Richard Wilson Ecology Limited

New Forest SSSI Spider Surveys

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Notice

This document and its contents have been prepared and are intended solely for Forestry Commission England's information and use in relation to the spider surveys undertaken between February and June 2018. The study contained in this document details the information collated from various sources (cited in the text) and field survey based on four visits across two broad areas (Matley Heath and Beaulieu Heath) within the New Forest Site of Special Scientific Interest (SSSI) and Special Area of Conservation (SAC), Hampshire during 2018. Whilst the focus and contractual requirement was to survey for, and report on, the spiders; other invertebrate groups collected as bycatch, or incidental observations are reported. It should be noted that no focussed survey effort was made to record other groups, so this should not be viewed as a comprehensive terrestrial invertebrate survey.

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Executive Summary

- The Forestry Commission commissioned Richard Wilson Ecology Limited to undertake spider surveys at various locations within the New Forest, a landscape that has been designated for its internationally (European) important habitats, flora and fauna; as well as a National Park. The New Forest is located within the administrative county of Hampshire (vice-county 11: South Hampshire), in southern England.

- The initial approach was developed between Forestry Commission England and Natural England, based on a desire to survey for a Nationally Rare jumping spider (*Sitticus caricis*) which is also designated as a Species of Principal Importance (= UK Biodiversity Action Plan/ Priority Species). This was subsequently expanded to an additional thirteen taxa based on historical records.

- Early correspondence between Forestry Commission England (Leanne Sargeant) and Richard Wilson Ecology Limited developed this strategy of surveying for targeted species and derived a list of ten target taxa, including *Sitticus caricis*, from three broad areas: Matley Heath, Shatterford Bottom, and Beaulieu Heath (collectively referred to as 'the study sites'), which would be subjected to a focussed survey effort between February and June 2018.

- This report conveys the results of the 2018 survey work, which comprises a review of historical survey work by other arachnologists undertaken within the New Forest, the results of the fieldwork, and analysing the results.

- Surveys focussing on recording spiders are surprisingly poorly reported given the known entomological interest of the New Forest. Based on the national Spider Recording Scheme dataset, administered by the British Arachnological Society, and considering the two main hectads (10 km x 10 km OS grid squares) covering the New Forest, a total of 352 species of spider have been recorded up to 2018, but excluding the current study. It has been estimated, based on monads (1 km x 1 km OS grid squares) that 244 species of spider have been recorded from the study sites.

- Whilst there have been records in every decade since the 1940s, almost two-thirds of species have not been documented in 30 to 80 years since they were first recorded between the 1940s and 1980s. Only two periods would seem to have experienced a concerted effort: the 1940s and the 1960s; with all remaining data collected on an *ad hoc* basis, or derived from brief forays by visiting specialists.

- For the ten target species, the last records from the study sites for the majority of species (8) are more than 50 years old (range: 1944 to 1999).

- A range of methods were employed to collect spiders which comprised vacuum sampling, pitfall trapping, sieving leaf-litter, extracting specimens using a Tullgren Funnel, and beating vegetation.

- Surveys commenced in late February and continued until June 2018. A total of 766 mature, and 12 sub-adult spiders were identified to species level, from 29 samples, culminating in 119 species of spider recorded across all study sites. This represents just under half the known species previously recorded. The surveys in 2018 have added an additional 17 species; of which four are entirely new to the New Forest.

- Of the ten target species, five were re-recorded during 2018: *Uloborus walckenaerius*, *Haplodrassus dalmatensis*, *Sitticus caricis*, *Saaristoa firma*, and *Tapinocyba mitis*. All of these are Key Species, defined as those with a nature conservation status.

- Of the 119 species of spider recorded, 24 are Key Species, representing 20 % of the fauna. As a rule of thumb, if 10 % of an assemblage are Key Species, this is suggestive that it is of national significance. The spider assemblage recorded from the study sites substantially exceeds this threshold.

- Two spiders, not target species: *Philodromus emarginatus*, and *Xysticus robustus* are very rare or exceptionally rare species; the latter having not been recorded anywhere in Britain in two decades. A further two species, both money-spiders (*Drepanotylus uncatus* and *Silometopus elegans*) are rare in vice-county 11.

- In addition to the spiders, a further 95 species of invertebrate, mostly beetles, were identified from pitfall traps, or collected by other means, including direct observation (e.g. butterflies). Of these, ten are Key Species, and included Nationally Rare and Near Threatened ground beetle: *Acupalpus flavicollis*. The additional taxa were not as thoroughly sampled or surveyed, and certain habitats such as wood decay, or groups (e.g. aquatic beetles) were not surveyed. Therefore, the additional data is not representative of species richness, and caution should be applied in interpreting the results.

- In evaluating the results (spider survey), analysis using Pantheon, an on-line website that provides detailed information on species ecology and assemblage's resource needs has been undertaken. There is insufficient data to provide an evaluation of the invertebrate fauna's nature conservation value using Pantheon, as this requires surveying a broader taxonomic assemblage. Nevertheless, commentary on habitat suitability, other suitable habitat, and threats and risks has been made, with reference to the New Forest's management plan.

- Recommendations for further survey work has been conveyed, taking in to consideration the information learned from reviewing previous survey work, and the work completed in 2018. Recommendations have been made to survey additional sites known to be important historically for spiders, including Vales Moor and Mark Ash Wood. Vales Moor is the known locality for the exceptionally rare *Haplodrassus umbratilis*, which is only known in Britain from the New Forest, apart from an outlier in Essex, and has not been recorded in Britain since 1990.

- Additional sites, in locations poorly recorded in recent times, such as the areas around Hampton Ridge and Ditchford Brook are also suggested for survey.

- It is recommended to repeat the survey work undertaken in 2018, targeting fewer species (and possibly sites), with the specific purpose of recording those target species not recorded in the current study. The three species considered to be more important are *Erigone welchi*, *Glyphesus cottonae* and *Mecopisthes peusi*.

- Finally, the survey work completed in 2018 should ideally be repeated before the end of the 2025 survey season as this would provide an informed appraisal of the 'medium term' effects of the habitat restoration works that are ongoing.

1 Introduction

1.1 Background

Richard Wilson Ecology Limited (as Richard Wilson Ecology) was commissioned in November 2017 by Forestry Commission England ('the Client'), to undertake spider surveys at specific locations within the New Forest Site of Special Scientific Interest (SSSI), Special Area of Conservation (SAC) and National Park (NP), Hampshire (vice-county 11: South Hampshire). The primary objective of the survey was to provide up to date information on rare species within the study area that had previously been recorded many decades ago. A secondary objective was to inform the ongoing wetland habitat restoration being undertaken within the New Forest.

The initial approach, developed between Forestry Commission England and Natural England, was to specifically survey the Nationally Rare and [1]Species of Principal Importance (SoPI) jumping spider (Araneae, Salticidae), *Sitticus caricis*. This subsequently expanded to an additional thirteen spiders known historically from the New Forest (see Table 1). This strategy focussed on three broad areas: Matley Heath, Shatterford Bottom, and Beaulieu Heath on the eastern side of the New Forest, where *S. caricis* had previously been recorded.

In supporting this work, consideration of the habitats present within the study areas was also requested to assess suitability for target taxa.

The survey results were initially requested to be delivered in a report to include:

1. description of methods;
2. description of habitat suitability, vegetation cover and structure within each survey site;
3. record of where the species were present and absent during the field survey;
4. the location and extent of each identified site and/ or meta-population mapped;
5. identify other suitable habitat nearby;
6. notes on competing species if present;
7. estimation of size of each meta-population;
8. assessment of the current status of populations within the New Forest;
9. an analysis of historic trends by assessing potential change in distribution and population size within the New Forest. To include a comparison of New Forest sites recorded in literature; and
10. a discussion of the threats and risks to the populations around the New Forest is to be provided in the write-up.

Of the above, items 6 and 7 would not be achievable for the following reasons. The field work undertaken in 2018 represented the first spider-focussed survey that the author is aware of within the New Forest in many decades. The historical records, many of which date back to between the mid-1940s and 1960s, give imprecise details of locations (e.g. '*…heaths and swamps round Beaulieu Road Station…*' (la Touche, 1946)), methods or survey effort, and thus comparison of trends at this geographic scale is not possible. Our knowledge of species' ecology is insufficient to elucidate which species are directly competing with each other than general commentary. All British spiders are predators of arthropods, including other spiders, and avoid competition by occupying subtley different microhabitat niches. For example, some species build webs such as the small orb-web species *Hypsosinga pygmaea*, whereas other species, though active hunters, are either diurnal such as the

[1] SoPI (formerly UK Priority Species) are taxa that are considered to be nature conservation priorities following the development of the UK Biodiversity Action Plan in the 1990s and subsequently, the UK post-2010 Biodiversity Framework. In England, these are listed under Section 41 of the Natural Environment and Rural Communities Act 2006.

wolf-spider *Pardosa pullata*, or nocturnal such as *Gnaphosa leporina*. An estimate of a species meta-population size is not practical without a comprehensive study of multiple sites/ locations across the New Forest.

Information on the ecology of the Key Species (those with a nature conservation status) following Harvey *et al*., 2017 has been provided, and within the context of Hampshire, reference to the [2]Spider Recording Scheme (SRS) has been undertaken.

Whilst the survey's focus was on the spiders, other invertebrate taxa were recorded but largely on an *ad hoc* basis and less intensively. Bycatch from pitfall traps was sorted and Coleoptera (beetles) sent to Bob Marsh, Yorkshire Naturalists' Union beetle recorder for identification. Other invertebrate groups caught in pitfall traps were sorted and retained, but these numbered few individuals. A few have been identified as time has allowed, and these are included in the overall species list (Table 20; Appendix B). Whilst vacuum sampling or beating vegetation, beetles were also collected but intermittently, and largely dependent on whether they caught the surveyor's attention. Incidental observations of readily identifiable taxa such as butterflies and day-flying moths (Lepidoptera), and some flies such as hoverflies (Diptera, Syrphidae) were noted in the field, but this was far from comprehensive and merely represent chance encounters as the surveyor moved around. Consequently, apart from the beetle fauna, the number and diversity of species recorded were limited and reflects the more mobile or obvious species (incidental observations) or those likely to be captured as a consequence of using pitfall traps or beating vegetation. Invertebrate faunas associated with features that are not particularly important for spiders, such as for example, wood decay habitats, were not investigated; thus saproxylic (wood decay) invertebrates, which will be an important indicator of woodland or wooded habitats are not likely to be represented. Likewise, pollinators, of which flies and solitary bees are a significant element, were generally ignored. Therefore, a robust evaluation of the invertebrate assemblages using Pantheon (Webb *et al*., 2018) is not possible, but this was used to analyse the spider assemblages.

1.2 The New Forest

The New Forest has long been considered one of England's most important extensive semi-natural landscapes having received protection through its designation as a medieval hunting area since the 12th Century. It comprises internationally important wet and dry heathlands, valley mires, grasslands, ancient pasture and woodland on an elevated plateau formed by the underlying geology (Wright and Westerhoff, 2001; Natural England, 2015). These habitats support a diverse flora and fauna, some of which, such as the New Forest Cicada (*Cicadetta montana*) are only known from Britain in the New Forest (Buglife, 2014). Wright and Westerhoff (2001) state that 276 invertebrate species of [nature] conservation concern have been recorded within the New Forest's woodlands and heathlands; though only one spider, *Haplodrassus umbratilis*, is mentioned.

The [3]New Forest SSSI was first designated in 1959 and has subsequently been revised; the current boundaries confirmed in November 1996. The SSSI extends for almost 29,000 ha and has been designated for its combination and extent of the lowland heath, fen, mire and pasture woodland which occur nowhere else in Britain at this scale; plus the various nationally important flora and fauna assemblages, including invertebrates.

The [4]New Forest SAC was designated in April 2005 and occupies a slightly large area than the SSSI. It has primarily been designated for eleven Annexe 1 habitats, and two Annexe 2 species (stag beetle (*Lucanus cervus*) and southern damselfly (*Coenagion mercuriale*)).

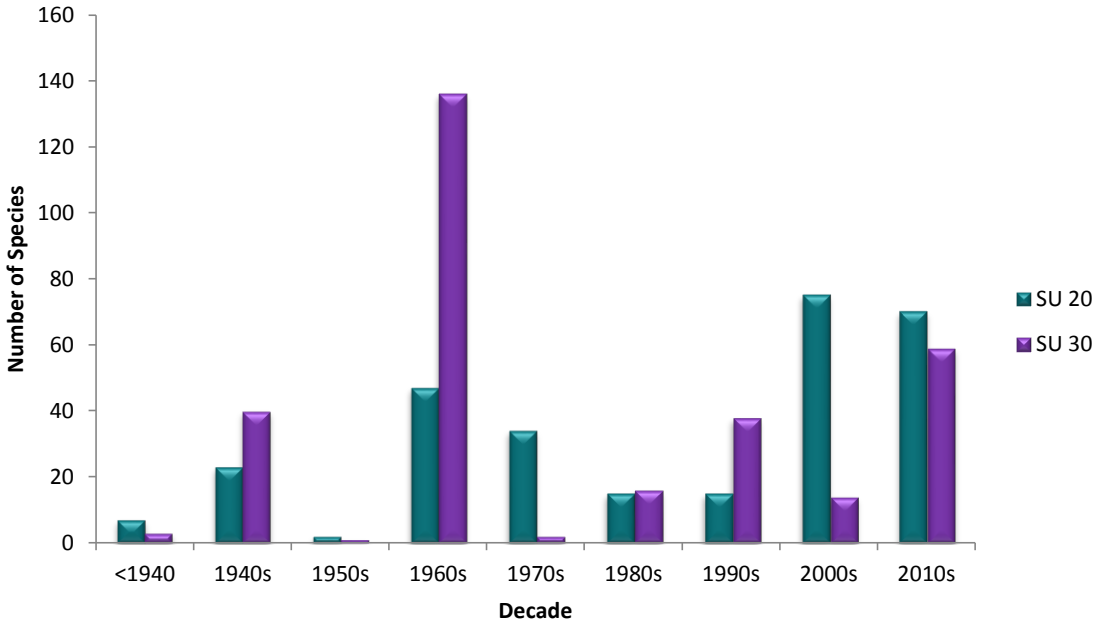
1.2.1 New Forest Spiders

Based on the national SRS database administered by the British Arachnological Society, and considering the two main hectads covering the New Forest, SU 20 (288 spp) and SU 30 (309 spp), a total of 352 species of spider have been recorded between 1858 and 2018. Recording effort, based on the published last records, has been variable, but nevertheless continuous in every decade since the 1940s (see Figure 1). A detailed analysis of all the raw data is beyond the scope of this project. Whilst there has been some recent effort, particularly in the western sector of the New Forest (SU 20), it is evident that there are a large number of species that have

[2] The Spider Recording Scheme (SRS) website (http://srs.britishspiders.org.uk/portal.php/p/Welcome) has been used to contextualise the results within Hampshire.
[3] SSSI citation, available here: https://designatedsites.naturalengland.org.uk/PDFsForWeb/Citation/1003036.pdf; and last accessed on the 4th March 2019.
[4] SAC information available here: http://jncc.defra.gov.uk/protectedsites/sacselection/sac.asp?eucode=UK0012557; and standard data form: http://jncc.defra.gov.uk/protectedsites/sacselection/n2kforms/UK0012557.pdf; both last accessed on the 4th March 2019.

not been recorded for between three and eight decades. Between the 1940s and 1980s, within the eastern sector (SU 30), 195 species (63 % of the spider fauna) have not been subsequently recorded; and within the western sector (SU 20), the total is 121 species (42 %). Given that the New Forest is known by entomologists and arachnologists to be of particular significance, it is somewhat surprising that there is limited recent data for spiders, particularly in the eastern sector. Therefore, the surveys undertaken in 2018 are significant in that it will hopefully improve our understanding of species' status within the New Forest.

Figure 1: Number of species last recorded in each hectad (SU 20 and SU 30) per decade in the New Forest



Other than a handful of records in the early part of the 20th century, the first period of what might be considered a more persistent effort are the records collected during the mid-1940s when the Yorkshire-born Alexander Arthur Digges La Touche (1899 – 1981) surveyed some of the heaths whilst stationed at Porstmouth during World War 2. He recorded 133 species in Hampshire (not just the New Forest) of which one species of money-spider, *Glyphesis cottonae*, he described as new to science (as *Diplocephalus cottoni*) and named after his wife, based on specimens collected between October 1943 and April 1944 (La Touche, 1946) from a '*…swamp near the Beaulieu Road Station.*'. This is presumably the mire identified on the 1:25,000 Ordnance Survey map as Shatterford Bottom. Examples of other species he mentioned which are not commonplace included *Uloborus walckenarius* (Matley Passage and Beaulieu Road Station), *Zelotes serotinus*, *Gnaphosa leporina*, *Philodromus emarginatus*, *Sitticus caricis*, *Dolomedes fimbriatus*, and *Aphileta misera* (as *Hilhousia miser*) (all Beaulieu Road Station).

