapwood & bark decay	Carn Gafallt, Cockshoot Wood; Dingestow Court, Gwydir Forest, **Old Cilgwyn**

Following a more comprehensive collation of data and analysis using the Pantheon analytical tool (Howe, in prep.), a total of 88 saproxylic invertebrates is now known from Old Cilgwyn of which 46 are regarded as key species (Appendix 1; Table 3), and key microhabitats include Dead Trunks & Branches, Fungal Fruiting Bodies and Sapwood & Bark Decay (Table 4). The Saproxylic Quality Index (SQI) and Index of Ecological Continuity (IEC) values were calculated as 269.2 and 13 respectively, although SQI should ideally be calculated on the basis of a single survey event.

Table 3. Old Cilgwyn saproxylic invertebrates. From: Howe (in prep.).

Taxon	No. species	No. key species
Bees & Wasps	1	1
Beetles	79	45
Bugs	1	0
Flies	3	0
Millipedes	1	0
Spiders	3	0
Total	**88**	**46**

Table 4. The microhabitats utilised by saproxylic invertebrates at Old Cilgwyn. From: Howe (in prep.).

Microhabitat	No. species	No. key species
Bark & Cambium, including bark predators	8	4
Bird & Mammal Nests	0	0
Canopy & Foliage	1	0
Dead Trunks & Branches	22	13
Epiphytes	1	1
Fruits	0	0
Fungal Fruiting Bodies	14	7
Heartrot	4	2
Heavy Shade	0	0
Hollow Cavities	0	0
Red Rot	3	3

Microhabitat	No. species	No. key species
Rot Holes	1	0
Sapwood & Bark Decay	27	15
Stumps, Roots & Underground Wood	2	0
Wasp Nests	0	0
White Rot	1	1
Wood Decay in Soil	0	0
Wood Mould	0	0
Woodland Litter	0	0
unknown	0	0
Total	**88**	**46**

The current survey of the saproxylic invertebrate fauna at Old Cilgwyn is the first since the rapid reconnaissance in 1994 and is the most comprehensive assessment to date.

2. Methods

The contractor initially undertook a walk-over survey of Old Cilgwyn that aimed primarily to assess the extent and quality of saproxylic habitats and to identify trees on which vane traps would be set up on the following day. This first survey block was undertaken on 30th and 31st May 2023. Further visits were made to the site on 10th July, 22nd August and 29th September 2023. To facilitate recording, Old Cilgwyn was divided into a series of survey units (abbreviated to SU elsewhere in this report), which have been used as the basis for general recording of old trees and associated saproxylic invertebrates in 2023. The location of the survey units is shown on Figure 2.

The survey methodology used has followed that laid out in Webb & Hackman (2018), which is the standardised methodology recommended by Natural England (NE) for saproxylic invertebrate surveys. This stipulates the use of passive vane traps placed in suitable habitat between spring and autumn, with supplementary active searching methods also employed while moving around the site servicing the vane traps. Vane trap placement was decided by the surveyor after assessing suitable trees during a half-day walk-over of the site on 30th May. They were then set up during the second day, emptied and re-filled during the July and August visits and removed during the final sampling session in September. Table 5 provides a brief description of each vane trap, including an eight-figure grid reference taken with a hand-held GPS unit to mark its position. The location of the vane traps is also shown on Figure 3.

Table 5. Vane trap (VAT) locations at Old Cilgwyn, 2023.

Tree code	Grid reference	Notes on siting of vane trap / survey unit
VAT01	SN31434125	Veteran oak with *Laetiporus sulphureus* brackets / SU OC02
VAT02	SN31504128	Dead fallen mature Beech / SU OC05
VAT03	SN31584137	Dead oak snag just behind VAT04
VAT04	SN31594137	Veteran stub-pollard with much burring and some red-rot / SU OC01
VAT05	SN31544160	Veteran oak with large fallen limb showing exposed red rot / SU OC01
VAT06	SN31564167	Veteran oak with numerous semi-broken limbs / SU OC01
VAT07	SN31714141	Veteran oak with red-rot in side branch / SU OC01
VAT08	SN31834141	Very large veteran Oak with *Ganoderma applanatum* brackets / OC04
VAT09	SN31894132	Veteran oak with broken limb and much exposed red rot / OC04
VAT10	SN31634130	Sycamore snag in mixed plantation / OC10

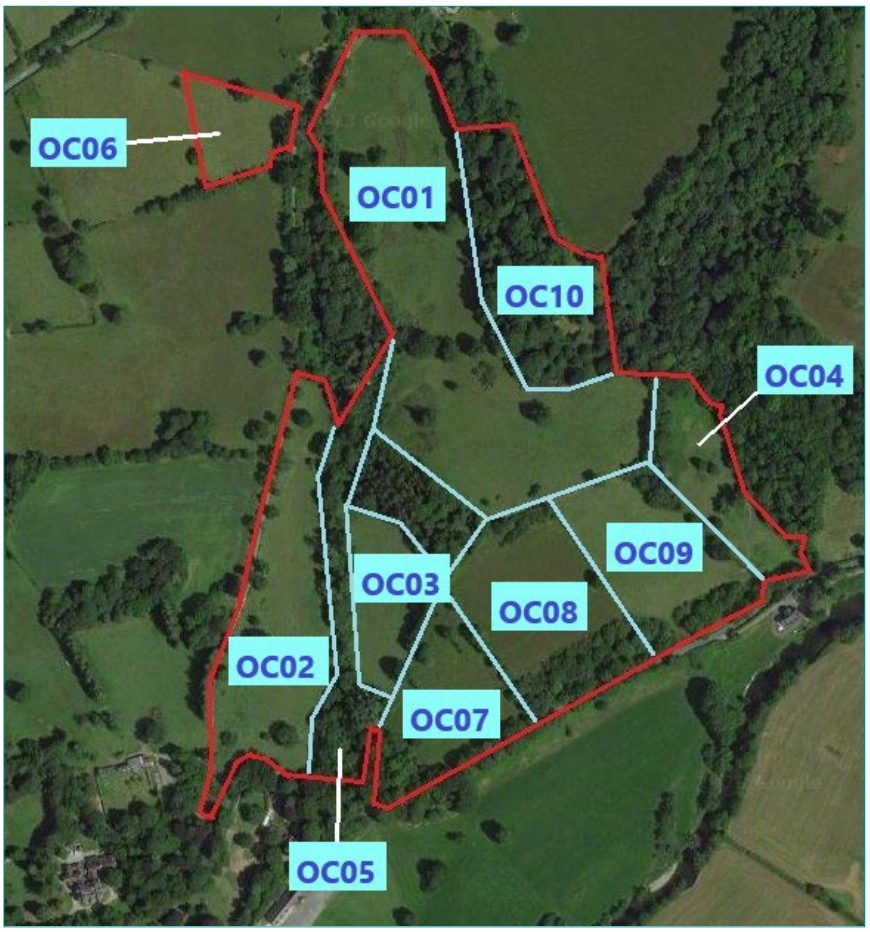

Figure 2. Invertebrate survey units (SU) at Old Cilgwyn, 2023.

In addition to the servicing of the vane traps, the contractor also collected invertebrates using a range of manual recording techniques. The most important of these were:

- searching under bark of dead trunks and branches;
- sieving heart rot;
- shaking wood-decay fungi over a tray;
- beating living and dead tree foliage (including flowering Hawthorn in May);
- and visual inspection of flowering umbels (mostly hogweed), dead trunks and branches.

Most small invertebrates (e.g. false scorpions, Aleocharine rove beetles) collected during fieldwork were put into tubes containing a 70% solution of isopropyl alcohol, while larger forms were usually collected in jars containing ethyl acetate.

All invertebrate specimens collected have been identified to species level. The main groups sampled were those of greatest value in assessment of saproxylic habitats. The most important group is beetles (Coleoptera). All saproxylic beetles have been collected, including 'difficult' groups such as the smaller rove beetles (Staphylinidae: Aleocharinae) and the Cryptophagidae. Some other invertebrate groups have also been identified to species level, where these are known to include saproxylic species indicative of high-quality dead wood habitats. Voucher specimens of any important invertebrates recorded have been retained in the contractor's collection. As well as the groups identified above, any records of other easily identified invertebrates (e.g. molluscs) have also been made. A checklist of all invertebrate species recorded at Old Cilgwyn in 2023 can be found in Table 6.

Those species with a formal conservation status are referred to here as key species and short profiles of all key species recorded during the 2023 survey that summarise their identification, ecology, British distribution and occurrence at Old Cilgwyn are provided in sub-section 3.1. Following this, sub-section 3.2 gives short profiles of other species which, though not having a formal conservation status, are nonetheless extremely scarce in Wales.

In sub-section 3.3, the key species list is used to inform a discussion of the condition and importance of saproxylic habitat features for invertebrates at Old Cilgwyn. The data collected has been analysed using the Saproxylic Quality Index (SQI) (Fowles *et al.*, 1999) and the Revised Index of Ecological Continuity (RIEC) (Harding & Rose, 1986; Alexander, 2004). In addition to the data collected this year, the results have also been assessed within the context of various earlier surveys of the saproxylic invertebrate fauna of the site. Following this, sub-section 3.3 gives some recommendations for the management of the site for saproxylic invertebrates.

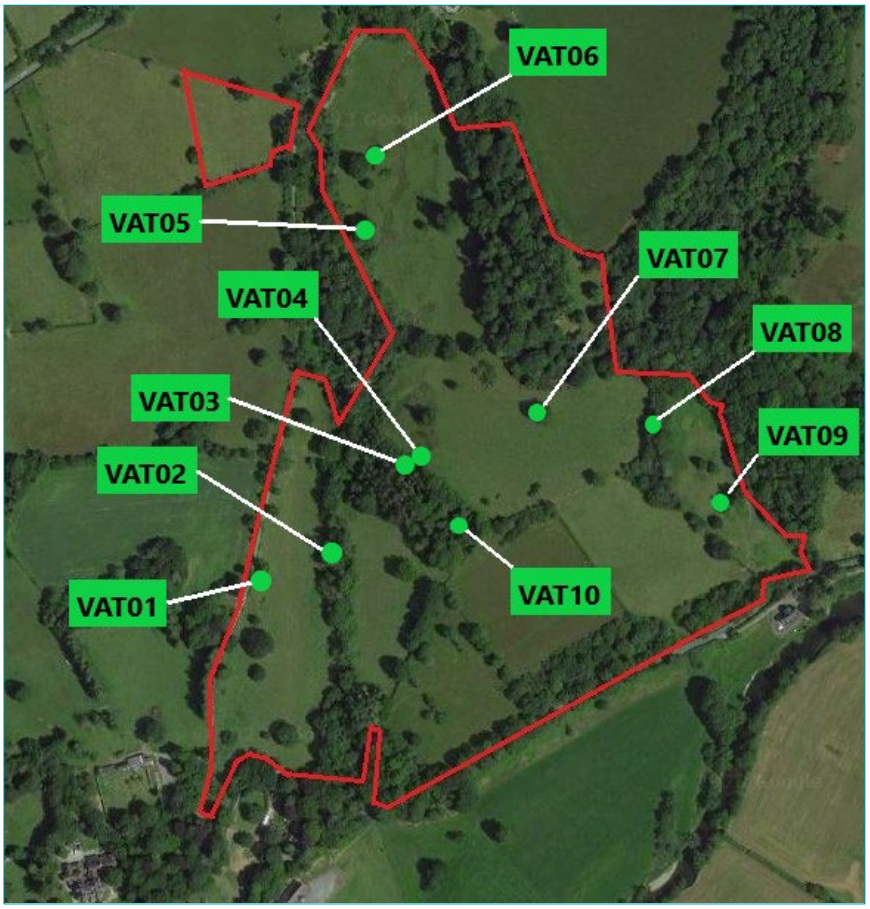

Figure 3. Location of vane traps at Old Cilgwyn, 2023.

