

# **A30 Chiverton to Carland Cross Environmental Statement**

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Terrestrial Invertebrate Survey Report**

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## Terrestrial Invertebrate survey of habitat within 100m of the proposed A30 Chiverton to Carland Cross Improvement Scheme



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## Summary

- An invertebrate-specific desk study, focusing mainly on habitat lying within a 100 m buffer on either side of the proposed Chiverton to Carland Cross A30 improvement scheme, was conducted during May 2017. Consulted information included a Phase 1 survey map (provided by WSP) and statutory and non- statutory designated site information. Aerial imagery of the survey area was also consulted.
- An invertebrate habitat scoping study was subsequently conducted to ground-truth habitat short-listed from the desk study for more detailed survey. Of around 30 defined sites including predominately semi-improved grassland, rush pasture, broad-leaved and mixed woodland and lowland heathland, 11 survey areas (or seven composite sites) were defined as requiring more detailed assessment.
- The majority of sites were then surveyed on three separate occasions between late May and early August. Two of the sites which were added later to the survey remit were sampled during single sampling events later in the survey.
- For each site, samples were collected using a variety of sampling techniques relevant to the substrates as described in Drake *et al* (2007). Methods used included mainly sweep net, vacuum, beating tray and direct searching. Mercury Vapour moth trapping and indirect capture methods, such as water traps and flight interception traps, were used at some sites.
- Samples collected during fieldwork were identified, where necessary, using a binocular microscope and appropriate and up to date taxonomic keys mainly including those published by the Royal Entomological Society and Field Studies Council.
- Data was subsequently analysed both on a site by site basis, but also on a combined site/landscape scale, using the newly available 'Pantheon' online resource developed jointly by Natural England, Centre for Ecology and Hydrology (CEH) and the Biological Records Centre (BRC). Pantheon includes a revised version of the Invertebrate Species-habitat Information System (ISIS), a programme developed initially for monitoring and assessing condition of invertebrate features on SSSIs, but subsequently becoming used extensively for Ecological Impact Assessment (EclA) purposes.
- In total, 772 species were recorded from combined sites in the A30 Chiverton to Carland Cross survey area and of these 22 Nationally Scarce were recorded together with a rare migrant species and 15 species listed within the Section 41 (England) of the NERC Act (2006) 'Species of Principal Importance' - 'Research Only' category.
- Within the recorded data, 381 of the species recognised in Pantheon were attributed to 'Open habitat' on a broad biotope level, with 172 species being attributed to 'Tree-associated' and 118 species to 'Wetland' habitats.
- On a habitat level, whilst the greatest number of species, by far, were attributed to the 'Tall sward and scrub' assemblage, the wetland habitats including 'Marshland' and 'Flowing water' assemblages supported fauna of the highest rarity level.
- However, the stand out assemblage from the survey as a whole was recognised at a Specific Assemblage level. The F003 – Open heath and moorland SAT recorded predominately from the combined heathland sites 3 and 5, achieved a species score more than double that of the Favourable Condition threshold set in Pantheon/ISIS. This indicates that these sites support a representative assemblage of high conservation value.
- Using Colin Plant Associates 'Criteria used to define significance of invertebrate habitat', combined Sites 3,4 and 5 fulfils criteria for at least 'National' significance; Sites 1, 6 and 9 all fulfil criteria for sites of 'County' significance for invertebrates and Sites 10 and 21/22 can be seen as supporting assemblages and habitat on the cusp of 'District' and 'County' significance. Insufficient data was collected for a robust analysis of Site 28/29; however

based on available findings it is considered that the site would also support an invertebrate assemblage on the cusp between 'District' and 'County' significance.

## Introduction

In 2017, a study was undertaken to assess the conservation value of terrestrial invertebrate assemblages occurring within a 100 m buffer zone on either side of a proposed road scheme relating to the existing A30 between Carland Cross and Chiverton Cross, Cornwall (hereafter referred to as the proposed Scheme).

The project comprised an initial invertebrate habitat scoping exercise, from which habitats of higher potential invertebrate value were shortlisted for detailed survey using sampling and analytical methods outlined in Drake *et al* (2007).

The scoping exercise was based primarily on perceived invertebrate habitat quality. Habitat was targeted through an initial desk study in which a Phase 1 survey (conducted by WSP in 2015) was consulted alongside invertebrate-specific data provided for the purposes of the project by the Environmental Records Centre for Cornwall and the Isles of Scilly (ERCCIS). In addition, satellite habitat imagery was consulted. Habitats defined as having some potential to support terrestrial invertebrate assemblages of potential conservation value were subsequently ground-truthed between 22<sup>nd</sup> and 23<sup>rd</sup> May, 2017.

Shortlisted areas with potential to support terrestrial invertebrate assemblages of conservation value were subject to more detailed survey. Timed sampling methods compatible with analysis using Invertebrate Species-habitat Information System (ISIS) now integrated into the web-based 'Pantheon' resource, were used. Methods primarily included direct sampling techniques such as timed sweep, vacuum sampling and beating tray; however, night-flying moth surveys using Mercury Vapour traps were also undertaken for certain sites.

The following report details findings of the scoping study and subsequent detailed survey of prioritised invertebrate habitats. Data analysis using Pantheon/ISIS enables a standardised approach and is a method promoted by Natural England both for monitoring of designated sites and for Ecological Impact Assessment (EclA) related applications.



## **Aims and objectives**

### **Aim**

The main aim of the survey was to establish the conservation value of terrestrial invertebrate assemblages occurring in habitat within a 100m buffer along each side of 13km stretch of a proposed Scheme. Findings would be used to assess the conservation value of invertebrate assemblages within these habitat areas.

### **Objectives**

1. To ground-truth and scope habitat with potential to support terrestrial invertebrate assemblages of conservation value within the described survey area;
2. To undertake detailed invertebrate surveys within habitat prioritised during the scoping exercise;
3. To analyse invertebrate data using Invertebrate Species-habitat Information System (ISIS) and produce a report including findings/species lists and an evaluation of key assemblages and species in terms of their conservation value.

## **Method**

### **Desk study**

Prior to conducting fieldwork, existing information pertaining to the invertebrate fauna of the site was consulted. Reviewed information comprised a biological records data-search conducted by the Environmental Records Centre for Cornwall and the Isles of Scilly (ERCCIS), (provided by WSP), which included records of S41 priority species and species currently classed in the UK within either Red Datas Book or Nationally Scarce categories. The review considered records within a two km boundary on either side of the proposed A30 Chiverton to Carland Cross improvement scheme route.

All potential S41 priority habitats (determined by WSP using Natural England's Priority Habitats Inventory) falling within the survey zone were covered by the scoping study. In addition certain, non-priority habitat mapped during a Phase 1 survey of the site, produced by WSP were also considered. These included habitats mapped as semi-improved grassland and marshy grassland as well as wooded areas not mapped as priority habitat.

### **Scoping survey**

An invertebrate habitat scoping survey was undertaken between 22<sup>nd</sup> and 23<sup>rd</sup> May, 2017. The survey encompassed sites within a one-hundred metre buffer of the proposed Scheme. Sites were walked and habitat features, including vegetation composition and structural characteristics beneficial to invertebrates, were recorded. Alongside the scoping study, more readily observed species such as butterflies and day-flying moths were recorded as seen. Also, where appropriate, habitat with potential to support S41 butterflies was scrutinised for the presence of species potentially on the wing at the time of survey.

Habitat features were recorded using geo-referenced target notes and a comprehensive set of digital photographs was taken.

All S41 priority habitats falling within the survey zone were covered by the scoping study. In addition, certain non-priority habitats mapped during a Phase 1 survey of the site, produced by WSP were also considered. Such habitat included habitat mapped as semi-improved grassland, marshy grassland as well as woodland.

Following the scoping study, sites considered to have potential to support invertebrate assemblages and species of higher conservation value were prioritised for more detailed survey.

### **Detailed sampling**

Sites selected for more detailed sampling were surveyed between 24<sup>th</sup> and 26<sup>th</sup> May, using methods appropriate for target habitats. Daytime sampling was undertaken between 8.30am and 5.00pm and the weather conditions were generally warm and sunny over this period. However, wind strength increased over the survey period.

The methodology broadly followed methods outlined in NERR005 (Drake *et al.*, 2007), a manual produced by Natural England, which sets out standard approaches to invertebrate survey and analytical techniques for the purposes of conservation evaluation. The methods and analytical techniques using Invertebrate Species-habitat Information System - ISIS (now part of an online resource called 'Pantheon') have become Natural England's recommended method for both Common Standards Monitoring and EclA applications. The method aims to ensure a robust analysis of key invertebrate assemblages within the specified areas.

### ***Invertebrate Sampling***

In accordance with Drake *et al* (2007) sampling was undertaken using a combination of standard capture methods enabling subsequent analysis using ISIS.

The majority of sites were surveyed on three separate occasions, including the last week of May, the first week of July and the first week of August, 2017. The only exceptions were Sites 21/22 and 28/29 (see Appendix 1, Table 1 and Appendix 2, Figure 1) which were added to the survey following scoping for a grassland National Vegetation Classification (NVC) survey conducted alongside the invertebrate survey during late June/early July, 2017. Site 21/22 was sampled on both the July and August sampling events and a sufficient number of samples were collected for robust analysis using ISIS. Landowner permission was withheld for, Sites 28/29 in August. As such, these sites were only sampled during the late June/early July survey event and a limited number of samples were collected at this date (refer to limitations section below).

Where practical, species were identified on site and without undue disturbance (no butterflies were collected during the course of the survey). However, many invertebrates cannot be adequately identified in the field necessitating specimens to be taken for *ex situ* identification using a microscope.

For robust analysis of assemblages from target habitats, at least four samples were collected per substrate (habitat layer), per site. Natural England generally recommend sampling over four discrete survey events between spring and late summer to comprehensively describe a site's assemblages; however, three site visits is generally considered acceptable to adequately assess the conservation value of a site.

The precise approach to sampling varied according to habitat, the following methods were used during the survey (see results section for site-specific information):

### ***Sweep-net***

A standard sweep net was used to collect specimens from grassland and scrub habitat. Timed sweeps were undertaken in representative habitat in accordance with Drake *et al* (2007);

#### ***Vacuum Sampling***

A vacuum sampler was used to collect ground-dwelling specimens not easily retrieved by other sampling methods. Vacuum sampling was timed, enabling repeatable surveying to be undertaken as specified in Drake *et al* (2007); and

#### ***Beating tray***

A beating tray was used to collect specimens from trees and scrub habitat. Timed samples were collected in accordance with Drake *et al* (2007).

In addition, the following methods were used:

#### ***Direct searching***

Direct searching beneath refugia such as rocks, under bark and in the crevices of standing and fallen trees;

#### ***Spot sampling***

Direct catching of species not easily caught using other methods (e.g. bees, solitary wasps, large hoverflies etc.);

#### ***Water Traps***

Water traps comprise flattish, shallow pans with the inside surface painted white which are filled with a solution of ethylene-glycol (antifreeze), water and a few drops of detergent (washing up liquid). Traps were deployed on the ground in suitable habitat and left for a period of two or more days (timing varied). Contents of each traps was collected and specimens preserved. Water traps are particularly effective for capturing flying insects such as two-winged flies (Diptera) and bees and wasps (Hymenoptera);

#### ***Flight interception traps***

Flight interception traps are effective in capturing flying insects such as social and solitary bees, wasps (Aculeate Hymenoptera), true flies (Diptera) and other aerial taxa. Flight interception traps were suspended from tree branches and flying insects and other captured invertebrates were preserved in an ethylene glycol (antifreeze) solution. Traps were run for approximately five days; and

#### ***Mercury vapour moth trapping***

In addition to the day-time surveys, moth trapping was undertaken on some sites. Moth trapping involved use of standard Robinson moth traps fitted with 125W mercury vapour bulbs. The traps required the use of 1KA petrol generators.

Moth surveys were undertaken overnight within the same time frame as the day-time surveys. Trapping followed standard moth trapping protocol as described in Fry and Waring (2001) and best practice advice for invertebrate surveys was followed throughout.

Where possible, trapping was undertaken during nights when conditions were optimal i.e. mild, still, cloudy nights with minimal moonlight (this was not always possible – see limitations section below).

Traps used included industry-standard Robinson traps fitted with 125W mercury vapour (MV) bulbs. Note: MV traps require a 240V power supply and therefore, petrol generators were required to run the traps due to the remoteness of survey locations from mains supply. Between six and eight MV traps were deployed over three separate survey sites.

Each generator was located in suitable habitat, were possible away from main routes used by members of the public. Two to three traps were run from each generator and 100 metres of cable for each trap enabled a maximum of 200 metres between traps sharing a common generator. Power cables were fitted with RCD circuit breaker trip switches.

Generators and traps were supervised and topped up as necessary to ensure adequate running time was maintained to cover both dusk and dawn periods.

In addition to MV traps, actinic traps were occasionally deployed in more remote parts of the sites. Actinic traps do not require a 240V supply and can be operated using a standard 12V car or motorcycle battery. Actinic traps are not as effective at producing large catches as MV traps, but are useful for sampling in inaccessible areas.

The precise locations of traps were determined during the initial site visit and positions of traps were maintained or moved to different locations during subsequent visits, pending findings and conditions.

Traps were set to run from dusk until dawn. The species collected in each trap were examined, recorded and released during the early part of the morning to minimise disturbance. Typically species lists for the first trap were recorded at around 5am and in all cases, the final trap was visited no later than 11am. In accordance with best practice, specimens were released into suitable cover to minimise the chances of predation by birds and other animals. Where identification in the field was not possible due to a requirement for microscopic examination, or in cases where a voucher specimen was required, specimens were collected for *ex-situ* identification. Both macro and micro-moths were covered by the survey.

All trap locations were geo-referenced using a handheld Garmin Global Positioning System (GPS) device, weather conditions, habitat notes and any other relevant data were standardly recorded.

#### **Identification – all taxa**

Specimens not identified in the field were identified using a binocular microscope and appropriate taxonomic keys.

#### **Data analysis**

Species data was input into Natural England's ISIS analytical package. The version of ISIS used was the newly available online version which has been revised and integrated within the Pantheon invertebrate recording resource (version 3.7.4) (Webb *et al*, 2017) Output and results are presented and discussed within the following sections of this report.

Species lists are entered into Pantheon/ ISIS which then produces a variety of tables and descriptives resulting from analysis. The key elements used for the purpose of the current report are included in three output tables which evaluate species assemblages on different habitat scale. These include a Habitats and resources 'broad biotopes' table, a Habitats and resources 'habitats' table and an ISIS – Specific Assemblage Types (SATs) output table.

At each scale, invertebrates are grouped according to a known affinity to a particular habitat or habitat resource. On the biotope scale the resolution is very broad e.g. 'wetland', 'open habitats', 'tree associated'. The next layer down, the habitat scale<sup>1</sup> groups invertebrates into somewhat more defined subdivisions such as 'marshland' and 'peatland' which are subdivisions of the 'wetland'

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<sup>1</sup> Habitat scale is analogous to the Broad Habitat Type (BAT) classification used in older versions of ISIS

biotope scale, for example. Examples of assemblages within the most precise scale, the Specific Assemblage include 'reed-fen and pools' grouped within the 'wetland' – 'peatland' hierarchy and 'undisturbed fluctuating marsh' which is nested as a third tier within the 'wetland' – 'marshland' hierarchy.

Unlike the previous versions of ISIS, the Pantheon version lists all species of higher conservation status (S41 species and RDB and Nationally Scarce species) which are grouped within a particular assemblage. Like the earlier versions, the tables also classify each assemblage in terms of 'favourable condition status'. And at the broader 'biotope' and 'habitat' scales, Species Quality Index (SQI) scores are given for each defined assemblage. The SQI pre-exists ISIS and formed the basis of the development of the programme. SQI scores provide assessment of the rarity value of a group of invertebrates based on mean rarity value.

For the purpose of this project, ISIS analysis was undertaken on two scales as is possible with ISIS. The whole dataset for all sites combined was analysed, enabling a landscape scale evaluation and also data was analysed on a site by site basis.

In certain cases, it was considered that sites named as separate units were analysed as a single unit. This was the case with Sites 21 and 22 and Sites 28 and 29 (see Appendix 1, Table 1 and Appendix 2, Figure 1) which could be seen as components of the same unit and for the heathland Sites 3 and 5 (see Appendix 1, Table 1 and Appendix 2, Figure 1) and the mixed woodland with remnant heathland patches in-between. The rationale for these decisions was in part that the sites were contiguous and also that there were overlapping edge habitats common to both units. Also moth trapping at the boundary of the heath and woodland Sites 3 and 4 and the linkage of these to Site 5 meant that there was an overlap in terms of catchment between these sites.

### **Survey Limitations**

The weather during the 2017 survey was inconsistent. In addition, the geographic position of the survey area meant that weather conditions could change sometimes rapidly and more elevated sites were exposed to southwest wind in particular. The necessity for survey timings to be pre-arranged, sometimes several weeks prior to the survey being conducted meant that it was not always possible for survey work to be undertaken in favourable, still, sunny and dry weather conditions. However, every effort was made to survey only during dry weather (sweep, vacuum and beating sampling).

Dry weather is not as critical for overnight moth trapping. Indeed, according to Fry and Waring (2001) and personal experience, significant catches can be made even during periods of heavy rain. That said, windy weather, not ideal for moth trapping was unavoidable on some occasions and may have compromised catches. Site 3 was particularly vulnerable to wind, being elevated. The impact of wind was anticipated during the second trapping episode and sampling was undertaken on a suitable night 27<sup>th</sup> June, which returned reasonable results. The wind problem was less pronounced within more sheltered sites 1 and 9 (see Appendix 1, Table 1 and Appendix 2, Figure 1). Overall, the resolution of sample data has ensured robustness within the survey sites and a sufficient number of samples were collected from representative habitat across the survey area to ensure a rigorous appraisal despite the necessity for some sampling to be undertaken in marginally suboptimal conditions.

Two sites not highlighted for survey during the initial scoping study, were added following the scoping of grassland sites between Zelah and Chiverton Cross section. Site 28/29 (see Appendix 1, Table 1 and Appendix 2, Figure 1), which supported herb-rich grassland habitat just north of Chiverton Cross was consequently not sampled during the initial (late May) survey window. Whilst this site was sampled during late June/early July, the landowner subsequently withheld survey permission and consequently an insufficient/borderline number of samples only were available only

for analysis. This means that stand-alone analysis and interpretation of data for Site 28/29 should be treated with caution. However, the landscape scale (combined site) analysis that has been completed is not compromised by this omission.

Similarly, a decision was only made to sample from Site 22/23 (see Appendix 1, Table 1 and Appendix 2, Figure 1) (the only other area considered to support habitat of reasonably high potential invertebrate value within the survey area) during the final visit in early August. However, at this time a sufficient number of samples were collected from all substrates to enable a robust analysis using ISIS.

On one occasion, management activities compromised the sampling of habitat. A herb-rich SI meadow at Site 10 (see Appendix 1, Table 1 and Appendix 2, Figure 1) was being cut for hay on the day earmarked for survey and consequently sampling was on this occasion confined to a headland supporting stands of wetter grassland habitat within the same field, but just outside of the proposed sampling zone. The overall impact of this is considered minimal as the fauna collected was representative of the unit as a whole.

Restrictions placed by the landowner of the Site 1 (see Appendix 1, Table 1 and Appendix 2, Figure 1) - priority woodland and woodland edge from the outset of the survey 'due to nesting birds', meant that sampling at this site was confined to the south-easternmost section. The edge habitat here was representative of the habitat along the length of the woodland. However, the woodland interior further west and north was arguably of better quality and more representative of ancient coppice woodland. In terms of moth trapping it would be expected that the coverage of trapping would bring in species representative of the greater woodland. Although some less mobile species occurring only within the more sheltered woodland interior may have been missed, this would not be expected to have significantly compromised the results.

Other than bumblebees, Aculeate Hymenoptera species (bees, ants and wasps) were poorly recorded during the survey. Mining bees of the larger genera *Andrena* and *Lasioglossum* and their respective associated parasites *Nomada* and *Sphecodes* were absent, apart from two species of *Lasioglossum*, from the samples.

Many such species occur most commonly in the early part of the season (between March and mid-May) corresponding to flowering periods of firstly Blackthorn *Prunus spinosa* and willows *Salix* spp. and subsequently, Hawthorn *Crataegus monogyna*. Although a late May survey was undertaken, the survey itself commenced too late in the season to enable coverage of early season species such as these. It could be argued that a late August survey would have also enabled a greater range of aculeates and other late season taxa to be recorded; however, from a pragmatic viewpoint the periods of higher diversity between late May and early August ensured that the most biodiverse assemblages were adequately covered.

The survey included primarily arthropod groups recognised within the ISIS analytical approach. It is important to note that no molluscs or representatives from other macroinvertebrate groups such as annelids were recorded during the survey and these would require additional survey if required. Such groups are not normally prioritised for evaluations of invertebrate assemblages using ISIS. Certain families of Diptera (two-winged flies) such as Muscidae and Tachinidae and non-Aculeate Hymenoptera (including Ichneumonids and other parasitica) are not included within ISIS analysis and not covered by the survey.

Pantheon/ISIS also recognises aquatic macro-invertebrate species normally only obtainable from dedicated aquatic sampling. Such species are attributed alongside terrestrial or partly terrestrial

species within assemblages such as, for example 'Marshland' and 'Peatland' and their nested SATs. Whilst some aquatic habitat worthy of sampling was recognised during the survey, it was understood at the outset of the project that the current survey was to be focussed entirely on terrestrial fauna and that any aquatic macro-invertebrate survey work would/had been undertaken as part of a separate contract. Therefore, this element was not covered by the survey.

## Results

### Desk study

The following sites subject to statutory designation occur within two km of the Scheme footprint:

- Newlyn Downs SAC/SSSI – 143m
- Carrick Heaths SSSI – 345m
- Ventongimps SSSI – 1585m
- Carnkeif Pond SSSI – 1910m

Records provided by the Environmental Records Centre for Cornwall and the Isles of Scilly (ERCCIS), (provided by WSP), included a vast number of records covering a large area. A number of the records were very old, dating back to the early C20<sup>th</sup> and also a number of records were for universally common species, such as the soldier beetle *Rhagonycha fulva* which is extremely common throughout the UK. To make the results manageable, only records within a two kilometre radius of the site from and post-1989 were consulted and then only species of conservation value.

Some species classified under IUCN post 2001 criteria as being of 'Least Concern' were removed from the list when they did not have another rarity-based designation. Whilst species listed within Section 41 (S41) of the NERC Act 'Species of Principal Importance' were considered within the review, many of these species were moth species afforded S41 status due to the recorded decline in recent decades of these species. However, the majority of species listed are still widespread and common throughout the UK. Such species are not considered individually within this review. However, species with true rarity value in the UK, i.e. species classed within one of the categories including Nationally Scarce and Red Data Book are included. The review also considers species with a conservation status other than 'Least Concern' under post-2001 IUCN guidelines.

### **Nationally scarce and Red Data book species (including both pre-1994 and post-2001 IUCN criteria designations) recorded within 2km of the proposed scheme**

#### ***Butterflies (Lepidoptera) 8 species***

The following species of butterfly have been recorded within two kilometres of the proposed scheme post 1989 records only:

**Marsh Fritillary *Euphydryas aurinia*** - Biodiversity Lists - England NERC S41; Red listing based on 2001 IUCN guidelines, Vulnerable; Red Data Book Cornwall and Isles of Scilly (2009), Red Data Book Species. Marsh Fritillary occurs in three main habitat types including damp, tussocky grasslands; chalk grassland; shorter coastal grasslands. The main larval foodplant is Devil's-bit Scabious *Succisa pratensis*, but occasionally uses Field Scabious *Knautia arvensis* and Small Scabious *Scabiosa columbaria*.

**Small Pearl-bordered Fritillary *Boloria selene*** - Biodiversity Lists - England, England NERC S41 Red listing based on 2001 IUCN guidelines, Near Threatened. Mainly a coppice woodland species, but in Cornwall, colonies of the butterfly occur on moorland and cliffs. At all sites, damp areas are

favoured, where the foodplants grow particularly vigorously. A violet *Viola* spp. feeding species; the main foodplants are Common Dog Violet *Viola riviniana* and Marsh Violet *Viola palustris*

**Small Heath *Coenonympha pamphilus*** - Biodiversity Lists - England, England NERC S41; Red listing based on 2001 IUCN guidelines, Near Threatened. Occurs in a range of habitats including grasslands, heathlands, quarries, railway embankments, sand dunes etc. Adults prefer sites with shorter swards. Larval foodplants include grasses such as fescues *Festuca* spp., meadow grasses *Poa* spp. and bent-grasses *Agrostis* spp.

**Grayling *Hipparchia semele*** - Biodiversity Lists - England, England NERC S41; Red listing based on 2001 IUCN guidelines, Vulnerable. Mainly a coastal species, inland colonies occur in habitats including; dry heathland, chalk grassland, old quarries, earthworks, derelict industrial sites such as old spoil heaps and very occasionally in open woodland on stony ground. Foodplants include fescues *Festuca* spp., bent-grasses *Agrostis* spp. and other species.

**Wall *Lasiommata megera*** - Biodiversity Lists - England, England NERC S41; Red listing based on 2001 IUCN guidelines, Near Threatened. Once found much more widely, the Wall is now found mainly in coastal areas such as unimproved grassland, wasteland, cliff edges and hedgerows. Larvae feed on grasses including bent-grasses *Agrostis* spp., Cock's-foot *Dactylis glomerata*, false-bromes *Brachypodium* spp., Wavy Hair-grass *Deschampsia flexuosa* and Yorkshire Fog *Holcus lanatus*.

**Silver-studded Blue *Plebejus argus*** - Biodiversity Lists - England, England NERC S41 Red listing based on 2001 IUCN guidelines, Vulnerable; Red Data Book Cornwall and Isles of Scilly (2009). Habitat is mainly heathland, but also coastal sand dunes and calcareous grassland in some parts of its range. Larval foodplants include ericoids such as *Calluna vulgaris*, *Erica cinerea* and *Erica tetralix* as well as gorses *Ulex* spp.

**Dingy Skipper *Erynnis tages*** - Biodiversity Lists - England, England NERC S41; Red listing based on 2001 IUCN guidelines, Vulnerable. Habitats include a range of open, sunny habitats including chalk downland, woodland rides and clearings, coastal habitats such as dunes and undercliffs, heathland, disused quarries and railway lines and waste ground. Larval foodplants include bird's-foot trefoils *Lotus* spp. and Horseshoe Vetch *Hippocrepis comosa*.

**Grizzled Skipper *Pyrgus malvae*** - Biodiversity Lists - England, England NERC S41; Red listing based on 2001 IUCN guidelines, Vulnerable. Main habitats include: Woodland rides and clearings; unimproved calcareous grassland; recently abandoned brownfield sites. Occasionally occurs on heathland, damp grassland and dunes. Larval foodplants include: Agrimony *Agrimonia eupatoria*, Creeping Cinquefoil *Potentilla reptans* and Wild Strawberry *Fragaria vesca* amongst other related species.

#### **Beetles (Coleoptera) (10 species)**

The following species of beetle have been recorded within two kilometres of the proposed scheme post 1989 records only:

**A rove beetle *Staphylinus caesareus*** - Red Listing based on pre 1994 IUCN guidelines, IUCN (pre 1994) – Indeterminate (RDBK).

**A diving beetle *Hydrovatus clypealis*** - Rare and scarce species (not based on IUCN criteria), Nationally scarce.

**A water scavenger beetle *Laccobius atratus*** - Rare and scarce species (not based on IUCN criteria), Nationally scarce.



**A water scavenger beetle *Helochares punctatus*** - Rare and scarce species (not based on IUCN criteria), Nationally scarce.

**A water scavenger beetle *Paracymus scutellaris*** – Nationally Scarce.

**A helophorid beetle *Helophorus alternans*** - Rare and scarce species (not based on IUCN criteria), Nationally Notable A.

**A burying beetle *Nicrophorus interruptus*** - Rare and scarce species (not based on IUCN criteria), Nationally Notable B.

**A longhorn beetle *Leptura aurulenta*** - Rare and scarce species (not based on IUCN criteria), Nationally Notable A; Red Data Book Cornwall and Isles of Scilly (2009).

**A leaf beetle *Calomicrus circumfusus*** - Rare and scarce species (not based on IUCN criteria), Nationally Notable A

**A true weevil *Curculio betulae*** - Rare and scarce species (not based on IUCN criteria), Nationally Notable B.

***Two-winged flies (Diptera) (3 species)***

The following species of two-winged fly have been recorded within two kilometres of the proposed scheme post 1989 records only:

**Short-horned Black Legionnaire *Beris fuscipes*** - Rare and scarce species (not based on IUCN criteria), Nationally Notable; Red Data Book Cornwall and Isles of Scilly (2009).

**Bright Four-spined Legionnaire *Chorisops nagatomii*** - Rare and scarce species (not based on IUCN criteria), Nationally Scarce.

**A snail-killing fly *Tetanocera punctifrons*** - Rare and scarce species (not based on IUCN criteria), Nationally Scarce.

***Bees (Aculeate Hymenoptera) (2 species)***

The following species of bee have been recorded within two kilometres of the proposed scheme post 1989 records only:

**Lathbury's Nomad Bee *Nomada lathburiana*** - Red Data Book Cornwall and Isles of Scilly (2009), Red Data Book Species; Red Listing based on pre 1994 IUCN guidelines, Rare.

**Cat's-ear Nomad Bee *Nomada integra*** - Rare and scarce species (not based on IUCN criteria), Nationally Notable A; Red Data Book Cornwall and Isles of Scilly (2009), Red Data Book Species.

***Dragonflies and damselflies (Odonata) (1 species)***

The following species of damselfly have been recorded within two kilometres of the proposed scheme post 1989 records only:

**Scarce Ischnura *Ischnura pumilio*** - Red listing based on 2001 IUCN guidelines, Near Threatened Red Data Book Cornwall and Isles of Scilly (2009), Red Data Book Species

## Scoping survey

All sites ground-truthed during the scoping study are listed and described in Appendix 1, Table 1 and a map showing the scoped areas is included in Appendix 2, Figure 1. For each site a brief evaluation of the potential of each habitat for supporting significant invertebrate assemblages/species is given, together with a column indicating whether or not a particular site was short-listed for detailed survey attention. In addition, target notes/habitat descriptions of the scoped areas are included in full in Appendix 1, Table 2.

## Detailed survey

Of around 30 sites subject to ground-truthing, 11 sites in total were short-listed for detailed survey. These are listed in Appendix 1, Table 3. Note: Two of the sites, 21/22 and 27/28, were treated as combined survey units from the outset. In addition, data collected for sites 3,4 and 5 were ultimately combined for the purpose of analysis, therefore analysis was conducted separately on seven sites as follows: Site 1, Combined Sites 3,4 and 5, Site 6, Site 9, Site 10, Combined Sites 21/22 and Combined Sites 28/29.

## Habitat

The range of habitat selected for detailed survey encompassed priority heathland, broadleaved woodland (including sites mapped as priority woodland) and semi-improved grassland including wetter grassland and rush pasture as well as more herb-rich examples of drier grassland. Elements of other habitat such as hedgerow and tall ruderal edge habitat were also sampled. Importantly, the sheltered transition zones between for example, grassland, through scrub to woodland, or heathland/woodland edge habitats, which can support important invertebrate assemblages were sampled from as well as more open representative habitat. In general heterogeneous habitats are likely to provide a greater range of microhabitats than more uniform stands. Overall the aim was to encompass sufficient habitat diversity to characterise the survey area.

## Number of samples

The number of sample sites and different sampling methods used at each sites varied according to habitat present and potential target groups. A site by site breakdown of the sample methods, number of samples collected per method and centroid grid reference of each sample location is included in Appendix 1, Table 4.

## Species recorded

The survey covered taxa from all of the larger<sup>2</sup> (and most of the smaller<sup>3</sup>) taxonomic insect orders, as well as other arthropods such as spiders (Araneae), harvestmen (Opiliones), woodlice (Isopoda), centipedes (Chilopoda) and pseudoscorpions (Pseudoscorpiones). For certain large groups, target taxa recognised within Pantheon/ISIS only were identified (e.g. parasitic hymenoptera such as Ichneumonoidea, and diptera within the families Muscidae and Tachinidae are not supported within Pantheon/ISIS and such groups are generally excluded from standard invertebrate surveys).

In total, 772 species were recorded during the survey derived from identification of in the region of 10,000 specimens from combined sites. A breakdown of the number of species identified per taxonomic order is included in Appendix 1, Table 5 and a list of all recorded species within a site by site matrix is included in Appendix 1, Table 6.

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<sup>2</sup> Larger orders include: True bugs (Hemiptera), butterflies and day-flying moths (Lepidoptera), two-winged flies (Diptera), bees, ants and wasps (Aculeate Hymenoptera), and beetles (Coleoptera).

<sup>3</sup> Examples of smaller orders include: Grasshoppers and crickets (Orthoptera), dragonflies and damselflies (Odonata) etc.

During the survey 22 species classed as Nationally scarce in the UK and 15 listed within the Section 41 (England) of the NERC Act (2006) 'Species of Principal Importance'- 'Research Only' category. These are listed together with a summary of conservation biology and recorded sites in Appendix 1, Table 7.

### **Pantheon/ISIS results**

Data tables showing site by site results from the Pantheon/ISIS data are included in Appendix 1, Tables 8 to 15. Three tables for each site are included representing the output for each of three scales. The broadest of these is 'Biotope', then 'Habitat' and 'Specific Assemblage Type'. Specific Assemblage Type (SAT) is unchanged from the original Excel ISIS versions; however, the original 'Broad Assemblage Type' (BAT) classification has been replaced by the Habitat level classification and a new Biotope level classification has been added.

### **Pantheon/ISIS assemblage hierarchy**

For the purpose of this report, results from three hierarchical levels recognised within the Pantheon output are defined as follows (from Webb *et al*, 2017):

- **Broad Biotope Level** - Broad Biotopes are a useful way to split sample data into something manageable but which still retains a strong ecological grounding. They include tree-associated, open, wetland and coastal habitats. Species can occur in more than one broad biotope. This occurs when the same habitat has been typed into two divisions. A good example is wet woodland, which is found in both tree-associated and wetlands biotopes.
- **Habitat Level** – Habitats are a mid-level category within the hierarchy and often readily identifiable and recognisable by conservation workers (e.g. saltmarsh). Some are identified as broad habitats in the UK but most are new terms used to refer to a series of resources or a series of broad habitat types.
- **Specific Assemblage Types (SATs)** - are characterised by ecologically restricted species and were generally only expressed in lists from sites with conservation value. This classification is particularly useful for identifying assemblages of higher conservation value.

## **Discussion**

### **Historic species data review**

#### **Historically recorded species**

##### ***Section 41 Butterflies (Lepidoptera)***

None of the butterfly species of higher conservation status which have been historically recorded within or in close proximity to the survey area were recorded during the survey. Whilst during the scoping study and subsequently during each of the detailed survey events, sites were searched for the presence of butterfly species, only common widespread species were recorded. S41 butterflies most likely to have been recorded included the Small Heath *Coenonympha pamphilus*, which, despite its designation, is still a common and widespread species that has been widely recorded within the locality and occurs in a fairly broad range of habitats.

Silver-studded Blue *Plebejus argus* being a heathland specialist known to occur on heathland within about a kilometre of heathland at Sites 3, 4 and 5, was not recorded. The site supported potentially suitable habitat for this species, but the consistently late building stage and mature dwarf shrub structure was not favourable for Silver-studded Blue or Grayling *Hipparchia semele*, a more xerophilous species favouring sparsely vegetated dry heathland where early successional stages are well represented. The Wall, another species which has been well recorded in the wider landscape is

another species favouring drier habitats characterised by bare ground and sparse vegetation and would not have been expected to occur in the habitats surveyed.

Some of the wetter grassland habitats such as those at sites 6, 9 and 10 in particular, were arguably suitable in terms of structure and hydrology for Marsh Fritillary *Euphydryas aurinia*. However, none of the species favoured foodplants (Devil's-bit Scabious *Succisa pratensis*, Field Scabious *Knautia arvensis* or Small Scabious *Scabiosa columbaria*) were recorded on the sites which were well scrutinised and in most cases subject to detailed botanical survey. Marsh Fritillary has not been frequently recorded and it is unknown whether it still occurs at the Ventongimps Moor site where it was recorded in 1990 and 1992.

Of the remaining species, Small Pearl-bordered Fritillary *Boloria selene*, is still relatively widespread in Cornwall, where it occurs in coastal grasslands and other inland sites where its larval foodplants Common Dog Violet *Viola riviniana* and Marsh Violet *Viola palustris* are abundant. Some habitat including the more grassy and Bracken-rich elements of the heathland and woodland edge grasslands showed structural potential for this butterfly, but the foodplants were rarely recorded and never occurred in abundance within the survey area.

Dingy Skipper *Erynnis tages* and Grizzled Skipper *Pyrgus malvae* are both mostly confined to drier habitats with shorter swards and bare ground in sunny locations. The survey sites generally lacked the combinations of habitat suitable for either species, although the larval foodplants of Dingy Skipper (Common Bird's-foot Trefoil *Lotus corniculatus* and Greater Bird's-foot Trefoil *L. pedunculatus*) and Grizzled Skipper *Pyrgus malvae* (Cinquefoils *Potentilla* spp.) were well distributed throughout the survey area.

#### **Other invertebrate species of higher conservation value**

Only two of the historically recorded designated species, including beetles (Coleoptera), two-winged flies (Diptera) or bees (Aculeate Hymenoptera) listed within a two kilometre buffer of the proposed scheme was re-recorded during the survey. These include a leaf beetle *Calomicrus circumfusus* and a soldierfly, Short-horned Black Legionnaire *Beris fuscipes*, discussed below.

#### **Beetles (Coleoptera)**

Five of the Nationally Scarce beetle species historically recorded are generally classed amongst the water beetles<sup>4</sup> and four of the species, comprising three species of water scavenger beetle (Hydrophilidae) and one *Helophorus alterans* from the family Helophoridae are specialists of peatland habitat, where they occur in seepage habitat where shallow water flows over peat and/or in shallow bog pools or in moss. Such habitat is primarily found in acid substrates and the above species were all recorded from heathland around Ventongimps Moor. The fifth species, *Hydrovatus clypealis* is a more strongly aquatic member of the diving beetle family (Dytiscidae) and occurs at the edges of ponds in soft mud as well as in floating rafts of aquatic vegetation (Foster and Friday, 2011).

Of the terrestrial species, one leaf beetle *Calomicrus circumfusus*, historically recorded from the southern margin of Newlyn Moor SAC/SSSI was also recorded in abundance at heathland Sites 3,4 and 5 during the 2017 survey. The species is associated with 'heathland, grassland, maritime cliff and disturbed ground habitats' Hyman and Parsons (1992). Whilst the remaining beetle species including two woodland associated species a weevil *Curculio betulae* and a longhorn beetle *Leptura aurulenta*

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<sup>4</sup> The aquatic habitat within the survey area was not covered by the current survey and it was understood that a dedicated aquatic macroinvertebrate survey was being undertaken separately. There was some wetland habitat within the survey area which would warrant survey and would clarify the presence/absence of such and other uncommon aquatic fauna occurring. Such findings may alter results of the Pantheon/ISIS analysis.

were not recorded, habitat potentially suitable for both of these species was present within the more wooded survey areas. Little is known about the habitat preferences of the two remaining species including the burying beetle *Nicrophorus interruptus* and an RDBK rove beetle *Staphylinus caesareus*. The former is a mobile species requiring a viable resource of carrion, whilst the latter is a predator with no known specialist habitat requirements. As such, these species both have a reasonable chance of occurring within the survey area, but are not commonly recorded.

### **Two-winged flies (Diptera)**

All three of the Nationally Scarce flies recorded historically within the search area were wetland associated species and all species were recorded from Ventongimp Moors. One of two Nationally Scarce species of soldierfly (Stratiomyidae) Short-horned Black Legionnaire *Beris fuscipes*, is according to Stubbs and Drake (2001) is associated with the wooded margins of fens and marshes. The second, the Bright Four-spined Legionnaire *Chorisops nagatomii*, is also associated with woody edges of wetland habitat, but according to Stubbs and Drake (2001), the insect is 'associated with peat soils of fens in some districts'.

The third Nationally Scarce fly recorded was one of several species of the family Sciomyzidae, known as 'marsh-flies' or 'snail-killing flies' *Tetanocera punctifrons* is now a fairly widespread species in the UK and it is said to have increased in range in recent years. The fly is mainly a wetland species, but can occur in a variety of situations where there is at least some wetland habitat.

As has been stated above, the Short-horned Black Legionnaire *Beris fuscipes* was the only historically recorded species within a two kilometre radius of the site to have been re-recorded during the survey. This species was recorded in wetland habitat at the woodland edge at both Sites 1 and 6. The habitat at these sites was arguably suitable for both other species. It is not known whether or not *Tetanocera punctifrons* has been downgraded from Nationally Scarce due to a recorded increase.

### **Bees (Hymenoptera)**

Two Nationally Scarce species of cleptoparasitic bee recorded post-1990 within two kilometres of the survey area include Lathbury's Nomad Bee *Nomada lathburiana* and Cat's-ear Nomad Bee *Nomada integra*. *Nomada* species are cuckoo species, the larvae of which develop in the provisioned nests of host mining bee species. The hosts of most species of *Nomada* are mining bees of the genus *Andrena*. In the case of Lathbury's Nomad Bee, hosts include the Ashy or Grey Mining Bee *Andrena cineraria*, which is an increasingly common ground nesting species. The other known host is *Andrena vaga*, a recent colonist of the UK, which is currently confined to the south-east of England.

The only known host of the Cat's-ear Nomad Bee is the Cat's-ear Mining Bee *Andrena humilis*, a species which is itself, classed as Nationally Scarce in the UK. Both *Nomada* species are confined to sites supporting their host. Falk (2015) cites the habitat of Cat's-ear Nomad Bee as being 'typically heathland/moorland edge, grassland and coastal cliff top grassland' but a plentiful supply of yellow composites is required by the host. Lathbury's Nomad Bee is usually associated with large host colonies and occurs on gorse-clad hillsides, sandy heathland paths and vertical faces of sandpits.

Both species are unlikely to occur within any of sites surveyed due to lack of exposed sand as nesting sites. Of the two, Lathbury's Nomad Bee has a greater potential to occur as the host species, the Grey Mining Bee is well distributed in Cornwall and does not necessarily require bare ground to nest in. The species often nests in short-sward grassland.

### **Dragonflies and damselflies (Odonata)**

One damselfly with a conservation status was recorded within close proximity to the survey area. The Scarce Ischnura or Scarce Blue-tailed Damselfly *Ischnura pumilio* – is listed as 'Near Threatened' under post-2001 IUCN guidelines. The insect has according to Brooks and Cham (2014) 'a strong

preference for shallow water conditions with little vegetation, such as occur in valley mires and some earth extraction sites'. *Ischnura pumilio* also occurs in spring-fed seepages and man-made vehicle tracks and other habitats resulting from, often, anthropogenic activities. The requirement for sparsely vegetated habitats makes disturbance an important factor in the habitat requirements of the insect according to Brooks and Cham (2014) who also cite livestock poaching as a factor on some sites.

*I. pumilio* was not recorded during the survey; however, there were poorly vegetated ephemeral water areas at several survey sites. Shallow, open-water disturbance features at Site 21/22 could favour the species if it occurred there.

## Site summaries and Pantheon/ISIS output

### Site 1 - Priority woodland and woodland edge

#### Habitat

The habitat surveyed within the Site 1 – Priority woodland included both dry and marshy grassland and bramble scrub edge habitat as well as woodland and woodland field and ground layers. The southern woodland margin was sinuous with a good structural succession from woodland understorey, through bramble scrub zone, tall ruderal and grassland habitats (Appendix 3, Photograph 1). The woodland edge supported mainly understorey trees including Grey Willow *Salix cinerea*, Hazel *Corylus avellana*, Blackthorn *Prunus spinosa*, Elder *Sambucus nigra*, with Bramble *Rubus fruticosus* agg. and scattered Common Gorse *Ulex europaeus*. Tall ruderal vegetation with Common Nettle *Urtica dioica*, Marsh Thistle *Cirsium palustre*, Creeping Thistle *C. arvense*, Wild Angelica *Angelica sylvestris* and Hogweed *Heracleum sphondylium* and other species were present at the margins and under the canopy.

The grassland was of uneven sward height and was typical of the semi-improved swards of the overall A30 survey area, with Yorkshire Fog *Holcus lanatus* and Sweet Vernal-grass *Anthoxanthum odoratum* and herbs including Creeping Buttercup *Ranunculus repens*, Ribwort Plantain *Plantago lanceolata*, Sorrel *Rumex acetosa*, Germander Speedwell *Veronica chamaedrys*, Bird's-foot Trefoils *Lotus* spp. etc. Wetter areas supported Soft Rush *Juncus effusus*, Marsh Foxtail *Alopecurus geniculatus* and Toad Rush *Juncus bufonius* etc.

The woodland interior supported leggy, mature Grey Willow and some Hazel and the field-layer was relatively diverse, with flora characteristic of more open woodland/ wet woodland. Field layer species included Water Mint *Mentha aquatica*, Enchanter's Nightshade *Circaea lutetiana*, Bittersweet *Solanum dulcamara*, Herb Robert *Geranium robertianum*, Ivy *Hedera helix*, Wavy Bitter-cress *Cardamine flexuosa*, Wood Avens *Geum urbanum*, Yorkshire Fog, Wild Angelica, Common Dog Violet *Viola riviniana*, Marsh Thistle, Creeping Buttercup, Lesser Spearwort *R. flammula*, Wood Speedwell *Veronica montana*, Marsh Bedstraw *Galium palustre*, Wood Dock *Rumex sanguineus*, Soft Rush and ferns including Broad Buckler Fern *Dryopteris dilatata*, Hard Fern *Blechnum spicant* and Polypodys *Polypodium* spp. A partial scrub layer primarily Bramble was present and tree trunks and branches supported abundant epiphytic bryophytes and lichens as well as Honeysuckle *Lonicera periclymenum*.

The habitat was generally shaded, but with some light reaching the ground-layer. There were inundated areas of exposed silt providing potential habitat for seepage species and species associated with inundated wood decay habitat.

#### Species recorded

In total, 320 invertebrate species were recorded from Site 1 – Priority woodland and woodland edge. In terms of species groups recorded from the sample data; the greatest number of species recorded for the site were moths (Lepidoptera), with 98 species being recorded. Beetles (Coleoptera) with 69 recorded species was the second most speciose group, followed by True bugs (Hemiptera) with 39 species, two-winged flies (Diptera) with 27 recorded species and spiders (Araneae) with 21 species. In addition, 14 species of butterfly (Lepidoptera) were recorded, eight species of Harvestman (Opiliones), seven combined bee, ant and wasp species (Aculeate Hymenoptera) and four species of Grasshoppers, Crickets and Groundhoppers (Orthoptera).

The overall low count of Hymenoptera was indicative of the survey as a whole. Of the butterflies recorded, all were common and widespread species of grassland and woodland edges throughout much of the UK and no S41 listed butterflies were recorded.

#### **Uncommon and Section 41 species recorded from Site 1**

A total of eight species (seven beetles and one soldierfly) classed as Nationally Scarce in the UK were recorded from Site 1 as well as six species (all moths) listed in Section 41 (England) of the NERC Act (2006) as 'Species of principal importance'. In addition, around 13 species considered to be Local in the UK were recorded.

The Short-horned Black Legionnaire *Beris fuscipes*, which is associated with the wooded margins of fens and marshes, was the only Nationally Scarce fly recorded from Site 1. The species was also recorded from Site 6.

Nationally Scarce beetles included one species of ground beetle *Stenolophus teutonius* associated with bare ground habitats at the margins of various types of standing water habitat. The species has also been recorded from woodland edge ponds and coastal chines and clay undercliffs Hyman and Parsons (1992) but has rarely been recorded from Cornwall.

Whilst a number of rove beetles (Staphylinidae) of the genus *Stenus* were recorded both from Site 1 samples and from the survey as a whole, only one classed Nationally Scarce, *Stenus pusillus* was recorded. At less than three millimetres in length, *S. pusillus* is one of the smaller British *Stenus* species. According to Lott and Anderson (2011), the insect is 'found in a variety of marshes, ditches and pond margins.' However, it is also said to be 'synanthropic in silage and hay swards, in roadside grass cuttings and on arable land'.

A flea beetle *Aphthona nigriceps*, recorded from Site 1 is a representative of another large beetle family the leaf beetles (Chrysomelidae) which include phytophagous species. According to Duff, 2016, *A. nigriceps* feeds on Crane's-bills *Geranium* spp. and Stork's-bills *Erodium* spp. The beetle is found in habitats including grassland, wetland, fens, river margins and parkland (Hyman and Parsons, 1992). In Cornwall there are post-1999 records from near Perranporth and earlier records for the Lizard.

In addition to the above, four species of the weevil family Curculionidae classed as Nationally Scarce were recorded from Site 1. Of these, one species *Leiosoma oblongulum* is associated primarily with broadleaved woodland, where it feeds on Wood Anemone *Anemone nemorosa* and *Ranunculus* species including Creeping Buttercup *Ranunculus repens* (both of which were recorded within the woodland field layer). In Britain the species has been recorded in leaf litter, damp moss and from roadside verges. Hyman and Parsons (1992) stated that *L. oblongulum* was a very local species in the UK, thought to be declining.

Two of the three remaining Nationally Scarce weevils, *Gymnetron veronicae* and *Pelenomus waltoni* are associated with wetland habitats. *G. veronicae* is associated with Brooklime *Veronica*

*beccabunga* which was recorded in some of the more inundated habitats at the woodland margin and *Pelenomus waltoni* is associated with bogs, marshes, watersides and areas of impeded drainage, where the host plant, Water-pepper *Persicaria hydropiper* grows (Morris, 2008).

The remaining species *Larinus planus* is a relatively large weevil associated with grassland habitats. *L. planus* larvae feed within the flower-heads of thistles, particularly of the genera *Carduus* and *Cirsium*. The species is scarce in the UK and according to both Hyman and Parsons (1992) and Duff (2016), is mainly found near the coast. On site the insect was swept from wet grassland habitat adjacent to the woodland edge.

All six moth species listed as S41 species in England fell within the 'research only' category. All species are still common and widespread in the UK, which were included within S41 due to significant recorded decline in the UK within recent decades. These species which include Small Square-spot *Diarsia rubi*, Small Phoenix, Rosy Rustic *Hydraecia micacea*, Dot Moth *Melanchra persicariae*, Rosy Minor *Mesoligia literosa*, Grass Rivulet *Perizoma albulata* and Dark-barred Twin-spot Carpet *Xanthorhoe ferrugata* are mainly habitat generalists, although Grass Rivulet *Perizoma albulata* is more associated with dry grasslands supporting Yellow Rattle *Rhinanthus minor*.

Another moth species recorded with an association with old oak woods was Great Prominent *Peridea anceps*, a fairly local species in the UK. Another local moth associated with woodland the Sharp-angled Peacock *Macaria alternata* was also recorded as was Pinion-streaked Snout *Schrankia costaestrigalis*, a marshy grassland and fen species.

