

Cosnard's Net-winged Beetle

Erotides cosnardi

Surveys and site assessment in Gloucestershire and adjoining areas of the Wye Gorge

**A contract survey commissioned by the Species Recovery Trust
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SUMMARY

Cosnard's net-winged beetle *Erotides cosnardi* has recently been described as a strong candidate for Britain's rarest beetle, with fewer than ten specimens reported since its original discovery more than 70 years ago.

Exploration of potentially suitable habitat was carried out in the Gloucestershire part of the Wye Gorge during May and June 2017. Considerable ground was covered, walking:

- Cadora and Bigsweir Woods (Woodland Trust);
- Astridge and Forge Woods (privately owned);
- Forest Enterprise land:
 - between Symonds Yat and Lady Park Wood (edge of Mailscot Wood);
 - Knockalls Inclosure;
 - the southern edge of Highmeadow Woods, ie the south side of the A4136 including Rodge Wood;
- Highbury Wood National Nature Reserve (Natural England).

Stands of old beech – thought to be the key habitat - are notably scarce and very localised across the area; the beetle was found in just one area. The discovery of a new site during the survey period usefully demonstrates that the surveys coincided with the adult phase of the beetle, so failure to find the beetle in other sites was not because the dates missed the beetle's restricted active period.

A recently cut stump of goat willow *Salix capraea* was found on the edge of Highbury Wood NNR where *Erotides cosnardi* could be found regularly in numbers – six were counted on 31st May and counts were made almost daily until the last beetle was seen here on 14th June. Three mating pairs were observed during this period. This is a major discovery in many ways: i) only a handful of specimens have been reported before in Britain, apparently nine at most; ii) the species has never previously been found at the same spot more than once; iii) mating had never been observed before; and iv) the species had been assumed to be confined to old growth beech. This NNR does include a stand of veteran beeches, although a significant distance from the stump. This single stump has made a major contribution to our understanding of this species in Britain.

The species however remains very enigmatic. No flight was observed at the willow stump, no clear evidence of emergence from the white-rotten heartwood present, nor observation of oviposition. Did this tree provide larval habitat? Or was the cut stump primarily a particularly attractive place for males to gather – an arena? Answers to these questions could be sought in future by establishing some trial sites where individual trees could be felled and the stumps monitored over the following season. Ideally a range of stumps could be tried – different tree species and some with/without white-rotten heartwood. The establishment of these trial monitoring plots would also have the effect of opening up a network of glades within the currently relatively shady woodlands – *Erotides cosnardi* is part of the central European warmth-loving saproxylic fauna and it may be expected that warmth will be especially important here within the edge of its global range. Clearance of undergrowth from around potential breeding trees and reduction in crown competition might also be beneficial.

Potential trial monitoring plots have subsequently been explored with the local Forestry Commission team, and areas agreed where a small number of trees will be felled during winter 2017/18, in preparation for follow-up monitoring during the 2018 activity period for the beetles.

An attempt was also made to identify the precise area of woodland where the beetle was originally discovered in 1944, using genealogical resources to interpret the original site description. This has narrowed the site down to two possibilities: Fiddler's Elbow NNR and the area of Highmeadow Woods adjoining York Cottage. These should be prioritised for survey.

The Wye Gorge woodlands are not known as a hot-spot for saproxylic diversity although this may just reflect under-recording. The rich old growth beech sites in Britain include Windsor Forest and the New Forest. The lack of records for *Erotides cosnardi* from these two key sites presumably reflects the highly fragmented nature of the range of this beetle, where stochastic effects have resulted in two very isolated remnant populations. An indication that the Wye Gorge is under-recorded was provided by the discovery of another saproxylic beetle currently with Endangered status – the false click beetle *Eucnemis capucina* - near Bowler's Hole, Symond's Yat. This is also regarded as a beech old growth species and is best known from Windsor Forest and the New Forest. It too has been found to be capable of developing in white-rot in other tree species – cherry, apple and lime in this case.

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CONTENTS

<i>Summary</i>	1
<i>Acknowledgements</i>	2
<i>Contents</i>	3
1 Introduction	5
1.1 Background	5
1.1.1 Cosnard’s Net-winged Beetle in Great Britain	5
1.1.2 Habitat associations	5
1.2 Objective	7
2 Methodology	7
2.1 Sites chosen for visits	7
2.2 Ancient Tree Inventory (ATI)	8
2.3 Hand search techniques	8
3 Results	9
3.1 Cadora Woods	9
3.1.1 Background information	9
3.1.2 2017 fieldwork.....	10
3.1.2.1 Bigsweir Woods.....	10
3.1.2.2 Cadora Woods.....	11
3.1.2.3 Overview	12
3.2 Symonds Yat to Lady Park Wood	12
3.2.1 Background information	12
3.2.2 2017 fieldwork.....	13
3.3 Highbury Wood NNR	14
3.3.1 Background information	14
3.3.2 2017 fieldwork – discovery of <i>Erotides cosnardi</i>	14
3.3.3 Observations on <i>Erotides cosnardi</i> over following weeks	16
3.4 Knockalls Inclosure & Rodge Wood (Forest Enterprise)	18
3.5 Astridge Wood SSSI & Forge Wood (private woodlands)	19
3.5.1 Background information	19
3.5.2 2017 fieldwork.....	19
3.6 Highmeadow Woods, Beaulieu Wood & The Kymin, Monmouthshire	20
3.7 Little Doward, Herefordshire (Woodland Trust)	20
4 The site of the original discovery	21
5 Discussion	22
5.1 Highbury Wood NNR	22
5.1.1 Habitat and situation	22
5.1.2 Behavioural observations.....	23
5.2 Habitat management issues and options	24
6 Recommendations	25
6.1 Areas where future survey work could be targeted	25

6.2	Development of a network of trial management sites.....	26
6.3	Woodland management for conservation.....	27
6.3.1	General considerations.....	27
6.3.2	Suggestions for habitat improvement.....	27
6.4	The significance of beech old growth in Wye Gorge.....	27
	<i>References</i>	<i>29</i>

1 INTRODUCTION

1.1 Background

1.1.1 Cosnard's Net-winged Beetle in Great Britain

Barclay (2016) has commented that in the 70 years since its discovery, fewer than 10 specimens have been reported of Cosnard's net-winged beetle *Erotides cosnardi*, making it a strong candidate for Britain's rarest beetle.

Reliable records of *Erotides cosnardi* in Britain come from two distinct areas: the Wye Gorge, where it was originally discovered in 1944 (Airy Shaw, 1944) and the Arundel Forest area of the South Downs, where it was first discovered in 1969 (Cooter, 1973). The most recent published report is actually of a very old specimen - dated 1894 - found in an insect collection recently acquired by the Natural History Museum, from the Derwent Valley in County Durham (Barclay, 2016). There have been a few other possible sightings reported in recent decades but none supported by voucher material nor from people familiar with the species (see Alexander, 2014a); these do not merit any serious attention until proof is forthcoming.

Most past records have related to single individual beetles, generally found by sweep-netting and so not the result of actual observation. No larvae have been reported. The species was known in Britain from just eight confirmed specimens when Barclay (2016) was writing. Telfer (2016) added one more.

The status of this species has recently been reviewed using IUCN Red List criteria and *Erotides cosnardi* has been confirmed as Endangered in Britain (Alexander, 2014a). This review was unaware however of the Kirby (2002 & 2004) unpublished records which were published subsequently (Alexander, 2014b). The species is listed under Section 41 of the 2006 Natural Environment & Rural Communities (NERC) Act as a Species of Principal Importance for the conservation of biodiversity. This provision makes it a statutory duty on planning authorities and other decision makers to consider these species when carrying out their duty to further the conservation of biodiversity.