3. Results

Table 6 below provides a checklist of the 243 invertebrate species recorded during the survey of Old Cilgwyn in 2023. Of these, 32 saproxylic beetles (Table 7) and three saproxylic flies (the Common Awl-fly *Xylophagus ater* and the hoverflies *Brachypalpus laphriformis* and *Ferdinandea ruficornis*) were new to Old Cilgwyn. In addition, the rove beetles *Aleochara diversa*, *Atheta hybrida* and *Atheta pilicornis* were also recorded at Old Cilgwyn for first time.

The codes in the fourth column of Table 6 refer to the survey units and vane traps in which species were recorded in 2023. The location of these is shown respectively in Figures 2 and 3 above.

The emboldened status categories given in the third column of Table 6 and also after the scientific name in sub-section 3.1 refer to those species having a formal rarity/threat status ascribed to them by the UK government conservation agencies. These are defined as follows:

Notes on Table 6.
The abbreviated status categories given in column 3 are explained below.
VU (GB) – GB Red List, Vulnerable. Taxa which either have a very small British range and/or are declining rapidly with a quantifiable probability of becoming extinct if the causal factors for decline continue to operate.
RDBK – Red Data Book Category K – Insufficiently Known. Taxa that are suspected but not definitely known to belong to one of the RDB categories, because of lack of information.
Nb – Nationally Scarce Category B. Taxa thought to occur in between 30 and 100 10 km squares of the National Grid (Hyman & Parsons, 1992, 1994).
N – Nationally Scarce. Taxa which are estimated to occur within the range of 16 to 100 10km squares, but where division into Na or Nb status has not been attempted due to limited availability of information on British distribution. Second status review not yet completed and status therefore taken from first review (Falk, 1991; Hyman & Parsons, 1994).
NS – Nationally Scarce. In recent reviews the Na and Nb sub-divisions have been subsumed into a single category covering species occurring in 16 to 100 10km squares of the National Grid. Unlike the previous 'N' category, which covers the same distribution range, the amalgamation does not necessarily result from inadequate information on the British distribution.
S7 – Species of Principal Importance for the maintenance and enhancement of biodiversity in Wales that are listed in Section 7 of the Environment (Wales) Act, 2016.
SFG2 – Saproxylic Fauna Group 2 - Saproxylic beetles that 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, or for which the locality data are imprecise (Harding and Rose, *ibid.*).
SFG3 – Saproxylic Fauna Group 3 - Saproxylic beetles that occur widely in wooded land, but which are collectively characteristic of ancient woodland with dead wood habitats (Harding and Rose, *ibid.*).

Table 6. Checklist of invertebrates recorded at Old Cilgwyn, 2023.

Species	Vernacular name	Status	SU/VAT
Arion ater	Large Black Slug	-	SU05
Arion subfuscus agg.	Dusky Slug	-	SU05
Arion intermedius	Hedgehog Slug	-	SU05
Discus rotundatus	Radiated Snail	-	SU10
Lehmannia marginata	Tree Slug	-	SU10
Limacus maculatus	Green Cellar Slug	-	SU10
Oxychilus alliarius	Garlic Snail	-	SU10
Calopteryx splendens	Banded Demoiselle damselfly	-	SU09
Calopteryx virgo	Beautiful Demoiselle damselfly	-	SU05
Panorpa communis	Common Scorpionfly	-	VAT04
Pseudochorthippus parallelus	Meadow Grasshopper	-	VAT05
Forficula auricularia	Common Earwig	-	SU01,05,09; VAT01,07,08
Acanthosoma haemorrhoidale	Hawthorn Shieldbug	-	SU01
Pentatoma rufipes	Forest Shieldbug	-	SU01,09; VAT05,08,09
Loricula elegantula	A Microphysid bug	-	SU01
Derephysia foliacea	A lacebug	-	VAT08
Tingis cardui	Spear Thistle Lacebug	-	SU02
Aphrophora alni	A leafhopper	-	VAT04,08
Tachycixius pilosus	A Cixiid planthopper	-	VAT05
Cixius nervosus	A Cixiid planthopper	-	VAT09
Conomelus anceps	A Delphacid planthopper	-	VAT05
Ocys tachysoides	A ground beetle	-	SU05

Species	Vernacular name	Status	SU/VAT
Pterostichus madidus	A ground beetle	-	VAT05
Calodromius spilotus	A ground beetle	-	SU09
Helophorus brevipalpis	A Helophorid water beetle	-	VAT03,09
Paromalus flavicornis	A clown beetle	-	SU10
Ptenidium gressneri	A featherwing beetle	**N; SFG2**	VAT08,09
Anisotoma humeralis	A Leiodid beetle	-	VAT02,05,09
Phosphuga atrata	A Silphid beetle	-	SU04
Dropephylla gracilicornis	A rove beetle	**NS**	SU01,09
Dropephylla ioptera	A rove beetle	-	SU01
Dropephylla koltzei	A rove beetle	-	SU01,09
Phloeonomus punctipennis	A rove beetle	-	VAT09
Phloeostiba plana	A rove beetle	**NS**	VAT06,09
Phyllodrepoidea crenata	A rove beetle	**NS**	VAT02
Proteinus brachypterus	A rove beetle	-	SU01,05
Proteinus ovalis	A rove beetle	-	SU05
Bibloporus bicolor	A rove beetle	-	VAT02,05
Euplectus mutator	A rove beetle	**N**	VAT04,08,09
Lordithon trinotatus	A rove beetle	-	VAT10
Aleochara diversa	A rove beetle	**N**	VAT01,03,07
Aleochara sparsa	A rove beetle	-	VAT01,02,03,04,05,07,08,09
Aleochara stichai	A rove beetle	**N**	VAT01,04,08
Phloeopora testacea	A rove beetle	-	VAT09
Haploglossa gentilis	A rove beetle	-	VAT01
Haploglossa villosula	A rove beetle	-	VAT01,06,08
Cypha longicornis	A rove beetle	-	VAT01,08
Oligota parva	A rove beetle	-	VAT09
Leptusa fumida	A rove beetle	-	SU01,05
Leptusa ruficollis	A rove beetle	-	SU01,09; VAT08
Bolitochara tecta	A rove beetle	-	SU05
Agaricochara latissima	A rove beetle	-	SU05
Homalota plana	A rove beetle	-	SU05
Placusa pumilio	A rove beetle	-	VAT09
Placusa tachyporoides	A rove beetle	**N**	VAT02
Amischa analis	A rove beetle	-	VAT01,02,03,05,08,09
Atheta hybrida	A rove beetle	**RDBK**	VAT01
Atheta membranata	A rove beetle	-	VAT01,03
Atheta corvina	A rove beetle	-	SU05
Atheta harwoodi	A rove beetle	-	VAT01,02,04,06,07,09
Atheta pilicornis	A rove beetle	**N**	SU05
Atheta vaga	A rove beetle	-	VAT01,02,03,04,05,06,08,09
Atheta celata	A rove beetle	-	SU05

Species	Vernacular name	Status	SU/VAT
Atheta sordidula	A rove beetle	-	VAT08,09
Atheta laticollis	A rove beetle	-	SU05
Atheta alpina	A rove beetle	-	VAT09
Atheta fungi ss	A rove beetle	-	VAT05
Atheta taxiceroides	A rove beetle	-	VAT01,02,03,04,05,06,07,08,09
Acrotona parvula	A rove beetle	-	VAT05
Thamiaraea cinnamomea	A rove beetle	-	VAT01,02,04,05,08,09
Aloconota sulcifrons	A rove beetle	-	VAT02
Anotylus tetracarinatus	A rove beetle	-	VAT02,03,04,05,08,09
Atrecus affinis	A rove beetle	-	SU10; VAT01
Quedius cruentus	A rove beetle	-	VAT01
Quedius mesomelinus	A rove beetle	-	VAT08
Quedius fumatus	A rove beetle	-	VAT02
Gabrius splendidulus	A rove beetle	-	SU10
Prionocyphon serricornis	A marsh beetle	**SFG3**	VAT09
Dascillus cervinus	Orchid Beetle	-	VAT02,04,09
Melanotus castanipes	A click beetle	-	VAT03,05,08,09
Athous haemorrhoidalis	A click beetle	-	SU01
Athous vittatus	A click beetle	-	VAT09
Denticollis linearis	A click beetle	-	VAT09
Cantharis rustica	A soldier beetle	-	SU03
Rhagonycha fulva	A soldier beetle	-	VAT07,08
Rhagonycha lignosa	A soldier beetle	-	SU01
Malthodes minimus	A soldier beetle	-	VAT04
Malthodes pumilus	A soldier beetle	**NS**	SU01; VAT09
Anthrenus fuscus	A carpet beetle	-	VAT03,06,08
Grynobius planus	A woodworm beetle	-	VAT01,05,08
Ochina ptinoides	A woodworm beetle	-	VAT08
Anobium punctatum	Common Woodworm Beetle	-	VAT07,08
Ptilinus pectinicornis	A woodworm beetle	-	VAT02,09
Dorcatoma chrysomelina	A woodworm beetle	**SFG3**	VAT06,07,09
Dorcatoma flavicornis	A woodworm beetle	**NS;SFG3**	VAT08,09
Phloiophilus edwardsii	A Phloiophilid beetle	**NS;SFG3**	SU09
Dasytes aeratus	A Melyrid beetle	-	SU01
Malachius bipustulatus	Common Malachite Beetle	-	SU09
Dacne rufifrons	An Erotylid beetle	-	VAT09
Triplax aenea	An Erotylid beetle	-	SU05
Rhizophagus cribratus	A Monotomid beetle	**NS**	VAT05,09
Rhizophagus bipustulatus	A Monotomid beetle	-	SU10
Rhizophagus dispar	A Monotomid beetle	-	SU05
Cryptophagus dentatus	A Cryptophagid beetle	-	VAT01,08,09