*Gibbaranea gibbosa*, a very distinctive but local species of orb-web spider associated with woodland edges was also recorded at Site 1 as was the Great Green Bush-cricket *Tettigonia viridissima*, heard stridulating from the scrub edge. This species is mainly coastal in Cornwall, but is common where it occurs.

### **Pantheon output**

Results of the Pantheon analysis of Site 1 data show that on the broad biotope level (biotope scale), the highest number of species (138) were attributed to the 'Open habitats' classification. The 'Tree associated' classification was attributed with 87 species and 46 species were included within the broad 'Wetland' biotope classification.

Species classed within a recognised conservation status were attributed to each of the broad biotope classifications as follows:

- **Open habitats** - Three species classified within one of the Nationally Scarce classifications together with three S41 (research only) moth species.
- **Tree associated** – One S41 (research only) moth species.
- **Wetland** – Four Nationally Scarce species

On the Habitat Level, the highest proportion of species was attributed to the 'Tall sward and scrub' category with 123 recognised species from the sample data. For the 'Arboreal' classification (nested within the 'Tree-associated' biotope classification), 60 species were recognised, with 22 species classed within the 'Shaded woodland floor' assemblage and 19 species were attributed to both 'Marshland' and 'Peatland' (both nested within the Wetland broad biotope classification). Several other assemblages were also recognised within the Pantheon output for combined sites 3, 4 and 5, however, none of these were sufficiently well attributed to be considered 'robust' in terms of the Pantheon definition. Of the remaining recognised assemblages, the 'Short sward and bare ground' assemblage was closest to the robustness threshold of 15 species with 12 species attributed to this group, however the remaining assemblages were each represented by much fewer species.



Species classed within a recognised conservation status were attributed to each of the habitat classifications as follows (includes species attributed to habitat classifications supporting less than 15 species):

- **Tall sward and scrub** - Two species classified within one of the Nationally Scarce classifications together with three S41 (research only) moth species
- **Arboreal** – One S41(research only) moth species.
- **Shaded woodland floor** – No species with a recognised conservation status were recorded.
- **Marshland** – Three Nationally Scarce species.
- **Peatland** - No species with a recognised conservation status were recorded.
- **Short sward and bare ground** - One Nationally Scarce species.
- **Running water** - One Nationally Scarce species.

Six Specific Assemblage Types (SATs) were represented within the Pantheon output for Site 1. However, none exhibited sufficiently high species scores to exceed the ‘Favourable Condition’ threshold set within ISIS<sup>5</sup>.

The SATs recorded were generally only represented by one (F003– Scrub, heath and moorland, A215 – Epiphyte fauna, W314 – Reed-fen and pools) or two (F002 – Rich flower resource, F112 – Open short sward) species. Whilst four species were classified within the A212 – Bark and sapwood decay, the FC threshold set in ISIS for this assemblage is 19 and the percentage representation was less than one percent<sup>6</sup> (compared to the five percent representation for A215 – Epiphyte fauna, which had a FC threshold as low as three, due to being represented within Pantheon by very few species).

Species classed within a recognised conservation status were attributed to the following Specific Assemblage classification(s):

- **Open short sward** - One Nationally Scarce species (A true weevil *Larinus planus*).

### ***Representativeness of assemblage***

The assemblages defined from the Pantheon results showed reasonable fidelity to the habitats actually sampled from. On a biotope level, the majority of samples were collected from more open edge habitats at the margin of the woodland; therefore, a greater representation in terms of species number was expected for ‘Open habitat’ than for ‘Tree associated’ assemblages. With 87 recognised species, the ‘Tree associated’ biotope assemblage was reasonably represented and reflected the woodland-specific sampling effort. On a biotope level the number of species attributed to the ‘Wetland’ assemblage reasonably reflected the presence of wetland habitat both at the woodland margin and within the woodland.

On a habitat level, the ‘Tall sward and scrub’ assemblage (123 recognised species) again indicates that the findings reasonably reflected the recorded habitat. Semi-natural systems supporting important examples of the ‘Tall sward and scrub assemblage’ type include heath grassland,

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<sup>5</sup> The ‘Favourable condition’ threshold is set at a level for assessing FC status of monitorable invertebrate features within a SSSI. FC status is therefore only achieved for assemblages of or near national importance.

<sup>6</sup> The percentage representation relates to the overall national species pool for this assemblage –i.e. the percentage of the total number of species recognised within Pantheon as belonging to this assemblage. In earlier versions of ISIS this was called ‘Percentage National species pool score.’ In ISIS, National Species Pool scores from a large sample of over 10% for most wetland and over 6% for most non-wetland SATs indicates an assemblage of national significance.

moorland, hay meadows, scattered scrub and woodland edge. The Species Quality Index (SQI) score registered for the 'Tall sward and scrub' assemblage of 105 was relatively low, despite the presence of two Nationally Scarce species. Importantly the SQI used in the current version of Pantheon scores 'local' species at the same level as widespread and common species, the previous ISIS version scored local species as 2 and widespread and common species as 1. The SQI score does not recognise the S41 species classification, but is based on rarity status alone.

As expected, the woodland based assemblages 'Arboreal' (60 species) and 'shaded woodland floor' (22) assemblages were fairly well represented at habitat level. Two other habitat level assemblages related to woodland were also recognised albeit at low levels. Seven species were attributed to 'decaying wood' and six species to the 'wet woodland' assemblage. The latter of these may have been expected to be higher, as the woodland interior was characteristic of wet woodland. All of the woodland assemblages registered SQI scores of only 100, indicating that these were made up of predominately widespread and common species, rather than assemblages of higher conservation value. However, the Tall sward and scrub habitat element is likely to relate largely to the woodland edge habitat and the Nationally Scarce weevil *Leiosoma oblongulum* is likely to be associated with woodland more than other habitats in this instance.

Of the remaining habitat level assemblages, a more significant SQI score of 147 was attributed to the 'Marshland' assemblage. This assemblage comprised species both within the marshy grassland edge habitat and persisted within the less shaded groundlayer of the woodland. An SQI value of 147 indicates a habitat of some conservation value, but not of a nationally significant level. The score was elevated by the presence of the Nationally Scarce wetland species including a weevil *Pelenomus waltoni*, a ground beetle *Stenolophus teutonius* and a rove beetle *Stenus pusillus*. Another Nationally Scarce weevil *Gymnetron veronicae* attributed to the 'Running water' habitat level assemblage also contributes to the overall conservation value of the wetland elements of the site.

Specific Assemblage Types generally comprise species with a greater level of habitat fidelity than the overarching habitat level and are thus considered to indicate assemblages of higher conservation value when well represented. As indicated above, whilst several SATs were represented within the Pantheon output data, none were attributed with a sufficient number of species. However, as SATs are indicative of specialist fauna, the presence of species attributed to SATs indicates some degree of specialism and conservation value even if the assemblages do not exceed their given 'Favourable Condition' threshold.

Overall the Site 1 – Priority woodland and woodland edge habitat supported species assemblages representative of woodland, woodland edge grassland and wetlands and collectively eight Nationally Scarce species and seven S41 (research only) moth species, were recorded.

### **Site 3, 4 and 5 – Priority heathland (east and west sections) and mixed woodland**

#### **Habitat**

Sites 3 and 5 comprised southwestern humid heath classifiable in NVC terms as H4 – *Ulex gallii* – *Agrostis curtisii* heath (Appendix 3, Photograph 2). This habitat also persisted in patches within the ground layer of the mixed woodland block which separated the two heathland sections (Appendix 3, Photographs 3 and 4). The wooded area was evidently planted with non-native trees including Maritime Pine *Pinus maritima* and Holme Oak *Quercus ilex* at some point in its history and the central area of the woodland formed a large circular pond, which had steep slopes supporting Grey Willow *Salix cinerea*. Grey Willow also occurred in a largish patch within the open heath of Site 3.

Both heathland sections supported co-dominant Common Heather *Calluna vulgaris*, Bell Heather *Erica cinerea* and Western Gorse *Ulex gallii*, with grasses including Bristle Bent-grass *Agrostis curtisii*

and Purple Moor-grass *Molinia caerulea* together with typical heathland herbs such as Tormentil *Potentilla erecta*, Heath Milkwort *Polygala serpyllifolia* and Heath Violet *Viola canina*. There were only small amounts of Cross-leaved Heath *Erica tetralix*, suggesting that the heath was comparatively dry for the most-part. In the Western section, some Dorset Heath *E. ciliaris* (or the infertile hybrid of *E. ciliaris* and *E. tetralix*) was present.

The heathland was generally flattish in the eastern section with some more varied microtopography only at the edges. The dwarf shrub habitat was generally of late-building to mature phase in terms of structure and there was little bare ground. An area towards the southeast corner was more grassy with tussocks of *Molinia caerulea*, *Agrostis curtisii* which later in the season became obscured by Bracken *Pteridium aquilinum*.

The western heath section was somewhat more topographically diverse than the eastern section and a tumulus was present close to the boundary with the woodland edge (Appendix 3, Photograph 5) The western section also supported habitat with slightly more structural variation. There were small bare earth patches within a grassier area where the dwarf shrub cover was more gappy (Appendix 3, Photograph 6).

The mixed woodland section supported a field layer of heathy vegetation along much of the section adjacent to the road verge and a patch of open heath also occupied a sheltered, but unshaded area above the pond on its northern bank. This habitat in particular received sampling attention within the woodland.

There was a resource of fallen branches and wood decay habitat within the woodland with potential to support bark and sapwood invertebrates. Overall the habitat comprising the two heathland sites and the mixed woodland was expected to support invertebrates characteristic of heathland acid grassland and mixed woodland/heathland edge. The limited resource of bare ground reduced the potential of the site to support a significant ground-nesting aculeate hymenoptera fauna and this was borne-out by the survey findings.

### **Species recorded**

The invertebrate fauna recorded between the two heathland sites and the heathland patches within the woodland were fairly consistent. However, moth trapping was conducted only within the Eastern section (Site 3) and mixed woodland (Site 4). The decision was made to treat the three sections as a single unit was made due to the overlap in assemblage sampling taking in the edge habitats between the heath and woodland and as the three areas were contiguous.

In total, 370 invertebrate species were recorded from the combined heathland and mixed woodland sites. In terms of species groups recorded from the sample data, the greatest number of species recorded within combined sites 3, 4 and 5 were moths (Lepidoptera), with 109 species being recorded. Beetles (Coleoptera) with 83 recorded species was the second most speciose group, followed by two-winged flies (Diptera) and spiders (Araneae) each with a recorded 35 species. 28 True bug (Hemiptera) species were recorded. Bees, ants and wasps (Aculeate Hymenoptera), a frequently species-rich group on heathlands was poorly represented with only 12 species being recorded. The majority of species were bumblebees including universally common species as well as *Bombus jonellus* a heather specialist. The main reason for the low number of recorded solitary bees and wasps within the heathland sites is likely to be the overall lack of a significant bare sand and bare ground resource. Bare ground is a critical resource for many ground nesting solitary bees and wasps associated with heathland.

Butterflies were represented by nine species, all of which were non-specialist universally common species. Whilst Common Blue *Polyommatus icarus* was recorded at the road verge area of the

western area, where there were patches of the larval foodplant Common Bird's-foot Trefoil *Lotus corniculatus*, the S41 listed Silver-studded Blue *Plebejus argus* was not recorded and the habitat was generally lacking the more pioneer/early building phase habitat that this species favours. The habitat was also lacking the bare earth component favoured by another typical heathland S41 butterfly the Grayling *Hipparchia semele*. However, there was some potential for Small Heath *Coenonympha pamphilus*, which is arguably the commonest of the S41 species. Small Heath is more of a grassland species than its common name implies, but the grassier areas of Site 5 supported some potentially suitable habitat for this species.

Another group for which heathlands are often important includes grasshoppers and crickets (Orthoptera). Whilst the two universally common Meadow Grasshopper *Chorthippus parallelus* and Field Grasshopper *C. brunneus* were recorded, other typical heathland grasshoppers and crickets were noticeably absent. The habitat was, for the most-part, too dry to support the Bog Bush-cricket *Metrioptera brachyptera* and lacked the openness to support Mottled Grasshopper *Myrmeleotettix maculatus* or Woodland Grasshopper *Omocestus rufipes*, which are recorded from the region. All three native British cockroaches of the genus *Ectobius* are heathland specialists and have been recorded in Cornwall, but none were recorded during the survey despite potentially suitable habitat.

#### **Uncommon and S41 species recorded from Sites 3, 4 and 5**

In total, seven species currently classed as Nationally Scarce in the UK and eleven species listed in Section 41 of the NERC Act (2006) England as 'Species of Principal Importance' were recorded during the survey. In addition, around 29 species considered to be Local in the UK were recorded.

Four of the Nationally Scarce species recorded were beetles and two of these, a leaf beetle *Calomicrus circumfusus* and a leaf weevil *Polydrusus confluens* were abundant throughout the heathland sections of the site. Both species are specialist gorse *Ulex* feeders, associated mainly with heathland biotopes. The other two nationally scarce species, a rove beetle *Tachyporus formosus* mainly associated with marshy habitats and a weevil *Acalles ptinioides*, which occurs both in leaf litter in woodland and under heather in heathlands, were infrequently found (Note: For more detailed information for these and other Nationally Scarce and S41 species recorded during the survey see Appendix 1, Table 7).

One Nationally Scarce species was *Chrysotus cupreus* one of several species of dolichopodid fly recorded from the mixed woodland section of the site and being a wetland species, was probably associated with the pond margins.

The remaining Nationally Scarce species recorded included a leafhopper *Anoscopus albifrons*, usually associated with grasslands and a distinctive theriid spider *Episinus truncatus* associated with heathlands. Other less common spiders recorded on site included the local orb-web spiders *Neoscona adianta* and *Agalenatea redii*, the former of which was particularly abundant on site.

All seven moth species listed as S41 species in England fell within the 'research only' category. All species are still common and widespread in the UK, which were included within S41 due to significant recorded decline in the UK within recent decades. These species are fairly general in terms of habitat association and are not confined to heathland.

Whilst no Nationally Scarce moths were recorded, species including the Sharp-angled Peacock *Macaria alternata*, Marbled White-spot *Deltote pygarga*, Least Black Arches *Nola confusalis*, Ringed China-mark *Parapoynx stratiotata*, Gold Swift *Phymatopus hecta* and Poplar Grey *Subacronicta megacephala* are all local in the UK. Marbled White-spot is most strongly associated with heathland.

#### **Pantheon output**

Results for Sites 3, 4 and 5 combined Pantheon analysis show that on the broad biotope level (biotope scale), the highest number of species (185) was attributed to the 'Open habitats' classification. The 'Tree associated' classification was attributed with 80 species and 40 species were included within the broad 'Wetland' biotope classification.

Species classed within a recognised conservation status were attributed to each of the broad biotope classifications as follows:

- **Open habitats** - Four species classified within one of the Nationally Scarce classifications together with five S41 (research only) moth species.
- **Tree associated** – Two Nationally Scarce species together with one S41 (research only) moth species.
- **Wetland** – One Nationally Scarce species

On the Habitat Level the highest proportion of species was attributed to the Tall sward and scrub category with 145 recognised species from the sample data. For the Arboreal classification (nested within the Tree Associated biotope classification) 52 species were recognised, with 23 species classed within the 'Shaded woodland floor' assemblage and 18 'Marshland' species (nested within the Wetland broad biotope classification). Several other assemblages were also recognised within the Pantheon output for combined sites 3, 4 and 5. However, none of these were sufficiently well attributed to be considered 'robust' in terms of the Pantheon definition. The 'Peatland' assemblage was close to the robustness threshold of 15 species with 14 species attributed to this group, however, the remaining assemblages were each represented by much fewer species.

Species classed within a recognised conservation status were attributed to each of the habitat classifications as follows (includes species attributed to habitat classifications supporting less than 15 species):

- **Tall sward and scrub** - Two species classified within one of the Nationally Scarce classifications together with five S41 (research only) moth species
- **Arboreal** – One Nationally Scarce species and one S41 (research only) moth species.
- **Shaded woodland floor** – No species with a recognised conservation status were recorded.
- **Marshland** – One Nationally Scarce species.
- **Peatland** - No species with a recognised conservation status were recorded.
- **Running water** - One Nationally Scarce species.
- **Decaying wood** - One Nationally Scarce species.

Within the Specific Assemblage Types (SATs) represented within the combined Sites 3, 4 and 5 output, one assemblage, the F003 – Scrub heath and moorland was significantly represented in terms of Pantheon criteria. The species score of 18 species was more than double the 'Favourable Condition' (FC) threshold score of 9 set within Pantheon for this assemblage. In addition, four more SATs were represented within the output; however, none of these achieved scores exceeding the corresponding threshold scores set in ISIS.

Of these, the highest number of species was attributed to F001 – Scrub edge with six attributed species (constituting three percent of the total national pool of species affiliated to this classification) and falling short of the 'Favourable condition' threshold of 10 set for the assemblage. Five species were attributed to the 'A212 – Bark and sapwood decay' assemblage (nested within the 'Decaying wood' habitat level assemblage) but this count constituted <1 percent of the National species pool for this assemblage and fell well short of the FC threshold of 19; The 'Rich flower resource' SAT was attributed with four species, again falling short of the FC threshold score of three

and 'Undisturbed fluctuating marsh' (nested within the 'Marshland' habitat assemblage) was represented by only one species; however, the FC target for this assemblage is set at three.

Species classed within a recognised conservation status were attributed to each of the Specific Assemblage classifications as follows (includes species attributed to habitat classifications supporting less than 15 species):

- **Scrub heath and moorland** - One Nationally Scarce species.
- **Scrub edge** - One Nationally Scarce species.
- **Bark and sapwood decay** - One Nationally Scarce species.

### ***Representativeness of assemblage***

The assemblages defined from the Pantheon results showed fidelity to the habitats actually sampled from. On a biotope level, most species would have been expected to be attributed to 'Open habitat' classification and the wooded (Tree Associated) element of the survey area and 'Wetland' would also be expected to be represented by a significant number of species.

On a habitat level, the 'Tall sward and scrub assemblage (145 recognised species) again indicates that the findings reasonably reflected the recorded habitat. Semi-natural systems supporting important examples of the Tall sward and scrub' assemblage defined within Pantheon include: 'Heath grassland, moorland, hay meadows, scattered scrub and woodland edge.' Similarly, elements of observed habitat suitable for supporting 'Arboreal', 'Shaded woodland floor', 'Marshland' and 'Peatland' assemblages would be expected.

The most significant result arising from the analysis was the score recorded for the 'F003 – Scrub heath and moorland' SAT. In Pantheon as with ISIS, a score exceeding the threshold score for a SAT indicates an assemblage of high conservation value. SATs comprised of invertebrate species with a high degree of fidelity to a particular habitat are generally considered the most important in terms of assessing conservation value of a site. The F003 assemblage is described in Webb *et al* (2017) as being 'found on nutrient-poor, acid soils where herbaceous or dwarf shrub vegetation is dominant, although trees and taller shrubs can be an important component of the overall habitat. Semi-natural systems supporting important examples of this assemblage type include mature areas of lowland heath, moorland and montane biotopes.'

Specifically, Webb *et al* then state that F003 'is the dominant assemblage on the Cornish West Penwith moors up to 250m'. This suggests that combined Sites support an invertebrate feature of high conservation value representative of similar moors found elsewhere in Cornwall.

None of the remaining SATs recorded from combined Sites 3, 4 and 5 achieved a score approaching 'Favourable Condition'. However, importantly FC status relates to invertebrate assemblages as monitorable features within SSSIs, therefore, such assemblages can be considered to be representative of sites of national importance for their invertebrate populations. As SATs are indicative of specialist fauna, the presence of species attributed to SATs indicates some degree of specialism and conservation value even if the assemblages are in 'unfavourable condition'.

The habitat present at Sites 3,4 and 5 is comparable to habitat recorded from Newlyn Downs Special Area of Conservation (SAC) and SSSI. Newlyn Downs was designated as a SAC primarily for supporting 'Temperate Atlantic wet heath with *Erica ciliaris* and *E. tetralix*.' habitat listed within Annex 1 of the European Habitats Directive and as an SSSI for supporting 'the largest area of Southern Atlantic wet heath with Dorset heath *Erica ciliaris* and cross-leaved heath *E. tetralix* in Cornwall'.

The close proximity of Newlyn Downs SSSI (within approximately 140m of Sites 3,4 and 5) increases the likelihood of more mobile heathland specialist invertebrates moving between sites supporting similar habitat patches. In addition, Sites 3,4 and 5 lies between Newlyn Downs SSSI and another heathland site, Carland Moor (comprising Units 16 and 17 of the Carrick Heaths SSSI). Carland Moor is less than one km west of Sites 3,4 and 5. The overall ecological value of a site, both in a broad ecological sense and from an entomological viewpoint, is increased when it forms part of a broader ecological unit, either as continuous habitat, or as a stepping stone, as is the case in this instance.

One of the greatest threats to heathland and heathland species, as described in numerous works e.g. Webb (1986), is attributed to habitat fragmentation and isolation of habitat patches on a landscape scale. The majority of academic studies relating to the mobility of heathland species associated with heathlands have concerned butterflies of conservation value. In simple terms, dispersal and colonisation of butterflies with limited mobility have been found to be more sustainable on a landscape scale where more suitable habitat patches are available. The importance of availability of habitat such as heathland in a landscape scale in sustaining viable butterfly populations is illustrated in many metapopulation studies, e.g. as Lewis *et al.* (1997) and Ravenscroft (1990) studies relating to Silver-studded Blue *Plebejus argus* (a species known to occur at Newlyn Down).

Whilst Sites 3,4 and 5 inevitably benefit from colonisation by more mobile heathland invertebrate species recorded at Newlyn Downs SSSI/SAC and Units 16 and 17 of Carrick Heaths SSSI, Sites 3,4 and 5 collectively provide a landscape-scale stepping-stone resource which increases the conservation value of the site for invertebrates on a landscape scale. However, many less well known heathland specialists, having limited power of flight, are poor colonisers. The conservation biology of species such as a Nationally Scarce weevil *Acalles ptinoides*, (recorded from Sites 3,4 and 5 combined) for example, is poorly known, however, the species is a litter specialist and is likely to have poor colonisation ability on a landscape scale. This and other species with poor colonisation ability may occur as remnant populations from when heathland was historically connected on a landscape scale.

Based on the findings of the ERCCIS datasearch, only one of the seven Nationally Scarce species recorded from combined Sites 3,4 and 5 has formerly been recorded within 2km of the site. *Calomicrus circumfusus* has been recorded historically from several locations within five km of the site including records from within 1.5km of Site 3,4 and 5 at the southern extremity of Newlyn Downs. Whilst it is probable that some other of the remaining Nationally Scarce species recorded at Site 3,4 and 5 also occur at Newlyn Downs, heathland sites, even SACs and SSSIs, are often under-recorded for invertebrates other than more obvious groups such as butterflies, moths and dragonflies and damselflies. Invertebrates are not listed as a primary feature for SAC or SSSI designation for either Newlyn Down or Carrick Heaths Units 16 and 17, therefore, invertebrates (other than possibly S41 butterflies and other popular groups) may not be subject to surveillance or monitoring at these sites.

Without extensive study, it is not possible to reasonably conclude to what extent Sites 3,4 and 5 are interdependent, or indeed whether the representative heathland invertebrate fauna recorded from Sites 3,4 and 5 are elevated due to the proximity of these combined sites to Newlyn Downs SAC/SSSI and Carrick Heaths SSSI Units 16 and 17. However, based on prevailing theories relating to landscape scale colonisation at a metapopulation scale, the juxtaposition of Sites 3,4 and 5, Newlyn Down SAC/SSSI and Carrick Heaths SSSI Units 16 and 17 would indicate that the proximity of these sites, regardless of conservation status, would increase colonisation potential for heathland species at a landscape scale and loss of habitat at Sites 3,4 and 5 would be detrimental to the overall ecological value of the designated SSSI and SAC sites for specialist heathland invertebrates with some

colonisation ability and in particular, those species known to occur in metapopulations such as Silver-studded Blue *Plebejus argus*.

#### **Site 6 – Wet grassland, rush pasture & wet woodland (north of Ennis Farm)**

##### **Habitat**

The survey area occupied the northwest corner of a large field, variously comprising semi-improved wet grassland and rush pasture habitats and with an area of wet woodland at the western boundary. Yorkshire Fog *Holcus lanatus* dominated wet grassland was generally fairly rank throughout the survey period and formed a mosaic with fairly dense Soft Rush *Juncus effusus* dominated stands (Appendix 3, Photograph 7). Some areas of site were waterlogged, particularly towards the west of the field and the level of wetness generally increased downslope from the survey area. The water level was frequently at or close to the soil surface.

Other graminoids abundant within the sward included Creeping Bent-grass *Agrostis stolonifera*, Sweet Vernal-grass *Anthoxanthum odoratum*, Rough Meadow-grass *Poa trivialis*, Marsh Foxtail *Alopecurus geniculatus*, a sweet-grass *Glyceria* sp. Herbs included Creeping Buttercup *Ranunculus repens*, Greater Bird's-foot Trefoil *Lotus pedunculatus*, Sorrel *Rumex acetosa*, Marsh Thistle *Cirsium palustre* and Cuckooflower *Cardamine pratensis* occurring both within the wet grassland and the Soft Rush dominated stands. Wetter areas supported species such as Marsh Bedstraw *Galium palustre*, Water Forget-me-not *Myosotis scorpioides*, Marsh Ragwort *Senecio aquaticus*, Tormentil *Potentilla erecta*, Water Mint *Mentha aquatica*, Lesser Spearwort *Ranunculus flammula* and Ragged Robin *Lychnis flos-cuculi*.

A strip of woodland followed the fenceline and included wetter carr with Grey Willow *Salix cinerea* and some Alder *Alnus glutinosa* and areas of raised drier woodland with trees including mature Sessile Oak *Quercus petraea*, Holly *Ilex aquifolium*, Ash *Fraxinus excelsior* and Hawthorn *Crataegus monogyna*. Rush pasture and fen habitat persisted to some extent beneath the wet woodland, with areas of seepage habitat and exposed, saturated mud. There was some wood-decay habitat and saturated wood.

##### **Species recorded**

In total, 249 invertebrate species were recorded from Site 6 – Wet grassland, rush pasture and wet woodland. In terms of species groups recorded from the sample data, the greatest number of species recorded for the site were beetles (Coleoptera), with 82 species being recorded. True bugs (Hemiptera) with 55 recorded species was the second most speciose group, followed by two-winged flies (Diptera) with 43 recorded species and spiders (Araneae) with 30 recorded species. In addition, 10 species of butterfly (Lepidoptera) were recorded, together with six species of grasshoppers, crickets and groundhoppers (Orthoptera), five combined bee, ant and wasp species (Aculeate Hymenoptera), five species of Harvestman (Opiliones), and four moth (Lepidoptera)<sup>7</sup> species.

The overall low count of Hymenoptera was indicative of the survey as a whole. Of the butterflies recorded all were common and widespread species of grassland and woodland edges throughout much of the UK and no S41 listed butterflies were recorded.

##### **Uncommon and Section 41 species recorded from Site 6**

A total of five species (two beetles, one leafhopper, one two-winged fly and one spider) classed as Nationally Scarce in the UK were recorded from Site 6. No species listed in Section 41 (England) of

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<sup>7</sup> No moth trapping was conducted at Site 6.



the NERC Act (2006) as 'Species of principal importance' were recorded<sup>8</sup>. In addition, around 18 species considered to be 'Local' in the UK were recorded.

Nationally Scarce beetles recorded at Site 6 included a thistle-feeding species of weevil *Larinus planus* (described under Site 1) and a rove beetle *Tachyporus formosus* which has been associated with marshland and sea cliff habitats in the UK.

*Anoscopus albifrons* a Nationally Scarce species of leafhopper associated with grassland habitats was also recorded from Site 6 as was the Short-horned Black Legionnaire *Beris fuscipes*, which is associated with the wooded margins of fens and marshes and *Pardosa proxima*, one of several species of wolf spider (Lycosidae) recorded during the survey.

According to Harvey *et al* (2002) *Pardosa proxima* is found in a variety of sparsely vegetated habitats but typically occurs in marshy places. The species is most frequent in coastal sites including earthy cliffs, saltmarsh, dune slacks and streamside habitats including exposed riverine sediments. Despite the Nationally Scarce status, there seem to be a number of *P. proxima* records from Cornwall including one record from close to the A30 at Marazanvose. The spider was also recorded at Site 28 during the survey.

*Gibbaranea gibbosa*, a very distinctive but local species of orb-web spider associated with woodland edges was also recorded at Site 6 (as well as Site 1) and four of eleven species of the rove beetle genus *Stenus* recorded from Site 6 were local species in the UK. Many *Stenus* species are strongly wetland associated.

One species once listed as a RDB species in the UK, but which has massively increased in range in recent decades, the Long-winged Conehead *Conocephalus discolor (fuscus)* was recorded from the site.

### **Pantheon output**

Results of the Pantheon analysis of Site 6 data show that on the broad biotope level (biotope scale), the highest number of species (115) was attributed to the 'Open habitats' classification. The 'Tree associated' classification was attributed with 59 species and 58 species were included within the broad 'Wetland' biotope classification. In addition, 1 species classed within the 'Coastal' broad biotope classification was recorded.

Species classed within a recognised conservation status were attributed to each of the broad biotope classifications as follows:

- **Open habitats** - Three species classified within one of the Nationally Scarce classifications.
- **Tree associated** – No species of higher conservation status attributed.
- **Wetland** – One Nationally Scarce species.
- **Coastal** – One Nationally Scarce species.

On the Habitat Level the highest number of species was attributed to the 'Tall sward and scrub' category with 101 recognised species from the sample data. For the 'Arboreal' classification (nested within the 'Tree-associated' biotope classification) 36 species were recognised, 33 species listed within the 'Peatland' and 20 species were attributed to the 'Marshland' assemblage (both Peatland and Marshland assemblages are nested within the Wetland biotope level assemblage). The only other assemblage represented by a sufficient number of species to be considered robust was

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<sup>8</sup> Most S41 species in other assemblages resulted from research only moths not sampled for at Site 6

'Shaded woodland floor' with 17 species. Two other woodland associated habitat level assemblages 'Decaying wood' and 'Wet woodland' both comprised nine species; however, the 'Short sward and bare ground' assemblage comprising eight species, supported two Nationally Scarce species.

Species classed within a recognised conservation status were attributed to each of the habitat classifications as follows (includes species attributed to habitat classifications supporting less than 15 species):

- **Tall sward and scrub** - One Nationally Scarce species.
- **Arboreal** – No species with a recognised conservation status were recorded.
- **Peatland** - No species with a recognised conservation status were recorded.
- **Marshland** – One Nationally Scarce species.
- **Shaded woodland floor** – No species with a recognised conservation status were recorded.
- **Decaying wood** - No species with a recognised conservation status were recorded.
- **Short sward and bare ground** - Two Nationally Scarce species.
- **Brackish pools and ditches** - One Nationally Scarce species.

Eight Specific Assemblage Types (SATs) were represented within the Pantheon output for Site 6; however, none exhibited sufficiently high species scores to exceed the 'Favourable Condition' threshold set within Pantheon.

The SATs recorded were generally only represented by one (F002 – Rich flower resource, F111 – Bare sand and chalk, F112 - Open short sward and W314 - Reed-fen and pools) or two (A215 – Epiphyte fauna, F001 - Scrub edge and F003– Scrub, heath and moorland) species. Whilst five species were classified within the 'A212 – Bark and sapwood decay' assemblage, the FC threshold set in ISIS for this assemblage is 19 and the percentage representation was less than one percent (compared to the ten percent representation for A215 – Epiphyte fauna, which had a FC threshold as low as three, due to being represented within Pantheon by very few species).

Species classed within a recognised conservation status were attributed to the following Specific Assemblage classification(s):

- **Open short sward** - One Nationally Scarce species (A true weevil *Larinus planus*).

#### ***Representativeness of assemblage***

On a biotope level, the assemblages defined from the Pantheon results showed reasonable fidelity to the habitats actually sampled from. The majority of samples were collected from more open habitat and edge habitats comprising open grassland and rush-pasture. A proportionally higher count of wetland-specific species were recorded from Site 6 than from the previously discussed sites and tree associated biotope level was also well represented, reflecting sampling effort from the arboreal component of the site.

On a habitat level, a large proportion of species would be expected to be attributed to the 'Tall sward and scrub' assemblage (101 recognised species) due to the site comprising largely meadowland. The wetland assemblages recognised were divided more broadly, with representatives of 'Peatland', 'Marshland', 'Wet woodland', 'Running water' and 'Lake' assemblages. 'Peatland', which was most strongly represented habitat-level wetland assemblage is defined in Pantheon as occurring in:

'Wetlands where disturbance is limited, although levels of environmental stress may be high as in some upland examples. In large open-water bodies, it is confined to well-vegetated margins, but it is

particularly characteristic of mires and seepages which may have little open water, but which remain permanently wet. Water level fluctuations are not usually significant or at least, when they do occur, the substrate rarely dries out completely. Consequently, this assemblage type is dominant on wet peat. They have often been in longer existence than mineral marsh habitats.'

And Marshland is defined as being:

'Associated with still open water bodies and littoral areas on mineral substrates that may be subject to repeated disturbance, for example by flooding or grazing. Floodplain sites may be inundated for varying periods either by surface run-off or by rising groundwater, but between floods, they can lose surface water to reveal a substrate that is humid rather than saturated.'

In real terms the survey area was, in part at least, permanently wetted over the entire period, suggesting an affinity with the peatland assemblage. The degree of waterlevel fluctuation is not known in terms of winter variation in waterlevel. However, the area of habitat was in the upslope part of the field and whilst some fluctuation in waterlevel is likely, seasonal flooding, other than some localised inundation from the stream which ran through the wet woodland, would not be likely to be significant.

The habitat scale assemblages nested within the Tree associated biotope comprising 'Arboreal', 'Shaded woodland floor', 'Decaying wood' and 'Wet woodland' collectively represented the overall range of habitat present within the wooded component of the site, although, although this habitat occupied rather a narrow strip at the edge of the field, the topography was varied with some drier and some wetter areas.

In general terms the SQI scores attributed to each of the more strongly represented assemblages were rather low, Tall sward and scrub, arboreal, peatland and shaded woodland floor assemblages all registered an SQI score of 100, indicating that these assemblages individually supported a rather unexceptional invertebrate fauna. The SQI score of 115 registered for the 'Marshland' habitat was somewhat higher due to the presence of a Nationally Scarce wolf spider *Pardosa proxima*.

Somewhat surprisingly, the highest scoring assemblage registered in terms of SQI on a habitat level was 'Short sward and bare ground' for which an SQI score of 175 was recorded. Importantly however, the number of species attributed to this assemblage was only eight and therefore cannot be considered robust. 'Short sward and bare ground' assemblages are characteristic of habitats subject to disturbance, where bare ground is provided due to poaching by cattle and other activities. There was evidence of such disturbance at the interface of the wooded part of the site with the grassland components. The two species attributed to this assemblage in Pantheon were both recorded on other sites and included the thistle associated weevil *Larinus planus* and a rove beetle *Tachyporus formosus*, the latter described by some authors as a wetland species.

As has been pointed out in relation to previously discussed sites, Specific Assemblage Types (SATs) generally comprise species with a greater level of habitat fidelity than the overarching habitat level and are thus considered to indicate assemblages of higher conservation value when well represented. As indicated above, whilst several SATs were represented within the Pantheon output data, none were attributed with a sufficient number of species. However, as SATs are indicative of specialist fauna, the presence of species attributed to SATs indicates some degree of specialism and conservation value even if the assemblages do not exceed their given 'Favourable Condition' threshold. One SAT – 'A215 – Epiphyte fauna' despite being attributed to only two species, was the closest to achieving FC status. The threshold for this assemblage is set at only three due to the small national species pool attributed to this group.

## Site 9 - Priority woodland and woodland edge (Honeycombe Barn)

### **Habitat**

Habitat sampled included herb-rich woodland edge, wet and dry grassland, scrub and broadleaved woodland interior and hedgerow habitat.

The habitat to the north generally exhibited a diverse structural succession from wet grassland, tall ruderal and fen, through scrub to woodland edge, scrub forming a mosaic with tall herbs and shorter grassland/swamp habitat (Appendix 3, Photograph 8). To the south, a strip of herb-rich semi-improved grassland occupied a moderately steep east facing slope c20m wide sloping downwards to woodland margin (Appendix 3, Photograph 9).

The woodland itself varied in terms of wetness. The northern section was frequently inundated and swamp and other wetland flora persisted beneath a canopy of predominately Grey Willow *Salix cinerea* carr. The northern wooded area was generally drier although the groundflora and dominant tree species varied due to topographic variation. Drier areas supported leggy Ash *Fraxinus excelsior* and Pedunculate Oak *Quercus robur* and tall Grey/Goat Willow. The understorey comprised shorter Grey/Goat Willow, Hawthorn *Crataegus monogyna* and Holly *Ilex aquifolium* and Bramble *Rubus fruticosus* (agg.) and Honeysuckle *Lonicera periclymenum* occurred within the shrub layer. The ground vegetation included Common Nettle *Urtica dioica*, Wood Dock *Rumex sanguineus*, Remote Sedge *Carex remota*, Wavy Bitter-cress *Cardamine flexuosa*, Common Dog Violet *Viola riviniana*, Enchanter's Nightshade *Circaea lutetiana*, sweet-grass *Glyceria* sp., Red Campion *Silene dioica*, Wood Avens *Geum urbanum*, Herb Robert *Geranium robertianum*, Foxglove *Digitalis purpurea*, Hart's-tongue Fern *Asplenium scolopendrium* and other species.

The wetter grassland and inundated habitat adjacent to the wood edge to the south comprised graminoids including Yorkshire Fog *Holcus lanatus*, Rough Meadow-grass *Poa trivialis* and Soft Rush *Juncus effusus*. Herbs included Creeping Buttercup *Ranunculus repens*, Brooklime *Veronica beccabunga*, Water Forget-me-not *Myosotis scorpioides*, Water Figwort *Scrophularia auriculata*, Fleabane *Pulicaria dysenterica*, Ragged Robin *Lychnis flos-cuculi*, Lesser Stitchwort *Stellaria graminea*, Curled Dock *Rumex crispus*, Cuckooflower *Cardamine pratensis*, Common Nettle, Marsh Thistle *Cirsium palustre*, Water Mint *Mentha aquatica*, Greater Willowherb *Epilobium hirsutum*, Wild Angelica *Angelica sylvestris* and Marsh Bedstraw *Galium palustre*. A scrub edge mainly of Bramble persisted and the woodland margin in the north supported Hazel and Grey/Goat Willow.

The sward of the drier slope grassland to the south was typically between five and 10cm tall at time of survey and apparently managed by livestock grazing (cattle). The sward included Sweet Vernal Grass *Anthoxanthum odoratum* and Yorkshire Fog with herbs including abundant Creeping Buttercup, Germander Speedwell *Veronica chamaedrys* and Ribwort Plantain *Plantago lanceolata* with Common Bird's-foot Trefoil *Lotus corniculatus*, Black Medick *Medicago lupulina*, Sorrel *Rumex acetosa*, Common Cat's-ear *Hypochaeris radicata*, White Clover *Trifolium repens*, Meadow Buttercup *Ranunculus acris*, Common Knapweed *Centaurea nigra* and Common Centaury *Centaureum erythraea*. There were numerous, small bare ground patches within the sward.

### **Species recorded**

In total, 327 invertebrate species were recorded from Site 9 – Wet woodland edge and wet and dry grassland near Honeycombe Barn. In terms of species groups recorded from the sample data; the greatest number of species recorded for the site were beetles (Coleoptera), with 91 species being recorded. Moths (Lepidoptera) with 58 recorded species was the second most speciose group, followed by true bugs (Hemiptera) with 52 recorded species, two-winged flies (Diptera) with 46 recorded species and spiders (Araneae) with 20 recorded species. In addition, 10 species of butterfly (Lepidoptera) were recorded, together with nine species of combined bee, ant and wasp species

(Aculeate Hymenoptera), seven species of grasshoppers, crickets and groundhoppers (Orthoptera), five dragonfly and damselfly (Odonata) species and five species of Harvestman (Opiliones).

The overall low count of Hymenoptera was indicative of the survey as a whole. Of the butterflies recorded all were common and widespread species of grassland and woodland edges throughout much of the UK and no S41 listed butterflies were recorded.

#### **Uncommon and Section 41 species recorded from Site 9**

A total of seven species (four beetles, two two-winged flies and one leafhopper) classed as Nationally Scarce in the UK were recorded from Site 9. Six species listed in Section 41 (England) of the NERC Act (2006) as 'Species of principal importance' – research only category was recorded. In addition, one rare migrant moth species and a rhopalid bug which may not have formerly been recorded from Cornwall was recorded. Around 18 species considered to be Local in the UK were also recorded from Site 9.

Of the Nationally Scarce beetles recorded at Site 9, two rove beetle species *Stenus pusillus* and *Tachyporus formosus* and one weevil *Gymnetron veronicae*, both recorded in other sites described above were recorded, as well as a hyperine weevil *Hypera (Dapalinus) meles*, one of several weevils of the genus *Hypera* recorded during the survey. *H. meles* is found in 'grasslands, roadside verges and field margins' (Hyman and Parsons, 1992) and is associated with clovers *Trifolium* spp. (Hyman and Parsons (1992) cite White Clover *T. repens*, whilst Duff (2016) states 'On clovers *Trifolium*, usually Red Clover *T. pratense*'). Both foodplants were ubiquitous within the survey area; however, there appear to be few Cornish records other than one from north Cornwall near Bude. Duff (2016) states that the species is 'apparently increasing' its range in southern England.

Two Nationally Scarce species of long-legged fly (dolichopodidae), *Dolichopus signatus* and *D. notatus* were recorded at Site 9. These species being the rarest of 12 species of the family dolichopodidae recorded from Site 9 samples.

*Dolichopus signatus* was not listed in Falk and Crossley (2005), which reviewed the conservation status of British Dolichopodidae. However, the species was listed as Nationally Scarce in the Pantheon output for the project. The insect is associated with wetland and peatland habitats. On site *D. signatus* was recorded from the wetter woodland edge habitat in Site 9. The species has been recorded historically near Bodmin, St Austell and on the Lizard Peninsula in Cornwall.

The other species *Dolichopus notatus* is described by Falk and Crossley (2005) as being 'a widespread but very localised species, in the UK'. It has been historically recorded from Cornwall and Devon and a range of other counties. Whilst the species is mainly associated with dune slacks and coastal marshes, Falk and Crossley state that 'adults have been taken inland on several occasions'. *D. notatus* was recorded from the wetland habitat/woodland interface at Site 9. There is significant dune slack and coastal marsh habitat six kilometres west of the recorded site at Penhale Sands a site designated SSSI and SAC. It is uncertain whether or not *D. notatus* has been recorded at this site, however, Dolichopodidae are rather poorly recorded in the UK, although there are many records for the commoner species.

*Anoscopus albifrons* a Nationally Scarce species of leafhopper associated with grassland habitats was also recorded from Site 9 (the species also occurred from several other sites during the survey).

All six moth species listed as S41 species in England fell within the 'research only' category. All species are still common and widespread in the UK, which were included within S41 due to significant recorded decline in the UK within recent decades. These species which included Buff Ermine *Spilosoma lutea*, Small Phoenix *Ecliptopera silacea*, Dark-barred Twin-spot Carpet

*Xanthorhoe ferrugata*, Blood-vein *Timandra comae*, Small Square-spot *Diarsia rubi* and Rosy Rustic *Hydraecia micacea*, are fairly catholic in terms of habitat association.

Two further species (a plume moth and a rhopalid bug) worthy of particular note were recorded from Site 9. These are described as follows:

The Scarce Light Plume *Oxyptilus laetus*, (named in the genus *Crombrugghia* in Sterling and Parsons (2012)) is a very rare immigrant in the UK. However, whilst the moth has only been recorded from a few sites nationally, there are at least seven records for Cornwall, mainly from the south coast. The insect occurs as a resident in southern Europe and North Africa, where the recorded foodplants are *Andryale* spp. (yellow-flowered composites not native to the UK). During the survey the Scarce Light Plume was recorded from a moth trap running at Site 9, the habitat being woodland edge grassland which was fairly herb-rich. The species has not been confirmed as a breeding species in the UK.

*Stictopleurus punctatonervosus* is one of two similar species of rhopalid bug (the other being *S. abutilon*), which were both as recently as 1992 described in Kirby (1992) as being 'Probably extinct' in the UK. However, since that time, both insects were refound in the Thames Gateway area around Kent and Essex and have since spread widely across southern England. Data sources suggest that the species may not have yet been recorded from Cornwall, hence its inclusion here. The species is not mentioned in a review of Cornish and Scilly Isles Hemiptera by Alexander (2008). In northern Europe *S. punctatonervosus* shows a preference for dry, open, sunny habitats. The habitat from which the species was recorded during the survey was the drier, more herb-rich grassland occupying a moderately steep, east-facing slope towards the south of the Site. *Stictopleurus* spp. feed on the sap of composites including Ragworts *Senecio* spp.

#### **Pantheon output**

Results of the Pantheon analysis of Site 9 data show that on the broad biotope level (biotope scale), the highest number of species (168) was attributed to the 'Open habitats' classification. The 'Wetland' classification was attributed with 63 species and 55 species were included within the broad 'Tree associated' biotope classification. In addition, 1 species classed within the 'Coastal' broad biotope classification was recorded.

Species classed within a recognised conservation status were attributed to each of the broad biotope classifications as follows:

- **Open habitats** - Three species classified within one of the Nationally Scarce classifications together with three S41 (research only) moth species.
- **Wetland** – Four Nationally Scarce species
- **Tree associated** – No species of higher conservation status attributed.
- **Coastal** – One Nationally Scarce species.

On the Habitat Level the highest number of species was attributed to the 'Tall sward and scrub' category with 150 recognised species from the sample data. For the 'Arboreal' classification (nested within the 'Tree-associated' biotope classification) 38 species were recognised, 31 species listed within the 'Peatland' and 29 species were attributed to the closely allied 'Marshland' assemblage (both 'Peatland' and 'Marshland' assemblages are nested within the 'Wetland' biotope level assemblage). No other assemblage represented by a sufficient number of species (15) to be considered robust. However, 13 species were attributed to the 'Short sward and bare ground' assemblage (nested within the Open habitats biotope) and 10 species were attributed to each of the 'Shaded woodland floor' and 'Decaying wood' assemblages. Interestingly, considering the composition of the site, only four species were attributed to the 'Wet woodland'. 'Running water' was attributed with seven species, two of which are classed as Nationally Scarce.

Species classed within a recognised conservation status were attributed to each of the habitat classifications as follows (includes species attributed to habitat classifications supporting less than 15 species):

- **Tall sward and scrub** - Two Nationally Scarce species and three S41 (research only) moth species.
- **Arboreal** – No species with a recognised conservation status were recorded.
- **Peatland** - One Nationally Scarce species.
- **Marshland** – One Nationally Scarce species.
- **Short sward and bare ground** - One Nationally Scarce species.
- **Running water** - Two Nationally Scarce species.
- **Shaded woodland floor** – No species with a recognised conservation status were recorded.
- **Sandy beach**<sup>9</sup> - One Nationally Scarce species
- **Brackish pools and ditches** - One Nationally Scarce species.

Eight Specific Assemblage Types (SATs) were represented within the Pantheon output for Site 9; however, none exhibited sufficiently high species scores to exceed the 'Favourable Condition' threshold set within Pantheon.

The SATs recorded were generally only represented by one (W314 - Reed-fen and pools, F002 – Rich flower resource, F003– Scrub, heath and moorland and F112 - Open short sward) or two (F001 - Scrub edge, F111 – Bare sand and chalk and A215 – Epiphyte fauna) Whilst seven species were classified within the 'A212 – Bark and sapwood decay', the FC threshold set in ISIS for this assemblage is 19 and the percentage representation was one percent (compared to the ten percent representation for 'A215 – Epiphyte fauna', which had a FC threshold as low as three, due to being represented within Pantheon by very few species).

On the Specific Assemblage level, no species classed within a recognised conservation status were attributed to any of the Specific Assemblage Types recognised from Site 9 data.

### ***Representativeness of assemblage***

For Site 9 sampling effort focused primarily on the woodland edge and adjacent wet and grassland habitats and whilst the woodland interior received some attention, the habitat was generally rather heavily shaded and herb-poor at field level. Moth trapping at Site 9 was undertaken mainly to contribute to the woodland-specific data, as moth species are an important taxon in Pantheon analysis of woodland habitat. It was, however, not unexpected that the largest number of 168 species were attributed to the 'Open habitat' biotope level classification. The 55 species attributed to the 'Tree associated' assemblage was rather a low turnout in relation to both the 'Open habitat' and 'Wetland' classification – which itself was as expected due to the significant woodland edge wetland habitat. However, the National species pool attributed to woodland biotopes is less than half that of the 'Open habitat' classification.

So it can be said that the representation at the broad biotope level shows a reasonable fidelity to what would be expected in terms of species associated with the surveyed habitat, which comprised strong woodland edge wet and dry grassland, swamp/fen and open water habitats as well as broadleaved woodland.

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<sup>9</sup> The same Nationally Scarce species *Dolichopus notatus*, was attributed to both Sandy beach and Brackish pools and ditches. The species is mainly coastal in the UK, but is occasionally recorded from inland marshy habitats.

On a habitat level a large proportion of species would be expected to be attributed to the 'Tall sward and scrub' assemblage (150 recognised species) due to the surveyed habitat comprising largely of grassland, scattered scrub and woodland edge habitat. These components are cited within the description of the Tall sward and scrub assemblage within Pantheon.

The habitat scale assemblages nested within the Tree associated biotope comprising 'Arboreal', 'Shaded woodland floor', 'Decaying wood' and 'Wet woodland' collectively represented the overall range of habitat present within the wooded component of the site. Somewhat surprisingly, the 'Wet woodland' element was not well represented with only four species assigned to this assemblage; however, there was a fairly strong representation in terms of species affiliated to wetland assemblages and the wetland habitat was very much confined on site to the woodland margin and ground layer beneath the Grey Willow dominated carr habitat towards the north of the site.

Collectively, around 60 species were attributed to the 'Peatland' and 'Marshland' assemblages recorded for the site, some species are attributed to both assemblages. The presence of almost equal number of both assemblages may result from a combination of remnant habitat and agricultural improvement, peatland assemblages are more characteristic of less improved remnant habitats which remain wet all year round.

Despite two Nationally Scarce species being attributed to the Tall sward and scrub assemblage, Pantheon returned an SQI score of only 102, indicating a rather low conservation value, where the ratio between Nationally Scarce species and Common and widespread species is high. The SQI for the 'arboreal' assemblage was only 100 due to the presence of species considered to be either common and widespread or local in the UK. The SQI scores of 109 and 110 registered for the 'Peatland' and 'Marshland' habitats respectively were somewhat higher due to the ratio of commoner species being lower in relation to Nationally Scarce species. These scores were increased by the presence of the Nationally Scarce long-legged fly *Dolichopus signatus* within the 'Peatland' assemblage and a rove beetle *Stenus pusillus* in the 'Marshland' assemblage.

A much higher SQI of 186 was attributed to the 'Running water' assemblage, which had two Nationally Scarce species out of a total of seven species. This assemblage cannot, however, be considered to be robust due to the low number of attributed species.