A brief excursion to several sites in May 1964 is described by Crocker (1965) when he recorded such Key Species as *Araeoncus crassiceps*, *Pirata uliginosus* and *Philodromus histrio*.

A second period of survey in the late 1960s and early 1970s is reported by Merrett (1972) from an area of dry heathland around Vale Moor (SU 19 05), about 2 km east of Ringwood. A total of 82 species were recorded, including a new species for Britain, *Haplodrassus umbratilis*, recorded in summer 1968; and again in summer 1971. This is a Nationally Rare spider which is only known from the western edge of the New Forest and a single location in Essex; and has not been recorded anywhere in Britain since 1990 (SRS, 2019). Peter also recorded noteworthy species such as *Scotina celans*, *Haplodrassus dalmantensis*, *Gnaphosa leporina*, *Thanatus striatus*, *Xerolycosa nemoralis*, *Peponocranium ludicrum*, *Trichopternoides thorelli* (as *Trichopterna thorelli*), *Hypselistes jacksoni*, and *Saaristoa firma* (as *Oreonetides firmus*). This area of heathland is at an altitude of 90 m (*c*. 300 feet), compared to sites further east which are around 20 m (*c*. 70 feet) and this somewhat minor difference may partially explain why *H. umbratilis* is so far, restricted to the western fringes of the New Forest.

It would appear that there has been limited survey effort, based on records submitted to the SRS during the 1980s and 1990s. More recently, there has been an upsurge of recording, mostly in the western sector of the New Forest. However, these records would appear to be derived from visiting arachnologists undertaking brief forays rather than a formal survey, meaning that the majority of rarer species targeted by the 2018 study remained unrecorded.

1.3 Study Site Selection

The initial selection of study sites within the New Forest evolved through considerations of an original list of target species presented in Table 1 with comments on the species' ecology, and distribution (correct in autumn 2017).

Table 1: Original target species list as proposed by Natural England/ Forestry Commission.

Family	Species	Nature Conservation Status	Habitat
Eresidae	*Eresus sandaliatus*	VU; Nationally Rare; SoPI [also Schedule 5]	Bare sandy areas of dry heathland, well drained soil, shelter from wind and south facing slope preferred. Schedule 5 species and all known sites monitored. No surveys liable to kill specimens should be undertaken. Existing conservation project ongoing with captive breeding programme. Realistically should fall outside this study.
Uloboridae	*Uloborus walckenaerius*	NT; Nationally Scarce	Mature heather on heathland sites. No modern records in the locality.
Dictynidae	*Altella lucida*	CR (PE); Nationally Rare; SoPI	Bare sandy areas of dry heathland. Seems to require dry algal mats. Last record in UK from 1971 at Morden Heath (SY 90 93). Specialist ground-dwelling dictynid associated with algal mats on edges of waterbodies. Would require a bespoke targeted search (hand-searching and possibly supplemented by pitfall trapping). Population, if extant, likely to be small and restricted.
Gnaphosidae	*Haplodrassus dalmatensis*	Nationally Scarce; SoPI	Dry heathland at ground level, including under stones. Old records associated with Dorset & Hampshire heaths but lack of recording possibly a contributory factor. Modern recorcds elsewhere in England almost all coastal – though whether this is a genuine reflection of habitat preference or merely an artefact of recording remains to be identified
Lycosidae	*Alopecosa fabrilis*	CR; Nationally Rare; SoPI	Dry, sandy heathland, with open stony areas where it occupies a burrow. No modern records in Britain.
Salticidae	*Sitticus caricis*	Nationally Rare; SoPI	Occurs in bogs and other wetland, amongst purple moor-grass (*Molinia caerulea*) and *Sphagnum*. Last records from locality in mid-1980s.
Theridiidae	*Dipoena inornata*	Nationally Scarce; SoPI	Heathland and coastal grassland. Found on overhanging heather on sandy banks, heather canopy, gorse scrub, and under stones. Several modern records throughout Dorset heaths.
Linyphiidae	*Glyphesis cottonae*	VU; Nationally Rare; SoPI	*Sphagnum* bogs (heathland), where there is strong growth above water level. Most recent record (1999) from Denny Bog (SU 34 06). Surveys should occur between late autumn and early spring and include pitfall trapping, vacuum

Family	Species	Nature Conservation Status	Habitat
			sampling and possibly hand searching.
Linyphiidae	*Mecopisthes peusi*	Nationally Scarce; SoPI	Dry heathland, amongst ground level heather litter and on edges of bare ground. Autumn and winter active species though possibly year-round. Another micro-habitat specific species associated with thin heather leaf-litter on edge of bare ground. Requires active management of heather; believed to be most frequent between 5 and 10 years after burning. Most recent record (February 2007) from Povington Heath (SY 886 833)
Linyphiidae	*Meioneta mollis*	NT; Nationally Rare; SoPI	In Britain, has been recorded in limestone grassland; in central Europe, in damp grassland and wet woodland. Autumn and winter active species associated with grasslands and possibly woodland/ woodland edge (or glades within woodland?). Very old records from the Hampshire & Dorset heaths.
Linyphiidae	*Notioscopus sarcinatus*	Nationally Scarce; SoPI	Wet heathland, amongst tall mosses (*Sphagnum*; *Polytrichum* spp.), often under tree cover. Late summer, autumn and winter active species associated with *Sphagnum* that has a canopy (scattered trees/ shrubs) over it. Most modern records are in northern England and Scotland. Possibly a species associated with cool climates? No modern records in locality.
Linyphiidae	*Saaristoa firma*	Nationally Scarce; SoPI	Wet habitat, amongst 5osses, heather, leaf/ pine litter. No modern records in locality.
Linyphiidae	*Tapinocyba mitis*	EN; Nationally Rare; SoPI	Open dry heathland in deep litter. Most numerous amongst mature heather. Winter active species with brief survey window available (January to March).
Linyphiidae	*Walckenaeria corniculans*	CR; Nationally Rare; SoPI	Old, dry heathland litter, and amongst woodland leaf litter. May be associated with pine or beech (*Fagus sylvaticus*) leaf-litter. A rare species and not recorded for twenty years in the UK.

The above list was refined based on the distribution of historical records and ease of re-survey. Furthermore, an additional five species (*Erigone welchi*, *Centromerus serratus*, *Dictyna pusilla*, *Monocephalus castaneipes*, and *Philodromus margaritatus*) were considered as these are additional SoPI, and not included by Natural England. The revised list came to eighteen species across eleven different locations (see Table 14; Appendix A). The final list was determined based on what could be achieved in 2018 and focussed on two broad areas: Beaulieu Heath and Matley Heath. This revised target list is presented in Table 2 with the year of the last record for that study site.

Table 2: Target species for 2018 survey with year of last record for that study site.

Family	Species	Nature Conservation Status	Beaulieu Heath	Matley Heath
Uloboridae	*Uloborus walckenaerius*	NT; Nationally Scarce	1944	1960
Gnaphosidae	*Haplodrassus dalmatensis*	Nationally Scarce; SoPI	1944	1944
Salticidae	*Sitticus caricis*	Nationally Rare; SoPI	1944	1986
Linyphiidae	*Erigone welchi*	EN; Nationally Rare; SoPI		1960
Linyphiidae	*Glyphesis cottonae*	VU; Nationally Rare; SoPI	1944	1999
Linyphiidae	*Mecopisthes peusi*	Nationally Scarce; SoPI		1956
Linyphiidae	*Meioneta mollis*	NT; Nationally Rare; SoPI	1944	1956
Linyphiidae	*Monocephalus castaneipes*	Nationally Scarce; SoPI		1960
Linyphiidae	*Saaristoa firma*	Nationally Scarce; SoPI		1968
Linyphiidae	*Tapinocyba mitis*	EN; Nationally Rare; SoPI	1944	1968

1.4 Study Sites

The named areas described below are based on the 1:25,000 Ordnance Survey map. The boundaries between them are not formally defined but are generally understood by stakeholders. All sites were grazed by ponies, horses and cattle. The habitat descriptions are those observed by the surveyor where the 2018 surveys occurred, and not necessarily a reflection of the entire area.

1.4.1 Matley Heath

The area referred to as Matley Heath in this report includes all open habitat biotopes and smaller woodlands to the west of the mainline railway and east of Lyndhurst. The Heath is on fairly flat ground at an altitude of between 15 m and 25 m and is located between two large woodland inclosures, Denny Wood and Denny Lodge to the south; and Ashurst Wood to the north.

The main areas of open habitat comprise dry heath with heather (*Calluna vulgaris*), and acid grassland communities with scattered gorse (*Ulex europaeus*) which lie adjacent to Matley Wood. The Wood's eastern fringe slopes down, and an area of wet heath has developed around springs that issue, resulting in a semi-enclosed *Sphagnum*-dominated mire with patches of cross-leaved heather (*Erica tetralix*) and round-leaved sundew (*Drosera rotundifolia*). A more extensive area of wet heath and valley mire sandwiched between the Wood and Matley Bog is orientated north-south, which was particularly wet in early spring. This rises up to an area of drier heath to the north-east and north of Matley Wood.

To the south of Matley Wood is an area of conifer plantation (Matley Ridge) with a deep litter layer and fringed by drier heath, which merges to Denny Denny Inclosure.

1.4.2 Shatterford Bottom

Further east and south of Matley Heath is a tract of open habitat that extends either side of a valley mire called Shatterford Bottom. To the south of the valley, the land forms part of the Scheduled Monument of Bishop's Dyke. The survey focussed on the land immediately to the west of the railway and Beaulieu Road Station, following the sinuous channel of the valley mire, north of the Bishop's Dyke.

The valley mire is characterised by wet, almost aquatic *Sphagnum* within its centre, which develops in to hummocks that support bog myrtle (*Myrica gale*) on its outer fringes. This rapidly grades towards drier heathland vegetation with heather and a carpet of lichen flora. Away from the channel, and closer to the car park, defined by a copse of pine trees, the heathland forms a low scrub with shallow ephemeral pools that have developed in hollows.

1.4.3 Beaulieu Heath

Beaulieu Heath is an extensive area that includes all land to the east of the railway line and south of the unnamed minor road linking the B3056 to Dibden Purlieu. The locations surveyed were on lower ground

(altitude of < 10 m) on the edge of an east facing escarpement, in close proximity to King's Hat Inclosure and the wet woodland and floodplain associated with the Beaulieu River.

A large waterbody (Starpole Pond) is the southernmost of several that occur on the western edge of this riparian woodland associated with the Beaulieu River, and is fringed by *Sphagnum*-mire and wet heath, grading up towards drier heath, acid grassland and scattered gorse.

A second area lies to the east of Beaulieu River and is characterised by an area of maturer damp heathland surrounded on three sides by woodland inclosures.

1.4.4 Yew Tree Heath

Yew Tree Heath lies to the east of Beaulieu Road Station and north of the minor road linking the B3056 to Dibden Purlieu. It occurs on a north facing escarepment that descends towards the Beaulieu River and the riparian woodland known as Withycombe Shade. The heathland is characterised by mature heather and scattered, and sometimes more dense stands of gorse. The area was not surveyed as intensively as either of the previous three study sites.

2 Methodologies

2.1 Survey Methods

A number of techniques were undertaken during the field surveys to record and collect specimens which included pitfall trapping; vacuum sampling; beating vegetation; sieveing leaf-litter and other detritus; sieving leaf-litter and the use of a Tullgren Funnel. Details are provided in the sub-headings below.

Specimens collected were either identified in the field or retained for subsequent microscopic identification.

2.1.1 Pitfall Trapping

Pitfall traps were set in various habitats (see Table 6 for details) in a transect, separated by *c*. 10 m and marked with a red flag to aid recovery. Each pitfall trap consisted of a plastic drinking cup (diameter: 70 mm) which was sunk in to the ground using a trowel such that the opening was flush or slightly below the surface. A second plastic cup was then inserted in to the first, thus enabling this to be removed and replaced without needing to repeatedly excavate the soil on servicing and approximately a third filled with a solution of monopropylene glycol as the preservative at a concentration of *c*. 50 %, diluted with tap water and a few drops of washing-up liquid to reduce the surface tension. Each trap was then covered with chicken-wire and pegged down using garden-cloche pegs.

2.1.2 Vacuum Sampling

Vacuum samples were collected using a modified commercially available garden blow-vac (G-Vac). The model used was one powered by a two-stroke petrol (unleaded) engine (McCulloch (part of the Husqvarna Group) (Model No. GBV 325)). A purpose-made collecting bag was attached to the nozzle using duck-tape such that material (leaf-litter, detritus and specimens) were sucked in but retained. On completion, the material collected is tipped in to a kitchen sieve over a white tray and vigorously shaken, allowing the smaller fraction to pass through and be sorted. Smaller specimens can then be collected using a pooter and transferred to collecting vials for subsequent determination at a later date. The coarser fraction was then similarly sorted with larger specimens collected in the same way.

At each site, a timed vacuum sample was taken, broadly following the protocol described in Drake *et al.* (2007) but extending the collection time from two to approximately three minutes.

Samples were collected from the habitat associated with the pitfall traps but also elsewhere within the wider site. Locations were selected by eye, and included mire vegetation, heath and grassland, including woodland rides/ glades.

2.1.3 Beating Vegetation

Lower branches of trees and shrubs, particularly gorse but also holly (*Ilex aquifolium*) and hawthorn (*Crataegus monogyna*) were beaten over a large white sheet (Bignall tray) which typically dislodges arboreal species which then either scatter, or play dead (catalepsy). The trick is then to capture the species scattering, and pick out the species playing dead.

2.1.4 Sieving Leaf-litter, Moss and Detritus

Loose leaf-litter, dead wood, moss and other lying material was scooped in to a large garden sieve which was inserted in to a large plastic bucket and shaken vigorously to dislodge species. This fraction is then further sorted in a kitchen sieve and specimens collected.

2.1.5 Tullgren Funnel

Some leaf-litter was brought back and placed in a Tullgren Funnel. The leaf-litter was placed on a mesh which lies on the aperture of a large funnel. A collecting pot is affixed to the funnel's tube. A heat gradient or some other deterrent (e.g. moth-balls) ensures specimens are driven away from the source and downwards, before falling through the mesh and in to the collecting pot.

2.1.6 Brushing Bark

There is a small fauna associated with tree trunks which can be dislodged by brushing bark (with a wide paint brush).

2.2 Analysis Methods

2.2.1 Species Nature Conservation Status

Telfer (2017) provided a means of evaluating an assemblage's potential nature conservation value by considering the proportion of species with a nature conservation status present, on the basis that the higher the percentage, the more important the assemblage. Definitions are provided in Appendix C but in summary, all Key Species are assigned a formal status which initially included Red Data Book (Shirt, 1987; Bratton, 1991), and Nationally Notable species (by various species status reviews administered by the Joint Nature Conservation Committee). Since 2001, consideration of a species' threat to survival such as through habitat loss, based on the International Union for the Conservation of Nature's (IUCN) criteria (IUCN, 2012) has been adopted and this is gradually replacing the old Red Data Book categories. Running parallel with the IUCN criteria are two British rarity categories, which are based on the hectad system, which again are being defined by [5]updating species status reviews.

Key Species are split in to two groups: Rare Key Species, which are those taxa assigned Red Data, IUCN Threatened and Data Deficient, and Nationally Rare status; and Scarce Key Species, which are those assigned IUCN Near Threatened, Least Concern, and Nationally Scarce/ Notable status. As a rule of thumb, if close to 10 % of the species recorded are Key Species; or more than 1 % are Rare Key Species, it is suggestive that the site/ land parcel which is being considered is potentially of national significance for its invertebrate fauna.

2.2.2 Pantheon

Since April 2017, the Invertebrate Species-habitat Information System (ISIS) developed by Derek Lott and referenced in Drake *et al.*, (2007) has been updated and advanced by Pantheon (Webb *et al.*, 2018). Pantheon is a database tool developed by Natural England and the Centre for Ecology & Hydrology to analyse invertebrate sample data. It incorporates ISIS but takes the analysis further by attaching associated habitats and resources, habitat fidelity scores and other ecological information against each species. This is based on approximately 11,000 invertebrate species out of an estimated 37,000 species known from the UK.