Species	Vernacular name	Status	SU/VAT
Cryptophagus scanicus	A Cryptophagid beetle	-	VAT05
Atomaria vespertina	A silken fungus beetle	-	VAT04
Pediacus dermestoides	A Cucujid beetle	**SFG3**	SU10; VAT09
Epuraea biguttata	A Nitidulid beetle	-	VAT08
Epuraea melanocephala	A Nitidulid beetle	-	VAT09
Epuraea terminalis	A Nitidulid beetle	**N**	VAT02
Epuraea unicolor	A Nitidulid beetle	-	VAT01
Cryptarcha strigata	A Nitidulid beetle	**Nb**	VAT01,08
Glischrochilus quadriguttatus	A Nitidulid beetle	-	VAT01,02,06,08
Cerylon ferrugineum	A Cerylonid beetle	-	SU10
Halyzia sedecimguttata	Orange Ladybird	-	VAT08
Aphidecta obliterata	Larch Ladybird	-	VAT04
Sericoderus brevicornis	A Corylophid beetle	-	VAT01,04,05,08
Cartodere bifasciata	A mould beetle	-	SU01
Cartodere nodifer	A mould beetle	-	VAT02,08
Enicmus brevicornis	A mould beetle	**N;SFG3**	VAT02,04,09
Enicmus testaceus	A mould beetle	-	VAT02,05,08
Corticaria elongata	A mould beetle	-	VAT08
Corticarina minuta	A mould beetle	-	VAT01,04,08,09
Mycetophagus multipunctatus	A fungus beetle	-	VAT09
Mycetophagus piceus	A fungus beetle	**SFG2**	VAT04,06,08,09
Octotemnus glabriculus	A Ciid beetle	-	SU05
Cis bilamellatus	A Ciid beetle	-	VAT02,06,09
Cis boleti	A Ciid beetle	-	SU05; VAT05
Cis pygmaeus	A Ciid beetle	-	VAT02
Cis vestitus	A Ciid beetle	-	SU09
Orchesia undulata	A false darkling beetle	**SFG3**	SU10; VAT02,04,05,07
Conopalpus testaceus	A false darkling beetle	**SFG3**	VAT03
Lagria hirta	A darkling beetle	-	VAT08
Nalassus laevioctostriatus	A darkling beetle	-	SU05
Oedemera nobilis	An Oedemerid beetle	-	SU02
Pyrochroa serraticornis	Common Cardinal Beetle	-	SU08
Salpingus planirostris	A Salpingid beetle	-	VAT02
Euglenes oculatus	An Aderid beetle	**NS;SFG3**	VAT01,04,05,06,09
Anaspis fasciata	A Scraptiid beetle	-	SU02; VAT01
Anaspis garneysi	A Scraptiid beetle	-	VAT01,02,04,05,08,09
Anaspis maculata	A Scraptiid beetle	-	VAT08,09
Anaspis regimbarti	A Scraptiid beetle	-	VAT01,03,06
Anaspis rufilabris	A Scraptiid beetle	-	VAT03
Rhagium mordax	A longhorn beetle	-	SU05
Grammoptera ruficornis	A longhorn beetle	-	SU01; VAT09

Species	Vernacular name	Status	SU/VAT
Batophila rubi	A flea beetle	-	VAT04
Longitarsus luridus	A flea beetle	-	VAT04
Tatianaerhynchites aequatus	A Rhynchitid weevil	-	SU01
Protapion fulvipes	An Apionid weevil	-	VAT02,08
Protapion nigritarse	An Apionid weevil	-	SU09
Orchestes pilosus	A flea weevil	-	VAT08
Orchestes quercus	A flea weevil	-	SU01
Rhamphus oxyacanthae	A flea weevil	-	SU01; VAT02,08
Euophryum confine	A weevil	-	VAT01,02,04,05,08
Strophosoma melanogrammum	A weevil	-	SU01; VAT08
Liophloeus tessulatus	A weevil	-	VAT08
Dryocoetes villosus	A bark beetle	-	VAT04,09
Pararge aegeria	Speckled Wood butterfly	-	SU03,05; VAT02,04
Coenonympha pamphilus	Small Heath butterfly	**VU;S41**	SU01,09
Maniola jurtina	Meadow Brown butterfly	-	SU03,05
Pyronia tithonus	Gatekeeper butterfly	-	SU05; VAT04
Vanessa atalanta	Red Admiral butterfly	-	VAT01
Lycaena phlaeas	Small Copper butterfly	-	SU01
Polyommatus icarus	Common Blue butterfly	-	SU01,08
Aphomia sociella	Bee Moth	-	VAT05
Falcaria lacertinaria	Scalloped Hook-tip moth	-	VAT02
Thyatira batis	Peach Blossom moth	-	VAT02,08
Xanthorhoe montanata	Silver Ground Carpet moth	-	SU10
Odontopera bidentata	Scalloped Hazel moth	-	VAT01
Lymantria monacha	Black Arches moth	-	VAT06
Autographa gamma	Silver Y moth	-	SU03
Panemeria tenebrata	Small Yellow Underwing moth	-	SU07
Amphipyra berbera	Svensson's Copper Underwing moth	-	VAT01,02,04,07,08
Phlogophora meticulosa	Angle Shades moth	-	VAT02
Apamea monoglypha	Dark Arches moth	-	VAT01,04,07,08,09
Agrotis exclamationis	Heart and Dart moth	-	VAT04,08
Noctua pronuba	Large Yellow Underwing moth	-	VAT01,02,08
Noctua comes	Lesser Yellow Underwing moth	-	VAT04,07
Xestia c-nigrum	Setaceous Hebrew Character moth	-	VAT02
Gnophomyia viridipennis	A cranefly	-	VAT04
Limonia nubeculosa	Three-banded Limonia cranefly	-	VAT02,05,08
Neolimonia dumetorum	Striped Twin-spot cranefly	-	VAT04
Sylvicola cinctus	An Anisopodid fly	-	VAT03,06,08
Sylvicola fenestralis	An Anisopodid fly	-	VAT04,05,07,08
Sylvicola punctatus	An Anisopodid fly	-	VAT01,02,03,04,05,06,07,08,09
Xylophagus ater	Common Awl-fly	-	SU10

Species	Vernacular name	Status	SU/VAT
Rhagio lineola	Small Fleck-winged Snipefly	-	VAT08
Rhagio scolopaceus	Downlooker Snipefly	-	SU01; VAT03,05,06,08,09
Rhagio tringarius	Marsh Snipefly	-	VAT07
Haematopota pluvialis	Notch-horned Cleg	-	VAT08
Chorisops tibialis	Dull Four-spined Legionnaire soldierfly	-	VAT01
Chloromyia formosa	Broad Centurion Soldierfly	-	SU08
Asilus crabroniformis	Hornet Robberfly	**S7**	SU01,09
Machimus atricapillus	Kite-tailed Robberfly	-	VAT01,06,07
Dioctria baumhaueri	Stripe-legged Robberfly	-	VAT01,09
Elaphropeza ephippiata	A Hybotid dance fly	-	VAT01,08
Platypalpus pallidiventris	A Hybotid dance fly	-	VAT08
Tachypeza nubila	A Hybotid dance fly	-	VAT03
Empis albinervis	A dance fly	-	VAT03
Empis tessellata	A dance fly	-	SU03
Brachypalpus laphriformis	A hoverfly	-	SU01; VAT08
Epistrophe eligans	A hoverfly	-	SU03
Episyrphus balteatus	Marmalade Hoverfly	-	VAT01
Eupeodes corollae	Migrant Field Syrph hoverfly	-	VAT01
Ferdinandea cuprea	Common Copperback hoverfly	-	VAT01
Ferdinandea ruficornis	Dark Copperback hoverfly	**NS**	VAT07
Platycheirus occultus	Dusky Marsh Boxer hoverfly	-	VAT02
Platycheirus scutatus	A boxer hoverfly	-	VAT02
Minettia inusta	A Lauxaniid fly	-	VAT01
Dryomyza anilis	A Dryomyzid fly	-	VAT01,02,04,05
Scathophaga inquinata	A dung fly	-	VAT01,02,03,04,06,08,09
Scathophaga stercoraria	A dung fly	-	SU03,09; VAT01,02,08
Scathophaga suilla	A dung fly	-	VAT01,03
Mesembrina meridiana	Noon Fly	-	SU04; VAT02,04,08,09
Eriothrix rufomaculata	A parasite fly	-	VAT02
Crabro cribrarius	Large Shield Wasp	-	VAT05
Ectemnius cavifrons	Golden-moustached Fly Fox wasp	-	VAT02
Apis mellifera	Honeybee	-	SU02
Bombus lucorum/terrestris	Buff-tailed/White-tailed Bumblebee workers	-	VAT05,09
Bombus hortorum	Garden Bumblebee	-	SU07
Bombus lapidarius	Red-tailed Bumblebee	-	SU02
Bombus pascuorum	Common Carder Bumblebee	-	SU02
Leptothorax acervorum	A Myrmicine ant	-	VAT03
Myrmica ruginodis	A red ant	-	VAT02,09
Myrmica scabrinodis	A red ant	-	VAT09
Dipogon subintermedius	Short-horned Bandwing spider wasp	-	VAT07

Species	Vernacular name	Status	SU/VAT
Vespula vulgaris	Common Wasp	-	VAT01,02,03,04,05,07 ,08,09
Oniscus asellus	Common Shiny Woodlouse	-	SU10; VAT05,08
Philoscia muscorum	Common Striped Woodlouse	-	SU09; VAT08
Porcellio scaber	Common Rough Woodlouse	-	SU01,10; VAT01,04,05,08,09
Lamprochernes chyzeri	Chyzer's Shining Claw false scorpion	-	VAT09
Segestria senoculata	A Segestriid spider	-	SU09
Anelosimus vittatus	A comb-footed spider	-	VAT03
Enoplognatha ovata	Common Candy-striped Comb-foot spider	-	VAT08
Hypomma cornutum	A money spider	-	VAT07
Erigone atra	A money spider	-	VAT09
Tenuiphantes zimmermanni	A money spider	-	VAT08
Tenuiphantes flavipes	A money spider	-	VAT08
Neriene peltata	A money spider	-	VAT02
Nuctenea umbratica	An orb-weaving spider	-	SU01
Philodromus aureolus	A Philodromid crab spider	-	VAT07
Philodromus cespitum	A Philodromid crab spider	-	VAT09
Diaea dorsata	A crab spider	-	SU01

Table 7. Saproxylic beetles and flies recorded new to Old Cilgwyn in 2023. **Dropephylla vilis sensu lato* has previously been recorded from here.

Species	Status	Rarity score	RIEC	IEC Score
Agaricochara latissima	-	2	-	-
Bolitochara tecta	-	2	-	-
Cis pygmaeus	-	2	-	-
Conopalpus testaceus	-	8	SFG3	1
Cryptarcha strigata	Nb	8	-	-
Cryptophagus dentatus	-	1	-	-
Dacne rufifrons	-	2	-	-
Dorcatoma flavicornis	NS	8	SFG3	1
Dropephylla gracilicornis	NS	-	-	-
Dropephylla ioptera	-	1	-	-
**Dropephylla koltzei*	-	1	-	-
Enicmus brevicornis	N	8	SFG3	1
Epuraea biguttata	-	2	-	-
Epuraea terminalis	N	8	-	-
Euplectus mutator	N	8	-	-
Glischrochilus quadriguttatus	-	2	-	-
Haploglossa gentilis	-	2	-	-
Homalota plana	-	2	-	-
Leptusa ruficollis	-	1	-	-
Mycetophagus multipunctatus	-	2	-	-
Ochina ptinoides	-	2	-	-

Species	Status	Rarity score	RIEC	IEC Score
Paromalus flavicornis	-	2	-	-
Phloeopora testacea	-	1	-	-
Phloeostiba plana	NS	2	-	-
Phloiophilus edwardsii	NS	8	SFG3	1
Phyllodrepoidea crenata	NS	8	-	-
Placusa tachyporoides	N	8	-	-
Prionocyphon serricornis	-	8	SFG3	1
Ptenidium gressneri	N	8	SFG2	2
Ptilinus pectinicornis	-	1	-	-
Rhizophagus cribratus	NS	2	-	-
Thamiaraea cinnamomea	-	2	-	-

3.1 Key invertebrates at Old Cilgwyn, 2023

20 key species were recorded at Old Cilgwyn in 2023. The emboldened status categories given after the species name have been explained at the start of section 3 above. Note that the Small Heath butterfly is not listed as a key species here, despite having a high national threat status in Britain (GB Vulnerable and Section 7 Species of Principal Importance in Wales). This is because though it has declined in other parts of Britain, it is still relatively common and does not appear to have decreased so markedly in Wales.