As has been pointed out in relation to previously discussed sites, Specific Assemblage Types generally comprise species with a greater level of habitat fidelity than the overarching habitat level and are thus considered to indicate assemblages of higher conservation value when well represented. As indicated above, whilst several SATs were represented within the Pantheon output data, none were attributed with a sufficient number of species. However, as SATs are indicative of specialist fauna, the presence of species attributed to SATs indicates some degree of specialism and conservation value even if the assemblages do not exceed their given 'Favourable Condition' threshold. As with Site 6, one SAT – 'A215 – Epiphyte fauna' despite being attributed to only two species, was the closest to achieving FC status. The threshold for this assemblage is set at only three due to the small national species pool attributed to this group.

#### **Site 10 – Semi-improved wet and dry grassland (meadow)**

##### ***Habitat***

Habitat to the east was site generally drier and to the west, areas of wetter grassland and rush pasture were recorded. Samples were collected from both habitat types.



The drier grassland sward was fairly herb-rich and at the time of survey the sward height was approximately 30cm (during the early part of the season) being fairly uniform (Appendix 3, Photograph 10). Later in the season a hay cut was taken and survey concentrated on the wetter sward towards the western end of the site. Constant graminoids included Common Bent-grass *Agrostis capillaris*, Yorkshire Fog *Holcus lanatus* and Sweet Vernal-grass *Anthoxanthum odoratum* and Perennial Rye-grass *Lolium perenne*, Crested Dog's-tail *Cynosurus cristatus* and Cock's-foot *Dactylis glomerata* all occurred to a lesser extent in decreasing order of frequency. Constant herbs included Ribwort Plantain *Plantago lanceolata*, Meadow Buttercup *Ranunculus acris* and Dandelion *Taraxacum officinale* (agg.), with Common Bird's-foot Trefoil *Lotus corniculatus*, Common Cat's-ear *Hypochaeris radicata* and Sorrel *Rumex acetosa* all being abundant.

Less frequent or more locally distributed herbs including Smooth Hawk's-beard *Crepis capillaris*, Hogweed *Heracleum sphondylium*, Common Knapweed *Centaurea nigra*, Tufted Vetch *Vicia cracca*, Red Clover *Trifolium pratense*, Meadow Vetchling *Lathyrus pratensis*, Selfheal *Prunella vulgaris*, White Clover *Trifolium repens*, Common Vetch *Vicia sativa* and Common Ragwort *Senecio jacobaeae*. A few Blackthorn *Prunus spinosa* saplings were also recorded in the sward and bryophytes including Springy Turf-moss *Rhytidiadelphus squarrosus* and Rough-stalked Feather-moss *Brachythecium rutabulum* were also recorded.

The wetter grassland area comprised Soft Rush *Juncus effusus*, Yorkshire Fog *Holcus lanatus* and Creeping Bent *Agrostis stolonifera* dominated wet grassland/rush pasture. Associated herbs included Greater Bird's-foot Trefoil *Lotus pedunculatus*, Marsh Bedstraw *Galium palustre*, Cuckooflower *Cardamine pratensis* and other herb species typical of rush-pasture swards within the survey area. This habitat was not subject to haycutting. A patch of Grey Willow *Salix cinerea* habitat and a pond with abundant non-native invasive New Zealand Pygmyweed *Crassula helmsii* adjacent to the survey area was not sampled.

### **Species recorded**

In total, 182 invertebrate species were recorded from Site 10 – Semi-improved wet and dry grassland (meadow). In terms of species groups recorded from the sample data; the greatest number of species recorded for the site were beetles (Coleoptera), with 74 species. True bugs (Hemiptera) with 33 recorded species was the second most speciose group, followed by two-winged flies (Diptera) with 29 recorded species and spiders (Araneae) with 18 recorded species. In addition, seven species of butterfly (Lepidoptera) were recorded, together with four species each of the groups dragonflies and damselflies (Odonata), grasshoppers, crickets and groundhoppers (Orthoptera) and bees, ants and wasps (Aculeate Hymenoptera). Only two moth (Lepidoptera)<sup>10</sup> species were recorded during the survey.

The overall low count of Hymenoptera was indicative of the survey as a whole. Of the butterflies recorded all were common and widespread species of grassland and woodland edges throughout much of the UK and no S41 listed butterflies were recorded.

### **Uncommon and Section 41 species recorded from Site 10**

A total of five species (two beetles, one leafhopper and one two-winged fly) classed as Nationally Scarce in the UK were recorded from Site 10. No species listed in Section 41 (England) of the NERC Act (2006) as 'Species of principal importance' were recorded<sup>11</sup>. In addition, around 11 species considered to be Local in the UK were recorded.

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<sup>10</sup> No moth trapping was conducted at Site 10.

<sup>11</sup> Most S41 species in other assemblages resulted from research only moths not sampled for at Site 10

Nationally Scarce beetles recorded at Site 10 included two weevil species including the clover *Trifolium* spp. feeding *Hypera (Dapalinus) meles* also recorded from Site 9 and the Brooklime *Veronica beccabunga* associated *Gymnetron veronicae* also recorded from several other sites.

*Anoscopus albifrons* a Nationally Scarce species of leafhopper associated with grassland habitats was also recorded as was a Nationally Scarce long-legged fly *Chrysotus laesus*.

*Chrysotus laesus* was not listed in Falk and Crossley (2005), in their review of the conservation status of British Dolichopodidae. However, there was a note suggesting that this species was uncommon and warranted review within this work. *Chrysotus laesus* was listed as Nationally Scarce in the Pantheon output for the project. The insect is associated with wetland habitats including running water. On site *C. laesus* was recorded from rush-pasture at Site 10. The species has been recorded historically near Wadebridge in Cornwall.

### **Pantheon output**

Results of the Pantheon analysis of Site 10 data show that on the broad biotope level (biotope scale), the highest number of species (122) was attributed to the 'Open habitats' classification. The 'Wetland' classification was attributed with 37 species and only nine species were included within the broad 'Tree associated' biotope classification.

Species classed within a recognised conservation status were attributed to each of the broad biotope classifications as follows:

- **Open habitats** - Three species classified within one of the Nationally Scarce classifications.
- **Wetland** – Two Nationally Scarce species.
- **Tree associated** – No species of higher conservation status attributed.

On the Habitat Level the highest number of species was attributed to the 'Tall sward and scrub' category with 111 recognised species from the sample data. The two wetland assemblages 'Peatland' and 'Marshland' were attributed with 17 and 15 species respectively.

All other recognised Habitat Level assemblages fell below the threshold of 15 required for a robust analysis in Pantheon. The best represented of these remaining assemblages was 'Short sward and bare ground' with eight attributed species with the 'Running water' and 'arboreal' habitat level assemblages comprising of five species each.

Species classed within a recognised conservation status were attributed to each of the habitat classifications as follows (includes species attributed to habitat classifications supporting less than 15 species):

- **Tall sward and scrub** - Two Nationally Scarce species.
- **Peatland** - No species with a recognised conservation status were recorded.
- **Marshland** – One Nationally Scarce species.
- **Short sward and bare ground** - One Nationally Scarce species.
- **Running water** - Two Nationally Scarce species.

Four Specific Assemblage Types (SATs) were represented within the Pantheon output for Site 10. However, none exhibited sufficiently high species scores to exceed the 'Favourable Condition' threshold set within Pantheon.

The SATs recorded were only represented by one (A212 – Bark and sapwood decay and W314 - Reed-fen and pools) or two (F003– Scrub, heath and moorland and F111 – Bare sand and chalk) all of which fell far short of their respective FC threshold scores set in Pantheon.

### **Representativeness of assemblage**

On a biotope level, the assemblages defined from the Pantheon results showed reasonable fidelity to the habitats actually sampled from. All Site 10 samples were collected from more open habitat comprising predominately open grassland habitat with some from more wet grassland and rush-pasture. The vast majority of species were attributed to ‘Open habitat’ on a broad biotope level. Whilst few species were classified within the ‘Tree-associated’ biotope, a reasonable number were attributed to ‘Wetland’ on a biotope level and this reflects the presence of both wet grassland and general grassland Open habitat species occurring together in the wetter areas.

On a habitat level a large proportion of species would be expected to be attributed to the ‘Tall sward and scrub’ assemblage due to the site comprising largely meadowland and with 122 recognised species, this is borne out by the findings. The wetland assemblages recognised are more divided, with representatives of ‘Peatland’, ‘Marshland’ and to a lesser extent, ‘Running water’ at a habitat level. The deployment of these wetland assemblages reflects a similar pattern recorded within all sites within the survey, where there has been a long history of agricultural improvement of more nutrient poor habitat to meadowland.

The wetter areas of the site were still relatively saturated even during August; however, the majority of the area managed as a hay-meadow was fairly dry throughout.

In general terms the SQI scores attributed to each of the more strongly represented assemblages were rather low, ‘Tall sward and scrub’, despite supporting two Nationally Scarce species, scored an SQI of 103 and ‘Peatland’ scored only 100, indicating a fauna comprised only of common and local species.

The SQI returned for the ‘Marshland’ on a habitat scale, was somewhat higher at 120. This related to the ratio of the one Nationally Scarce species to common and local species in the assemblage. With only 15 species attributed to ‘Marshland’, the assemblage supported the minimum number of species required to ensure robustness. In terms of affinity to Broad Assemblage Type (BAT) category used in former versions of ISIS, the ‘Marshland’ habitat-level classification now used in Pantheon is closest to the ‘W2 – Mineral marsh and open water’ BAT. In ISIS, a threshold score of 150 was set as the Favourable Condition Target score.

The highest SQI score of 220 related to the ‘Open water’ habitat-level assemblage. However, only five species in total were affiliated to this classification, with two of these including the Brooklime *Veronica beccabunga* feeding weevil *Gymnetron veronicae* and the long-legged fly *Chrysotus laesus* being Nationally Scarce.

As has been pointed out in relation to previously discussed sites, Specific Assemblage Types generally comprise species with a greater habitat fidelity than shown at the overarching habitat level and are thus considered to indicate assemblages of higher conservation value when well represented. As indicated above, whilst several SATs were represented within the Pantheon output data, none were attributed with a sufficient number of species. However, as SATs are indicative of specialist fauna, the presence of species attributed to SATs indicates some degree of specialism and conservation value even if the assemblages do not exceed their given ‘Favourable Condition’ threshold.

Overall the Site 10 – Semi-improved wet and dry grassland (meadow) habitat supported species assemblages representative of open grassland, peatland, marshy grassland and wet and drier woodland and collectively four Nationally Scarce species were recorded. The site did not receive the moth survey attention that was prioritised in sites with more strongly represented woodland or heathland elements. Overall analysis using Pantheon showed that the site supported species representative of the habitat elements surveyed. However, the overall species specialisation was somewhat diffuse whilst collectively a number of specialised species were recorded, these were deployed rather diffusely over a range of assemblages and the results do not indicate a site of higher conservation value. It was considered that the habitats surveyed received sufficient survey effort to enable a robust evaluation.

### **Site 21/22 – Priority Woodland and grassland/tall ruderal edge habitat**

#### ***Habitat***

The site comprised of open rough grassland, tall ruderal habitat and scrub-edge with mature broadleaved woodland (Appendix 3, Photograph 11). The grassland was generally rank and species-poor, with graminoids including Yorkshire Fog *Holcus lanatus*, Creeping Bent-grass *Agrostis stolonifera*, Common Bent-grass *A. capillaris* with Sweet Vernal-grass *Anthoxanthum odoratum* and occasional Timothy *Phleum pratense* and Cock's-foot *Dactylis glomerata*. Herbs included Ribwort Plantain *Plantago lanceolata*, with occasional Common Cat's-ear *Hypochaeris radicata*, Meadow Buttercup *Ranunculus acris*, Creeping Buttercup *R. repens*, Curled *Rumex crispus*, Broad-leaved Dock *R. obtusifolius* and Common Knapweed *Centaurea nigra*. Also, a very small area supported damper habitat resembling rush pasture with Soft Rush *Juncus effusus*, alongside Yorkshire Fog and other grasses as above with fairly abundant Greater Bird's-foot Trefoil *Lotus pedunculatus*, but otherwise herb-poor.

The site has varied topography, with a bank in the middle probably formed by dumping rubble or soil. It had/was also being used as a dump for scallop shells. The raised bank supported tall herb habitat including abundant Marsh Woundwort *Stachys palustris*, Curled Dock *Rumex crispus*, Hogweed *Heracleum sphondylium*, Marsh Thistle *Cirsium palustre* and Bramble *Rubus fruticosus* (agg.) scrub, which also persisted along the woodland boundary. The woodland interior heavily shaded for the most part, but with some mature/veteran Pedunculate Oak *Quercus robur*, and Ash *Fraxinus excelsior*, some of which occurred on or close to the field edge. Other trees included Sycamore *Acer pseudoplatanus* and Sessile Oak *Quercus petraea*, with understory of Grey Willow *Salix cinerea* with Hawthorn *Crataegus monogyna*, Hazel *Corylus avellana*, Holly *Ilex aquifolium*, also Common Gorse *Ulex europaeus* scrub alongside the Bramble. Some wood decay habitat, both within trees and fallen bark and sapwood decay habitat was present, but the habitat was generally shaded at ground level. Trees often supported epiphytes including lichens and bryophytes.

#### ***Species recorded***

In total, 140 invertebrate species were recorded from Site 21/22 – which was only surveyed during the August (2017) survey period. In terms of species groups recorded from the sample data, the greatest number of species recorded for the site were beetles (Coleoptera) with 47 species. True bugs (Hemiptera) with 32 species was the second most speciose group, followed by two-winged flies (Diptera) with 19 recorded species and spiders (Araneae) with 10 species. In addition, eight species of butterfly (Lepidoptera) were recorded, together with seven of the collective grasshoppers, crickets and groundhoppers (Orthoptera) and four bees (Aculeate Hymenoptera). Only one moth (Lepidoptera)<sup>12</sup> species were recorded during the survey.

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<sup>12</sup> No moth trapping was conducted at Site 21/22.

The overall low count of Hymenoptera was indicative of the survey as a whole. Of the butterflies recorded all were common and widespread species of grassland and woodland edges throughout much of the UK and no S41 listed butterflies or moths were recorded.

#### **Uncommon and Section 41 species recorded from Site 21/22**

Two species, both beetles classed as Nationally Scarce in the UK were recorded from Site 21/22. No species listed in Section 41 (England) of the NERC Act (2006) as 'Species of principal importance' were recorded<sup>13</sup>. In addition, around eight species considered to be 'Local' in the UK were recorded.

Nationally Scarce beetles recorded at Site 21/22 included a Marsh Woundwort *Stachys palustris* associated weevil *Thamiocolus viduatus* and *Tachyporus formosus* a grassland and wetland associated rove beetle which was recorded from other sites during the survey.

*Thamiocolus viduatus* is a small weevil found in wetland, wet grasslands and field margin habitats where it is associated with Marsh Woundwort and less commonly, Field Woundwort *Stachys arvensis* (Hyman and Parsons, 1992). According to Morris, 2008, the beetle is most commonly found in the drier parts of wetlands, this corresponding to the typical habitat of Marsh Woundwort. On site a single specimen of the insect was swept from a large patch of Marsh Woundwort growing on a disturbed bank in the middle of the damp grassland field (Site 21). It is uncertain whether the insect has been historically recorded from Cornwall; Morris (2008) states that the *T. viduatus* is 'not common, but widely, if patchily recorded throughout England and Wales and in southern Scotland'.

Of the remaining species, one species of interest recorded from the site was the Fork-tailed Flower-bee *Anthophora furcata*. This species is of interest as it is the only British species of *Anthophora* which habitually nests in deadwood such as rotting tree-stumps. The bee feeds exclusively on labiates, particularly woundworts. It was feeding on the resource of Marsh Woundwort *Stachys palustris* recorded at the site.

#### **Pantheon output**

Results of the Pantheon analysis of Site 21/22 data show that on the broad biotope level (biotope scale), the highest number of species (74) was attributed to the 'Open habitats' classification. The 'Wetland' classification was attributed with 31 species and 20 species were included within the broad 'Tree-associated' biotope classification.

Species classed within a recognised conservation status were attributed to each of the broad biotope classifications as follows:

- **Open habitats** - Two species classified within one of the Nationally Scarce classifications.
- **Wetland** – No species of higher conservation status attributed.
- **Tree associated** –No species of higher conservation status attributed.

On the habitat level, the highest number of species was attributed to the 'Tall sward and scrub' category with 67 recognised species from the sample data. With 15 attributed species, the 'Marshland' habitat level classification was the only other habitat level assemblage represented with any level of robustness and then only through supporting a minimum number of species for a valid SQI score to be assigned.

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<sup>13</sup> Most S41 species in other assemblages resulted from research only moths not sampled for at Site 21/22

For the 'Arboreal' classification (nested within the Tree-associated biotope classification) 14 species were recognised, the SQI score for this list, therefore, falls marginally below the threshold of 15 indicating SQI robustness.

Of the remaining habitat-level classifications, 'Peatland', closely allied to the 'Marshland' assemblage was attributed with 12 species and other wetland classifications were represented by 'Running water' and 'Wet woodland' four species each. The 'Short sward and bare ground' assemblage was represented by four species as was the 'Shaded woodland floor' assemblage. The remaining 'Tree-associated' habitat-level assemblage represented was 'Decaying wood' which was represented by only two species.

Species classed within a recognised conservation status were attributed to each of the habitat classifications as follows (includes species attributed to habitat classifications supporting less than 15 species):

- **Tall sward and scrub** - One Nationally Scarce species.
- **Marshland** – No species with a recognised conservation status were recorded.
- **Short sward and bare ground** - One Nationally Scarce species.

Four Specific Assemblage Types (SATs) were represented within the Pantheon output for Site 21/22; however, none exhibited sufficiently high species scores to exceed the 'Favourable Condition' threshold set within Pantheon.

Three SATs were only represented by one species including (F002 – Rich flower resource , F003– Scrub, heath and moorland and W314 - Reed-fen and pools) and two species were ascribed to the A212 – Bark and sapwood decay SAT.

On the Specific Assemblage level, no species classed within a recognised conservation status were attributed to any of the Specific Assemblage Types recognised from Site 21/22 data.

### ***Representativeness of assemblage***

For Site 21/22 sampling effort focused primarily on the wet and dry grassland woodland edge and scrub habitats of the survey area. Whilst the woodland interior received some attention (mainly through use of flight interception traps), the habitat was generally rather heavily shaded and herb-poor at field level and yielded relatively few species. It should be noted that as this site was only surveyed on one occasion, towards the end of the fieldwork season, that certain fauna best surveyed during the earlier parts of the summer including saproxylic beetles and flies in particular would have been missed from the survey regardless of survey effort.

Some of the mature Oak and Ash standards within the section of woodland adjacent to the survey area, which differed from the larger conifer-dominated plantation woodland, exhibited signs of wood-decay habitat with rot-holes and signs of decay which were inaccessible for the purpose of survey. This group and other 'Tree-associated' species were poorly expressed within the Pantheon output, but would undoubtedly be better represented from more targeted sampling earlier in the field season. In addition, no moth trapping was undertaken at this site and whilst the moth trapping contributed mainly common and widespread species to the species-lists of sites where this method was used, a greater resolution of data for the site would have enabled a better assessment of the woodland element in particular.

In view of the survey focus being mainly restricted to edge habitat and open grassland, scrub and tall ruderal, the 'Open habitats' and nested 'Tall sward and scrub' habitat-level assemblage would be expected to be most strongly represented within the Pantheon output. Like the majority of sites

surveyed, there was a wetland element to Site 21/22, with areas of rush-pasture, wet woodland and open water present, though these did not collectively comprise the dominant habitat within the survey area which was fairly dry, rather rank grassland and woodland scrub edge. Like the majority of sites the wetland assemblages registered on a habitat-level comprised 'Marshland' and 'Peatland' associates in almost equal measure and the species attributed to these assemblages were representative of the overall survey.

In terms of conservation significance from the recorded samples, on a broad-biotope level, both 'Wetland' and 'Tree-associated' biotopes produced SQI scores of 100 indicating assemblages comprised of species classed as widespread and at most local species. The SQI score recorded for 'Open habitats' was derived both from the largest number of species and included the only two Nationally Scarce species recorded for the site (a weevil *Thamiocolus viduatus* and rove beetle *Tachyporus formosus*). The SQI of 108 indicated a slightly higher conservation value.

On a habitat level, the majority of habitats scored 100, again indicating relatively unexceptional fauna. However, as only two assemblages, 'Tall sward and scrub' and 'Marshland' supported 15 or more species required for robustness, the SQIs for lower attributed groups cannot be considered robust. So, 'Tall sward and shrub' with an SQI score of 104 can be seen as the most significant assemblage recorded from existing data. The presence of the weevil *Thamiocolus viduatus* elevated this score slightly. However, one of the four 'Short sward and bare ground' assemblage species was Nationally Scarce, this returning a score of 175, which would be significant if the sample comprised the required number of species.

As has been pointed out in relation to previously discussed sites, Specific Assemblage Types generally comprise species with a greater level of habitat fidelity than the overarching habitat-level and are thus considered to indicate assemblages of higher conservation value when well represented. As indicated above, whilst several SATs were represented within the Pantheon output data, none were attributed with a sufficient number of species. However, as SATs are indicative of specialist fauna, the presence of species attributed to SATs indicates some degree of specialism and conservation value even if the assemblages do not exceed their given 'Favourable Condition' threshold.

## **28/29 – Semi-improved grassland (pasture and meadow)**

### ***Habitat***

The survey work was conducted in one of two contiguous fields of herb-rich mesotrophic pasture at Silver Spring Farm. Although the aim was to survey the other field (Site 29) at the same time as part of the same unit, ownership was unconfirmed and ultimately, sampling was undertaken only during a single sampling event on 5<sup>th</sup> July, 2017 within Site 28, as survey permission for the later survey was declined. Consequently, the surveying effort was theoretically insufficient for a robust analysis using Pantheon<sup>14</sup>, although as four samples (two vacuum and two sweep) from more or less the same habitat, the resolution should be greater than would have been the case if only two sweep or two vacuum samples only had been collected and these methods sample from essentially different elements of the same substrate.

The habitat within the Site 28 area sampled had been grazed in the past, but the sward was fairly tall (about 20-25cm) at time of survey and was becoming rank in places. There was little bare ground with around 0.1 percent cover for the most part, locally slightly higher, e.g. around gate entrances.

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<sup>14</sup> Robust analysis using ISIS protocol requires a minimum of four samples per substrate.

The sward composition was fairly consistent throughout, with the more herb-rich areas occurring towards the eastern end of the stand. The soil was a clayey loam or similar.

Common Bent-grass *Agrostis capillaris* and Yorkshire Fog *Holcus lanatus* were the constant and co-dominant graminoids throughout, with abundant Sweet Vernal-grass *Anthoxanthum odoratum*, frequent Crested Dog's-tail *Cynosurus cristatus* and Perennial Rye-grass *Lolium perenne*. Small amounts of Cock's-foot *Dactylis glomerata* and Rough-stalked Meadow Grass *Poa trivialis* also occurred within the stand and Toad Rush *Juncus bufonius* occurred locally in more disturbed areas around the gateways etc.

Constant herbs included Ribwort Plantain *Plantago lanceolata* and Meadow Buttercup *Ranunculus acris*, with abundant White Clover *Trifolium repens*, Frequent Common Knapweed *Centaurea nigra*, Common Cat's-ear *Hypochaeris radicata*, Dandelion *Taraxacum officinale* (agg.), Silverweed *Potentilla anserina*, Red Clover *Trifolium pratense* and Smooth Hawk's-beard *Crepis capillaris* and occasional Common Bird's-foot Trefoil *Lotus corniculatus*, Yellow Bartsia *Parentucellia viscosa*, Creeping Buttercup *Ranunculus repens*, Curled Dock *Rumex crispus*, Selfheal *Prunella vulgaris* and rare Scarlet Pimpernel *Anagallis arvensis*, Broad-leaved Dock *Rumex obtusifolius*, Sticky Mouse-ear *Cerastium glomeratum*, Common Mouse-ear *C. fontanum*, Creeping Cinquefoil *Potentilla reptans*, Sorrel *Rumex acetosa* and Beaked Hawk's-beard *Crepis vesicaria*. Appendix 3, Photograph 12 shows a close-up of herb-rich sward in the adjacent field 29 illustrating the herb-rich sward.

Topographically the site was on a gentle south-west facing slope, there was little microtopographic variation. Hedgerows provided shelter and there was some scrub succession outwards from the hedgerows.

### **Species recorded**

In total, 80 invertebrate species were recorded from Site 28/29 – Semi-improved grassland (meadow). In terms of species groups recorded from the sample data, the greatest number of species recorded for the site were beetles (Coleoptera), with 24 species. Two-winged flies (Diptera) with 15 recorded species was the second most speciose group, followed by true bugs (Hemiptera) with 14 recorded species and spiders (Araneae) with 12 recorded species. In addition, five species of butterfly (Lepidoptera) were recorded, together with three species each of the groups grasshoppers, crickets and groundhoppers (Orthoptera) and bees, ants and wasps (Aculeate Hymenoptera). Only one moth (Lepidoptera)<sup>15</sup> species was recorded during the survey.

The overall low count of Hymenoptera was indicative of the survey as a whole. Of the butterflies recorded all were common and widespread species of grassland and woodland edges throughout much of the UK and no S41 listed butterflies were recorded.

### **Uncommon and Section 41 species recorded from Sites 28/29**

Two species including one wolf spider *Pardosa proxima* and one leafhopper *Anoscopus albifrons* classed as Nationally Scarce in the UK were recorded from Site 28/29. No species listed in Section 41 (England) of the NERC Act (2006) as 'Species of principal importance' were recorded<sup>16</sup>. In addition, two species considered to be 'Local' in the UK were recorded.

According to Harvey *et al* (2002) *Pardosa proxima* is found in a variety of sparsely vegetated habitats but typically occurs in marshy places. The species is most frequent in coastal sites including earthy cliffs, saltmarsh, dune slacks and streamside habitats including exposed riverine sediments. Despite

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<sup>15</sup> No moth trapping was conducted at Site 28/29.

<sup>16</sup> Most S41 species in other assemblages resulted from research only moths not sampled for at Site 28/29



the Nationally Scarce status there seem to be a number of *P. proxima* records from Cornwall including one record from close to the A30 at Marazanvose. The spider was also recorded at Site 6 during the survey.

*Anoscopus albifrons* a Nationally Scarce species of leafhopper associated with grassland habitats was also recorded at several other of the survey sites.

Additional species considered to be 'Local' in the UK recorded included a pea weevil *Coelositona cambricus*, which was found alongside several species of the tribe sitonini in several of the surveyed sites. *C. cambricus* generally feeds on Greater Bird's-foot Trefoil *Lotus pedunculatus* in damp grasslands (although Morris, 1997) also refers to Common Bird's-foot Trefoil *L. corniculatus* as a foodplant on the continent. *Orthocephalus saltator* is a species of mirid bug which feeds on species of composite in wet and dry grassland habitats.

### ***Pantheon output***

Results of the Pantheon analysis of Site 28/29 data show that on the broad biotope level (biotope scale), the highest number of species (60) was attributed to the 'Open habitats' classification. The 'Wetland' classification was attributed with 11 species and only two species were included within the broad 'Tree associated' biotope classification.

Species classed within a recognised conservation status were attributed to each of the broad biotope classifications as follows:

- **Open habitats** - One Nationally Scarce species.
- **Wetland** – One Nationally Scarce species.
- **Tree associated** – No species of higher conservation status attributed.

On the habitat-level the highest number of species was attributed to the 'Tall sward and scrub' category with 53 recognised species from the sample data. None of the remaining habitat assemblages registered within the Pantheon output supported a sufficient number of species for robust SQI analysis. The second most speciose assemblage was 'Short sward and bare ground', which like 'Tall sward and scrub' is nested within the overall 'Open habitats' biotope level assemblage.

Wetland assemblages were relatively poorly represented compared to most other sites. However, the site whilst damp in places, was never marshy or inundated. As was usual within the sample area, a similar number of species was attributed to the 'Peatland' (five species) and 'Marshland' (four species) assemblages. The remaining assemblages were represented by only one or two species. Tree-associated assemblages including 'Arboreal' and 'Shaded woodland floor' on a habitat-level accounted for only two species between them.

Species classed within a recognised conservation status were attributed to each of the habitat classifications as follows (includes species attributed to habitat classifications supporting less than 15 species):

- **Tall sward and scrub** - One Nationally Scarce species.
- **Marshland** – One Nationally Scarce species.
- **Short sward and bare ground** - One Nationally Scarce species.

- **Brackish pools and ditches** - One Nationally Scarce species<sup>17</sup>.

Three Specific Assemblage Types (SATs) were represented within the Pantheon output for Site 28/29; however, none exhibited sufficiently high species scores to exceed the 'Favourable Condition' threshold set within Pantheon.

The SATs recorded were each only represented by one species attributed to each of F003– Scrub, heath and moorland, F111 – Bare sand and chalk and F112 – Open short sward assemblages. These SATs returned scores which fell far short of their respective FC threshold scores set in Pantheon.

### ***Representativeness of assemblage***

On a biotope level, the assemblages defined from the Pantheon results showed a strong fidelity to the habitats actually sampled from. All Site 28/29 samples were collected from more open habitat comprising dryish to damp open grassland. The vast majority of species were attributed to 'Open habitat' on a broad biotope level and this affinity was also exhibited strongly in the nested 'Tall herb and scrub' habitat level assemblage, which comprised by far the greatest number of recorded species.

Whilst very few species were classified within the 'Tree-associated' biotope, the number of species attributed to 'Wetland' on a biotope level reflected that the site was in part damp, there was rush-pasture in one or two of the fields to the north of the sampled field.

In general terms the SQI scores attributed to each of the more strongly represented assemblages were rather low, 'Tall sward and scrub' despite supporting one Nationally Scarce species scored an SQI of 100 and this was the only significantly represented assemblage on a habitat level. The 'Marshland' assemblage scored 175 but was not sufficiently well subscribed for this score to be considered robust.

As has been pointed out in relation to previously discussed sites, Specific Assemblage Types generally comprise species with a greater level of habitat fidelity than the overarching habitat level and are thus considered to indicate assemblages of higher conservation value when well represented. As indicated above, whilst several SATs were represented within the Pantheon output data, none were attributed with a sufficient number of species. However, as SATs are indicative of specialist fauna, the presence of species attributed to SATs indicates some degree of specialism and conservation value even if the assemblages do not exceed their given 'Favourable Condition' threshold.

Overall the Site 28/29 – Semi-improved grassland (meadow) habitat supported species assemblages representative primarily of open grassland and grassland edge habitat. Collectively two Nationally Scarce species were recorded despite the site having received much lower sampling effort than any of the other sites surveyed.

The site did not receive the moth survey attention that was prioritised in sites with more strongly represented woodland or heathland elements. Overall analysis using Pantheon showed that the site supported species representative of the habitat elements surveyed. However, the overall species specialisation exhibited from the limited number of species registered on the Specific Assemblage type (SAT) level was low. Like Site 21/22, Site 28 and 29 were added to the survey remit later in the season than the majority of sampled sites. The original intention was to survey both fields of this

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<sup>17</sup> This refers to the wolf spider *Pardosa proxima* which is attributed both to Marshland and Brackish pools and ditches habitat level assemblages.

site, first during the late June early July sampling episode and then again in late summer survey; however, landowner access refusal to both Site 28 and 29 meant that the later survey was not undertaken and only Site 28, arguably the less promising of the two fields in terms of invertebrate suitability was only sampled once.

Whilst the derived samples were collected from representative substrates at Site 28, the results are somewhat inconclusive due to insufficient survey data and lack of coverage over different times in the field season.

Tentatively, findings indicate a similar fauna to other grassland sites with comparable floristic and structural elements, therefore, Site 28/29 may be reasonably expected to support an assemblage of similar conservation value to some of the other grassland sites surveyed such as Sites 6,9 and 10. However, it cannot be guaranteed that rare, uncommon or S41 species may not occur at the site which would have been missed due to lack of survey at suitable times of year. From a pragmatic viewpoint, a sufficient resolution of data is available on a landscape scale (from all sites surveyed) to reasonably inform habitat creation/management for mitigation purposes.

## **Combined Sites**

### ***Habitats***

The survey data analysed for Combined sites represents all data collected from all sites surveyed between late May and mid- August, 2017. Such analysis enables a greater understanding of key assemblages on a landscape scale and elucidates which of these habitats support invertebrate assemblages of the greatest conservation value on a landscape scale.

The range of habitat selected for detailed survey encompassed areas of semi-improved grassland including wetter grassland and rush pasture as well as more herb-rich examples of drier grassland, priority heathland and broadleaved woodland (including sites mapped as priority woodland) Elements of other habitat such as hedgerow and tall ruderal edge habitat were also sampled. Importantly, the sheltered transition zones between for example, grassland, through scrub to woodland, or heathland/woodland edge habitats, which can support important invertebrate assemblages, were sampled from, as well as more open representative habitat.

### ***Species recorded***

In total, 772 invertebrate species were recorded from the combined survey. In terms of species groups recorded from the sample data, the greatest number of species recorded for the site were beetles (Coleoptera), with 224 species. Moths (Lepidoptera) with 189 recorded species was the second most speciose group, followed by true bugs (Hemiptera) with 105 recorded species, two-winged flies (Diptera) with 93 and spiders (Araneae) with 76 and bees, ants and wasps (Aculeate Hymenoptera) with 25 recorded species. In addition, 16 species of butterfly (Lepidoptera) were recorded from combined sites, together with nine species for each of the orders including dragonflies and damselflies (Odonata), grasshoppers, crickets and groundhoppers (Orthoptera) and Harvestmen (Opiliones). Other taxonomic groups represented by five or fewer species from the entire survey included: Woodlice and slaters (Isopoda), stone centipedes (Lithobiomorpha), scorpionflies (Mecoptera), earwigs (Dermaptera), false scorpions (Pseudoscorpiones), shrimps (Amphipoda) and pill millipedes (Glomerida).

Whilst most of the larger orders were reasonably covered, the bees, ants and wasps (Aculeate Hymenoptera) were particularly poorly recorded during the survey and a greater number of two-winged flies would have been expected, although certain families were excluded from the survey as is usual for the purposes of Pantheon/ISIS analysis. Of more 'popular groups' butterflies recorded all were common and widespread species of grassland and woodland edges throughout much of the UK

and no S41 listed butterflies were recorded. Being (in most cases) easy to spot and identify in the field, butterflies were recorded mainly incidentally during the survey and during the scoping study sites were walked and butterflies and other, more obvious species from other taxonomic groups recorded where seen.

#### ***Uncommon and Section 41 species recorded from all sites combined***

From the survey data, 22 species classed as Nationally scarce in the UK and 15 listed within the Section 41 (England) of the NERC Act (2006) 'Species of Principal Importance' - 'Research Only' category, were recorded. In addition, around 72 species considered to be of 'Local' occurrence in the UK were recorded.

Nationally Scarce species included 13 beetles (Coleoptera), Four two-winged flies, two spiders (Araneae) and one true bug (Hemiptera). The Section 41 species were all moths (Lepidoptera), which were added to the list of 'Species of Principal Importance' within the 'Research only' category. These species are all still widespread and common in the UK, but were included in the list due to a significant decline in recorded number over recent decades.

Nationally Scarce and S41 species recorded from the combined samples are all described in Appendix 1, Table 7 and in relation to the individual sites recorded in the Site specific sections (above).

#### ***Pantheon output***

Results of the Pantheon analysis of combined site data show that on the broad biotope level, the highest number of species (381) was attributed to the 'Open habitats' classification. 172 species classed as 'Tree-associated' on a broad biotope level and the 'Wetland' classification was attributed with 118 species. In addition, two species were classed within the 'Coastal' broad biotope classification.

Species classed within a recognised conservation status were attributed to each of the broad biotope classifications as follows:

- **Open habitats** - Ten species classified within one of the Nationally Scarce classifications and eight S41 species.
- **Tree associated** – Two species classified within one of the Nationally Scarce classifications and one S41 species.
- **Wetland** – Nine Nationally Scarce species.
- **Coastal** - Two Nationally Scarce species

On the habitat-level the highest number of species from the combined data was, by far, attributed to the 'Tall sward and scrub' category with 315 recognised species from the sample data. The second highest number of species were ascribed to the 'Arboreal' habitat level classification with 109 species. The third and fourth largest groups on a habitat scale were 'Marshland' with 54 and 'Peatland', with 53 attributed species. 'Shaded woodland floor', nested within the 'Tree-associated' biotope level assemblage, comprised 47 species and 'Short sward and bare ground' was attributed with 40 species. In total, 21 species were ascribed to the 'Decaying wood' assemblage and 17 species to 'Running water' on a habitat level.

The remaining assemblages were represented by too few species for robust analysis in terms of SQI analysis, of these, 14 species were credited to 'Wet woodland', two species to 'Brackish pools and ditches' and one species each was attributed to the 'Lake' and 'Sandy beach' assemblages.

Species classed within a recognised conservation status were attributed to each of the habitat classifications as follows (includes species attributed to habitat classifications supporting less than 15 species):

- **Tall sward and scrub** - Six Nationally Scarce species and eight S41 species.
- **Arboreal** - One Nationally Scarce species and one S41 species.
- **Marshland** – Six Nationally Scarce species.
- **Peatland** - One Nationally Scarce species.
- **Shaded woodland floor** - No species with a recognised conservation status were recorded.
- **Short sward and bare ground** - Three Nationally Scarce species.
- **Decaying wood** - One Nationally Scarce species.
- **Running water** - Four Nationally Scarce species.
- **Wet woodland** - No species with a recognised conservation status were recorded.
- **Brackish pools and ditches** - Two Nationally Scarce species.
- **Sandy beaches** – One Nationally Scarce species.

From Pantheon/ISIS analysis of combined 2017 sample data nine Specific assemblages types (SATs) were recognised. Of these, one assemblage '**F003 – Scrub heath and moorland**' was attributed with 21 specialist species. This number more than doubled the threshold score of eight set in ISIS required for a site to achieve 'Favourable Condition' status. 21 species represents six percent of the national species pool attributed to this assemblage in Pantheon.

Based on combined sample data, no other assemblage was attributed with a sufficient number of specialist species to exceed the corresponding FC target set within Pantheon. The assemblages recorded were represented as follows:

- '**A212 - Bark and sapwood decay**' (nested within the 'Decaying wood' habitat level assemblage) was represented by 14 species, compared to a threshold score in Pantheon/ISIS of 19.
- '**F001 - Scrub edge**' (nested within the 'Open habitats' biotope level assemblage) represented by eight species against a FCT of 10 set in Pantheon/ISIS.
- **F002 – Rich flower resource** - (nested within the 'Open habitats' biotope level assemblage) represented by seven species against a FCT of 14 set in Pantheon/ISIS.
- **F111 – Bare sand and chalk** – (nested within the 'Open habitats' biotope and 'Short sward and bare ground' habitat level assemblage) represented by four species against a FCT of 12 set in Pantheon/ISIS.
- **F112– Open short sward** – (nested within the 'Open habitats' biotope and 'Short sward and bare ground' habitat level assemblage) represented by three species against a FCT of 12 set in Pantheon/ISIS.
- **A215 – Epiphyte fauna** – (nested within the 'Tree-associated' biotope and 'Decaying wood' habitat level assemblage) represented by two species against a FCT of three set in Pantheon/ISIS.
- **W221 - Undisturbed fluctuating marsh** – (nested within the 'Wetlands' biotope and 'Marshland' habitat level assemblage) represented by 1 species against a FCT of three set in Pantheon/ISIS.
- **W314 – Reed-fen and pools** - (nested within the 'Wetlands' biotope and 'Marshland' habitat level assemblage) represented by 1 species against a FCT of 10 set in Pantheon/ISIS.

Nationally Scarce species were attributed to the above SATs as follows:

- **F003 – Scrub heath and moorland** – One Nationally Scarce species - a leaf beetle *Calomicrus circumfusus*.
- **A212 - Bark and sapwood decay** – One Nationally Scarce species – a true weevil *Acalles ptinoides*.
- **F001 - Scrub edge** – One Nationally Scarce species – a leaf beetle *Calomicrus circumfusus*.
- **F112– Open short sward** – One Nationally Scarce species – A true weevil *Larinus planus*.

### ***Representativeness of assemblage***

#### **Biotope level**

On a biotope level, the assemblages defined from the Pantheon results showed reasonable fidelity to the habitats actually sampled from over the survey area as a whole.

All sites surveyed comprised of significant areas which can be broadly termed ‘Open habitat’ on a biotope level and there was also a significant emphasis on woodland habitat analogous to the ‘Tree-associated’ biotope-level assemblage. Wetland habitats occurred both with and in association with all the above and occurred to a varying degree through the targeted survey areas. The distribution of species between all three of these broad-biotope assemblages; ‘Open habitats’ – 381 species, ‘Tree-associated’ – 172 species and ‘Wetland’ – 118 species, reasonably reflects both habitat deployment and sampling effort within the entire A30 survey area.

#### **Habitat level**

A similar pattern was reflected in the habitat-level’ findings. A large proportion of species were expected to be attributed to the ‘Tall sward and scrub’ assemblage, this corresponding to the actual extent of open habitat surveyed. With 315 species, the ‘Tall sward and scrub’ accounted for over half of the total species list attributed at a habitat level. In the Pantheon glossary (Webb *et al.*, 2017) ‘Tall sward and scrub’ is defined as follows:

‘Semi-natural systems supporting important examples of this assemblage type include heath grassland, moorland, hay meadows, scattered scrub and woodland edge. Sward height and density is often an important factor in species representation, as are the extent of flowering and seed-set.’

‘Tall sward and scrub’ was invariably the most speciose habitat level assemblage throughout all survey sites and the description of this assemblage reasonably reflects the actual habitats surveyed.

In relation to other habitat-level assemblages, the representation within the combined data again reasonably represents surveying effort and the various nuances of the actual habitats sampled.

The only other habitat level assemblage nested within the ‘Open habitats’ biotope was ‘Short sward and bare ground’. The habitat supporting such assemblages is described in Pantheon as occurring ‘In lowland habitats where disturbance removes vegetation to create areas of bare or sparsely vegetated ground.’ Over the survey area as a whole the resource of disturbed habitat was limited to small areas, often confined to gateways and areas subject to livestock grazing. The limited resource of bare ground may to some extent reflect the relatively poor representation of ground nesting solitary hymenoptera such as bees and solitary wasps within the survey data. The 40 species attributed to the ‘Short sward and bare ground’ assemblage reasonably reflected the deployment of this habitat resource in relation to the distribution of this habitat within the survey area.

In the Pantheon glossary the habitat level assemblage is described as ‘A habitat in and on trees, including the canopy, trunks and branches.’ On a combined level the 109 species attributed to the ‘Arboreal’ assemblage gives a reasonable representation of tree-living species within the survey

area. The other 'Tree-associated' or woodland assemblages 'Shaded woodland floor', 'Decaying wood' and 'Wet woodland' recorded consisted of fewer species.

The 'Decaying wood' assemblage was rather poorly recorded, with only two percent of the overall national species pool represented and with only 21 species being attributed for the combined survey data. Much of the wood-decay habitat was inaccessible due to occurring higher up in trees and where fallen wood-decay habitat was present, this often occurred in shaded areas of woodland, sub-optimal for supporting significant wood-decay assemblages. The shaded woodland floor assemblage was reasonably representative of the survey area, however, this assemblage comprised mainly of species of relatively low conservation value as did the 'wet woodland' assemblage, to which fewer species than expected were attributed within the combined survey data and at a site level.

Within sites with a significant representation of wetland assemblages, 'Marshland' and 'Peatland' habitat level assemblages were frequently present in equal measure. This is reflected in the combined sample data analysis, with these two assemblages being attributed with an almost equal number of species (54 and 53 respectively).

There is an evident crossover in habitat use between these groups, separated by the difference between permanently wetted habitat (relating to the peatland assemblage) and habitats of with a more fluctuating water table associated with mineral soils pertaining to 'Marshland' habitat. The more oceanic conditions present within the western extremities of southern England may reduce the differences between these two habitat types compared to more continental conditions in eastern UK, where habitats are fundamentally drier.

It is considered that wetland (not including aquatic) assemblages recorded were reasonably well covered within the survey as a whole and on a site by site level. Importantly however, no dedicated aquatic invertebrate survey work was undertaken for the purpose of this study.<sup>18</sup> Combining the sample data from the mainly terrestrial invertebrate data collected within the current survey with any aquatic data collected during separate surveys (if compatible) could significantly influence the scores for wetland associated habitats such as 'Marshland', 'Peatland', 'Running water' and their corresponding SATs.

Due to the proximity of the survey area to the coast, the presence of invertebrate species attributed to the 'Coastal' biotope was not unexpected. Only two species with more of a coastal affinity were recorded and attributed at a habitat level to 'brackish pools and ditches', neither of these species including a wolf spider *Pardosa proxima* and a long-legged fly *Dolichopus notatus* – the latter also attributed to the 'sandy beach' assemblage, are exclusively recorded from coastal habitats in the UK, however, but show a recorded preference for coastal habitats.

### **SQI scores**

#### **Biotope level**

SQI scores registered for the different biotope-level assemblages, on a combined sample level were robust on a biotope-level. Scores of 107 for the 'Open habitat' and 104 for the 'Tree associated' biotopes, do not indicate particularly high rarity value within these assemblages. A higher score of 123 was, however, registered for the overall 'Wetland' assemblage on a biotope-level.

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<sup>18</sup> Pantheon/ISIS includes both wetland species which spend part or all of their lifecycle out of water and purely or mainly aquatic species such as water beetles within its analysis and most species from pure aquatic assemblages only attainable from aquatic sampling are also attributed to assemblages such as 'Marshland' and 'Peatland' and their nested SATs.

### Habitat level

On a habitat-level higher SQI scores were registered for 'Marshland' and 'Running water' habitats nested within the 'Wetland' biotope, than any other habitats. The 'Marshland' assemblage nested within the 'Wetland' biotope registered an SQI of 134 from a robust sample size (54 species) and an even higher score was recorded for the 'Running water' habitat level assemblage. At 17 species, the sample size was smaller for the 'Running water' assemblage, however, still above the threshold of 15 species necessary for a robust evaluation. The SQI for Running water was 171, and accounted for the high number of Nationally Scarce (four) species in relation to the overall number of species recognised in the sample. Running water closely resembles the old Broad Assemblage Type (BAT) classification 'Flowing water'. A rarity score threshold within ISIS of 150 was set for this assemblage, and whilst the two classifications cannot be seen as being interchangeable, a score of 171 may indicate that the Running water assemblage is of higher conservation significance, even if this was not reflected on a site level.

The score of 134 registered for the 'Marshland' habitat level assemblage, indicates that on a site level this assemblage was of some conservation value equating to at least county level significance. From the combined data, six Nationally Scarce species were attributed to the 'Marshland' habitat assemblage, this being a higher number or rarer species than was attributed to any other of the habitat level assemblages, regardless of size. However, the four Nationally Scarce species attributed to the 'Running water' assemblage (reflected by the higher SQI score), comprised a significant proportion of the overall species count of 17 attributed to this assemblage.

Of the other wetland assemblages, whilst an almost equal number of species were attributed to the 'Peatland' assemblage than to 'Marshland' the rarity value for this assemblage with much lower. Only one Nationally Scarce species was recorded for 'Peatland' and this led to the much lower SQI of 106.

On a combined site level, SQI scores attributed to the 'Open ground' habitat level assemblages were somewhat lower overall than those recorded for the nested 'Wetland' assemblages. As mentioned above, the 'Tall sward and scrub assemblage' was attributed with by far the greatest number of species than any other of the assemblages recorded within the survey and this was consistent across all survey sites and correspondingly strongly reflected in the combined site level. Whilst five Nationally Scarce species were attributed to this assemblage, this represented a small proportion of this largish dataset, in terms of ratio one Nationally Scarce species was recorded to every 63 of the commoner species recorded for the 'Tall sward and scrub assemblage', compared to the ratio of one Nationally scarce species to every nine commoner species recorded for 'Marshland' and one to every 4.25 for the 'Flowing water' assemblage. The SQI score of 105 attained by the 'Tall sward and scrub' was not particularly high and would only indicate a fairly moderate conservation value for this assemblage.

The SQI recorded for the other 'Open habitat' habitat-level assemblage 'Short sward and bare ground' was somewhat higher than that recorded for 'Tall sward and scrub'. This assemblage was represented by a considerably smaller species count, but returned an SQI of 124 indicating that the inherent rarity value of the 'Short sward and bare ground' assemblage was higher than that of the 'Tall sward and scrub assemblage'.

The habitats nested within the 'Tree-associated' biotope assemblage including 'Arboreal', 'Shaded woodland floor', 'decaying wood' and 'wet woodland' did not collectively return SQI scores indicative of high conservation value. Only one Nationally Scarce species, a leaf weevil *Polydrusus confluentis*, was coded to the 'Arboreal' assemblage. However, this species was ironically recorded only from *Ulex gallii* on dwarf shrub heath during the survey and not from woodland (although the



species is known to occur in both habitats). Regardless, the SQI score was only 103 (One Nationally Scarce species to every 109 of the common or local species recorded) and such a score does not indicate habitat of particularly high conservation value. The same was true of the 'Shaded woodland floor' and 'Wet woodland' assemblages, each of which achieved SQI scores of only 100 indicating assemblages comprised of species of at most local occurrence in the UK.

A slightly higher SQI of 114 was achieved for the 'Wood decay' habitat-level assemblage which comprised 21 species from the entire survey data, one species of which, a weevil *Acalles ptinoides* is classed as Nationally Scarce in the UK. However, whilst this species is associated with bark and sapwood decay, it also occurs in leaf litter at the base of heathers and it was in such habitat, rather than woodland, that this species was recorded during the survey.

#### **Specific Assemblage Type (SAT) level**

As has been pointed out in relation to previously discussed sites, Specific Assemblage Types generally comprise species with a greater level of habitat fidelity than the overarching habitat level and are thus considered to indicate assemblages of higher conservation value when well represented.

As would be expected from a larger, combined sample, SAT scores were generally higher than those returned on an individual site basis. This is due to SAT scores being based on actual number of species attributed to an assemblage (rather than an index based on the mean of sample scores as is the case for SQI).

On an individual site basis only one SAT 'Scrub heath and moorland' produced a sufficiently high score to exceed the 'Favourable Condition Target' set in Pantheon. This was also the case with the overall combined data and whilst some assemblages produced species scores approaching their corresponding FCTs in Pantheon/ISIS, none of the others exceeded their respective thresholds.

It can be said that the F003 – Scrub-heath and moorland SAT was the stand out assemblage from the survey results, both on the level of the combined heathland sites and on an overall combined data for all surveyed sites level. Importantly, the score returned at both levels more than doubled the FCT threshold score of eight set in Pantheon/ISIS. On the combined site level, three more species were added to the score achieved for the combined heathland sites only data. The clear picture is that the heathland habitats surveyed supported the invertebrate assemblages of highest conservation value within the survey and that this representation was at around the National significance level, meaning that the invertebrate assemblage could be of, or close to, the required quality for an invertebrate feature of an SSSI.