1.1.2 Habitat associations

Very little is known about the ecology of this beetle. All known British records have been associated with old growth beech, and it is said to be an old growth beech specialist throughout its European range (Speight, 1990). No larvae have been reported however and so the larval habitat remains to be determined. Other Lycidae are known to develop in relatively old white- or brown-rotten wood – primarily heartwood, and it is assumed that this will also be the case with *Erotides cosnardi*. Speight (1990) contains some interesting observations from rearing *Pyropterus nigroruber* and which may apply also to *Erotides cosnardi*: the larvae live colonially, in well-rotted wood, and were found in twos or threes in small chambers in the wood; prior to pupation they gathered into larger groups, upwards of twelve larvae pupating together in one chamber; hatching of the adults was not synchronous, but occurred over a period of two weeks.

The larvae of the family are similar in form to those of glow worm and soldier beetles – relatively elongate, more or less round in cross-section, and relatively free-living; they are not dorso-laterally flattened like many beetle species which live beneath bark on deadwood. Crowson (1981) suggests lycid larvae are not predatory, and digest their food – suitable organic material found within the decaying wood - externally, by means of enzymes secreted via the mouthparts, and only ingest liquid food. This is comparable with the closely-related glow worm *Lampyris noctiluca* (Lampyridae), which feeds on snails. A final instar larva of the non-British net-winged beetle *Lygistopterus sanguineus* has been observed (KNAA) crawling on the upper surface of a large old lying decaying tree trunk exhibiting white-rotten sapwood and lying in full sun-shine. The implication is that large volumes of white-rot may be required – warmed by sunshine - in which the larva searches for dead or relatively inactive prey items, and possibly for decayed fungal material. However, the most widespread British net-winged beetle *Platycis minutus* has been found in numbers on stacks of well-rotted hazel stems (KNAA), and the adult has been found inside a fallen hollow white-rotted apple trunk (KNAA). It may be that *Erotides cosnardi* can develop in accumulations of white-rotten beech stems, irrespective of the individual stem diameter. However, it is generally assumed that large decaying trunks are required, and Telfer (2016) found one specimen close to a standing dead beech snag of substantial girth – but the measurements of this snag were unfortunately not recorded.

As a species associated with white-rotten wood of broad-leaved trees, it would be surprising if it really is confined to beech as a host – beech appears to be no different as a habitat provider as other broad-leaved tree species. White-rot is formed by a wide range of specialist fungi. Beech itself may be decayed by a wide variety of specialist fungi including some which are broad-leaved tree generalists but also a few more closely associated with beech. It might be that *Erotides cosnardi* requires a special type of white-rot, although this does seem unlikely on present evidence. If the beetle merely requires large volumes of white-rot then a wide range of host trees might be suitable. Or perhaps the beetle has a particular habitat requirement that it shares with beech? Beech is a shade-tolerant tree species and the beetle adults are often found by sweep-netting shaded ground layer vegetation – they appear to spend a lot of time at rest on plant leaves. However, the most recent Wye Gorge records (Kirby, 2002 & 2004) both arose from sweep-netting field-layer vegetation around the edges of woodland glades, and so a requirement for shade by the adult beetles should not be assumed. The specimen found by Telfer (2016) was in full sunshine. It is also worth bearing in mind that in Switzerland it is associated with oak and birch as well as beech (Allenspach & Wittmer, 1979, mentioned by Barclay, 2016). Kirby (2000) states that it is also reported from pine and fir in mainland Europe but does not provide details of the source of this information.

The species is a rare European endemic, with its range centred on central Europe. It may therefore be expected to have a requirement for a continental type climate. Relatively warm and dry conditions may be favoured. This has been suggested by its presence in the Wye Gorge on steep wooded slopes (Cadora Woods and Little Doward) with a southern and western aspect. Adults of related net-winged beetles are often mentioned in the literature as being attracted to blossom, presumably feeding on pollen and/or nectar, and one of the Sussex reports for *Erotides cosnardi* was from

flowering wild garlic. However, an association with blossom has not been the experience generally in Britain.

There is a need for much greater detail when recording this beetle, for detailed descriptions of the situation where the adult has been found and covering the wider landscape as well. Without this detail, progress with understanding its ecology - and hence its conservation requirements - will be slow. No site management - with this species specifically in mind - is being carried out at any of the known sites.

1.2 Objective

Alexander (2014) identified an urgent need for: i) targeted survey of remaining old beech stands in the Wye Valley & the old Arundel Forest area of the South Downs; ii) assessment of the extent and condition of old beech stands in these areas; iii) identification of the key conservation management requirements; and iv) establishment of monitoring protocols for old beech trees, to identify population trends in known sites.

The Species Recovery Trust set up the present contract to:

- Carry out further survey of potentially suitable habitat in the Wye Gorge in the adult flight period, focusing primarily on Gloucestershire; and
- Discuss habitat management options with Forest Enterprise contractors in the autumn.

2 METHODOLOGY

2.1 Sites chosen for visits

The only currently known site for *Erotides cosnardi* in Gloucestershire is the Cadora Woods Complex, owned and managed by **The Woodland Trust**. This was visited by Telfer (2016) but another exploration was considered justifiable in order to provide a base-line for the other site visits.

The Species Recovery Trust had previously approached **Forest Enterprise** for access permission for surveying as well as for information on potentially interesting areas of woodland in the general Highmeadow Woods area under their management. The targeted areas were selected partly on the basis of known presence of veteran trees and beeches in particular: Symond's Yat to Lady Park Wood; Knockalls Inclosure and the southern edge of the main block of Highmeadow Woods, on the south side of the A4136 Staunton-Monmouth road. The western half of the latter area extends into Monmouthshire.

Highbury Woods National Nature Reserve (**Natural England**) was also considered a priority site as the present writer was aware of a concentration of ancient beeches here from a previous visit. This site straddles the ridge above Cadora Woods.

Privately-owned woodlands lying between the Cadora/Highbury block and Knockalls Inclosure were also explored using the public footpath network.

Two further short exploratory visits were made outside of Gloucestershire: Little Doward (Herefordshire) and Beaulieu Wood (Monmouthshire). These are both Woodland Trust sites. Little Doward is the only British site where *Erotides cosnardi* has been observed on two separate occasions and the second occasion (Telfer, 2016) associated the beetle with a particular standing dead beech tree but provided no detailed information on that tree – an attempt to properly document that tree was considered worthwhile. Beaulieu Wood is mapped in the Ancient Tree Inventory as containing a concentration of old beech trees.

2.2 Ancient Tree Inventory (ATI)

The Ancient Tree Inventory is a major national project initiated by the Woodland Trust, aiming to map and document all of the significant veteran and ancient trees across the country. The website provides access to the mapped trees and so the data can be used to target searches for saproxylic species such as *Erotides cosnardi*. Accordingly, the mapping was checked for all areas where survey was planned and the available tree data used to guide survey work on the ground.

2.3 Hand search techniques

On each visit as much of the site was explored as readily feasible, following the network of forest rides and footpaths, and penetrating off-path into areas with veteran trees and accessible deadwood. *Erotides cosnardi* has mostly been found by sweep-netting and occasionally by direct observation but a wider range of techniques was considered sensible as so little is known about its behaviour.