Dropephylla koltzei Jászey & Hlaváĉ, 2006 was recorded here during the current survey. This species has only been split from *Dropephylla vilis* (Erichson, 1840) quite recently and is new to Old Cilgwyn although *D. vilis* agg. was found here in 1991 and 1992. The majority of older records of *D. vilis* agg. are thought likely to be referable to *D. koltzei*, which seems to be much more frequent than *D. vilis sensu stricto* in Wales and southwest England.

3.1.1 *Ptenidium gressneri:* Nationally Scarce (N); SFG2

Ptenidium gressneri Erichson, 1845 is a very small, reddish-brown featherwing beetle distinguished from other members of this large genus by having the pronotum widest at the base and also by the form of the female spermatheca. It is very locally distributed across England and Wales, as far north as Yorkshire. It is a saproxylic specialist which is thought to be confined to ancient woods and parks, where it develops in moist heart rot. It is one of a group of saproxylic beetles that occur mainly in areas believed to be ancient woodland with abundant dead wood habitats (Harding and Rose, 1986; Alexander, 2004).
At Old Cilgwyn, a single male was collected from the May-July sample in VAT08. In Wales, it is otherwise only known from Chirk Park and Powis Park and was last recorded in 1996. **New to Old Cilgwyn in 2023**.

3.1.2 *Dropephylla gracilicornis*: Nationally Scarce (NS)

Dropephylla gracilicornis (Fairmaire & Laboulbène, 1856) is a small, flattened, reddish-brown rove beetle that is very similar to its congeners, being most easily recognised by the presence of long furrows on the head that reach back as far as the ocelli and the form of the male genitalia. It has a very thinly scattered distribution across England and Wales, with a few sites north as far as central Scotland. Most records relate to specimens found under bark, or by beating dead branchwood of broadleaved trees but it also occurs very occasionally in reed litter. In Wales, it has been recorded from Aberithon Turbary, Carn Gafallt, Chirk Park, Dinefwr Estate, Gilfach, Gregynog, Llanover Park and Piercefield Park. At Old Cilgwyn, a female and a male were beaten from dead oak branches in SU01 and SU09 respectively on 29th September 2023. **New to Old Cilgwyn in 2023**.

3.1.3 *Phloeostiba plana:* Nationally Scarce (NS)

The two British *Phloeostiba* are broad-bodied, somewhat flattened rove beetles. *Phloeostiba plana* (Paykull, 1792) can be easily distinguished from the much rarer *P. lapponica* by the small depressions on the front margin of the pronotum, in line with the ocellar depressions at the rear of the head. This species has a scattered distribution across much of England and Wales, with a few sites in southern Scotland. It is associated with sap flows on a wide range of broadleaved trees, including those produced by the feeding activity of Goat Moth *Cossus cossus* larvae. In Wales, it has been recorded from Coed Madie B Goddard, Dinefwr Estate, Great Barnet's Wood and King's Wood. At Old Cilgwyn, single adults were collected in VAT06 and 09. **New to Old Cilgwyn in 2023**.

3.1.4 *Phyllodrepoidea crenata:* Nationally Scarce (NS)

The single British *Phyllodrepoidea, P. crenata* (Ganglbauer, 1895) is a distinctive, pitchy-red, mid-sized rove beetle. The elytra are irregularly striate, the antennae are blackish with orange-yellow basal segments and the last palpomere well-developed and very elongate. It is restricted to northern and western Britain, from northern Scotland south as far as Wales and Derbyshire. It is a dead wood species which is found under the bark of both broadleaved and coniferous trees in woods and parkland. At Old Cilgwyn, a single adult was collected in the August-September sample from VAT02. **New to Old Cilgwyn in 2023**.

3.1.5 *Euplectus mutator*: Nationally Scarce (N)

The 15 currently recognised species of *Euplectus* are all tiny Pselaphine rove beetles with a somewhat elongate body form. *Euplectus mutator* Fauvel, 1895 (formerly known as *E. fauveli*) is of a reddish-orange colour, of about 1.5mm length and is best distinguished from its congeners by careful microscopic examination of the male aedeagus and of secondary sexual characters on the abdominal sternites. It is quite widely, but very locally, distributed across England and Wales as far north as a notional line connecting the Dee and Humber

estuaries. It is found in a range of dead wood micro-habitats such as rotten heartwood, sapwood and in bird nests in tree hollows. *Euplectus* species are thought to be mite predators. In Wales, it is known from Dingestow Court, Gregynog and Wyndcliff Wood. Adults were collected at Old Cilgwyn from VAT04, 08 and 09. **New to Old Cilgwyn in 2023**.

3.1.6 Aleochara diversa: Nationally Scarce (N)

Aleochara is a large genus of Aleocharine staphylinids with a characteristic broad body form. *Aleochara diversa* (Sahlberg, J., 1876) is one of a group of four black shiny species with reddish legs in the *A. sparsa* group that can only be distinguished with certainty by microscopic examination of the genitalia. Though it is poorly known, *A. diversa* is clearly one of the rarest members of this group, with recent records confined to a few locations in southern England and Wales. Like other members of the genus, it is believed to be a parasitoid of fly larvae, with the adults most frequently found in fly-rich patch habitats, such as carrion, dung, rotting fungi and decomposing vegetation. Most records of *A. diversa* are from rotting bracket fungi or heart-rot associated with over-mature trees. In Wales, contemporary records are restricted to Gilfach, Livox Wood and Plas Newydd. Adults were collected at Old Cilgwyn in VAT01, 03 and 07. **New to Old Cilgwyn in 2023**.

3.1.7 Aleochara stichai: Nationally Scarce (N)

Aleochara is a large genus of small, shiny Staphylinids with a characteristic broad body form. *Aleochara stichai* Likovsky, 1965 is one of four black shiny species with reddish legs and antennal bases in the *A. sparsa* group that can only be distinguished with certainty by microscopic examination of the palps and the form of the male aedeagus or female spermatheca. There are scattered records of this species across much of Britain. Like other members of the genus, it is believed to be a parasitoid of fly larvae, with adults most frequently found in patch habitats, such as carrion, dung, rotting fungi and decomposing vegetation that are rich in fly larvae. Most records of *A. stichai* are from woodland, where it has been found in various habitats, including tree holes, rotting fungi, carrion, dung and bird's nests. At Old Cilgwyn this species was collected in VAT01, 04 and 08. Previously recorded here in 1992.

3.1.8 *Placusa tachyporoides*: Nationally Scarce (N)

The rove beetle genus *Placusa* contains four British species all of which are predominantly black to pitchy, with a broad, tapering body form. *Placusa tachyporoides* (Waltl, 1838) can be recognised by its small size, shining integument and yellow basal antennal segments. In addition, the male has very long processes on the hind edge of the sixth abdominal tergite and the genitalia are also distinctive. It is quite widely, but very locally distributed across England and Wales, but appears to be absent from Scotland. It is a species of freshly fallen or cut deciduous trees, often being found where the wood is still sappy. It has

also been found in sappy piles of sawdust. In Wales, it is known from Carn Gafallt, Dinefwr Estate, Llanover Park and Powis Park. At Old Cilgwyn, two males and a female of this species were collected from the May-July sample in VAT02. **New to Old Cilgwyn in 2023**.

3.1.9 Atheta hybrida: Nationally Rare (RDBK)

With 125 British species as currently constituted, *Atheta* is the largest genus of British beetles and also one of the most challenging to identify accurately to species level. *Atheta hybrida* Sharp, 1869 is a small black rove beetle with lighter elytra and is best distinguished from its numerous congeners by the presence of a swelling at the base of the seventh male tergite and the distinctive form of the male aedeagus or female spermatheca. It has only been found on a few occasions in Britain, though these records are widely distributed across Scotland, Wales and England. Its ecology is not well understood, but most records with habitat data refer to dead wood habitat features, particularly bracket fungi and sap runs in woodland or parkland. It has also been found in a rabbit nest once and it is possible there may be an association with mammal nests. In Wales, it is known from Carn Gafallt, Dingestow Court and Great Barnet's Wood. At Old Cilgwyn, a single male was collected in VAT01 from the May-July sample. **New to Old Cilgwyn in 2023**.

3.1.10 *Atheta pilicornis*: Nationally Scarce (N)

Like most members of this very large genus, *Atheta pilicornis* (Thomson, C.G., 1852) is a small black-brown rove beetle that is superficially very similar to many other species of the genus. It can be distinguished by the sharply bicoloured seventh abdominal segment, which is reddish towards the apex and also by the presence of lateral teeth on the apical margin of this tergite in females. The form of the male aedeagus and female spermatheca is also diagnostic. It has quite a wide but very scattered distribution from southern Scotland across Wales and England. Its ecology is very poorly understood but it is certainly a woodland species, which is usually found in moss and litter at ground level, though it has also been recorded under bark and in rotting wood of dead trees. In Wales, it has been recorded from Chirk Park, the Dolgellau area and Powis Park. At Old Cilgwyn, a single female was collected during the September visit to the site in SU05. **New to Old Cilgwyn in 2023**.

3.1.11 Malthodes pumilus: Nationally Scarce (NS)

The soldier beetle *Malthodes pumilus* (Brébisson, 1835) is one of two very small, all-dark British species of *Malthodes* that lack the bright yellow elytral apices of many of the larger members of the genus. It can be distinguished from the very rare *M. crassicornis* by having more obtuse pronotal hind angles and parallel-sided temples. It has a wide but scattered distribution across much of England and Wales and is also present very locally in Scotland, primarily in a band across the central Highlands. Like other members of the genus, its ecology is poorly understood and though it is most often found in wooded

habitats, especially in river valleys and where there are old trees, it can also be found in more open habitats such as scrubby grassland and heathland. It is thought probable that larvae are nocturnal predators, possibly living on trunks and branches of trees, shrubs and other woody sub-shrubs such as Ling *Calluna vulgaris*. At Old Cilgwyn, adults were collected in VAT09 and were also beaten from veteran oak branches in SU01. It was previously recorded here in 1992.

3.1.12 Dorcatoma flavicornis: Nationally Scarce (NS); SFG3

This is one of the smaller British *Dorcatoma* woodworm beetles with uniform elytral puncturation. *Dorcatoma flavicornis* (Fabricius, 1792) can be quite easily distinguished from its congeners by its nine-segmented antennae, the partial fusing of the abdominal sternites and the form of the male genitalia. It is very locally distributed across southern England and Wales, north as far as Yorkshire. Larvae are usually found in red-rotted heartwood of old oaks, where they feed on the mycelia of the Chicken of the Woods bracket fungus *Laetiporus sulphureus*. It is one of a suite of species that are collectively thought to be characteristic of ancient woodland and parkland with abundant dead wood habitats (Alexander, 2004; Harding & Rose, 1986). At Old Cilgwyn, a single female was collected in VAT08 from the May-July sample and a number of specimens were recorded from the May-July and July-August samples in VAT09. The only other VC46 locality is Trawscoed where it was recorded in 1992. **New to Old Cilgwyn in 2023**.