Against this, it is worth considering that conservation value in this sense does not necessarily equate to rarity value. Only one of the 21 Nationally Scarce species recorded from the combined survey, a leaf beetle *Calomicrus circumfusus*, was attributed to the 'Scrub heath and moorland' SAT. However, several other Nationally Scarce species recorded and associated with heathland, but not attributed to this specialised group due to having slightly less specialised habitat requirements, were also recorded, but not attributed to this group. Examples include a spider *Episinus truncatus*, a leaf weevil *Polydrusus confluens* and a weevil *Acalles ptinoides*, all of which were found exclusively within the heathland habitat during the survey.

The value of surveyed heathland surveyed was discussed in relation to designated habitat at Newlyn Downs SAC and SSSI and Carrick Heath SSSI in the Sites 3,4 and 5 section (above). Whilst firm conclusions cannot be adequately drawn regarding the extent of mutual usage of these sites on a landscape scale by more mobile invertebrate species, landscape scale and metapopulation studies relating to heathland and heathland species such as Silver-studded Blue *Plebejus argus* would

indicate that the conservation value of these sites, collectively, is increased by their proximity and collective area.

Somewhat contrary to the discussion relating to woodland habitat level assemblages above, the second highest number of species attributed to a single SAT within the combined data was for the A212 – Bark and sapwood decay assemblage. The number of species attributed to this assemblage was 14, a score suggesting that the Bark and sapwood decay resource was of some conservation value, even if the SQI was not particularly high. The score, however, fell short of the FCT threshold score of 19 set in Pantheon/ISIS. Again, the species attributed to the bark and sapwood decay were mainly common or local species and only one was Nationally Scarce. However, the species recorded are included as SAT species due to a high level of habitat specialism to bark and sapwood habitats. Bark and sapwood decay habitat is summarised in Pantheon as follows:

‘The assemblage type is found in and around trees and shrubs generally, but especially in older specimens. The assemblage is primarily associated with death and decay of the outer woody tissues of the trees or shrubs - the sapwood and bark.’

The species score returned for the ‘Scrub edge’ SAT on a combined sample level was eight. This score was quite close to the FCT threshold score of 10 set for this species. As such this assemblage suggests that species associated with edge habitats, such as those on the interfaces of woodland and grasslands and heath and woodland for example, are of some conservation value on a landscape level. Another resource-based assemblage – the F001 – Rich flower resource was represented by seven species overall, not close to the FCT threshold of 14 in Pantheon/ISIS. High species scores are often returned from samples rich in bee species and this assemblage is often well represented in habitats supporting F111 – Bare sand and chalk and F112 – Open short sward assemblages.

As has been discussed elsewhere in the report, bees and other Aculeate Hymenoptera were poorly recorded within the survey despite the survey covering a number of flower-rich grasslands and heathland. F002 was represented entirely by bees which included mainly common bumblebees *Bombus* spp., but also ground-nesting solitary species including only two species of base-banded furrow bee, *Lasioglossum morio* and the somewhat less common *L. lativentre*. The Fork-tailed Flower Bee *Anthophora furcata* and the Honey Bee *Apis mellifera* were also typed to this group. Notable by their absence from samples were species of the mining bee genus *Andrena*. This large family includes a number of widespread ground-nesting species, which are often well represented in samples. The lack of an early season survey corresponding with the flowering of Blackthorn *Prunus spinosa*, willows *Salix* spp. and Hawthorn *Crataegus monogyna* blossom on which many species forage, may in part explain the absence. However, many species are common in grassland and persist throughout much of the summer. Similarly, no *Colettes* species including the heather-feeding *Colette succinctus* often found in heathland were found; however, the species requires cliffs or open sand habitat for nesting, a resource poorly represented during the survey.

On a combined survey level the remaining SATs were all represented by relatively few species with ‘F111– Bare sand and chalk’ and ‘F112 – Open short sward’ assemblages, which were poorly represented considering the overall sample size.

Whilst the ‘Marshland’ and ‘Running Water’ habitat level assemblage exhibited scores indicative of fairly high conservation value at a habitat scale, none of the wetland SATs were particularly well represented in terms of the number of attributed species. However, the ‘Undisturbed fluctuating marsh’ SAT nested within the ‘Marshland’ habitat level assemblage was represented by three species, equal to, but not exceeding the threshold of three set in ISIS. A low threshold is set due in part to the small national species pool attributed to this group as a whole.

## Conclusions/Evaluation

### Scoping study

Through desk study and scoping surveys a total of 10 sites were subject to detailed surveys. Much of the habitat to the north and south of the current A30 was subject to intensive arable and livestock farming; however, less improved habitats of higher potential conservation value were found to be distributed throughout the landscape, including habitat with potential to support significant invertebrate assemblages. Whilst no sites subject to habitat designations were found within the survey buffer, one internationally designated heathland site is located within 150m of the Scheme and a number of nationally designated heathland and wetland sites occur within 2 km of the Scheme.

### Historically recorded species of a recognised conservation status

#### Priority Butterflies (Lepidoptera)

None of the species of higher conservation status that have been historically recorded within 2km of the Scheme were found within or in close proximity to the survey area and with the exception of S41 species, Small Heath *Coenonympha pamphilus* and Silver-studded Blue *Plebejus argus*, habitat was generally considered unsuitable for supporting these species. Habitat with potential to support the relatively common Small Heath (grassland and heathland) and Nationally Scarce Silver-studded Blue (heathland) was recorded within the survey area.

#### Other invertebrate species of higher conservation value

Of the species listed within the data-search considered within this study, only two Nationally Scarce species, the Short-horned Black Legionnaire *Beris fuscipes* and a leaf beetle *Calomicrus circumfusus* were re-recorded during the survey. None of the other historically recorded designated species, including beetles (Coleoptera), two-winged flies (Diptera) or bees (Aculeate Hymenoptera) or the 'Near Threatened' damselfly *Ischnura pumilio*, listed within a two kilometre buffer of the proposed scheme, were re-recorded during the survey.

Of the historically recorded species not re-found during the survey, the survey area as a whole arguably contains at least some habitat potentially suitable for supporting the following:

#### Beetles (Coleoptera)

A rove beetle *Staphylinus caesareus*  
A diving beetle *Hydrovatus clypealis*  
A water scavenger beetle *Laccobius atratus*  
A water scavenger beetle *Helochares punctatus*  
A burying beetle *Nicrophorus interruptus*  
A longhorn beetle *Leptura aurulenta*  
A true weevil *Curculio betulae*

#### Two-winged flies (Diptera)

Short-horned Black Legionnaire *Beris fuscipes*  
Bright Four-spined Legionnaire *Chorisops nagatomii*  
A snail-killing fly *Tetanocera punctifrons*

#### Bees (Aculeate Hymenoptera)

Lathbury's Nomad Bee *Nomada lathburiana*

#### Dragonflies and damselflies (Odonata)

Scarce Ischnura *Ischnura pumilio*

### **Section 41 – Research only moth species**

A number of common and widespread moth species listed in Section 41 of the NERC Act (2006) within the 'Research only' category have been recorded within the survey area. These have not been considered in detail as the species are mainly habitat generalists, which are still widespread and common in the UK, despite having suffered a significant recorded decline in recent decades.

## **Key findings of the 2017 terrestrial invertebrate survey –site by site level**

### **Site 1**

Species recorded reasonably reflected the habitats recorded at Site 1 with the largest number of species being attributed to 'Open habitat' followed by 'Tree-associated' and 'Wetland' assemblages on a biotope level. At the biotope level, SQI results suggested that the 'Wetland' assemblage at this site supported an invertebrate assemblage of greatest conservation value, whilst the 'Tree associated' and 'Open habitat' assemblages comprised mainly of widespread and at most local species.

At habitat level whilst the best represented assemblages were 'Tall sward and scrub', 'Arboreal' and 'Shaded woodland floor', these all achieved low SQI scores and the only significantly represented assemblage exhibiting a relatively high SQI score was the 'Marshland' assemblage, which achieved a score indicating an assemblage of fairly high conservation value. The score was elevated by the presence of Nationally Scarce wetland species including a weevil *Pelenomus waltoni*, a ground beetle *Stenolophus teutonius* and a rove beetle *Stenus pusillus*. Another Nationally Scarce weevil *Gymnetron veronicae* attributed to the 'Running water' habitat level assemblage also contributes to the overall conservation value of the site's wetland elements.

Whilst several Specific Assemblage Types were represented within the Pantheon output, none achieved a score approaching the corresponding 'Favourable Condition' threshold set in Pantheon/ISIS.

Overall the Site 1 – Priority woodland and woodland edge habitat supported species assemblages representative of woodland, woodland edge grassland and wetlands and collectively eight Nationally Scarce species and seven S41 (research only) moth species, were recorded. Using criteria for evaluating the conservation value of sites developed by Colin Plant Associates, a site with 'habitat that is scarce or threatened on a county level and/or which contains an assemblage of invertebrates that includes viable populations of at least five Nationally Notable species' are considered to be of 'County' level in terms of conservation significance.

In terms of habitat value, the 'Marshland' assemblage was of the highest conservation value, this reflecting the presence of wet grassland/swamp habitat on mineral soils at the woodland margin of the site.

### **Sites 3, 4 and 5**

On both biotope and habitat scales, relatively low SQI scores were returned for the best represented, 'Tall sward and scrub' and 'Arboreal', assemblages. However, the most significant result arising from analysis was recorded for the 'F003 – Scrub heath and moorland' SAT. The score for this SAT exceeded the threshold set in Pantheon/ISIS for 'Favourable Condition'.

SATs, being composed of invertebrate species with a high degree of fidelity to a particular habitat, are generally considered the most important in terms of assessing conservation value of a site. The F003 assemblage is described in Webb *et al* (2017) as being 'found on nutrient-poor, acid soils where herbaceous or dwarf shrub vegetation is dominant, although trees and taller shrubs can be an

important component of the overall habitat. Semi-natural systems supporting important examples of this assemblage type include mature areas of lowland heath, moorland and montane biotopes.'

Specifically Webb *et al* then state that F003 'is the dominant assemblage on the Cornish West Penwith moors up to 250m'. This suggests that combined Sites 3, 4 and 5 collectively support an invertebrate feature of high conservation value representative of similar moors found elsewhere in Cornwall. Importantly, the position of Site 3,4 and 5 in relation to Newlyn Downs SSSI and Units 16 and 17 of Carrick Heath SSSI increases the overall conservation potential of the site as a stepping stone with potential to support metapopulations of key heathland species in the wider landscape. S41 Priority Species such as the Silver-studded Blue *Plebejus argus*, recorded at Newlyn Downs SSSI are likely to use the site from time to time as a stepping stone and together with other, less well researched species, would undoubtedly colonise the site with sympathetic management.

If Colin Plant Associates criteria for defining the significance of invertebrate habitat are applied to Sites 3,4 and 5, based on habitat alone, the combined site achieves at least 'National' significance level', due to the presence of representative lowland heathland habitat.

### **Site 6**

Overall, the Site 6 – Wet grassland, rush pasture and wet woodland (north of Ennis Farm) habitat supported species assemblages representative of open grassland, peatland, marshy grassland and wet and drier woodland and collectively five Nationally Scarce species were recorded. The site did not receive the moth survey attention that was prioritised in sites with more strongly represented woodland or heathland elements. Overall analysis using Pantheon showed that the site supported species representative of the habitat elements surveyed. However, the overall species specialisation was somewhat diffuse whilst collectively a number of specialised species were recorded, these were deployed over a range of assemblages and the results do not indicate a site of higher conservation value. It is possible that elements of the habitat would have yielded a greater range of species with more targeted sampling within, for example the wooded components of the site. It was considered that the more wetland elements received reasonable survey effort.

Using alternative criteria for evaluating the conservation value of sites developed by Colin Plant Associates, a site with 'habitat that is scarce or threatened on a county level and/or which contains an assemblage of invertebrates that includes viable populations of at least five Nationally Notable species' are considered to be of 'County' level in terms of conservation significance. The findings suggest that the Site would be classifiable as being falling within this definition.

### **Site 9**

Overall, the Site 9 – Priority woodland and woodland edge (Honeycombe Barn) habitat supported species assemblages representative of open SI grassland and woodland edge, peatland, marshy grassland and wet and drier woodland and collectively seven Nationally Scarce species were recorded, together with six moth species listed for 'research only' within Section 41 of the NERC Act. Additional interest was added to the site list by the presence of the rare migrant, the Scarce Light Plume *Oxyptilus laetus* and the presence of a Rhopalid bug *Stictopleurus punctatonervosus* which may have not formerly been recorded from Cornwall.

Pantheon/ISIS analysis showed that the site supported species representative of the habitat elements surveyed although the representation of species attributed to the 'Wet woodland' habitat level assemblage was lower than expected. As with Site 6, the overall species specialisation was somewhat diffuse and whilst collectively a number of specialised species were recorded, these were deployed rather thinly over a range of assemblages and the results do not indicate a site of higher conservation value.

Using alternative criteria for evaluating the conservation value of sites developed by Colin Plant Associates, a site with 'habitat that is scarce or threatened on a county level and/or which contains an assemblage of invertebrates that includes viable populations of at least five Nationally Notable species' are considered to be of 'County' level in terms of conservation significance. The findings suggest that Site 9 would fulfil criteria for this category.

#### **Site 10**

Overall the Site 10 – Semi-improved wet and dry grassland (meadow) habitat supported species assemblages representative of open grassland, peatland, marshy grassland and wet and drier woodland and collectively four Nationally Scarce species were recorded. The site did not receive the moth survey attention that was prioritised in sites with more strongly represented woodland or heathland elements. Overall analysis using Pantheon showed that the site supported species representative of the habitat elements surveyed. However, the overall species specialisation was somewhat diffuse. Whilst collectively a number of specialised species were recorded, these were deployed over a range of assemblages and the results do not indicate a site of higher conservation value. It was, however, considered that the habitats surveyed received sufficient survey effort to enable a robust evaluation.

If Colin Plant Associates criteria are applied to the collective data for Site 10, the findings suggest that the Site would be classifiable as being on the cusp of the District and County Level definitions.

#### **Site 21/22**

Overall the Site 21/22 – Priority Woodland and grassland/tall ruderal edge habitat supported species assemblages representative of open grassland, scrub and woodland edge, peatland, marshy grassland and wet and drier woodland and collectively two Nationally Scarce species were recorded.

Overall analysis using Pantheon showed that the site supported species representative of the habitat elements surveyed although the representation of species attributed to the 'Tree-associated' broad biotope and corresponding habitat and SAT level assemblages was small and probably reflected the time of year, the site being only surveyed in August – a suboptimal time for sampling woodland invertebrate fauna, as well as a more concerted sampling effort being invested in the edge and open grassland habitats.

As with several other sites surveyed, the overall species specialisation was somewhat diffuse whilst collectively several more specialised species were recorded, these were deployed rather thinly over a range of assemblages and the results do not indicate a site of higher conservation value. It is possible that elements of the habitat would have yielded a greater range of species with more targeted sampling within, for example the woodland interior. It was considered that the woodland edge and grassland elements received reasonable survey effort in terms of number of samples collected, but the sample data was not as robust as for most other sites, due to being only collected from a single site visit, with no early and midsummer visits having been undertaken.

In terms of what has been recorded from the site, use of alternative criteria for evaluating the conservation value of sites developed by Colin Plant Associates, the invertebrate value falls into the 'District' level classification, or arguably the 'County level' category based on habitat criteria. Whilst a National significance level may be considered unlikely for a site such as this, further survey effort at different times of year would inevitably yield a greater species diversity including potentially, additional species of higher conservation value.

## **Site 28/29**

Overall the Site 28/29 – Semi-improved grassland (meadow) habitat supported species assemblages representative primarily of open grassland and grassland edge habitat. Collectively two Nationally Scarce species were recorded despite the site having received much lower sampling effort than any of the other sites surveyed.

The site did not receive the moth survey attention that was prioritised in sites with more strongly represented woodland or heathland elements. Overall analysis using Pantheon showed that the site supported species representative of the habitat elements surveyed. However, the overall species specialisation exhibited from the limited number of species registered on the Specific Assemblage type (SAT) level was low. Like Site 21/22, Site 28 and 29 were added to the survey remit later in the season than the majority of sampled sites. The original intention was to survey both fields of this site first during the late June early July sampling episode and then again in late summer survey. However, landowner access refusal to both Site 28 and 29 meant that the later survey was not undertaken and only Site 28, arguably the less promising of the two fields in terms of invertebrate suitability was only sampled once.

Whilst the derived samples were collected from representative substrates at Site 28, the site was less well recorded than comparable sites within the survey due to having been sampled only once during the survey. However, the habitat was comparable to similar grassland sites within the survey and was found to support a similar range of characteristic species as found, for example in grassland habitat at sites 9 and 10.

Taking into account the somewhat reduced sampling effort, Site 28/29 may be expected to support an invertebrate assemblage of ‘District’ or ‘County’ invertebrate conservation value classification based on Colin Plant Associates criteria. The majority of species conformed to the ‘Tall sward and scrub’ assemblage, which equates to typical tall sward grasslands such as hay meadows.

## **Key findings of the 2017 terrestrial invertebrate survey – combined site landscape level**

### **Species of conservation status recorded during the survey**

During the survey a total of 772 species were recorded from 10 survey sites short-listed as having potential to support assemblages/species of conservation value.

From all sites combined, a total of 22 species currently classed in the UK as Nationally Scarce (including species listed in either former Notable A and B classifications or as Nationally Scarce in association with a Post-2001 IUCN threat status) were recorded.

In addition, a rare migrant moth, the Scarce Light Plume *Oxyptilus laetus* was recorded from Site 9 and a rhopalid bug *Stictopleurus punctatonervosus*, which has recently recolonised much of southern England having formerly been considered ‘Extinct’ in the UK was recorded from Site 9.

15 moth species listed within the Section 41 (England) of the NERC Act (2006) ‘Species of Principal Importance’ - ‘Research Only’ category. These species are all still generally widespread and common in the UK but have all experienced a significant recorded decline in recent years.

### **Pantheon/ISIS analysis**

Analysis of 2017 data was undertaken both on a combined sites level enabling invertebrate assemblages to be evaluated on a landscape scale and on a site by site level, enabling individual sites to be assessed as stand alone units.

### **Pantheon/ISIS analysis of combined sample data for all survey sites**

Analysis of data derived from all 2017 sample data enables invertebrate species affinities to be assessed on a scale representative of the A30 survey area as a whole. On a landscape scale, findings from the results of Pantheon, including ISIS analysis, provide a breakdown of species occurring on a variety of scales from broad biotope, through habitat level to specific assemblage level.

#### **Combined site level**

Overall, Pantheon results of all site data combined indicate that the invertebrate fauna can be seen to well represent the range of habitats present within the survey area. In total, 22 Nationally scarce species were recorded as well as 15 species listed within the Section 41 (England) of the NERC Act (2006) 'Species of Principal Importance' - 'Research Only' category. On a biotope level the greatest number of species by far were attributed to the 'Open habitat' classification as would be expected; however, both 'Tree-associated' and 'wetland' assemblages were well represented at biotope scale.

On a habitat scale, the 'Tall sward and scrub' assemblage was by far the most species-rich classification, but the wetland habitats including 'Marshland' and 'Running water' supported assemblages of the highest conservation value, with tree-associated assemblages being of comparatively low conservation value at this level.

The conservation values recorded at the habitat-level were not reflected at SAT level, however. SATs of greatest conservation value were not at all associated with the wetland biotopes, but by far the most well represented SAT was the F003 – Scrub heath and moorland resource-based assemblage, which was the only assemblage achieving a score exceeding the FC threshold recorded from the survey data. This finding suggests that the heathland habitat supported an assemblage of National Conservation value and was representative of heathland biotops including sites designated as SSSIs in the wider Cornish landscape.

Whilst it is not possible to draw strong conclusions without detailed species-specific study, heathland conservation theory relating to invertebrates would indicate that the heathland elements of the survey area (Sites 3,4 and 5) would contribute in a landscape scale to the ecological unit comprising Newlyn Downs SAC/SSSI and Carrick Heaths SSSI (Units 16 and 17), as well as supporting invertebrate assemblages of conservation value in its own right.

Other SATs that were well represented on a landscape scale included A212 – Bark and sapwood decay F001 - Scrub edge which both achieved scores approaching the FC threshold. These representations suggest that these specific assemblages are of some conservation value, albeit on a landscape level. On a combined survey level, the remaining SATs including F002 – rich flower resource, F111– Bare sand and chalk and F112 – Open short sward assemblages were poorly represented considering the overall sample size.

## **Recommendations**

It is understood that recommendations relating to impact assessment and mitigation are not required at this stage. However, the following recommendations relating to filling gaps in survey findings are made:

- Wetland assemblages are recognised and discussed within the current report; however are based on species collected from above the water surface, some of which spend part of their lifecycles in aquatic habitats. Sites 1,4,6,9,10 and 21/22 all contained some wetland species. To further inform the impact assessment, species-level aquatic macro-invertebrate data



should be obtained through relevant surveys and if comparable could be combined with the terrestrial invertebrate data and re-analysed within Pantheon.

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## Appendices

### Appendix 1 - Tables

Table 1 – Invertebrate scoping

Site number	Grid ref.	Habitat recorded on survey	Selected for invertebrate survey?	Reason for selection/rejection
1 – Priority Deciduous Woodland	SW84844 54294	Deciduous woodland and associated scrub and wet grassland margins	Yes	Site surveyed was part of a substantial block of representative deciduous woodland and wet woodland habitats. Woodland exhibited plants and other features characteristic of ancient woodland. Edge habitat fairly herb rich and with good structure for woodland edge invertebrates. Interior of woodland reasonably open in places, with damp exposed silt and characteristic wetland/ woodland herbs with potential to support significant invertebrate assemblages
2 -Improved grassland	SW 84410 53809	Habitat mapped as SI in Phase 1 survey but herb-poor and composition more representative of improved swards	No	Too improved to be considered of high invertebrate potential
3 - Priority heathland (eastern section)	SW 84193 53741	Lowland heathland (H4 NVC type) Mainly late building stage and mature heath with <i>Calluna vulgaris</i> , <i>Erica cinerea</i> and <i>Ulex gallii</i> variously co-dominant with occasional <i>E. tetralix</i> and abundant to locally dominant <i>Agrostis curtisii</i> and <i>Molinia caerulea</i> and Locally dominant <i>Pteridium aquilinum</i> . Little bare ground in stand.	Yes	Lowland heathland representative of H4 <i>Ulex gallii</i> - <i>Agrostis curtisii</i> heath. Such habitat frequently supports invertebrate assemblages and species of conservation value
4 - Mixed woodland (with pond and heathland remnants)	SW 84056 53716	Mixed heath edge woodland with pond and some ericaceous ground vegetation.	Yes	Site provides structural variation and potentially important edge habitat to adjacent heathland. Supports combination of habitat including open water, mature mixed woodland and willow scrub woodland and acid groundflora including scattered patches of heathland groundflora. Varied microtopography and potential significant arboreal canopy assemblages

Site number	Grid ref.	Habitat recorded on survey	Selected for invertebrate survey?	Reason for selection/rejection
5 - Priority Heathland (west section).	SW 83916 53672	Lowland heathland (H4 NVC type). Habitat similar both in terms of composition and structure to Site 3 above, with more varied microtopography. Structure generally late building and mature, but with some, more grassy and less developed areas towards the western extremity.	Yes	Lowland heathland representative of H4 <i>Ulex gallii-Agrostis curtisii</i> heath. Such habitat frequently supports invertebrate assemblages and species of conservation value
6 - Rush pasture and wet woodland	SW83493 53258	Wet grassland, rush pasture, wet woodland and mature hedgerow	Yes	Part of extensive, herb-rich area of rush pasture in mosaic with mature woodland, bramble scrub and wet woodland/willow carr. Habitat potentially of high quality for invertebrate assemblages associated with wet grassland and wet woodland mosaic habitats.
7 - SI mesotrophic grassland on road verge	SW 82935 53166	Yorkshire Fog <i>Holcus lanatus</i> and Sweet Vernal Grass <i>Anthoxanthum odoratum</i> dominated SI neutral grassland – fairly herb-rich with <i>Plantago lanceolata</i> , <i>Lotus corniculatus</i> , <i>Achillea millefolium</i> , <i>Ranunculus repens</i> , <i>R. bulbosus</i> , <i>Centaurea nigra</i> , <i>Veronica chamaedrys</i> , <i>Rumex acetosa</i> and other typical herbs of SI neutral grassland	No	Small, roadside fragment similar in composition to some larger areas of SI grassland within the survey area which were preferred. Habitat had been mown just prior to survey.
8 - Ploughed field margin	SW 82958 53230	Habitat mapped as SI, but field margins ploughed right to edges at time of survey	No	Habitat of relatively low conservation value; no sign of recorded SI grassland
9 - Priority woodland and wet and dry SI grassland	SW82620 52908	Deciduous wet woodland and woodland edge habitat north of Honeycombe Barn	Yes	Habitat with good wet woodland diversity and structure. Woodland edge habitat herb-rich and with good succession from grassland edge through bramble scrub to woodland edge.

Site number	Grid ref.	Habitat recorded on survey	Selected for invertebrate survey?	Reason for selection/rejection
10 - SI grassland (meadow)	SW82351 52905	Damp SI grassland field south of A30. Herb-rich mesotrophic meadow with Yorkshire Fog <i>Holcus lanatus</i> and Sweet Vernal Grass <i>Anthoxanthum odoratum</i> co-dominant. With range of typical herbs including <i>Lotus pedicularis</i> , Common Cat's-ear <i>Hypochaeris radicata</i> and Black Knapweed <i>Centaurea nigra</i> .	Yes	Good diversity of herb-species beneficial to meadow invertebrates in sward and large size of habitat unit. Burnet moth <i>Zygaena</i> sp. cocoons and larvae in sward; species usually associated with less-improved, herb-rich swards of conservation value to invertebrates. Habitat comparable in terms of sward composition and diversity to mown verge indicated as 'Calcareous grassland' priority habitat on Magic Map.
11 - SI grassland	SW 80095 50574	SI damp grassland relatively herb-poor, but with some characteristic wet grassland species	No	Not as herb-rich as some comparable sites. Rather manicured and lacking the structural variation favourable for good invertebrate sites. Unexceptional.
12 - poor SI grassland	SW 79874 50454	SI damp grassland relatively herb-poor, but with some characteristic wet grassland species	No	Not as herb-rich as some comparable sites. Rather manicured and lacking the structural variation favourable for good invertebrate sites. Unexceptional.

Site number	Grid ref.	Habitat recorded on survey	Selected for invertebrate survey?	Reason for selection/rejection
13 - Priority Woodland	SW 80089 50224	Smallish block of deciduous woodland at Nancarrow Farm. Trees mainly Sycamore <i>Acer pseudoplatanus</i> , with some Ash <i>Fraxinus excelsior</i> and Pedunculate Oak <i>Quercus robur</i> . Understorey with Hazel <i>Corylus avellana</i> , Holly <i>Ilex aquifolium</i> and Hawthorn <i>Crataegus monogyna</i> . Groundflora predominately Ivy <i>Hedera helix</i> with other mainly shade-tolerant species.	No	Rather heavily shaded and unremarkable, some potential wood decay (mainly bark and sapwood decay habitat). Adjacent strip of wet grassland with <i>Juncus</i> and mature oaks on hedgebank with some potential, but lower overall potential for invertebrates than comparable sites.
14 - Wet grassland	SW 80027 50167	SI damp grassland relatively herb-poor, but with some characteristic wet grassland species including Cuckooflower <i>Cardamine pratensis</i>	No	Not as herb-rich as some comparable sites. Potentially of some conservation value, but unexceptional and on outer range of buffer
15- Priority Woodland	SW 79511 49773	Small stand of mature trees including multi-stemmed Sycamore <i>Acer pseudoplatanus</i> , Sessile Oak <i>Quercus petraea</i> , Beech <i>Fagus sylvatica</i> and Ash <i>Fraxinus excelsior</i> . No significant understorey or scrub layer and groundflora rather species-poor, cattle –grazed grassland with few significant woodland species.	No	Lacked structural diversity beneficial to invertebrates, fairly shaded at ground layer and rather exposed site. Some mature standards, but no significant wood decay habitat recorded
16 - Poor SI/improved grassland	SW 79227 49527	Relatively herb-poor SI and Improved grassland (though all mapped as SI in Phase 1)	No	Unremarkable relatively herb-poor grassland, unlikely to support invertebrate assemblages of high conservation value

Site number	Grid ref.	Habitat recorded on survey	Selected for invertebrate survey?	Reason for selection/rejection
17 - Scrub and grassland mosaic	SW 78906 49501	Small areas of herb-rich SI mesotrophic sward with extensive, encroaching bramble scrub	No	Some conservation value in current condition due to mosaic and flower-rich sward, but small habitat area and habitat unlikely to be significantly impacted by development
18 - Roadside inventory site BS315	SW 78860 49417	Short, (possibly seeded?) improved grassland sward with Perennial Rye-grass <i>Lolium perenne</i> and White Clover <i>Trifolium repens</i> . Adjacent field edge was ploughed to margin. Note: Babington's Leek was not recorded from verge, but was seen at margin of site 19	No	Habitat of low invertebrate potential
19 - Poor SI grassland	SW 78783 49313	Relatively herb-poor SI habitat – but Babington's Leek <i>Allium ampeloprasum var babingtonii</i>	No	Unremarkable relatively herb-poor grassland, unlikely to support invertebrate assemblages of high conservation value
20 - Roadside inventory site BS22	SW 78251 48743 (surveyed SW 78379 48690 as no evidence of priority habitat at previously mapped site)	Habitat on very narrow road verge adjacent to Hillview Farm listed for botanical interest. SI habitat surveyed on opposite side of road to Hillview Farm scoped, but generally rather herb-poor	No	Habitat of some potential value to typical SI grassland invertebrate assemblages, but rather herb-poor compared with some other sites surveyed.

Site number	Grid ref.	Habitat recorded on survey	Selected for invertebrate survey?	Reason for selection/rejection
21 - Grassland/ruderal/wood edge habitat	SW 77142 48594	Grassland generally rank and species-poor SI, but with small patch of slightly more diverse rush pasture with <i>Juncus effusus</i> and <i>Holcus lanatus</i> with <i>Lotus pedunculatus</i> and other herbs. Habitat graded into tall ruderal/bramble scrub habitat with <i>Heracleum sphondylium</i> , <i>Stachys palustris</i> and <i>Rumex crispus</i> . Habitat potentially good for invertebrates due to proximity with Priority deciduous woodland	Yes	Good structural and floristic diversity with grassland, tall ruderal and scrub-edge habitat analogous to brownfield habitat. Woodland edge with some mature trees
22 - Priority woodland	SW 77096 48543	Not subject to detailed evaluation, but native broadleaves including Pedunculate Oak <i>Quercus robur</i> and Ash <i>Fraxinus excelsior</i> present.	Yes	Remnant native broadleaved woodland at edge of plantation, with mature trees and some wood decay potential. Proximity to open grassland and scrub habitat increases overall value
23 - Field margin	SW 76159 48283 to SW 77273 48770	Mapped as SI field margins in original Phase 1, but ploughed and sown to margins at time of survey	No	Very low interest
24 - Field margin	SW 76171 48265 to SW 76706 48531	Mapped as SI field margins in original Phase 1. Grassland still with a range of herbs including Great Burnet <i>Sanguisorba officinalis</i> and Tufted Vetch <i>Vicia cracca</i> , but herbs rather thinly scattered through sward and rather disparate habitat	No	Not in direct impact zone and structurally and compositionally unexceptional as an invertebrate resource



Site number	Grid ref.	Habitat recorded on survey	Selected for invertebrate survey?	Reason for selection/rejection
25 - Field margin	SW 75439 47898 to SW 75634 48242	Mapped with SI grassland margin on map, now ploughed and sown to edge with potato crop and <i>Lolium perenne</i>	No	Habitat of low potential to support significant invertebrate species/assemblages
26 - Field margin	SW 75372 47814 to SW 75383 48131 to SW 75383 48131 and SW 75383 48131 to SW 75613 48246	Mapped with SI grassland margin on map, now ploughed and sown to edge with <i>Lolium perenne</i>	No	Habitat of low potential to support significant invertebrate species/assemblages
27 - Field margin	SW 74938 47289 to SW 75168 47512 to SW 74975 47627 and SW 75168 47512 to SW 75363 47803	Mapped with SI grassland margin on map, now ploughed and sown to edge with <i>Lolium perenne</i>	No	Habitat of low potential to support significant invertebrate species/assemblages
28 - SI grassland (meadow)	SW 74859 47268	Fairly herb-rich SI grassland. Of similar composition to adjacent Site 29, but not currently grazed and slightly more rank. <i>Centaurea nigra</i> , <i>Hypochaeris radicata</i> , <i>Lotus corniculatus</i> and <i>Parentucellia viscosa</i> all locally abundant in field	Yes	Herb-rich habitat with good structural and floristic diversity with potential to support significant invertebrate species/assemblages. Direct impact of road scheme.
29 - SI grassland (pasture)	SW 74857 47374	Herb-rich grassland with <i>Agrostis capillaris</i> , <i>Holcus lanatus</i> , <i>Cynosurus cristatus</i> and <i>Anthoxanthum odoratum</i> with <i>Centaurea nigra</i> , <i>Lotus corniculatus</i> , <i>Prunella vulgaris</i> , <i>Hypochaeris radicata</i> and <i>Parentucellia viscosa</i> . Livestock grazed, but no livestock on site during survey.	Yes	Herb-rich habitat with good structural and floristic diversity with potential to support significant invertebrate species/assemblages. Very close to proposed road scheme.

Site number	Grid ref.	Habitat recorded on survey	Selected for invertebrate survey?	Reason for selection/rejection
30 - Improved grassland	SW 74909 47116	Field largely improved <i>Lolium perenne</i> grassland with very small SI remnants at margins	No	Habitat mainly improved and mowed with little floristic or structural diversity. Potential invertebrate habitat patches very small and disjunct

Table 2 – Target notes (NB: combined NVC (Mellings, 2017) and Invertebrate scoping, therefore not all TNs relevant to invertebrate survey)

Target note	Date	Grid reference	Site	Feature	Description	Invertebrate habitat potential
1	22/05/2017	SW84832 54332	Site 1 (Priority Woodland edge/interior)	General broadleaved woodland and grassland edge habitat (western edge of wood)	Habitat close to concrete trough denoting north-eastern edge of allowed survey area. Mature broadleaved woodland, wet woodland at this point with <i>Salix cinerea</i> and <i>Ilex aquilinum</i> . General habitat low understorey/ex-coppice woodland with no real canopy layer. <i>Corylus avellana</i> and <i>Prunus spinosa</i> abundant. Ground layer south-west of this point fairly herb-poor and shaded with <i>Glechoma hederacea</i> , <i>Silene dioica</i> , <i>Hedera helix</i> . <i>Hyacinthioides non-scripta</i> abundant in wood to north-east, occurring with a range of other ancient woodland indicators. Edge habitat with Bramble <i>Rubus fruticosus</i> agg. scrub, tall herbs including <i>Heracleum sphondylium</i> and low growing <i>Ranunculus repens</i> and <i>Galium aparine</i> . Floristically poor.	Unexceptional in terms of invertebrate potential, both in terms of structure and vegetation diversity, but woodland edge habitat with potential to support arboreal and epiphyte assemblages
2	22/05/2017	SW84791 54239	Site 1 (Priority Woodland edge/interior)	Corner of broadleaved woodland and field margin	Woodland interior rather dense and overgrown at this point. Margin of field (ploughed at time of survey) fairly narrow (c2-3m). Edge with woodland with Bramble <i>Rubus fruticosus</i> agg. scrub and herb layer with abundant <i>Ranunculus repens</i> , <i>Holcus lanatus</i> , <i>Urtica dioica</i> and <i>Heracleum sphondylium</i> and occasional <i>Veronica chamaedrys</i> , <i>Silene dioica</i> , <i>Pteridium aquilinum</i> and <i>Galium aparine</i> . Some open Bramble and hedgerow scrub with varied structure; woodland interior at this point heavily shaded. <i>Crataegus monogyna</i> , <i>Salix cinerea</i> in woodland edge.	Some open Bramble and hedgerow scrub with varied structure beneficial to scrub edge invertebrate assemblages, but woodland interior at this point heavily shaded and of limited value. <i>Crataegus monogyna</i> and <i>Salix cinerea</i> in woodland edge can provide a valuable spring/early summer nectar resource.

Target note	Date	Grid reference	Site	Feature	Description	Invertebrate habitat potential
3	22/05/2017	SW84848 54281	Site 1 (Priority Woodland edge/interior)	More open wet woodland interior	Wetter woodland interior with leggy, mature <i>Salix cinerea</i> and some <i>Corylus avellana</i> . Ground-layer with fairly diverse flora characteristic of more open woodland/ wet woodland. Species included <i>Mentha aquatica</i> , <i>Circaea lutetiana</i> , <i>Solanum dulcamara</i> , <i>Geranium robertianum</i> , <i>Hedera helix</i> , <i>Cardamine flexuosa</i> , <i>Geum urbanum</i> , <i>Holcus lanatus</i> , <i>Angelica sylvatica</i> , <i>Viola riviniana</i> , <i>Cirsium palustre</i> , <i>Ranunculus repens</i> , <i>R. flammula</i> , <i>Veronica montana</i> , <i>Galium palustre</i> , <i>Rumex sanguineus</i> , <i>Juncus effusus</i> and ferns including <i>Dryopteris dilatata</i> , <i>Blechnum spicant</i> and <i>Polypodium</i> sp. A partial scrub layer primarily Bramble <i>Rubus fruticosus</i> agg. was present and trees with abundant epiphytic bryophytes and lichens as well as <i>Lonicera periclymenum</i> .	Potential for wet woodland associated invertebrate assemblages including seepage/wood decay species.
4	22/05/2017	SW84890 54318	Site 1 (Priority Woodland edge/interior)	Habitat adjacent to concrete water pump building	The western extent of the southern woodland margin for which survey was permitted (adjacent to a concrete water pump building at the woodland edge). Woodland margin sinuous with a good structural succession from woodland understorey, through bramble scrub zone, tall ruderal and grassland habitats. Woodland edge with <i>Salix cinerea</i> , <i>Corylus avellana</i> , <i>Prunus spinosa</i> , <i>Sambucus nigra</i> , scrub with <i>Rubus fruticosus</i> agg. and scattered <i>Ulex europaeus</i> and <i>Rubus idaea</i> . Tall ruderal vegetation with <i>Urtica dioica</i> , <i>Cirsium palustre</i> , <i>C. arvense</i> , <i>Angelica sylvatica</i> and <i>Heracleum sphondylium</i> . Uneven grassland sward with <i>Holcus lanatus</i> , <i>Anthoxanthum odoratum</i> , <i>Ranunculus repens</i> , <i>Plantago lanceolata</i> , <i>Rumex acetosa</i> , <i>Veronica chamaedrys</i> , <i>Dactylis glomerata</i> . Wetter areas with <i>Juncus effusus</i> , <i>Alopecurus geniculatus</i> and <i>Juncus bufonius</i> etc.	Interface of woodland edge and grassland with potential to support scrub edge invertebrate fauna of conservation value.

Target note	Date	Grid reference	Site	Feature	Description	Invertebrate habitat potential
5	22/05/2017	SW84831 54241	Site 1 (Priority Woodland edge/interior)	Woodland edge seepage and scallop habitat	Woodland edge scalloped adjacent to area of wet grassland/rush pasture seepage habitat. Wet woodland margin predominately <i>Salix cinerea</i> , with extensive Bramble <i>Rubus fruticosus</i> agg. scrub margin. Adjacent wet grassland habitat structurally diverse and disturbed, with water at around and in places, slightly above the soil surface. Possibly spring fed and flowing downslope. Vegetation varied with patches of <i>Juncus effusus</i> , <i>J. bufonius</i> , <i>Glyceria</i> sp., some tall ruderal vegetation with <i>Epilobium hirsutum</i> , <i>Pulicaria dysenterica</i> , <i>Solanum dulcamara</i> , <i>Cirsium palustre</i> and shorter vegetaion including marshy <i>Holcus lanatus</i> , and <i>Agrostis stolonifera</i> grassland with <i>Alopecurus geniculatus</i> , <i>Anthoxanthum odoratum</i> and <i>Ranunculus repens</i> . Also bare ground areas with surface water and scattered forbs including <i>Cardamine flexuosa</i> and in wetter areas, <i>Callitriche</i> spp.	Habitat with good potential for seepage and wet woodland associated invertebrate assemblages
6	22/05/2017	SW85030 54408	Site 1 (Priority Woodland edge/interior)	Field margin with wood edge	Edge habitat similar to TN4 but with more flower-rich herb margin with <i>Veronica chamaedrys</i> , <i>Ranunculus repens</i> and <i>Rumex acetosa</i> in a sward of <i>Holcus lanatus</i> , <i>Anthoxanthum odoratum</i> and <i>Dactylis glomerata</i> . Extensive <i>Rubus fruticosus</i> agg. and <i>Ulex europaeus</i> scrub layer between grassland and woodland margins. Woodland edge drier, with <i>Corylus avellana</i> , <i>Prunus spinosa</i> and some <i>Crataegus monogyna</i> .	Good structure for scrub edge invertebrate assemblages, with relatively rich nectaring resource
7	22/05/2017	SW84177 53731	Site 3 (Humid heath - eastern section)	General heathland (H4)	Flattish area of H4 <i>Ulex gallii</i> - <i>Agrostis curtisii</i> humid heath typical of southwest England. <i>Calluna vulgaris</i> , <i>Erica cinerea</i> and <i>Ulex gallii</i> variously co-dominant, with frequent to abundant graminoids including <i>Agrostis curtisii</i> and <i>Molinia caerulea</i> and occasional to rare <i>Potentilla erecta</i> , <i>Carex binervis</i> , <i>Ulex europaeus</i> and <i>Rubus fruticosus</i> agg. General stand uniformly late building to mature stage, with little bare ground. Some patches of <i>Salix cinerea</i> and <i>Ulex europaeus</i> scrub and <i>Pteridium aquilinum</i> locally	Heathland suitable for supporting representative heathland species associated with ericoids and <i>Ulex</i> spp. as a food/structural resource. Potential for ground nesting aculeates and other species requiring bare ground limited, due to closed canopy with little bare ground. In current condition, suboptimal for supporting Silver-studded Blue <i>Plebejus argus</i> , but species such as this could potentially use the site as a stepping stone.

Target note	Date	Grid reference	Site	Feature	Description	Invertebrate habitat potential
					dominant/abundant. Small amounts of <i>Erica tetralix</i> occurring in damper areas, particularly close to the A30 to the eastern corner of the patch.	
8	22/05/2017	SW84226 53703	Site 3 (Humid heath - eastern section)	Area with <i>Molinia caerulea</i> and <i>Pteridium aquilinum</i> dominant	Tussocky strip adjacent to heath with <i>Molinia caerulea</i> and <i>Pteridium aquilinum</i> co-dominant, with <i>Agrostis curtisii</i> , <i>Teucrium scorodonia</i> , <i>Digitalis purpurea</i> , <i>Rubus fruticosus</i> agg., <i>Anthoxanthum odoratum</i> and <i>Potentilla erecta</i> . Habitat with deep litter layer and few ericoids. Edge habitat with <i>Urtica dioica</i> and <i>Heracleum sphondylium</i> .	Tussock and litter layer with potential to support specialist invertebrates favouring patch habitat.
9	22/05/2017	SW84321 53779	Site 2 (Grassland west of Carland Cross)	Improved grassland	Grassland recorded as semi-improved in existing Phase 1, but clearly improved at time of current survey. Sward uniformly <i>Lolium perenne</i> dominated with locally abundant <i>Ranunculus repens</i> and frequent <i>Rumex obtusifolius</i> , but few other herbs. (excluded from botanical and invertebrate survey)	Habitat of low invertebrate potential in current condition
10	22/05/2017	SW84129 53748	Site 4 (Mixed woodland and pond)	Mixed woodland with <i>Pinus maritima</i> , <i>Quercus ilex</i> and native broadleaves around ex-quarry pond	Mature planted mixed woodland sandwiched between two patches of heathland (Sites 3 and 5). Habitat with mature <i>Pinus maritima</i> and <i>Quercus ilex</i> , surrounding a largish pond located in a steep-sided basin with dense, <i>Salix cinerea/caprea</i> scrub on slopes down to pond margin. At interface with heathland edge and below canopy, heathland grades into a low <i>Rubus fruticosus</i> agg. and <i>Lonicera periclymenum</i> scrub layer, with areas of bare ground, typically with leaf litter (pine needles and <i>Q. ilex</i> leaves) and plants including <i>Holcus lanatus</i> , <i>Agrostis curtisii</i> , <i>Teucrium scorodonia</i> and <i>Digitalis purpurea</i> . Extensive resource of fallen branches and twigs at ground layer providing an often shaded wood decay resource. Broadleaves present in woodland mainly towards western interface with Site 5, including <i>Prunus spinosa</i> , <i>Quercus petraea</i> , <i>Acer pseudoplatanus</i> , <i>Crataegus monogyna</i> and <i>Fraxinus excelsior</i> . Groundflora in western section with <i>Viola riviniana</i> , <i>Brachypodium</i>	Habitat providing some bare earth not found in adjacent heathland as well as an extensive wood decay resource - with potential to support bark and sapwood decay invertebrate assemblages. Some more open but sheltered patches with bramble scrub and ericoids providing potential habitat for nectaring insects and other invertebrates. Trees providing canopy and general resource for broadleaved and conifer associated assemblages. Pond with potential to support aquatic assemblages including heathland associated dragonflies and damselflies.

Target note	Date	Grid reference	Site	Feature	Description	Invertebrate habitat potential
					<i>sylvaticum</i> , <i>Asplenium scolopendrium</i> , <i>Primula vulgaris</i> and <i>Hyacinthoides non-scripta</i> with introduced <i>H. hispanica</i> and <i>Allium triquetrum</i> . Habitat close to upper slopes of pond with remnant patches of heathland (described in TN11)	
11	22/05/2017	SW84093 53714	Site 4 (Mixed woodland and pond)	Small patch of heathland adjacent and above pond	Small patch of sheltered <i>Erica cinerea</i> and <i>Ulex gallii</i> dominated heath overlooking pond. With cliffed-edges and varied microtopography. Ericoids building to mature stage with <i>Molinia caerulea</i> , <i>Agrostis curtisii</i> and <i>Rubus fruticosus</i> agg. Habitat open and south-facing, but sheltered by surrounding woodland. Patches of bare ground present (virtually absent on adjacent heathland sites).	Habitat small but with good invertebrate potential, especially for thermophilic and nectaring heathland species. Some ground nesting potential. Habitat patch complementary to heathland sites 3 and 5.
12	22/05/2017	SW83930 53680	Site 5 (Humid heath - western section)	General heathland (H4)	Heathland similar in size and shape to the eastern fragment (TN7). <i>Calluna vulgaris</i> , <i>Erica cinerea</i> and <i>Ulex gallii</i> variously co-dominant, with abundant <i>Agrostis curtisii</i> and <i>Molinia caerulea</i> . <i>Potentilla erecta</i> frequent and <i>Teucrium scorodonia</i> , <i>Polygala serpyllifolia</i> and <i>Galium saxatile</i> occasional to locally abundant. <i>Erica ciliaris</i> was also recorded in small amounts towards the westernmost extremity of the site (see TN11). Also bryophyte patches, mainly <i>Campylopus introflexus</i> . Habitat with areas of varied microtopography, including a slightly cliffed ditch edge, which afforded small amounts of bare ground. Ericoids generally late building to mature, with more mature grassy patches persisting towards the west of the site.	Heathland suitable for supporting representative heathland species associated with ericoids and <i>Ulex</i> spp. as a food/structural resource. Potential for ground nesting aculeates and other species requiring bare ground limited, due to closed canopy with little bare ground. In current condition, suboptimal for supporting Silver-studded Blue <i>Plebejus argus</i> , but species such as this could potentially use the site as a stepping stone. Site somewhat more varied in structure/composition than eastern section, therefore potentially of higher invertebrate value.

Target note	Date	Grid reference	Site	Feature	Description	Invertebrate habitat potential
13	22/05/2017	SW83854 53660	Site 5 (Humid heath - western section)	More grassy heath at western end of unit	More grassy heath towards western end of more mature heathland stand. <i>Agrostis curtisii</i> and <i>Molinia caerulea</i> abundant, with <i>Ulex gallii</i> , <i>Calluna vulgaris</i> , <i>Erica cinerea</i> , <i>Potentilla erecta</i> and more occasional <i>Teucrium scorodonia</i> , <i>Polygala serpyllifolia</i> and <i>Galium saxatile</i> . <i>Erica ciliaris</i> locally recorded here but not elsewhere within the site. A ditch bisecting site north to south afforded some small bare earth patches.	More varied structure than elsewhere on site, with some small patches of bare ground and more varied vegetation structure and composition. Habitat with potential to support diverse heathland, acid grassland and patch habitat specialists.
14	22/05/2017	SW83975 53676	Site 5 (Humid heath - western section)	Heather covered tumulus	Raised barrow providing microtopographic variation. Habitat with similar vegetation composition and structure as surrounding heath. Little bare ground, but microtopographic varying from flatter surrounding habitat. Sloughed Adder <i>Vipera berus</i> skin found on top of tumulus.	Tumulus provides varied microtopography contrasting to flatter general heath. Adding value to overall habitat for invertebrates.
15	22/05/2017	SW74480 49750	Site 15 (Priority woodland)	Small triangular area of broadleaved woodland adjacent to A30	Small triangular stand of mature, broadleaved standards including <i>Quercus petraea</i> , <i>Acer pseudoplatanus</i> , <i>Fagus sylvatica</i> , <i>Fraxinus excelsior</i> . Fairly open and little structure. No significant understorey or scrub layers. Ground/filed layer grassy throughout with <i>Poa trivialis</i> , <i>Lolium perenne</i> and <i>Dactylis glomerata</i> and herbs including <i>Cerastium fontanum</i> , <i>Silene dioica</i> , <i>Ranunculus repens</i> , <i>Rumex sanguineus</i> , <i>Ranunculus ficaria</i> , <i>Urtica dioica</i> , <i>Stellaria media</i> and <i>Ranunculus acris</i> . In addition, one species <i>Veronica montana</i> which is considered to be an ancient woodland indicator species in southwest England, was recorded. The non-native invasive <i>Hyacinthoides hispanica</i> was also recorded, however, native <i>H. non-scripta</i> was absent. Whilst many of the trees were mature and some showed signs of historic coppicing (being multistemmed). The wood was fairly open, with dappled shade at ground layer, but lacked structural diversity and there was little fallen or standing wood decay habitat, although some trees on the eastern boundary/hedge-bank had some rot holes	Lacked structural diversity or significant wood decay elements, therefore, suboptimal for saproxylic invertebrates. Woodland also very exposed to wind. The trees would provide habitat for canopy dwelling species and epiphytes, but generally of limited invertebrate compared to more structurally diverse habitats. More of an assemblage of tree than a woodland.