The 2018 surveys focussed on spiders and limited attention was paid to other taxa. To complete a more thorough analysis, a wider taxonomic spread, including at least two of the following groups: Coleoptera (beetles), Diptera (flies), Hemiptera (bugs), or aculeate Hymenoptera (bees, wasps and allies), would be advisable; and this was beyond the scope of this study. Nevertheless, Pantheon is useful as it provides information on individual species' ecology such as resource needs, and assemblage characteristics, and it is for this purpose that it has been used.

2.3 Survey Constraints

Weather conditions leading up to the survey (i.e. winter 2017/ 2018), and during spring and summer 2018 are considered to have influenced the spider survey, with specific outcomes for the project. Winter 2017/ 2018 was prolonged with an extended cold snap between late February and late March 2018 (the 'Beast from the East'). This coincided with the late winter/ early spring visit targeting species such as *Tapinocyba mitis*. A consequence of this inclement weather was the combination of snow melt and rainfall resulting in the wet heaths and mire communities being waterlogged, such that some of the pitfalls were submerged; though all were retrieved.

From late April and particularly from mid-May, temperatures were above, and rainfall below, average such that ground conditions rapidly dried out. Whilst the mires remained damp to wet, there was a noticeable draw-down of Starpole Pond during this period. However, the surveys were completed before the substantial effects of the dry conditions experienced in July and August 2018 took hold.

[5] Updated species status reviews are published on the JNCC website: http://jncc.defra.gov.uk/page-3352

The weather conditions described above likely affected spider behaviour, perhaps resulting in species becoming less active during the late winter/ early spring surveys, but also reducing the efficacy of the pitfall traps. The weather conditions leading up to, and during the 2018 survey season may have reduced the likelihood of encountering specialist species that are associated with very wet or damp vegetation communities such as *Glyphesis cottonae* and *Erigone welchi* in that they may have retreated in to the *Sphagnum* layer and thus became more challenging to record. An attempt could have been made to undertaking a more destructive approach by sieving handfuls of *Sphagnum* but this was avoided given the sensitivity of the habitat and the likelihood of requiring specific permission from Natural England.

2.4 Personnel

Surveys were undertaken by Richard Wilson MSc CEnv MCIEEM; a freelance ecologist who specialises in entomology, particularly spiders. Outside of work, he is the honorary spider recorder for Yorkshire, County Durham and Northumberland for the national spider recording scheme. He is also the Yorkshire Naturalists' Union recorder for the group. He has been a Council member of the British Arachnological Society (May 2012 to May 2015), and currently sits on the conservation sub-committee. Richard identified all the spiders and other taxa with the exception of most of the beetles.

Coleoptera collected were retained and have been identified by Bob Marsh (Yorkshire beetle recorder).

3 Field Survey

3.1 Selection of Locations for Survey

Within each study site, a number of locations were identified for survey and these are described in Table 3. The reasons for selecting these locations were based on habitat and interpreting historical records on the SRS database. It should be borne in mind that older records, particularly those pre-dating the 1970s, lacked precise information on location such as national grid references. In these circumstances, the SRS database has subsequently added a national grid reference based on the written description associated with the original record, which may have been sufficiently vague (e.g. Matley Heath) to cover more than one tetrad (2 km x 2 km Ordnance Survey grid square).

Table 3: Locations surveyed within New Forest study sites in 2018.

Study Site	General location	NGR (centroid)	Description of habitat
Matley Heath	Glade within Matley Wood.	SU 3319 0762	Ancient broad-leaved oak woodland.
	Leaf-litter filled ditch within Matley Wood	SU 333 075	Ancient broad-leaved oak woodland.
	Matley Wood (Mire)	SU 3336 0748	*Sphagnum* mire on south-eastern slope of Matley Wood.
	Area of dry heath to the south-east of Matley Wood	SU3336 0736	Scattered gorse and drier heath/ acid grassland.
	Wet heath sandwiched between Matley Wood and Matley Bog	SU 338 077	Valley mire with *Sphagnum* and wet heath.
	Matley Heath	SU 339 077	Drier heath with heather.
	Matley Heath	SU 338 080	Dry heath comprised of patches of grazed heather and bare ground.
	Matley Ridge	SU 331 073	Pine needle and heather leaf-litter on edge of plantation.
Shatterford Bottom	Edge of valley mire	SU 348 058	Wet *Sphagnum* mire with drier hummocks.
	Edge of valley mire	SU 347 061	Wet *Sphagnum* mire with drier hummocks.
	Edge of valley mire	SU 344 061	Wet *Sphagnum* mire with drier hummocks.
	Edge of valley mire	SU 345 062	Drier heathland on slightly raised ground adjacent to valley mire.
Yew Tree Heath	Dry heathland	SU 363 069	Taller heather and scattered gorse scrub.
	Dry heathland	SU 368 067	Taller heather and scattered gorse scrub.
Beaulieu Heath	Starpole Pond	SU 383 050	Wet *Sphagnum* mire grading in to slightly drier *Sphagnum* hummocks.
	Beaulieu Heath (King's Hat Inclosure)	SU3893 0534	Mosaics of taller heather and acid grassland.
	Beaulieu Heath (King's Hat Inclosure)	SU 3908 0538	Mosaics of taller heather and acid grassland.

3.2 Historical Records

A total of 244 species of spider have been recorded from the six monads (1 km x 1 km OS grid squares) which covers the various locations within each of the study sites.

3.2.1 Matley Heath

Prior to the 2018 surveys 208 species of spider have been recorded from Matley Heath between 1944 and 2016 (see Table 15; Appendix A); the substantial majority of species were last recorded in the 1960s or earlier.

3.2.2 Shatterford Bottom

Prior to the 2018 surveys 163 species of spider have been recorded from Shatterford Bottom between 1900 and 2014 (see Table 16; Appendix A); again the substantial majority of species were last recorded in the 1960s or earlier.

3.2.3 Beaulieu Heath

Prior to the 2018 surveys only 19 species of spider had previously been recorded from the area of Beaulieu Heath around Starpole Pond and King's Hat Inclosure (see Table 17; Appendix A); all last recorded between 1990 and 2017.

3.2.4 Yew Tree Heath

The area of Yew Tree Heath has received little attention by arachnologists in the past, with seemingly a single brief foray in 1990 yielding three species (see Table 18; Appendix A).

3.3 Survey Schedule

Based on the target species phenology (see Table 4), a survey schedule was developed, details presented in Table 5 (Section 4).

Table 4: Phenology (adult season) of targeted spider species.

Family	Binomial Name	Nature Conservation Status	Time active	
			Males	Females
Uloboridae	*Uloborus walckenaerius*	NT; Nationally Scarce	May - August, seem most abundant June and July.	
Gnaphosidae	*Haplodrassus dalmatensis*	Nationally Scarce; SoPI	March - July, Peak in June	April - August, Peak in June.
Salticidae	*Sitticus caricis*	Nationally Rare; SoPI	March - July, September - November, Possibly overwinters.	
Linyphiidae	*Erigone welchi*	EN; Nationally Rare; SoPI	Insufficient information. Four records with adult season information (February, May to July).	
Linyphiidae	*Glyphesis cottonae*	VU; Nationally Rare; SoPI	September - May, Most common October – February.	
Linyphiidae	*Mecopisthes peusi*	Nationally Scarce; SoPI	March – May.	
Linyphiidae	*Meioneta mollis*	NT; Nationally Rare; SoPI	September - April, Most abundant in November.	
Linyphiidae	*Monocephalus castaneipes*	Nationally Scarce; SoPI	Year round, with possible peak in September and October.	
Linyphiidae	*Saaristoa firma*	Nationally Scarce; SoPI	April – June; August and September.	Year round.
Linyphiidae	*Tapinocyba mitis*	EN; Nationally Rare; SoPI	February – March.	

4 Invertebrate Survey Results

4.1 Dates

Survey work commenced in late February, and continued until June 2018, over two periods. Seven days were spent on site during this period; the complete schedule, including weather conditions, is presented in Table 5.

Table 5: Survey Schedule (February to June 2018)

Date	Weather	Activity
20th February 2018	**Cloud:** 3/8; **Temperature:** 11° C; **Wind Speed:** 1.3 kph (13.7 kph) W	Setting pitfall traps at Matley Heath, Shatterford Bottom and Starpole Pond. Sieving leaf-litter and vacuum sampling.
21st February 2018	**Cloud:** 1/8; **Temperature:** 4° C; **Wind Speed:** 4.7 kph (13.0 kph) E	
21st March 2018	**Cloud:** 6/8; **Temperature:** 14.1° C; **Wind Speed:** 0.8 kph (9.7 kph) S	Servicing pitfalls. Removed all pitfalls except at Shatterford. Vacuum sampling.
16th April 2018	**Cloud:** 4/8; **Temperature:** 16.3° C; **Wind Speed:** 3.2 kph (6.5 kph) W	Serviced and collected pitfalls at Shatterford Bottom; and vacuum sample.
23rd May 2018	**Cloud:** 0/8; **Temperature:** 18° C; **Wind Speed:** 0.8 kph (10.7 kph) SSE	Setting pitfall traps at Matley Heath, Shatterford Bottom and Starpole Pond. General collecting at all sites.
24th May 2018	**Cloud:** 8/8; **Temperature:** 14.5° C; **Wind Speed:** Calm	
21st June 2018	**Cloud:** 1/8; **Temperature:** 17.1° C; **Wind Speed:** 10.2 kph (21.7 kph) NNE	Servicing pitfalls. Removed all pitfalls except at Shatterford. General collecting at all sites.

Pitfall traps were left for two separate periods. The first was between the 20th/ 21st February and run continuously until the 21st March 2018. They were then removed with the exception at Shatterford Bottom, where they were left and serviced in April. This was because the trapping at Shatterford in the period February to March failed due to the waterlogging of the mire and all raps being submerged. Pitfall traps were then re-set for the period 23rd/ 24th May and left until the 21st June 2018.

Pitfall trapping was undertaken in nine separate locations. The details are provided in Table 6; locations are illustrated on the Map Figures provided in Appendix D.

Table 6: Location and description of static traps.

Study Site	Grid Reference	Habitat
Matley Heath	SU 339 077	Six pitfall traps in *Calluna* dominated heath with lichens, amongst patches of bare ground. Slightly undulating topography with 'micro-hummocks'. Pitfalls set between February and March 2018.
	SU 338 077	Six pitfall traps in a transect following the edge of narrow wet ditch. Set amongst *Sphagnum*, cross-leaved heather and purple moor-grass. Hummocks of vegetation forming with *Calluna*. Ground poached by horses. Pitfalls set between February and March 2018.
	SU 3336 0748	Six pitfall traps in a transect on sloping ground characterised by *Sphagnum*-rich mire created by springs issuing on south-eastern edge of Matley Wood. Pitfalls set between May and June 2018.
	SU 338 080	Five pitfall traps set within short vegetation on dry heath characterised by bare ground and grazed *Calluna* to the north of Matley Wood. Pitfalls set between May and June 2018.

Study Site	Grid Reference	Habitat
Shatterford Bottom	SU 348 058	Six pitfall traps in a transect on edge of *Sphagnum* mire. Pitfall set between February and April 2018.
	SU 344 061	Six pitfall traps in a transect on edge of *Sphagnum* mire. Pitfall set between May and June 2018.
	SU 345 062	Six pitfall traps in a transect on slightly higher ground, set within Calluna heath and lichen carpets. Pitfalls set between May and June 2018.
Beaulieu Heath	SU 383 050	Six pitfall traps set within *Sphagnum* hummocks on edge of Starpole Pond. Pitfalls set between February and March; and again between May and June 2018.

4.2 Summary of survey effort

A total of 29 spider samples were collected from all study sites over the survey period, comprising 766 mature individuals (390 ♂; 386 ♀), and 12 sub-adult specimens of four species that could be reliably identified (*Pisaura mirabilis*, *Agelena labyrinthica*, *Dolomedes fimbriatus* and *Argiope bruennichi*). A total of 119 species of spider were recorded across all locations in 2018 which represents about 49 % of the species recorded historically from all monads covered by this study.

A full list of spiders is included in Table 19 in Appendix B.

4.3 Summary of Species Recorded

The spider surveys undertaken during 2018 are considered to have been intensive and thorough, utilising a wide range of techniques and investigating various microhabitats within each of the locations. This resulted in 119 species being recorded.

Interrogating the SRS database, of the 119 species recorded in 2018, seventeen species would appear to be new for the area surveyed (see Table 7). Of these, four species are new for the entire New Forest; and a further three species are either recorded for the first time in many decades, or are absent from the Forest's eastern sector. Thus, a total of 261 species of spider have now been recorded from the study area.

Table 7: Status of spider species new to the study sites. Descriptive terms based on author's own wording.

Family	Species	Nature Conservation Status	Status in New Forest SSSI/ National Park	Status in Hampshire (VC11 & [6]VC 12)
Gnaphosidae	*Micaria pulicaria*	Least Concern	Scattered records. Could be anticipated in appropriate habitat.	Scattered
Mimetidae	*Ero aphana*	Nationally Scarce	No records in the east of the New Forest. Increasing number of records (nationally) in south-east England. Could be anticipated in appropriate habitat.	Rare

[6] VC 12 : North Hampshire.

Family	Species	Nature Conservation Status	Status in New Forest SSSI/ National Park	Status in Hampshire (VC11 & [6]VC 12)
Thomisidae	*Diaea dorsata*	Least Concern	Frequent, so a lack of previous records likely due to under-recording.	Frequent
	Tibellus maritimus	Least Concern	New species for the New Forest.	Very rare
	Xysticus kochi	Least Concern	Rare. One old inland record (1944), and two more recent records associated with the Beaulieu River estuary.	Scattered
Philodromidae	*Philodromus cespitum*	Least Concern	Widespread, so a lack of previous records likely due to under-recording.	Common
Salticidae	*Heliophanus cupreus*	Least Concern	Infrequent. Likely to be a consequence of a lack of recording.	Scattered
	Myrmarachne formicaria	Nationally Scarce	The New Forest is a core area for this ant-mimicking jumping spider. Why there has previously been a lack of records from the hectad SU 30 previously is odd and may simply have been overlooked.	Local in South Hampshire
	Synageles venator	Nationally Scarce	New. A very rare species in Hampshire, and only previously been recorded in urban Southampton.	Very Rare
	Talavera aequipes	Least Concern	Old records dating back to the 1940s and 1960s; and no records in the east of the New Forest.	Rare
Lycosidae	*Pirata uliginosus*	Least Concern	A number of old records dating back to the 1960s and earlier; but seemingly rare in recent times. Possibly under-recorded due to confusion with similar *Pirata* species.	Scattered
	Xerolycosa nemoralis	Nationally Scarce	Widespread, so a lack of previous records likely due to	Common

Family	Species	Nature Conservation Status	Status in New Forest SSSI/ National Park	Status in Hampshire (VC11 & [6]VC 12)
			under-recording.	
Araneidae	*Araniella cucurbitina sens. str.*	Least Concern	Widespread. Lack of previous records likely due to under-recording.	Common
	Argiope bruennichi	Least Concern	Widespread. Lack of previous records likely due to under-recording at right time of year as this is an obvious species if present.	Widespread
Theridiidae	*Anelosimus vittatus*	Least Concern	Widespread. Lack of previous records likely due to under-recording.	Common
Linyphiidae	*Meioneta saxatilis sens. str.*	Least Concern	New. This is a frequently encountered money-spider in the author's experience, so why it is so rare in Hampshire is odd.	Rare
	Panamomops sulcifrons	Nationally Scarce	New. A species associated with wet grasslands and woodland edge habitat. Recorded within the *Sphagnum* mire on edge of Matley Wood.	Rare in VC 11, one modern record.

Of the 17 species that are new for the study area, *M. pulicaria*, *X. kochi*, *P. cespitum*, *H. cupreus*, *A. cucurbitina*, *A. bruennechi*, *A. vittatus*, and *M. saxatilis* are the most surprising as they are generally considered to be widespread (all evaluated to be Least Concern) within their known British distribution. Three species (*P. cespitum*, *A. cucurbitina* and *A. vittatus*) are typically associated with the lower branches of trees and shrubs, including tall heather and their previous absence are likely to be a lack of appropriate survey effort. *M. pulicaria*, *X. kochi* and *H. cupreus* are ground-dwelling species and can be more frequent in drier, warmer micro-habitats. That they have not been recorded from any of the study sites prior to 2018 may be due to previous surveyors targeting the wetter habitats for the known rarer species; and thus their approach has unconsciously selected against the likelihood of recording these otherwise widespread and common spiders. *A. bruennechi* is a large and distinctive orb-web spider which reaches sexual maturity is late summer and autumn. It may not have previously been recorded if there has been a lack of survey effort in appropriate times of the year.