3.1.13 *Phloiophilus edwardsii*: Nationally Scarce (NS); SFG3

Phloiophilus edwardsii Stephens, 1830 is a mid-sized beetle in which the head and thorax are dark brown to black and the elytra are pale orange-brown with a very distinctive pattern of darker spots and lines. *P. edwardsii* is a saproxylic species that is usually found on dead branches of oak and other broadleaves, where the larvae feed on the encrusting fungus *Peniophora quercina*. In Wales, it is of very local occurrence, being restricted to a handful of old woods and parks. This is one of a suite of species that are characteristic of wooded habitats with abundant dead wood habitats (Alexander, 2004; Harding & Rose, 1986). At Old Cilgwyn, adults were beaten from dead oak branches in SU09 on 29th September 2023. **New to Old Cilgwyn in 2023**.

3.1.14 *Rhizophagus cribratus*: Nationally Scarce (NS)

The truncate antennal clubs of this all-reddish species make the monotomid beetle *Rhizophagus cribratus* Gyllenhal, 1827 easily distinguished from any of the other species in the genus. It has a wide but very local distribution in England and Wales and is also known from a few sites in southern Scotland as far north as the Central Belt. It is primarily a saproxylic species that is most often found under bark on the lower trunks and roots of dead trees, with oak and Beech being especially favoured. However, it can occasionally be

found in compost and decaying vegetation. In Wales, there are contemporary records from Chirk Park, Dinefwr Estate, Powis Park and St. Fagans. At Old Cilgwyn, single adults were collected in vane traps VAT05 and VAT09. **New to Old Cilgwyn in 2023**.

3.1.15 *Epuraea terminalis*: Nationally Scarce (N)

The nitidulid beetle *Epuraea terminalis* (Mannerheim, 1843) can be distinguished from the many other similar species in this genus by a combination of its quite widely separated mid-coxae, shallowly emarginate pronotal fore margin and the leathery texture of the body surface. It is a scarce woodland species, which is known from very scattered localities throughout Britain. It is a saproxylic species, usually found in association with dead and dying broadleaved trees, especially where these are exuding sap. In Wales, it was previously recorded at Powis Park in 1996. At Old Cilgwyn, a single female was collected in VAT02 from the May-July sample. **New to Old Cilgwyn in 2023**.

3.1.16 *Cryptarcha strigata*: Nationally Scarce (Nb)

The nitidulid beetle *Cryptarcha strigata* (Fabricius, 1787) is a dark black-brown, oval beetle with yellow undulate markings on the elytra. The borders of both the thorax and elytra are paler reddish-orange and the apex of the prosternal process is emarginate. It has a very local distribution across England and Wales, north as far as Yorkshire. It is exclusively associated with sap runs, especially those caused by the workings of the Goat Moth *Cossus cossus*. At Old Cilgwyn, single adults were collected in VAT01 and 08 in 2023. **New to Old Cilgwyn in 2023**.

3.1.17 Enicmus brevicornis: Nationally Scarce (N); SFG3

Though it is one of a number of small mould beetles in this genus that occur in Britain, *Enicmus brevicornis* (Mannerheim, 1844) can be easily distinguished from its congeners by a combination of the depression across the base of the relatively elongate elytra, the short, markedly clubbed antennae and dull black appearance. It is found very locally across central and southern England and Wales, though there are outlying sites north to Cumbria. It is found on powdery moulds growing on the trunks and branches of dead trees and has increased its British range in recent years in association with the spread across the country of sooty bark disease on sycamore. It is found in a range of wooded habitats but is part of a group of species that are collectively characteristic of ancient wooded sites with dead wood habitats (Alexander, 2004; Harding & Rose, 1986). It has been recorded from nine widely scattered Welsh localities. At Old Cilgwyn, adults were collected in VAT02, 04 and 09. **New to Old Cilgwyn in 2023**.

3.1.18 *Euglenes oculatus*: Nationally Scarce (NS); SFG3

The beetle family Aderidae contains only three British species. *Euglenes oculatus* (Paykull, 1798) is a small, reddish beetle in which the male has very large eyes and long antennae. It is very locally distributed across the southern half of England, north as far as Yorkshire. There are also a very few records from Wales. It is a dead wood species, larvae of which are found within red heart-rot of old oaks. Adults are most often found by beating branches of old oak trees in summer. It is one of a suite of species that are collectively thought to be characteristic of ancient woodland and parkland with good dead wood habitats (Alexander, 2004; Harding & Rose, 1986). This was a common beetle in vane traps set at Old Cilgwyn in 2023, with adults recorded in VAT01, 04, 05, 06 and 09. It was previously recorded here in 1988, 1991 and 1994.

3.1.19 *Asilus crabroniformis*: Section 7

Its very large size, yellow and black abdomen and dusky-yellow wings with darker patches along the hind edges makes the Hornet Robberfly *Asilus crabroniformis* (Linnaeus, 1758) an unmistakeable insect. It is a southern species, found south of a line from the Dee estuary to The Wash. In Wales, most sites are in the southern half of the country. It is found in warm, dry, open habitats such as unimproved grasslands and lowland heaths. Adults fly in late-summer and early-autumn, and are often to be seen perched on the top of dung pats. They are predators of large insects such as grasshoppers, dung beetles and flies. The larvae are thought to be subterranean and may feed on the larvae of large dung beetles. The Hornet Robberfly has shown a marked decline in its British populations, which primarily relates to the loss of its habitats and possibly also because of the use of toxic veterinary chemicals such as avermectin wormers to treat livestock. There is a very good population of this species at Old Cilgwyn and, although it was not the focus of this survey, adults were seen in SU01 and SU09 during the August and September visits to the site.

3.1.20 *Ferdinandea ruficornis*: Nationally Scarce

There are two British *Ferdinandea* species, both of which are mid-sized, dark hoverflies with conspicuous golden-yellow pubescence, dull metallic body colouration and an orange-yellow scutellum and legs. The Dark Copperback hoverfly *Ferdinandea ruficornis* (Fabricius, 1775) is a little smaller than the common *F. cuprea* and lacks the black bristles on the tibiae found in that species. It has a very scattered distribution across southern Britain, north as far as Yorkshire. It is extremely scarce in Wales, most records being from the Borders and the north coast. Larvae are specialist inhabitants of sap runs, often those produced by the workings of the Goat Moth *Cossus cossus*. At Old Cilgwyn, a single adult was collected in vane trap OC07. **New to Old Cilgwyn in 2023**.

3.2 Other important invertebrates at Old Cilgwyn, 2023

3.2.1 *Conopalpus testaceus*

Conopalpus testaceus (Olivier, 1790) is a mid-sized false darkling beetle in which the antennae are black with the three basal segments yellow. The most common form has the entire body and legs reddish but another form has the head and elytra dark-grey to black. Larvae develop in white-rotted wood of smaller branches of various broadleaved trees. It is one of a suite of species that are collectively thought to be characteristic of ancient woodland and parkland with good dead wood habitats (Alexander, 2004; Harding & Rose, 1986). It is found across much of England and Wales but is much commoner in central and eastern areas. In Wales it is quite rare and is mostly found in the Borders; records are from Chirk Park, Clytha Park, Dinefwr Estate, Gregynog Great Wood, Hendre Woods, Pembrey Forest, Powis Park and St. Fagans & Wyndcliff Wood. **New to Old Cilgwyn in 2023**.

3.2.2 *Haploglossa gentilis*

The sub-family Aleocharinae includes over 450 British species of small rove beetles, many of which require careful microscopic examination to ensure an accurate identification. The genus *Haploglossa* is one of only two Aleocharine genera that has a row of fine spines along the external edge of the tibiae and this genus is distinguished from *Aleochara* species by the absence of the palpal pseudosegments present in the latter. *Haploglossa gentilis* (Märkel, 1844) is a dark, pitchy species with the apex of the elytra usually having a diffuse reddish patch. It is readily distinguished from its congeners by its shiny, quite sparsely punctured thorax. Confirmation is provided by dissection of the male aedeagus or female spermatheca. It is most often found in the nests of various birds that nest in tree holes, though it also occurs in nests of the Jet Ant *Lasius fuliginosus* and the Brown Tree Ant *L. brunneus* in cavities of old trees. The UK distribution is very scattered across southern Britain, north as far as Meirionydd and Norfolk. This is only the fifth Welsh record, the other sites being Dinefwr Estate, Piercefield Park, Rug and St. Fagans. **New to Old Cilgwyn in 2023**.

3.2.3 *Thamiaraea cinnamomea*

There are only two British species in this genus, both of which are relatively large, reddish Aleocharine rove beetles with two-segmented labial palps and a distinctive long, needle-like apical segment of the maxillary palps. *Thamiaraea cinnamomea* (Gravenhorst, 1802) can be distinguished from *T. hospita* by its generally greater size (usually length ≥4mm) and almost impunctate basal abdominal tergites. The form of the genitalia provides a further confirmatory character. Both species are specialist inhabitants of sap runs on tree trunks caused by larvae of the Goat Moth *Cossus cossus*, which feed in the trunk of a range of native broadleaves. The frequency of *T. cinnamomea* at Old Cigwyn was one of

the most striking results of the 2023 survey, with adults recorded from vane traps VAT01,02,04,05,06,08 and 09. This is the first record for Ceredigion and only the third Welsh record, ther others being from St. Fagans and Coedcae-bach. **New to Old Cilgwyn in 2023**.

3.3 Key Saproxylic Habitats at Old Cilgwyn, 2023

Harding & Rose (1986) listed 196 beetle species as indicators of ancient parklands and wood pastures with well-developed dead wood habitats. They assigned these to one of three saproxylic fauna groups (SFG). SFG1 species were those having the highest fidelity to ancient wood-pasture and parkland sites with abundant dead wood habitats and SFG3 species had the lowest, being found across a range of landscapes with old trees, though still showing a significant association with ancient parks and wood-pastures. Using this list as a basis, Alexander (1988) devised a simple index of ecological continuity (IEC) for scoring sites where SFG1 beetles score three points, SFG2 species score 2 and SFG3 species score 1 point. Alexander (2004) subsequently created a revised index of ecological continuity (RIEC). This reduced the list down to 180 qualifying species to take into account the considerable body of additional data on saproxylic beetles generated since Harding & Rose (*ibid*.) was published. The index is calculated simply by adding up the points for the various qualifying species. Two SFG2 species and nine with SFG3 status were recorded at Old Cilgwyn in 2023, giving a RIEC score of 13. When considering all the data on saproxylic beetles collected at Old Cilgwyn from 1980 up to and including this survey, the **RIEC score is 20** (the same two SFG2 species and 16 listed as SFG3). Column 4 of Table 8 shows the species recorded here that are included in the RIEC.

Table 8. The 98 species of saproxylic beetles recorded at Old Cilgwyn, 1988-2023. Only species that contribute to a Saproxylic Quality Index (SQI) or Index of Ecological Continuity (IEC) are included. The 66 species recorded in 2023 are emboldened and of these, 32 were new to Old Cilgwyn.

