

# Survey for moths at Alfoxton Park in 2022

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# Summary

This report describes a moth survey at Alfoxton Park, which is part of The Quantocks Site of Special Scientific Interest (SSSI) in Somerset. It contains a mixture of locally native trees, particularly oak, ash and birch, and other planted species that have also self-seeded, including beech, sycamore, and horse chestnut. There are also large areas of dense bracken including scattered mature hawthorns, and a small area of grassland in the east of the park.

The aim of the survey was to assess the moth fauna at the site, and to provide management advice. Three 125W MV Robinson moth traps were run overnight on six occasions, monthly between May and October. Traps were placed in five locations depending on the prevailing wind direction, sampling either broadleaved woodland or grassland. 308 moth species were recorded, with 41 species in May, 130 in June, 172 in July, 116 in August, 24 in September, and 26 in October.

Twelve species with conservation status or provisional conservation status were recorded – oak hook-tip *Watsonalla binaria*, lackey *Malacosoma neustria*, broom moth *Ceramica pisi* and true lover's knot *Lycophotia porphyrea* (Vulnerable); grey pug *Eupithecia subfuscata*, white-spotted pug *Eupithecia tripunctaria*, September thorn *Ennomos erosaria*, dusky thorn *Ennomos fuscantaria*, flounced chestnut *Agrochola helvola* and beaded chestnut *Agrochola lychnidis* (Near Threatened); feathered slender (Nationally Scarce A; and bright neg (Nationally Scarce B).

Overall, Alfoxton Park has experienced little recent management intervention and is a good site for moths. There has been some tree-planting on area of open grassland with ant-hills, which should be removed as there is little open, grassy habitat at Alfoxton. The open areas are dominated by bracken, which could possibly be diversified if the dominance of this could be reduced. The park particularly benefits from a lack of overnight lighting, and no permanent illumination should be installed.

# 1. Introduction

## 1.1 Brief

The brief for this survey was to:

- Undertake a moth survey at Alfoxton Park using standardised sampling methods.
- Visit monthly between May and October.
- Provide a description of the habitat and its condition, suggesting where current management is working and where it is not, and why that might be.

## 1.2 Site description and landscape context

Alfoxton Park is in South Somerset (VC5) on the northern side of the Quantocks Hills, south of Kilve village and within four kilometres of the Bristol Channel. The site is on a steep north-facing slope, from 200 m at the highest point to 130 m at the base. The underlying rocks on the higher slope are hard sandstones of the Hangman Grits strata with the Avill Slates and Sandstones Member lower down.

Alfoxton is labelled as a deer park on the 1887 Ordnance Survey Map, although the date this was established is unknown. It is likely to be of relatively recent origin although incorporating part of a pre-existing area of ancient wood pasture on the Quantock Common. It contains a mixture of locally native trees, particularly oak, ash and birch, and other species that have been planted and are now also established as self-seeded trees, including beech, sycamore and horse chestnut. Seedlings of other planted trees were not seen during this survey, including horse chestnut and Scots pine. There are also large areas of dense bracken including scattered hawthorns, and an area of grassland in the east of the park.

## 1.3 Designation

Alfoxton Park is Unit 37 within The Quantocks Site of Special Scientific Interest (SSSI). This unit is 14.97 ha in area and located approximately 2 km south of Kilve village in west Somerset. The SSSI is notified for a wide variety of habitats including dry dwarf-shrub heath, wet dwarf-shrub heath, acidic flushes, ancient semi-natural broadleaved woodland, and dense scrub. While Alfoxton Park is not specifically mentioned, the citation does include mention the presence of mature sessile oak *Quercus petraea* in the adjacent Alfoxton Wood (Natural England, 2022). Invertebrates are not a notified feature of the SSSI.

## 2. Method

### 2.1 Desk study

A data-search from Somerset Environmental Records Centre (SERC) returned no records of moths at Alfoxton Park.

### 2.2 Sampling methods

Light trapping is the single most effective survey method for recording nocturnal macro-moths (Waring & Townsend 2009). This survey was completed using three Robinson-pattern 125w mercury-vapour light traps operated simultaneously overnight. This trap design and bulb offer the greatest moth attraction and catch retention (Fry & Waring 2020). A Robinson-pattern 125w mercury-vapour light trap is illustrated at Photo 1. Some micro-lepidoptera are also attracted to light, although most of these are more easily recorded as larvae, larval feeding signs, or as adults by day.



**Photo 1. A Robinson-pattern 125W mercury-vapour light trap.**

Traps were deployed in five locations during the survey, variously placed to sample broadleaved woodland or grassland, and to benefit from shelter from the wind.