Whilst none of the newly recorded species listed in Table 7 are new for VC 11, *E. aphana*, *T. maritimus*, *T. aequipes*, *S. venator* and *P. sulcifrons* can be considered rare in the vice-county and thus the records are of significance in that they are further evidence that the New Forest's mires and heaths support an important assemblage of spiders. That *E. aphana*, *T. maritimus* and *T. aequipes* have not previously been recorded is a little surprising given the habitats present. However, *S. venator* and *P. sulcifrons* are genuinely rare and constitute important county records.

Of the ten target species (refer back to Table 2), five were re-recorded during 2018 (see Map Figures in Appendix D) and a summary is presented in Table 8. *S. caricis* was recorded from three study sites: Matley Heath, Beaulieu Heath and Shatterford Bottom, all of which have previous records for the jumping-spider. *U. walckenaerius* represents the first confirmed record in the New Forest since August 1999. It requires mature

heathland where the heather has reached a sufficient height to allow the spider to create its web, about halfway up the plant (SRS, 2019). The record of *H. dalmatensis* is of particular interest as it represents the first confirmed record within this part of the New Forest in 75 years; and anywhere in the New Forest for half a century. *T. mitis* is a challenging species to record, partly owing to its cryptic habitat (leaf-litter) and also the short period in February and March when it is sexually mature and active. The single specimen was recorded in an area of short heather on an area of slightly raised ground above a valley mire at Matley Heath. The ground cover was a mosaic of bare ground, lichens and leaf-litter.

Table 8: Target species identified from historical surveys recorded in 2018 study.

Family	Species	Nature Conservation Status	Commentary
Uloboridae	*Uloborus walckenaerius*	NT; Nationally Rare	Male collected on the 21st June 2018 from the King's Hat area of Beaulieu Heath.
Gnaphosidae	*Haplodrassus dalmatensis*	Nationally Scarce; SoPI	Male collected in pitfall traps set on heathland to the north of Matley Wood between May and June 2018.
Salticidae	*Sitticus caricis*	Nationally Rare; SoPI	One female collected on the 23rd May 2018 from the *Sphagnum* mire on the edge of Matley Wood. One male and two females collected from Shatterford Bottom on the 23rd May 2018; and the same combination on the 21st June 2018. One male collected on the 21st June 2018 from wet heath on edge of Starpole Pond, Beaulieu Heath.
Linyphiidae	*Saaristoa firma*	Nationally Scarce; SoPI	One female sieved from leaf-litter on the 20th February 2018 from Matley Ridge, Denny Inclosure.
Linyphiidae	*Tapinocyba mitis*	EN; Nationally Rare; SoPI	One male from pitfall trap set within *Calluna* dominated heath with lichens, amongst patches of bare ground. Slightly undulating topography with 'micro-hummocks'.

Of the 119 species recorded across the study site, 24 are Key Species, of which four are Rare Key Species, representing 20 % and 3 % of the fauna respectively. Ten of these Key Species were either new to the study site (included in Table 7) or target species that were re-recorded (Table 8). The survey recorded an additional 14 species (see Table 9) which are discussed in further detail below. All ecology and distributional data is taken from SRS (2019).

Table 9: Additional Key Species of Spider recorded in 2018.

Family	Species	Nature Conservation Status	Commentary
Theridiidae	*Kochiura aulica*	Nationally Scarce	A species that is typically recorded on gorse on lowland heathland. In Britain, it is restricted to southern England and is widespread, though scattered in VC 11. Within the New Forest, there are a number of older records associated with Matley Heath (1960) and Beaulieu Heath (1990). A male was recorded by beating gorse from Matley Heath on the 23rd May 2018. It is likely to be present in suitable habitat throughout the study area. The lack of additional records simply reflects the priority given to searching for target species.
Linyphiidae	*Araeoncus crassiceps*	Nationally Scarce	This species of money-spider has a western distribution in Britain, favouring damp conditions in a wide range of open habitat

Family	Species	Nature Conservation Status	Commentary
			biotopes including grassland, heathland and coastal habitats. In VC 11, there are several old records dating back to the 1940s and 1960s. Eight females and one male were recorded at Shatterford Bottom in May and June 2018; and a single female was collected from Beaulieu Heath (Starpole Pond) in May.
	Hypselistes jacksoni	Nationally Scarce	This is a species that has a generally northern and western distribution in Britain; with outlier populations associated with the Surrey Heaths and the New Forest. There are several records from the 1940s and 1960s so the male and female taken in February 2018; and the single female in May 2018; all from Shatterford Bottom represents the first instance of this wetland species for at least half a century.
	Trichoncus saxicola	VU; Nationally Rare	This small money-spider is generally associated with calcareous grassland though in Cornwall and the New Forest, it is associated with heathland. Rarely recorded in the New Forest, with only five records, most in the 1960s; nine males and ten females were collected at various locations including Beaulieu Heath, Matley Heath and Shatterford Bottom in May and June 2018.
	Walckenaeria nodosa	Nationally Scarce	This is generally a northern species in Britain, though historically recorded from the Surrey Heaths and the New Forest; the latter for the most part, not since the 1940s. A single male was captured in a pitfall trap in February 2018 from Beaulieu Heath (Starpole Pond).
Araneidae	*Hypsosinga sanguinea*	Nationally Scarce	A small orb-web spider associated with heathland, mostly in southern England. It is widespread within the New Forest with a few recent records in the last decade or so, but not within the vicinity of the study sites, where it waslast recorded in the 1960s. A male was collected in February 2018 from Beaulieu Heath (Starpole Pond) and two females from Shatterford Bottom and Matley Heath, both in May 2018.
Lycosidae	*Pirata piscatorius*	Nationally Scarce	This is a semi-aquatic wolf-spider that is associated with very wet *Sphagnum* mire. Nationally, it has an odd distribution, being recorded frequently in Wales, north-west England, the Trent/ Humber valley, East Anglia, the Surrey Heaths and the New Forest. The most recent records in VC 11 are from Matley Bog, in 2010, but otherwise the species has not been recorded since the 1960s. Five males and two females were recorded from Shatterford Bottom in May 2018; and one male from Beaulieu Heath (Starpole Pond) on the 21st June 2018.
Pisauridae	*Dolomedes fimbriatus*	Nationally Scarce	The raft spider is a widespread and frequently recorded species in the New Forest. A number of immature specimens were observed around Beaulieu Heath (Starpole Pond) and Shatterford

Family	Species	Nature Conservation Status	Commentary
			Bottom in June 2018.
Liocranidae	*Scotina celans*	Nationally Scarce	An autumn and winter active ground-dwelling spider associated with heathland which is relatively widespread in south-east England. In the New Forest, there are scattered records from the 1960s and a very few more recent ones. A single female was recorded from Shatterford Bottom in February 2018. A contributory factor for the lack of records is possibly down to the time of year it is sexually mature.
Gnaphosidae	*Gnaphosa leporina*	Nationally Scarce	A species with an odd distribution nationally, with scattered records in northern England, central Scotland and the New Forest and Surrey Heaths. Apart from a single female collected from Matley Heath in May 2007, there have been no more recent records than the 1960s. Three males and one female were collected from Matley Heath in May 2018; and 26 males and 10 females were collected from Shatterford Bottom.
Philodromidae	*Philodromus emarginatus*	VU; Nationally Rare	A very rare species nationally, having only been recorded from 13 hectads in Britain since 1992. It has a core range of the Caledonian pine woods in central Scotland, the Surrey Heaths and the New Forest. The last records from the western edge of the New Forest are approximately twenty years old, with far older records (50 to 75 years) known from the study sites surveyed in 2018. A single male was beaten from gorse on Matley Heath on the 23rd May 2018. Despite not being a target species, this is one of the more important records derived from the survey.
	Thanatus striatus	Nationally Scarce	A ground-dwelling crab-spider that is associated with dry sandy grasslands and heathland in southern and south-east England, with an outlier population in and around the Humberhead peatlands. Within the eastern sector of the New Forest, it has not been recorded since the 1940s, other than a single record from May 1960 from Beaulieu Heath. Two females were collected in a pitfall trap in May 2018 from Shatterford Bottom.
Thomisidae	*Xysticus robustus*	EN; Nationally Rare	An exceptionally rare crab-spider which has only been recorded once anywhere in Britain in the last two decades, from grassland near Lulworth Cove, Dorset; and 17 times since records began. Within the New Forest, there are very few records and none since the 1960s. A single male was collected in a pitfall trap set in drier heathland (SU 345 062) on Shatterford Heath. This probably constitutes one of the most significant record of the study.
Salticidae	*Evarcha arcuata*	Nationally Scarce	A large heathland jumping spider, frequently encountered in suitable habitat in southern

Family	Species	Nature Conservation Status	Commentary
			England. It is widespread in the New Forest and a species likely to be recorded with reasonable effort. A male was collected from Shatterford Bottom in June 2018; and a female from Matley Wood in the same month.

In addition to the species that were new to the study sites (Table 7), Target Species (Table 8) or Key Species (Table 9), a further two species, which have been recorded in VC 11 from five or less hectads were recorded (see Table 10).

Table 10: Scarce VC 11 species of spider recorded in 2018.

Family	Species	No. of Hectads in VC 11	Commentary
Linyphiidae	*Drepanotylus uncatus*	3	This is a species most frequently recorded in the north and west of Britain, with scattered records south of a line between The Wash and The Severn estuaries. It is a species associated with wet heathland, marshes and bogs; and was last recorded in VC 11 in 1968; and from the New Forest in the 1940s other than a single record from 1960. One male was collected in a pitfall trap from Shatterford Bottom in February/ March 2018.
	Silometopus elegans	3	This money-spider has a similar national distribution to *D. uncatus*, and likewise, occupies wet habitats, including grasslands. It was last recorded in VC 11 in 1945 from the New Forest. Two males were collected by vacuum sample at Shatterford Bottom on the 23rd May 2018.

A summary of the results for each of the study sites is provided in Table 11. Matley Heath and Shatterford Bottom proved to be the most species-rich. Disappointingly, the Starpole Pond area of Beaulieu Heath yielded fewer species, despite comparable survey effort and similar habitat investigated. The King's Hat area of Beaulieu Heath was only sampled once (vacuum sampling), but nevertheless, recorded 26 species; including two Key Species. The proportion of Key Species and Rare Key Species recorded is broadly consistent across these four locations, suggesting perhaps that despite the variation in species-richness, the habitat is of comparable nature conservation value.

Yew Tree Heath was only sampled in February 2018 which explains why so few species were collected of which there were no highlights

Table 11: Spider species recorded in each study site (2018).

Study Site	Species Richness	Key Species (Proportion)	Rare Key Species (Proportion)	Highlights
Matley Heath	76	15 (20 %)	4 (5 %)	*Tapinocyba mitis*; *Trichoncus saxicola*; *Philodromus emarginatus*; *Saaristoa firma*; *Haplodrassus dalmatensis*; *Sitticus caricis*, *Synageles venator*; and *Myrmarachne formicaria*. New for study area: *Micaria pulicaria*; *Ero aphana*; *Diaea dorsata*; *Xysticus kochi*; *Philodromus cespitum*; *Heliophanus cupreus*; *Pirata uliginosus*; *Xerolycosa nemoralis*; *Araniella cucurbitina*; *Anelosimus vittatus*; *Meioneta saxatilis*; and *Panamomops*

Study Site	Species Richness	Key Species (Proportion)	Rare Key Species (Proportion)	Highlights
				sulcifrons.
Shatterford Bottom	57	13 (23 %)	3 (5 %)	*Xysticus robustus*; *Trichoncus saxicola*; *Sitticus caricis*; and *Synageles venator*. New for study area: *Tibellus maritimus*; *Pirata uliginosus*; and *Argiope bruennichi*.
Beaulieu Heath (Starpole Pond)	34	7 (21 %)	1 (3 %)	*Sitticus caricis* and *Myrmarachne formicaria*. New for study area: *Pirata uliginosus*.
Beaulieu Heath (King's Hat)	26	3 (12 %)	1 (4 %)	*Trichoncus saxicola*; and *Uloborus walckenarius*. New for study area: *Talavera aequipes*; and *Pirata uliginosus*.
Yew Tree Heath	11	0	0	None

4.3.1 Habitat Associations

The habitats surveyed as part of this study are generally classified as heaths or mire which are recognised as being a priority for nature conservation. Invertebrates with a strong association with these nationally important habitats could be considered to be of particular significance within the locations studied, particularly if they exhibit a high fidelity to these habitats. A couple of studies have identified spiders that are indicators of mire and heaths (one used the term 'peat bog'). Scott, Oxford and Selden (2006) listed 71 species of spider that they considered to be indicators of peat bogs in western Britain (SOS1 in Table 12) whilst Boyce (2004) undertook a review of all invertebrate species associated with acid mires, including the habitats investigated in this study. He assigned three classes, graded A to C:

- A = acid mire obligate;
- B = acid mire specialist; and
- C = acid mire preferentials.

A total of 21 spiders (see Table 12) recorded in this study are considered to have an association with acid mire vegetation, representing 18 % of the species recorded; one third (7 species) being specialist or obligate mire spiders.

Table 12: Peat bog and mire specialist species recorded within the study sites in 2018.

Family	Species	Conservation status	Habitat score
Araneidae	*Hypsosinga sanguinea*	Nationally Scarce	Acid mire: Grade C
Gnaphosidae	*Gnaphosa leporina*	Nationally Scarce	Acid mire: Grade B
Hahniidae	*Antistea elegans*		SOS 1
Linyphiidae	*Aphileta misera*		Acid mire: Grade B; SOS 1
Linyphiidae	*Araeoncus crassiceps*	Nationally Scarce	SOS 1
Linyphiidae	*Centromerus dilutus*		SOS 1
Linyphiidae	*Ceratinella brevipes*		SOS 1
Linyphiidae	*Drepanotylus uncatus*		Acid mire: Grade C; SOS 1
Linyphiidae	*Hypselistes jacksoni*	Nationally Scarce	Acid mire: Grade A; SOS 1
Linyphiidae	*Silometopus elegans*		Acid mire: Grade C; SOS 1
Linyphiidae	*Trichopterna thorelli*		SOS 1

Family	Species	Conservation status	Habitat score
Linyphiidae	*Walckenaeria nodosa*	Nationally Scarce	Acid mire: Grade B; SOS 1
Lycosidae	*Arctosa leopardus*		SOS 1
Lycosidae	*Pirata hygrophilus*		SOS 1
Lycosidae	*Pirata latitans*		SOS 1
Lycosidae	*Pirata piraticus*		SOS 1
Lycosidae	*Pirata piscatorius*	Nationally Scarce	Acid mire: Grade B; SOS 1
Lycosidae	*Pirata uliginosus*		Acid mire: Grade C; SOS 1
Pisauridae	*Dolomedes fimbriatus*	Nationally Scarce	Acid mire: A; SOS 1
Salticidae	*Evarcha arcuata*	Nationally Scarce	Acid mire: Grade B
Salticidae	*Sitticus caricis*	Nationally Rare; SoPI	Acid mire: Grade C; SOS 1

4.4 Other Invertebrates Recorded

In addition to the spiders, a further 95 species of invertebrate were recorded during the surveys; the majority (76 species) being beetles (Coleoptera). Of these, ten species are Key Species; and three are Rare Key Species, representing 11 % and 3 % of the fauna respectively.

The beetles were generally bycatch in pitfall traps, supplemented by specimens collected by vacuum sampling and additional individuals that caught the attention of the surveyor whilst beating vegetation. The effort that went in to collecting or recording these additional groups was not as rigorous compared to the spiders, as this was outside the Brief. A more comprehensive survey of the beetle fauna would have required additional methods and investigation of different habitat features than was otherwise undertaken. For example, the wood decay habitat was not particularly investigated as there are no spider species considered to be specialists of this important habitat, whereas the beetle fauna can be and aquatic beetles were not sampled for at all. Similarly, methods appropriate for sampling flying invertebrates such as aerial netting were not used at all and thus the Diptera and aculeate Hymenoptera are noted only from incidental observations.

Despite the 'light touch' several species recorded are worthy of note.