The main techniques used were as follows:

- beating lower canopy foliage and branches over a beating tray;
- targeted beating any available blossom on accessible flowering shrubs;
- sweep-netting vegetation beneath tree canopy;
- visual inspection of tree trunks for resting invertebrates;
- inspection of fruiting wood-decay fungi and tapping these gently over a net to dislodge any invertebrates present externally;
- inspection of accessible cavities in tree trunks and investigating within any accumulations of wood mould and other debris in cavities;
- hand search within any accessible large items of dead and decaying wood, investigating beneath loose bark and inside decayed heartwood, etc; this technique was applied advisedly and carefully, so as not to cause excessive damage to the habitat.

Although the survey was targeted at a single distinctive beetle species, the opportunity was taken to record other species of potential conservation significance. Wherever possible specimens of invertebrates encountered were identified in the field, retaining voucher specimens of the more critical species. Other specimens were taken away for identification using a microscope. Larvae and pupae were also retained for rearing through to the more readily identifiable adult stage.

3 RESULTS

3.1 Cadora Woods

3.1.1 Background information

The survey period was started with the Cadora Woods complex as this was the only known site for *Erotides cosnardi* in Gloucestershire. The site name is used for a complex of individual woods and an area of former pasture within the ownership of the Woodland Trust. It comprises the following named woods, from south to north along the lower valley sides immediately above the A466 Chepstow to Monmouth road (using the OS 1: 25 000 mapping): Slip Wood, Wyeseal Wood, New Weir Grove (these three known collectively as Bigsweir Woods), Church Grove, Oaken Grove, Bowen's Grove, Great Grove, Upper Great Grove, and Cadora Grove (known collectively as Cadora Wood). The Woodland Trust additionally owns woodland to the north of Cadora Grove named Causeway Grove together with an area of old pasture with in-field trees (Highbury Fields) above Cadora Grove and below Highbury Woods NNR. The multiplicity of wood names suggests multiple ownership historically.

These woodlands are generally believed to be ancient woodland sites (Woodland Trust leaflet). The Cadora Wood section was however subject to extensive clear-felling and replanting with conifers prior to Woodland Trust acquisition.

Kirby (2002) reported the discovery of '*Platycis cosnardi*' – the species was later transferred to a separate genus '*Erotides*' - in Cadora Wood and much later provided the present writer with further details: one individual each from SO53310785 and SO53680731, between 9th and 11th May 2002 (Alexander, 2014). These two locations are in the lower parts close to the main access ride.

The Woodland Trust has subsequently initiated a programme of gradual removal of those conifers 'to allow native trees to flourish' (Woodland Trust leaflet). Over 20 species of native broadleaved tree and shrub survive here, with oak, ash, beech, birch, small-leaved lime, wild cherry, hazel and holly being common. Some show signs of past coppice management and others pollard management. Many of the trees are large old examples. Management of the broadleaves will involve occasional thinning to allow enough light in for young trees to grow.

The Bigsweir Woods section has been designated as a Site of Special Scientific Interest (SSSI) as part of one of the most important areas of woodland conservation in Britain – the woodlands of the lower Wye Valley. The citation is focused entirely on the vegetation and does not mention its known invertebrate conservation interests. The SSSI also has European status as part of the Wye Valley Woodlands Special Area of Conservation (SAC). The SAC relates to the special conservation interest of the following features:

- H9130 *Asperulo-Fagetum* beech forests
- H9180 *Tilio-Acerion* forests of slopes, screes and ravines
- H91J0 *Taxus baccata* woods of the British Isles
- S1303 Lesser horseshoe bat, *Rhinolophus hipposideros*

The Ancient Tree Inventory (ATI) identifies a scattering of veteran trees along the length of the Cadora Woods complex.

Telfer (2016) focused his survey work particularly on the area where *Erotides cosnardi* was found in 2002 but provides little by way of overall description of the site.

3.1.2 2017 fieldwork

This section was walked on 30th May 2017 and areas with mapped veteran trees specifically targeted. The walk started at the Woodland Trust car park at the southern end and followed the main forest ride northwards as far as Cadora Grove at the northern end of the woodlands.

3.1.2.1 Bigsweir Woods

Much of the Bigsweir Woods section is dominated by closed-canopy woodland, with an oak-standards-with-hazel-coppice structure, although showing no signs of active management for many decades. The oak standards achieve up to 1.5m in girth at breast height, approximately, and appear to be fairly even-aged. Large girth dead and decaying wood is largely absent.

An old trackway follows the southern edge of the wood (Slip Wood), cutting the corner between the lane above and the A-road below. The old wood bank above is lined by large old lime coppice together with field maple, wych elm, hazel and hawthorn. A large old rotting elm stool and an old cherry provide valuable saproxylic habitats, as does a massive lime collapsed across the sunken way. This trackway provides a valuable hot-spot for invertebrates within the otherwise undistinguished woodland.

Another hot-spot is provided by the public footpath which cuts down through Slip Wood towards the former Florence Hotel below – above the A-road - from the main forest ride. This linear section includes a series of mature and older beech trees. The oldest beech has the form of an old layer, with a basal girth in excess of 2m and the main trunk forking at about 1m. There is a 2m girth beech higher up the path and young beeches and limes along the bank. Two further mature beech standard trees are present within the woodland above – as mapped by the ATI. Much fallen deadwood is apparent along the adjoining slopes, but little accessible large items of decaying wood were however accessible to investigation at the time of the visit. General sweep-netting found one saproxylic beetle of interest, the false darkling beetle *Orchesia undulata*, which is an uncommon species characteristic of old growth situations (Alexander, 2004).

Veteran trees are clearly very sparse in Bigsweir Woods and are mostly associated with old footpath routes. Young beech and lime standards are scattered through although are of a tall pole form due to the intense competition for light.

The northern boundary with Cadora Woods is represented on the ground by an old fence post line which stands along the north side of a small dip in the valley side,

presumably an old seepage or stream drainage line. The broken ground here includes a large old wych elm coppice stool, a few old lime coppice stools, as well as a concentration of fallen broken branches. This area forms a third hot-spot for invertebrates in this otherwise structurally poor woodland.

3.1.2.2 *Cadora Woods*

Although much of this section has been subject to coniferization and subsequent clearance of the non-native conifers, the southern area – Church Grove – comprises a valuable stand of mature oak trees of a semi-open-grown form. They have been subject to in-fill planting of conifers which are now maturing, but are not yet putting the survival of the old oaks at risk. The oaks are no more than 2m in girth but have good lateral branch development – a very rare feature through the Wye Gorge woodlands. These trees should be a priority for halo-release from the potentially damaging planted conifers and it is unclear why this work has not been carried out by the Woodland Trust. This area was the only area with redstarts. Access to the old oaks for survey was practically impossible due the height and density of bramble. One tree had collapsed across an access ride; beating the accessible dead twigs produced an example of the uncommon weevil *Acalles misellus*. This is a rare species in the county and primarily known from the Wye Gorge woodlands and a few Cotswold ancient woodlands.

Much of the rest of Cadora Woods comprises a mix of mature spruce plantation and remnant broadleaves in open bracken and bramble after clearance of conifers. Much is therefore not conducive to investigation of saproxylic invertebrates.

What appears to be a vehicle turning bay - where the lower track swings abruptly upslope - contained a lying oak trunk in May 2017 and beetle larvae plentiful beneath the loose bark – cardinal beetles (*Pyrochroa* sp) and the click beetles *Melanotus* sp and *Stenagostus rhombeus*. The latter is an uncommon species, also characteristic of old growth situations (Alexander, 2004) but widespread in the west of the county.

As with Bigsweir Wood, it is the old footpath route down through the wood towards Wyeseal Farm which provides a hot-spot for invertebrates. The lower section has old hazels alongside and a large old oak stump.