Target note	Date	Grid reference	Site	Feature	Description	Invertebrate habitat potential
					and flacking bark. The wood was open to grazing by cattle and the sward uniformly c20cm tall	
16	23/05/2017	SW82933 53166	Site 7 (Grass verge mapped as Priority 'calcareous grassland' )	Mown verge with fairly herb-rich semi-imrpoved grassland	Described as 'calcareous grassland priority habitat'. Verge c15m at widest point, extending for approximately 300m along northern boundary of the existing A30. Sward mowed shortly prior to survey and uniformly 5cm tall throughout. Grassland with graminoids including <i>Holcus lanatus</i> , <i>Anthoxanthum odoratum</i> , <i>Dactylis glomerata</i> , <i>Festuca rubra</i> , <i>Luzula campestris</i> and forbs including <i>Ranunculus repens</i> , <i>Lotus corniculatus</i> , <i>Plantago lanceolata</i> , <i>Geranium dissectum</i> , <i>Centaurea nigra</i> , <i>Achillea millefolium</i> , <i>Ranunculus bulbosus</i> , <i>Trifolium pratensis</i> , <i>Rumex crispus</i> , <i>Potentilla reptans</i> , <i>Potentilla anserina</i> , <i>Trifolium repens</i> , <i>Taraxacum officinale</i> (agg.), <i>Cerastium fontanum</i> , <i>Veronica chamaedrys</i> , <i>Rumex acetosa</i> , <i>Sagina procumbens</i> , <i>Vicia sativa</i> , <i>Cirsium arvense</i> and <i>Heracleum sphondylium</i> . Taller grassland close to the hedgerow/scrub edge with <i>Heracleum sphondylium</i> , <i>Rubus fruticosus</i> (agg.), <i>Ulex europaeus</i> and <i>Galium aparine</i> .	Habitat of moderate potential for invertebrates. Herb-rich, but heavily managed and lacking structural diversity.
17	23/05/2017	SW82965 53228	Site 8 (Mapped as SI grassland along field margin)	Hedgerow/field margin habitat	Field with ruderal vegetation ( <i>Epilobium</i> sp.) and bare ground. Hedge-bank lacking woody species, but with c2m wide grassy margin. Tall grasses mainly <i>Dactylis glomerata</i> and <i>Holcus lanatus</i> with <i>Urtica dioica</i> , <i>Pteridium aquilinum</i> , <i>Heracleum sphondylium</i> , <i>Aphanes arvensis</i> , <i>Geranium robertianum</i> , <i>Ranunculus repens</i> , bare ground but low diversity. Hedgebank variously with tall, rank <i>Dactylis glomerata</i> , <i>Holcus lanatus</i> , <i>Digitalis purpurea</i> , <i>Heracleum sphondylium</i> , <i>Rubus fruticosus</i> agg., <i>Pteridium aquilinum</i> , <i>Teucrium scorodonia</i> , <i>Lonicera periclymenum</i> , <i>Galium aparine</i> , <i>Umbilicus rupestris</i> , with few woody species but <i>Prunus spinosa</i> further north with <i>Galium mollugo</i> and <i>Festuca rubra</i> .	Habitat too improved to support significant invertebrate assemblages

Target note	Date	Grid reference	Site	Feature	Description	Invertebrate habitat potential
18	23/05/2017	SW82953 53263	Site 8 (Mapped as SI grassland along field margin)	Ploughed and sown field and field margin	Field margin indicated as 'SI grassland' on Phase 1 map. Ploughed to margin and sown with arable (wheat) crop. No remaining marginal habitat. Adjacent hedgebank as TN17.	Habitat too improved to support significant invertebrate assemblages
19	23/05/2017	SW82564 52950	Site 9 (Wet and dry grassland and woodland margin north of Honeycombe Barn)	Wetland and scrub at woodland edge (western edge of woodland)	Herb-rich woodland edge wet grassland and scrub at woodland margin. Habitat with diverse structural succession from wet grassland, tall ruderal and fen, through scrub to woodland edge, scrub forming a mosaic with tall herbs and shorter grassland/swamp habitat. Grassland with rich-flower resource, with graminoids including <i>Holcus lanatus</i> , <i>Poa trivialis</i> and <i>Juncus effusus</i> , with forbs including <i>Ranunculus repens</i> , <i>Veronica beccabunga</i> , <i>Myosotis scorpioides</i> , <i>Scrophularia auriculata</i> , <i>Pulicaria dysenterica</i> , <i>Lychnis flos-cuculi</i> , <i>Stellaria graminea</i> , <i>Rumex crispus</i> , <i>Cardamine pratensis</i> , <i>Urtica dioica</i> , <i>Cirsium palustre</i> , <i>Mentha aquatica</i> , <i>Epilobium hirsutum</i> , <i>Angelica sylvatica</i> , <i>Galium palustre</i> , <i>G. aparine</i> . Scrub mainly <i>Rubus fruticosus</i> (agg.) and woodland margin with <i>Corylus avellana</i> and <i>Salix caprea/cinerea</i> . Woodland carr habitat at this point with standing water.	Good potential for wet woodland edge, wet grassland and permanent wet mire invertebrate assemblages
20	23/05/2017	SW82618 52909	Site 9 (Wet and dry grassland and woodland margin north of Honeycombe Barn)	Wet woodland interior (towards northern end of wood)	Fairly shaded wet woodland interior. Mainly low canopy woodland/carr with leggy <i>Salix cinerea/caprea</i> (possibly hybrids occurring), with <i>Fraxinus excelsior</i> and understorey also of lower growing <i>Salix cinerea/caprea</i> with <i>Sambucus nigra</i> and <i>Corylus avellana</i> and <i>Hedera helix</i> , <i>Lonicera periclymenum</i> and <i>Rubus fruticosus</i> (agg.) mainly in the scrub layer. Some <i>Prunus spinosa</i> and <i>Crataegus monogyna</i> at margins. Groundlayer mainly shaded with <i>Hedera helix</i> , <i>Urtica dioica</i> , <i>Circaea lutetiana</i> , <i>Glyceria</i> sp., <i>Cardamine flexuosa</i> , <i>Dryopteris dilatata</i> , <i>Geranium robertianum</i> , <i>Galium palustre</i> , <i>Rumex sanguineus</i> , <i>Blechnum spicant</i> . Non-native Spanish Bluebell <i>Hyacinthoides hispanica</i> also present. Small stream flowing through	Generally rather shaded, but of potential value to invertebrates associated with wet woodland canopy and seepage and to some extent, wood decay habitats (the latter mainly saturated wood developing species such as diptera, best sampled as adults from adjacent vegetation and marginal habitat)

Target note	Date	Grid reference	Site	Feature	Description	Invertebrate habitat potential
					centre of woodland with steep banks in places. Bryophytes and lichens abundant in places.	
21	23/05/2017	SW82626 52870	Site 9 (Wet and dry grassland and woodland margin north of Honeycombe Barn)	East-facing flower-rich SI grassland at woodland edge	Herb-rich SI grassland on moderately steep east facing slope c20m wide sloping downwards to woodland margin. Sward height c5-10cm at time of survey and apparently managed by livestock grazing (cattle). Sward with graminoids including <i>Anthoxanthum odoratum</i> and <i>Holcus lanatus</i> and forbs including abundant <i>Ranunculus repens</i> , <i>Veronica chamaedrys</i> and <i>Plantago lanceolata</i> with <i>Lotus corniculatus</i> , <i>Medicago lupulina</i> , <i>Rumex acetosa</i> , <i>Hypochaeris radicata</i> , <i>Trifolium repens</i> , <i>Ranunculus acris</i> , <i>Centaurea nigra</i> and <i>Centaureum erythraea</i> . Fairly damp at slope bottom, drier upslope. Many small bare ground patches.	Sheltered but open and flower-rich resource beneficial to a range of grassland and woodland edge invertebrates. Good potential for ground nesting aculeates, though few seen on survey
22	23/05/2017	SW82667 52835	Site 9 (Wet and dry grassland and woodland margin north of Honeycombe Barn)	General woodland interior (southern end of wood)	Woodland interior slightly more open than at TN20. Canopy with leggy <i>Fraxinus excelsior</i> and <i>Quercus robur</i> and tall <i>Salix caprea/cinerea</i> . Understorey with shorter <i>Salix caprea/cinerea</i> , <i>Crataegus monogyna</i> and <i>Ilex aquifolium</i> . Scrub layer with <i>Rubus fruticosus</i> (agg.) and <i>Lonicera periclymenum</i> . Some more mature trees ( <i>Quercus robur</i> and <i>Fraxinus excelsior</i> ) on hedge-bank. Ground vegetation with <i>Urtica dioica</i> , <i>Rumex sanguinius</i> , <i>Carex remota</i> , <i>Cardamine flexuosa</i> , <i>Viola riviniana</i> , <i>Circaea lutetiana</i> , <i>Glyceria</i> sp., <i>Silene dioica</i> , <i>Geum urbanum</i> , <i>Geranium robertianum</i> , <i>Digitalis purpurea</i> , <i>Asplenium scolopendrium</i> , <i>Poa trivialis</i> and <i>Galium aparine</i> .	Woodland habitat with potential to support representative canopy and epiphyte invertebrate assemblages. Some potential for shaded ground and scrub layer and wood decay assemblages

Target note	Date	Grid reference	Site	Feature	Description	Invertebrate habitat potential
23	23/05/2017	SW83493 53258	Site 6 (Rush pasture/wet grassland/wet woodland edge)	Wet grassland and rush pasture	<p>Survey area in the northwest corner of a large field variously comprising semi-improved wet grassland and rush pasture habitats and with an area of wet woodland at the western boundary. <i>Holcus lanatus</i> dominated wet grassland generally tall at time of survey and forming a mosaic with fairly dense <i>Juncus effusus</i> dominated stands. Some areas of site waterlogged, particularly towards the west of the field and increasing downslope from the survey area. Water level frequently at or close to the soil surface. Other graminoids abundant within the sward included <i>Anthoxanthum odoratum</i>, <i>Poa trivialis</i>, <i>Alopecurus geniculatus</i>, <i>Glyceria</i> sp. Herbs including <i>Ranunculus repens</i>, <i>Lotus pedunculatus</i>, <i>Rumex acetosa</i>, <i>Cirsium palustre</i> and <i>Cardamine pratensis</i> occurred both within the wet grassland and <i>Juncus</i> dominated stands, with species such as <i>Galium palustre</i>, <i>Myosotis scorpioides</i>, <i>Senecio aquaticus</i>, <i>Potentilla erecta</i>, <i>Mentha aquatica</i>, <i>Ranunculus flammula</i> and <i>Lychnis flos-cuculi</i> more confined to the wetter areas and <i>Juncus</i> stands. A strip of woodland followed the fenceline and included wetter carr with <i>Salix cinerea</i> and some <i>Alnus glutinosa</i> and areas of raised drier woodland with trees including mature <i>Quercus petraea</i>, <i>Ilex aquifolium</i>, <i>Fraxinus excelsior</i> and <i>Crataegus monogyna</i>. Rush pasture and fen habitat persisted to some extent beneath the wet woodland, with areas of seepage habitat and exposed, saturated mud. There was some wood decay habitat and saturated wood.</p>	Combination of habitats, structural diversity and representative fauna together with varied hydrology increased the potential of this site to support invertebrate assemblages of at least moderate conservation value.

Target note	Date	Grid reference	Site	Feature	Description	Invertebrate habitat potential
24	23/05/2017	SW82314 52953	Site 10 (SI meadow and wet grassland)	Mesotrophic damp SI grassland adjacent to A30	Habitat managed as hay meadow. Habitat to east of site generally drier and to the west, areas of wetter grassland and rush pasture were recorded. Both swards were fairly herb-rich. At the time of survey the sward height was approximately 20cm being fairly uniform. Graminoids including <i>Holcus lanatus</i> , <i>Anthoxanthum odoratum</i> , <i>Agrostis stolonifera</i> with <i>Lolium perenne</i> , <i>Dactylis glomerata</i> and <i>Cynosurus cristatus</i> with herbs including <i>Ranunculus acris</i> <i>Lotus pedunculatus</i> , <i>Rumex acetosa</i> , <i>Trifolium repens</i> , <i>T. pratense</i> , <i>Centaurea nigra</i> , <i>Vicia sativa</i> , <i>Hypochaeris radicata</i> , <i>Geranium dissectum</i> , <i>Medicago lupulina</i> , <i>Lotus corniculatus</i> , <i>Cardamine pratensis</i> , <i>Heracleum sphondylium</i> , <i>Taraxacum officinale</i> (agg.). Field margin with taller herbs including abundant <i>Heracleum sphondylium</i> , <i>Digitalis purpurea</i> and <i>Silene dioica</i> with some <i>Rubus fruticosus</i> (agg.) Scrub. Hedegrow fairly uniform, cut with <i>Prunus spinosa</i> , <i>Sambucus nigra</i> , <i>Crataegus monogyna</i> , <i>Ulex europaeus</i> and a non-native alder, probably Italian Alder <i>Alnus cordata</i> . Also with <i>Lonicera periclymenum</i> . Presence of Burnet Moth <i>Zygaena</i> sp. cocoons on old grass stems suggests that field is not frequently cut.	Herb-rich wet and dry grassland sward of potential value to grassland invertebrate assemblages. Habitat is managed for hay cuts but Five-spot Burnet <i>Zygaena trifolii</i> was abundant on site suggesting that hay-cutting may be undertaken during late summer, or topped only.
25	23/05/2017	SW80100 50580	Site 11 (SI grassland)	SI grassland (recently mowed at time of survey)	Recently mowed, SI mesotrophic grassland. Field used for equestrian activities (horse jumps). Sward with graminoids including <i>Holcus lanatus</i> and <i>Anthoxanthum odoratum</i> with <i>Dactylis glomerata</i> , <i>Festuca rubra</i> and <i>Lolium perenne</i> and forbs including <i>Lotus corniculatus</i> , <i>Veronica chamaedrys</i> , <i>Plantago lanceolata</i> , <i>Hypochaeris radicata</i> , <i>Medicago lupulina</i> , <i>Centaurea nigra</i> , <i>Ranunculus repens</i> , <i>Rumex acetosa</i> , <i>Ranunculus repens</i> , <i>Rumex acetosa</i> , <i>Trifolium repens</i> , <i>T. pratense</i> , <i>Bellis perennis</i> , <i>Geranium dissectum</i> , <i>Rumex obtusifolius</i> . Field margin with slightly taller sward of similar composition but with <i>Brachypodium sylvaticum</i> , <i>Heracleum sphondylium</i> , <i>Prunus spinosa</i> (seedlings), <i>Galium mollugo</i> , <i>G. aparine</i> , <i>Silene dioica</i> ,	Rather manicured habitat, lacking the necessary structural heterogeneity important for good invertebrate habitat. Whilst a range of herbs were recorded, the resource was rather thinly scattered through the grassland, which was, for the most part, mowed short. Would not be expected to support invertebrate assemblages of high conservation value.

Target note	Date	Grid reference	Site	Feature	Description	Invertebrate habitat potential
					<i>Geranium robertianum</i> and <i>Pteridium aquilinum</i> . Woody species comprising hedge included <i>Prunus spinosa</i> , <i>Ulex europaeus</i> , <i>Rubus fruticosus</i> (agg.), <i>Acer pseudoplatanus</i> , <i>Crataegus monogyna</i> , <i>Fraxinus excelsior</i> . Uniformly cut.	
26	23/05/2017	SW79917 50411	Site 12 (SI grassland)	SI grassland (sheep grazed)	<i>Holcus lanatus</i> dominant with <i>Anthoxanthum odoratum</i> . Similar composition to TN25, but with longer sward and sheep grazed (low density). Sward height C10cm. Hedgerow of similar composition to TN25, but less manicured.	Habitat of marginally higher invertebrate potential than TN25 due to less extreme management, however, sward generally lacking a high density of flowering plants and otherwise lacking the range of habitat features indicative of sites with high invertebrate conservation value.
27	23/05/2017	SW80088 50222	Site 13 (Priority woodland - Nancarrow Farm)	Broadleaved woodland	Broadleaved woodland with canopy predominately of mature <i>Acer pseudoplatanus</i> with <i>Fraxinus excelsior</i> and <i>Quercus robur</i> . Understorey with <i>Corylus avellana</i> , <i>Ilex aquifolium</i> , <i>Crataegus monogyna</i> and <i>Taxus baccata</i> . Scrub layer generally of low <i>Rubus fruticosus</i> (agg.) throughout with <i>Rosa arvensis</i> . Shaded groundlayer with continuous <i>Hedera helix</i> carpet, with <i>Dryopteris filix-mas</i> and rather thinly scattered groundflora species including <i>Circaea lutetiana</i> , <i>Geranium robertianum</i> , <i>Galium aparine</i> , <i>Blechnum spicant</i> , <i>Asplenium scolopendrium</i> , <i>Hyacinthoides non-scripta</i> , <i>Urtica dioica</i> , <i>Ranunculus ficaria</i> , <i>Veronica montana</i> and <i>Brachypodium sylvaticum</i> . Varied structure and topography, some light reaching groundlayer in places but generally rather heavily shaded. Some bark and sapwood decay habitat.	Whilst the woodland exhibited good structural diversity and supported several herbs considered to be ancient woodland indicators in the south-west, dominance of Sycamore and general shaded nature of site reduced the potential invertebrate. There was some fallen and standing bark and sapwood decay habitat, but under shade. The wood may support some invertebrate interest, especially in terms of canopy and epiphytes, but unlikely to be exceptional due to management.
28	23/05/2017	SW80044 50158	Site 13 (Priority woodland - Nancarrow Farm)	Hedgebank with mature <i>Quercus robur</i> and <i>Juncus dominated strip</i>	Hedgebank with mature <i>Quercus robur</i> and <i>Fraxinus excelsior</i> adjacent to a narrow strip of wet grassland with <i>Juncus effusus</i> co-dominant with <i>Holcus lanatus</i> . Also with <i>Anthoxanthum odoratum</i> , <i>Ranunculus repens</i> , <i>R. acris</i> , <i>Urtica dioica</i> , <i>Stellaria graminea</i> , <i>Cardamine flexuosa</i> , <i>Veronica chamaedrys</i> , <i>Ranunculus ficaria</i> , <i>Cirsium palustre</i> , <i>Scrophularia auricularia</i> . Patches of <i>Rubus fruticosus</i> (agg.) scrub also present in mosaic. Structural diversity.	Some invertebrate potential, but habitat patch rather small. Comparable to more extensive areas of marshy grassland elsewhere within the survey area.

Target note	Date	Grid reference	Site	Feature	Description	Invertebrate habitat potential
29	23/05/2017	SW80044 50158	Site 14 (Marshy SI grassland south of Nancarrow Farm)	SI mesotrophic wet grassland	Mesotrophic wet grassland in western corner of a larger field. Sward tall (c30cm) at time of survey. <i>Holcus lanatus</i> and <i>Anthoxanthum odoratum</i> abundant in sward with scattered and locally dominant <i>Juncus effusus</i> . <i>Ranunculus acris</i> abundant with other herbs including <i>Plantago lanceolata</i> , <i>Rumex obtusifolius</i> , <i>R. crispus</i> , <i>Cardamine pratensis</i> , <i>Rumex acetosa</i> , <i>Geranium dissectum</i> , <i>Lotus pedunculatus</i> , <i>Galium palustris</i> , <i>Mentha aquatica</i> , <i>Myosotis laxa</i> and <i>Veronica chamaedrys</i> . Hedgerow margins with <i>Heracleum sphondylium</i> , <i>Silene dioica</i> , <i>Urtica dioica</i> , <i>Rubus fruticosus</i> (agg.), <i>Galium aparine</i> , <i>Geum urbanum</i> , <i>Cirsium palustre</i> and <i>Digitalis purpurea</i> . Woodland edge/hedgerow with <i>Salix cinerea/caprea</i> , <i>Crataegus monogyna</i> , <i>Corylus avellana</i> , <i>Prunus spinosa</i> , <i>Fraxinus excelsior</i> .	Habitat of some potential invertebrate value, but not exceptional. Whilst a reasonable diversity of herbs present, not at high density and site lacked structural and species diversity of some comparable sites within the survey area.
30	23/05/2017	SW78843 49410	Site 18 (Roadside Inventory BS315)	Listed due to presence of Babington's Leek <i>Allium ampeloprasum var babingtonii</i>	Verge surveyed initially as it was said to be 'heathland'. But only short, mown <i>Lolium perenne</i> dominated amenity grassland, with <i>Trifolium repens</i> , but v. herb-poor. Adjacent field ploughed to margin. No Babington's Leek recorded - though it was recorded in nearby Site 19.	Low invertebrate potential.
31	23/05/2017	SW78800 49363	Site 19 (SI grassland south of A30)	Damp SI grassland south of A30	Fairly short sward (c5-10cm) mesotrophic damp grassland with <i>Agrostis capillaris</i> , <i>Holcus lanatus</i> and <i>Anthoxanthum odoratum</i> with scattered <i>Juncus effusus</i> and <i>J. conglomeratus</i> and herbs including <i>Ranunculus repens</i> , <i>Rumex crispus</i> , <i>R. acetosa</i> , <i>Myosotis laxa</i> , <i>Pulicaria dysenterica</i> , <i>Taraxacum officinale</i> (agg.), <i>Cirsium arvense</i> , <i>Cirsium palustre</i> and rarely <i>Centaurea nigra</i> , <i>Lotus pedunculatus</i> , and <i>Geranium dissectum</i> and <i>Trifolium repens</i> . Field margin/hedge-bank with <i>Urtica dioica</i> , <i>Silene dioica</i> , <i>Dactylis glomerata</i> , <i>Heracleum sphondylium</i> , <i>Digitalis purpurea</i> and <i>Galium mollugo</i> and woody species including <i>Rubus fruticosus</i> (agg.), <i>Crataegus monogyna</i> (mature), <i>Salix cinerea</i> and <i>Acer pseudoplatanus</i>	Herbs generally rather sparse and site somewhat manicured, with small patches of habitat of value for grassland invertebrates, but generally patches too small an area to warrant survey.

Target note	Date	Grid reference	Site	Feature	Description	Invertebrate habitat potential
					(young) and <i>Ulex europaeus</i> . Babington's Leek <i>Allium ampeloprasum var babingtonii</i> also recorded in hedge.	
32	23/05/2017	SW78368 48699	Site 20 (Roadside Inventory BS22 adjacent )	Reason for listing uncertain, but was said to be ' <i>Molina caerulea</i> /heathland' Area surveyed opposite field which appeared to support SI grassland.	Roadside verge adjacent to Hillview Farm rather botanically unremarkable and narrow. Area surveyed included small field on opposite side of road which contained SI grassland. Habitat here with graminoids including <i>Holcus lanatus</i> , <i>Anthoxanthum odoratum</i> , <i>Agrostis capillaris</i> and <i>A. stolonifera</i> , with herbs including <i>Rumex acetosa</i> , <i>Crepis capillaris</i> , <i>Ranunculus repens</i> , <i>R. acris</i> , <i>Cirsium palustre</i> , <i>Hypochaeris radicata</i> , <i>Plantago lanceolata</i> and <i>Trifolium pratense</i> Hedgebank and within the sward <i>Epilobium angustifolium</i> , <i>Pteridium aquilinum</i> , <i>Dactylis glomerata</i> and <i>Rubus fruticosus</i> (agg.). Hedgebank otherwise with no woody species.	Some invertebrate potential, but herbs rather thinly scattered and grassland unremarkable. Small Copper <i>Lycaena phlaeas</i> seen.
33	23/05/2017	SW78917 49512	Site 17 (SI grassland and scrub habitat)	Largely scrubbed over mesotrophic grassland.	Habitat formerly sheep-grazed, SI grassland. Now largely scrubbed over with <i>Rubus fruticosus</i> (agg.) forming a close mosaic with two small (c5m x 5m) patches of grassland and one or two other very small patches. The grassland patches, whilst small have been maintained as a short sward due to rabbit grazing. Bramble scrub extending continuously (height c0.5 to 1m tall) to field margin lined with woody hedgerow species including mature <i>Acer pseudoplatanus</i> , <i>Fraxinus excelsior</i> , <i>Crataegus monogyna</i> , <i>Sambucus nigra</i> and <i>Prunus spinosa</i> . Grassland with <i>Holcus lanatus</i> and <i>Anthoxanthum odoratum</i> with abundant <i>Veronica chamaedrys</i> , <i>Ranunculus repens</i> , <i>Plantago lanceolata</i> and <i>Rumex acetosa</i> and frequent <i>Cirsium palustre</i> , <i>Rumex crispus</i> , <i>Trifolium repens</i> and <i>Dipsacus fullonum</i> , <i>Veronica serpyllifolia</i> , <i>Lotus corniculatus</i> and <i>Glechoma hederacea</i> . Habitat patches very small but herb-rich.	Habitat of some invertebrate potential in its current state due to mosaic. However, grassland patches very small in proportion to continuous Bramble scrub.



Target note	Date	Grid reference	Site	Feature	Description	Invertebrate habitat potential
34	23/05/2017	SW79066 49517	Site 16 (mapped as SI grassland) Nanteague Farm	Mainly cattle grazed improved pasture (mapped as SI grassland in Phase 1 survey).	Complex of fields mainly managed as pasture and cattle grazed. Habitat virtually all herb-poor, with <i>Lolium perenne</i> and <i>Holcus lanatus</i> dominant with <i>Poa pratensis</i> and some <i>Ranunculus repens</i> and <i>Trifolium repens</i> . Few other herbs though very thinly scattered <i>Cerastium fontanum</i> , <i>Veronica chamaedrys</i> and <i>Potentilla anserina</i> , but not present in most fields. Hedgerow habitat of greater conservation value, with mature <i>Crataegus monogyna</i> , <i>Fraxinus excelsior</i> and <i>Prunus spinosa</i> with <i>Rubus fruticosus</i> (agg.)	Hedgerows of some potential invertebrate value, but improved nature of fields, lacking succession at field margin interface with hedgerows and herb poor sward, limited invertebrate potential.
35	23/05/2017	SW79164 49507	Site 16 (mapped as SI grassland) Nanteague Farm	Mainly cattle grazed improved pasture (mapped as SI grassland in Phase 1 survey).	Cattle-grazed pasture. Poor SI field - slightly less improved than all other fields in complex, with <i>Holcus lanatus</i> , <i>Lolium perenne</i> , <i>Anthoxanthum odoratum</i> , <i>Ranunculus acris</i> , <i>Trifolium pratense</i> , <i>T. repens</i> , <i>Veronica chamaedrys</i> , <i>Geranium dissectum</i> , <i>Taraxacum officinale</i> (agg.), <i>Cerastium fontanum</i> , <i>Ranunculus repens</i> , <i>Veronica serpyllifolium</i> and <i>Cirsium arvense</i> . Sward height <5cm. Hedge mature but grassland very thinly scattered with flowering herbs.	Grassland with low herb cover and lacking vegetation structure, therefore, unlikely to be of high conservation value for invertebrates.
36	02/07/2017	SW74867 47338	Ste 29 (SI habitat at Silver Spring Farm)	Herb-rich SI grassland	One of two contiguous fields. Grassland with graminoids including <i>Agrostis capillaris</i> , <i>Holcus lanatus</i> , <i>Cynosurus cristatus</i> and <i>Anthoxanthum odoratum</i> and herbs including <i>Centaurea nigra</i> , <i>Lotus corniculatus</i> , <i>Prunella vulgaris</i> , <i>Hypochaeris radicata</i> , <i>Parentucellia viscosa</i> . Pony grazed but sward fairly uneven and not over-grazed. Some mature trees in boundary hedge and some encroaching <i>Prunus spinosa</i> providing good edge habitat for invertebrates.	Grassland herb-rich, with uneven sward, fairly uneven microtopography and mature hedgerow, with <i>Prunus spinosa</i> seedlings encroaching into field. Therefore good potential to support invertebrate assemblages of some conservation value.

Target note	Date	Grid reference	Site	Feature	Description	Invertebrate habitat potential
37	02/07/2017	SW74863 47292	Ste 28 (SI habitat at Silver Spring Farm)	Herb-rich SI grassland	One of two contiguous fields at Silver Spring Farm. Habitat with similar floristic composition as described in TN36, but not subject to grazing at time of survey, therefore, sward fairly tall and locally rank. Co-ominant graminoids included <i>Agrostis capillaris</i> , <i>Holcus lanatus</i> . Herbs somewhat more diffuse in coverage than in TN36, possibly due to management. <i>Cenaturea nigra</i> and <i>Hypochaeris radicata</i> constant with some largish aggregations of <i>Parentucellia viscosa</i> . Hedgerow with fairly diverse range of native species, but with a line of <i>Cupressus x leylandii</i> adjacent to buildings. Good scrub edge succession in places away from farm buildings, with <i>Prunus spinosa</i> encroaching onto field margin, also <i>Rubus fruticosus</i> (agg.)	Fairly herb-rich grassland and good succession between hedgerow and field edge. Habitat with good potential for grassland invertebrates.
38	02/07/2017	SW74911 47113	Site 30 (mapped as SI habitat) adjacent to Chiverton Cross	Improved grassland (mapped as SI grassland) Chiverton Cross	Improved, <i>Lolium perenne</i> dominated ley, with <i>Holcus lanatus</i> , <i>Trifolium repens</i> , <i>T. pratense</i> . Unsown margin slightly more diverse with elements of SI grassland including <i>Lotus corniculatus</i> , but generally uniform and lacking diversity.	Ringlet <i>Aphantopus hyperantus</i> and Meadow Brown <i>Maniola jurtina</i> butterflies in taller grass at field margin, but habitat of low invertebrate potential
39	02/07/2017	SW74933 47050	Site 30 (mapped as SI habitat) adjacent to Chiverton Cross	Tumulus with rank, coarse grasses, in improved grassland field, Chiverton Cross	Taller sward, rank <i>Holcus lanatus</i> , <i>Agrostis capillaris</i> and <i>Anthoxanthum grassland</i> on tumulus in field described in TN38. With <i>Cirsium arvense</i> , <i>Rubus fruticosus</i> agg. and anomalously, <i>Circaea lutetiana</i> in species-poor sward.	Some variation to surrounding field but still herb-poor and of low invertebrate potential

Target note	Date	Grid reference	Site	Feature	Description	Invertebrate habitat potential
40	02/07/2017	SW77148 48567	Site 21 (Grassland East of North Plantation	Grassland, tall ruderal and woodland edge habitat east of North Plantation	Grassland generally rank and species-poor, with graminoids including <i>Holcus lanatus</i> , <i>Agrostis stolonifera</i> , <i>A. capillaris</i> and <i>Anthoxanthum odoratum</i> and occasional <i>Phleum pratense</i> and <i>Dactylis glomerata</i> . Herbs included <i>Plantago lanceolata</i> , with occasional <i>Hypochaeris radicata</i> , <i>Ranunculus acris</i> , <i>R. repens</i> , <i>Rumex crispus</i> , <i>R. obtusifolius</i> and <i>Centaurea nigra</i> . Also very small area of rush pasture with <i>Holcus lanatus</i> , <i>Juncus effusus</i> , <i>Anthoxanthum odoratum</i> , <i>Phleum pratense</i> , <i>Agrostis stolonifera</i> and <i>Lotus pedunculatus</i> . Bank with Tall herb habitat including abundant <i>Stachys paulstris</i> , <i>Rumex crispus</i> , <i>Heracleum sphondylium</i> , <i>Cirsium palustre</i> and <i>Rubus fruticosus</i> (agg.) scrub. Also largish dump of scallop shells in middle of field. <i>Rubus fruticosus</i> (agg.) scrub at woodland margin. Woodland edge with some mature/veteran <i>Quercus robur</i> , and <i>Fraxinus excelsior</i> .	Habitat with structural variation, both through vegetation and topography. Hydrological variation and some good nectar resource (ruderals) and good scrub edge with woodland edge which may support interesting invertebrate assemblages, but rather dark beneath the canopy and much of wood a conifer plantation.
41	02/07/2017	SW76461 48434	Site 24 (Field edge grassland immediately west of North Plantation and south of A30	Field margin with a range of herbs and grasses, possibly sown?	Field margin SI grassland strip adjacent to potato crop in field. Grassland with <i>Holcus lanatus</i> , <i>Agrostis stolonifera</i> with a range of other graminoids occurring locally including <i>Phleum pratense</i> , <i>Arrhenatherum elatius</i> , <i>Dactylis glomerata</i> , <i>Festuca rubra</i> , <i>F. arundinacea</i> and <i>Juncus conglomeratus</i> and <i>J. effusus</i> . Herbs thinly and disparately scattered through sward, but quite diverse with species including <i>Ranunculus repens</i> , <i>Rumex acetosa</i> , <i>R. crispus</i> , <i>Trifolium pratense</i> , <i>T. repens</i> , <i>Sanguisorba officinalis</i> , <i>Lotus corniculatus</i> , <i>Centaurea nigra</i> , <i>Geranium dissectum</i> , <i>Dipsacus fullonum</i> , <i>Vicia sativa</i> , <i>V. cracca</i> , <i>Cirsium palustre</i> , <i>Heracleum sphondylium</i> , <i>Senecio jacobaeae</i> , <i>Achillea millefolium</i> , <i>Cirsium vulgare</i> , <i>Calystegia sepium</i> with <i>Rubus fruticosus</i> agg. scrub.	Good diversity of flowering herbs and some bare earth. Habitat likely to be of some value to invertebrates and Five-spot Burnet <i>Zygaena trifolii</i> recorded on site, but flowers diffusely scattered.

Target note	Date	Grid reference	Site	Feature	Description	Invertebrate habitat potential
42	02/07/2017	SW76294 48341	Site 24 (Field edge grassland in field immediately west of TN41)	Field margin mapped as SI in Phase 1, now ploughed with barley to margin	No significant field margin habitat, planted to edge with barley crop. Four tumuli in field.	Very low invertebrate potential
43	02/07/2017	SW 76159 48283 to SW 77273 48770	Site 23 (Field edge habitat adjacent to north margin of A30 opposite North Plantation)	Habitat mapped as SI grassland, but ploughed and sown with various crops along entire length	Mapped as SI field margins in original Phase 1, but ploughed and sown to margins at time of survey	Very low invertebrate potential
44	02/07/2017	SW 76088 48235	Field edge mapped as SI grassland, immediately west of TN43	Habitat mapped as SI grassland in Phase 1, now ploughed to margin	No SI grassland recorded, ploughed to margin and sown with potato crop	Very low invertebrate potential
45	03/07/2017	SW 76472 48473	Site 23 (Field edge habitat adjacent to north margin of A30 opposite North Plantation)	Habitat mapped as SI grassland in Phase 1, now ploughed to margin	No SI grassland recorded, ploughed to margin and sown with barley crop	Very low invertebrate potential

Target note	Date	Grid reference	Site	Feature	Description	Invertebrate habitat potential
46	03/07/2017	SW 77199 48733	Site 23 (Field edge habitat adjacent to north margin of A30 opposite North Plantation	Habitat mapped as SI in Phase 1, now Lolium perenne ley and planted right to hedgerow	Grassland at margin of improved <i>Lolium perenne</i> ley. Grassland at margin with <i>Lolium perenne</i> (dominant), <i>Holcus lanatus</i> , <i>Trifolium repens</i> , <i>Ranunculus repens</i> , <i>Rumex obtusifolius</i> , <i>Plantago lanceolata</i> . At extreme margin with hedge with <i>Silene dioica</i> , <i>Cirsium arvense</i> , <i>Heracleum sphondylium</i> and <i>Rubus fruticosus</i> (agg.). Small, damp area at field bottom with small amounts of <i>Juncus effusus</i> , <i>Potentilla anserina</i> and <i>Stachys palustris</i> , but very localised and very rarely, small patch or two of <i>Lotus corniculatus</i> and <i>Vicia sativa</i> .	Low invertebrate potential. Though slightly more diverse flora, very thinly scattered remnants
47	03/07/2017	SW 77086 48702	Site 23 (Field edge habitat adjacent to north margin of A30 opposite North Plantation	Very small patch of SI grassland and tall ruderal vegetation in extreme southeast corner of field	Very small (c5m x 15m) patch of fairly herb-rich SI grassland in corner of otherwise improved grassland field. Graminoids included <i>Holcus lanatus</i> , <i>Cynosurus cristatus</i> , <i>Anthoxanthum odoratum</i> , <i>Dactylis glomerata</i> , <i>Agrostis stolonifera</i> , with herbs including <i>Lotus pedunculatus</i> , <i>Potentilla anserina</i> , <i>Lathyrus pratensis</i> , <i>Vicia cracca</i> , <i>Plantago lanceolata</i> , <i>Trifolium pratense</i> and <i>Rumex crispus</i> . Habitat graded into tall ruderal/rank grassland vegetation with <i>Heracleum sphondylium</i> , <i>Cirsium arvense</i> and <i>Rubus fruticosus</i> (agg.)	Good nectare resource and structure for invertebrates, but very small patch. Invertebrates recorded at this point included: Meadow Grasshopper <i>Chorthippus parallelus</i> , Five-spot Burnet Moth <i>Zygaena trifolii</i> , Common Blue <i>Polyommatus icarus</i> , Ringlet <i>Aphantopus hyperantus</i> and Meadow Brown <i>Maniola jurtina</i> .
48	03/07/2017	SW 75278 47660	Site 27 (Field edge habitat near Trevisome Park)	Mapped on Phase 1 with SI grassland margin on map, now ploughed and sown to edge with <i>Lolium perenne</i>	Field with <i>Lolium perenne</i> dominated improved sward reaching to boundary. Road margin outside of field boundary slightly less improved with abundant <i>Heracleum sphondylium</i> tall ruderal habitat with rank, tall <i>Arrhenatherum elatius</i> and <i>Holcus lanatus</i> grassland at extreme edge. Tiny bit of habitat with <i>Lotus pedunculatus</i> and <i>Potentilla anserina</i> at extreme corner (SW 75358 47806). Possible remnant of former damp SI grassland margin which had been subsequently sown to margin as <i>Lolium perenne</i> ley	Low invertebrate potential.

Target note	Date	Grid reference	Site	Feature	Description	Invertebrate habitat potential
49	03/07/2017	SW 75271 47854	Site 27 (Field edge habitat near Trevisome Park)	Mapped on Phase 1 with SI grassland margin on map, now ploughed and sown to edge with <i>Lolium perenne</i>	As TN48	Low invertebrate potential.
50	03/07/2017	SW 75431 47936	Site 27 (Field edge habitat near Trevisome Park)	Mapped on Phase 1 with SI grassland margin on map, now ploughed and sown to edge with <i>Lolium perenne</i>	As TN48 - <i>Lolium perenne</i> ley sown to margin, with disturbed ground flora <i>Ranunculus repens</i> , <i>Trifolium repens</i> , <i>Matricaria discoidea</i> , <i>Taraxacum officinale</i> (agg.), <i>Rumex obtusifolius</i> , <i>Plantago major</i> and <i>Galium mollugo</i> .	Low invertebrate potential.
51	03/07/2017	SW 75490 48050	Site 26 (Field edge habitat near Trevisome Park)	Small patch of remnant SI in corner of field	Very small (c4m x 4m) remnant patch of SI grassland in corner of otherwise improved grassland field. Graminoids included <i>Holcus lanatus</i> , <i>Anthoxanthum odoratum</i> , <i>Lotus pedunculatus</i> , <i>Ranunculus acris</i> and <i>Galium mollugo</i> .	Some invertebrate value as patch habitat/stepping stone, but tiny patch
52	03/07/2017	SW 75431 48091	Site 26 (Field edge habitat near Trevisome Park)	Mapped on Phase 1 with SI grassland margin on map, now ploughed and sown to edge with <i>Lolium perenne</i>	Ploughed and planted to field boundary with <i>Lolium perenne</i> monoculture	Very low invertebrate potential
53	03/07/2017	SW 75440 48095	Site 26 (Field edge habitat near Trevisome Park)	Mapped on Phase 1 with SI grassland margin on map, now ploughed and sown to edge with <i>Lolium perenne</i>	Ploughed and planted to field boundary with <i>Lolium perenne</i> monoculture	Very low invertebrate potential

Target note	Date	Grid reference	Site	Feature	Description	Invertebrate habitat potential
54	03/07/2017	SW 75554 48145	Site 26 (Field edge habitat near Trevisome Park)	Mapped on Phase 1 with SI grassland margin on map, now ploughed and sown to edge with <i>Lolium perenne</i>	Ploughed and planted to field boundary with <i>Lolium perenne</i> monoculture	Very low invertebrate potential
55	03/07/2017	SW 75621 48232	Site 25 (Field edge habitat near Trevisome Park)	Mapped on Phase 1 with SI grassland margin on map, now ploughed and sown to edge with potato crop	Ploughed and planted to field boundary with potato crop	Very low invertebrate potential
56	03/07/2017	SW 75516 48037	Site 25 (Field edge habitat near Trevisome Park)	Mapped on Phase 1 with SI grassland margin on map, now ploughed and sown to edge with <i>Lolium perenne</i>	Ploughed and planted to field boundary with <i>Lolium perenne</i> monoculture	Very low invertebrate potential
57	03/07/2017	SW 75490 47861	Site 25 (Field edge habitat near Trevisome Park)	Mapped on Phase 1 with SI grassland margin on map, now ploughed and sown to edge with <i>Lolium perenne</i>	Ploughed and planted to field boundary with <i>Lolium perenne</i> monoculture	Very low invertebrate potential

**Table 3 – Sites prioritised for detailed invertebrate survey**

Site name	Grid reference
Site 1* – Priority Deciduous Woodland	SW 84844 54294
Site 3* – Priority Heathland	SW 84193 53741
Site 4* – Mixed heath edge woodland with pond and some ericaceous ground vegetation	SW 84056 53716
Site 5* – Priority Heathland	SW 83916 53672
Site 6* – Includes edge of Priority Woodland, wet grassland, rush pasture, wet woodland and mature hedgerow	SW83493 53258
Site 9* – Deciduous wet woodland and woodland edge habitat north of Honeycombe Barn	SW82620 52908
Site 10* – Damp SI grassland field south of A30. Herb-rich mesotrophic meadow with Yorkshire Fog <i>Holcus lanatus</i> and Sweet Vernal Grass <i>Anthoxanthum odoratum</i> co-dominant.	SW82351 52905
Site 21/22* – Grassland, tall ruderal and woodland edge habitat east of North Plantation	SW77131 48602
Site 28/29* – Herb-rich, SI mesotrophic grassland in two contiguous fields north of A30 and just northeast of Chiverton Cross. Hay meadow Field 28 only surveyed.	SW74850 47276; SW74857 47371

\*Sites numbered according to site numbers from scoping exercise

**Table 4 – Sample methods used per site and per sampling date**

Site	24 <sup>th</sup> -26 <sup>th</sup> May 2017		1 <sup>st</sup> -5 <sup>th</sup> July 2017		31 <sup>st</sup> July - 5 <sup>th</sup> August 2017		Total number of samples per site
	Sample Method	Grid reference	Sample Method	Grid reference	Sample Method	Grid reference	
Site 1 - Priority woodland and woodland edge	Timed Sweep	SW84833 54234; SW84841 54267	Timed Sweep	SW84875 54270; SW84844 54288	Timed Sweep	SW84840 54244; SW 84845 54293	6 x Sweep samples
	Timed Vacuum	SW84833 54234; SW84842 54283	Timed Vacuum	SW84834 54236; SW84844 54288	Timed Vacuum	SW84840 54244; SW 84845 54293	6 x Vacuum samples
	Timed Beat	SW84833 54242; SW84852 54313	Timed Beat	SW84850 54252; SW 84847 54309	Timed Beat	SW 84859 54273; SW 84845 54293	6 x Beat samples
	MV Moth Trap	SW84891 54317; SW84873 54275	MV Moth Trap	SW84891 54317; SW84873 54275	MV Moth Trap	SW84891 54317 SW84873 54275;	6 x MV moth trap samples, over 3 sampling events
Site 3 – Priority heathland (east section)	Timed Sweep	SW84198 53720; SW84145 53734	Timed Sweep	SW 84224 53772; SW 84233 53710	Timed Sweep	SW84143 53699; SW84158 53752	6 x Sweep samples
	Timed Vacuum	SW84198 53720; SW84145 53734	Timed Vacuum	SW 84140 53695; SW 84248 53785	Timed Vacuum	SW84143 53699; SW84158 53752	6 x Vacuum samples
	Timed Beat	SW84157 53710	Timed Beat	SW 84126 53697	Timed Beat	-	2 x Beat samples (shared with Site 4 as woodland edge habitat)
	Water Trap	-	Water Trap	SW84141 53710; SW84163 53716	Water Trap	-	2 x Water Trap samples
	MV Moth Trap	SW84174 53710; SW84125 53715;	MV Moth Trap	*SW84134 53715; SW8412 553715; SW84160 53714	MV Moth Trap	SW84134 53715; SW84174 53710	*Shared with Site 4 = x7 MV moth trap samples, over 4 sampling events
Site 4 – Mixed woodland (with	Timed Sweep	SW 84110 53715 SW 84109 53713	Timed Sweep	SW 84110 53715 SW 84109 53713	Timed Sweep	SW 84110 53715 SW 84109 53713	6 x Sweep samples



Site	24 <sup>th</sup> -26 <sup>th</sup> May 2017		1 <sup>st</sup> -5 <sup>th</sup> July 2017		31 <sup>st</sup> July - 5 <sup>th</sup> August 2017		Total number of samples per site
	Sample Method	Grid reference	Sample Method	Grid reference	Sample Method	Grid reference	
pond and remnant heath	Timed Vacuum	SW84158 53752; SW 84109 53713	Timed Vacuum	SW84158 53752; SW 84109 53713	Timed Vacuum	SW84158 53752; SW 84109 53713	6 x Vacuum samples
	Timed Beat	SW84094 53707	Timed Beat	SW 84126 53697; SW 84092 53691	Timed Beat	SW 84106 53703	4 x Beat samples
	Water Trap	-	Water Trap	SW84111 53706; SW84092 53716	Water Trap	-	2 x Water Trap samples
	MV Moth Trap	SW8409353707; SW8409253688;	MV Moth Trap	*SW8413453715; SW8409853693	MV Moth Trap	*SW8413453715	*Shared with Site 4 = 5 MV moth trap samples, over 3 sampling events
Site 5 – Priority heathland (west section)	Timed Sweep	SW83850 53653; SW83962 53671	Timed Sweep	SW83853 53649; SW83892 53670	Timed Sweep	SW83852 53650; SW83947 53673	6 x Sweep samples
	Timed Vacuum	SW83850 53653; SW83962 53671	Timed Vacuum	SW83853 53649; SW83892 53670	Timed Vacuum	SW83852 53650; SW83947 53673	6 x Vacuum samples
Site 6 – Wet grassland, rush pasture & wet woodland (north of Ennis Farm)	Timed Sweep	SW83504 53257; SW83496 53216	Timed Sweep	SW83512 53252; SW83542 53265	Timed Sweep	SW83496 53263;	6 x Sweep samples
	Timed Vacuum	SW83504 53257; SW83496 53216	Timed Vacuum	SW83486 53221; SW83512 53252;	Timed Vacuum	SW83496 53263; SW83486 53225	6 x Vacuum samples
	Timed Beat	SW83484 53255; SW83496 53216	Timed Beat	SW83486 53221; SW 83487 53174	Timed Beat	SW83486 53255; SW83480 53211	6 x Beat samples
Site 9 - Priority woodland and woodland edge (Honeycombe Barn)	Timed Sweep	SW82564 52942; SW82635 52851	Timed Sweep	SW SW82607 52887; 82632 52826	Timed Sweep	SW82560 52971; SW83547 53271	6 x Sweep samples
	Timed Vacuum	SW82564 52942; SW82620 52908	Timed Vacuum	SW82625 52874; SW82604 52919	Timed Vacuum	SW82560 52971; SW83547 53271	6 x Vacuum samples
	Timed Beat	SW82607 52902; SW82635 52851	Timed Beat	SW82553 53016; SW82607 52887	Timed Beat	SW82583 52888; SW82605 52914	6 x Beat samples
	MV Moth Trap	SW8262 5284; SW8260 5288; SW8259 5291; SW82555 52970	MV Moth Trap	SW8259 5291; SW8260 5288; SW82625284	MV Moth Trap	SW8255552970; SW82595291; SW82605288	10 MV moth trap samples, over 2 sampling events
Site 10 – Semi-improved wet and dry grassland (meadow)	Timed Sweep	SW82351 52905; SW82321 52881	Timed Sweep	SW82071 52881; SW82076 52819	Timed Sweep	SW82225 52815; SW82341 52902	6 x Sweep samples
	Timed Vacuum	SW82351 52905; SW82321 52881	Timed Vacuum	SW82071 52881; SW82076 52819	Timed Vacuum	SW82225 52815; SW82341 52902	6 x Vacuum samples
Site 21/22 – Priority	Timed Sweep	-	Timed Sweep	-	Timed Sweep	SW77128 48588; SW77114 48590	4 x Sweep samples

Site	24 <sup>th</sup> -26 <sup>th</sup> May 2017		1 <sup>st</sup> -5 <sup>th</sup> July 2017		31 <sup>st</sup> July - 5 <sup>th</sup> August 2017		Total number of samples per site
	Sample Method	Grid reference	Sample Method	Grid reference	Sample Method	Grid reference	
Woodland and grassland/tall ruderal edge habitat						SW77136 48600; SW77145 48601	
	Timed Vacuum	-	Timed Vacuum	-	Timed Vacuum	SW77128 48588; SW77114 48590 SW77136 48600; SW77145 48601	4 x Vacuum samples
	Timed Beat	-	Timed Beat	-	Timed Beat	SW 77122 48575 (whole woodland margin sampled)	Equivalent to 4 samples
	Flight Interception Trap	-	Flight Interception Trap	-	Flight Interception Trap	SW77106 48599; SW77109 48596 SW77113 48588; SW77121 48576;	4 x Flight Interception Trap samples
28/29 – Semi-improved grassland (pasture and meadow)	Timed Sweep	-	Timed Sweep	SW74885 47296; SW74876 47284	Timed Sweep	-	2 x Sweep samples
	Timed Vacuum	-	Timed Vacuum	SW74885 47296; SW74876 47284	Timed Vacuum	-	2 x Vacuum samples

**Table 5 – Number of species recorded by taxon from total survey data**

<b>Order</b>	<b>Vernacular</b>	<b>Number of species per taxon</b>
Coleoptera	Beetles	224
Lepidoptera	Butterflies and moths	205
Hemiptera	True Bugs	105
Diptera	Two-winged Flies	93
Araneae	Spiders	76
Hymenoptera	Bees, Ants, Wasps	25
Orthoptera	Grasshoppers and Crickets	9
Opiliones	Harvestmen	9
Odonata	Dragonflies and damselflies	9
Isopoda	Woodlice and Slaters	5
Isopoda	Woodlice and slaters	5
Lithobiomorpha	Stone Centipedes	2
Mecoptera	Scorpionflies	1
Dermaptera	Earwigs	1
Pseudoscorpions	Pseudoscorpiones	1
Amphipoda	Freshwater Shrimps	1
Glomerida	Pill Millipedes	1
	<b>Total</b>	<b>772</b>

Table 6 – Species list with site by site matrix (species presence within a site indicated with 'x')