Acupalpus flavicollis is a Nationally Rare and Near Threatened species of ground beetle that is associated with lowland bogs (Luff, 2007). *Carabus nitens* is another Nationally Scarce species of ground beetle associated with *Sphagnum* bogs and is very local in Hampshire and Dorset (Luff, 2007). *Paederus caligatus* is a Red Data Book species of rove beetle (Staphylinidae), and the least commonly-recorded species of the genus. It is associated with permanently wet mire. A single specimen of the Nationally Rare leaf beetle *Agelastica alni* was recorded from Matley Heath. This is a very scarce species in the south of England, as opposed to its recent discovery and huge expansion in the north Midlands and Yorkshire. The NBN Atlas suggests that the species may be new to the New Forest area. The water beetle *Chaetarthria simillima* has only recently been recognised as distinct from *C. seminulum* and is probably widespread in *Sphagnum* bogs and other wet situations at the edges of water bodies

The remaining species of invertebrates were a mix of incidental observations noted as the surveyor walked around the various locations and are thus generally highly mobile groups such as butterflies. However, a single specimen of the Nationally Scarce hoverfly *Microdon analis* was collected in a pitfall trap. The larvae are commensals in ant's nests. Individuals of the Nationally Scarce silver-studded blue (*Plebejus argus*) butterfly which has been evaluated as Vulnerable against IUCN criteria, and which is also a SoPI were observed on Beaulieu Heath.

4.5 Summary

The survey work within the selected study sites in the New Forest resulted in a total of 119 species of spider and an additional 95 species of other invertebrate being recorded, resulting in a total list of 214 species; of which 34 are Key Species and 7 are Rare Key Species. The proportion of Key species and Rare Key Species are substantially (20 % and 3 % respectively) above a threshold (10 % and 1 % respectively) considered by Telfer (2017) to suggest that the assemblages are of national nature conservation value.

It should be borne in mind that the effort to collect and record taxa other than spiders meant that there was no attempt made to methodically record other taxonomic groups. Furthermore, habitats and locations were selected based on the historic records of target species. Therefore, the additional taxa recorded reflect this approach and there is likely a bias against species which may be present, but stood little chance of being recorded. Obvious examples would be aquatic beetles. The assemblage is also grossly under-represented in terms of the flying insects, notably Diptera (flies) and aculeate Hymenoptera (social and solitary bees and wasps); or whose lifestyle or habitats were not investigated. The species-richness and taxonomic spread is not representative of the invertebrate assemblage present within any of the locations studied.

5 Evaluation

5.1 Habitat Suitability

Of the 24 Key Species, nine are associated with dry heath and leaf-litter; twelve are associated with wet heath and mire vegetation; and three are associated with woodland vegetation, either canopy or leaf-litter (Webb *et al*., 2018). This range of resources reflects the diversity of habitats present within each of the study sites surveyed.

The wider spider assemblage similarly reflects the pattern presented by Key Species (see Table 13) when analysing the data using Pantheon (Webb *et al*., 2018). Tall sward and scrub, which is defined as, "*Areas of dense herbage or partial shade where a humid microclimate is maintained at ground level. Dominance by woody plants is limited by exposure, grazing or cutting of vegetation, but they often form an important component of the habitat*." is the most species-rich of the habitats and supports seven Key Species. This corresponds to the areas of drier heathland with taller (= mature) heather which is present within the King's Hat area of Beaulieu Heath, drier areas to the west of Starpole Pond (also Beaulieu Heath) and Yew Tree Heath.

Peatland supports fewer species but a higher proportion of Key Species. Webb *et al*. (2018) defines peatland as "*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.*". Peatland habitat corresponds to the *Sphagnum* mire and wetter heaths present across the study site, including Shatterford Bottom, Matley Heath and Starpole Pond (Beaulieu Heath).

The other habitat which stands out is the short sward and bare ground, which corresponds to the shorter heath and grassland vegetation communities that occur on the slightly raised ground. Examples occur on Matley Heath; for example to the north of Matley Wood, and at Shatterford Bottom, running parallel with the sinuous mire.

The woodland habitats would appear to be of lesser significance based on the data presented in Table 13; however, caution needs to be applied. This habitat was surveyed less intensively, owing to the focus being on target species occurring outwith such habitat, with the exception of *Monocephalus castaneipes* (refer back to Table 2). Pitfall trapping was not undertaken in the woodlands as this method was considered less likely to record *M. castaneipes*. Instead, focus was on sieving leaf-litter and moss; and using a Tullgren Funnel to extract specimens from leaf-litter.

Table 13: Habitats supporting Key Species across the study sites.

Broad biotope	Habitat	No. of species	SQI	No. of Key Species	Conservation status
Open habitats	Tall sward & scrub	52	179	7	*Araeoncus crassiceps* – NS *Panamomops sulcifrons* – NS *Tapininocyba mitis* – EN; NR; SoPI *Trichoncus saxicola* – VU; NR *Ero aphana* – NS *Thanatus striatus* – NS *Uloborus walckenaerius* – NT; NR
Open habitats	Short sward & bare ground	11	345	5	*Haplodrassus dalmatensis* – NS; SoPI *Xerolycosa nemoralis* – NS *Myrmarachne formicaria* – NS *Synageles venator* – NS *Xysticus robustus* – EN; NR
Open habitats	Upland	4	100		
Tree-associated	Shaded woodland floor	12	125	1	*Scotina celans* – NS

Broad biotope	Habitat	No. of species	SQI	No. of Key Species	Conservation status
Tree-associated	Arboreal	6	217	1	*Philodromus emarginatus* – VU; NR
Wetland	Peatland	17	247	7	*Hypeslistes jacksoni* – NS *Saaristoa firma* – NS; SoPI *Walckenaeria nodosa* – NS *Pirata piscatorius* – NS *Dolomedes fimbriatus* – NS *Evarcha arcuata* – NS *Sitticus caricis* – NR; SoPI

The distribution and number of Key Species recorded in 2018 across the varied habitats studied is suggestive that the vegetation communities investigated are currently in an appropriate condition. Pantheon is able to evaluate invertebrate assemblages to determine if they are in Favourable Condition (for SSSIs), though there is a requirement to survey for a wider taxonomic range than just a single group such as spiders. Thus, the output generated, relying just on the spider assemblage, is not considered likely to be a reflection of the nature conservation value of the habitats studied. This also applies if you include the beetle bycatch. Nevertheless, the proportion of Key Species, and Rare Key Species of spider are indicative of habitats of very high nature conservation value; likely to be of national importance.

5.2 Other Suitable Habitat

The habitat descriptions provided in Section 1.4 are specifically those where samples were collected, and observed as the surveyor moved from location to location. The habitats surveyed were, as judged by eye, and not through formal assessment, a relatively small component of a more extensive area. Therefore, whilst the records relate to specific locations, where similar habitat exists within the landscape comprising Matley Heath, Beaulieu Heath, Yew Tree Heath and Shatterford Bottom, there is no reason to doubt the likelihood of recording similar assemblages and target species (see Table 2), including those not recorded in 2018; and additional species included in Table 1 such as *Notioscopus sarcinatus* and possibly even *Walckenaeria corniculans*. Further commentary on this, including reference to geographic locations is provided in Section 6.

5.3 Threats and Risks

The threats applicable to each of the Key Species, and more widespread fauna recorded in this study, specifically within the New Forest SSSI/ SAC are broadly described in Wright and Westerhoff (2001; Section 3.6). That a high proportion of the target spider species have been re-recorded (refer back to Table 8) suggests that populations of these important taxa have been maintained, at least at the coarse presence/ likely absence scale. The 2018 study focussed on specific locations where target taxa had previously been recorded and so confirming some of these species presence has not described an expansion in range other than at the [7]monad, or tetrad scale.

For species listed in Table 12 and Table 19, the threats for each of the Key Species recorded can be readily correlated with those described in the relevant section of Wright and Westerhoff (2001) based on the biotope and/ or habitat each species is associated with. Changes in the hydrological regime, either through drainage or through climate change processes such as increased drying out or reduced precipitation (rainfall primarily) will have the potential to affect spider faunas. That there is an existing management plan, and that this is being implemented, will hopefully reduce the risk. However, care must be given to maintaining the structural variation present within each of the study sites (and elsewhere) so that where there is an ecocline between very wet to drier habitats; taller heath to shorter vegetation, as observed at Shatterford Bottom, this is maintained. This existing structural relationship, which occurs across a short distance (tens of metres), sometimes as a consequence of minor topographical variations (Shatterford Bottom), but in other locations, as a consequence of grazing pressure variability (north of Matley Wood), has allowed Key Species such as the Endangered Nationally Rare crab spider *Xysticus robustus* (short sward and bare ground), the Nationally Rare and SoPI jumping spider *Sitticus caricis*, or the Nationally Scarce and SoPI gnaphosid *Haplodrassus dalmatensis* to occur in close proximity.

[7] A monad is 1 km x 1 km; and a tetrad is 2 km x 2 km based on the Ordnance Survey grid squares. Tetrads and hectads (10 km x 10 km) are the commonest unit of recording in Britain.

The major risk which is perhaps harder to predict , is the consequence of climate change, and the resulting increased risk of anthropogenic fire (*wildfire* in common parlance, but in this context, it is intended to mean flames either deliberately started through acts of arson; or through carelessness/ reckless behaviour such as BBQs). Maintenance or creation of firebreaks, particularly where there is mature stands of heather, may well assist in reducing the risk; and concurrently increase areas of bare ground and shorter vegetation, that would be structurally different to grazed areas, and benefit species associated with this more open habitat; including faunas not surveyed in this study such as aculeate Hymenoptera.

The final risk worth mentioning is allowing survey information to enter another hiatus extending more many decades. The previous historical survey work is between 50 and 75 years of age, when accessing the New Forest was largely by public transport (train) and foot. This partly explains why many of the older records are associated with the Heaths relatively close to Beaulieu Road Station. If climate change referred to above has any effects on the spider fauna, either in terms of species-richness, composition or quality, then these changes may occur in a relatively short timeframe by which, no more than a couple of decades is considered a reasonable magnitude. In order to be able to understand this, a more frequent survey effort repeating site visits would be needed, on a schedule in the order of once every five to eight years.

6 Recommendations for Further Work

6.1 Additional Sites

The survey work undertaken in 2018 covered a single hectad (SU 30) and six tetrads (SU 30I; SU 30J; SU 30N; SU 30M; SU 30T; and SU 30X). For example, *Haplodrassus dalmatensis* was recorded for the first time in SU 30J (heathland north of Matley Wood) but this is not a meaningful range extension within the New Forest as it has previously been recorded in the hectad.

It would be beneficial, particularly in the context of understanding Key Species resilience to climate change impacts, and thus informing the SAC's Management Plan and existing wetland habitat restoration work to survey similar habitat but elsewhere within the SSSI for the same target taxa (as listed in Table 2) but including the additional Key Species recorded in 2018 such as *Xysticus robustus*.

Additional sites should include general locations such as the Vales Moor (centroid: SU 189 041; tetrad: SU 10X); and Mark Ash Wood (SU 245 074; tetrad: SU 20N) areas; the former would include the locality where *Haplodrassus umbratilis* was recorded by Merrett (1972) and which hasn't been recorded in Britain since 1990. Additional locations such as Hincheslea Moor (SU 264 016; tetrad: SU 20Q) and the area between Hampton Ridge (SU 193 137) and Ditchford Brook (SU 188 151) would be worth investigating. This would also add additional target taxa such as the Nationally Scarce jumping spider *Aelurillus v-insignitus* which hasn't been recorded in the New Forest for about 15 years.

6.2 Repeat Survey Effort

In the shorter term, it would be prudent, notwithstanding fiscal constraints, to repeat the survey work in the next couple of years, but perhaps focussing on fewer locations, to make a second attempt at recording those target species listed in Table 2 that were not recorded in 2018: **Erigone welchi*, **Glyphesus cottonae*, **Mecopisthes peusi*, *Meioneta mollis* and *Monocephalus castaneipes*. Those marked with an '*' are considered the more important species, being associated with the peatland habitats. It would be particularly significant to record *G. cottonae* again at Shatterford Bottom as this is the type locality for the species (la Touche, 1946).

In the long term, it would be beneficial to repeat the survey effort undertaken in 2018 before the end of the 2025 survey season in that this would provide an informed appraisal of the 'medium term' effects of the habitat restoration works that are ongoing.

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A. Appendix A: Historical Species Lists

Table 14: Proposed target spider species, locations, and year of last record (from SRS).

Species	Avon Heath Country Park	Beaulieu Heath	Beaulieu Heath (Dibden)	Black Knowl (Brockenhurst)	Goatspen Plain	Hampton Ridge	Hincheslea Moor	Mark Ash Wood	Matley Heath	Morden Heath	Vales Moor
Alopecosa fabrilis										1965	
Altella lucida										1971	
Centromerus serratus				1944				1960			
Dictyna pusilla				1944				1944			
Dipoena inornata	2002										2000
Erigone welchi									1960		
Glyphesis cottonae		1944	1944					1960	1999		
Haplodrassus dalmatensis		1944	1944		1968	1968	1968		1944		1968
Mecopisthes peusi					1968	1968			1968		1968
Meioneta mollis		1944		1945					1968		
Monocephalus castaneipes									1960		
Notioscopus sarcinatus				1944				1972			
Philodromus margaritatus								1971			
Saaristoa firma				1944				1972	1968		1968
Sitticus caricis		1944	1944						1986		1990
Tapinocyba mitis		1944							1968		1971
Uloborus walckenaerius		1944	1944						1960		
Walckenaeria corniculans											1971

Table 15: Species historically recorded at Matley Heath (based on records from monads SU 34 06 and SU 34 05).

Species	Year of Last Record
Achaearanea riparia	1960
Aelurillus v-insignitus	1960
Agalenatea redii	2016
Agelena labyrinthica	2007
Agroeca brunnea	1960
Agroeca inopina	1960
Agroeca proxima	1960
Agyneta cauta	1960
Agyneta conigera	1960
Agyneta subtilis	1960
Alopecosa pulverulenta	1960
Antistea elegans	1986
Aphileta misera	1960
Araeoncus crassiceps	1960
Araneus diadematus	2016
Araneus quadratus	2010
Arctosa leopardus	1986
Atypus affinis	1960
Baryphyma trifrons	1960
Bathyphantes approximatus	1960
Bathyphantes gracilis	1960
Bathyphantes nigrinus	1960
Centromerita bicolor	1945
Centromerita concinna	1960
Centromerus dilutus	1960
Centromerus sylvaticus	1945
Ceratinella brevipes	1960
Ceratinella brevis	1960
Ceratinopsis stativa	1960
Cheiracanthium virescens	1960
Clubiona comta	2012
Clubiona corticalis	1998
Clubiona lutescens	1960
Clubiona stagnatilis	1960
Clubiona subtilis	1960
Clubiona terrestris	1960
Clubiona trivialis	1982
Cnephalocotes obscurus	1960
Crustulina guttata	1964

Species	Year of Last Record
Crustulina sticta	1945
Dictyna arundinacea	1964
Dictyna latens	2007
Dicymbium nigrum	1960
Diplocephalus latifrons	1960
Diplocephalus permixtus	1960
Dismodicus bifrons	1960
Dolomedes fimbriatus	2016
Drassodes cupreus	1960
Drassyllus pusillus	1960
Drepanotylus uncatus	1960
Enoplognatha ovata sens. str.	1960
Episinus angulatus	1964
Episinus truncatus	1960
Erigone atra	1960
Erigone dentipalpis	1960
Erigone promiscua	1960
Erigone welchi	1960
Erigonella hiemalis	1960
Erigonella ignobilis	1945
Ero cambridgei	1960
Ero furcata	1960
Euophrys frontalis	1960
Euryopis flavomaculata	1960
Evarcha arcuata	2016
Floronia bucculenta	1960
Glyphesis cottonae	1960
Gnaphosa leporina	2007
Gnathonarium dentatum	1945
Gonatium rubens	1960
Gongylidiellum latebricola	1960
Gongylidiellum vivum	1960
Hahnia helveola	1960
Hahnia montana	1960
Hahnia nava	1960
Haplodrassus signifer	1960
Harpactea hombergi	1960
Heliophanus flavipes	1960
Hygrolycosa rubrofasciata	1963
Hypomma bituberculatum	1960