Species	Status	Rarity score	RIEC	IEC Score	Comment
Agaricochara latissima	-	2	-	-	New to Old Cilgwyn in 2023
Agathidium seminulum	-	2	-	-	n/a
Anaspis fasciata	-	2	-	-	n/a
Anaspis frontalis	-	1	-	-	n/a
Anaspis rufilabris	-	1	-	-	n/a
Anisotoma humeralis	-	2	-	-	n/a
Anobium punctatum	-	1	-	-	n/a
Atrecus affinis	-	1	-	-	n/a
Bibloporus bicolor	-	2	-	-	n/a
Bolitochara tecta	-	2	-	-	New to Old Cilgwyn in 2023
Calambus bipustulatus	**Nb**	8	**SFG3**	1	n/a
Cerylon ferrugineum	-	2	-	-	n/a
Cis boleti	-	1	-	-	n/a
Cis nitidus	-	2	-	-	n/a
Cis pygmaeus	-	2	-	-	New to Old Cilgwyn in 2023
Cis vestitus	-	2	-	-	n/a

Species	Status	Rarity score	RIEC	IEC Score	Comment
Conopalpus testaceus	-	8	**SFG3**	1	New to Old Cilgwyn in 2023
Cryptarcha strigata	**Nb**	8	-	-	New to Old Cilgwyn in 2023
Cryptophagus dentatus	-	1	-	-	New to Old Cilgwyn in 2023
Ctesias serra	-	4	-	-	n/a
Dacne bipustulata	-	2	-	-	n/a
Dacne rufifrons	-	2	-	-	New to Old Cilgwyn in 2023
Dadobia immersa	-	2	-	-	n/a
Dasytes aeratus	-	2	-	-	n/a
Denticollis linearis	-	1	-	-	n/a
Dorcatoma chrysomelina	-	4	**SFG3**	1	n/a
Dorcatoma flavicornis	**NS**	8	**SFG3**	1	New to Old Cilgwyn in 2023
Dropephylla ioptera	-	1	-	-	New to Old Cilgwyn in 2023
Dropephylla vilis agg./koltzei seg.	-	1	-	-	Seg. new to Old Cilgwyn in 2023
Dryocoetes villosus	-	2	-	-	n/a
Enicmus brevicornis	**N**	8	**SFG3**	1	New to Old Cilgwyn in 2023
Enicmus testaceus	-	2	-	-	n/a
Epuraea biguttata	-	2	-	-	New to Old Cilgwyn in 2023
Epuraea terminalis	**N**	8	-	-	New to Old Cilgwyn in 2023
Euglenes oculatus	**NS**	8	**SFG3**	1	n/a
Euplectus mutator	**N**	8	-	-	New to Old Cilgwyn in 2023
Gabrius splendidulus	-	1	-	-	n/a
Glischrochilus quadriguttatus	-	2	-	-	New to Old Cilgwyn in 2023
Grammoptera ruficornis	-	1	-	-	n/a
Grynobius planus	-	2	-	-	n/a
Gyrophaena strictula	**N**	8	-	-	n/a
Haploglossa gentilis	-	2	-	-	New to Old Cilgwyn in 2023
Homalota plana	-	2	-	-	New to Old Cilgwyn in 2023
Ischnoglossa prolixa	-	2	-	-	n/a
Leiopus nebulosus	-	2	-	-	n/a
Leptusa fumida	-	1	-	-	n/a
Leptusa pulchella	-	2	-	-	n/a
Leptusa ruficollis	-	1	-	-	New to Old Cilgwyn in 2023
Litargus connexus	-	2	-	-	n/a
Magdalis ruficornis	-	2	-	-	n/a
Malachius bipustulatus	-	1	-	-	n/a
Malthinus seriepunctatus	-	2	-	-	n/a
Malthodes marginatus	-	1	-	-	n/a
Malthodes maurus	**NS**	16	-	-	n/a
Malthodes minimus	-	1	-	-	n/a
Malthodes pumilus	**NS**	2	-	-	n/a
Melandrya caraboides	-	4	**SFG3**	1	n/a
Melanotus castanipes	-	1	-	-	n/a
Mycetaea subterranea	-	2	-	-	n/a
Mycetophagus multipunctatus	-	2	-	-	New to Old Cilgwyn in 2023

Species	Status	Rarity score	RIEC	IEC Score	Comment
Mycetophagus piceus	-	4	**SFG2**	2	n/a
Ochina ptinoides	-	2	-	-	New to Old Cilgwyn in 2023
Octotemnus glabriculus	-	1	-	-	n/a
Orchesia undulata	-	4	**SFG3**	1	n/a
Orthoperus nigrescens	-	4	-	-	n/a
Paromalus flavicornis	-	2	-	-	New to Old Cilgwyn in 2023
Pediacus dermestoides	-	4	**SFG3**	1	n/a
Phloeonomus punctipennis	-	2	-	-	n/a
Phloeopora corticalis	**N**	8	-	-	n/a
Phloeopora testacea	-	1	-	-	New to Old Cilgwyn in 2023
Phloeostiba plana	**NS**	2	-	-	New to Old Cilgwyn in 2023
Phloiophilus edwardsii	**NS**	8	**SFG3**	1	New to Old Cilgwyn in 2023
Phyllodrepoidea crenata	**NS**	8	-	-	New to Old Cilgwyn in 2023
Placusa pumilio	-	2	-	-	n/a
Placusa tachyporoides	**N**	8	-	-	New to Old Cilgwyn in 2023
Platypus cylindrus	**Nb**	8	**SFG3**	1	n/a
Prionocyphon serricornis	-	8	**SFG3**	1	New to Old Cilgwyn in 2023
Ptenidium gressneri	**N**	8	**SFG2**	2	New to Old Cilgwyn in 2023
Ptilinus pectinicornis	-	1	-	-	New to Old Cilgwyn in 2023
Pyrochroa coccinea	-	4	**SFG3**	1	n/a
Pyrochroa serraticornis	-	1	-	-	n/a
Rhagium bifasciatum	-	1	-	-	n/a
Rhagium mordax	-	1	-	-	n/a
Rhizophagus bipustulatus	-	1	-	-	n/a
Rhizophagus cribratus	**NS**	2	-	-	New to Old Cilgwyn in 2023
Rhizophagus dispar	-	1	-	-	n/a
Rhizophagus ferrugineus	-	2	-	-	n/a
Rhizophagus nitidulus	-	4	**SFG3**	1	n/a
Rutpela maculata	-	1	-	-	n/a
Salpingus planirostris	-	1	-	-	n/a
Scaphidium quadrimaculatum	-	2	-	-	n/a
Scolytus intricatus	-	2	-	-	n/a
Siagonum quadricorne	-	2	-	-	n/a
Soronia grisea	-	2	-	-	n/a
Stenagostus rhombeus	-	4	**SFG3**	1	n/a
Stenichnus bicolor	-	4	**SFG3**	1	n/a
Thamiaraea cinnamomea	-	2	-	-	New to Old Cilgwyn in 2023
Triplax aenea	-	2	-	-	n/a
Total	-	**2023 = 189**	-	**20**	n/a

The second widely-used index to assess dead wood sites is the Saproxylic Quality Index (SQI) developed by Fowles et *al*. (1999). This has the advantage of employing a much longer list of saproxylic Coleoptera, including many that are common and widely distributed across Britain. It can therefore be used to assess sites without the veteran trees required by many of the species included in the RIEC. The full list of beetles recorded at Old

Cilgwyn that are used in calculating the SQI can be found in Table 8. The scoring system is based on the rarity of the species, as defined in the original Coleoptera status reviews (Hyman & Parsons, 1992, 1994), with these Rarity Scores ranging from one for a common species up to 32 for those considered Endangered or Vulnerable. The Saproxylic Quality Index (SQI) is then calculated by totalling the scores for all qualifying species to give an overall Saproxylic Quality Score (SQS), then dividing this figure by the total number of qualifying species and multiplying the result by 100. A great advantage of the SQI is that it should be less influenced by the amount of recording effort than is the strictly cumulative RIEC index, which will continue to increase with further survey work. At Old Cilgwyn, a total of 66 qualifying dead wood beetles were recorded in 2023 (see Table 8), giving a SQS of 189 and a SQI score of 286.4. The equivalent figures for the site across the whole period from 1980 to 2023 inclusive are 98, 301 and 307.1 respectively.

Table 9 compares the RIEC and SQI scores achieved at Old Cilgwyn in both 2023 and over the period from 1988 onwards with those from other parkland or wood-pasture sites in mid-Wales that meet the threshold for number of saproxylic beetles (40) considered sufficient for a valid assessment of their importance for dead wood invertebrates. As can be seen from this, Old Cilgwyn is a mid-ranking site that has a less important saproxylic invertebrate fauna than the best sites to the east of the Cambrian Mountains. However, it is still the most important site for saproxylic invertebrates in Ceredigion.

Table 9. RIEC and SQI scores for selected sites in mid-Wales.

Notes on Table 8: The SQI scores for other mid-Welsh sites included here are taken from the following sources: Alexander, 2023, 2024; Boyce, 2023a, 2023b; Howe, *in prep.*; Fowles, 2024[1].

Site	No. Saproxylic Beetles	RIEC	SQI
Gregynog SSSI, Montgomery (VC47)	-	53	409.0
Powis Castle Park, Montgomery (VC47)	158	65	403.2
Dinefwr Estate SSSI, Carmarthen (VC44)	159	59	379.9
Carn Gafallt, Brecon (VC42) 2004-2022	104	36	367.3
Carn Gafallt, Brecon (VC42) 2022 only	54	23	363.0
Gilfach, Radnor (VC43)	56	5	314.3
Old Cilgwyn, Ceredigion (VC46) 1988-2023	96	20	307.1
Old Cilgwyn, Ceredigion (VC46) 2023 only	66	13	286.4
Cwm Llyfnant, Ceredigion (VC46)	44	4	284.1
Parc Pont-faen, Ceredigion (VC46)	45	11	260.0
Parc Nanteos, Ceredigion (VC46)	46	8	253.3

Natural England's (NE) ISIS application can be accessed online via the Biological Records Centre's (BRC) Pantheon database.[2] ISIS identifies three main dead wood invertebrate assemblages, referred to as Specific Assemblage Types (SATs). These are associated with the following habitat features:

- heartwood decay;
- bark and sapwood decay
- fungal fruiting bodies.

[1] Further information on SQI can be found at http://khepri.uk/main/

[2] The Pantheon database can be accessed at https://pantheon.brc.ac.uk/

This provides a convenient and reasonably robust system for understanding the saproxylic fauna of Old Cilgwyn and has therefore been adopted here as the basis for the following discussion. Whilst NRW does not use Pantheon to assess the condition of SSSI invertebrate features, it is worth noting that entry of the Old Cilgwyn species list into Pantheon gave nine specialists of heartwood decay, 44 species associated with bark and sapwood decay and nine with fungal fruiting bodies and that under NE criteria, these totals would have resulted in an assessment of Favourable Condition for all three SATs.

3.3.1 Heartwood decay (9 associated species at Old Cilgwyn)

The heartwood decay fauna makes up only a relatively small element of the total saproxylic invertebrate assemblage at Old Cilgwyn. This is not surprising as the resource of truly old trees with heart-rot is quite small. Almost all of the living over-mature and veteran trees at Old Cilgwyn are oaks and the invertebrate fauna associated with this habitat feature is unsurprisingly dominated by species associated with oak red-rot caused by the Chicken of the Woods bracket fungus. The distinctive red-rot beetle fauna here includes *Dorcatoma chrysomelina*, *D. flavicornis*, *Mycetophagus piceus* and *Euglenes oculatus*, this still being the only Ceredigion site known for the latter, where it was first recorded in 1988 (Boyce, 1988).
One of the key heartwood decay species at Old Cilgwyn, the featherwing beetle *Ptenidium gressneri*, is often found in bird and mammal nests in heart-rot cavities of old trees. This is also the habitat of the very local rove beetle *Haploglossa gentilis*. There are also records of three other key rove beetles that show some association with tree hole nests elsewhere in Britain, though in all cases, their ecology remains too poorly known to draw definitive conclusions. These are *Aleochara diversa*, *A. stichai* and the pselaphine *Euplectus mutator*. The *Aleochara* species are not listed by Fowles *et al.* (*op. cit.*) as saproxylic specialists but most British records of both are from dead wood microhabitats where there are high densities of the fly larvae on which they are parasitoids.