Common name	Scientific name	Family	Order	UK status	Site 1 - Priority woodland and woodland edge	Site 3 - Priority heathland (east section)	Site 4 - Mixed woodland	Site 5 - Priority heathland (west section)	Site 6 - Wet grassland, rush pasture & wet woodland (north of Ennis Farm)	Site 7 - SI grassland on wide verge adjacent A30 (not sampled)	Site 9 - Priority woodland and woodland edge (Honeycombe Barn)	Site 10 - Semi-improved grass land (meadow)	Site 14 - Marshy SI grassland south of Nancarrow Farm (not sampled)	Site 20 - SI grassland opposite Hill View Farm (not sampled)	Site 21/22 - Priority woodland and grassland/tall ruderal edge habitat	Site 24 (not sampled)	Site 27 (not sampled)	Site 28/29 - Semi-improved grassland (pasture)	Site 30 - Improved grassland
<b>Freshwater and land shrimps (Amphipoda)</b>																			
A freshwater shrimp	<i>Crangonyx pseudogracilis</i>	Crangonyctidae	Amphipoda	Widespread (introduced)															x
<b>Spiders (Araneae)</b>																			
Labyrinth Spider	<i>Agelena labyrinthica</i>	Agelenidae	Araneae	Local		x													
An orb-web spider	<i>Agalenatea redii</i>	Araneidae	Araneae	Local		x		x					x						
Garden Spider	<i>Araneus diadematus</i>	Araneidae	Araneae	Widespread	x	x	x	x	x				x			x			
Garden Spider	<i>Araneus quadratus</i>	Araneidae	Araneae	Widespread		x		x	x										
A cucumber spider	<i>Araniella curcubitina</i>	Araneidae	Araneae	Widespread		x		x					x						
A cucumber spider	<i>Araniella sp.</i>	Araneidae	Araneae	Unknown		x	x												
An orb-web spider	<i>Gibbaranea gibbosa</i>	Araneidae	Araneae	Local	x				x				x						
An orb-web spider	<i>Hypsosinga pygmaea</i>	Araneidae	Araneae	Local					x										
An orb-web spider	<i>Larinioides cornutus</i>	Araneidae	Araneae	Widespread	x				x				x		x				
An orb-web spider	<i>Mangora acalypha</i>	Araneidae	Araneae	Widespread		x			x										
An orb-web spider	<i>Neoscona adianta</i>	Araneidae	Araneae	Local		x			x										
An orb-web spider	<i>Zygiella atrica</i>	Araneidae	Araneae	Widespread		x			x				x		x				
An orb-web spider	<i>Zygiella x-notata</i>	Araneidae	Araneae	Widespread			x		x		x								
A clubionid spider	<i>Cheiracanthium erraticum</i>	Clubionidae	Araneae	Local		x													
A clubionid spider	<i>Clubiona comta</i>	Clubionidae	Araneae	Widespread					x				x						
A clubionid spider	<i>Clubiona neglecta</i>	Clubionidae	Araneae	Local															x

Common name	Scientific name	Family	Order	UK status	Site 1 - Priority woodland and woodland edge	Site 3 - Priority heathland (east section)	Site 4 - Mixed woodland	Site 5 - Priority heathland (west section)	Site 6 - Wet grassland, rush pasture & wet woodland (north of Ennis Farm)	Site 7 - SI grassland on wide verge adjacent A30 (not sampled)	Site 9 - Priority woodland and woodland edge (Honeycombe Barr)	Site 10 - Semi-improved grass land (meadow)	Site 14 - Marshy SI grassland south of Nancarrow Farm (not sampled)	Site 20 - SI grassland opposite Hill View Farm (not sampled)	Site 21/22 - Priority woodland and grassland/tall ruderal edge habitat	Site 24 (not sampled)	Site 27 (not sampled)	Site 28/29 - Semi-improved grassland (pasture)	Site 30 - Improved grassland
A clubionid spider	<i>Clubiona pallidula</i>	Clubionidae	Araneae	Local					x										
A clubionid spider	<i>Clubiona reclusa</i>	Clubionidae	Araneae	Widespread				x			x							x	
A clubionid spider	<i>Clubiona sp.</i>	Clubionidae	Araneae	Widespread	x														
A clubionid spider	<i>Clubiona stagnatilis</i>	Clubionidae	Araneae	Local							x								
A dictynid spider	<i>Dictyna arundinacea</i>	Dictynidae	Araneae	Widespread		x		x											
A dictynid spider	<i>Dictyna latens</i>	Dictynidae	Araneae	Local		x													
A gnaphosid spider	<i>Micaria pulicaria</i>	Gnaphosidae	Araneae	Widespread			x	x											
A linyphiid spider	<i>Bathyphantes approximatus</i>	Linyphiidae	Araneae	Widespread	x														
A linyphiid spider	<i>Erigone atra</i>	Linyphiidae	Araneae	Widespread	x				x		x				x			x	
A linyphiid spider	<i>Erigone dentipalpis</i>	Linyphiidae	Araneae	Widespread		x			x			x			x			x	
A linyphiid spider	<i>Erigone promiscua</i>	Linyphiidae	Araneae	Widespread	x														
A linyphiid spider	<i>Erigone sp.</i>	Linyphiidae	Araneae	Unknown	x														
A linyphiid spider	<i>Gnathonarium dentatum</i>	Linyphiidae	Araneae	Widespread							x								
A linyphiid spider	<i>Lepthyphantes flavipes</i>	Linyphiidae	Araneae	Widespread	x														
A linyphiid spider	<i>Lepthyphantes leprosus</i>	Linyphiidae	Araneae	Widespread							x								
A linyphiid spider	<i>Lepthyphantes mengei</i>	Linyphiidae	Araneae	Widespread	x	x			x								x		
A linyphiid spider	<i>Lepthyphantes obscurus</i>	Linyphiidae	Araneae	Widespread		x													
A linyphiid spider	<i>Lepthyphantes tenebricola</i>	Linyphiidae	Araneae	Widely scattered					x			x							
A linyphiid spider	<i>Lepthyphantes zimmermanni</i>	Linyphiidae	Araneae	Widespread				x			x	x							
A Linyphiid spider	<i>Linyphia hortensis</i>	Linyphiidae	Araneae	Widespread	x		x												

Common name	Scientific name	Family	Order	UK status	Site 1 - Priority woodland and woodland edge	Site 3 - Priority heathland (east section)	Site 4 - Mixed woodland	Site 5 - Priority heathland (west section)	Site 6 - Wet grassland, rush pasture & wet woodland (north of Ennis Farm)	Site 7 - SI grassland on wide verge adjacent A30 (not sampled)	Site 9 - Priority woodland and woodland edge (Honeycombe Barr)	Site 10 - Semi-improved grass land (meadow)	Site 14 - Marshy SI grassland south of Nancarrow Farm (not sampled)	Site 20 - SI grassland opposite Hill View Farm (not sampled)	Site 21/22 - Priority woodland and grassland/tall ruderal edge habitat	Site 24 (not sampled)	Site 27 (not sampled)	Site 28/29 - Semi-improved grassland (pasture)	Site 30 - Improved grassland
A linyphiid spider	<i>Linyphia triangularis</i>	Linyphiidae	Araneae	Widespread	x	x	x		x						x				
A linyphiid spider	<i>Microlinyphia pusilla</i>	Linyphiidae	Araneae	Widespread	x				x		x	x							
A linyphiid spider	<i>Neriene montana</i>	Linyphiidae	Araneae	Widespread					x										
A linyphiid spider	<i>Neriene peltata</i>	Linyphiidae	Araneae	Widespread	x		x		x										
A linyphiid spider	<i>Oedothorax fuscus</i>	Linyphiidae	Araneae	Widespread														x	
A linyphiid spider	<i>Oedothorax retusus</i>	Linyphiidae	Araneae	Widespread	x														
A linyphiid spider	<i>Pocadicnemis juncea</i>	Linyphiidae	Araneae	Widespread		x													
A linyphiid spider	<i>Tenuiphantes tenuis</i>	Linyphiidae	Araneae	Widespread	x	x	x	x	x		x	x			x			x	
A lycosid spider	<i>Arctosa leopardus</i>	Lycosidae	Araneae	Local	x														
A lycosid spider	<i>Pardosa amentata</i>	Lycosidae	Araneae	Widespread	x				x		x	x							
A lycosid spider	<i>Pardosa nigriceps</i>	Lycosidae	Araneae	Widespread		x	x	x	x										
A lycosid spider	<i>Pardosa palustris</i>	Lycosidae	Araneae	Widespread					x					x				x	
A lycosid spider	<i>Pardosa proxima</i>	Lycosidae	Araneae	Nationally Scarce					x									x	
A lycosid spider	<i>Pardosa pullata</i>	Lycosidae	Araneae	Widespread				x	x		x	x							
A lycosid spider	<i>Pardosa sp.</i>	Lycosidae	Araneae	Unknown				x											
A lycosid spider	<i>Pirata piraticus</i>	Lycosidae	Araneae	Widespread											x				
A jumping spider	<i>Euophrys frontalis</i>	Salticidae	Araneae	Widespread								x							
A jumping spider	<i>Neon reticulatus</i>	Salticidae	Araneae	Widespread		x	x	x											
A tetragnathid spider	<i>Meta mengei</i>	Tetragnathidae	Araneae	Widespread	x	x	x	x	x		x	x							
A tetragnathid spider	<i>Meta segmentata</i>	Tetragnathidae	Araneae	Widespread	x	x	x	x	x		x	x			x				

Common name	Scientific name	Family	Order	UK status	Site 1 - Priority woodland and woodland edge	Site 3 - Priority heathland (east section)	Site 4 - Mixed woodland	Site 5 - Priority heathland (west section)	Site 6 - Wet grassland, rush pasture & wet woodland (north of Ennis Farm)	Site 7 - SI grassland on wide verge adjacent A30 (not sampled)	Site 9 - Priority woodland and woodland edge (Honeycombe Barr)	Site 10 - Semi-improved grass land (meadow)	Site 14 - Marshy SI grassland south of Nancarrow Farm (not sampled)	Site 20 - SI grassland opposite Hill View Farm (not sampled)	Site 21/22 - Priority woodland and grassland/tall ruderal edge habitat	Site 24 (not sampled)	Site 27 (not sampled)	Site 28/29 - Semi-improved grassland (pasture)	Site 30 - Improved grassland
A tetragnathid spider	<i>Pachygnatha clercki</i>	Tetragnathidae	Araneae	Widespread											x				
A tetragnathid spider	<i>Pachygnatha degeeri</i>	Tetragnathidae	Araneae	Widespread					x		x	x			x			x	
A tetragnathid spider	<i>Tetragnatha extensa</i>	Tetragnathidae	Araneae	Widespread	x	x	x	x	x		x	x						x	
A tetragnathid spider	<i>Tetragnatha montana</i>	Tetragnathidae	Araneae	Widespread	x		x		x		x								
A theridiid spider	<i>Anelosimus vittatus</i>	Theridiidae	Araneae	Widespread	x				x		x								
A theridiid spider	<i>Enoplognatha latimana</i>	Theridiidae	Araneae	Widespread	x													x	
A theridiid spider	<i>Enoplognatha ovata</i>	Theridiidae	Araneae	Widespread	x	x	x		x		x	x						x	
A theridiid spider	<i>Episinus truncatus</i>	Theridiidae	Araneae	Nationally Scarce (Nb)		x	x	x											
A theridiid spider	<i>Theridion sisyphium</i>	Theridiidae	Araneae	Widespread		x	x	x	x		x	x							
A theridiid spider	<i>Theridion varians</i>	Theridiidae	Araneae	Widespread					x										
Crab Spider	<i>Misumena vatia</i>	Thomisidae	Araneae	Widespread											x				
A thomisid spider	<i>Ozyptila sp.</i>	Thomisidae	Araneae	Unknown		x	x												
A thomisid spider	<i>Ozyptila trux</i>	Thomisidae	Araneae	Local		x													
A thomisid spider	<i>Philodromus cespitum</i>	Thomisidae	Araneae	Widespread		x			x										
A thomisid spider	<i>Tibellus oblongus</i>	Thomisidae	Araneae	Widespread		x		x	x										
A thomisid spider	<i>Xysticus audax</i>	Thomisidae	Araneae	Widespread														x	
A thomisid spider	<i>Xysticus cristatus</i>	Thomisidae	Araneae	Widespread	x	x	x	x	x		x	x							
A thomisid spider	<i>Xysticus sp.</i>	Thomisidae	Araneae	Unknown		x										x			
A zorid spider	<i>Zora sp.</i>	Zoridae	Araneae	Unknown	x														
A zorid spider	<i>Zora spinimana</i>	Zoridae	Araneae	Widespread		x		x											

Common name	Scientific name	Family	Order	UK status	Site 1 - Priority woodland and woodland edge	Site 3 - Priority heathland (east section)	Site 4 - Mixed woodland	Site 5 - Priority heathland (west section)	Site 6 - Wet grassland, rush pasture & wet woodland (north of Ennis Farm)	Site 7 - SI grassland on wide verge adjacent A30 (not sampled)	Site 9 - Priority woodland and woodland edge (Honeycombe Barr)	Site 10 - Semi-improved grass land (meadow)	Site 14 - Marshy SI grassland south of Nancarrow Farm (not sampled)	Site 20 - SI grassland opposite Hill View Farm (not sampled)	Site 21/22 - Priority woodland and grassland/tall ruderal edge habitat	Site 24 (not sampled)	Site 27 (not sampled)	Site 28/29 - Semi-improved grassland (pasture)	Site 30 - Improved grassland
<b>Pseudoscorpions (Pseudoscorpiones)</b>																			
Common Chthonid	<i>Chthonius ischnocheles</i>	Chthoniidae	Chthoniinea	Widespread				x											
<b>Beetles (Coleoptera)</b>																			
An apionid weevil	<i>Apion cruentatum</i>	Apionidae	Coleoptera	Local								x							
An apionid weevil	<i>Apion frumentarium</i>	Apionidae	Coleoptera	Widespread								x			x				
An apionid weevil	<i>Ceratapion gibbirostre</i>	Apionidae	Coleoptera	Widespread						x									
An apionid weevil	<i>Eutrichapion ervi</i>	Apionidae	Coleoptera	Widespread								x							
An apionid weevil	<i>Exapion ulicis</i>	Apionidae	Coleoptera	Widespread							x								
An apionid weevil	<i>Ischnoterapion loti</i>	Apionidae	Coleoptera	Widespread	x	x	x	x				x							
An apionid weevil	<i>Ischnoterapion virens</i>	Apionidae	Coleoptera	Widespread		x	x	x	x		x								
An apionid weevil	<i>Perapion curtirostre</i>	Apionidae	Coleoptera	Widespread							x	x							
An apionid weevil	<i>Perapion hydrolapathi</i>	Apionidae	Coleoptera	Widespread							x	x				x			
An apionid weevil	<i>Perapion violaceum</i>	Apionidae	Coleoptera	Widespread								x			x			x	
An apionid weevil	<i>Pirapion immune</i>	Apionidae	Coleoptera	Local		x	x	x											
An apionid weevil	<i>Protapion apricans</i>	Apionidae	Coleoptera	Widespread								x						x	
An apionid weevil	<i>Protapion assimile</i>	Apionidae	Coleoptera	Widespread								x							
An apionid weevil	<i>Protapion fulvipes</i>	Apionidae	Coleoptera	Widespread		x	x	x	x		x	x							
An apionid weevil	<i>Protapion nigrirtarse</i>	Apionidae	Coleoptera	Widespread		x	x												
An apionid weevil	<i>Protapion trifolii</i>	Apionidae	Coleoptera	Widespread								x						x	
An apionid weevil	<i>Protopirapion atratum</i>	Apionidae	Coleoptera	Local		x	x	x											



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An apionid weevil	<i>Stenopterapion scutellare</i>	Apionidae	Coleoptera	Local		x	x	x											
Raspberry Beetle	<i>Byturus tomentosus</i>	Byturidae	Coleoptera	Widespread			x				x								
A soldier beetle	<i>Cantharis bicolor/cryptica</i>	Cantharidae	Coleoptera	Widespread	x	x	x		x										
A soldier beetle	<i>Cantharis pallida</i>	Cantharidae	Coleoptera	Widespread	x							x							
A soldier beetle	<i>Cantharis pellucida</i>	Cantharidae	Coleoptera	Widespread					x										
A sailor beetle	<i>Malthinus flaveolus</i>	Cantharidae	Coleoptera	Widespread							x								
A sailor beetle	<i>Malthodes marginatus</i>	Cantharidae	Coleoptera	Widespread	x				x		x								
A sailor beetle	<i>Malthodes mysticus/guttifer</i>	Cantharidae	Coleoptera	Unknown							x								
A soldier beetle	<i>Rhagonycha fulva</i>	Cantharidae	Coleoptera	Widespread	x		x	x	x		x	x						x	
A soldier beetle	<i>Rhagonycha testacea</i>	Cantharidae	Coleoptera	Widespread					x		x				x				
A ground beetle	<i>Acupalpus dubius</i>	Carabidae	Coleoptera	Widespread	x				x		x	x							
A ground beetle	<i>Acupalpus meridianus</i>	Carabidae	Coleoptera	Local		x	x												
A ground beetle	<i>Acupalpus parvulus</i>	Carabidae	Coleoptera	Widespread			x	x	x			x							
A ground beetle	<i>Agonum muelleri</i>	Carabidae	Coleoptera	Widespread	x														
A ground beetle	<i>Agonum thoreyi</i>	Carabidae	Coleoptera	Widespread					x										
A ground beetle	<i>Amara aenea</i>	Carabidae	Coleoptera	Widespread		x						x							
A ground beetle	<i>Amara communis</i>	Carabidae	Coleoptera	Widespread								x							
A ground beetle	<i>Amara curta?</i>	Carabidae	Coleoptera	Nationally Scarce (Nb)								x							
A ground beetle	<i>Amara familiaris</i>	Carabidae	Coleoptera	Widespread		x	x												
A ground beetle	<i>Amara lunicollis</i>	Carabidae	Coleoptera	Widespread					x			x							

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A ground beetle	<i>Amara plebeja</i>	Carabidae	Coleoptera	Widespread		x		x										x	
A ground beetle	<i>Amara similata</i>	Carabidae	Coleoptera	Widespread	x	x		x											
A ground beetle	<i>Asaphidion flavipes</i>	Carabidae	Coleoptera	Widespread	x										x				
A ground beetle	<i>Bembidion aeneum</i>	Carabidae	Coleoptera	Widespread	x	x					x				x				
A ground beetle	<i>Bembidion biguttatus</i>	Carabidae	Coleoptera	Widespread					x										
A ground beetle	<i>Bembidion guttula</i>	Carabidae	Coleoptera	Widespread		x	x		x			x							
A ground beetle	<i>Bembidion lampros</i>	Carabidae	Coleoptera	Widespread	x		x		x										
A ground beetle	<i>Bembidion lunulatum</i>	Carabidae	Coleoptera	Widespread									x						
A ground beetle	<i>Bembidion mannerheimii</i>	Carabidae	Coleoptera	Widespread					x									x	
A ground beetle	<i>Bembidion quadrimaculatum</i>	Carabidae	Coleoptera	Widespread					x										
A ground beetle	<i>Bradycellus harpalinus</i>	Carabidae	Coleoptera	Widespread														x	
A ground beetle	<i>Demetrias atricapillus</i>	Carabidae	Coleoptera	Widespread	x						x							x	
A ground beetle	<i>Elaphrus cupreus</i>	Carabidae	Coleoptera	Widespread	x														
A ground beetle	<i>Leistus fulvibarbis</i>	Carabidae	Coleoptera	Widespread															
A ground beetle	<i>Nebria brevicollis</i>	Carabidae	Coleoptera	Widespread															
A ground beetle	<i>Nebria salina</i>	Carabidae	Coleoptera	Widespread	x														
A ground beetle	<i>Notiophilus biguttatus</i>	Carabidae	Coleoptera	Widespread					x										
A ground beetle	<i>Notiophilus substriatus</i>	Carabidae	Coleoptera	Widespread	x	x	x		x									x	
A ground beetle	<i>Paradromius linearis</i>	Carabidae	Coleoptera	Widespread	x	x	x	x	x						x				
A ground beetle	<i>Pterostichus nigrita</i>	Carabidae	Coleoptera	Widespread	x														

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A ground beetle	<i>Pterostichus strenuus</i>	Carabidae	Coleoptera	Widespread	x										x				
A ground beetle	<i>Pterostichus vernalis</i>	Carabidae	Coleoptera	Widespread		x													
A ground beetle	<i>Pterostichus diligens</i>	Carabidae	Coleoptera	Widespread					x										
A ground beetle	<i>Stenolophus teutonius</i>	Carabidae	Coleoptera	Nationally Scarce (Nb)	x														
A ground beetle	<i>Trechus obtusus</i>	Carabidae	Coleoptera	Widespread						x									
A ground beetle	<i>Trechus quadristriatus</i>	Carabidae	Coleoptera	Widespread		x	x	x	x			x							
Two-banded Longhorn Beetle	<i>Rhagium bifasciatum</i>	Cerambycidae	Coleoptera	Widespread	x														
Black and Yellow Longhorn	<i>Rutpela maculata</i>	Cerambycidae	Coleoptera	Widespread						x		x							
A leaf beetle	<i>Altica lythri</i>	Chrysomelidae	Coleoptera	Widespread	x				x	x		x							
A flea beetle	<i>Altica palustris</i>	Chrysomelidae	Coleoptera	Widespread											x				
A flea beetle	<i>Aphthona nigriceps</i>	Chrysomelidae	Coleoptera	Nationally Scarce (Na)	x														
A leaf beetle	<i>Calomicrus circumfusus</i>	Chrysomelidae	Coleoptera	Nationally Scarce (Na)		x	x	x											
A tortoise beetle	<i>Cassida flaveola</i>	Chrysomelidae	Coleoptera	Widespread	x				x										
Thistle Tortoise Beetle	<i>Cassida rubiginosa</i>	Chrysomelidae	Coleoptera	Widespread							x								
Mangold Flea Beetle	<i>Chaetocnema concinna</i>	Chrysomelidae	Coleoptera	Widespread	x						x								
A leaf beetle	<i>Chrysolina polita</i>	Chrysomelidae	Coleoptera	Widespread	x														
A leaf beetle	<i>Chrysomela banksii</i>	Chrysomelidae	Coleoptera	Widespread								x							
A willow beetle	<i>Crepidodera aurea</i>	Chrysomelidae	Coleoptera	Widespread	x				x										
A flea beetle	<i>Crepidodera fulvicornis</i>	Chrysomelidae	Coleoptera	Widespread	x														
Dock Beetle	<i>Gastrophysa viridula</i>	Chrysomelidae	Coleoptera	Widespread	x	x		x	x		x				x				

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Heather Beetle	<i>Lochmaea suturalis</i>	Chrysomelidae	Coleoptera	Widespread		x													
A flea beetle	<i>Longitarsus atricillus</i>	Chrysomelidae	Coleoptera	Widespread								x							
A flea beetle	<i>Longitarsus jacobaeae/flavicornis</i>	Chrysomelidae	Coleoptera	Widespread											x			x	
A flea beetle	<i>Longitarsus pratensis</i>	Chrysomelidae	Coleoptera	Widespread								x							
A flea beetle	<i>Longitarsus sp.</i>	Chrysomelidae	Coleoptera	Unknown			x												
Wheat-stem Flea Beetle	<i>Neocrepidodera ferrugnea</i>	Chrysomelidae	Coleoptera	Widespread	x	x						x			x				
A flea beetle	<i>Neocrepidodera transversa</i>	Chrysomelidae	Coleoptera	Widespread					x		x	x							
A leaf beetle	<i>Oulema melanopus</i>	Chrysomelidae	Coleoptera	Widespread	x				x			x			x				
A leaf beetle	<i>Oulema obscura</i>	Chrysomelidae	Coleoptera	Widespread					x		x	x			x			x	
Blue Willow Leaf Beetle	<i>Phratora vulgatissima</i>	Chrysomelidae	Coleoptera	Widespread	x						x				x				
Blue Willow Leaf Beetle	<i>Phratora vulgatissima</i>	Chrysomelidae	Coleoptera	Widespread							x				x				
A flea beetle	<i>Phyllotreta diademata/atra</i>	Chrysomelidae	Coleoptera	Unknown															
A flea beetle	<i>Phyllotreta tetrastigma</i>	Chrysomelidae	Coleoptera	Widespread	x										x				
A flea beetle	<i>Phyllotreta undulata</i>	Chrysomelidae	Coleoptera	Widespread	x														
A flea beetle	<i>Phyllotreta vittatus</i>	Chrysomelidae	Coleoptera	Widespread								x							
Potato Flea Beetle	<i>Psylliodes affinis</i>	Chrysomelidae	Coleoptera	Widespread	x														
A flea beetle	<i>Psylliodes napi</i>	Chrysomelidae	Coleoptera	Widespread					x										
10-spot Ladybird	<i>Adalia decempunctata</i>	Coccinellidae	Coleoptera	Widespread					x										
A ladybird beetle	<i>Coccidula rufa</i>	Coccinellidae	Coleoptera	Widespread	x	x			x		x	x							
7-spot Ladybird	<i>Coccinella septempunctata</i>	Coccinellidae	Coleoptera	Widespread	x				x		x				x				

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14-spot Ladybird	<i>Propylea quattuordecimpunctata</i>	Coccinellidae	Coleoptera	Widespread					x		x	x			x				
A ladybird beetle	<i>Scymnus haemorrhoidalis</i>	Coccinellidae	Coleoptera	Local	x						x								
A true weevil	<i>Acalles misellus</i>	Curculionidae	Coleoptera	Widespread		x													
A true weevil	<i>Acalles ptinoides</i>	Curculionidae	Coleoptera	Nationally Scarce (Nb)				x											
A pea weevil	<i>Andrion (Sitona) regensteinese</i>	Curculionidae	Coleoptera	Widespread					x										
A true weevil	<i>Anthonomus pedicularis</i>	Curculionidae	Coleoptera	Widespread	x		x												
Strawberry-blossom weevil	<i>Anthonomus rubi</i>	Curculionidae	Coleoptera	Widespread							x								
A true weevil	<i>Archarius salicivorus</i>	Curculionidae	Coleoptera	Widespread	x	x	x		x		x				x				
Spider Weevil	<i>Barypeithes araneiformis</i>	Curculionidae	Coleoptera	Widespread							x								
A broad-nosed weevil	<i>Caenopsis waltoni</i>	Curculionidae	Coleoptera	Local					x										
Cabbage Leaf Weevil	<i>Ceutorhynchus contractus</i>	Curculionidae	Coleoptera	Widespread	x						x								
A ceutorhynchine weevil	<i>Ceutorhynchus obstrictus</i>	Curculionidae	Coleoptera	Widespread	x														
A ceutorhynchine weevil	<i>Ceutorhynchus typhae</i>	Curculionidae	Coleoptera	Local			x				x								
A figwort weevil	<i>Cionus alauda</i>	Curculionidae	Coleoptera	Local							x								
A figwort weevil	<i>Cionus scrophulariae</i>	Curculionidae	Coleoptera	Widespread							x								
A pea weevil	<i>Coelositona cambricus</i>	Curculionidae	Coleoptera	Local					x		x	x			x			x	
A true weevil	<i>Dorytomus rufatus</i>	Curculionidae	Coleoptera	Local	x														
A true weevil	<i>Dorytomus taeniatus</i>	Curculionidae	Coleoptera	Widespread	x	x	x		x										
A broad-nosed weevil	<i>Graptus triguttatus</i>	Curculionidae	Coleoptera	Local							x	x							
A true weevil	<i>Gymnetron veronicae</i>	Curculionidae	Coleoptera	Nationally Scarce (Nb)	x						x	x							

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A bark beetle	<i>Hylastinus obscurus</i>	Curculionidae	Coleoptera	Widespread		x													
A true weevil	<i>Hypera (Dapalinus) meles</i>	Curculionidae	Coleoptera	Nationally Scarce (Na)							x	x							
A true weevil	<i>Hypera nigrirostris</i>	Curculionidae	Coleoptera	Widespread		x												x	
A true weevil	<i>Hypera plantaginis</i>	Curculionidae	Coleoptera	Widespread			x				x	x						x	
A true weevil	<i>Hypera postica</i>	Curculionidae	Coleoptera	Widespread		x													
A true weevil	<i>Hypera rumicis</i>	Curculionidae	Coleoptera	Widespread								x						x	
A true weevil	<i>Larinus planus</i>	Curculionidae	Coleoptera	Nationally Scarce (Nb)	x				x										
A true weevil	<i>Leiosoma deflexum</i>	Curculionidae	Coleoptera	Local							x								
A true weevil	<i>Leiosoma oblongulum</i>	Curculionidae	Coleoptera	Nationally Scarce (Nb)	x														
A true weevil	<i>Mecinus pyraeaster</i>	Curculionidae	Coleoptera	Widespread							x	x						x	
A ceutorhynchine weevil	<i>Micrelus ericae</i>	Curculionidae	Coleoptera	Widespread		x	x	x											
A flea weevil	<i>Orchestes fagi</i>	Curculionidae	Coleoptera	Widespread												x			
Violet Weevil	<i>Orobitis cyaneus</i>	Curculionidae	Coleoptera	Widespread				x											
A broad-nosed weevil	<i>Otiorhynchus singularis</i>	Curculionidae	Coleoptera	Widespread					x		x								
A ceutorhynchine weevil	<i>Pelenomus waltoni</i>	Curculionidae	Coleoptera	Nationally Scarce (Nb)	x														
A leaf weevil	<i>Phyllobius argentatus</i>	Curculionidae	Coleoptera	Widespread								x							
A leaf weevil	<i>Phyllobius pyri</i>	Curculionidae	Coleoptera	Widespread		x	x	x											
A leaf weevil	<i>Polydrusus cervinus</i>	Curculionidae	Coleoptera	Widespread												x			
A leaf weevil	<i>Polydrusus confluens</i>	Curculionidae	Coleoptera	Nationally Scarce (Nb)		x	x	x											
A leaf weevil	<i>Polydrusus pterygomalis</i>	Curculionidae	Coleoptera	Widespread	x	x	x		x		x								

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A ceutorhyncine weevil	<i>Rhinoncus perpendicularis</i>	Curculionidae	Coleoptera	Widespread							x	x							
A pea weevil	<i>Sitona hispidulus</i>	Curculionidae	Coleoptera	Widespread							x								
A pea weevil	<i>Sitona lepidus</i>	Curculionidae	Coleoptera	Widespread	x				x		x	x							
A pea weevil	<i>Sitona lineatus</i>	Curculionidae	Coleoptera	Widespread		x	x	x										x	
A pea weevil	<i>Sitona striatellus</i>	Curculionidae	Coleoptera	Widespread		x	x	x											
A pea weevil	<i>Sitona sulcifrons</i>	Curculionidae	Coleoptera	Local									x						
A pea weevil	<i>Sitona suturalis</i>	Curculionidae	Coleoptera	Local									x						
A broad-nosed weevil	<i>Strophosoma nebulosum</i>	Curculionidae	Coleoptera	Widespread				x											
A ceutorhyncine weevil	<i>Thamiocolus viduatus</i>	Curculionidae	Coleoptera	Nationally Scarce (Nb)												x			
A broad-nosed weevil	<i>Trachyphloeus bifoveolatus</i>	Curculionidae	Coleoptera	Local							x								
A ceutorhyncine weevil	<i>Trichosirocalus troglodytes</i>	Curculionidae	Coleoptera	Widespread							x							x	
A true weevil	<i>Tychius picirostris</i>	Curculionidae	Coleoptera	Widespread		x					x								
A click beetle	<i>Agriotes lineatus</i>	Elateridae	Coleoptera	Widespread					x		x	x							
A click beetle	<i>Agriotes obscurus</i>	Elateridae	Coleoptera	Widespread															
A click beetle	<i>Agriotes pallidulus</i>	Elateridae	Coleoptera	Widespread	x	x	x	x	x		x	x				x			
A click beetle	<i>Athous bicolor</i>	Elateridae	Coleoptera	Widespread	x						x	x							
A click beetle	<i>Athous haemorrhoidalis</i>	Elateridae	Coleoptera	Widespread		x	x												
A click beetle	<i>Denticollis linearis</i>	Elateridae	Coleoptera	Widespread					x										
False Ladybird	<i>Endomychus coccineus</i>	Endomychidae	Coleoptera	Local												x			
A helophorid beetle	<i>Helophorus aequalis</i>	Helophoridae	Coleoptera	Widespread															x

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A helophorid beetle	<i>Helophorus brevipalpis</i>	Helophoridae	Coleoptera	Widespread					x		x				x				
A helophorid beetle	<i>Helophorus flavipes</i>	Helophoridae	Coleoptera	Widespread					x										
A water scavenger beetle	<i>Anacaena limbata</i>	Hydrophilidae	Coleoptera	Widespread							x				x				
A water scavenger beetle	<i>Megasternum concinnum</i>	Hydrophilidae	Coleoptera	Widespread								x							
A water scavenger beetle	<i>Paracercyon analis</i>	Hydrophilidae	Coleoptera	Widespread											x				
A water scavenger beetle	<i>Sphaeridium lunatum</i>	Hydrophilidae	Coleoptera	Widespread			x												
A leiodid beetle	<i>Catops tristis</i>	Leiodidae	Coleoptera	Widespread			x												
Lurid Flower Beetle	<i>Oedemera lurida</i>	Oedemeridae	Coleoptera	Widespread														x	
Thick-kneed Flower Beetle	<i>Oedemera nobilis</i>	Oedemeridae	Coleoptera	Widespread					x		x		x					x	
Red-headed Cardinal Beetle	<i>Pyrochroa serraticornis</i>	Pyrochroidae	Coleoptera	Widespread					x										
Strawberry Rhynchites	<i>Neocoenorrhinus germanicus</i>	Rhynchitidae	Coleoptera	Widespread				x											
A scirtid beetle	<i>Cyphon coarctatus</i>	Scirtidae	Coleoptera	Widespread	x	x	x				x								
A scirtid beetle	<i>Cyphon ochraceus</i>	Scirtidae	Coleoptera	Widespread															
A scirtid beetle	<i>Cyphon padi</i>	Scirtidae	Coleoptera	Widespread				x											
A scirtid beetle	<i>Cyphon variabilis</i>	Scirtidae	Coleoptera	Widespread															
A scirtid beetle	<i>Elodes minuta</i>	Scirtidae	Coleoptera	Widespread								x							
A scaptiid beetle	<i>Anaspis frontalis</i>	Scaptiidae	Coleoptera	Widespread	x	x	x		x										
A scaptiid beetle	<i>Anaspis maculata</i>	Scaptiidae	Coleoptera	Widespread	x	x	x		x										
A scaptiid beetle	<i>Anaspis pulicaria</i>	Scaptiidae	Coleoptera	Widespread				x											
A scaptiid beetle	<i>Anaspis rufilabris</i>	Scaptiidae	Coleoptera	Widespread					x										



Common name	Scientific name	Family	Order	UK status	Site 1 - Priority woodland and woodland edge	Site 3 - Priority heathland (east section)	Site 4 - Mixed woodland	Site 5 - Priority heathland (west section)	Site 6 - Wet grassland, rush pasture & wet woodland (north of Ennis Farm)	Site 7 - SI grassland on wide verge adjacent A30 (not sampled)	Site 9 - Priority woodland and woodland edge (Honeycombe Barr)	Site 10 - Semi-improved grass land (meadow)	Site 14 - Marshy SI grassland south of Nancarrow Farm (not sampled)	Site 20 - SI grassland opposite Hill View Farm (not sampled)	Site 21/22 - Priority woodland and grassland/tall ruderal edge habitat	Site 24 (not sampled)	Site 27 (not sampled)	Site 28/29 - Semi-improved grassland (pasture)	Site 30 - Improved grassland
A rove beetle	<i>Anotylus rugosus</i>	Staphylinidae	Coleoptera	Widespread		x	x		x		x	x							
A pselaphid rove beetle	<i>Brachyglutta fossulata</i>	Staphylinidae	Coleoptera	Widespread					x			x							
A pselaphid rove beetle	<i>Bryaxis bulbifer</i>	Staphylinidae	Coleoptera	Widespread			x		x		x								
A rove beetle	<i>Gabrius breviventer</i>	Staphylinidae	Coleoptera	Widespread	x	x	x		x		x								
A rove beetle	<i>Lesteva sicula</i>	Staphylinidae	Coleoptera	Widespread	x				x		x								
A rove beetle	<i>Mycetoporus sp.</i>	Staphylinidae	Coleoptera	Unknown								x							
A rove beetle	<i>Paederus littoralis</i>	Staphylinidae	Coleoptera	Widespread					x		x	x			x				
A rove beetle	<i>Paederus riparius</i>	Staphylinidae	Coleoptera	Widespread	x				x		x	x			x				
A rove beetle	<i>Philonthus carbonarius</i>	Staphylinidae	Coleoptera	Widespread								x							
A rove beetle	<i>Philonthus cognatus</i>	Staphylinidae	Coleoptera	Widespread					x										
A rove beetle	<i>Philonthus varians</i>	Staphylinidae	Coleoptera	Widespread								x							
A rove beetle	<i>Quedius schatzmayri</i>	Staphylinidae	Coleoptera	Widespread					x										
A pselaphid rove beetle	<i>Reichenbachia junctorum</i>	Staphylinidae	Coleoptera	Widespread	x				x		x	x			x				
A rove beetle	<i>Rugilus orbiculatus</i>	Staphylinidae	Coleoptera	Widespread					x										
A pselaphid rove beetle	<i>Rybaxis laminata</i>	Staphylinidae	Coleoptera	Widespread					x		x				x				
A pselaphid rove beetle	<i>Rybaxis longicornis</i>	Staphylinidae	Coleoptera	Widespread	x				x			x			x				
A rove beetle	<i>Sepedophilus nigripennis</i>	Staphylinidae	Coleoptera	Widespread					x		x	x						x	
A rove beetle	<i>Stenus aceris</i>	Staphylinidae	Coleoptera	Local		x													
A rove beetle	<i>Stenus bifoveolatus</i>	Staphylinidae	Coleoptera	Widespread								x							
A rove beetle	<i>Stenus bimaculatus</i>	Staphylinidae	Coleoptera	Widespread	x				x		x								

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A rove beetle	<i>Stenus brunnipes</i>	Staphylinidae	Coleoptera	Widespread				x	x			x							
A rove beetle	<i>Stenus cicindeloides</i>	Staphylinidae	Coleoptera	Widespread	x				x		x	x			x			x	
A rove beetle	<i>Stenus clavicornis</i>	Staphylinidae	Coleoptera	Widespread	x			x	x		x	x			x			x	
A rove beetle	<i>Stenus flavipes</i>	Staphylinidae	Coleoptera	Widespread				x											
A rove beetle	<i>Stenus fulvicornis</i>	Staphylinidae	Coleoptera	Widespread	x				x		x	x			x			x	
A rove beetle	<i>Stenus impressus</i>	Staphylinidae	Coleoptera	Widespread		x	x	x											
A rove beetle	<i>Stenus juno</i>	Staphylinidae	Coleoptera	Widespread	x				x						x				
A rove beetle	<i>Stenus lustrator</i>	Staphylinidae	Coleoptera	Local					x										
A rove beetle	<i>Stenus nitidiusculus</i>	Staphylinidae	Coleoptera	Widespread	x		x		x		x				x			x	
A rove beetle	<i>Stenus ossium</i>	Staphylinidae	Coleoptera	Local				x	x		x	x			x				
A rove beetle	<i>Stenus pallipes</i>	Staphylinidae	Coleoptera	Local			x												
A rove beetle	<i>Stenus picipes</i>	Staphylinidae	Coleoptera	Widespread							x	x							
A rove beetle	<i>Stenus providus</i>	Staphylinidae	Coleoptera	Local					x						x				
A rove beetle	<i>Stenus pusillus</i>	Staphylinidae	Coleoptera	Nationally Scarce (Nb)	x						x								
A rove beetle	<i>Stenus similis</i>	Staphylinidae	Coleoptera	Widespread							x	x			x			x	
A rove beetle	<i>Stenus tarsalis</i>	Staphylinidae	Coleoptera	Local	x				x		x	x			x				
A rove beetle	<i>Sunius propinquus</i>	Staphylinidae	Coleoptera	Local			x												
A rove beetle	<i>Tachinus rufipes</i>	Staphylinidae	Coleoptera	Widespread							x								
A rove beetle	<i>Tachyporus chrysomelinus/dispar</i>	Staphylinidae	Coleoptera	Widespread		x	x	x	x		x	x			x			x	
A rove beetle	<i>Tachyporus formosus</i>	Staphylinidae	Coleoptera	Nationally Scarce (Na)				x	x		x				x				

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A rove beetle	<i>Tachyporus hypnorum</i>	Staphylinidae	Coleoptera	Widespread	x	x	x	x	x		x	x			x				
A rove beetle	<i>Tachyporus nitidulus</i>	Staphylinidae	Coleoptera	Widespread		x	x	x	x		x	x							
A rove beetle	<i>Tachyporus obtusus</i>	Staphylinidae	Coleoptera	Widespread	x		x		x		x								
A rove beetle	<i>Tachyporus pallidus</i>	Staphylinidae	Coleoptera	Widespread	x				x		x	x			x				
A rove beetle	<i>Tachyporus pusillus</i>	Staphylinidae	Coleoptera	Widespread								x						x	
A rove beetle	<i>Xantholinus longiventris</i>	Staphylinidae	Coleoptera	Widespread				x											
A darkling beetle	<i>Lagria hirta</i>	Tenebrionidae	Coleoptera	Widespread	x		x	x	x										
A throscid beetle	<i>Trixagus carinifrons</i>	Throscidae	Coleoptera	Local												x			
<b>Earwigs (Dermaptera)</b>																			
Common Earwig	<i>Forficula auricularia</i>	Forficulidae	Dermaptera	Widespread		x	x	x	x		x	x							
<b>Two-winged flies (Diptera)</b>																			
Striped Slender Robberfly	<i>Leptogaster cylindrica</i>	Asilidae	Diptera	Widespread								x							x
A chloropid fly	<i>Chlorops sp.</i>	Chloropidae	Diptera	Unknown		x	x												
A conopid fly	<i>Physocephala rufipes</i>	Conopidae	Diptera	Local												x			
A conopid fly	<i>Sicus ferrugineus</i>	Conopidae	Diptera	Widespread		x													
A dolichopodid fly	<i>Argyra perplexa</i>	Dolichopodidae	Diptera	Widespread	x														
A dolichopodid fly	<i>Chrysotus blepharosceles</i>	Dolichopodidae	Diptera	Widespread		x	x												
A dolichopodid fly	<i>Chrysotus cilipes</i>	Dolichopodidae	Diptera	Widespread					x		x								
A dolichopodid fly	<i>Chrysotus cupreus</i>	Dolichopodidae	Diptera	Nationally Scarce		x	x												
A dolichopodid fly	<i>Chrysotus gramineus</i>	Dolichopodidae	Diptera	Widespread	x			x	x			x				x			x

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A dolichopodid fly	<i>Chrysotus laesus</i>	Dolichopodidae	Diptera	Nationally Scarce								x							
A dolichopodid fly	<i>Chrysotus neglectus</i>	Dolichopodidae	Diptera	Widespread											x				
A dolichopodid fly	<i>Dolichopus brevipennis</i>	Dolichopodidae	Diptera	Widespread		x	x	x	x		x								
A dolichopodid fly	<i>Dolichopus festivus</i>	Dolichopodidae	Diptera	Widespread		x	x	x	x		x	x			x			x	
A dolichopodid fly	<i>Dolichopus griseipennis</i>	Dolichopodidae	Diptera	Widespread	x										x				
A dolichopodid fly	<i>Dolichopus notatus</i>	Dolichopodidae	Diptera	Natiionally Scarce							x								
A dolichopodid fly	<i>Dolichopus plumipes</i>	Dolichopodidae	Diptera	Widespread	x	x		x	x		x	x							
A dolichopodid fly	<i>Dolichopus popularis</i>	Dolichopodidae	Diptera	Widespread	x						x								
A dolichopodid fly	<i>Dolichopus signatus</i>	Dolichopodidae	Diptera	Nationally Scarce							x								
A dolichopodid fly	<i>Dolichopus simplex</i>	Dolichopodidae	Diptera	Locally common					x		x	x							
A dolichopodid fly	<i>Dolichopus trivialis</i>	Dolichopodidae	Diptera	Widespread	x	x	x	x	x		x	x			x			x	
A dolichopodid fly	<i>Dolichopus ungulatus</i>	Dolichopodidae	Diptera	Widespread			x												
A dolichopodid fly	<i>Dolichopus urbanus</i>	Dolichopodidae	Diptera	Local	x	x		x			x								
A dolichopodid fly	<i>Dolichopus wahlbergi</i>	Dolichopodidae	Diptera	Local					x										
A dolichopodid fly	<i>Hercostomus aerosus</i>	Dolichopodidae	Diptera	Widespread	x														
A dolichopodid fly	<i>Hercostomus metallicus</i>	Dolichopodidae	Diptera	Widespread					x										
A dolichopodid fly	<i>Hercostomus nigripennis</i>	Dolichopodidae	Diptera	Local								x							
A dolichopodid fly	<i>Poecilobothrus nobilitatus</i>	Dolichopodidae	Diptera	Widespread							x								
A dolichopodid fly	<i>Sybistroma obscurellum</i>	Dolichopodidae	Diptera	Widespread	x			x											
A dolichopodid fly	<i>Sympycnus desoutteri</i>	Dolichopodidae	Diptera	Widespread							x								

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A lauxaniid fly	<i>Peplomyza litura</i>	Lauxaniidae	Diptera	Widespread			x												
A lauxaniid fly	<i>Sapromyza sexpunctata</i>	Lauxaniidae	Diptera	Widespread		x	x	x											
A cranefly	<i>Austrolimnophila oleracea</i>	Limoniidae	Diptera	Widespread	x														
A cranefly	<i>Dicranophragma adjunctum</i>	Limoniidae	Diptera	Widespread						x									
A cranefly	<i>Erioconopa trivialis</i>	Limoniidae	Diptera	Widespread	x														
A cranefly	<i>Phylidorea fulvonervosa</i>	Limoniidae	Diptera	Widespread							x								
A cranefly	<i>Rhipidia maculata</i>	Limoniidae	Diptera	Widespread					x										
A lonchopteric fly	<i>Lonchoptera bifurcata</i>	Lonchopteridae	Diptera	Widespread	x		x		x		x	x			x				
Noon Fly	<i>Mesembrina meridiana</i>	Muscidae	Diptera	Widespread		x	x												
An opomyzid fly	<i>Geomyzia balachowyski</i>	Opomyzidae	Diptera	Widespread					x		x				x				
An opomyzid fly	<i>Geomyzia tripunctata</i>	Opomyzidae	Diptera	Widespread	x	x			x										
An opomyzid fly	<i>Opomyza germinationis</i>	Opomyzidae	Diptera	Widespread	x	x	x	x	x		x	x			x			x	
An opomyzid fly	<i>Opomyza petrei</i>	Opomyzidae	Diptera	Widespread	x	x	x	x	x		x	x			x			x	
An opomyzid fly	<i>Opomyzia florea</i>	Opomyzidae	Diptera	Widespread	x				x		x								
A picture-winged fly	<i>Palloptera trimacula</i>	Pallopteridae	Diptera	Widespread							x								
A cranefly	<i>Dicranota claripennis</i>	Pediciidae	Diptera	Locally common							x								
A picture-winged fly	<i>Rivellia syngenesiae</i>	Platystomatidae	Diptera	Widespread			x	x	x		x	x			x			x	
Black Snipefly	<i>Chrysophilus cristatus</i>	Rhagionidae	Diptera	Widespread					x		x	x			x				
Downlooker Snipefly	<i>Rhagio scolopaceus</i>	Rhagionidae	Diptera	Widespread	x				x		x	x							
Marsh Snipefly	<i>Rhagio tringarius</i>	Rhagionidae	Diptera	Widespread				x											

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Yellow Dungfly	<i>Scathophaga stercoraria</i>	Scathophagidae	Diptera	Widespread	x	x	x	x	x		x	x			x			x	
A black fungus-gnat	<i>Sciara hemerobioides</i>	Sciaridae	Diptera	Widespread	x														
A marsh fly	<i>Tetanocera elata</i>	Sciomyzidae	Diptera	Widespread		x	x								x				
A marsh fly	<i>Tetanocera ferruginea</i>	Sciomyzidae	Diptera	Widespread	x		x		x										
Murky-legged Black Legionnaire	<i>Beris chalybata</i>	Stratiomyidae	Diptera	Widespread	x				x										
Short-horned Black Legionnaire	<i>Beris fuscipes</i>	Stratiomyidae	Diptera	Nationally Scarce	x				x										
Common Orange Legionnaire	<i>Beris vallata</i>	Stratiomyidae	Diptera	Widespread					x			x							
Broad Centurion	<i>Chloromyia formosa</i>	Stratiomyidae	Diptera	Widespread		x			x		x	x							
Black-horned Gem	<i>Microchrysa flavicornis</i>	Stratiomyidae	Diptera	Widespread					x										
Yellow-legged Black	<i>Pachygaster leachii</i>	Stratiomyidae	Diptera	Widespread							x								
A hoverfly	<i>Cheilosia albitarsis</i>	Syrphidae	Diptera	Widespread							x								
A hoverfly	<i>Cheilosia proxima</i>	Syrphidae	Diptera	Widespread				x											
A hoverfly	<i>Chrysogaster cemiteriorum</i>	Syrphidae	Diptera	Local							x								
A hoverfly	<i>Chrysogaster solstitialis</i>	Syrphidae	Diptera	Widespread											x				
Marmalade Hoverfly	<i>Episyrphus balteatus</i>	Syrphidae	Diptera	Widespread					x		x	x							
A hoverfly	<i>Eristalis pertinax</i>	Syrphidae	Diptera	Widespread							x								
A hoverfly	<i>Eristalis tenax</i>	Syrphidae	Diptera	Widespread		x			x		x								
A hoverfly	<i>Eumerus funeralis</i>	Syrphidae	Diptera	Widespread		x	x				x						x		
A hoverfly	<i>Eumerus strigatus</i>	Syrphidae	Diptera	Widespread		x													

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A hoverfly	<i>Eupeodes latifasciatus</i>	Syrphidae	Diptera	Widespread					x										
A hoverfly	<i>Helophilus pendulus</i>	Syrphidae	Diptera	Widespread					x										
A hoverfly	<i>Melanogaster hirtella</i>	Syrphidae	Diptera	Widespread					x		x								
A hoverfly	<i>Melanostoma mellinum</i>	Syrphidae	Diptera	Widespread	x				x		x	x			x			x	
A hoverfly	<i>Melanostoma scalare</i>	Syrphidae	Diptera	Widespread			x		x		x	x			x			x	
Narcissus Fly	<i>Merodon equestris</i>	Syrphidae	Diptera	Widespread		x	x	x											
A hoverfly	<i>Paragus haemorrhous</i>	Syrphidae	Diptera	Widespread		x													
A hoverfly	<i>Platycheirus albimanus</i>	Syrphidae	Diptera	Widespread			x		x		x								
A hoverfly	<i>Platycheirus clypeatus</i>	Syrphidae	Diptera	Widespread	x	x			x		x	x			x			x	
A hoverfly	<i>Platycheirus manicatus</i>	Syrphidae	Diptera	Widespread					x			x						x	
A hoverfly	<i>Platycheirus peltatus</i>	Syrphidae	Diptera	Widespread								x							
A hoverfly	<i>Platycheirus rosarum</i>	Syrphidae	Diptera	Widespread					x										
Heineken Hoverfly	<i>Rhingia campestre</i>	Syrphidae	Diptera	Widespread							x								
A hoverfly	<i>Sphaerophoria interrupta</i>	Syrphidae	Diptera	Widespread	x				x		x	x							
A hoverfly	<i>Sphaerophoria philanthus</i>	Syrphidae	Diptera	Locally common				x											
A hoverfly	<i>Sphegina clunipes</i>	Syrphidae	Diptera	Widespread	x														
A hoverfly	<i>Syritta pipiens</i>	Syrphidae	Diptera	Widespread	x				x		x	x							
A hoverfly	<i>Volucella bombylans</i>	Syrphidae	Diptera	Widespread								x	x						
Splayed Deerfly	<i>Chrysops caecutiens</i>	Tabanidae	Diptera	Widespread															
Notch-horned Cleg	<i>Haematopota pluvialis</i>	Tabanidae	Diptera	Widespread					x		x	x			x			x	