Species	Year of Last Record
Hypselistes jacksoni	1960
Hypsosinga albovittata	1960
Hypsosinga pygmaea	2010
Hypsosinga sanguinea	1960
Hyptiotes paradoxus	1960
Jacksonella falconeri	1960
Kaestneria dorsalis	1960
Kaestneria pullata	1966
Kochiura aulica	1960
Larinioides cornutus	2010
Leptorhoptrum robustum	1960
Leptothrix hardyi	1960
Linyphia triangularis	1960
Lophomma punctatum	1960
Macrargus rufus	1960
Mangora acalypha	2012
Maso sundevalli	1960
Mecopisthes peusi	1960
Meioneta beata	1960
Meioneta innotabilis	1960
Meioneta mollis	1964
Meioneta rurestris	1960
Metellina mengei	1960
Metellina segmentata sens. str.	2016
Micrargus herbigradus sens. str.	1960
Micrargus laudatus	1960
Microlinyphia pusilla	1964
Minyriolus pusillus	1960
Moebelia penicillata	1960
Monocephalus castaneipes	1960
Monocephalus fuscipes	1960
Neon reticulatus	1960
Neoscona adianta	1960
Neottiura bimaculata	1960
Neriene clathrata	1960
Neriene furtiva	1960
Neriene montana	1964
Neriene peltata	1964
Obscuriphantes obscurus	1960
Oedothorax fuscus	1960

Species	Year of Last Record
Oedothorax gibbosus	1960
Ozyptila atomaria	1960
Ozyptila scabricula	1960
Ozyptila trux	1960
Pachygnatha degeeri	1960
Paidiscura pallens	1964
Palliduphantes ericaeus	1960
Palliduphantes pallidus	1960
Pardosa amentata	1982
Pardosa hortensis	1960
Pardosa monticola	1960
Pardosa nigriceps	1964
Pardosa palustris	1964
Pardosa proxima	1960
Pardosa pullata	1982
Pardosa saltans	1964
Peponocranium ludicrum	1960
Philodromus aureolus	1960
Philodromus emarginatus	1960
Philodromus histrio	1982
Pholcomma gibbum	1944
Phrurolithus festivus	1960
Phylloneta sisyphia	1964
Pirata hygrophilus	1960
Pirata latitans	1960
Pirata piraticus	1960
Pirata piscatorius	2010
Pisaura mirabilis	2016
Pocadicnemis pumila sens. str.	1960
Robertus lividus	1960
Saaristoa abnormis	1960
Saaristoa firma	1945
Salticus cingulatus	1960
Satilatlas britteni	1960
Savignia frontata	1960
Scotina celans	1960
Scotina gracilipes	1960
Simitidion simile	1960
Sintula corniger	1960
Sitticus caricis	1986

Species	Year of Last Record
Steatoda albomaculata	1960
Syedra gracilis	1960
Talavera petrensis	1960
Tallusia experta	1960
Tapinocyba mitis	1960
Tapinopa longidens	1960
Taranucnus setosus	1960
Tegenaria agrestis	1982
Tegenaria silvestris	1964
Tenuiphantes cristatus	1960
Tenuiphantes flavipes	1960
Tenuiphantes mengei	1964
Tenuiphantes tenuis	1964
Tenuiphantes zimmermanni	1964
Tetragnatha extensa	1960
Tetragnatha montana	1964
Tetragnatha nigrita	1960
Tetragnatha obtusa	1960
Theonoe minutissima	1945
Theridion varians	1960
Theridiosoma gemmosum	1960
Thomisus onustus	1960
Tibellus oblongus	1960
Tiso vagans	1960
Trichoncus saxicola	1960
Trichopternoides thorelli	1960
Trochosa ruricola	1960
Trochosa spinipalpis	1945
Trochosa terricola	1960
Uloborus walckenaerius	1960
Walckenaeria acuminata	1960
Walckenaeria antica	1960
Walckenaeria atrotibialis	1960
Walckenaeria cucullata	1960
Walckenaeria cuspidata	1944
Walckenaeria dysderoides	1960
Walckenaeria nodosa	1960
Walckenaeria nudipalpis	1960
Walckenaeria unicornis	1960
Walckenaeria vigilax	1960

Species	Year of Last Record
Xysticus cristatus	1964
Xysticus erraticus	1960
Xysticus luctator	1960
Xysticus robustus	1960
Xysticus sabulosus	1960
Zelotes latreillei	1960
Zelotes longipes	1960
Zilla diodia	2012
Zora spinimana	1960

Table 16: Species historically recorded at Shatterford Bottom (based on records from monads SU 34 06 and SU 34 05).

Species	Year of Last Record
Aelurillus v-insignitus	1945
Agroeca proxima	1968
Agyneta cauta	1968
Agyneta conigera	1944
Agyneta ramosa	1945
Agyneta subtilis	1944
Alopecosa barbipes	1945
Alopecosa pulverulenta	1968
Antistea elegans	1967
Aphileta misera	1967
Araeoncus crassiceps	1962
Araniella opisthographa	1945
Arctosa fulvolineata	1900
Atypus affinis	1968
Baryphyma trifrons	1945
Bathyphantes gracilis	1999
Bathyphantes nigrinus	1944
Centromerita concinna	1968
Centromerus prudens	1961
Ceratinella brevipes	1945
Ceratinella scabrosa	1945
Cheiracanthium virescens	1945
Clubiona lutescens	1945
Clubiona subtilis	1945
Clubiona trivialis	1968
Crustulina guttata	1960
Dictyna arundinacea	2012
Dolomedes fimbriatus	1999
Drassodes cupreus	1968
Drassyllus pusillus	1968
Drepanotylus uncatus	1945
Enoplognatha ovata sens. str.	1967
Enoplognatha thoracica	1944
Erigone arctica	1944
Erigone atra	1999
Erigone dentipalpis	1961
Erigone promiscua	1968
Erigone welchi	1960

Species	Year of Last Record
Erigonella hiemalis	1944
Euryopis flavomaculata	1945
Evarcha falcata	1967
Glyphesis cottonae	1999
Gnaphosa leporina	1968
Gnathonarium dentatum	1967
Gonatium rubens	1987
Gongylidiellum murcidum	1945
Hahnia montana	1945
Haplodrassus dalmatensis	1944
Haplodrassus signifer	1968
Hypomma bituberculatum	1967
Hypselistes jacksoni	1945
Hypsosinga albovittata	1960
Hypsosinga sanguinea	1968
Kaestneria pullata	1967
Larinioides cornutus	1993
Leptothrix hardyi	1945
Linyphia triangularis	2006
Lophomma punctatum	1962
Mangora acalypha	1999
Maso sundevalli	1944
Mecopisthes peusi	1945
Meioneta beata	1968
Meioneta innotabilis	1945
Meioneta mollis	1944
Meioneta rurestris	1968
Metopobactrus prominulus	1945
Micaria silesiaca	1945
Micrargus laudatus	1968
Microlinyphia pusilla	1987
Microneta viaria	1961
Minyriolus pusillus	1944
Neon reticulatus	1945
Neriene clathrata	1961
Neriene furtiva	1968
Neriene montana	1987
Neriene peltata	1967
Nuctenea umbratica	2006
Pachygnatha degeeri	1968

Species	Year of Last Record
Paidiscura pallens	1999
Pardosa nigriceps	1999
Pardosa prativaga	1968
Pardosa pullata	1968
Philodromus emarginatus	1960
Philodromus histrio	1999
Pholcomma gibbum	1945
Pirata piraticus	1967
Pirata piscatorius	1967
Pisaura mirabilis	1987
Pocadicnemis pumila sens. str.	1945
Rugathodes instabilis	1967
Saaristoa abnormis	1968
Satilatlas britteni	1945
Scotina gracilipes	1968
Silometopus elegans	1945
Simitidion simile	1999
Singa hamata	1967
Sitticus caricis	1960
Steatoda albomaculata	1945
Steatoda phalerata	1985
Stemonyphantes lineatus	1961
Talavera petrensis	1960
Tapinopa longidens	1968
Taranucnus setosus	1962
Tegenaria agrestis	1968
Tenuiphantes flavipes	1961
Tenuiphantes tenuis	1968
Tenuiphantes zimmermanni	1961
Tetragnatha extensa	1987
Tetragnatha nigrita	1945
Thanatus striatus	1968
Theridiosoma gemmosum	1945
Thomisus onustus	1945
Tibellus oblongus	1987
Tiso vagans	1968
Trichopternoides thorelli	1968
Uloborus walckenaerius	1999
Walckenaeria acuminata	1968
Walckenaeria antica	1945

Species	Year of Last Record
Walckenaeria cucullata	1944
Walckenaeria monoceros	1945
Walckenaeria nodosa	1945
Walckenaeria nudipalpis	1945
Walckenaeria vigilax	1968
Xysticus luctator	1958
Xysticus luctuosus	1945
Zelotes latreillei	1945
Zelotes longipes	1945
Zygiella x-notata	2014

Table 17: Species historically recorded at Beaulieu Heath (based on records from monad SU 38 05).

Species	Last recorded
Anyphaena accentuata	1990
Dolomedes fimbriatus	2017
Enoplognatha ovata sens. str.	1990
Evarcha arcuata	2017
Hypomma cornutum	2017
Lathys humilis	2017
Mangora acalypha	2017
Metellina mengei	1990
Neriene peltata	1990
Paidiscura pallens	2017
Pardosa saltans	1990
Phylloneta sisyphia	1990
Pisaura mirabilis	2017
Platnickina tincta	2017
Simitidion simile	2017
Sitticus caricis	2017
Tetragnatha extensa	1990
Theridion varians	1990
Xysticus bifasciatus	2017

Table 18: Species historically recorded at Yew Tree Heath (based on records from monad SU 36 06).

Species	Last recorded
Ero cambridgei	1990
Pardosa pullata	1990
Phylloneta sisyphia	1990

B. Appendix B: Overall Species List (2018)

Table 19: Spiders recorded at New Forest Study Sites in 2018.

Class	Order	Family	Species	Vernacular	National Status	Matley Heath	Shatterford Bottom	Beaulieu Heath (Starpole Pond)	Beaulieu Heath (King's Hat)	Yew Tree Heath
Arachnida	Araneae	Mimetidae	*Ero aphana*		Nationally Scarce	X				
Arachnida	Araneae	Uloboridae	*Uloborus walckenaerius*		NT; Nationally Rare				X	
Arachnida	Araneae	Theridiidae	*Episinus angulatus*			X				
Arachnida	Araneae	Theridiidae	*Crustulina guttata*			X				X
Arachnida	Araneae	Theridiidae	*Steatoda phalerata*			X				
Arachnida	Araneae	Theridiidae	*Anelosimus vittatus*			X				
Arachnida	Araneae	Theridiidae	*Kochiura aulica*		Nationally Scarce	X				
Arachnida	Araneae	Theridiidae	*Theridion varians*			X				
Arachnida	Araneae	Theridiidae	*Neottiura bimaculata*			X	X	X		
Arachnida	Araneae	Theridiidae	*Enoplognatha thoracica*			X				
Arachnida	Araneae	Theridiidae	*Pholcomma gibbum*			X				X
Arachnida	Araneae	Linyphiidae	*Ceratinella brevipes*			X	X			X
Arachnida	Araneae	Linyphiidae	*Walckenaeria cucullata*							X
Arachnida	Araneae	Linyphiidae	*Walckenaeria nodosa*		Nationally Scarce			X		
Arachnida	Araneae	Linyphiidae	*Walckenaeria nudipalpis*				X		X	
Arachnida	Araneae	Linyphiidae	*Dicymbium nigrum*			X				
Arachnida	Araneae	Linyphiidae	*Metopobactrus prominulus*						X	
Arachnida	Araneae	Linyphiidae	*Peponocranium ludicrum*			X	X		X	
Arachnida	Araneae	Linyphiidae	*Pocadicnemis pumila sens. str.*			X			X	
Arachnida	Araneae	Linyphiidae	*Hypselistes jacksoni*		Nationally Scarce		X			
Arachnida	Araneae	Linyphiidae	*Oedothorax fuscus*					X		
Arachnida	Araneae	Linyphiidae	*Trichopternoides thorelli*				X	X		
Arachnida	Araneae	Linyphiidae	*Silometopus elegans*				X			

Class	Order	Family	Species	Vernacular	National Status	Matley Heath	Shatterford Bottom	Beaulieu Heath (Starpole Pond)	Beaulieu Heath (King's Hat)	Yew Tree Heath
Arachnida	Araneae	Linyphiidae	*Cnephalocotes obscurus*			X				
Arachnida	Araneae	Linyphiidae	*Trichoncus saxicola*		VU; Nationally Rare	X	X		X	
Arachnida	Araneae	Linyphiidae	*Tiso vagans*			X	X		X	
Arachnida	Araneae	Linyphiidae	*Minyriolus pusillus*			X				
Arachnida	Araneae	Linyphiidae	*Tapinocyba mitis*		EN; Nationally Rare; SoPI	X				
Arachnida	Araneae	Linyphiidae	*Monocephalus fuscipes*			X				
Arachnida	Araneae	Linyphiidae	*Gongylidiellum vivum*				X	X		X
Arachnida	Araneae	Linyphiidae	*Erigonella hiemalis*			X				
Arachnida	Araneae	Linyphiidae	*Savignia frontata*							X
Arachnida	Araneae	Linyphiidae	*Diplocephalus latifrons*			X				
Arachnida	Araneae	Linyphiidae	*Diplocephalus picinus*			X				
Arachnida	Araneae	Linyphiidae	*Araeoncus crassiceps*		Nationally Scarce		X	X		
Arachnida	Araneae	Linyphiidae	*Panamomops sulcifrons*		Nationally Scarce	X				
Arachnida	Araneae	Linyphiidae	*Erigone dentipalpis*			X		X	X	
Arachnida	Araneae	Linyphiidae	*Erigone atra*			X	X	X	X	
Arachnida	Araneae	Linyphiidae	*Erigone promiscua*			X		X		
Arachnida	Araneae	Linyphiidae	*Drepanotylus uncatus*				X			
Arachnida	Araneae	Linyphiidae	*Aphileta misera*				X			
Arachnida	Araneae	Linyphiidae	*Meioneta rurestris*						X	
Arachnida	Araneae	Linyphiidae	*Meioneta saxatilis sens. str.*			X				
Arachnida	Araneae	Linyphiidae	*Centromerus dilutus*			X	X			X
Arachnida	Araneae	Linyphiidae	*Centromerita concinna*			X	X	X	X	X
Arachnida	Araneae	Linyphiidae	*Saaristoa firma*		Nationally Scarce; SoPI	X				
Arachnida	Araneae	Linyphiidae	*Bathyphantes gracilis*			X		X		

Class	Order	Family	Species	Vernacular	National Status	Matley Heath	Shatterford Bottom	Beaulieu Heath (Starpole Pond)	Beaulieu Heath (King's Hat)	Yew Tree Heath
Arachnida	Araneae	Linyphiidae	*Tenuiphantes tenuis*			X	X	X		
Arachnida	Araneae	Linyphiidae	*Tenuiphantes zimmermanni*			X		X		
Arachnida	Araneae	Linyphiidae	*Tenuiphantes mengei*			X	X		X	
Arachnida	Araneae	Linyphiidae	*Palliduphantes ericaeus*				X		X	
Arachnida	Araneae	Linyphiidae	*Neriene clathrata*			X				
Arachnida	Araneae	Linyphiidae	*Microlinyphia pusilla*			X	X	X	X	
Arachnida	Araneae	Tetragnathidae	*Tetragnatha extensa*				X			
Arachnida	Araneae	Tetragnathidae	*Pachygnatha degeeri*			X				
Arachnida	Araneae	Tetragnathidae	*Metellina segmentata sens. str.*			X				
Arachnida	Araneae	Araneidae	*Neoscona adianta*						X	
Arachnida	Araneae	Araneidae	*Araniella cucurbitina sens. str.*			X				
Arachnida	Araneae	Araneidae	*Hypsosinga pygmaea*				X			
Arachnida	Araneae	Araneidae	*Hypsosinga sanguinea*		Nationally Scarce	X	X	X		
Arachnida	Araneae	Araneidae	*Mangora acalypha*				X		X	
Arachnida	Araneae	Araneidae	*Argiope bruennichi*				X			
Arachnida	Araneae	Lycosidae	*Pardosa palustris*			X	X			
Arachnida	Araneae	Lycosidae	*Pardosa pullata*			X	X	X	X	
Arachnida	Araneae	Lycosidae	*Pardosa nigriceps*			X	X			
Arachnida	Araneae	Lycosidae	*Pardosa saltans*			X				
Arachnida	Araneae	Lycosidae	*Xerolycosa nemoralis*		Nationally Scarce	X				
Arachnida	Araneae	Lycosidae	*Alopecosa pulverulenta*			X				
Arachnida	Araneae	Lycosidae	*Alopecosa barbipes*			X				
Arachnida	Araneae	Lycosidae	*Trochosa terricola*			X	X	X		X
Arachnida	Araneae	Lycosidae	*Arctosa leopardus*			X	X	X		