**Table 1. The locations in Alfoxton Park where moth traps were run in 2022.**

Code	SSSI Unit	O.S. grid reference	Immediate habitat
1	37	ST 1464 4138	Broadleaved woodland
2	37	ST 1468 4128	Broadleaved woodland
3	37	ST 1471 4135	Broadleaved woodland
4	37	ST 1472 4133	Broadleaved woodland
5	37	ST1500 4134	Grassland

Each moth trapping location is shown in Figure 1.



**Figure 1. Moth trap locations at Alfoxton Park in 2022. Imagery © 2022 Google, Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies.**

## Survey dates and weather conditions

The weather conditions during the moth survey visits at Alfoxton Park in 2022 are outlined in Table 2.

**Table 2. Weather conditions during moth survey visits at Alfoxton Park in 2022.**

<b>Date (2022)</b>	<b>Start time</b>	<b>Finish time</b>	<b>Maximum temperature (°C)</b>	<b>Cloud cover (%)</b>	<b>Rainfall (mm)</b>	<b>Maximum wind speed (mph)</b>
20 <sup>th</sup> May	21:02	05:14	11	85	0	11
17 <sup>th</sup> June	21:29	04:57	15	67	0	8
12 <sup>th</sup> July	21:23	05:12	18	80	0	7
13 <sup>th</sup> August	20:37	05:57	21	95	0	4
21 <sup>st</sup> September	19:13	06:58	13	70	0	5
18 <sup>th</sup> October	18:13	07:42	10	100	0	16

## Sample identification

Most moths were recognisable in the field, although a few specimens were identified by microscopy.

## 2.4 Data interpretation

### Conservation status of moths

Moth species with published conservation status, or a provisional conservation status assessment, are listed in Subsection 3.1. The conservation status of micro-moths has not been assessed using current IUCN Red List criteria and thresholds (IUCN, 2001; IUCN, 2012), with the result that two classification systems are currently in operation. These are summarised in Appendix 1.



## Foodplant associations for moth larvae

Potential larval foodplants for moths recorded in this survey are listed in sub-section 3.2. The plant species listed were recorded at the same time. Recently published literature was used to construct the summaries for macro-moths (Henwood and Sterling, 2020) and micro-moths (Langmaid *et al.*, 2018), these being collated in a review of bat prey species associations (Andrews & McGill, 2022).

## 2.5 Constraints

The majority of micro-lepidoptera are best recorded as larvae, from larval feeding signs, or as adults by day, although there was no time for this in the present survey. This means that the survey results should be interpreted as a baseline for the sampling method and seasonal coverage, rather than a more general inventory of the moth fauna in the park.

## 3. Results

308 moth species were recorded in the 2022 samples at Alfoxton Park. These are listed in Appendix 1. Photographs of selected moth species are provided in Appendix 2.

### 3.1 Species status

Twelve moth species with published conservation status or a provisional conservation status were recorded at Alfoxton Park in 2022. These are listed in Table 3 and following this the ecological requirements and status of the species in Somerset are discussed.

**Table 3. Moth species with conservation status recorded at Alfoxton Park in 2022.**

Vernacular	Scientific	Conservation status
Oak hook-tip	<i>Watsonalla binaria</i>	Vulnerable
Lackey	<i>Malacosoma neustria</i>	Vulnerable
Broom moth	<i>Ceramica pisi</i>	Vulnerable
True lover's knot	<i>Lycophotia porphyrea</i>	Vulnerable
Grey pug	<i>Eupithecia subfuscata</i>	Near Threatened

Vernacular	Scientific	Conservation status
White-spotted pug	<i>Eupithecia tripunctaria</i>	Near Threatened
September thorn	<i>Ennomos erosaria</i>	Near Threatened
Dusky thorn	<i>Ennomos fuscantaria</i>	Near Threatened
Flounced chestnut	<i>Agrochola helvola</i>	Near Threatened
Beaded chestnut	<i>Agrochola lychnidis</i>	Near Threatened
Feathered slender	<i>Caloptilia cuculipennella</i>	Na
Bright neb	<i>Argolamprotes micella</i>	Nb

#### **Oak hook-tip *Watsonalla binaria* [VU]**

Larvae of this species feed on sessile and pedunculate oak (Henwood and Sterling, 2020). It occurs widely in Somerset, including in woodland, hedgerows, and gardens with oak. It is also widespread nationally, although it has declined in abundance at monitored sites (Randle *et al.*, 2019).

#### **Lackey *Malacosoma neustria* [VU]**

Larvae of this species feed on a variety of woody plants (Henwood and Sterling, 2020), at Alfoxton Park potentially including hawthorn and bramble. It is widely distributed in Somerset in open habitats including hedgerows, scrub, and gardens. It is also widespread nationally, although it has declined in abundance at monitored sites, and in overall distribution (Randle *et al.*, 2019).