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A tephritid fly	<i>Anomoia purmunda</i>	Tephritidae	Diptera	Local					x										
A tephritid fly	<i>Chaetorellia jaceae</i>	Tephritidae	Diptera	Local							x								
Celery Fly	<i>Euleia heracleii</i>	Tephritidae	Diptera	Widespread					x										
A tephritid fly	<i>Tephritis vespertina</i>	Tephritidae	Diptera	Widespread								x						x	
A tephritid fly	<i>Urophora jaecana (complex)</i>	Tephritidae	Diptera	Unknown														x	
A tephritid fly	<i>Xyphosia miliaria</i>	Tephritidae	Diptera	Widespread							x								
A cranefly	<i>Tipula maxima</i>	Tipulidae	Diptera	Widespread	x		x				x								
Marsh Cranefly	<i>Tipula oleracea</i>	Tipulidae	Diptera	Widespread				x	x		x	x							
<b>Pill Millipedes (Glomerida)</b>																			
Common Pill Millipede	<i>Glomerus marginata</i>	Glomeridae	Glomerida	Widespread				x											
<b>True Bugs (Hemiptera)</b>																			
A flower bug	<i>Anthocoris confusus</i>	Anthocoridae	Hemiptera	Widespread	x				x										
A flower bug	<i>Anthocoris nemoralis</i>	Anthocoridae	Hemiptera	Widespread	x				x		x							x	
Common Flower Bug	<i>Anthocoris nemorum</i>	Anthocoridae	Hemiptera	Widespread	x	x	x		x		x	x						x	
A flower bug	<i>Orius laevigatus</i>	Anthocoridae	Hemiptera	Widespread							x								
Alder Spittlebug	<i>Aphrophora alni</i>	Aphrophoridae	Hemiptera	Widespread	x				x		x							x	
A froghopper	<i>Neophilaenus lineatus</i>	Aphrophoridae	Hemiptera	Widespread	x	x	x	x	x			x							x
Common Froghopper	<i>Philaenus spumarius</i>	Aphrophoridae	Hemiptera	Widespread	x	x	x	x	x		x	x						x	
A leafhopper	<i>Alnetoidea alneti</i>	Cicadellidae	Hemiptera	Widespread	x														
A leafhopper	<i>Anoscopus albifrons</i>	Cicadellidae	Hemiptera	Nationally Scarce (Nb)				x	x		x	x						x	



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A leafhopper	<i>Anoscopus serratulae</i>	Cicadellidae	Hemiptera	Local				x	x										
A leafhopper	<i>Aphrodes makarovi</i>	Cicadellidae	Hemiptera	Widespread			x		x		x				x				
A leafhopper	<i>Arthaleus pascuellus</i>	Cicadellidae	Hemiptera	Widespread					x									x	
A leafhopper	<i>Cicadella viridis</i>	Cicadellidae	Hemiptera	Widespread	x		x		x		x	x			x				
A leafhopper	<i>Cicadula quadrinotata</i>	Cicadellidae	Hemiptera	Widespread	x				x						x				
A leafhopper	<i>Conosanus obsoletus</i>	Cicadellidae	Hemiptera	Widespread					x			x							
A leafhopper	<i>Euscelis incisus</i>	Cicadellidae	Hemiptera	Widespread	x				x		x	x			x			x	
A leafhopper	<i>Evacanthus acuminatus</i>	Cicadellidae	Hemiptera	Widespread							x								
A leafhopper	<i>Evacanthus interruptus</i>	Cicadellidae	Hemiptera	Widespread							x								
A leafhopper	<i>Idiocerus albicans</i>	Cicadellidae	Hemiptera	Widespread	x						x								
A leafhopper	<i>Idiocerus lituratus</i>	Cicadellidae	Hemiptera	Widespread					x						x				
A leafhopper	<i>Macropsis cerea</i>	Cicadellidae	Hemiptera	Widespread							x								
A leafhopper	<i>Megophthalmus scabripennis</i>	Cicadellidae	Hemiptera	Widespread								x							
A leafhopper	<i>Streptanus sordidus</i>	Cicadellidae	Hemiptera	Widespread					x			x							
A leafhopper	<i>Stroggylocephalus agrestis</i>	Cicadellidae	Hemiptera	Local					x										
A leafhopper	<i>Ulopa reticulata</i>	Cicadellidae	Hemiptera	Widespread		x	x	x											
A lacehopper	<i>Cixius nervosus</i>	Cixiidae	Hemiptera	Widespread	x	x	x	x	x		x				x				
Dock Bug	<i>Coreus marginatus</i>	Coreidae	Hemiptera	Widespread	x	x					x	x			x				
A leafhopper	<i>Conomelus anceps</i>	Delphacidae	Hemiptera	Widespread					x			x							
A planthopper	<i>Hyledelphax elegantulus</i>	Delphacidae	Hemiptera	Widespread			x												

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A planthopper	<i>Javesella dubia</i>	Delphacidae	Hemiptera	Widespread					x		x	x			x				
A planthopper	<i>Javesella pellucida</i>	Delphacidae	Hemiptera	Widespread	x		x	x	x										
A planthopper	<i>Megamelodes quadrimaculatus</i>	Delphacidae	Hemiptera	Local					x										
A planthopper	<i>Muellerianella fairmairei</i>	Delphacidae	Hemiptera	Widespread					x			x							
A ground bug	<i>Cymus clavicolus</i>	Lygaeidae	Hemiptera	Widespread	x						x								
A ground bug	<i>Drymus sylvaticus</i>	Lygaeidae	Hemiptera	Widespread	x	x		x				x			x				
A lygaeid bug	<i>Kleidocerys ericae</i>	Lygaeidae	Hemiptera	Local		x													
A ground bug	<i>Peritrechus geniculatus</i>	Lygaeidae	Hemiptera	Widespread				x											
A ground bug	<i>Scolopostethus affinis</i>	Lygaeidae	Hemiptera	Widespread			x												
A ground bug	<i>Scolopostethus decoratus</i>	Lygaeidae	Hemiptera	Widespread		x	x	x				x							
A ground bug	<i>Stygnocoris fuliginosus</i>	Lygaeidae	Hemiptera	Widespread							x								
A ground bug	<i>Stygnocoris sabulosus</i>	Lygaeidae	Hemiptera	Widespread		x	x	x					x					x	
A grass bug	<i>Acetropis gimmerhali</i>	Miridae	Hemiptera	Widely scattered	x				x		x	x						x	
Lucerne Bug	<i>Adelphocoris lineolatus</i>	Miridae	Hemiptera	Widespread		x		x											
A mirid bug	<i>Apolygus spinolae</i>	Miridae	Hemiptera	Widespread					x		x								
A mirid bug	<i>Campyloneura virgula</i>	Miridae	Hemiptera	Widespread	x				x										
A mirid bug	<i>Capsus ater</i>	Miridae	Hemiptera	Widespread								x							
A mirid bug	<i>Closterotomus fulvomaculatus</i>	Miridae	Hemiptera	Widely scattered							x								
Potato Capsid	<i>Closterotomus norwegicus</i>	Miridae	Hemiptera	Widespread	x				x		x	x			x			x	
A mirid bug	<i>Deraeocoris ruber</i>	Miridae	Hemiptera	Widespread							x								

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A mirid bug	<i>Dicyphus epilobii</i>	Miridae	Hemiptera	Widespread	x														
A mirid bug	<i>Heterotoma planicornis</i>	Miridae	Hemiptera	Widespread							x								
A grass bug	<i>Leptopterna dolabrata</i>	Miridae	Hemiptera	Widespread	x				x		x	x			x			x	
A mirid bug	<i>Liocoris tripustulatus</i>	Miridae	Hemiptera	Widespread							x				x				
Common Green Capsid	<i>Lygocoris pabulinus</i>	Miridae	Hemiptera	Widespread	x				x						x				
A mirid bug	<i>Lygocoris rugicollis</i>	Miridae	Hemiptera	Widespread	x				x		x								
A mirid bug	<i>Lygus maritimus</i>	Miridae	Hemiptera	Local					x		x								
Tarnished Plant Bug	<i>Lygus rugulipennis</i>	Miridae	Hemiptera	Widespread							x				x				
A mirid bug	<i>Malacocoris chlorizans</i>	Miridae	Hemiptera	Widespread	x														
A mirid bug	<i>Mecomma ambulans</i>	Miridae	Hemiptera	Widespread	x				x		x				x				
A mirid bug	<i>Miridius quadrivirgatus</i>	Miridae	Hemiptera	Local					x										
Bracken Bug	<i>Monalocoris filicis</i>	Miridae	Hemiptera	Widespread	x						x								
A grass bug	<i>Notostira elongata</i>	Miridae	Hemiptera	Widespread				x											
A mirid bug	<i>Orthocephalus saltator</i>	Miridae	Hemiptera	Local														x	
A mirid bug	<i>Orthops basalis</i>	Miridae	Hemiptera	Widely scattered							x								
A mirid bug	<i>Orthops campestris</i>	Miridae	Hemiptera	Widespread							x				x				
A mirid bug	<i>Orthops kalmii</i>	Miridae	Hemiptera	Widespread	x														
A mirid bug	<i>Orthotylus ericetorum</i>	Miridae	Hemiptera	Widespread		x	x	x											
A mirid bug	<i>Orthotylus marginalis</i>	Miridae	Hemiptera	Widespread	x				x		x								
A mirid bug	<i>Phylus coryli</i>	Miridae	Hemiptera	Unknown					x										

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A mirid bug	<i>Phylus coryli</i>	Miridae	Hemiptera	Widespread					x		x								
A mirid bug	<i>Phylus palliceps</i>	Miridae	Hemiptera	Local	x				x		x								
A mirid bug	<i>Phytocoris longipennis</i>	Miridae	Hemiptera	Widespread	x				x		x								
A mirid bug	<i>Phytocoris tiliae</i>	Miridae	Hemiptera	Widespread					x										
A mirid bug	<i>Phytocoris varipes/insignis</i>	Miridae	Hemiptera	Unknown		x		x											
A mirid bug	<i>Pinalitus cervinus</i>	Miridae	Hemiptera	Widespread					x		x		x						
A mirid bug	<i>Pithanus maerkelii</i>	Miridae	Hemiptera	Widespread	x			x	x		x		x					x	
A mirid bug	<i>Plagiognathus arbustorum</i>	Miridae	Hemiptera	Widespread	x				x		x		x		x			x	
A mirid bug	<i>Plagiognathus chrysanthemii</i>	Miridae	Hemiptera	Widespread					x				x					x	
A mirid bug	<i>Psallus ambiguus</i>	Miridae	Hemiptera	Widespread	x				x		x								
A mirid bug	<i>Psallus assimilis?</i>	Miridae	Hemiptera	Local					x										
A mirid bug	<i>Psallus haematodes</i>	Miridae	Hemiptera	Widespread	x				x						x				
A mirid bug	<i>Psallus sp.</i>	Miridae	Hemiptera	Unknown					x										
A mirid bug	<i>Psallus varians</i>	Miridae	Hemiptera	Widespread					x						x				
A mirid bug	<i>Ptinalitus cervinus</i>	Miridae	Hemiptera	Widespread							x								
A grass bug	<i>Stenodema calcarata</i>	Miridae	Hemiptera	Widespread	x	x		x			x		x		x				
A grass bug	<i>Stenodema laevigata</i>	Miridae	Hemiptera	Widespread					x		x				x				
A mirid bug	<i>Stenotus binotatus</i>	Miridae	Hemiptera	Widespread							x		x		x			x	
A grass bug	<i>Trigonotylus ruficornis</i>	Miridae	Hemiptera	Widespread				x											
A mirid bug	<i>Tytthus pygmaeus</i>	Miridae	Hemiptera	Widespread					x				x						

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Grey Damselbug	<i>Himacerus major</i>	Nabidae	Hemiptera	Widespread		x			x		x								
Field Damselbug	<i>Nabis ferus</i>	Nabidae	Hemiptera	Widespread							x	x							
Broad Damselbug	<i>Nabis flavomarginatus</i>	Nabidae	Hemiptera	Widespread								x							
Marsh Damselbug	<i>Nabis limbatus</i>	Nabidae	Hemiptera	Widespread	x				x		x	x				x			
Hairy Shieldbug	<i>Dolycoris baccarum</i>	Pentatomidae	Hemiptera	Widespread							x	x							
Parent Bug	<i>Elasmucha grisea</i>	Pentatomidae	Hemiptera	Widespread								x							
Common Green Shieldbug	<i>Palomena prasina</i>	Pentatomidae	Hemiptera	Widespread					x										
Common Green Shieldbug	<i>Palomina prasina</i>	Pentatomidae	Hemiptera	Widespread							x					x			
Red-legged Shieldbug	<i>Pentatoma rufipes</i>	Pentatomidae	Hemiptera	Widespread					x							x			
Bronze Shieldbug	<i>Troilus luridus</i>	Pentatomidae	Hemiptera	Widespread					x							x			
Blue Shieldbug	<i>Zicrona caerulea</i>	Pentatomidae	Hemiptera	Locally common	x														
A rhopalid bug	<i>Stictopleurus punctatonervosus</i>	Rhopalidae	Hemiptera	Least Concern (IUCN Post 1994 criteria)							x								
Common Shore Bug	<i>Saldula saltatoria</i>	Saldidae	Hemiptera	Widespread	x														
Tortoise Shieldbug	<i>Eurygaster testudinaria</i>	Scutelleridae	Hemiptera	Widespread	x		x		x		x	x				x			
A lacebug	<i>Derephysia foliacea</i>	Tingidae	Hemiptera	Local												x			
Gorse Lacebug	<i>Dictyonota strichnocera</i>	Tingidae	Hemiptera	Widespread				x											
A lacebug	<i>Physatocheila dumetorum</i>	Tingidae	Hemiptera	Widespread					x		x								
<b>Bees, Ants and Wasps (Aculeate Hymenoptera)</b>																			
Fork-tailed Flower Bee	<i>Anthophora furcata</i>	Apidae	Hymenoptera	Widespread												x			

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Honey Bee	<i>Apis mellifera</i>	Apidae	Hymenoptera	Widespread		x	x	x	x		x								
Field Cuckoo Bee	<i>Bombus campestris</i>	Apidae	Hymenoptera	Widespread		x	x												
Tree Bumblebee	<i>Bombus hypnorum</i>	Apidae	Hymenoptera	Widespread (recent UK colonist)	x														
Heath Bumblebee	<i>Bombus jonellus</i>	Apidae	Hymenoptera	Widespread		x	x	x											
Large Red-tailed Bumblebee	<i>Bombus lapidarius</i>	Apidae	Hymenoptera	Widespread	x	x		x			x								
White-tailed Bumblebee	<i>Bombus leucorum</i>	Apidae	Hymenoptera	Widespread	x														
A bumblebee	<i>Bombus leucorum/magnus</i>	Apidae	Hymenoptera	Unknown		x	x												
Common Carder Bee	<i>Bombus pascuorum</i>	Apidae	Hymenoptera	Widespread		x		x	x		x				x			x	
Early Bumblebee	<i>Bombus pratorum</i>	Apidae	Hymenoptera	Widespread	x	x	x												
Forest Cuckoo Bee	<i>Bombus sylvestris</i>	Apidae	Hymenoptera	Widespread										x					
Buff-tailed Bumblebee	<i>Bombus terrestris</i>	Apidae	Hymenoptera	Widespread	x	x	x	x			x				x			x	
Buff-tailed Bumblebee	<i>Bombus terrestris var audax</i>	Apidae	Hymenoptera	Widespread		x	x												
A formicine ant	<i>Formica fusca</i>	Formicidae	Hymenoptera	Widespread	x	x	x	x				x							
A formicine ant	<i>Formica lemani</i>	Formicidae	Hymenoptera	Widespread		x	x	x											
Black Ant	<i>Lasius niger</i>	Formicidae	Hymenoptera	Widespread					x		x								
A myrmicine ant	<i>Myrmica rubra</i>	Formicidae	Hymenoptera	Widespread					x		x	x							
A myrmicine ant	<i>Myrmica ruginodis</i>	Formicidae	Hymenoptera	Widespread		x	x	x	x		x	x						x	
A myrmicine ant	<i>Myrmica scabrinodis</i>	Formicidae	Hymenoptera	Widespread					x		x	x						x	
Furry-clasped Furrow Bee	<i>Lasioglossum lativentre</i>	Halictidae	Hymenoptera	Local							x								

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Green Furrow Bee	<i>Lasioglossum morio</i>	Halictidae	Hymenoptera	Widespread		x	x												
A spider-hunting wasp	<i>Arachnospila anceps</i>	Pompilidae	Hymenoptera	Widespread		x	x												
German Wasp	<i>Paravespula germanica</i>	Vespidae	Hymenoptera	Widespread	x														
Common Wasp	<i>Paravespula vulgaris</i>	Vespidae	Hymenoptera	Widespread						x									
Garden Bumblebee	<i>Bombus hortorum</i>	Apidae	Hymenoptera	Widespread		x	x									x			
<b>Woodlice and Slaters (Isopoda)</b>																			
A woodlouse	<i>Cylisticus convexus</i>	Cylisticidae	Isopoda	Widespread	x														
Common Shiny Woodlouse	<i>Oniscus asellus</i>	Oniscidae	Isopoda	Widespread			x				x					x			
Common Striped Woodlouse	<i>Philoscia muscorum</i>	Philoscidae	Isopoda	Widespread		x			x		x								
Common Rough Woodlouse	<i>Porcellio scaber</i>	Porcellionidae	Isopoda	Widespread	x	x			x		x					x			
A woodlouse	<i>Porcellionides cingendus</i>	Porcellionidae	Isopoda	Local			x												
<b>Butterflies and Moths (Lepidoptera)</b>																			
A micro-moth	<i>Nematopogon schwarziellus</i>	Adelidae	Lepidoptera	Widespread		x	x												
A micro-moth	<i>Nematopogon swammerdamella</i>	Adelidae	Lepidoptera	Widespread	x														
A micro-moth	<i>Blastobasis adustella</i>	Blastobasidae	Lepidoptera	Widespread (introduced)	x	x					x								
A micro-moth	<i>Agriphila straminella</i>	Crambidae	Lepidoptera	Widespread	x	x					x								
A micro-moth	<i>Agriphila tristella</i>	Crambidae	Lepidoptera	Widespread	x	x					x								
A micro-moth	<i>Catoptria pinella</i>	Crambidae	Lepidoptera	Local	x														
Garden Grass-veneer	<i>Chrysoteuchia culmella</i>	Crambidae	Lepidoptera	Widespread	x	x					x								
A micro-moth	<i>Eudonia angustea</i>	Crambidae	Lepidoptera	Local	x														

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A micro-moth	<i>Eudonia mercurella</i>	Crambidae	Lepidoptera	Widespread	x	x					x								
Small Magpie	<i>Eurrhynx hortulata</i>	Crambidae	Lepidoptera	Widespread		x	x				x								
Rush Veneer	<i>Nomophila noctuella</i>	Crambidae	Lepidoptera	Migrant		x	x				x								
Ringed China-mark	<i>Parapoynx stratiotata</i>	Crambidae	Lepidoptera	Local		x	x												
Mother of Pearl	<i>Pleuroptya ruralis</i>	Crambidae	Lepidoptera	Widespread	x	x					x								
A micro-moth	<i>Scoparia ambigualis</i>	Crambidae	Lepidoptera	Widespread		x	x												
Rusty-dot Pearl	<i>Udea ferrugalis</i>	Crambidae	Lepidoptera	Migrant	x	x					x								
A micro-moth	<i>Udea lutealis</i>	Crambidae	Lepidoptera	Widespread	x														
Chinese Character	<i>Cilix glaucata</i>	Drepanidsae	Lepidoptera	Widespread	x						x								
Pebble Hook-tip	<i>Drepana falcataria</i>	Drepanidsae	Lepidoptera	Widespread		x	x												
Buff Arches	<i>Habrosyne pyritoides</i>	Drepanidsae	Lepidoptera	Widespread		x	x												
Common Lutestring	<i>Ochropacha duplaris</i>	Drepanidsae	Lepidoptera	Widespread	x														
Peach Blossom	<i>Thyatira batis</i>	Drepanidsae	Lepidoptera	Widespread	x	x													
A micro-moth	<i>Agonopterix arenella</i>	Drepressariidae	Lepidoptera	Widespread	x														
A micro-moth	<i>Agonopterix assimilella</i>	Drepressariidae	Lepidoptera	Widespread	x														
Parsnip Moth	<i>Depressaria heraclei</i>	Drepressariidae	Lepidoptera	Widespread		x	x												
A micro-moth	<i>Elachista argentella</i>	Elachistidae	Lepidoptera	Widespread		x	x												
A micro-moth	<i>Elachista canapennella</i>	Elachistidae	Lepidoptera	Widespread	x														
Pale Tussock	<i>Calliteara pudibunda</i>	Erebidae	Lepidoptera	Widespread	x														
Muslin Moth	<i>Diaphora mendica</i>	Erebidae	Lepidoptera	Widespread	x	x													



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Buff Footman	<i>Eilema depressa</i>	Erebidae	Lepidoptera	Locally common	x	x													
Dingy Footman	<i>Eilema griseola</i>	Erebidae	Lepidoptera	Widespread	x						x				x				
Common Footman	<i>Eilema lurideola</i>	Erebidae	Lepidoptera	Widespread	x														
Yellow-tail	<i>Euproctis similis</i>	Erebidae	Lepidoptera	Widespread	x														
Small Fan-foot	<i>Herminia grisealis</i>	Erebidae	Lepidoptera	Widespread		x	x				x								
Snout	<i>Hypena proboscidalis</i>	Erebidae	Lepidoptera	Widespread		x	x				x								
Black Arches	<i>Lymantria monacha</i>	Erebidae	Lepidoptera	Widespread	x														
Ruby Tiger	<i>Phragmatobia fuliginosa</i>	Erebidae	Lepidoptera	Widespread	x	x					x	x							
Straw Dot	<i>Rivula sericealis</i>	Erebidae	Lepidoptera	Widespread	x	x					x								
Pinion-streaked Snout	<i>Schrankia costaestrigalis</i>	Erebidae	Lepidoptera	Local	x														
White Ermine	<i>Spilosoma lubricipeda</i>	Erebidae	Lepidoptera	S41 - research only/widespread		x	x												
Buff Ermine	<i>Spilosoma luteum</i>	Erebidae	Lepidoptera	S41 - research only/widespread		x	x				x								
Fan-foot	<i>Zanclognatha tarsipennalis</i>	Erebidae	Lepidoptera	Widespread		x	x				x								
A micro-moth	<i>Anacamptis populella</i>	Gelechiidae	Lepidoptera	Widespread							x								
A micro-moth	<i>Helcystogramma rufescens</i>	Gelechiidae	Lepidoptera	Widespread	x	x													
A micro-moth	<i>Scrobipalpa costella</i>	Gelechiidae	Lepidoptera	Widespread	x														
Magpie Moth	<i>Abraxas grossulariata</i>	Geometridae	Lepidoptera	Widespread	x	x			x		x								
Peppered Moth	<i>Biston betularia</i>	Geometridae	Lepidoptera	Widespread	x	x													
Common Wave	<i>Cabera exanthemata</i>	Geometridae	Lepidoptera	Widespread	x	x					x								
Common White Wave	<i>Cabera pusaria</i>	Geometridae	Lepidoptera	Widespread		x	x												

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Latticed Heath	<i>Chiasmia clathrata clathrata</i>	Geometridae	Lepidoptera	S41 - research only/widespread			x												
Common Marbled Carpet	<i>Chloroclysta truncata</i>	Geometridae	Lepidoptera	Widespread	x	x													
V-Pug	<i>Chloroclystis v-ata</i>	Geometridae	Lepidoptera	Widespread		x	x				x								
Green Carpet	<i>Colostygia pectinataria</i>	Geometridae	Lepidoptera	Widespread	x														
Purple Bar	<i>Cosmorhoe ocellata</i>	Geometridae	Lepidoptera	Widespread	x						x								
Scalloped Oak	<i>Crocallis elinguaris</i>	Geometridae	Lepidoptera	Widespread		x	x				x								
Small Phoenix	<i>Ecliptopera silaceata</i>	Geometridae	Lepidoptera	S41 - research only/widespread	x	x					x								
Engrailed	<i>Ectropis bistortata</i>	Geometridae	Lepidoptera	Widespread	x	x													
Broken-barred Carpet	<i>Electrophaes corylata</i>	Geometridae	Lepidoptera	Widespread	x														
Bordered Beauty	<i>Epione repandaria</i>	Geometridae	Lepidoptera	Widespread	x	x													
Common Carpet	<i>Epirrhoe alternata</i>	Geometridae	Lepidoptera	Widespread	x	x					x								
Phoenix	<i>Eulithis prunata</i>	Geometridae	Lepidoptera	Widespread		x	x												
Chevron	<i>Eulithis testata</i>	Geometridae	Lepidoptera	Widespread		x	x												
Lime-speck Pug	<i>Eupithecia centaureata</i>	Geometridae	Lepidoptera	Widespread		x	x												
Grey Pug	<i>Eupithecia subfuscata</i>	Geometridae	Lepidoptera	Widespread	x	x													
Common Pug	<i>Eupithecia vulgata</i>	Geometridae	Lepidoptera	Widespread	x														
Barred Straw	<i>Gandaritis pyraliata</i>	Geometridae	Lepidoptera	Widespread		x	x												
Large Emerald	<i>Geometra papilionaria</i>	Geometridae	Lepidoptera	Widespread		x	x												
Double-striped Pug	<i>Gymnoscelis rufifasciata</i>	Geometridae	Lepidoptera	Widespread	x														
Common Emerald	<i>Hemithea aestivaria</i>	Geometridae	Lepidoptera	Widespread		x	x												

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July Highflyer	<i>Hydriomena furcata</i>	Geometridae	Lepidoptera	Widespread	x	x					x								
May Highflyer	<i>Hydriomena impluviata</i>	Geometridae	Lepidoptera	Widespread		x	x												
Riband Wave	<i>Idaea aversata</i>	Geometridae	Lepidoptera	Widespread							x								
Small Fan-footed Wave	<i>Idaea biselata</i>	Geometridae	Lepidoptera	Widespread	x														
Single-dotted Wave	<i>Idaea dimidiata</i>	Geometridae	Lepidoptera	Widespread							x								
Satin Wave	<i>Idaea subsericeata</i>	Geometridae	Lepidoptera	Widespread		x	x												
Water Carpet	<i>Lampropteryx suffumata</i>	Geometridae	Lepidoptera	Widespread	x														
Clouded Border	<i>Lomaspilis marginata</i>	Geometridae	Lepidoptera	Widespread	x	x													
Clouded Silver	<i>Lomographa temerata</i>	Geometridae	Lepidoptera	Widespread	x	x					x								
Sharp-angled Peacock	<i>Macaria alternata</i>	Geometridae	Lepidoptera	Local	x	x													
Scalloped Hazel	<i>Odontopera bidentata</i>	Geometridae	Lepidoptera	Widespread		x	x												
Brimstone Moth	<i>Opisthograptis luteolata</i>	Geometridae	Lepidoptera	Widespread	x	x			x		x								
Swallow-tailed Moth	<i>Ourapteryx sambucaria</i>	Geometridae	Lepidoptera	Widespread	x														
Green Pug	<i>Pasiphila rectangulata</i>	Geometridae	Lepidoptera	Widespread	x						x								
Rivulet	<i>Perizoma affinitata</i>	Geometridae	Lepidoptera	Widespread	x						x								
Grass Rivulet	<i>Perizoma albulata</i>	Geometridae	Lepidoptera	S41 - research only/widespread	x														
Sandy Carpet	<i>Perizoma flavofasciata</i>	Geometridae	Lepidoptera	Widespread		x	x												
Brown Silver-line	<i>Petrophora chlorosata</i>	Geometridae	Lepidoptera	Widespread	x	x													
Speckled Yellow	<i>Pseudopanthera macularia</i>	Geometridae	Lepidoptera	Widespread		x	x	x											
Grass Emerald	<i>Pseudoterpna pruinata</i>	Geometridae	Lepidoptera	Widespread		x	x												

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Cream Wave	<i>Scopula floslactata</i>	Geometridae	Lepidoptera	Widespread	x														
Shaded Broad-bar	<i>Scotopteryx chenopodiata</i>	Geometridae	Lepidoptera	S41 - research only/widespread		x	x												
Early Thorn	<i>Selenia dentaria</i>	Geometridae	Lepidoptera	Widespread	x	x													
Grey Pine Carpet	<i>Thera obelliscata</i>	Geometridae	Lepidoptera	Widespread	x	x	x												
Blood-vein	<i>Timandra comae</i>	Geometridae	Lepidoptera	S41 - research only/widespread		x	x					x							
Flame Carpet	<i>Xanthorhoe designata</i>	Geometridae	Lepidoptera	Widespread	x							x							
Dark-barred Twin-spot Carpet	<i>Xanthorhoe ferrugata</i>	Geometridae	Lepidoptera	S41 - research only/widespread	x	x						x							
Silver-ground Carpet	<i>Xanthorhoe montanata</i>	Geometridae	Lepidoptera	Widespread	x	x													
Red Twin-spot Carpet	<i>Xanthorhoe spadicearia</i>	Geometridae	Lepidoptera	Widespread	x	x							x						
A micro-moth	<i>Aspilapteryx tringipennella</i>	Gracillariidae	Lepidoptera	Widespread	x								x						
A micro-moth	<i>Caloptilia stigmatella</i>	Gracillariidae	Lepidoptera	Widespread	x														
A micro-moth	<i>Phyllonorycter messaniella</i>	Gracillariidae	Lepidoptera	Widespread		x	x												
Gold Swift	<i>Phymatopus hecta</i>	Hepialidae	Lepidoptera	Local		x	x												
Large Skipper	<i>Ochlodes sylvanus</i>	Hesperiidae	Lepidoptera	Widespread	x	x			x			x		x					
Small Skipper	<i>Thymelicus sylvestris</i>	Hesperiidae	Lepidoptera	Widespread	x					x				x		x			
Drinker	<i>Euthrix potatoria</i>	Lasiocampidae	Lepidoptera	Widespread	x	x		x					x						
Oak Eggar	<i>Lasiocampa quercus</i>	Lasiocampidae	Lepidoptera	Widespread		x	x												
Lackey	<i>Malacosoma neustria</i>	Lasiocampidae	Lepidoptera	Widespread	x	x													
Small Copper	<i>Lycaena phlaeas</i>	Lycaenidae	Lepidoptera	Widespread	x							x							
Common Blue	<i>Polyommatus icarus</i>	Lycaenidae	Lepidoptera	Widespread	x			x										x	

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Spectacle	<i>Abrostola tripartita</i>	Noctuidae	Lepidoptera	Widespread	x	x					x								
Knot Grass	<i>Acronicta rumicis</i>	Noctuidae	Lepidoptera	Widespread	x														
Heart and Dart	<i>Agrotis exclamationis</i>	Noctuidae	Lepidoptera	Widespread	x	x					x								
Dark Sword-grass	<i>Agrotis ipsilon</i>	Noctuidae	Lepidoptera	Migrant		x	x												
Ear Moth agg.	<i>Amphipoea oculea agg.</i>	Noctuidae	Lepidoptera	S41 - research only/widespread		x	x												
Copper Underwing	<i>Amphipyra pyramidea</i>	Noctuidae	Lepidoptera	Widespread	x														
Clouded-bordered Brindle	<i>Apamea crenata</i>	Noctuidae	Lepidoptera	Widespread	x														
Light Arches	<i>Apamea lithoxylaea</i>	Noctuidae	Lepidoptera	Widespread	x	x	x				x								
Silver Y	<i>Autographa gamma</i>	Noctuidae	Lepidoptera	Migrant		x	x							x					
Plain Golden Y	<i>Autographa jota</i>	Noctuidae	Lepidoptera	Widespread	x	x			x										
Flame	<i>Axylia putris</i>	Noctuidae	Lepidoptera	Widespread		x	x												
Mottled Rustic	<i>Caradrina morpheus</i>	Noctuidae	Lepidoptera	S41 - research only/widespread		x	x												
Broom Moth	<i>Ceramica pisi</i>	Noctuidae	Lepidoptera	S41 - research only/widespread		x	x												
Nut-tree Tussock	<i>Colocasia coryli</i>	Noctuidae	Lepidoptera	Widespread		x	x												
Coronet	<i>Craniophora ligustri</i>	Noctuidae	Lepidoptera	Widespread		x	x												
Marbled White Spot	<i>Deltote pygarga</i>	Noctuidae	Lepidoptera	Local		x	x												
Burnished Brass	<i>Diachrysia chrysitis</i>	Noctuidae	Lepidoptera	Widespread		x	x												
Purple Clay	<i>Diarsia brunnea</i>	Noctuidae	Lepidoptera	Widespread	x	x					x								
Ingrailed Clay	<i>Diarsia mendica</i>	Noctuidae	Lepidoptera	Widespread		x	x												
Small Square-spot	<i>Diarsia rubi</i>	Noctuidae	Lepidoptera	S41 - research only/widespread	x	x					x								

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Small Angle Shades	<i>Euplexia lucipara</i>	Noctuidae	Lepidoptera	Widespread	x	x					x								
Lychnis	<i>Hadena bicurris</i>	Noctuidae	Lepidoptera	Widespread							x								
Uncertain	<i>Hoplodrina alsines</i>	Noctuidae	Lepidoptera	Widespread	x	x					x								
Vine's Rustic	<i>Hoplodrina ambigua</i>	Noctuidae	Lepidoptera	Widespread		x	x												
Rosy Rustic	<i>Hydraecia micacea</i>	Noctuidae	Lepidoptera	S41 - research only/widespread	x						x								
Bright-line Brown-eye	<i>Lacanobia oleracea</i>	Noctuidae	Lepidoptera	Widespread		x	x												
True-lover's Knot	<i>Lycophotia porphyrea</i>	Noctuidae	Lepidoptera	Widespread		x	x	x											
Dot Moth	<i>Melanchra persicariae</i>	Noctuidae	Lepidoptera	S41 - research only/widespread	x	x													
Common Rustic agg.	<i>Mesapamea secalis</i> agg.	Noctuidae	Lepidoptera	Widespread	x	x					x								
Cloaked Minor	<i>Mesoligia furuncula</i>	Noctuidae	Lepidoptera	Widespread	x						x								
Rosy Minor	<i>Mesoligia literosa</i>	Noctuidae	Lepidoptera	S41 - research only/widespread	x														
Smoky Wainscot	<i>Mythimna impura</i>	Noctuidae	Lepidoptera	Widespread	x	x					x								
Lesser Broad-bordered Yellow Underwing	<i>Noctua janthe</i>	Noctuidae	Lepidoptera	Widespread	x	x					x								
Large Yellow Underwing	<i>Noctua pronuba</i>	Noctuidae	Lepidoptera	Widespread	x	x					x								
Flame Shoulder	<i>Ochropleura plecta</i>	Noctuidae	Lepidoptera	Widespread	x	x					x								
Middle-barred Minor	<i>Oligia fasciuncula</i>	Noctuidae	Lepidoptera	Widespread	x														
Marbled Minor agg.	<i>Oligia strigilis</i> agg.	Noctuidae	Lepidoptera	Widespread	x	x					x								
Common Quaker	<i>Orthosia cerasi</i>	Noctuidae	Lepidoptera	Widespread		x	x												
Hebrew Character	<i>Orthosia gothica</i>	Noctuidae	Lepidoptera	Widespread	x	x	x												

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Angle Shades	<i>Phlogophora meticulosa</i>	Noctuidae	Lepidoptera	Widespread		x	x												
Small Dotted Buff	<i>Photedes minima</i>	Noctuidae	Lepidoptera	Widespread							x								
Gold Spot	<i>Plusia festucae</i>	Noctuidae	Lepidoptera	Widespread	x						x								
Grey Arches	<i>Polia nebulosa</i>	Noctuidae	Lepidoptera	Widespread	x	x													
Green Silver-lines	<i>Pseudoips prasinana</i>	Noctuidae	Lepidoptera	Widespread		x	x												
Poplar Grey	<i>Subacronicta megacephala</i>	Noctuidae	Lepidoptera	Local		x	x												
Setaceous Hebrew Character	<i>Xestia c-nigrum</i>	Noctuidae	Lepidoptera	Widespread	x	x													
Triple-spotted Clay	<i>Xestia ditrapezium</i>	Noctuidae	Lepidoptera	Local		x	x												
Early Grey	<i>Xylocampa areola</i>	Noctuidae	Lepidoptera	Widespread	x														
Least Black Arches	<i>Nola confusalis</i>	Nolidae	Lepidoptera	Local		x	x												
Sallow Kitten	<i>Furcula furcula</i>	Notodontidae	Lepidoptera	Widespread	x	x													
Iron Prominent	<i>Notodonta dromedarius</i>	Notodontidae	Lepidoptera	Widespread	x														
Pebble Prominent	<i>Notodonta ziczac</i>	Notodontidae	Lepidoptera	Widespread	x	x					x								
Great Prominent	<i>Peridea anceps</i>	Notodontidae	Lepidoptera	Locally common	x														
Buff-tip	<i>Phalera bucephala</i>	Notodontidae	Lepidoptera	Widespread		x	x				x								
Swallow Prominent	<i>Pheosia tremula</i>	Notodontidae	Lepidoptera	Widespread		x	x												
Pale Prominent	<i>Pterostoma palpina</i>	Notodontidae	Lepidoptera	Widespread	x	x					x								
Coxcomb Prominent	<i>Ptilodon capucina</i>	Notodontidae	Lepidoptera	Widespread	x	x					x								
Small Tortoiseshell	<i>Aglais urticae</i>	Nymphalidae	Lepidoptera	Widespread						x								x	

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Ringlet	<i>Aphantopus hyperantus</i>	Nymphalidae	Lepidoptera	Widespread	x				x		x	x			x		x	x	x
Peacock Butterfly	<i>Inachis io</i>	Nymphalidae	Lepidoptera	Widespread	x						x						x		
Meadow Brown	<i>Maniola jurtina</i>	Nymphalidae	Lepidoptera	Widespread	x	x		x	x		x	x			x		x	x	x
Speckled Wood	<i>Pararge aegeria</i>	Nymphalidae	Lepidoptera	Widespread	x	x	x		x		x	x			x				
Comma	<i>Polygonia c-album</i>	Nymphalidae	Lepidoptera	Widespread	x						x				x				
Gatekeeper	<i>Pyronia tithonus</i>	Nymphalidae	Lepidoptera	Widespread		x	x	x											
Red Admiral	<i>Vanessa atalanta</i>	Nymphalidae	Lepidoptera	Regular migrant	x	x	x		x		x				x			x	
Painted Lady	<i>Vanessa cardui</i>	Nymphalidae	Lepidoptera	Regular migrant	x														
A micro-moth	<i>Carcina quercana</i>	Peleopodidae	Lepidoptera	Widespread		x	x												
Orange Tip	<i>Anthocharis cardamines</i>	Pieridae	Lepidoptera	Widespread	x		x		x		x								
Large White	<i>Pieris brassicae</i>	Pieridae	Lepidoptera	Widespread	x	x	x	x	x		x	x			x				
Green-veined White	<i>Pieris napi</i>	Pieridae	Lepidoptera	Widespread	x	x	x	x	x		x	x			x				
A plume moth	<i>Oxyptilus laetus</i>	Pterophoridae	Lepidoptera	Rare migrant															
A micro-moth	<i>Trachycera advenella</i>	Pyralidae	Lepidoptera	Widespread	x	x													
Elephant Hawk-moth	<i>Deilephila elpenor</i>	Sphingidae	Lepidoptera	Widespread	x	x													
Poplar Hawk-moth	<i>Laothoe populi</i>	Sphingidae	Lepidoptera	Widespread	x	x													
Privet Hawk-moth	<i>Sphinx ligustri</i>	Sphingidae	Lepidoptera	Widespread	x	x													
A tortrix moth	<i>Acleris emargana</i>	Tortricidae	Lepidoptera	Widespread	x	x													
A tortrix moth	<i>Acleris laterana/comariana</i>	Tortricidae	Lepidoptera	Widespread	x	x													
Rhomboid Tortrix	<i>Acleris rhombana</i>	Tortricidae	Lepidoptera	Widespread	x														



Common name	Scientific name	Family	Order	UK status	Site 1 - Priority woodland and woodland edge	Site 3 - Priority heathland (east section)	Site 4 - Mixed woodland	Site 5 - Priority heathland (west section)	Site 6 - Wet grassland, rush pasture & wet woodland (north of Ennis Farm)	Site 7 - SI grassland on wide verge adjacent A30 (not sampled)	Site 9 - Priority woodland and woodland edge (Honeycombe Barr)	Site 10 - Semi-improved grass land (meadow)	Site 14 - Marshy SI grassland south of Nancarrow Farm (not sampled)	Site 20 - SI grassland opposite Hill View Farm (not sampled)	Site 21/22 - Priority woodland and grassland/tall ruderal edge habitat	Site 24 (not sampled)	Site 27 (not sampled)	Site 28/29 - Semi-improved grassland (pasture)	Site 30 - Improved grassland
Garden Rose Tortrix	<i>Acleris variegana</i>	Tortricidae	Lepidoptera	Widespread	x	x													
A tortrix moth	<i>Agapeta hamana</i>	Tortricidae	Lepidoptera	Widespread	x						x								
A tortrix moth	<i>Agapeta zoegana</i>	Tortricidae	Lepidoptera	Widespread							x								
Large Fruit-tree Tortrix	<i>Archips podana</i>	Tortricidae	Lepidoptera	Widespread							x								
A tortrix moth	<i>Capua vulgana</i>	Tortricidae	Lepidoptera	Widespread	x	x													
A tortrix moth	<i>Celypha lacunana</i>	Tortricidae	Lepidoptera	Widespread	x	x													
Cnephasia species	<i>Cnephasia sp.</i>	Tortricidae	Lepidoptera	Unknown		x	x												
A tortrix moth	<i>Cydia ulicetana</i>	Tortricidae	Lepidoptera	Widespread		x	x				x								
Bramble Shoot Moth	<i>Epiblema uddmanniana</i>	Tortricidae	Lepidoptera	Widespread	x														
Light Brown Apple Moth	<i>Epiphyas postvittana</i>	Tortricidae	Lepidoptera	Widespread	x	x					x								
A tortrix moth	<i>Eupoecilia angustana</i>	Tortricidae	Lepidoptera	Widespread	x						x								
Plum Tortrix	<i>Hedya pruniana</i>	Tortricidae	Lepidoptera	Widespread	x														
Barred Fruit-tree Tortrix	<i>Pandemis cerasana</i>	Tortricidae	Lepidoptera	Widespread	x														
Dark Fruit-tree Tortrix	<i>Pandemis heparana</i>	Tortricidae	Lepidoptera	Widespread	x	x					x								
Holly Tortrix	<i>Rhopobota naevana</i>	Tortricidae	Lepidoptera	Widespread	x						x								
A tortrix moth	<i>Syndemis musculana</i>	Tortricidae	Lepidoptera	Widespread		x	x												
Green Oak Tortrix	<i>Tortrix viridana</i>	Tortricidae	Lepidoptera	Widespread		x	x												
Honeysuckle Moth	<i>Ypsolopha dentella</i>	Ypsolophidae	Lepidoptera	Widespread		x	x												
A micro-moth	<i>Ypsolopha parenthesesella</i>	Ypsolophidae	Lepidoptera	Widespread	x														
Five-spot Burnet	<i>Zygaena trifolii</i>	Zygaenidae	Lepidoptera	Widespread	x				x		x	x				x	x	x	

Common name	Scientific name	Family	Order	UK status	Site 1 - Priority woodland and woodland edge	Site 3 - Priority heathland (east section)	Site 4 - Mixed woodland	Site 5 - Priority heathland (west section)	Site 6 - Wet grassland, rush pasture & wet woodland (north of Ennis Farm)	Site 7 - SI grassland on wide verge adjacent A30 (not sampled)	Site 9 - Priority woodland and woodland edge (Honeycombe Barr)	Site 10 - Semi-improved grass land (meadow)	Site 14 - Marshy SI grassland south of Nancarrow Farm (not sampled)	Site 20 - SI grassland opposite Hill View Farm (not sampled)	Site 21/22 - Priority woodland and grassland/tall ruderal edge habitat	Site 24 (not sampled)	Site 27 (not sampled)	Site 28/29 - Semi-improved grassland (pasture)	Site 30 - Improved grassland
<b>Stone Centipedes (Lithobiomorpha)</b>																			
A stone centipede	<i>Lithobius calcaratus</i>	Lithobiidae	Lithobiomorpha	Local			x												
A stone centipede	<i>Lithobius microps</i>	Lithobiidae	Lithobiomorpha	Widespread			x												
<b>Scorpionflies (Mecoptera)</b>																			
A scorpion fly	<i>Panorpa sp.</i>	Planorpidae	Mecoptera	Unknown					x										
<b>Dragonflies and Damselflies (Odonata)</b>																			
Southern Hawker	<i>Aeshna cyanea</i>	Aeshnidae	Odonata	Widespread	x	x						x							
Common Hawker	<i>Aeshna juncea</i>	Aeshnidae	Odonata	Widespread						x		x							
Azure Damselfly	<i>Coenagrion puella</i>	Coenagridae	Odonata	Widespread						x		x							
Common Blue-tailed Damselfly	<i>Ischnura elegans</i>	Coenagridae	Odonata	Widespread						x		x							
Large Red Damselfly	<i>Pyrhosoma nymphula</i>	Coenagridae	Odonata	Widespread	x					x									
Golden-ringed Dragonfly	<i>Cordulegaster boltonii</i>	Cordulegastridae	Odonata	Widespread					x							x			
Emerald Damselfly	<i>Lestes sponsa</i>	Lestidae	Odonata	Widespread	x														
Four-spot Chaser	<i>Libellula quadrimaculata</i>	Libellulidae	Odonata	Widespread			x				x					x			
Black-tailed Skimmer	<i>Orthetrum cancellatum</i>	Libellulidae	Odonata	Widespread	x														
<b>Harvestmen (Opiliones)</b>																			
A harvestman	<i>Nemasoma bimaculatum</i>	Nemastomatidae	Opiliones	Widespread			x	x	x										
A harvestman	<i>Dicranopalpus ramosus</i>	Phalangidae	Opiliones	Widespread	x				x		x								
A harvestman	<i>Leiobunum rotundum</i>	Phalangidae	Opiliones	Widespread	x	x	x		x		x	x			x				x
A harvestman	<i>Lophopilio palpalis</i>	Phalangidae	Opiliones	Widespread	x		x				x								

Common name	Scientific name	Family	Order	UK status	Site 1 - Priority woodland and woodland edge	Site 3 - Priority heathland (east section)	Site 4 - Mixed woodland	Site 5 - Priority heathland (west section)	Site 6 - Wet grassland, rush pasture & wet woodland (north of Ennis Farm)	Site 7 - SI grassland on wide verge adjacent A30 (not sampled)	Site 9 - Priority woodland and woodland edge (Honeycombe Barr)	Site 10 - Semi-improved grass land (meadow)	Site 14 - Marshy SI grassland south of Nancarrow Farm (not sampled)	Site 20 - SI grassland opposite Hill View Farm (not sampled)	Site 21/22 - Priority woodland and grassland/tall ruderal edge habitat	Site 24 (not sampled)	Site 27 (not sampled)	Site 28/29 - Semi-improved grassland (pasture)	Site 30 - Improved grassland
A harvestman	<i>Mitopus morio</i>	Phalangidae	Opiliones	Widespread	x			x	x		x				x				
A harvestman	<i>Nelima gothica</i>	Phalangidae	Opiliones	Local	x														
A harvestman	<i>Oligolophus tridens</i>	Phalangidae	Opiliones	Widespread	x		x												
A harvestman	<i>Paroligolophus agrestis</i>	Phalangidae	Opiliones	Widespread	x	x	x		x		x	x			x				
A harvestman	<i>Platybunus triangularis</i>	Phalangidae	Opiliones	Widespread	x	x	x												
<b>Grasshoppers, Groundhoppers and Crickets (Orthoptera)</b>																			
Field Grasshopper	<i>Chorthippus brunneus</i>	Acrididae	Orthoptera	Widespread			x	x			x	x			x			x	
Meadow Grasshopper	<i>Chorthippus parallelus</i>	Acrididae	Orthoptera	Widespread		x	x	x	x		x	x			x		x	x	
Slender Groundhopper	<i>Tetrix subulata</i>	Tetrigidae	Orthoptera	Widespread	x				x		x				x				
Common Groundhopper	<i>Tetrix undulata</i>	Tetrigidae	Orthoptera	Widespread	x				x		x				x				
Long-winged Conehead	<i>Conocephalus discolor</i>	Tettigoniidae	Orthoptera	Widespread					x			x			x				
Speckled Bush Cricket	<i>Leptophyes punctatissima</i>	Tettigoniidae	Orthoptera	Widespread					x		x	x			x				
Oak Bush-cricket	<i>Meconema thalassinum</i>	Tettigoniidae	Orthoptera	Widespread					x		x								
Dark Bush Cricket	<i>Pholidoptera griseoptera</i>	Tettigoniidae	Orthoptera	Widespread	x	x	x	x			x				x			x	
Great Green Bush-cricket	<i>Tettigonia viridissima</i>	Tettigoniidae	Orthoptera	Local	x														

**Table 7 – Species listed as having a conservation designation in the UK/England includes Nationally Scarce and S41 – Species recorded during the survey**

Common name	Scientific name	Family	Order	UK status	Site(s) recorded	Description
A lycosid spider	<i>Pardosa proxima</i>	Lycosidae	Araneae	Nationally Scarce	Site 6 (Rush pasture and wet woodland); Site 28 (SI mesotrophic grassland nr Chiverton Cross)	According to Harvey <i>et al</i> (2002) <i>Pardosa proxima</i> is found in a variety of sparsely vegetated habitats but typically occurs in marshy places. The species is most frequent in coastal sites including earthy cliffs, saltmarsh, dune slacks and streamside habitats including exposed riverine sediments. The spider has also been recorded from lowland heaths and gardens. Most UK records for <i>P. proxima</i> are from southern England and Wales. Despite the Nationally Scarce status there seem to be a number of records from Cornwall including one record from close to the A30 at Marazanvose. The spider was recorded in rush pasture (Site 6) and dampish meadowland (Site 28) during the survey.
A theridiid spider	<i>Episinus truncatus</i>	Theridiidae	Araneae	Nationally Scarce (Nb)	Site 3 - Heath (east section); Site 4 - Mixed woodland; Site 5 - Heath (west section)	<i>Episinus truncatus</i> is a distinctive spider associated with heathlands, where it spins a simple web beneath the heather and maritime grasslands, where it has been found beneath mats of rock-rose <i>Helianthemum</i> spp. On the Lizard, the spider has also been found amongst grass tussocks (Harvey <i>et al</i> (2002)). The species is largely confined to the southern UK including South Wales and there are several records for Cornwall including the Peranporth area. During the survey the spider was found in open heathland and in heather patches within the mixed woodland habitat (Sites 3, 4 and 5). There has been a 40 percent recorded decline in records for the species in recent decades.
A ground beetle	<i>Stenolophus teutonius</i>	Carabidae	Coleoptera	Nationally Scarce (Notable B)	Site 1 - Priority Woodland	<i>Stenolophus teutonius</i> is a species of ground beetle associated with bare ground habitats at the margins of various types of standing water habitat. The species has also been recorded from woodland edge ponds and coastal chines and clay undercliffs. In Hyman and Parsons (1992) the beetle is described as being 'widespread but local in the southern half of England'. There are few records in Cornwall, but the species is unmistakable and has been recorded on the Lizard.
A flea beetle	<i>Aphthona nigriceps</i>	Chrysomelidae	Coleoptera	Nationally Scarce (Notable B)	Site 1 - Priority Woodland	<i>Aphthona nigriceps</i> is a species of flea beetle which feeds on Crane's-bills <i>Geranium</i> spp. and Stork's-bills <i>Erodium</i> spp. (Duff, 2016). The beetle is found in habitats including grassland, wetland, fens, river margins and parkland (Hyman and Parsons, 1992). According to Hyman and Parsons (1992) beetle is very local and with a widely

Common name	Scientific name	Family	Order	UK status	Site(s) recorded	Description
						scattered distribution on England. In Cornwall there are post-1999 records from near Peranporth and earlier records for the Lizard.
A leaf beetle	<i>Calomicrus circumfusus</i>	Chrysomelidae	Coleoptera	Nationally Scarce (Notable A)	Site 3 - Heath (east section); Site 5 - Heath (west section)	<i>Calomicrus circumfusus</i> is a species of leaf beetle which according to Hyman and Parsons (1992) is associated with heathland, grassland, maritime cliff and disturbed ground habitats. The beetle, which has been historically recorded from Cornwall, has a very local, but scattered distribution across southern England. The insect is phytophagous being associated with gorses including <i>Ulex europaeus</i> , <i>U.gallii</i> and <i>U. minor</i> , as well as closely related Dyer's Greenweed <i>Genista tinctoria</i> and possibly other <i>Genista</i> species and broom species <i>Cytisus scoparius</i> . On site, a number of specimens were swept from Western Gorse <i>U. gallii</i> .
A true weevil	<i>Acalles ptinoides</i>	Curculionidae	Coleoptera	Nationally Scarce (Nb)	Site 5 - Heath (west section)	According to Hyman and Parsons (1992) <i>Acalles ptinoides</i> is a species of weevil associated with both broadleaved and mixed woodland as well as heathland biotopes. The beetle is phytophagous and is often recorded from leaf litter and under heather.
A true weevil	<i>Gymnetron veronicae</i>	Curculionidae	Coleoptera	Nationally Scarce (Notable B)	Site 1 - Priority Woodland; Site 9 (Wet woodland/ woodland edge - near Honeycombe Barn)	<i>Gymnetron veronicae</i> is a small, black and red, phytophagous weevil typically found in wetland habitats where it is primarily associated with Brooklime <i>Veronica beccabunga</i> , but Morris (2012) also refers to Blue Water Speedwell ' <i>Veronica anagallis-aquatica</i> and probably other waterside <i>Veronica spp.</i> ' Whilst figworts <i>Scrophularia spp.</i> are also cited in Hyman and Parsons (1992) and are a known host on the continent, Morris is sceptical regarding any association between British <i>G. veronicae</i> and <i>Scrophularia spp.</i> The species is widely recorded, but local in England according to Hyman and Parsons (1992). On site both <i>Veronica beccabunga</i> and <i>Scrophularia auricularia</i> were present and both were swept. It is therefore not possible to establish which of these plants the beetle was obtained from. However, both plants occurred predominately in the marshy woodland edge and interior habitat.