Class	Order	Family	Species	Vernacular	National Status	Matley Heath	Shatterford Bottom	Beaulieu Heath (Starpole Pond)	Beaulieu Heath (King's Hat)	Yew Tree Heath
Arachnida	Araneae	Lycosidae	*Pirata piraticus*				X	X		
Arachnida	Araneae	Lycosidae	*Pirata hygrophilus*			X	X			
Arachnida	Araneae	Lycosidae	*Pirata uliginosus*			X	X	X	X	
Arachnida	Araneae	Lycosidae	*Pirata latitans*			X		X		
Arachnida	Araneae	Lycosidae	*Pirata piscatorius*		Nationally Scarce		X	X		
Arachnida	Araneae	Pisauridae	*Pisaura mirabilis*			X	X	X		
Arachnida	Araneae	Pisauridae	*Dolomedes fimbriatus*	Raft Spider	Nationally Scarce		X	X		
Arachnida	Araneae	Agelenidae	*Agelena labyrinthica*				X	X	X	
Arachnida	Araneae	Hahniidae	*Antistea elegans*			X	X	X		
Arachnida	Araneae	Hahniidae	*Hahnia montana*					X		
Arachnida	Araneae	Dictynidae	*Dictyna arundinacea*					X		
Arachnida	Araneae	Dictynidae	*Dictyna latens*						X	
Arachnida	Araneae	Liocranidae	*Agroeca brunnea*							X
Arachnida	Araneae	Liocranidae	*Agroeca proxima*							X
Arachnida	Araneae	Liocranidae	*Scotina celans*		Nationally Scarce		X			
Arachnida	Araneae	Liocranidae	*Phrurolithus festivus*			X	X			
Arachnida	Araneae	Clubionidae	*Clubiona comta*			X				
Arachnida	Araneae	Clubionidae	*Clubiona trivialis*				X	X		
Arachnida	Araneae	Clubionidae	*Clubiona subtilis*				X		X	
Arachnida	Araneae	Gnaphosidae	*Drassodes cupreus*				X			
Arachnida	Araneae	Gnaphosidae	*Haplodrassus signifer*			X	X			
Arachnida	Araneae	Gnaphosidae	*Haplodrassus dalmatensis*		Nationally Scarce; SoPI	X				
Arachnida	Araneae	Gnaphosidae	*Zelotes latreillei*				X			
Arachnida	Araneae	Gnaphosidae	*Drassyllus pusillus*			X				

Class	Order	Family	Species	Vernacular	National Status	Matley Heath	Shatterford Bottom	Beaulieu Heath (Starpole Pond)	Beaulieu Heath (King's Hat)	Yew Tree Heath
Arachnida	Araneae	Gnaphosidae	*Gnaphosa leporina*		Nationally Scarce	X	X			
Arachnida	Araneae	Gnaphosidae	*Micaria pulicaria*			X				
Arachnida	Araneae	Zoridae	*Zora spinimana*			X	X			
Arachnida	Araneae	Philodromidae	*Philodromus aureolus*					X		
Arachnida	Araneae	Philodromidae	*Philodromus cespitum*			X				
Arachnida	Araneae	Philodromidae	*Philodromus emarginatus*		VU; Nationally Rare	X				
Arachnida	Araneae	Philodromidae	*Thanatus striatus*		Nationally Scarce		X			
Arachnida	Araneae	Philodromidae	*Tibellus maritimus*				X			
Arachnida	Araneae	Philodromidae	*Tibellus oblongus*				X		X	
Arachnida	Araneae	Thomisidae	*Diaea dorsata*			X				
Arachnida	Araneae	Thomisidae	*Xysticus cristatus*			X				
Arachnida	Araneae	Thomisidae	*Xysticus kochi*			X				
Arachnida	Araneae	Thomisidae	*Xysticus erraticus*				X			
Arachnida	Araneae	Thomisidae	*Xysticus robustus*		EN; Nationally Rare		X			
Arachnida	Araneae	Thomisidae	*Ozyptila trux*			X				
Arachnida	Araneae	Salticidae	*Heliophanus cupreus*			X				
Arachnida	Araneae	Salticidae	*Heliophanus flavipes*				X	X		
Arachnida	Araneae	Salticidae	*Neon reticulatus*			X			X	
Arachnida	Araneae	Salticidae	*Euophrys frontalis*			X	X	X	X	
Arachnida	Araneae	Salticidae	*Talavera aequipes*						X	
Arachnida	Araneae	Salticidae	*Sitticus caricis*		Nationally Rare; SoPI	X	X	X		
Arachnida	Araneae	Salticidae	*Evarcha arcuata*		Nationally Scarce	X	X			
Arachnida	Araneae	Salticidae	*Synageles venator*		Nationally Scarce	X	X			
Arachnida	Araneae	Salticidae	*Myrmarachne formicaria*		Nationally Scarce	X		X	X	

Table 20: Other invertebrate taxa recorded at New Forest Study Sites in 2018.

Class	Order	Family	Species	Vernacular	National Status
Gastropoda	Pulmonata	Limacidae	*Limax maximus*	Leopard Slug	
Insecta	Coleoptera	Dytiscidae	*Agabus bipustulatus*		
Insecta	Coleoptera	Carabidae	*Carabus granulatus*		
Insecta	Coleoptera	Carabidae	*Carabus nitens*		Nationally Scarce
Insecta	Coleoptera	Carabidae	*Nebria salina*		
Insecta	Coleoptera	Carabidae	*Cicindela campestris*	Green Tiger Beetle	
Insecta	Coleoptera	Carabidae	*Dyschirius globosus*		
Insecta	Coleoptera	Carabidae	*Bembidion lampros*		
Insecta	Coleoptera	Carabidae	*Poecilus versicolor*		
Insecta	Coleoptera	Carabidae	*Pterostichus niger*		
Insecta	Coleoptera	Carabidae	*Pterostichus minor*		
Insecta	Coleoptera	Carabidae	*Pterostichus nigrita*		
Insecta	Coleoptera	Carabidae	*Pterostichus strenuus*		
Insecta	Coleoptera	Carabidae	*Agonum fuliginosum*		
Insecta	Coleoptera	Carabidae	*Bradycellus ruficollis*		
Insecta	Coleoptera	Carabidae	*Trichocellus placidus*		
Insecta	Coleoptera	Carabidae	*Acupalpus dubius*		
Insecta	Coleoptera	Carabidae	*Acupalpus flavicollis*		NT; Nationally Rare
Insecta	Coleoptera	Carabidae	*Demetrias atricapillus*		
Insecta	Coleoptera	Carabidae	*Paradromius linearis*		
Insecta	Coleoptera	Carabidae	*Philorhizus melanocephalus*		
Insecta	Coleoptera	Carabidae	*Syntomus foveatus*		
Insecta	Coleoptera	Helophoridae	*Helophorus brevipalpis*		
Insecta	Coleoptera	Hydrophilidae	*Chaetarthria simillima*		Nationally Scarce

Class	Order	Family	Species	Vernacular	National Status
Insecta	Coleoptera	Hydrophilidae	*Helochares punctatus*		
Insecta	Coleoptera	Hydrophilidae	*Enochrus affinis*		
Insecta	Coleoptera	Staphylinidae	*Stenichnus collaris*		
Insecta	Coleoptera	Silphidae	*Nicrophorus vespilloides*		
Insecta	Coleoptera	Staphylinidae	*Anthobium unicolor*		
Insecta	Coleoptera	Staphylinidae	*Olophrum piceum*		
Insecta	Coleoptera	Staphylinidae	*Acidota crenata*		
Insecta	Coleoptera	Staphylinidae	*Sepedophilus nigripennis*		
Insecta	Coleoptera	Staphylinidae	*Tachyporus chrysomelinus*		
Insecta	Coleoptera	Staphylinidae	*Tachyporus hypnorum*		
Insecta	Coleoptera	Staphylinidae	*Lordithon thoracicus*		
Insecta	Coleoptera	Staphylinidae	*Myllaena dubia*		
Insecta	Coleoptera	Staphylinidae	*Myllaena intermedia*		
Insecta	Coleoptera	Staphylinidae	*Myllaena kraatzi*		Notable
Insecta	Coleoptera	Staphylinidae	*Mocyta fungi agg.*		
Insecta	Coleoptera	Staphylinidae	*Drusilla canaliculata*		
Insecta	Coleoptera	Staphylinidae	*Stenus boops*		
Insecta	Coleoptera	Staphylinidae	*Stenus brunnipes*		
Insecta	Coleoptera	Staphylinidae	*Stenus fulvicornis*		
Insecta	Coleoptera	Staphylinidae	*Stenus nitidiusculus*		
Insecta	Coleoptera	Staphylinidae	*Stenus picipes*		
Insecta	Coleoptera	Staphylinidae	*Stenus aceris*		
Insecta	Coleoptera	Staphylinidae	*Stenus impressus*		
Insecta	Coleoptera	Staphylinidae	*Stenus ossium*		
Insecta	Coleoptera	Staphylinidae	*Euaesthetus ruficapillus*		

Class	Order	Family	Species	Vernacular	National Status
Insecta	Coleoptera	Staphylinidae	*Paederus caligatus*		RDB3
Insecta	Coleoptera	Staphylinidae	*Lithocharis nigriceps*		
Insecta	Coleoptera	Staphylinidae	*Ochthephilum fracticorne*		
Insecta	Coleoptera	Staphylinidae	*Ocypus olens*	Devil's Coach-horse	
Insecta	Coleoptera	Scirtidae	*Cyphon hilaris*		
Insecta	Coleoptera	Scirtidae	*Cyphon ochraceus*		
Insecta	Coleoptera	Scirtidae	*Cyphon padi*		
Insecta	Coleoptera	Byrrhidae	*Byrrhus pilula*	Pill Beetle	
Insecta	Coleoptera	Elateridae	*Athous haemorrhoidalis*		
Insecta	Coleoptera	Malachiidae	*Malachius bipustulatus*	Malachite Beetle	
Insecta	Coleoptera	Byturidae	*Byturus tomentosus*	Raspberry Beetle	
Insecta	Coleoptera	Coccinellidae	*Scymnus suturalis*		
Insecta	Coleoptera	Coccinellidae	*Exochomus quadripustulatus*	Pine Ladybird	
Insecta	Coleoptera	Coccinellidae	*Tytthaspis sedecimpunctata*	16-spot Ladybird	
Insecta	Coleoptera	Latridiidae	*Corticarina fuscula*		
Insecta	Coleoptera	Tenebrionidae	*Nalassus laevioctostriatus*		
Insecta	Coleoptera	Chrysomelidae	*Lochmaea suturalis*	Heather Beetle	
Insecta	Coleoptera	Chrysomelidae	*Agelastica alni*		DD; Nationally Rare
Insecta	Coleoptera	Chrysomelidae	*Luperus longicornis*		
Insecta	Coleoptera	Chrysomelidae	*Chaetocnema confusa*		Nationally Scarce
Insecta	Coleoptera	Chrysomelidae	*Chaetocnema hortensis*		
Insecta	Coleoptera	Apionidae	*Exapion ulicis*	Gorse Weevil	
Insecta	Coleoptera	Apionidae	*Protapion fulvipes*	White Clover Seed Weevil	
Insecta	Coleoptera	Curculionidae	*Caenopsis waltoni*		
Insecta	Coleoptera	Curculionidae	*Strophosoma capitatum*		

Class	Order	Family	Species	Vernacular	National Status
Insecta	Coleoptera	Curculionidae	*Sitona regensteinensis*		
Insecta	Coleoptera	Curculionidae	*Sitona striatellus*		
Insecta	Coleoptera	Curculionidae	*Micrelus ericae*	Small Heather Weevil	
Insecta	Diptera	Syrphidae	*Microdon analis*		Nationally Scarce
Insecta	Hemiptera, Auchenorrhyncha	Cicadellidae	*Ulopa reticulata*		
Insecta	Hemiptera, Heteroptera	Nepidae	*Nepa cinerea*		
Insecta	Hemiptera, Heteroptera	Tingidae	*Acalypta parvula*		
Insecta	Hymenoptera	Sphecidae	*Ammophila sabulosa*	Red Banded Sand Wasp	
Insecta	Hymenoptera	Andrenidae	*Andrena cineraria*	Grey Mining Bee	
Insecta	Hymenoptera	Halictidae	*Lasioglossum lativentre*	a mining bee	
Insecta	Lepidoptera	Hesperiidae	*Ochlodes sylvanus*	Large Skipper	
Insecta	Lepidoptera	Pieridae	*Gonepteryx rhamni*	Brimstone	
Insecta	Lepidoptera	Lycaenidae	*Plebejus argus*	Silver-studded Blue	VU; Nationally Scarce; SoPI
Insecta	Odonata	Libellulidae	*Sympetrum striolatum*	Common Darter	
Insecta	Orthoptera	Tettigoniidae	*Metrioptera brachyptera*	Bog Bush Cricket	Nationally Scarce
Insecta	Orthoptera	Tetrigidae	*Tetrix undulata*	Common Ground Hopper	
Malacostraca	Isopoda	Philosciidae	*Philoscia muscorum*	Common Striped Woodlouse	
Malacostraca	Isopoda	Oniscidae	*Oniscus asellus*	Common Shiny Woodlouse	

C. Appendix C: Nature Conservation Status Categories (Definitions and Scores)

Introduction

The up to date status of species of conservation concern have been taken from Pantheon, the web-based analytical package maintained by the national biological records centre and developed by Webb *et al*. (2018) but reference to the various published Species Status Reviews; and the [8]Joint Nature Conservation Committee database of species designations has been undertaken where the author is aware there might be a discrepancy. However, no guarantee is given that this has been entirely comprehensive and reliance has largely been placed on Pantheon#s accuracy.

Great Britain Rarity Status

Nationally Rare (NR) species are those that have been recently reassessed and are roughly equivalent to the old Red Data Book categories. These are defined as occurring in 15 or fewer hectads (10 km Ordnance Survey grid squares) and where there is reasonable confidence that intensive recording effort won't increase the number of hectads above 15.

Nationally Scarce (NS) species are those that are not NR and which have not been recorded in more than 100 hectads, and where there is reasonable confidence that intensive recording effort won't increase the number of hectads above 100.

Where taxa have yet to be reassessed under the Species Status Reviews, they formally retain their status based on historical reviews, which may date back to the late 1980s or early 1990s. These status' should be treated with caution as it is likely a significant proportion are no longer accurate, either due to a better understanding of their ecology, or have subsequently spread due to climate change or other amenable factors (e.g. they are more frequent and no longer deserve a nature conservation status); or they have declined; and may merit upgrading to a threat category.

Nationally Notable - species recorded, or likely to be restricted to 16 - 100 hectads in Britain. Historically, for some better recorded invertebrate taxa, they were further divided between Notable-A (Na) for species thought to occur in 30 or fewer hectads, and Notable-B (Nb) for those thought to occur between 31-100 hectads. These are referred to as Nationally Scarce (Na), or Nationally Scarce (Nb). Within Pantheon, some status' have been placed in square brackets, e.g. [Nationally Scarce (Nb)]. This denotes that in the professional judgement of the specialists (Webb et. al., 2018), this status is unreliable, but they have not been formally assessed against up to date criteria. The species are included in the relevant table in this report for the avoidance of doubt.

Red Data Book (RDB) species –species occurring in fewer than 16 10-km squares of the National Grid, divided as:

RDB 1: Endangered - for species known from a single population or in continuous recent decline and now known from five or fewer 10-km squares;

RDB 2: Vulnerable - likely to become endangered (RDB 1) if causal factors continue;

RDB 3: Rare: - species at risk but not qualifying as vulnerable; and

RDB K: Insufficiently Known - species likely to qualify at least as rare.

UK Biodiversity Action Planning

Species of Principal Importance as listed in Section 41 of the National Environment and Rural Communities Act, 2006. These are abbreviated as NERC-S41. Approximately 70 species of moth have been included in a list which proposes 'for Research only'; a frequently encountered example is the cinnabar (*Tyria jacobaeae*). These are widespread species which are believed to have experienced a decline and have been included to enable funding to be allocated for research.

[8] Joint Nature Conservation Committee, http://jncc.defra.gov.uk/page-3408

UK Legal Protection

Approximately 50 species of invertebrate species in Britain receive legal protection through Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). About half receive limited protection; for example it is illegal to sell, or advertise for sale, a number of butterfly species. The remaining 28 species are more strictly protected, for example it is an offence to take or kill specimens without an appropriate licence. These species are generally extremely rare, restricted to a few, or a single site and none are likely to occur anywhere in the region.