#### **Broom moth *Ceramica pisi* [VU]**

Larvae of this species feed on a wide variety of herbaceous and woody plants (Henwood and Sterling, 2020), at Alfoxton Park potentially including birches, bracken, bramble, and marsh thistle. It is particularly associated with the Quantocks, Exmoor, and the Mendips in Somerset. It is also widespread nationally on moorland and heaths, although it has declined in abundance at monitored sites, and in overall distribution in lowland areas (Randle *et al.*, 2019).

### **True lover's knot *Lycophotia porphyrea* [VU]**

Larvae of this species feed on ericaceous shrubs (Henwood and Sterling, 2020), which potentially include heather, bell heather and bilberry at Alfoxton Park. It is particularly associated with the Quantocks and Exmoor in Somerset, which retain extensive areas of heathland. It is widely distributed on moors and heaths throughout Britain, although it has declined in abundance at monitored sites (Randle *et al.*, 2019).

### **Grey pug *Eupithecia subfuscata* [NT]**

Larvae of this species feed on a wide variety of herbaceous and woody plants (Henwood and Sterling, 2020), which at Alfoxton Park are likely to include hawthorn, common ragwort and willows. It occurs widely in Somerset, in habitats including gardens, heathland, downland and woodland. It is also widespread nationally, although it has declined in abundance at monitored sites (Randle *et al.*, 2019).

### **White-spotted pug *Eupithecia tripunctaria* [NT]**

This species has two generations annually. Larvae of the first generation feed on elder, and the larvae of the second generation feed on common ragwort and various umbellifers (Henwood and Sterling, 2020), of which hogweed has been recorded at Alfoxton Park. It occurs widely in Somerset, in habitats including woodland, hedgerows, marshy places and gardens. It is also widespread nationally, although it has declined in abundance at monitored sites (Randle *et al.*, 2019).

### **September thorn *Ennomos erosaria* [NT]**

Larvae of this species feed on broadleaved trees (Henwood and Sterling, 2020), which at Alfoxton Park are likely to include beech, birches, and oaks. It occurs widely in Somerset in wooded areas and gardens. It is also widespread nationally, although it has declined in abundance at monitored sites, and in overall distribution (Randle *et al.*, 2019).

### **Dusky thorn *Ennomos fuscantaria* [NT]**

The sole larval foodplant of this species is ash (Henwood and Sterling, 2020). It occurs widely in Somerset in woodland, parks, hedgerows, and gardens. It is also widespread in England, although with a steep long-term decline in abundance at monitored sites (Randle *et al.*, 2019). This may have begun to stabilise, although it is also threatened by ash dieback.

### **Flounced chestnut *Agrochola helvola* [NT]**

Larvae of this species feed on a variety of broadleaved trees (Henwood and Sterling, 2020), which at Alfoxton Park are likely to include birches, hawthorn, oaks and willows. It has a scattered distribution in Somerset in woodland, scrub, heaths, and moors. It is also widespread nationally, although with major long-term decreases in distribution and abundance trends (Randle *et al.*, 2019).

### **Beaded chestnut *Agrochola lychnidis* [NT]**

Larvae of this species feed on as a variety of herbaceous plants and grasses, as well as woody plants (Henwood and Sterling, 2020), which at Alfoxton Park are likely to include hawthorn. It occurs widely in Somerset. It is also widespread nationally, although it has declined in abundance at monitored sites, and in overall distribution (Randle *et al.*, 2019).

### **Feathered slender *Caloptilia cuculipennella* [Na]**

Larvae of this species feed in a leaf mine on wild privet and ash (Sterling & Parsons, 2012). It is rarely recorded in Somerset, and this is the first record for the Quantocks.

### **Bright neb *Argolamprotes micella* [Nb]**

Larvae of this species feed in shoots of bramble. Records are widely scattered in Somerset, and nationally it is mostly found in south-west England (Sterling & Parsons, 2012).

## **3.2 Larval foodplant associations**

The number of potential larval foodplant associations for moths recorded in the survey at Alfoxton park are listed in Table 4.

The trees were not subject to equal sampling intensity, and the data are based on adult specimens which may not have developed in the tree where these were recorded. Nevertheless it is likely that this broadly represents the importance of different tree species at the site.

**Table 4. Potential larval foodplant associations for moths recorded in the survey at Alfoxton Park in 2022.**

<b>Form</b>	<b>Vernacular</b>	<b>Scientific</b>	<b>SPP.</b>	<b>UNIQUE</b>
Tree	birches	<i>Betula</i> spp.	54	3
Tree	Hawthorn	<i>Crataegus monogyna</i>	45	0
Tree	Hazel	<i>Corylus avellana</i>	42	0
Tree	Beech	<i>Fagus sylvatica</i>	29	1
Tree	oaks	<i>Quercus</i> spp.	24	2
Tree	Sweet chestnut	<i>Castanea sativa</i>	20	0
Tree	Sycamore	<i>Acer pseudoplatanus</i>	17	0
Tree	Hornbeam	<i>Carpinus betulus</i>	14	0
Tree	broadleaved trees	Broadleaved trees	13	N/A