Common name	Scientific name	Family	Order	UK status	Site(s) recorded	Description
A true weevil	<i>Hypera (Dapalinus) meles</i>	Curculionidae	Coleoptera	Nationally Scarce (Notable A)	Site 9 (Wet woodland/woodland edge - near Honeycombe Barn); Site 10 (SI meadow/wet grassland)	<i>Hypera (Dapalinus) meles</i> is one of several weevils of the genus <i>Hypera</i> recorded during the survey. The species is found in 'grasslands, roadside verges and field margins' (Hyman and Parsons, 1992) and is associated with clovers <i>Trifolium</i> spp. (Hyman and Parsons (1992) cite White Clover <i>T. repens</i> , whilst Duff (2016) states 'On clovers <i>Trifolium</i> , usually Red Clover <i>T. pratense</i> '). Both foodplants were ubiquitous within the survey area, however, there appear to be few Cornish records other than one from north Cornwall near Bude. Duff (2016) states that the species is 'apparently increasing' its range in southern England.
A true weevil	<i>Larinus planus</i>	Curculionidae	Coleoptera	Nationally Scarce (Notable B)	Site 1 - Priority Woodland	<i>Larinus planus</i> is a fairly large, elongate weevil associated with thistles, particularly of the genera <i>Carduus</i> and <i>Cirsium</i> and the larvae feed within the flowerheads. The species is scarce in the UK and according to both Hyman and Parsons (1992) and Duff (2016) is mainly found near the coast. On site the insect was swept from wet grassland habitat adjacent to the woodland edge. Marsh Thistle <i>Cirsium palustre</i> was most common in the damper areas of the site, but Creeping Thistle <i>Cirsium arvense</i> was also fairly abundant in the drier areas. <i>Larinus planus</i> has been recorded on several occasions in south-west England, the Cornish records are mainly coastal. Grazing management is considered important to maintain the open, grassland habitats required by this species.
A true weevil	<i>Leiosoma oblongulum</i>	Curculionidae	Coleoptera	Nationally Scarce (Notable B)	Site 1 - Priority Woodland	<i>Leiosoma oblongulum</i> is a small weevil associated with broadleaved woodland, coastal cliffs and possibly grassland. Associated with Wood Anemone <i>Anemone nemorosa</i> and <i>Ranunculus</i> species including Creeping Buttercup <i>Ranunculus repens</i> . In Britain the species has been recorded in leaf litter, damp moss and from roadside verges. A very local species in the UK, thought to be declining (Hyman and Parsons, 1992). On site the beetle was vacuumed from partially shaded damp woodland ground-layer. <i>Ranunculus repens</i> was abundant in this area and <i>Anemone nemorosa</i> was also recorded from the site.

Common name	Scientific name	Family	Order	UK status	Site(s) recorded	Description
A ceutorhyncine weevil	<i>Pelenomus waltoni</i>	Curculionidae	Coleoptera	Nationally Scarce (Notable B)	Site 1 - Priority Woodland	<i>Pelenomus waltoni</i> is a small weevil associated with bogs, marshes, watersides and areas of impeded drainage, where the host plant, Water-pepper <i>Persicaria hydropiper</i> grows (Morris, 2008). Adult beetles are capable of swimming on the water surface using all six legs (Morris, 2008). The insect is local and rather rare. It has been historically recorded from West Cornwall. It was collected from the wet seepage habitat within the field at the woodland margin of Site 1. This habitat supported abundant Water-pepper.
A leaf weevil	<i>Polydrusus confluens</i>	Curculionidae	Coleoptera	Nationally Scarce (Notable B)	Site 3 - Heath (east section); Site 5 - Heath (west section)	<i>Polydrusus confluens</i> is a species of leaf weevil which is typically associated with grassland, heathland and scrub habitats. The beetle feeds on Broom <i>Cytisus scoparius</i> , gorses <i>Ulex</i> spp. and possibly greenweeds/whins <i>Genista</i> spp. The adult beetles are flightless. The species is of local distribution in the UK, being absent from many regions. However, there are several records from Cornwall and on both heathland areas (sites 3 and 5) the insect was abundant. Western Gorse <i>Ulex gallii</i> is evidently the principal food plant on these habitats.
A ceutorhyncine weevil	<i>Thamiocolus viduatus</i>	Curculionidae	Coleoptera	Nationally Scarce (Notable B)	Site 21/22 - Woodland edge wet grassland- North Plantation	<i>Thamiocolus viduatus</i> is a small weevil found in wetland, wet grasslands and field margin habitats where it is associated with Marsh Woundwort <i>Stachys palustris</i> and less commonly, Field Woundwort <i>S. arvensis</i> (Hyman and Parsons, 1992). According to Morris, 2008, the beetle is most commonly found in the drier parts of wetlands, this corresponding to the typical habitat of Marsh Woundwort. On site a single specimen of the insect was swept from a large patch of Marsh Woundwort growing on a disturbed bank in the middle of the damp grassland field (site 21). It is uncertain whether the insect has been historically recorded from Cornwall; Morris (2008) states that the <i>T. viduatus</i> is 'not common, but widely, if patchily recorded throughout England and Wales and in southern Scotland'.
A rove beetle	<i>Stenus pusillus</i>	Staphylinidae	Coleoptera	Nationally Scarce (Notable B)	Site 1 - Priority Woodland and Site 9 (Wet woodland/ woodland edge - near Honeycombe Barn)	<i>Stenus pusillus</i> is a small member of the Steninae subfamily of Staphylinidae (rove beetles). According to Lott and Anderson (2011), the insect is 'found in a variety of marshes, ditches and pond margins.' However, it is also said to be 'synanthropic in silage and hay swazrds, in roadside grss cuttings and on arable land'. During the survey <i>S. pusillus</i> was recorded from habitat including marshy

Common name	Scientific name	Family	Order	UK status	Site(s) recorded	Description
						grassland at the margin of broadleaved woodland. Whilst there are relatively few records of the species, it is said by Lott and Anderson (2011) to be 'Widespread in England and Wales but probably commoner in the south'.
A rove beetle	<i>Tachyporus formosus</i>	Staphylinidae	Coleoptera	Nationally Scarce (Na)	Site 5 - Heath (west section); Site 9 (Wet woodland/ woodland edge - near Honeycombe Barn) and Site 21/22 Woodland edge wet grassland - North Plantation	<i>Tachyporus formosus</i> is a species of rove beetle which has been associated primarily with marsh and sea cliff habitats. A number of commoner species of the genus <i>Tachyporus</i> were recorded during the survey, several such species being ubiquitous throughout the different survey areas. The habitat from which it was recorded on site was similar between the two sites, being wet/marshy grassland at the edge of broadleaved woodland.
A dolichopodid fly	<i>Chrysotus cupreus</i>	Dolichopodidae	Diptera	Nationally Scarce	Site 3 - Heath (east section); Site 4 - Mixed woodland	Not listed in Falk and Crossley (2005), which reviewed the conservation status of British Dolichopodidae. However, the species was listed as Nationally Scarce in the Pantheon output for the project. The insect is associated with wetland habitats including running water. On site <i>C. cupreus</i> was recorded from humid heathland and woodland habitat which surrounded a large pond at Sites 3 and 4. There are historic records of <i>C. cupreus</i> from the Lizard Peninsula.
A dolichopodid fly	<i>Chrysotus laesus</i>	Dolichopodidae	Diptera	Nationally Scarce	Site 10 (SI meadow/wet grassland)	Not listed in Falk and Crossley (2005), which reviewed the conservation status of British Dolichopodidae. However, there was a note suggesting that this species was uncommon and warranted review within this work. <i>Chrysotus laesus</i> was listed as Nationally Scarce in the Pantheon output for the project. The insect is associated with wetland habitats including running water. On site <i>C. laesus</i> was recorded from rush pasture habitat at Site 10. The species has been recorded historically near Wadebridge in Cornwall.



Common name	Scientific name	Family	Order	UK status	Site(s) recorded	Description
A dolichopodid fly	<i>Dolichopus notatus</i>	Dolichopodidae	Diptera	Nationally Scarce (Lower Risk)	Site 9 (Wet woodland/woodland edge - near Honeycombe Barn)	<i>Dolichopus notatus</i> is one of several species of the family dolichopodidae or 'long-legged flies' recorded during the survey. Falk and Crossley (2005) describe the species as being 'a widespread but very localised species, in the UK'. It has been historically recorded from Cornwall and Devon and a range of other counties. Whilst the species is mainly associated with dune slacks and coastal marshes, Falk and Crossley state that 'adults have been taken inland on several occasions'. <i>D. notatus</i> was recorded from the wetland habitat/woodland interface at Site 9. There is significant dune slack and coastal marsh habitat six kilometres west of the recorded site at Penhale Sands a site designated SSSI and SAC. It is uncertain whether or not <i>D. notatus</i> has been recorded at this site, however, Dolichopodidae are rather poorly recorded in the UK, although there are many records for the commoner species.
A dolichopodid fly	<i>Dolichopus signatus</i>	Dolichopodidae	Diptera	Nationally Scarce	Site 9 (Wet woodland/woodland edge - near Honeycombe Barn)	Not listed in Falk and Crossley (2005), which reviewed the conservation status of British Dolichopodidae. However, <i>Dolichopus signatus</i> was listed as Nationally Scarce in the Pantheon output for the project. The insect is associated with wetland and peatland habitats. On site <i>D. signatus</i> was recorded from the wetter habitat in Site 9. The species has been recorded historically near Bodmin, St Austell and on the Lizard Peninsula in Cornwall.
Short-horned Black Legionnaire	<i>Beris fuscipes</i>	Stratiomyidae	Diptera	Nationally Scarce	Site 1 - Priority Woodland; Site 6 (Rush pasture and wet woodland).	<i>Beris fuscipes</i> is associated with fen and marshland habitat and adults are usually found in the shelter of bushes or along the edges of woodlands. The larvae are thought to develop beneath the bark of inundated wood. In the UK, this soldierfly is most frequently recorded in southwest England.
A leafhopper	<i>Anoscopus albifrons</i>	Cicadellidae	Hemiptera	Nationally Scarce (Nb)	Sites 5,6,9,10,28/29	<i>Anoscopus albifrons</i> is listed as Nationally Scarce (Nb) in the Pantheon output, however, there seem to be a reasonable number of records for the species from Cornwall. The insect is described by Alexander (2008), in relation to Cornwall as being 'Common on grasses, usually near ground level'. It has been recorded near Perranporth, St Ives and on the Lizard. The species is associated with grassland habitats and during the survey it was recorded from grassy heath at Site 5 as well as wet to drier grassland at sites 6,9,10 and 28/29.

Common name	Scientific name	Family	Order	UK status	Site(s) recorded	Description
A rhopalid bug	<i>Stictopleurus punctatonervosus</i>	Rhopalidae	Hemiptera	Least Concern (IUCN Post 1994 criteria)	Site 9 (Wet woodland/ woodland edge - near Honeycombe Barn)	<i>Stictopleurus punctatonervosus</i> is one of two similar species of rhopalid bug (the other being <i>S. abutilon</i> ), which were both as recently as 1992 described in Kirby (1992) as being 'Probably extinct' in the UK. However, since that time, both insects were refound in the Thames Gateway area around Kent and Essex and have since spread widely across southern England. Data sources suggest that the species may not have yet been recorded from Cornwall, hence its inclusion here. The species is not mentioned in a review of Cornish and Scilly Isles Hemiptera by Alexander (2008). In northern Europe <i>S. punctatonervosus</i> shows a preference for dry, open, sunny habitats. The habitat from which the species was recorded during the survey was the drier, more herb-rich grassland occupying a moderately steep, east-facing slope at Site 9. <i>Stictopleurus</i> spp. feed on the sap of composites including Ragworts <i>Senecio</i> spp.
White Ermine	<i>Spilosoma lubricipeda</i>	Erebidae	Lepidoptera	S41 - research only	Site 3 - Heath (east section); Site 4 - Mixed woodland	White Ermine is one of a number of moth species which are still generally widespread and common in England, but were included in the 'research only' category of Section 41 list as 'Species of principal importance' due to a recorded decline in the UK in recent decades. Waring and Townsend (2003) state that White Ermine occurs in 'most rural and urban habitats, including gardens, hedgerows, wet and dry grassland, heathland, moorland and coastal situations'. Larval foodplants include a wide range of herbaceous plants, including Common Nettle <i>Urtica dioica</i> and docks <i>Rumex</i> spp.
Buff Ermine	<i>Spilosoma luteum</i>	Erebidae	Lepidoptera	S41 - research only	Site 3 - Heath (east section); Site 4 - Mixed woodland; Site 9 (Wet woodland/woodland edge - near Honeycombe Barn)	Buff Ermine is one of a number of moth species which are still generally widespread and common in England, but were included in the 'research only' category of Section 41 list as 'Species of principal importance' due to a recorded decline in the UK in recent decades. Waring and Townsend (2003) state that Buff Ermine occurs in 'most habitats, including gardens, hedgerows, parks and woodland'. Larval foodplants include a wide range of herbaceous plants, especially Common Nettle <i>Urtica dioica</i> and also woody plants including Honeysuckle <i>Lonicera periclymenum</i> , Hop <i>Humulus lupulus</i> and other species.

Common name	Scientific name	Family	Order	UK status	Site(s) recorded	Description
Latticed Heath	<i>Chiasmia clathrata clathrata</i>	Geometridae	Lepidoptera	S41 - research only	Site 4 - Mixed woodland	The Latticed Heath is one of a number of moth species which are still generally widespread and common in England, but were included in the 'research only' category of Section 41 list as 'Species of principal importance' due to a recorded decline in the UK in recent decades. According to Waring and Townsend (2003) the Latticed heath is 'most abundant around Lucerne crops', but that it 'generally occurs in smaller numbers in open ground, including gardens and ranging from calcareous grassland and fens to acid heathland and moorland. Sometimes open woodland and derelict or unkempt urban sites'. The larval foodplants include 'Clovers, trefoils and Lucerne'.
Small Phoenix	<i>Ecliptopera silaceata</i>	Geometridae	Lepidoptera	S41 - research only	Site 1 - Priority Woodland; Site 3 - Heath (east section)	The Small Phoenix is one of a number of moth species which are still generally widespread and common in England, but were included in the 'research only' category of Section 41 list as 'Species of principal importance' due to a recorded decline in the UK in recent decades. Waring and Townsend (2003) state that the Small Phoenix is 'most numerous in woodland rides and glades, but found wherever the foodplants occur'. Cited larval foodplants cited by Waring and Townsend (2003) include 'Various species of willowherbs, including Rosebay Willowherb and the related Enchanter's Nightshade'.
Grass Rivulet	<i>Perizoma albulata</i>	Geometridae	Lepidoptera	S41 - research only	Site 1 - Priority Woodland	The Grass Rivulet is one of a number of moth species which are still generally widespread and common in England, but were included in the 'research only' category of Section 41 list as 'Species of principal importance' due to a recorded decline in the UK in recent decades. Waring and Townsend (2003) describe the favoured habitat of the species as 'Grassland, usually on calcareous soils, dune slacks and coastal shingle, from dry to damp situations'. The larvae feed on the ripening seeds of Yellow Rattle <i>Rhinanthus minor</i> .
Shaded Broad-bar	<i>Scotopteryx chenopodiata</i>	Geometridae	Lepidoptera	S41 - research only	Site 3 - Heath (east section); Site 4 - Mixed woodland	The Shaded Broad-bar is one of a number of moth species which are still generally widespread and common in England, but were included in the 'research only' category of Section 41 list as 'Species of principal importance' due to a recorded decline in the UK in recent decades. Waring and Townsend (2003) state that Shaded Broad-bar inhabits 'a wide range of open grassy places including hedgerows, calcareous grasslands, neutral meadows, acid heathland, woodland rides' etc. where 'Clovers and vetches' are cited as the larval foodplants.

Common name	Scientific name	Family	Order	UK status	Site(s) recorded	Description
Blood-vein	<i>Timandra comae</i>	Geometridae	Lepidoptera	S41 - research only	Site 3 - Heath (east section); Site 4 - Mixed woodland; Site 9 (Wet woodland/woodland edge - near Honeycombe Barn)	The Blood-vein is one of a number of moth species which are still generally widespread and common in England, but were included in the 'research only' category of Section 41 list as 'Species of principal importance' due to a recorded decline in the UK in recent decades. Bloodvein is associated primarily with 'damp places with rank, herb-rich vegetation including hedgerow ditches, woodland rides, wet meadows and gardens' (Waring and Townsend, 2003). Larval foodplants include docks <i>Rumex</i> spp., knotgrass <i>Polygonum</i> spp.
Dark-barred Twin-spot Carpet	<i>Xanthorhoe ferrugata</i>	Geometridae	Lepidoptera	S41 - research only	Site 1 - Priority Woodland; Site 3 - Heath (east section); Site 9 (Wet woodland/woodland edge - near Honeycombe Barn)	The Dark-barred Twin-spot Carpet is one of a number of moth species which are still generally widespread and common in England, but were included in the 'research only' category of Section 41 list as 'Species of principal importance' due to a recorded decline in the UK in recent decades. According to Waring and Townsend (2003) Dark-barred Twin-spot Carpet is found in a wide range of habitats including 'gardens, woodland, hedgerows, downland, fens, moorland and coastal sand-dunes.' Larval foodplants include 'the leaves of herbaceous plants including bedstraws, docks and Ground-ivy'. (Waring and Townsend, 2003).
Ear Moth agg.	<i>Amphipoea oculea</i> agg.	Noctuidae	Lepidoptera	S41 - research only	Site 3 - Heath (east section); Site 4 - Mixed woodland	The Ear Moth is one of a number of moth species which are still generally widespread and common in England, but were included in the 'research only' category of Section 41 list as 'Species of principal importance' due to a recorded decline in the UK in recent decades. According to Waring and Townsend (2003) the Ear Moth is 'Less restricted to damp habitats than the other ear moths' it is 'sometimes recorded in gardens but more frequently in unimproved grassland, woodland rides, marshes, moorland and saltmarshes.' The larvae feed on 'The insides of the lower stems of grasses, including Annual Meadow-grass and Tufted Hair-grass' (Waring and Townsend, 2003).
Mottled Rustic	<i>Caradrina morpheus</i>	Noctuidae	Lepidoptera	S41 - research only	Site 3 - Heath (east section); Site 4 - Mixed woodland	The Mottled Rustic is one of a number of moth species which are still generally widespread and common in England, but were included in the 'research only' category of Section 41 list as 'Species of principal importance' due to a recorded decline in the UK in recent decades.

Common name	Scientific name	Family	Order	UK status	Site(s) recorded	Description
						According to Waring and Townsend (2003) the Mottled Rustic is 'Found in most lowland situations, including gardens, farmland, grassland, heathland, scrub, woodland and many coastal habitats'. The larvae feed on a 'wide range of herbaceous and woody plants including Common Nettle, docks, goosefoots, teasels and Hedge Bedstraw.' (Waring and Townsend, 2003).
Broom Moth	<i>Ceramica pisi</i>	Noctuidae	Lepidoptera	S41 - research only	Site 3 - Heath (east section); Site 4 - Mixed woodland	The Broom Moth is one of a number of moth species which are still generally widespread and common in England, but were included in the 'research only' category of Section 41 list as 'Species of principal importance' due to a recorded decline in the UK in recent decades. According to Waring and Townsend (2003) Broom Moth is found in 'all kinds of open country, including gardens. Most numerous on heathland and moorland. Less frequent in woodland and marshland'. The larvae feed on a 'wide variety of herbaceous and woody plants including heather, bracken, broom, bramble, sallows' etc. (Waring and Townsend, 2003).
Small Square-spot	<i>Diarsia rubi</i>	Noctuidae	Lepidoptera	S41 - research only	Site 1 - Priority Woodland; Site 3 - Heath (east section); Site 9 (Wet woodland/woodland edge - near Honeycombe Barn)	The Small Square-spot is one of a number of moth species which are still generally widespread and common in England, but were included in the 'research only' category of Section 41 list as 'Species of principal importance' due to a recorded decline in the UK in recent decades. According to Waring and Townsend (2003) the Small Square-spot occurs 'almost everywhere, but most abundant in damp woodland and other marshy places'. The larva feeds on a range of herbaceous plants including Dandelion, docks and Foxglove.
Rosy Rustic	<i>Hydraecia micacea</i>	Noctuidae	Lepidoptera	S41 - research only	Site 1 - Priority Woodland; Site 9 (Wet woodland/woodland edge - near Honeycombe Barn)	The Rosy Rustic is one of a number of moth species which are still generally widespread and common in England, but were included in the 'research only' category of Section 41 list as 'Species of principal importance' due to a recorded decline in the UK in recent decades. It occurs in a wide range of habitats including, according to Waring and Townsend (2003), 'gardens, disturbed weedy places, hedgerow-bases, pasture, fens, marshes and woodland rides.' Larval foodplants cited by Waring and Townsend (2003) include 'A range of low-growing plants including Broad-leaved Dock, Ribwort Plantain, , Field Woundwort, sea lavenders' and various others.






Common name	Scientific name	Family	Order	UK status	Site(s) recorded	Description
Dot Moth	<i>Melanchra persicariae</i>	Noctuidae	Lepidoptera	S41 - research only	Site 1 - Priority Woodland; Site 3 - Heath (east section)	The Dot Moth is one of a number of moth species which are still generally widespread and common in England, but were included in the 'research only' category of Section 41 list as 'Species of principal importance' due to a recorded decline in the UK in recent decades. According to Waring and Townsend (2003) Dot Moth is 'Frequent in gardens and hedgerows.' and 'Occurs in a wide range of open and wooded habitats'. The larvae feed on a 'wide range of wild and cultivated herbaceous and woody plants' (Waring and Townsend, 2003).
Rosy Minor	<i>Mesoligia literosa</i>	Noctuidae	Lepidoptera	S41 - research only	Site 1 - Priority Woodland	The Rosy Minor is one of a number of moth species which are still generally widespread and common in England, but were included in the 'research only' category of Section 41 list as 'Species of principal importance' due to a recorded decline in the UK in recent decades. According to Waring and Townsend (2003) the Mottled Rustic is found in 'various open calcareous habitats including grassland, fens, scrub, gardens, coastal cliffs and sand-dunes'. The larvae feed on 'various grasses including Lyme Grass, Marram, Cock's-foot and also cereal crops and sedges.' (Waring and Townsend, 2003).
Scarce Light Plume	<i>Oxyptilus laetus</i>	Pterophoridae	Lepidoptera	Rare migrant	Site 9 (Wet woodland/ woodland edge - near Honeycombe Barn)	The Scarce Light Plume (named in the genus <i>Crombrugghia</i> in Sterling and Parsons (2012) is a very rare immigrant in the UK. However, whilst the species has only been recorded from a few sites nationally, there are at least seven records for Cornwall, mainly from the south coast. The insect occurs as a resident in southern Europe and North Africa, where the recorded foodplants are <i>Andryale</i> spp. (yellow-flowered composites not native to the UK). During the survey the Scarce Light Plume was recorded from a moth trap running at Site 9, the habitat being woodland edge grassland which was fairly herb-rich. The species has not been confirmed as a breeding species in the UK.

**Table 8 – Site 1 – Priority Woodland Pantheon/ISIS output tables<sup>19</sup>**







**Habitats & resources: broad biotopes**

Broad biotope <sub>i</sub>	No. of species	% representation	SQI	Conservation status <sub>i</sub>	Species with conservation status
open habitats <sub>j</sub>	138	3	107	3 Section 41 Priority Species - research only; 2 Nb; 1 NS <sub>i</sub>	6
tree-associated <sub>j</sub>	87	2	100	1 Section 41 Priority Species - research only	1
wetland <sub>j</sub>	46	2	126	1 NS <sub>j</sub> ; 3 Nb	4

**Habitats & resources: habitats**

Broad biotope <sub>i</sub>	Habitat <sub>i</sub>	No. of species	% representation	Conservation status <sub>i</sub>	SQI	Species with conservation status
open habitats <sub>i</sub>	tall sward & scrub <sub>i</sub>	123	5	3 Section 41 Priority Species - research only; 1 Nb; 1 NS <sub>i</sub>	105	5
tree-associated <sub>i</sub>	arboreal <sub>i</sub>	60	5	1 Section 41 Priority Species - research only	100	1
tree-associated <sub>i</sub>	shaded woodland floor <sub>i</sub>	22	2		100	
wetland <sub>i</sub>	marshland <sub>i</sub>	19	2	2 Nb; 1 NS <sub>i</sub>	147	3
wetland <sub>i</sub>	peatland <sub>i</sub>	19	2		100	
open habitats <sub>i</sub>	short sward & bare ground <sub>i</sub>	12	<1	1 Nb	 130	1
tree-associated <sub>i</sub>	decaying wood <sub>i</sub>	7	<1		 100	
wetland <sub>i</sub>	wet woodland <sub>i</sub>	6	2		 100	
tree-associated <sub>i</sub>	wet woodland <sub>i</sub>	6	2		 100	
wetland <sub>i</sub>	running water <sub>i</sub>	5	<1	1 Nb	 160	

**Habitats & resources: ISIS specific assemblage types**

Broad biotope <sub>i</sub>	Habitat <sub>i</sub>	SAT	No. of species	% representation	SQI	Conservation status <sub>i</sub>	Species with conservation status	Code	Reported condition <sub>i</sub>
open habitats <sub>i</sub>		open habitats >> rich flower resource	2	<1	 100			F002	Unfavourable
open habitats <sub>i</sub>	short sward & bare ground <sub>i</sub>	open short sward <sub>i</sub>	2	1	 250	1 Nb	1	F112	Unfavourable
open habitats <sub>i</sub>		open habitats >> scrub-heath & moorland	1	<1	 100			F003	Unfavourable
tree-associated <sub>i</sub>	decaying wood <sub>i</sub>	bark & sapwood decay <sub>i</sub>	4	<1	 100			A212	Unfavourable
tree-associated <sub>i</sub>	decaying wood <sub>i</sub>	epiphyte faun <sub>i</sub>	1	5	 100			A215	Unfavourable
wetland <sub>i</sub>	peatland <sub>i</sub>	reed-fen & pools <sub>i</sub>	1	<1	 100			W314	Unfavourable






<sup>19</sup> Note triangular symbol with exclamation mark under SQI indicates too few species (<15) for robust SQI analysis

Table 9 – Sites 3,4 and 5 – Priority heathland (east and west sections and mixed woodland) Pantheon/ISIS output tables

Habitats & resources: broad biotopes

Broad biotope <sub>i</sub>	No. of species	% representation	SQI	Conservation status <sub>i</sub>	Species with conservation status
open habitats <sub>i</sub>	185	4	105	1 Nb; 1 Na; 5 Section 41 Priority Species - research only; 2 NS <sub>i</sub>	9
tree-associated <sub>i</sub>	80	2	108	1 Section 41 Priority Species - research only; 2 Nb	3
wetland <sub>i</sub>	40	1	108	1 NS <sub>i</sub>	1

Habitats & resources: habitats

Broad biotope <sub>i</sub>	Habitat <sub>i</sub>	No. of species	% representation	Conservation status <sub>i</sub>	SQI	Species with conservation status
open habitats <sub>i</sub>	tall sward & scrub <sub>i</sub>	145	5	1 Nb; 5 Section 41 Priority Species - research only; 1 NS <sub>i</sub>	102	7
tree-associated <sub>i</sub>	arboreal <sub>i</sub>	52	4	1 Section 41 Priority Species - research only; 1 Nb	106	2
tree-associated <sub>i</sub>	shaded woodland floor <sub>i</sub>	23	2		100	
wetland <sub>i</sub>	marshland <sub>i</sub>	18	2	1 NS <sub>i</sub>	117	1
open habitats <sub>i</sub>	short sward & bare ground <sub>i</sub>	17	1	1 Na	117	1
wetland <sub>i</sub>	peatland <sub>i</sub>	14	1		 100	
wetland <sub>i</sub>	running water <sub>i</sub>	5	<1	1 NS <sub>i</sub>	 160	1
tree-associated <sub>i</sub>	decaying wood <sub>i</sub>	5	<1	1 Nb	 160	1
wetland <sub>i</sub>	wet woodland <sub>i</sub>	4	1		 100	
tree-associated <sub>i</sub>	wet woodland <sub>i</sub>	4	2		 100	

Habitats & resources: ISIS specific assemblage types






Broad biotope <sub>i</sub>	Habitat <sub>i</sub>	SAT	No. of species	% representation	SQI	Conservation status <sub>i</sub>	Species with conservation status	Code	Reported condition <sub>i</sub>
open habitats <sub>i</sub>		open habitats >> scrub-heath & moorland	18	5	116	1 NS <sub>i</sub>	1	F003	Favourable
open habitats <sub>i</sub>		open habitats >> scrub edge	6	3	 120	1 NS <sub>i</sub>	1	F001	Unfavourable
tree-associated <sub>i</sub>	decaying wood <sub>i</sub>	bark & sapwood decay <sub>i</sub>	5	<1	 160	1 Nb	1	A212	Unfavourable
open habitats <sub>i</sub>		open habitats >> rich flower resource	4	2	 100			F002	Unfavourable
wetland <sub>i</sub>	marshland <sub>i</sub>	undisturbed fluctuating marsh <sub>i</sub>	1	3	 100			W221	Unfavourable










Table 10 – Site 6 - Rush pasture and wet woodland edge north of Ennis Farm Pantheon/ISIS output tables









Habitats & resources: broad biotopes

Broad biotopei	No. of species	% representation	SQI	Conservation statusi	Species with conservation status
open habitatsi	115	3	105	1 Na; 2 Nb	3
tree-associatedi	59	2	100		
wetlandi	58	2	105	1 NSi	1
coastali	1	<1	 400	1 NSi	1

Habitats & resources: habitats


Broad biotopei	Habitati	No. of species	% representation	Conservation statusi	SQI	Species with conservation status
open habitatsi	tall sward & scrubi	101	4	1 Nb	100	1
tree-associatedi	arboreali	36	3		100	
wetlandi	peatlandi	33	3		100	
wetlandi	marshlandi	20	2	1 NSi	115	1
tree-associatedi	shaded woodland floori	17	1		100	
tree-associatedi	decaying woodi	9	<1		 100	
wetlandi	wet woodlandi	9	3		 100	
tree-associatedi	wet woodlandi	9	4		 100	
open habitatsi	short sward & bare groundi	8	<1	1 Nb; 1 Na	 175	2
wetlandi	running wateri	6	<1		 100	
wetlandi	lakei	1	<1		 100	
coastali	brackish pools & ditchesi	1	<1	1 NSi	 400	1

Habitats & resources: ISIS specific assemblage types









Broad biotopei	Habitati	SAT	No. of species	% representation	SQI	Conservation statusi	Species with conservation status	Code	Reported conditioni
tree-associatedi	decaying woodi	bark & sapwood decayi	5	<1	 100			A212	Unfavourable
tree-associatedi	decaying woodi	epiphyte faunai	2	10	 100			A215	Unfavourable
open habitatsi		open habitats >> scrub edge	2	<1	 100			F001	Unfavourable
open habitatsi		open habitats >> scrub-heath & moorland	2	<1	 100			F003	Unfavourable
open habitatsi		open habitats >> rich flower resource	1	<1	 100			F002	Unfavourable
open habitatsi	short sward & bare groundi	bare sand & chalki	1	<1	 100			F111	Unfavourable
open habitatsi	short sward & bare groundi	open short swardi	1	<1	 400	1 Nb	1	F112	Unfavourable
wetlandi	peatlandi	reed-fen & poolsi	1	<1	 100				

**Table 11 – Site 9 - Wet woodland edge and wet and dry grassland near Honeycombe Barn Pantheon/ISIS output tables**









**Habitats & resources: broad biotopes**

Broad biotopei	No. of species	% representation	SQI	Conservation statusi	Species with conservation status
open habitatsi	168	4	104	<b>1 Nb; 3 Section 41 Priority Species - research only; 2 Na</b>	6
wetlandi	63	2	119	<b>2 NSi; 2 Nb</b>	4
tree-associatedi	55	2	100		
coastali	1	<1	 400	<b>1 NSi</b>	1

**Habitats & resources: habitats**


Broad biotopei	Habitati	No. of species	% representation	Conservation statusi	SQI	Species with conservation status
open habitatsi	tall sward & scrubi	150	6	<b>3 Section 41 Priority Species - research only; 1 Nb; 1 Na</b>	102	5
tree-associatedi	arboreali	38	3		100	
wetlandi	peatlandi	31	3	<b>1 NSi</b>	109	1
wetlandi	marshlandi	29	3	<b>1 Nb</b>	110	1
open habitatsi	short sward & bare groundi	13	<1	<b>1 Na</b>	 133	1
tree-associatedi	shaded woodland floori	10	<1		 100	
tree-associatedi	decaying woodi	10	<1		 100	
wetlandi	running wateri	7	<1	<b>1 Nb; 1 NSi</b>	 186	2
wetlandi	wet woodlandi	4	1		 100	
tree-associatedi	wet woodlandi	4	2		 100	
coastali	sandy beachi	1	<1	<b>1 NSi</b>	 400	1
coastali	brackish pools & ditchesi	1	<1	<b>1 NSi</b>	 400	1

**Habitats & resources: ISIS specific assemblage types**








Broad biotopei	Habitati	SAT	No. of species	% representation	SQI	Conservation statusi	Species with conservation status	Code	Reported conditioni
tree-associatedi	decaying woodi	bark & sapwood decayi	7	1	 100			A212	Unfavourable
open habitatsi		open habitats >> scrub edge	2	<1	 100			F001	Unfavourable
open habitatsi	short sward & bare groundi	bare sand & chalki	2	<1	 100			F111	Unfavourable
tree-associatedi	decaying woodi	epiphyte faunai	2	10	 100			A215	Unfavourable
wetlandi	peatlandi	reed-fen & poolsi	1	<1	 100			W314	Unfavourable
open habitatsi		open habitats >> rich flower resource	1	<1	 100			F002	Unfavourable
open habitatsi		open habitats >> scrub-heath & moorland	1	<1	 100			F003	Unfavourable
open habitatsi	short sward & bare groundi	open short swardi	1	<1	 100			F112	Unfavourable

**Table 12 - Site 10 – SI Grassland near Penny-Come-Quick - Pantheon/ISIS output tables**





**Habitats & resources: broad biotopes**

Broad biotopei	No. of species	% representation	SQI	Conservation statusi	Species with conservation status
open habitatsi	122	3	105	1 NSi; 1 Na; 1 Nb	3
wetlandi	37	1	116	1 NSi; 1 Nb	2
tree-associatedi	9	<1	 100		

**Habitats & resources: habitats**

Broad biotopei	Habitati	No. of species	% representation	Conservation statusi	SQI	Species with conservation status
open habitatsi	tall sward & scrubi	111	4	1 Na; 1 Nb	103	2
wetlandi	peatlandi	17	2		100	
wetlandi	marshlandi	15	2	1 NSi	120	1
open habitatsi	short sward & bare groundi	8	<1	1 NSi	 138	1
wetlandi	running wateri	5	<1	1 NSi; 1 Nb	 220	2
tree-associatedi	arboreali	5	<1		 100	
tree-associatedi	shaded woodland floori	3	<1		 100	
wetlandi	wet woodlandi	2	<1		 100	
tree-associatedi	wet woodlandi	2	<1		 100	
tree-associatedi	decaying woodi	1	<1		 100	

**Habitats & resources: ISIS specific assemblage types**

Broad biotopei	Habitati	SAT	No. of species	% representation	SQI	Conservation statusi	Species with conservation status	Code	Reported conditioni
open habitatsi		open habitats >> scrub-heath & moorland	2	<1	 100			F003	Unfavourable
open habitatsi	short sward & bare groundi	bare sand & chalki	2	<1	 250	1 NSi	1	F111	Unfavourable
tree-associatedi	decaying woodi	bark & sapwood decayi	1	<1	 100			A212	Unfavourable
wetlandi	peatlandi	reed-fen & poolsi	1	<1	 100			W314	Unfavourable

**Table 13 - Site 21-22 – Woodland edge wet grassland and tall ruderal habitat adjacent to North Plantation - Pantheon/ISIS output tables**

**Habitats & resources: broad biotopes**

Broad biotope <i>j</i>	No. of species	% representation	SQI	Conservation status <i>j</i>	Species with conservation status
open habitats <i>j</i>	<u>74</u>	2	108	<u>1 Nb</u> ; <u>1 Na</u>	2
wetland <i>j</i>	<u>31</u>	1	100		
tree-associated <i>j</i>	<u>20</u>	<1	100		

**Habitats & resources: habitats**




Broad biotope <i>i</i>	Habitat <i>i</i>	No. of species	% representation	Conservation status <i>i</i>	SQI	Species with conservation status
open habitats <i>i</i>	tall sward & scrubi	<b>67</b>	3	<b>1 Nb</b>	104	1
wetland <i>i</i>	marshland <i>i</i>	<b>15</b>	2		100	
tree-associated <i>i</i>	arboreali	<b>14</b>	1		100	
wetland <i>i</i>	peatland <i>i</i>	<b>12</b>	1		100	
wetland <i>i</i>	running water <i>i</i>	<b>6</b>	<1		100	
open habitats <i>i</i>	short sward & bare ground <i>i</i>	<b>4</b>	<1	<b>1 Na</b>	175	1
tree-associated <i>i</i>	wet woodland <i>i</i>	<b>4</b>	2		100	
wetland <i>i</i>	wet woodland <i>i</i>	<b>4</b>	1		100	
tree-associated <i>i</i>	shaded woodland floor <i>i</i>	<b>4</b>	<1		100	
tree-associated <i>i</i>	decaying wood <i>i</i>	<b>2</b>	<1		100	

**Habitats & resources: ISIS specific assemblage types**








Broad biotope <i>i</i>	Habitat <i>i</i>	SAT	No. of species	% representation	SQI	Conservation status <i>i</i>	Species with conservation status	Code	Reported condition <i>i</i>
tree-associated <i>i</i>	decaying wood <i>i</i>	bark & sapwood decay <i>i</i>	<b>2</b>	<1	100			A212	Unfavourable
open habitats <i>i</i>		open habitats >> rich flower resource	<b>1</b>	<1	100			F002	Unfavourable
open habitats <i>i</i>		open habitats >> scrub-heath & moorland	<b>1</b>	<1	100			F003	Unfavourable
wetland <i>i</i>	peatland <i>i</i>	reed-fen & pools <i>i</i>	<b>1</b>	<1	100			W314	Unfavourable

Table 14 - Site 28-29 – SI grassland meadow and pasture north of Chiverton Cross - Pantheon/ISIS output tables




Habitats & resources: broad biotopes

Broad biotopei	No. of species	% representation	SQI	Conservation statusi	Species with conservation status
open habitatsi	60	1	100	1 Nb	1
wetlandi	11	<1	 127	1 NSi	1
tree-associatedi	2	<1	 100		
coastali	1	<1	 400	1 NSi	1


Habitats & resources: habitats

Broad biotopei	Habitati	No. of species	% representation	Conservation statusi	SQI	Species with conservation status
open habitatsi	tall sward & scrubi	53	2	1 Nb	100	1
open habitatsi	short sward & bare groundi	8	<1		 100	
wetlandi	peatlandi	5	<1		 100	
wetlandi	marshlandi	4	<1	1 NSi	 175	1
wetlandi	running wateri	2	<1		 100	
coastali	brackish pools & ditchesi	1	<1	1 NSi	 400	1
tree-associatedi	arboreali	1	<1		 100	
tree-associatedi	shaded woodland floori	1	<1		 100	






Habitats & resources: ISIS specific assemblage types

Broad biotopei	Habitati	SAT	No. of species	% representation	SQI	Conservation statusi	Species with conservation status	Code	Reported conditioni
open habitatsi		open habitats >> scrub-heath & moorland	1	<1	 100			F003	Unfavourable
open habitatsi	short sward & bare groundi	bare sand & chalki	1	<1	 100			F111	Unfavourable
open habitatsi	short sward & bare groundi	open short swardi	1	<1	 100			F112	Unfavourable









**Table 15 – A30 - Sites Combined – Pantheon/ISIS output tables - Habitats & resources: broad biotopes**

Broad biotopei	No. of species	% representation	SQI	Conservation statusi	Species with conservation status
open habitatsi	381	9	107	4 NSi; 2 Na; 8 Section 41 Priority Species - research only; 3 Nb	17
tree-associatedi	172	5	104	1 Section 41 Priority Species - research only; 2 Nb	3
wetlandi	118	4	123	3 Nb; 6 NSi	9
coastali	2	<1	 400	2 NSi	2

**Habitats & resources: habitats**

Broad biotopei	Habitati	No. of species	% representation	Conservation statusi	SQI	Species with conservation status
open habitatsi	tall sward & scrubi	315	12	2 NSi; 8 Section 41 Priority Species - research only; 2 Nb; 1 Na	105	13
tree-associatedi	arboreali	109	8	1 Nb; 1 Section 41 Priority Species - research only	103	2
wetlandi	marshlandi	54	6	2 Nb; 4 NSi	134	6
wetlandi	peatlandi	53	5	1 NSi	106	1
tree-associatedi	shaded woodland floori	47	4		100	
open habitatsi	short sward & bare groundi	40	3	1 NSi; 1 Nb; 1 Na	124	3
tree-associatedi	decaying woodi	21	2	1 Nb	114	1
wetlandi	running wateri	17	2	3 NSi; 1 Nb	171	4
wetlandi	wet woodlandi	14	5		 100	
tree-associatedi	wet woodlandi	14	5		 100	
coastali	brackish pools & ditchesi	2	2	2 NSi	 400	2
wetlandi	lakei	1	<1		 100	
coastali	sandy beachi	1	<1	1 NSi	 400	1

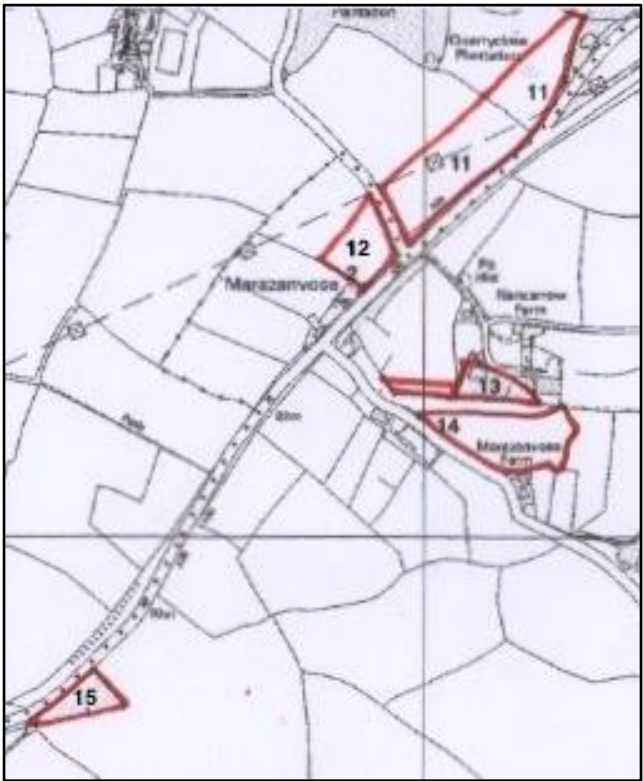
**Habitats & resources: ISIS specific assemblage types**

Broad biotopei	Habitati	SAT	No. of species	% representation	SQI	Conservation statusi	Species with conservation status	Code	Reported conditioni
open habitatsi		open habitats >> scrub-heath & moorland	21	6	113	1 NSi	1	F003	Favourable
tree-associatedi	decaying woodi	bark & sapwood decayi	14	3	 121	1 Nb	1	A212	Unfavourable
open habitatsi		open habitats >> scrub edge	8	3	 114	1 NSi	1	F001	Unfavourable
open habitatsi		open habitats >> rich flower resource	7	3	 100			F002	Unfavourable
open habitatsi	short sward & bare groundi	bare sand & chalki	4	<1	 200	1 NSi	1	F111	Unfavourable
open habitatsi	short sward & bare groundi	open short swardi	3	2	 175	1 Nb	1	F112	Unfavourable
tree-associatedi	decaying woodi	epiphyte faunai	2	10	 100			A215	Unfavourable
wetlandi	marshlandi	undisturbed fluctuating marshi	1	3	 100			W221	Unfavourable
wetlandi	peatlandi	reed-fen & poolsi	1	<1	 100			W314	Unfavourable

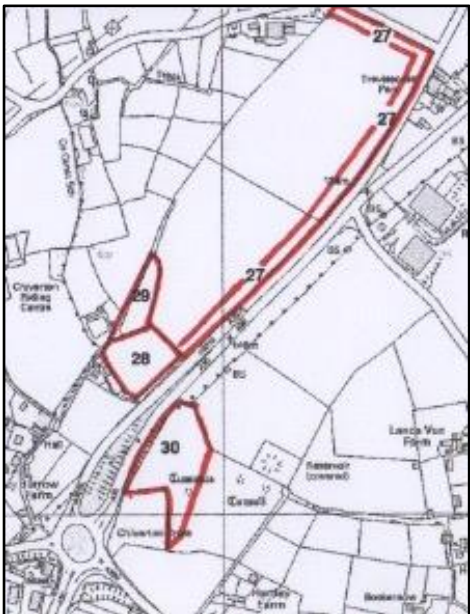
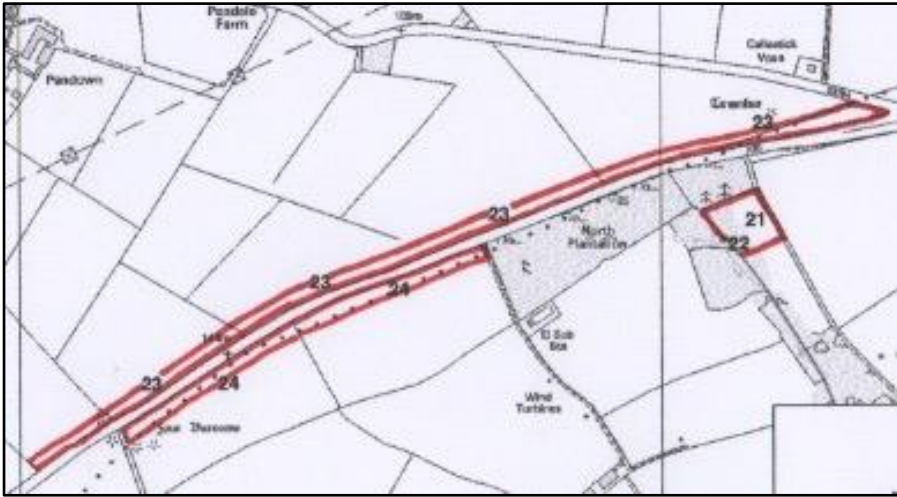
## Appendix 2 - Figures

Figure 1 – A30 scoping sites for combined grassland and invertebrate surveys (not to scale)









## Appendix 3 - Photographs



Photograph 1 – Site 1 – Priority woodland edge



Photograph 2 – Site 3 – humid heathland



Photograph 3– Site 4 – Mixed woodland edge



Photograph 4 – Site 4- Heathland fragment and pond mixed woodland



Photograph 5 – Site 5 - Mature heathland



Photograph 6– Site 5 – Grassy heath and ditch microtopography



Photograph 7 – Site 6 – Rush pasture and woodland edge



Photograph 8– Site 9 - wetland habitat woodland edge



Photograph 9 – Site 9 – drier, woodland edge herb-rich grassland



Photograph 10 –Site 10 – Semi-improved meadow



Photograph 11 – Site 21/22 – General habitat



Photograph 12 – Site 28/29 – Herb-rich sward

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