A timber stacking bay in Birchen Grove contained a stack of lengths of cut lime trunk sections in May 2017. These were relatively freshly cut, but had already been colonised by one uncommon saproxylic beetle, the flat bark beetle *Pediacus dermestoides*, characteristic of old growth situations (Alexander, 2004) but widespread in ancient woodlands and wood pastures across the county.

Intriguingly the two precise grid references provided by Kirby for the spots where single *Erotides cosnardi* were taken by sweep-netting roughly coincide with two further timber stacking bays cut into the hillside above the forest ride. Of course, his survey was in 2002 before the Woodland Trust had begun gradual clearance of conifers and these bays were not apparent. He describes the beetles as being swept in woodland glades.

The timber stacking bay in Bowen's Grove lies just north of a section of forest ride which is lined upslope by a series of veteran trees and native trees and shrubs generally. These include a large old sycamore stump at the south end, old hazel and lime coppice stools, one field maple, one beech standard of about 2m girth, old cherry coppice stools and a large ash tree. There is also a rocky escarpment higher up-slope lined by old limes, yew, etc. This area provides a hot-spot of old growth woodland, which is interesting given its proximity to one of the *Erotides cosnardi* record sites. Sweep-netting around the timber stacking area – empty at present – revealed a saproxylic hoverfly *Criorhina berberina* – this is a localised species which develops in decaying wood in large old stumps and hollow trees.

The bay in Great Grove has a few mature oaks on the bank above and limes on the south side. Some old decaying trunk sections were visible under dense bramble and nettle, and some burnt wood was also present. This material appeared to have been pushed back into the bank using a bulldozer or similar heavy equipment. One fresh oak trunk section had been pushed into an adjacent area – a 2m length and 0.5m diameter. No saproxylics could be found here on this occasion.

Scattered beeches along the roadside below Upper Great Grove include some with relatively large girth. This is potentially an interesting area for saproxylics. The final section of forest ride mid-slope includes a few mature beech although drawn up tall and thin through crown competition with the former plantation.

Returning along Coxbury Lane, a large concentration of mature and veteran broad-leaved trees occurs - as mapped by the ATI – along and within the upper wooded slopes south of Coxbury Farm, ie Oaken Grove. The remnants of a substantial drystone wall within the top edge of the woodland is lined by old lime and beech coppice stools and young beeches are developing amongst mature larches in the area above the old wall. This area could be opened up by felling and removing the larches to favour beech development

3.1.2.3 Overview

Overall there appeared to be limited opportunities for *Erotides cosnardi* through these woodlands at present, although it is feasible that a small localised population persists here. The sections with mature beeches in particular appear too small to be able to maintain a viable population – few if any of these trees appear to be in suitable condition for heartwood decay. However, there are plenty of opportunities where younger beech could be favoured by thinning out and removing competitive growth. This is especially true along some upper sections – in both Cadora and Bigsweir Woods - where there are core areas of mature beech trees as seed-sources.

3.2 Symonds Yat to Lady Park Wood

3.2.1 Background information

A particular focus of the 2017 field work was land managed by Forest Enterprise. The most promising area selected was a section of the Upper Wye Gorge SSSI, from the Symond's Yat car park downstream to The Slaughter and into the Gloucestershire part of Lady Park Wood. The central section is inexplicably omitted from the current

designated site despite being superficially of apparent equivalent interest – it had been within the previous Wye Gorge SSSI. The citation is focused mainly on the vegetation and does not mention the veteran tree interests. It does however eventually briefly mention the rich invertebrate fauna, but not specifically saproxylics. The SSSI also has European status as part of the Wye Valley Woodlands Special Area of Conservation (SAC) – see 3.1.1. – designated for vegetation and lesser horseshoe bat.

The Ancient Tree Inventory shows no veteran trees in this section but this reflects lack of survey data rather than lack of trees – the writer has explored this area in the past and is aware that it contains good numbers of veteran oak in particular. Telfer (2016) briefly visited The Slaughter from the New Weir Car Park across the river, and states that the area is almost devoid of veteran trees. It is unclear how large a section he investigated.

3.2.2 2017 fieldwork

This area was visited on 31st May 2017 and the writer was accompanied on this occasion by two SRT volunteers, Lucy Grove and Lewis Thomson, who had been carrying out field surveys of potentially suitable habitat in the Forest of Dean area. The intention was to share experience and knowledge, particularly on habitat association and survey techniques.

The area around Bowler's Hole (SO5604815411) was the first area examined. A beech snag provided the first feature of attention. At least four false click beetles (Eucnemidae) were quickly found while investigating old dry white-rotten heartwood in the top of the broken stem; one was retained for microscopic examination and proved to be the rare *Eucnemis capucina*. This species currently has Endangered status in Britain (Hyman, 1992). The beech was of 0.97m girth and about 1m high. The species is also known from the north Cotswolds area of the county where it is associated with veteran ash trees in ancient wood pasture situations.

Southwards along the upper gorge slopes and the gorge brow – mostly outside of the currently designated SSSI - there is a good scattering of veteran oak trees. One particular example at SO5580314992 is of 2.76m girth and had old fruit bodies of the white-rot bracket fungus *Inonotus dryadeus* at its base. The characteristic emergence holes of the Nationally Scarce beetle *Dorcatoma substriata* were noticeable. This is a rare species in the county, having only previously been found in Berkeley Deer Park.

The *Eucnemis* and the *Dorcatoma* are both high quality old growth species (Alexander, 2004) and demonstrate the considerable interest of the SSSI for saproxylic beetles associated with veteran trees.

Large old beech trees are scarce in this section (outside the SSSI) but a recently sawn beech stump was found as well as at least two fallen large mature beech trees in situ. The latter are at SO5554014450. Two saproxylic beetles noted here were the longhorn beetle *Stenocorus meridianus* and the black-headed cardinal beetle *Pyrochroa coccinea*. Rhinoceros beetle *Sinodendron cylindricum* was also present in a decayed ash tree. Younger beech are widespread, providing a next generation cohort.

Overall the woodlands here are closed-canopy due to the frequency of young beech but the gorge edge benefits from good lateral light. There are also plentiful old coppice stools and squirrel-damaged stems with white-rot developing. The area does seem to provide relatively favourable habitat for *Erotides cosnardi*, and habitat that will increase in value as the younger beeches develop.

Lady Park Wood was briefly entered but the Gloucestershire section appears to be even aged beech of small girth, of no value for *Erotides cosnardi*.

3.3 Highbury Wood NNR

3.3.1 Background information

As with other local SSSI, Highbury Wood National Nature Reserve was designated as one of the better-quality woodlands of the lower Wye Valley. The citation is focused mainly on the vegetation and does not mention the veteran tree interests. It does however mention invertebrates, although only ground-living molluscs and butterflies. The SSSI also has European status as part of the Wye Valley Woodlands Special Area of Conservation (SAC) – see 3.1.1. – designated for vegetation and lesser horseshoe bat. The present writer visited this woodland many years ago and noted the presence of a line of ancient beeches along the ridge of the wood and these are now mapped on the Ancient Tree Inventory. About 30 notable trees are mapped – lime, yew and beech – the latter represented by ten trees. The wood was bought by English Nature in 1986 (reserve leaflet) and has partly been under an active coppice-cutting regime and partly unmanaged. The veteran trees stand in the unmanaged section and this area is noted as being rich in dead wood.