Form	Vernacular	Scientific	SPP.	UNIQUE
Tree	Ash	<i>Fraxinus excelsior</i>	13	3
Tree	Holly	<i>Ilex aquifolium</i>	5	0
Tree	Horse-chestnut	<i>Aesculus hippocastanum</i>	4	0
Tree	Scots pine	<i>Pinus sylvestris</i>	4	0
Tree	Wild cherry	<i>Prunus avium</i>	3	0
Tree	Rhododendron	<i>Rhododendron ponticum</i>	2	0
Shrub	Heather	<i>Calluna vulgaris</i>	30	2
Shrub	Bilberry	<i>Vaccinium myrtillus</i>	25	0
Shrub	broadleaved shrubs	Broadleaved shrubs	11	N/A
Shrub	Elder	<i>Sambucus nigra</i>	7	0
Shrub	Bell heather	<i>Erica cinerea</i>	2	0
Climber	Honeysuckle	<i>Lonicera periclymenum</i>	21	0
Herb	Stinging nettle	<i>Urtica dioica</i>	25	2
Herb	Wild strawberry	<i>Fragaria vesca</i>	10	0
Herb	Common ragwort	<i>Jacobaea vulgaris</i>	10	1
Herb	Yarrow	<i>Achillea millefolium</i>	7	0
Herb	Foxglove	<i>Digitalis purpurea</i>	7	1
Herb	Cleavers	<i>Galium aparine</i>	7	0
Herb	thistles	<i>Cirsium spp.</i>	5	1
Herb	Woodruff	<i>Galium odoratum</i>	4	0
Herb	Heath bedstraw	<i>Galium saxatile</i>	4	0
Herb	Ribwort plantain	<i>Plantago lanceolata</i>	4	0
Herb	Enchanter's-nightshade	<i>Circaea lutetiana</i>	3	0
Herb	Ground-ivy	<i>Glechoma hederacea</i>	3	0
Herb	Dog's mercury	<i>Mercurialis perennis</i>	3	0
Herb	Greater plantain	<i>Plantago major</i>	3	0
Herb	Spear thistle	<i>Cirsium vulgare</i>	2	0
Herb	Wood avens	<i>Geum urbanum</i>	2	0

Form	Vernacular	Scientific	SPP.	UNIQUE
Herb	Hogweed	<i>Heracleum sphondylium</i>	2	0
Herb	Lords-and-ladies	<i>Arum maculatum</i>	1	0
Herb	Nipplewort	<i>Lapsana communis</i>	1	0
Herb	Wall lettuce	<i>Mycelis muralis</i>	1	0
Herb	Creeping cinquefoil	<i>Potentilla reptans</i>	1	0
Herb	Barren strawberry	<i>Potentilla sterilis</i>	1	0
Herb	Selfheal	<i>Prunella vulgaris</i>	1	0
Herb	Navelwort	<i>Umbilicus rupestris</i>	1	0
Graminoid	grasses	Poaceae spp.	29	4
Graminoid	Cock's-foot	<i>Dactylis glomerata</i>	11	0
Graminoid	Annual meadow-grass	<i>Poa annua</i>	7	0
Graminoid	False brome	<i>Brachypodium sylvaticum</i>	5	1
Graminoid	meadow-grasses	<i>Poa</i> spp.	4	0
Graminoid	Field wood-rush	<i>Luzula campestris</i>	3	0
Graminoid	Sweet vernal-grass	<i>Anthoxanthum odoratum</i>	2	0
Graminoid	Common bent	<i>Agrostis capillaris</i>	1	0
Graminoid	Bristle bent	<i>Agrostis curtisii</i>	1	0
Graminoid	Wavy hair-grass	<i>Deschampsia flexuosa</i>	1	0
Graminoid	rushes	<i>Juncus</i> spp.	1	0
Fern	Bracken	<i>Pteridium aquilinum</i>	10	2
Lichen	lichens	Lichens	14	5
Lichen	Lichens	<i>Peltigera</i> spp.	4	1
Algae	Algae	Algae	8	0

## 4. Discussion

Although seven moth species with conservation status were recorded during this survey, these are all widespread in Somerset. Alfoxton nevertheless supports a good diversity of moths, which reflects the range of broadleaved tree species in the park. Birch, hawthorn, and hazel had the most species associated as potential larval foodplants, and birch, beech, oak, and ash were sole foodplants for a small number of monophagous moths. A few species had particularly strong populations. 102 marbled white-spot *Protodeltote pygarga* were recorded at Location 3 on 17<sup>th</sup> June – the previous highest nightly count in Somerset was 26. There were also 36 grey arches *Polia nebulosa* in the same trap – the previous highest nightly count in Somerset was 17. Thirty-five triple-spotted clay were recorded at Location 4 on 12<sup>th</sup> July – this is only the second count of more than 10 in Somerset, with one higher total of 38 at nearby Holford Glen on 13<sup>th</sup> July 2011. Fifteen species were associated with lichens as potential larval foodplants, which reflects a recent assessment of clean air-quality in the park based on these (Orange, 2022).