IUCN Threat Categories

In recent years, invertebrate taxa in Great Britain have been assessed against the International Union for the Conservation of Nature's (IUCN) threat criteria that considers factors influencing a species survival. These include population decline or geographic contraction through habitat loss. These assessments are ongoing as part of the Species Status Reviews, overseen by the Joint Nature Conservation Committee and mostly published by Natural England. The criteria are defined by the IUCN, which places an assessed taxon in one of seven categories from Extinct down to Least Concern, based on one of the five main criteria. The following categories are defined as Threatened (Red List):

Critically Endangered (CR): A taxon is Critically Endangered when the best available evidence indicates that it is considered to be facing an extremely high risk of extinction in the wild.

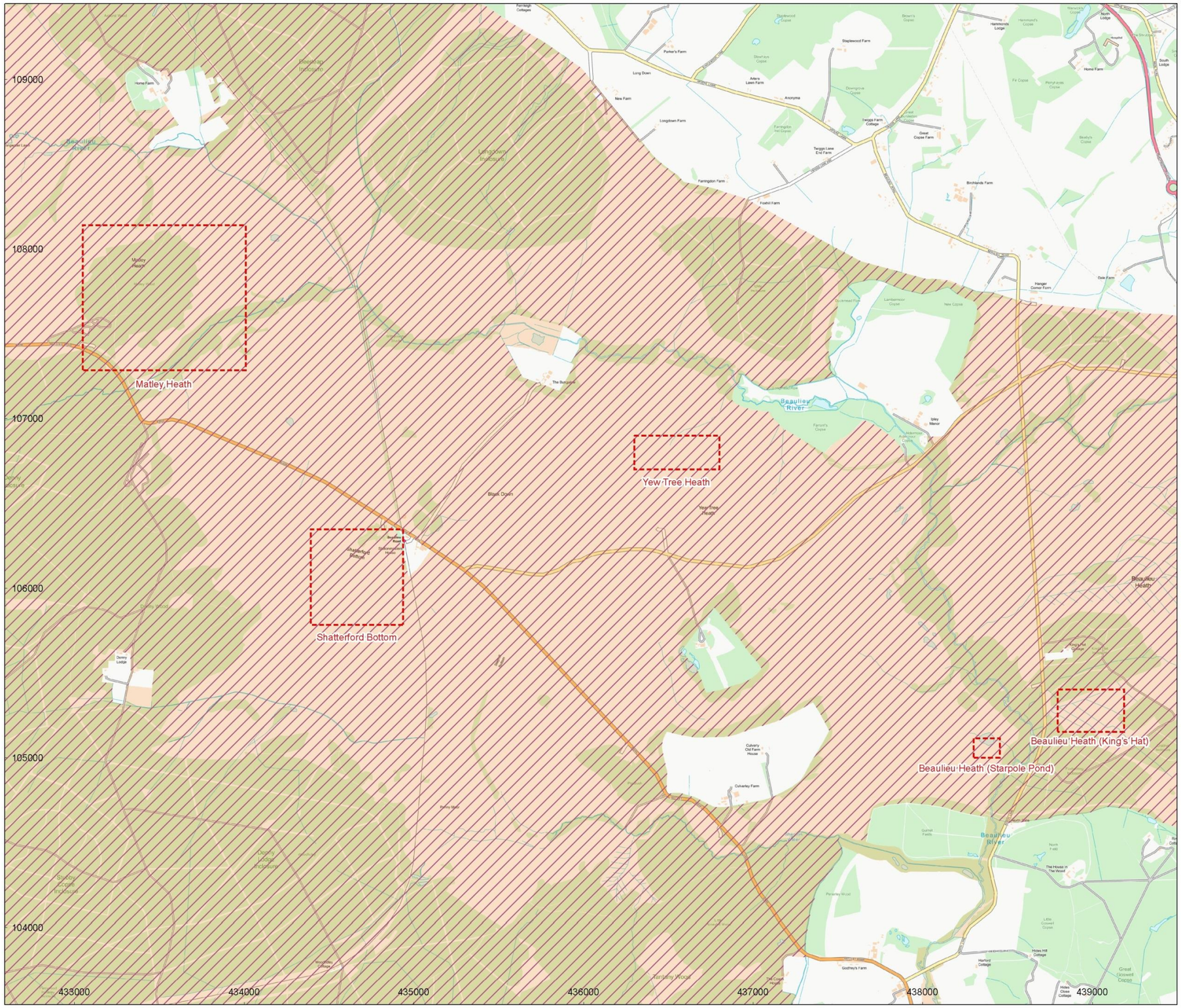
Endangered (EN): A taxon is Endangered when the best available evidence indicates that it is considered to be facing a very high risk of extinction in the wild.

Vulnerable (VU): A taxon is Vulnerable when the best available evidence indicates that it is considered to be facing a high risk of extinction in the wild.

A further category, Near Threatened (NT), is applied to a taxon, which following assessment, came close to, but failed to qualify as a Threatened species. However, it is considered that if the factors influencing its assessment continue, it is likely to move in to one of the threat categories; and thus it acts as a watching brief.

D. Appendix D: Locations of Study Sites and Key Species Recorded

Map Figure 1: Overview of study sites within New Forest SSSI.

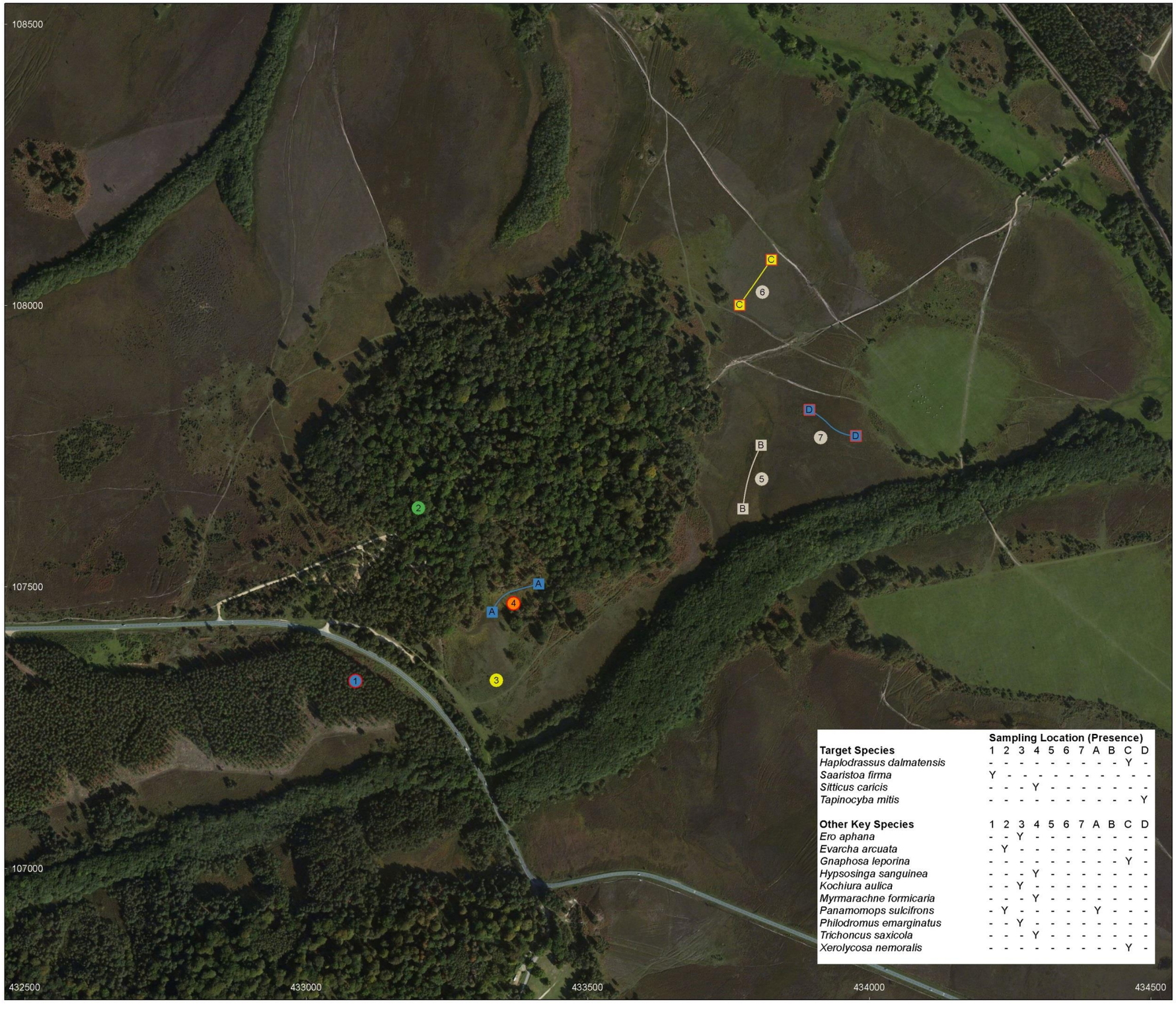


29 Primley Park Lane, Alwoodley, Leeds, West Yorkshire, LS17 7JE. T:0113 269 2581.
www.richardwilsonecology.wordpress.com

Project	New Forest Spider Surveys [RWE0193]
Title	Figure 1: Over view of study sites within New Forest SSSI
Client	Forestry Commission England

Date	Reviewer	Version	Scale	Size
13/03/19	MP	2.3	1:20,000	A3

Map Figure 2: Sampling locations and distribution of Key Species at Matley Heath, New Forest SSSI.



Target Species	1	2	3	4	5	6	7	A	B	C	D
Haplodrassus dalmatensis	-	-	-	-	-	-	-	-	-	Y	-
Saaristoa firma	Y	-	-	-	-	-	-	-	-	-	-
Sitticus caricis	-	-	-	Y	-	-	-	-	-	-	-
Tapinocyba mitis	-	-	-	-	-	-	-	-	-	-	Y
Other Key Species	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**A**	**B**	**C**	**D**
Ero aphana	-	-	Y	-	-	-	-	-	-	-	-
Evarcha arcuata	-	Y	-	-	-	-	-	-	-	-	-
Gnaphosa leporina	-	-	-	-	-	-	-	-	-	Y	-
Hypsosinga sanguinea	-	-	-	Y	-	-	-	-	-	-	-
Kochiura aulica	-	-	Y	-	-	-	-	-	-	-	-
Myrmarachne formicaria	-	-	-	Y	-	-	-	-	-	-	-
Panamomops sulcifrons	-	Y	-	-	-	-	-	Y	-	-	-
Philodromus emarginatus	-	-	Y	-	-	-	-	-	-	-	-
Trichoncus saxicola	-	-	-	Y	-	-	-	-	-	-	-
Xerolycosa nemoralis	-	-	-	-	-	-	-	-	-	Y	-

Map Legend

Target Species Records	
○	Target species recorded - point survey
□	Target species recorded - transect
Species Abundance - Point & Transect Survey	
	0 Key species recorded
	1 Key species recorded
	2 Key species recorded
	3 Key species recorded
	4 Key species recorded
	5 Key species recorded
	6 Key species recorded

Additional Information
Numbers associated with points refer to the point survey location identifier, whilst letters are used to identify transects.

0 50 100 200 m

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Project	New Forest Spider Surveys [RWE0193]
Title	Figure 2 - Sampling locations at Matley Heath, New Forest SSSI/ SAC
Client	Forestry Commission England

Date	Reviewer	Version	Scale	Size
13/03/19	MP	2.2	1:6,000	A3

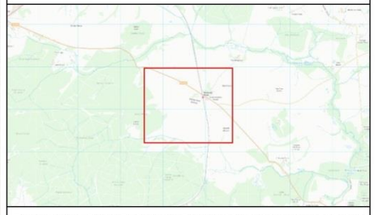
Map Figure 3: Sampling locations and distribution of Key Species at Shatterford Bottom, New Forest SSSI.

Target Species	Sampling Location (Presence) 8	9	10	11	12	13	E	F	G
Sitticus caricis	Y	Y	-	-	-	-	-	-	-
Other Key Species									
Araeoncus crassiceps	Y	Y	-	-	-	-	Y	-	-
Dolomedes fimbriatus	-	Y	-	-	-	-	-	-	-
Evarcha arcuata	-	Y	-	-	-	-	-	-	-
Gnaphosa leporina	-	-	-	-	-	-	Y	Y	-
Hypselistes jacksoni	Y	-	Y	-	-	-	-	-	-
Hypsosinga sanguinea	Y	-	-	-	-	-	-	-	-
Pirata piscatorius	Y	-	-	-	-	-	Y	-	-
Scotina celans	-	-	Y	-	-	-	-	-	-
Synageles venator	-	-	-	-	Y	-	-	-	-
Thanatus striatus	-	-	-	-	-	-	-	Y	-
Trichoncus saxicola	Y	-	-	-	-	-	Y	Y	-
Xysticus robustus	-	-	-	-	-	-	-	Y	-

Map Legend

Target Species Records	
○	Target species recorded - point survey
□	Target species recorded - transect
Species Abundance - Point & Transect Survey	
	0 Key species recorded
	1 Key species recorded
	2 Key species recorded
	3 Key species recorded
	4 Key species recorded
	5 Key species recorded
	6 Key species recorded

Additional Information
Numbers associated with points refer to the point survey location identifier, whilst letters are used to identify transects.



0 50 100 200 m

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Project	New Forest Spider Surveys [RWE0193]
Title	Figure 3 - Sampling locations at Shatterford Bottom, New Forest SSSI/ SAC
Client	Forestry Commission England

Date	Reviewer	Version	Scale	Size
13/03/19	MP	2.2	1:6,000	A3

Map Figure 4: Sampling locations and distribution of Key Species at Beaulieu Heath (Starpole Pond [western cluster] and King's Hat [eastern cluster], New Forest SSSI.

	Sampling Location (Presence)					
Target Species	14	15	16	17	18	H
Sitticus caricis	-	Y	-	-	-	-
Uloborus walckenaerius	-	-	-	Y	-	-
Other Key Species	14	15	16	17	18	H
Araeoncus crassiceps	-	Y	-	-	-	-
Dolomedes fimbriatus	-	Y	-	-	-	-
Myrmarachne formicaria	-	Y	-	Y	-	-
Pirata piscatorius	-	Y	-	-	-	-
Trichoncus saxicola	-	-	-	-	Y	-
Walckenaeria nodosa	-	-	-	-	-	Y

Map Legend

Target Species Records	
○	Target species recorded - point survey
□	Target species recorded - transect
Species Abundance - Point & Transect Survey	
	0 Key species recorded
	1 Key species recorded
	2 Key species recorded
	3 Key species recorded
	4 Key species recorded
	5 Key species recorded
	6 Key species recorded

Additional Information
Numbers associated with points refer to the point survey location identifier, whilst letters are used to identify transects.

0 50 100 200 m

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Project	New Forest Spider Surveys [RWE0193]
Title	Figure 4 - Sampling locations at Beaulieu Heath (Starpole Pond and King's Hat), New Forest SSSI/ SAC
Client	Forestry Commission England

Date	Reviewer	Version	Scale	Size
13/03/19	MP	2.2	1:6,000	A3

Map Figure 5: Sampling locations and distribution of Key Species at Yew Tree Heath, New Forest SSSI.

Map Legend

Target Species Records	
○	Target species recorded - point survey
□	Target species recorded - transect
Species Abundance - Point & Transect Survey	
	0 Key species recorded
	1 Key species recorded
	2 Key species recorded
	3 Key species recorded
	4 Key species recorded
	5 Key species recorded
	6 Key species recorded

Additional Information
Numbers associated with points refer to the point survey location identifier, whilst letters are used to identify transects.

0 50 100 200 m

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Project	New Forest Spider Surveys [RWE0193]			
Title	Figure 5 - Sampling locations at Yew Tree Heath, New Forest SSSI/ SAC			
Client	Forestry Commission England			
Date	**Reviewer**	**Version**	**Scale**	**Size**
13/03/19	MP	2.2	1:6,000	A3

E. Appendix E: Photos

Photograph 1: Area of drier heather on Matley Heath (looking south) , New Forest SSSI.

Photograph 2: Line of pitfall traps on edge of *Sphagnum* mire, Matley Heath, New Forest SSSI.

Photograph 3: Example of a pitfall trap within *Sphagnum* mire, Matley Heath, New Forest SSSI.

Photograph 4: Area of heath surveyed on Beaulieu Heath (Starpole Pond), New Forest SSSI..

Photograph 5: *Sphagnum* mire on south-western edge of Matley Wood, Matley Heath, New Forest SSSI.

Photograph 6: Edge of *Sphagnum* mire, Shatterford Bottom, New Forest SSSI.

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