3.3.2 2017 fieldwork – discovery of *Erotides cosnardi*

The focus of the visit on 31st May 2017 was the ridge with its veteran trees. There are also old coppice stools of beech and lime here. The old coppice includes plentiful dead white-rotted stems and stem bases. The visit involved walking the ridge from north to south. One massive forked beech has collapsed many years ago, leaving a large stump of 1.3m diameter with the collapsed tops either side. The stump is hollow. The surrounding tree canopy has closed over and the decaying wood is now in heavy shade. While some of the other beeches are standing but dead, most are live and continuing to generate fresh rotten wood. This strip of old growth provides excellent wood-decay habitats. One standing dead beech was found to contain pockets of dry white-rot wood mould in which were living alleculine larvae – probably the uncommon *Prionychus ater* (specimens have been retained for rearing in order to clarify their identity) – and elytra of Rhinoceros beetle *Sinodendron cylindricum* were also noted. Beating yew foliage revealed the uncommon wood-decay weevil *Acalles misellus* and the more widespread beetle *Grynobius planus*. An example of the uncommon longhorn beetle *Stenocorus meridianus* was also found by sweeping. It seems possible that these trees could be supporting larvae of *Erotides cosnardi*.

While walking out of the wood, down the meandering track towards Lower Redbrook, a recently felled goat willow *Salix capraea* was noticed on the lower edge of the wood (SO5415709262) – Fig.1. The twin stem had been sawn across horizontally and the top cut and stacked alongside. The stems were of 0.43m diameter, of which 0.15-0.16

comprised white-rotten heartwood. Site aspect is east-facing. A specimen of *Erotides cosnardi* was immediately noticed standing on the un-decayed part of one of the cut stumps and closer inspection found two beetles on the cut surfaces of each of the two stumps, a total of four individuals. The beetles were observed moving only very slowly on the cut wood surface, with their foreparts raised and their antennae also raised – the appearance was of individuals straining to test the chemicals in the air – ‘sniffing the air’. The weather conditions were noted as bright, but with more-or-less complete cloud cover, and high humidity; the car thermometer was registering 22 degrees C. The time was 17.00 hours. The bark surfaces of the sides of the trunks were closely inspected and no further beetles were found, the stack of cut wood similarly proved negative, as did sweep-netting of the ground vegetation around the trunk and stack. No large old beeches were visible in the general area, the woodland up-slope being mixed broadleaved, closed canopy, with no stems of substantial size.



Fig.1. One of the cut stems of the twin-stemmed Goat Willow, the other visible top right; note the central core of white-rotten heartwood

This is an extraordinary discovery in many ways – the beetles were associated with goat willow rather than beech, they were actually on dead woody tissue rather than amongst neighbouring vegetation, four individuals were present whereas all previous records have been of a single individual or two at most, and the site was not in a particularly sunny situation.

It was quickly appreciated that this stump provided a rare opportunity to monitor the activity of the beetles, and arrangements were made with the SRT volunteers that together we would try and visit the stump as often as we could over the next few

weeks to record numbers and behaviour in relation to weather conditions. The resulting observations are presented in 3.3.3.

3.3.3 Observations on *Erotides cosnardi* over following weeks

1st June 12.00 hrs KNAA

Two beetles on each stump again, but inactive and in the white-rotten heartwood areas, not on the cut wood surface as yesterday afternoon. Sluggish movements, no attempt to fly when mildly disturbed.

1st June 12.30 hrs KNAA

Two on left stump but now three visible on right stump, still relatively inactive and on the white-rotten area. This makes a minimum count of seven individuals as one was taken the day before and another today, as vouchers and to check gender (both males).

1st June 14.30 LG & LT

Five beetles on stump.

2nd June 14:35 to around 16:00 LT

Four individuals, two of those were mating, but they soon walked to the edge of the stump and down the side, eventually disappearing amongst the bark and litter. 19 centigrade, full cloud cover with occasional light showers, light SW wind (but completely sheltered on site).

3rd June 15:00 to 16:30 LT

Two on top of the stump, motionless, perched on high points of the white rot area in the centre. They had hardly moved an inch by the time I left. 18 centigrade, broken cloud with sunny spells, moderate WSW wind. There were six individuals altogether. 15:42 **pair mating** on the side of the trunk and they were still mating when I left. 15:58 **another two mating** on the side of the trunk, but soon lost sight of amongst ivy. They seem to avoid the top of the stump when mating and are constantly on the move, in stark contrast to the singletons on top of the stump.

4th June 16.20-16.40 LT

No beetles to be found; the weather was broken cloud with sunny spells, dry (but earlier heavy rain showers until c2pm), light SW wind (completely sheltered on site), 16 centigrade. The stump was quite wet from the rain and it was also much cooler last night than for quite some time.

6th June 16.30-17.00 LT

Three individuals on top of the stump, no real activity. 15 degrees Centigrade, overcast, moderate WSW wind but sheltered on site.

7th June 16.30-17.00 LT

Three individuals on top of stump; no real activity; overcast; 15 degrees; moderate WSW wind, sheltered on site

9th June 16.30-17.00 LT

One individual on top of stump. Clear and sunny, 18 degrees; sheltered from moderate WSW wind

11th June 15.30-16.00 LT

Two beetles motionless on top of stump; **one pair mating** on side of stump, constantly on the move. Broken cloud with sunny spells; 18 degrees; strong WSW wind, fairly sheltered here

12th June 15.00-15.30 LT

No beetles to be found. Overcast; 18 degrees; moderate WNW wind, sheltered on site.

14th June 2017 10.40 hrs KNAA

A bright and sunny morning, the car temperature gauge indicating 19 degrees C. The left stump partially in shade but one male moving about over the cut wood area with its antennae actively moving in the air; appeared flighty when approached, raising elytra but not actually flying. No other beetles seen.

22nd June 2017 11.30 & 12.30 hrs KNAA

No sign of any beetles. Car temperature reading 19 degrees C; overcast. Core of white-rot in stumps more closely examined – material very loose and airy with cavities. Could this provide suitable larval habitat? Were the beetles emerging from this white-rot, or merely using the stump for assembling and attracting females?



Fig.2. The typical stance of the male beetles, with the front part of the body raised and the antennae held up into the air.

Conclusions:

- The beetles could be seen throughout much of the day, not just on warm afternoons or evenings
- Activity was greatest when warm and sunny; 18 degrees C may be an approximate guide/cut off point, although some were seen but inactive down to 15 degrees
- 18 and 19 degrees were registered for mating pairs
- Mating pairs tended to move into the cover down the side of the stump and so might have been present at other times
- The beetles retreated to the white-rot core when inactive but remained on the surface, still visible but much better camouflaged
- The maximum count of individuals achieved was 7

3.4 Knockalls Inclosure & Rodge Wood (Forest Enterprise)

With the original discovery of *Erotides cosnardi* in Britain being from close to beech woodland west of Staunton, a large area of FE managed forest lying to the south-west of the village was subjected to a walk-through exploration on 14th June 2017. The Ancient Tree Inventory shows very few notable trees in this area but this was suspected to be under-recording rather than true absence.

Knockalls Inclosure comprises a large area of forestry plantations with a very roughly pear-drop shape. Working on the basis that the outer fringes of such forestry blocks tend to be less intensively managed, with landscape and shelter as the primary objective, the outermost forest ride on the west side was used to access those fringes. This proved to be the case, with semi-natural aspects very much widely present, with ash, hazel, lime and oak prominent although few veteran trees. Two veteran trees were noted along the lower western edge of the Inclosure: an alder pollard of about 3m girth stands on the old boundary bank at SO5352611310 and a goat willow pollard of 1.76m girth on a bank below the forest ride. A large lime pollard of about 5m girth stands inside the edge of adjoining pasture on the north side, at SO5379612144. Where the Inclosure narrows at the north end, on the west side of the unenclosed pasture of Staunton Meend, veteran beech line the old boundary bank. These include what appear to be the remnants of an old laid beech hedge, with massive bases and potentially white-rotten interiors. Beeches continue into Rodge Wood, forming the western fringes together with oaks. These beech trees are high forest form standards of about 2m girth. There is also an area of old beech coppice on rocky ground with oak standards. This 'neck' area, where Knockalls meets Rodge Wood, has the potential to be providing valuable habitat for *Erotides cosnardi*.