### Management advice

No changes are suggested to the management recommendations in a concurrent saproxylic survey (McGill, 2022). Some tree planting is desirable in specific areas of the park to support tree cohort continuity (McGill, 2022) although other areas are ecologically sensitive. Ten moth species in this survey are solely associated with grasses at Alfoxton Park. Open grassland at ST 149 413 is well-established based on the presence of yellow meadow ant *Lasius flavus* mounds. There has been poorly-planned tree planting on the western edge of this area which should be removed, and it should not be used for further tree planting.

It is predicted that 80% of ash in the UK will succumb to ash dieback *Hymenoscyphus fraxineus*, although no signs of it were seen during this survey. Ash has been recorded as a larval foodplant for 13 of the moth species recorded in this survey and is the sole foodplant for 3 species – dusky thorn *Ennomos fuscantaria*, and the micro-moths *Euzophera pinguis* and *Prays ruficeps*. It is imperative nationally that ash dieback-tolerant trees are identified and retained and that conditions are created to enable the seed from these trees to naturally regenerate (Elliot, 2019). For this reason it is recommended that ash is not prematurely felled in Alfoxton Park, as it does not occur next to public rights of way.

Moths at Alfoxton Park clearly benefit from the lack of lighting at night. No permanent lighting should be installed as this may have negative effects, for example by increasing predation risk (Wakefield *et al.*, 2015) and disrupting pollen transport networks (Macgregor *et al.*, 2016).

# Appendix 1 – Conservation status of moths

## Old Red Data lists

Categories in the first Red Data Book for insects in Britain (Shirt, 1987) were based on criteria established by the International Union for Conservation of Nature (IUCN). Some of the criteria were expanded in subsequent Red List publications (Hyman and Parsons, 1994) and the categorisation is outlined in Table A2.1.

**Table A2.1. Red Data Book categories based on criteria in Shirt (1987) and Hyman and Parsons (1994).**

Categorisation	Definition	Criteria
<b>Red Data Book Category 1 (RDB1)</b>	Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating.	<ul style="list-style-type: none"> <li>Species which are known or believed to occur as only a single population with one 10 km square of the National Grid.</li> <li>Species which occur only in habitats known to be especially vulnerable.</li> <li>Species which have shown a rapid or continuous decline over the last twenty years and are now estimated to exist in five or fewer 10 km squares.</li> <li>Species which are possibly extinct but have been recorded this century and if rediscovered would need protection.</li> </ul>
<b>Red Data Book Category 2 (RDB2)</b>	Taxa believed likely to move into the Endangered category in the near future if the causal factors continue operating.	<ul style="list-style-type: none"> <li>Species declining throughout their range.</li> <li>Species in vulnerable habitats.</li> </ul>
<b>Red Data Book Category 3 (RDB3)</b>	Taxa with small populations that are not at present Endangered or Vulnerable, but are at risk.	<ul style="list-style-type: none"> <li>Species which are estimated to exist in only fifteen or fewer post 1970 10 km squares. This criterion may be relaxed where populations are likely to exist in over fifteen 10 km squares but occupy small areas of especially vulnerable habitat.</li> </ul>



<b>Categorisation</b>	<b>Definition</b>	<b>Criteria</b>
<b>Red Data Book Category K (RDBK)</b>	Species that are suspected but not definitely known to belong to another Red Data Book category, because of lack of information.	<ul style="list-style-type: none"> <li>• Taxa recently discovered or recognised in Britain which may prove to be more widespread in the future.</li> <li>• Taxa with very few or perhaps only a single locality but which belong to poorly recorded or taxonomically difficult groups.</li> <li>• Species with very few or perhaps only a single locality, inhabiting inaccessible or infrequently sampled but widespread habitats.</li> <li>• Species with very few or perhaps only a single locality and of questionable native status, but not clearly falling into the category of recent colonist, vagrant or introduction.</li> </ul>
<b>Nationally Scarce Category A (Na)</b>	Taxa which do not fall within RDB categories but which are none-the-less uncommon in Great Britain.	<ul style="list-style-type: none"> <li>• Species thought to occur within the range of 16 and 30 10 km squares of the National Grid.</li> </ul>
<b>Nationally Scarce Category B (Nb)</b>	Taxa which do not fall within RDB categories but which are none-the-less uncommon in Great Britain.	<ul style="list-style-type: none"> <li>• Species thought to occur within the range of 31 and 100 10 km squares of the National Grid.</li> </ul>
<b>Nationally Notable (N)</b>	Taxa which do not fall within RDB categories but which are none-the-less uncommon in Great Britain.	<ul style="list-style-type: none"> <li>• Species which are estimated to occur within the range of 16 to 100 10 km squares. The subdividing of this category into Notable A and Notable B has not been attempted for some species.</li> </ul>

## Current IUCN Red Lists

The IUCN Red List Guidelines have been revised (IUCN, 2001; IUCN, 2012) and species assessments are based on five criteria:

- A.** Reduction in population size.
- B.** Limited geographic range in the form of either B1 (extent of occurrence) OR B2 (area of occupancy) OR both.
- C.** Small population size and declining.
- D.** Very small population size; or D2. Very small area of occupancy.
- E.** Probability of extinction.