One of the key objectives for management of the saproxylic invertebrate assemblage will be to increase the number of old trees with heart-rot habitats by selecting a new tranche of mid-aged to mature trees for retention that will augment and replace the existing, very limited stock of over-mature specimens over the longer term. Old Cilgwyn has a good stock of mid-aged oak trees and so with careful management it should be possible to achieve this objective.

3.3.2 Bark and Sapwood decay (44 associated species at Old Cilgwyn)

The majority of saproxylic invertebrates found at Old Cilgwyn are associated with this habitat feature, which is better represented away from ‘classic’ parkland and wood-pasture sites with much over-mature timber. In general, the most valuable fallen timber for invertebrates comprises larger items, such as trunks and larger branchwood.

This is a compendious assemblage that encompasses a range of saproxylic microhabitats, including sub-cortical species across a range of stages in the bark decay cycle, fungivores associated with bark and sapwood decay (e.g. crustose fungi such as *Peniophora* and *Stereum*) and a well-defined group of specialists associated with sap exudations, including those caused by the borings of the Goat Moth *Cossus cossus*.

The latter group is particularly well represented at Old Cilgwyn and includes five key species, the rove beetles *Phloeostiba plana* and *Placusa tachyporoides*, the nitidulid beetles *Epuraea terminalis* and *Cryptarcha strigata* and the Dark Copperback hoverfly *Ferdinandea ruficornis*. Additionally, the very local rove beetle *Thamiaraea cinnamomea*, which is usually only found in small numbers in association with Goat Moth borings, was quite common at Old Cilgwyn; specimens being collected in seven of the vane traps. No obvious evidence of sap runs was noticed on the old trees but this is clearly an important element of the invertebrate fauna and it seems very likely that there is a well-established colony of the cryptic Goat Moth here.

As with the heart-rot assemblage, bark and sapwood decay habitat features experiencing a warmer microclimate tend to have a richer invertebrate fauna that includes more of the scarcer species. This is certainly true for the Goat Moth that is found on a very wide range of native broadleaves but which appears to be most frequent on seasonally waterlogged soils where there are mature willow, poplar and birch trees that are either in open or wood-edge situations. For the beetles, open-grown trees with attached or ‘hanging’ dead branches that have only partially fallen have a relatively warm and dry microclimate that is suitable for many important species, including key species recorded in 2023 such as the rove beetle *Dropephylla gracilicornis* and the phloiophilid beetle *Phloiophilus edwardsii*.

The classic management prescription for dead wood is to leave it in ‘dappled shade’. However, associated saproxyles are to be found across the range of microclimatic conditions and dead wood with a cooler, moister microclimate (e.g. branches and trunks lying on the floor in shaded situations) may be of greater importance for other invertebrate groups such as two-winged flies and molluscs. It is therefore best to have dead wood in a range of situations, from full sun to deep shade, but being mindful that it is intermediate positions that will tend to have the richest saproxylic assemblage.

3.3.3 Fungal fruiting bodies (9 associated species at Old Cilgwyn)

Despite very wet weather in the second half of the survey period, very few sporophores of saproxylic fungi were recorded at Old Cilgwyn and the associated invertebrate fauna lacked any of the key species associated with the other two saproxylic habitat features described in the preceding sub-sections. The abundance of the large bracket fungi that are the most important species for saproxylic specialist invertebrates shows great variation from year-to-year. It is likely that survey during a season when fruiting brackets of species such as Chicken of the Woods, Weeping Bracket *Inonotus dryadeus*, Dryad’s Saddle *Polyporus squamosus* and Beefsteak Fungus *Fistulina hepatica* were more in evidence at

would have shown fungal fruiting bodies to be of greater importance for saproxylic invertebrates. There is a strong link between this and the heartwood decay assemblage described above, as it is the hyphae of Chicken of the Woods that are the causal agent of the red heart-rot required by most of the species coded to the latter assemblage at Old Cilgwyn.

Again, most of these bracket fungi (with the exception of Birch Polypore *Fomitopsis betulina*, which is common in both shaded and more open situations) favour relatively dry, warm conditions and, in western woodlands at least, are most numerous on open-grown trees. The retention of the open parkland landscape at Old Cilgwyn and the maintenance and enhancement of the stock of open-grown over-mature and veteran trees is therefore likely to be one of the key objectives of management. The other will be the retention of as much dead wood on site as possible with larger trunks and branches being of greatest importance for saproxylic fungi.

4. Discussion

Old Cilgwyn continues to support a regionally important saproxylic invertebrate fauna that appears to have changed relatively little since it was first surveyed by the author and others in the late-1980s. The addition of 32 saproxylic beetle species is perhaps not surprising given that this is the first detailed survey since 1994 and highlights the importance of more regular assessments of the fauna. A cumulative total of 99 beetle species count towards RIEC and SQI indices, with the RIEC now standing at 20 and an SQI score of 291.2 based on the 2023 survey. Whilst these are not particularly high in a Wales or UK context, and the RIEC threshold for being of national importance is 25, they do demonstrate that Old Cilgwyn supports the best saproxylic invertebrate fauna in the SSSI Area of Search (Ceredigion) and that the assemblage should remain a feature of Old Cilgwyn a Cae Heslop SSSI.

Old Cilgwyn is important in a Welsh context for several key saproxylic species including:

- the nitidulid beetle *Epuraea terminalis*, a 2nd Welsh record after first being recorded at Powis Park in 1996;
- the featherwing beetle *Ptenidium gressneri*, otherwise restricted in Wales to Chirk Park and Powis Park (both in 1996);
- the rove beetle *Thamiaraea cinnamomea*, otherwise known in Wales only from Coedcae-bach (1994) and St. Fagans (1997);
- the rove beetle *Euplectus mutator*, otherwise restricted in Wales to Dingestow Court (2019), Gregynog (2022) and Wyndcliff Wood (2018);
- the rove beetles *Haploglossa gentilis*, *Phloeostiba plana* and *Placusa tachyporoides* and the monotomid beetle *Rhizophagus cribratus* at their 5th Welsh localities;
- the rove beetle *Dropephylla gracilicornis* at its 9th Welsh locality;
- the beetles *Conopalpus testaceus* and *Enicmus brevicornis* at their 10th Welsh localities;
- the Dark Copperback hoverfly *Ferdinandea ruficornis* at its only VC46 locality;

- the hoverfly *Brachpalpus laphriformis* at one of its few VC46 localities.

The existing management of the site appears to be sympathetic to the maintenance of its dead wood invertebrate fauna. The following list of bullet points identifies the main management issues pertaining to the saproxylic invertebrate fauna that have been identified at Old Cilgwyn. An attempt has been made to order this list to reflect their importance in maintaining and enhancing the saproxylic invertebrate interest of the site.

- Old Cilgwyn forms the core area within a wider landscape in the lower Teifi valley that is rich in over-mature and veteran trees. These other areas form a key part of the overall habitat resource that is helping to maintain viable metapopulations of important saproxylic invertebrates in the landscape. The developing Sustainable Farming Scheme that will be introduced by the Welsh Government in 2025 places high emphasis on increasing tree cover on farmland in Wales. Using this and other relevant schemes to implement the management prescriptions outlined below at Old Cilgwyn and in the area around it should be very beneficial to the saproxylic invertebrate fauna.

- It would be very valuable to undertake a tree survey that identified the resource of veteran, over-mature and mature trees at Old Cilgwyn. This is a site that currently has a relatively small resource of veteran and over-mature Pedunculate Oaks and very few specimens of other tree species. Identification of cohorts of younger oaks and other tree species that can be managed to act as replacements for these and to increase the number of veteran trees on the site over the longer term would be extremely valuable.

- Pedunculate Oak should continue to be the main species promoted for saproxylic invertebrates at Old Cilgwyn but it would also be beneficial to increase the representation of other broadleaves over the longer term. Mid-aged to mature trees, especially those in open situations such as parkland, hedgerows/field boundaries and wood edges should be identified and retained as replacements for existing over-mature and veteran specimens in the medium term. Planting and selection of younger oaks and a range of other tree species should also be carried out. It is important that the management strategy adopted allows for the retention of sufficient numbers of younger age-classes of trees to provide enough replacements for the existing veterans to double the number of over-mature and veteran trees present on the SSSI over the next 200 years.

- The open parkland in OC01, OC02, OC03 and OC04 constitute the most important areas for saproxylic invertebrates at Old Cilgwyn. This is where there are the main concentrations of veteran oaks with important saproxylic invertebrate assemblages. These areas (including the boundaries around them) should therefore be the core parts of the site in which the stock of open-grown old trees is maintained and increased over the longer term.

- Standing and fallen dead wood, and especially that derived from over-mature or veteran trees, should be retained *in situ* unless there are compelling safety reasons

for it to be moved. Of particular importance are large dead oak trunks and branches, especially those that are still standing (snags) or are still situated well above ground level (e.g. dead branches in the canopy or hanging/resting at heights of greater than approximately 2 metres). In general, larger items of dead wood, such as snags and fallen trunks or main branches are of greater importance than smaller pieces. If it is necessary to move dead wood, it should generally be placed in 'dappled shade' where the microclimate is relatively warm and dry. However, dead wood should be provided across the full range of microclimatic conditions, from dense shade to full sun, as all of these situations have their own saproxylic invertebrate communities.

- At Old Cilgwyn and across the surrounding area, there are a handful of old Beech trees, at least two of which have recently been windthrown. Any remaining Beech standards on the SSSI should be retained and replanting and recruitment of younger examples of this species should be undertaken in order to increase the long-term representation and to provide replacements for the existing old trees.

- Though Ash is not a significant component of the old tree resource at Old Cilgwyn, its ongoing loss to Ash dieback disease is detrimental to the diversity of the saproxylic invertebrate fauna (and to epiphytic lichens and many other elements of overall biodiversity). Ash should be retained where there are no compelling safety reasons for its removal. In the longer term, it is hoped that some resistant trees can be favoured to replace and increase the representation of this species. Mature to mid-aged specimens of Sycamore are already quite frequent in this area, both within the SSSI and in the excluded copse that lies between the two main blocks of parkland OC01 and OC03 (this is the excluded area marked on the SSSI map at Figure 1). These older Sycamores should also be retained where possible. This species can have a similar 'white-rot' saproxylic fauna to that found in Ash heart-rot (and also has quite base-rich bark like Ash, which can make it a good host for epiphytic lichens). It is also one of the most favoured hosts of the Dryad's Saddle bracket fungus, which can have a very diverse saproxylic fauna.

- There are some stands of closed-canopy woodland on the SSSI and in adjacent areas of the estate. Thinning of these copses to favour any mid-aged broadleaves and allowing stock to graze them has the potential to increase the resource of open-grown old trees in the area over the longer term.

- Sufficient Hawthorn, Blackthorn, Bramble, Grey Willow, Elder *Sambucus nigra* and other flowering shrubs and trees should be maintained in sunny situations (e.g. in hedges, wood edges and isolated specimens) in order to provide nectar and pollen sources for saproxylic invertebrates and as a habitat for other wood edge invertebrates such as Brown Hairstreak butterfly *Thecla betulae*.