The western side of Knockalls Inclosure – named Birchen Wood on the OS 1: 25 000 map) – includes a stand of dense maturing beech, with maximum girths of around 1.5m. This area also has potential to support *Erotides cosnardi* in the future if some beeches were to be retained in perpetuity.

3.5 Astridge Wood SSSI & Forge Wood (private woodlands)

3.5.1 Background information

Astridge and Forge Woods occupy a strategic position, clothing the west-facing slopes of the side valley of the Valley Brook opposite Highbury Wood NNR and between the Cadora/Highbury complex and the Staunton area woodlands to the north. The Ancient Tree Inventory shows a small number of notable trees through these woods but this was suspected as being under-recording rather than reality.

It is another of the lower Wye Valley woodland SSSIs and part of the Wye Valley Woodlands Special Area of Conservation (SAC). The citation states that it is one of the best examples of rich calcareous mixed coppice woodland in the Wye Valley; it comments that most of the trees have been subject to coppice management and that there are a relatively small number of maiden trees in the wood. The citation only discusses vegetation, no fauna.

3.5.2 2017 fieldwork

The public paths through these woods were walked on 14th June, the last day that *Erotides cosnardi* was seen at Highbury Wood.

Astridge Wood proved to be as unusual as the SSSI citation suggests, with ash standards over hazel coppice and a rich variety of other native plants. Maidens appear to be more frequent than the citation suggests however. Beech is also present but of relatively small girth. The dominance of ash in the canopy means that much dappled sunlight reaches the ground flora – closed canopy conditions here does not mean heavy shade. Large old yew trees are a feature at the top of the path which cuts up the slope before leaving the woodland towards Newland village.

Large old yews are also a feature along the track through Forge Wood, together with large old lime coppice stools and pollards. There is much conifer plantation here too and stands of dense pole ash and lime. One lime pollard within the woodland at SO5393710092 has a girth of 3.58m and the south side is open and hollow. Further north are a series of large old lime pollards inside the lower edge of the wood, towards Old Hills Wood, and with girths of about 6m and 7m. These old limes presumably contain much white-rotten heartwood and are potentially of considerable interest for saproxylic invertebrates.

Following the discovery of *Erotides cosnardi* using the willow stump, another visit was paid to the core of the wood on 22nd June to find out more about the wood-decay habitat available. The lower path cuts through typical old coppice with standards terrain but with a few veteran trees scattered through: one large old beech stump about 1m high, one lime pollard, and large old coppice stools of alder and other species. There does seem to be a good resource of large volume decaying wood present.

3.6 Highmeadow Woods, Beaulieu Wood & The Kymin, Monmouthshire

The strip of **Highmeadow Woods** which lies along the south side of the A4136 Staunton to Monmouth road close to Beaulieu Farm was briefly explored on 22nd June 2017 as this is close to one of the two most likely sites for the original 1944 record (see section 4). This strip of FE land comprises mature high forest beech and oak, one of the largest girth beech being 2.8m gbh. Old sawn stumps of oak are frequent here. Young beech are frequent and so there is a relatively good age structure to this beech population. The structure is generally open canopied, with goat willow, elder and hawthorn in the glades. The larger beech may already have some white-rotten heartwood developing, or at least will have in the coming decades.

This area has the potential for some targeted conservation work for improving its quality for *Erotides cosnardi*. Some very small-scale opening up by cutting any larger beech showing signs of rot-hole or heartwood-decay formation. Any sections with decay should be retained on site but solid sections might be removed and sold in order to provide some funding for the work.

Beaulieu Farm includes a strip of old beech coppice with a large old pollard-form beech close to where the public path passes through. This appears to be around 6m girth. This strip provides some potential habitat for *Erotides cosnardi*.

Beaulieu Wood (Woodland Trust) is predominantly a dense spruce plantation but has a few veteran oak, ash and beech around its margins. Subsequent consultation of the Ancient Tree Inventory has shown that it also contains a core of old beech trees, along the line of low rocky outcrops. These were not investigated during the visit.

The grounds of **The Kymin (National Trust)** also contain some mature high forest form beeches. One large beech had recently been felled and the trunk left, but the smaller branch-wood all removed. The trunk shows no sign of heartwood decay although southern bracket *Ganoderma australe* was fruiting at its base so there must be a pocket of white-rot within the base.

3.7 Little Doward, Herefordshire (Woodland Trust)

Little Doward is a Woodland Trust property within the Upper Wye Gorge SSSI. The core is an ancient deer park named Wyastone Leys which retains much of its ancient drystone park wall and ancient old growth beech wood pasture.

Telfer (2016) reported finding a single specimen of *Erotides cosnardi* on Little Doward, 13th May 2015. He records that it was found by sweep-netting the vegetation around the base of a standing dead beech. He provided images of that tree and stated that it is in a very open situation and in a quite advanced stage of decay with the bark around the base of the trunk starting to loosen and with some soft rotten wood exposed, no bracket fungi were noted, but no further details, not even a precisely mapped location. Girth would have been a very useful piece of data. An attempt was therefore made to try and find that tree and to make more detailed observations on its size and condition, and - should the opportunity present itself - search for larvae

within the decayed wood. Much of the morning of 1st June was therefore spent exploring the old growth beech areas of this site but to no avail – the beech with the *Erotides cosnardi* could not be found. The area does however have the appearance of very suitable old growth beech habitat and at a larger scale than seen anywhere else in the Wye Gorge area. The full range of beech saproxylic microhabitats appear to be present and in great abundance. The habitat quality is considerably better than the impression previously provided by Woodland Trust staff and mentioned in Alexander (2014b). The age structure of the beeches appears excellent too, providing good habitat continuity into the future. The old beeches occur both in open sunny situations and in denser and shadier stands, providing a range of micro-climatic conditions.

The only wood-decay fungi noted fruiting on the old beeches were southern bracket *Ganoderma australe* and *Kretzschmaria deusta* (formerly known as *Ustulina*). Both form white-rotten heartwood, in which *Erotides cosnardi* is believed to develop.

General searching across the steep slopes of old beeches resulted in the discovery of a number of saproxylic beetle species but no *Erotides cosnardi*. Larvae of the wood mould inhabiting darkling beetles were found in one old beech stump, presumably *Prionychus ater*, a species not reported here by Kirby (2004). Specimens have been retained for rearing in order to clarify their identity. Fragments of Rhinoceros beetle *Sinodendron cylindricum* were found in many decaying trunks and this may be an important species in creating suitable conditions within the decay trunks.

While a good grazing regime has been restored to much of the site, using a suitable rare breed (white park cattle), the most valuable extent of old growth beech is currently outside of the grazing enclosure. While this has enabled good growth of young beech trees it has also allowed the development of rampant bramble growth. Thorn does act as a nurse for developing saplings, keeping browsing wild large herbivores away but it also blocks access for survey and monitoring.