Qualifying thresholds for the criteria are used to assign species to seven categories which are described fully in the IUCN Guidelines (IUCN, 2001; IUCN, 2012). Critically Endangered, Endangered and Vulnerable species are collectively classified as Threatened. More recent Red Lists for invertebrates in Britain use these categories, which are abbreviated as listed below. There is no equivalence between the old and new systems.

- CE** – Critically Endangered.
- EN** – Endangered.
- VU** – Vulnerable.
- NT** – Near Threatened.
- DD** – Data Deficient.
- LC** – Least Concern.

Finally, at the national level, countries are permitted under the IUCN guidelines to refine the definitions. Some reviews therefore additionally classify species as Nationally Rare (NR) or Nationally Scarce (NS), based on the number of 10 km squares the species is known from in a specified period, usually 30 years preceding the assessment. Nationally Rare species are recorded from 15 or fewer hectads of the Ordnance Survey national grid in Great Britain. Nationally Scarce species are recorded from 16 to 100 hectads of the Ordnance Survey national grid in Great Britain.

## Appendix 2 – Moth data

Table A1.1 Moth species and counts recorded during the survey at Alfoxton Park in 2022.

Taxon	Vernacular	Records	Individuals
<i>Korscheltellus lupulina</i>	Common Swift	3	18
<i>Korscheltellus fusconebulosa</i>	Map-winged Swift	3	4
<i>Hepialus humuli</i>	Ghost Moth	1	1
<i>Coptotriche marginea</i>	a moth	3	4
<i>Nemapogon clematella</i>	a moth	1	1
<i>Tinea semifulvella</i>	a moth	1	1
<i>Caloptilia cuculipennella</i>	a moth	1	1
<i>Caloptilia semifascia</i>	a moth	1	1
<i>Cameraria ohridella</i>	a moth	1	2
<i>Swammerdamia pyrella</i>	a moth	2	3
<i>Ypsolopha parenthesella</i>	a moth	3	9
<i>Ypsolopha ustella</i>	a moth	1	1
<i>Ypsolopha sequella</i>	a moth	1	1
<i>Plutella xylostella</i>	a moth	2	2
<i>Argyresthia brockeella</i>	a moth	2	9
<i>Argyresthia goedartella</i>	a moth	4	69
<i>Lyonetia clerkella</i>	a moth	2	2
<i>Prays ruficeps</i>	a moth	1	1
<i>Hofmannophila pseudospretella</i>	a moth	3	4
<i>Borkhausenia fuscescens</i>	a moth	1	1
<i>Crassa unitella</i>	a moth	2	2
<i>Batia lunaris</i>	a moth	1	1
<i>Tachystola acroxantha</i>	a moth	4	6
<i>Carcina quercana</i>	a moth	4	6
<i>Agonopterix arenella</i>	a moth	1	1
<i>Hypatima rhomboidella</i>	a moth	2	3
<i>Brachmia blandella</i>	a moth	3	9
<i>Argolamprotes micella</i>	a moth	1	6
<i>Monochroa cytisella</i>	a moth	2	10
<i>Psoricoptera gibbosella</i>	a moth	1	1
<i>Scrobipalpa costella</i>	a moth	1	1
<i>Teleiodes vulgella</i>	a moth	1	1
<i>Blastodacna hellerella</i>	a moth	1	1
<i>Mompha locupletella</i>	a moth	1	1
<i>Blastobasis adustella</i>	a moth	3	301
<i>Blastobasis lacticolella</i>	a moth	2	2
<i>Amblyptilia punctidactyla</i>	a moth	1	1
<i>Olindia schumacherana</i>	a moth	1	1
<i>Ditula angustiorana</i>	a moth	1	1
<i>Archips podana</i>	a moth	1	1
<i>Argyrotaenia ljugiana</i>	a moth	1	1