- Species-rich grasslands should continue to be managed sympathetically. These extensively managed grasslands should be retained and managed with moderate grazing and/or late hay cutting that permits abundant flowering of species including robust species such as Hogweed that are important for flower-visiting saproxylic

invertebrates. These fields also continue to support a population of Hornet Robberfly, a feature of the SSSI.

- Any invasive exotics such as Cherry Laurel, Rhododendron and Japanese Knotweed should be eradicated.

- Continue grazing of the parkland and other wooded habitats at Old Cilgwyn at a level that prevents excessive regeneration of young trees, shrubs and Bramble. Bracken may also be controlled in the southeastern part of the site (OC04) by cutting, rolling and trampling by cattle and/or horses.

- Consider pollarding of young to mid-aged trees, as this can speed up the development of dead wood habitat features. Pollarding can be particularly valuable if applied to quite quick-growing hardwoods such as Ash and Sycamore – though with the former this will only be worthwhile on specimens that show clear evidence of resistance to ADB.

- There are interesting stands of wet woodland dominated by Alder and Grey Willow along the central stream valley (OC05) and in the stream valley that marks the eastern boundary of the site. Old willows and Alders can support a distinctive saproxylic assemblage and though the current study did not identify these areas as having a significant interest, they should be maintained in favourable condition. Willow catkins are also important sources of nectar and pollen. Little management intervention is required in these areas currently, beyond the removal of any invasive exotic plants.

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6. Appendix 1. List of saproxylic invertebrates recorded from Old Cilgwyn supplied by Natural Resources Wales prior to the 2023 survey. 88 species including 46 key species.

Includes * = non-native species and ** = canopy species.

Species	Order	Family	SQS	IEC	Microhabitat	NRW key species
Agathidium seminulum	Coleoptera	Leiodidae	2	-	dead trunks & branches	x
Aleochara stichai	Coleoptera	Staphylinidae	-	-	fungal fruiting bodies	-
Amaurobius fenestralis	Araneae	Amaurobiidae	-	-	dead trunks & branches	-
Amaurobius similis	Araneae	Amaurobiidae	-	-	dead trunks & branches	-
Anaspis fasciata	Coleoptera	Scraptiidae	2	-	dead trunks & branches	x
Anaspis frontalis	Coleoptera	Scraptiidae	1	-	dead trunks & branches	-
Anaspis maculata	Coleoptera	Scraptiidae	-	-	dead trunks & branches	-
Anaspis regimbarti	Coleoptera	Scraptiidae	-	-	sapwood & bark decay	-
Anaspis rufilabris	Coleoptera	Scraptiidae	1	-	sapwood & bark decay	-
Atrecus affinis	Coleoptera	Staphylinidae	1	-	beneath bark	-
Bibloporus bicolor	Coleoptera	Staphylinidae	2	-	sapwood & bark decay	x
Bolitochara obliqua	Coleoptera	Staphylinidae	-	-	fungal fruiting bodies	-
Calambus bipustulatus	Coleoptera	Elateridae	8	1	dead trunks & branches	x
Calodromius spilotus	Coleoptera	Carabidae	-	-	bark predator	-
Cerylon ferrugineum	Coleoptera	Cerylonidae	2	-	sapwood & bark decay	x
**Cis bilamellatus*	Coleoptera	Ciidae	-	-	fungal fruiting bodies	-
Cis boleti	Coleoptera	Ciidae	1	-	fungal fruiting bodies	-
Cis nitidus	Coleoptera	Ciidae	-	-	fungal fruiting bodies	-
Cis vestitus	Coleoptera	Ciidae	2	-	dead trunks & branches	x
***Coeliodes transversealbofasciatus*	Coleoptera	Curculionidae	-	-	canopy & foliage	-
Ctesias serra	Coleoptera	Dermestidae	4	-	heartrot	x
Dacne bipustulata	Coleoptera	Erotylidae	2	-	fungal fruiting bodies	x
Dadobia immersa	Coleoptera	Staphylinidae	2	-	sapwood & bark decay	x
Dasytes aeratus	Coleoptera	Dasytidae	2	-	sapwood & bark decay	x

Species	Order	Family	SQS	IEC	Microhabitat	NRW key species
Denticollis linearis	Coleoptera	Elateridae	1	-	sapwood & bark decay	-
Dorcatoma chrysomelina	Coleoptera	Ptinidae	4	1	red rot	X
Dromius agilis	Coleoptera	Carabidae	-	-	bark predator	-
Dromius quadrimaculatus	Coleoptera	Carabidae	-	-	bark predator	-
Dropephylla vilis sensu lato	Coleoptera	Staphylinidae	1	-	sapwood & bark decay	-
Dryocoetes villosus	Coleoptera	Curculionidae	2	-	dead trunks & branches	X
Enicmus testaceus	Coleoptera	Latridiidae	2	-	beneath bark	X
Euglenes oculatus	Coleoptera	Aderidae	8	1	red rot	X
**Euophryum confine*	Coleoptera	Curculionidae	-	-	heartrot	-
Gabrius splendidulus	Coleoptera	Staphylinidae	1	-	sapwood & bark decay	-
Grammoptera ruficornis	Coleoptera	Cerambycidae	1	-	dead trunks & branches	-
Grynobius planus	Coleoptera	Curculionidae	2	-	dead trunks & branches	X
Gyrophaena strictula	Coleoptera	Staphylinidae	8	-	fungal fruiting bodies	X
Haploglossa villosula	Coleoptera	Staphylinidae	-	-	heartrot	-
Ischnoglossa prolixa	Coleoptera	Staphylinidae	2	-	sapwood & bark decay	X
Leiopus nebulosus	Coleoptera	Cerambycidae	2	-	dead trunks & branches	X
Leptusa fumida	Coleoptera	Staphylinidae	1	-	sapwood & bark decay	-
Leptusa pulchella	Coleoptera	Staphylinidae	2	-	sapwood & bark decay	X
Litargus connexus	Coleoptera	Mycetophagidae	2	-	fungal fruiting bodies	X
Magdalis ruficornis	Coleoptera	Curculionidae	2	-	dead trunks & branches	X
Malachius bipustulatus	Coleoptera	Malachiidae	1	-	sapwood & bark decay	-
Malthinus seriepunctatus	Coleoptera	Cantharidae	2	-	sapwood & bark decay	X
Malthodes marginatus	Coleoptera	Cantharidae	1	-	sapwood & bark decay	-
Malthodes maurus	Coleoptera	Cantharidae	16	-	sapwood & bark decay	X
Malthodes minimus	Coleoptera	Cantharidae	1	-	sapwood & bark decay	-
Malthodes pumilus	Coleoptera	Cantharidae	2	-	sapwood & bark decay	X
Melandrya caraboides	Coleoptera	Melandryidae	4	1	white rot	X
Melanotus villosus sensu lato	Coleoptera	Elateridae	1	-	sapwood & bark decay	-
Myathropa florea	Diptera	Syrphidae	-	-	rot holes	-
Mycetaea subterranea	Coleoptera	Endomychidae	2	-	heartrot	X
Mycetophagus piceus	Coleoptera	Mycetophagidae	4	2	red rot	X
Nalassus laevioctostriatus	Coleoptera	Tenebrionidae	-	-	epiphytes	X
Nemasoma varicorne	Julida	Nemasomatidae	-	-	sapwood & bark decay	-
Nuctenea umbratica	Araneae	Araneidae	-	-	bark predator	-
Octotemnus glabriculus	Coleoptera	Ciidae	1	-	fungal fruiting bodies	-
Orchesia undulata	Coleoptera	Melandryidae	4	1	dead trunks & branches	X
Orthoperus nigrescens	Coleoptera	Corylophidae	4	-	fungal fruiting bodies	X

Species	Order	Family	SQS	IEC	Microhabitat	NRW key species
Pediacus dermestoides	Coleoptera	Cucujidae	4	1	fungal fruiting bodies	X
Phloeonomus punctipennis	Coleoptera	Staphylinidae	2	-	beneath bark	X
Phloeopora corticalis	Coleoptera	Staphylinidae	8	-	sapwood & bark decay	X
Placusa pumilio	Coleoptera	Staphylinidae	2	-	beneath bark	X
Platypus cylindrus	Coleoptera	Platypodidae	8	1	dead trunks & branches	X
Pseudomalus violaceus	Hymenoptera	Chrysididae	-	-	dead trunks & branches	X
Ptinella cavelli	Coleoptera	Ptiliidae	-	-	beneath bark	-
Pyrochroa coccinea	Coleoptera	Pyrochroidae	4	1	dead trunks & branches	X
Pyrochroa serraticornis	Coleoptera	Pyrochroidae	1	-	beneath bark	-
Rhagium bifasciatum	Coleoptera	Cerambycidae	1	-	dead trunks & branches	-
Rhagium mordax	Coleoptera	Cerambycidae	1	-	dead trunks & branches	-
Rhizophagus bipustulatus	Coleoptera	Monotomidae	1	-	sapwood & bark decay	-
Rhizophagus dispar	Coleoptera	Monotomidae	1	-	fungal fruiting bodies	-
Rhizophagus ferrugineus	Coleoptera	Monotomidae	2	-	sapwood & bark decay	X
Rhizophagus nitidulus	Coleoptera	Monotomidae	4	1	sapwood & bark decay	X
Rutpela maculata	Coleoptera	Cerambycidae	1	-	stumps, roots & underground wood	-
Salpingus planirostris	Coleoptera	Salpingidae	1	-	dead trunks & branches	-
Scaphidium quadrimaculatum	Coleoptera	Staphylinidae	2	-	fungal fruiting bodies	X
Scolytus intricatus	Coleoptera	Curculionidae	2	-	dead trunks & branches	X
Siagonium quadricorne	Coleoptera	Staphylinidae	2	-	beneath bark	X
Soronia grisea	Coleoptera	Nitidulidae	2	-	sapwood & bark decay	X
Stenagostus rhombeus	Coleoptera	Elateridae	4	1	sapwood & bark decay	X
Stenichnus bicolor	Coleoptera	Staphylinidae	4	1	sapwood & bark decay	X
Triplax aenea	Coleoptera	Erotylidae	2	-	fungal fruiting bodies	X
Xylocoris cursitans	Hemiptera	Anthocoridae	-	-	beneath bark	-
Xylota segnis	Diptera	Syrphidae	-	-	dead trunks & branches	-
Xylota sylvarum	Diptera	Syrphidae	-	-	stumps, roots & underground wood	-
Total	-	-	**175**	**13**	-	**46**

Data Archive Appendix

The data archive contains:

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

~~[B] A full set of maps produced in JPEG format~~.

~~[C] A series of GIS layers on which the maps in the report are based with a series of word documents detailing the data processing and structure of the GIS layers~~.

~~[D] A set of raster files in ESRI and ASCII grid formats~~.

~~[E] A database named [name] in Microsoft Access 2000 format with metadata described in a Microsoft Word document [name.doc]~~.

~~[F] A full set of images produced in [jpg/tiff] format~~.

[G] Species records held in Welsh Invertebrate Database (WID).

Metadata for this project is publicly accessible through Natural Resources Wales' Library Catalogue https://libcat.naturalresources.wales (English Version) and https://catllyfr.cyfoethnaturiol.cymru (Welsh Version) by searching 'Dataset Titles'. The metadata is held as record no. XXXXXX.