4 THE SITE OF THE ORIGINAL DISCOVERY

The original locality has remained anonymous as the discoverer was rather vague about its whereabouts. The first beetle was found by Mr Robert Lewis' sister, Miss L. Lewis, in the garden of their house on the Staunton Road, a mile or so to the east of Monmouth (Airy Shaw, 1944). The garden was described as surrounded by woods, though part of these were cut in 1936, leaving mostly young trees and masses of brambles and Clematis. The uncut portion, however, contains some very old oaks and beeches. The soil is red sandstone, with clay in parts. Mr Lewis has ascertained that the two local sawmills, two and three miles distant respectively, use only home-grown timber.

From this description, it is clear that:

- the beetle was assumed to be a native, not brought in with timber;
- the house belonged to a household named Lewis,
- the house lay somewhere along the Staunton to Monmouth road, surrounded by woods.

The one feature which might be used to identify the precise spot is the family name of the household, although unfortunately 'Lewis' is a common name in Monmouthshire.

The present writer consulted Paul Harding (formerly Head of the Biological Records Centre) who was known to have been spending considerable time researching his family tree and so would have good understanding of the genealogical resources available and the best ways to identify the locations of Lewis households along the Staunton Road in 1944. PT pointed out that the UK Government censuses carried out every ten years were not in the public domain for the 1940s. However, he suggested that the Occupational Register for 1939 might provide some useful information. He accordingly very kindly followed this lead up and discovered that there were two Lewis households with an address on the Staunton Road in 1939, at:

- Fiddler's Elbow SO526137: the adjoining woodland is now part of Fiddler's Elbow NNR.
- York Cottage SO535125: the adjoining woodland is Highmeadow Woods

Both of these locations would appear to fit the description provided in 1944

5 DISCUSSION

5.1 Highbury Wood NNR

The discovery of adults of *E. cosnardi* on a relatively recently cut stump of a twin-stemmed Goat Willow *Salix caprea* is a major advance in our knowledge of the behaviour and ecology of this endangered beetle.

5.1.1 Habitat and situation

The goat willow twin-stemmed tree is reported to have been overhanging the access track to Highbury Farm, and Natural England were requested to remove it. This they did on 4th March 2017 (Robert Silverwood, pers. comm.). The two main stems of the tree were chain-sawn at about the same level, cut more or less horizontally, and the felled tops cut into lengths which were stacked alongside the track and the lop-and-top piled the other side of the cut stumps. The bases of the two stems proved to have advanced white-rotten heartwood – but the stacked poles showed no sign of heartwood decay; a few rings of cut stem exhibiting the white-rot hollowing were pushed behind the stack. Although heartwood-decay had been progressing within the twin trunks, cavity formation had not yet occurred, and it is therefore presumed that white-rotten cavities suitable for *E. cosnardi* larval development were not present. The fungus causing the heartwood decay was not fruiting and so could not be identified – southern bracket *Ganoderma australe* is the most likely fungus as fruit bodies of this species have often been observed on goat willow.

The stump is situated on the lower edge of Highbury Wood NNR, a large area of ancient semi-natural woodland of mainly coppice structure, but with a line of large old beech and yew along the central ridge of Offa's Dyke.

The slope here is actually north-east facing as the site lies near the entrance to the side valley of the Valley Brook, with Highbury Wood NNR clothing the ridge between this valley and the Wye.

The woodland immediately above is dominated by hazel coppice beneath young standards, mainly ash but including a few wych elm and cherry. Sycamore and birch

are present up-slope, together with field maple and alder, but no beech. All the standard trees are small girth, no more than 1m at breast height, so unlikely to contain much by way of heartwood-decay. The older coppice stools however may contain volumes of white-rot, but this would be difficult to ascertain.

There are no beech in the immediate vicinity, the closest being a mature standard farther up along the farm access track, about 100m away. The latter tree is about 2m in girth and has a small rot-hole on its upper side but it is difficult to know whether or not this constitutes suitable larval habitat. The next closest is farther down the track towards the village, and stands on the boundary between the track and a cottage garden below; the girth is about 3m and the stem forks at about 1.5m height. The veteran beeches along the summit ridge do however include examples with extensive white-rot development and some with cavities; these are about 250m away at their closest. These are substantial distances for such a small beetle.

Four adult *E. cosnardi* were observed on the un-decayed outer halves of the cut wood surface, two on each stump, at about 17.00 on 31st May 2017. The individuals exhibited no behaviour towards each other, and were poised with the front part of their bodies and their antennae raised, moving occasionally to shift position. They occasionally appeared to respond to the observer's presence, especially while being photographed and while the camera lens approached closer to them. The individual concerned moved either over the lip of the cut stump onto the mossy, rugged bark surfaces below, or else onto the central core of white-rotten heartwood, whichever was closest. One specimen retained for closer examination proved to be a male. Although feeding from the cut wood cannot be ruled out, the attention of the beetles observed appeared more as if sensing the chemical composition of the air. The wood would have been very sappy immediately after cutting but now, two months later, the cut wood was moist but not obviously sappy. Cut live wood potentially holds more nutrition than dead wood as the tree has been unable to withdraw nutrients from the woody tissues before death, unlike the situation with natural death of the wood.

5.1.2 Behavioural observations

The discovery of adult *E. cosnardi* on the cut surface of a stump of relatively recently freshly cut willow provides a new insight into the behaviour of this rare and elusive species. It has never before been associated either with cut stumps or goat willow in Britain, which raises a number of questions.

Given the absence of old decaying beech in the immediate vicinity, had they flown a large distance in order to feed, or might they have developed in the white-rotten heartwood of the same goat willow which had been felled? Or was there other suitable development habitat close by that escaped the notice of the observer? And, of course, the site is east-facing rather than south-west, which has always been the assumed preference for adult activity – slopes with a sunny aspect in the afternoon and early evening.

The midday observations on 1st June found the beetles on the white-rotten surface and very sluggish. Had they retreated here as a refuge while less active? The structure of the white-rot provides many small cavities for hiding within.

Both records from Cadora Woods relate to single individual adult beetles found by sweep-netting ground vegetation in the vicinity of timber stacking bays alongside the main forestry extraction track – although there was no timber stacked here at the time and there was no evidence of recent forestry operations (P. Kirby, pers. comm.). The new information does however raise the question of whether these were individuals that had been attracted to freshly felled timber rather than to larval habitat. Freshly cut wood is presumed to provide unsuitable larval habitat as the desirable timber product is normally unaffected by heartwood decay.

The individual adults on the Highbury Wood cut stump were showing no obvious interest in each other which may suggest that they were all from the same sex? Is the stump being used as an arena? Are these particular beetles all males, waiting for females to be attracted to the stump? When active their antennae were clearly on the alert, being spread high, perhaps scenting the air?

The beetles when inactive are similar in general appearance to the tan-coloured beech bud scales shed after leaf opening and this may be an evolved camouflage for life in old growth beech stands.

5.2 Habitat management issues and options

A question arises about the previous association with large old beech trees. Beeches have the potential to provide large volumes of white-rotten heartwood as well as cavity formation as decay proceeds, but so do lime, ash, sycamore and other tree species, native or otherwise. The goat willow stump contained white-rotten heartwood. How important is cavity formation for *Erotides cosnardi*? and how much white-rotten wood is needed? Are the larvae active only in white-rotten wood or do they explore the accumulations of wood mould in the base of the cavities? The larval requirements appear to be completely unknown at present.

Damage to growing young beech trees by grey squirrels and deer may be detrimental to forestry interests but it does act as a veteranisation process, stimulating development of white rot at a much earlier stage. Provided the tree survives the damage, it may provide *Erotides cosnardi* larval habitat sooner rather than later, provided the volumes are suitable.