<b>Taxon</b>	<b>Vernacular</b>	<b>Records</b>	<b>Individuals</b>
<i>Pandemis cinnamomeana</i>	a moth	1	1
<i>Pandemis corylana</i>	a moth	2	4
<i>Pandemis cerasana</i>	a moth	2	2
<i>Pandemis heparana</i>	a moth	1	1
<i>Clepsis consimilana</i>	a moth	3	4
<i>Epiphyas postvittana</i>	a moth	3	5
<i>Tortrix viridana</i>	a moth	1	1
<i>Acleris forsskaleana</i>	a moth	1	1
<i>Acleris sparsana</i>	a moth	1	1
<i>Acleris cristana</i>	a moth	3	7
<i>Acleris variegana</i>	a moth	1	2
<i>Acleris aspersana</i>	a moth	1	1
<i>Agapeta hamana</i>	a moth	3	4
<i>Aethes cnicana</i>	a moth	4	4
<i>Thyralia nana</i>	a moth	1	1
<i>Apotomis betuletana</i>	a moth	1	1
<i>Apotomis capreana</i>	a moth	2	2
<i>Hedya nubiferana</i>	a moth	1	1
<i>Celypha striana</i>	a moth	3	4
<i>Celypha lacunana</i>	a moth	13	67
<i>Lobesia abscisana</i>	a moth	1	1
<i>Bactra lancealana</i>	a moth	1	2
<i>Ancylis badiana</i>	a moth	1	1
<i>Ancylis mitterbacheriana</i>	a moth	1	1
<i>Rhopobota naevana</i>	a moth	2	2
<i>Epinotia ramella</i>	a moth	1	2
<i>Eucosma cana</i>	a moth	2	7
<i>Eucosma campoliliana</i>	a moth	1	1
<i>Notocelia cynosbatella</i>	a moth	1	2
<i>Notocelia uddmanniana</i>	a moth	3	3
<i>Cydia splendana</i>	a moth	2	14
<i>Pammene fasciana</i>	a moth	1	1
<i>Zeuzera pyrina</i>	a moth	1	1
<i>Aphomia sociella</i>	a moth	1	1
<i>Pempelia palumbella</i>	a moth	1	1
<i>Phycita roborella</i>	a moth	1	1
<i>Acrobasis advenella</i>	a moth	2	2
<i>Myelois circumvoluta</i>	a moth	1	2
<i>Euzophera pinguis</i>	a moth	2	4
<i>Pyrausta aurata</i>	a moth	1	1
<i>Pyrausta purpuralis</i>	a moth	1	1
<i>Anania lancealis</i>	a moth	3	4
<i>Anania hortulata</i>	a moth	6	39
<i>Udea ferrugalis</i>	a moth	3	3

<b>Taxon</b>	<b>Vernacular</b>	<b>Records</b>	<b>Individuals</b>
<i>Udea prunalis</i>	a moth	4	7
<i>Udea olivalis</i>	a moth	5	27
<i>Patania ruralis</i>	a moth	5	22
<i>Nomophila noctuella</i>	a moth	5	8
<i>Scoparia ambigualis</i>	a moth	4	6
<i>Eudonia lacustrata</i>	a moth	6	99
<i>Eudonia angustea</i>	a moth	1	1
<i>Eudonia truncicolella</i>	a moth	2	2
<i>Eudonia mercurella</i>	a moth	8	173
<i>Chrysoteuchia culmella</i>	a moth	5	47
<i>Crambus perlella</i>	a moth	2	3
<i>Agriphila tristella</i>	a moth	3	26
<i>Agriphila straminella</i>	a moth	6	12
<i>Catoptria pinella</i>	a moth	1	1
<i>Falcaria lacertinaria</i>	Scalloped Hook-tip	2	2
<i>Watsonalla binaria</i>	Oak Hook-tip	5	7
<i>Watsonalla cultraria</i>	Barred Hook-tip	1	2
<i>Drepana falcataria</i>	Pebble Hook-tip	5	5
<i>Cilix glaucata</i>	Chinese Character	1	2
<i>Thyatira batis</i>	Peach Blossom	5	13
<i>Habrosyne pyritoides</i>	Buff Arches	4	23
<i>Tethea ocularis</i>	Figure of Eighty	1	1
<i>Ochropacha duplaris</i>	Common Lutestring	3	4
<i>Malacosoma neustria</i>	Lackey	2	2
<i>Lasiocampa quercus</i>	Oak Eggar	1	1
<i>Macrothylacia rubi</i>	Fox Moth	3	4
<i>Euthrix potatoria</i>	Drinker	5	9
<i>Laothoe populi</i>	Poplar Hawk-moth	2	2
<i>Sphinx ligustri</i>	Privet Hawk-moth	2	3
<i>Deilephila elpenor</i>	Elephant Hawk-moth	5	18
<i>Deilephila porcellus</i>	Small Elephant Hawk-moth	1	1
<i>Idaea subsericeata</i>	Satin Wave	1	1
<i>Idaea dimidiata</i>	Single-dotted Wave	5	12
<i>Idaea trigeminata</i>	Treble Brown Spot	1	3
<i>Idaea biselata</i>	Small Fan-footed Wave	3	20
<i>Idaea aversata</i>	Riband Wave	5	44
<i>Idaea straminata</i>	Plain Wave	1	1
<i>Timandra comae</i>	Blood-Vein	4	5
<i>Cyclophora annularia</i>	Mocha	1	2
<i>Cyclophora punctaria</i>	Maiden's Blush	3	4
<i>Cyclophora linearia</i>	Clay Triple-lines	5	8
<i>Scotopteryx chenopodiata</i>	Shaded Broad-bar	1	1
<i>Xanthorhoe spadicearia</i>	Red Twin-spot Carpet	5	14
<i>Xanthorhoe designata</i>	Flame Carpet	4	8