Microclimate may also be important. It is thought likely that veteran trees favoured by the beetle for egg-laying and larval development will be in situations open to sunlight and where the decaying wood will be regularly warmed by the sun. The association of this rare beetle with two medieval royal forests – Dean and Arundel – may imply an association with wood pasture habitat, where historic livestock grazing practices have maintained open stands of trees with a relatively high frequency of veteran trees in warm sunny situations. In both cases, managed grazing is now considerably reduced, almost eliminated, following widespread conversion to commercial forestry. This may go some way in explaining the small size and extreme localisation of the known populations of this beetle, making it very difficult to find on demand and to monitor. It may be that management aimed at opening up around veteran beeches – halo clearing - could be beneficial to the species.

The 2017 surveys have provided new information on the behaviour of adult beetles. Never before has arena-type behaviour been described for net-winged beetles, but the beetles observed did seem to be remaining on the stump for a reason, and appeared to be showing great interest in the chemistry of the surrounding air and presumably wind currents; the individuals seemed to be reluctant to fly away when disturbed. Management trials, setting up cut stumps across the known range of the beetle, would be a very interesting option, especially where combining cut stumps with heartwood decay as well as un-decayed stumps. Such trials would necessarily have to be small-scale, both from human resource and habitat resource points of view. It would be counter-productive to kill too many potential habitat trees for such an extremely rare beetle.

6 RECOMMENDATIONS

6.1 Areas where future survey work could be targeted

Two distinct foci are beginning to form for the species although this may still reflect under-recording: the Cadora/Highbury Woods complex on the ridge between the Wye and the minor valley of the Valley Brook, Lower Redbrook in Gloucestershire and the Little Doward area of Herefordshire, 6-7km to the north. The original discovery west of Staunton, in Monmouthshire, is about half way between the two. Has the local population become fragmented into two, or is the area in between still under-recorded? Direct searching is time-consuming and so a few trials of providing a network of cut stumps like the Highbury one may be worth investing in. A high priority will be to check the original stump over the next few years, to see if it is still active. A number of other areas with concentrations of old beeches remain to be investigated too. The top sites for survey therefore appear to be as follows:

- Highbury Wood NNR, Gloucestershire:
 - to see if the willow stump is still in use one year on;
 - explore more widely to see if the beetle can be found elsewhere, especially if other cut stumps become available.
- Beaulieu Wood (Woodland Trust), Monmouthshire:
 - To investigate the suitability of the old beeches deep within the plantation.
- Fiddler's Elbow area, Monmouthshire
 - The Fiddler's Elbow NNR comprises three coppice woodlands – Priory Grove, Lady Grove and Garth Wood – and has been described as mainly oak standards over beech, hazel and lime coppices, but the Ancient Tree Inventory indicates a good number of notable beech through the area north of the A road.
 - Priory Grove is now owned by Woodland Trust, while the Fiddlers elbow is managed by NRW in partnership with the private landowner.
 - Access is from the Hadnock Road below the woods.
- Lord's Wood, Herefordshire
 - A long sweep of the Wye Gorge east from Little Doward about which very little seems to be known with regard to old growth remnants.
- Lord's & Harper's Groves, Monmouthshire
 - A key linkage area between the two known populations, between Lower Redbrook and Beaulieu Wood

6.2 Development of a network of trial management sites

The discovery that *Erotides cosnardi* will use a cut stump as an arena for males to attract females (apparently, but not proven) is a major coup. It remains unclear whether or not the presence of a white-rotted core in the goat willow stump was essential. Can the beetle develop in white-rotten goat willow as well as beech and perhaps other tree species such as lime, ash and sycamore?

Although questions remain, it was suggested that opportunities be sought to provide a series of additional cut stumps across likely areas, preferably selecting large girths that may contain white-rotten interiors. Target areas could include:

- Highbury Wood NNR, choosing sites closer to the ridge of old growth beech, or identifying particular stumps arising from any on-going coppice management programme;
- Rodge Wood, Staunton, as this is close to York Cottage, a potential for the original site, and managed by Forest Enterprise;
- Cadora Woods, if the Woodland Trust wish to get involved in the project;
- Highmeadow Woods, parts of which are semi-natural in character.

Three trial sites would be manageable and would generate some answers to whether or not *Erotides cosnardi* populations can be manipulated for monitoring purposes in this way.

As a follow-up to this recommendation, a meeting was held in Rodge Wood with the FC Ecologist, Rebecca Wilson, and the Beat Forester (Dave Sykes) on 19th September 2017. The ecology of *Erotides cosnardi*, the observations from Highbury Wood NNR, and the idea of some trial fellings being carried out over winter 2017/18 were all discussed.

Two areas of Rodge Wood were examined in some detail. The western edge, closest to York Cottage, comprises mature oak and beech high forest. A series of mature beech trees were examined and three selected as potential monitoring trees, for felling. The selected trees have external signs which might suggest heartwood-decay within. The slopes above the central forest ride were also visited although are predominantly former beech coppice which had been singled for conversion to high forest. The area was considered largely unsuitable for the proposed trials but a few mature standard beech along the lower eastern end of the wood do appear potentially suitable. Two large beech which may have white-rot within were identified for felling.

Mature beech stands potentially suitable for *Erotides cosnardi* have also been sought widely across Highmeadow Woods. As this area is primarily managed as productive forestry, there is a general lack of suitable trees, and follow-up assessment of a number of identified possibilities on 20th November has resulted in the selection of just one area where trial cutting will be carried out during winter 2017/18.

6.3 Woodland management for conservation

6.3.1 General considerations

Habitat quality and condition for saproxylic invertebrates depend on four key factors:

- The total number of veteran trees, as the fauna needs sufficient trees to maintain viable populations;
- The age structure of those trees, to ensure continual renewal of available decaying wood habitats;
- The density pattern of those trees, especially in maintaining open-grown conditions, which favour longevity of individual trees, and also provides open sunny conditions for warmth-loving fauna;
- Continuity of habitat in time as well as space – the historic aspect of this fauna.

Conservation management needs to focus especially on tree health, as it is living veteran trees which provide the important decaying wood habitats.

6.3.2 Suggestions for habitat improvement

Woodland management in the Forest of Dean area, and especially along the Wye Gorge, has in recent times focused on high forest structures. Historically, it seems likely that wood pasture would have been much more widely practiced. The latter maintains a more open structure to the tree stands, providing space for the full development potential of the individual trees and especially the ability to grow old without damaging competition for light from more vigorous younger trees, as well as greater sun penetration to the forest floor. It seems feasible that *Erotides cosnardi* is a species of open beech forest conditions. It is therefore recommended that some opening up of beech stands which might be suitable for the beetle should be considered, clearing competitive young growth from around large beech trees – halo clearance. A network of sunny glades might result in an increased abundance of this rare beetle. Any trial areas should preferably be away from areas well-used by visitors as cut stumps provide attractive spots for sitting and picnicking, which is incompatible with beetle arena behaviour.

6.4 The significance of beech old growth in Wye Gorge

Beech old growth is part of the ecological heritage of the Wye Gorge area but has received scant attention from the Government agencies and the NGOs. It is recommended that the conservation of beech old growth in the Wye Gorge is properly addressed in future, with mapping of the key areas and conservation management plans developed which promote not only the protection and conservation of the veteran beech but also promotes the development of diverse age structures of beech and other tree and shrub species which are part of the native vegetation of the area.

Cosnard's net-winged beetle has the potential to be a flagship species for the beech old growth habitat and actions developed here in the Wye Gorge may provide case studies for application to the only other extant population of this beetle, in the Arundel Forest area of the South Downs National Park.

Recognition of the significance of Cosnard's net-winged beetle and the beech old growth habitat in the Wye Gorge is long overdue.

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