<b>Taxon</b>	<b>Vernacular</b>	<b>Records</b>	<b>Individuals</b>
<i>Xanthorhoe montanata</i>	Silver-ground Carpet	5	8
<i>Camptogramma bilineata</i>	Yellow Shell	2	2
<i>Epirrhoe alternata</i>	Common Carpet	7	26
<i>Euphyia biangulata</i>	Cloaked Carpet	3	14
<i>Mesoleuca albicillata</i>	Beautiful Carpet	1	1
<i>Hydriomena furcata</i>	July Highflyer	3	6
<i>Hydriomena impluviata</i>	May Highflyer	1	1
<i>Pennithera firmata</i>	Pine Carpet	1	1
<i>Thera britannica</i>	Spruce Carpet	1	1
<i>Thera obeliscata</i>	Grey Pine Carpet	4	4
<i>Plemyria rubiginata</i>	Blue-bordered Carpet	1	1
<i>Cosmorhoe ocellata</i>	Purple Bar	1	1
<i>Eulithis testata</i>	Chevron	2	2
<i>Eulithis populata</i>	Northern Spinach	2	3
<i>Gandaritis pyraliata</i>	Barred Straw	2	6
<i>Ecliptopera silaceata</i>	Small Phoenix	8	36
<i>Chloroclysta siterata</i>	Red-Green Carpet	5	23
<i>Dysstroma truncata</i>	Common Marbled Carpet	14	52
<i>Dysstroma citrata</i>	Dark Marbled Carpet	4	10
<i>Colostygia pectinataria</i>	Green Carpet	7	16
<i>Asthena albulata</i>	Small White Wave	1	1
<i>Hydrelia flammeolaria</i>	Small Yellow Wave	5	10
<i>Rheumaptera undulata</i>	Scallop Shell	1	1
<i>Triphosa dubitata</i>	Tissue	1	1
<i>Perizoma alchemillata</i>	Small Rivulet	2	2
<i>Gymnoscelis rufifasciata</i>	Double-striped Pug	7	9
<i>Chloroclystis v-ata</i>	V-Pug	2	4
<i>Pasiphila rectangulata</i>	Green Pug	4	11
<i>Eupithecia tenuiata</i>	Slender Pug	1	1
<i>Eupithecia pulchellata</i>	Foxglove Pug	5	8
<i>Eupithecia tripunctaria</i>	White-spotted Pug	1	1
<i>Eupithecia nanata</i>	Narrow-winged Pug	3	5
<i>Eupithecia centaureata</i>	Lime-speck Pug	2	2
<i>Eupithecia absinthiata</i>	Wormwood Pug	2	2
<i>Eupithecia subfuscata</i>	Grey Pug	3	13
<i>Acasis viretata</i>	Yellow-barred Brindle	3	3
<i>Abraxas grossulariata</i>	Magpie Moth	1	1
<i>Lomasipilis marginata</i>	Clouded Border	4	6
<i>Ligdia adustata</i>	Scorched Carpet	1	1
<i>Petrophora chlorosata</i>	Brown Silver-line	8	62
<i>Plagodis dolabraria</i>	Scorched Wing	3	5
<i>Opisthograptis luteolata</i>	Brimstone Moth	11	78
<i>Angerona prunaria</i>	Orange Moth	2	3
<i>Apeira syringaria</i>	Lilac Beauty	1	1

<b>Taxon</b>	<b>Vernacular</b>	<b>Records</b>	<b>Individuals</b>
<i>Ennomos quercinaria</i>	August Thorn	1	1
<i>Ennomos alniaria</i>	Canary-shouldered Thorn	2	2
<i>Ennomos fuscantaria</i>	Dusky Thorn	4	6
<i>Ennomos erosaria</i>	September Thorn	2	2
<i>Selenia dentaria</i>	Early Thorn	4	13
<i>Odontopera bidentata</i>	Scalloped Hazel	2	3
<i>Crocallis elinguaris</i>	Scalloped Oak	1	2
<i>Ourapteryx sambucaria</i>	Swallow-tailed Moth	3	7
<i>Biston betularia</i>	Peppered Moth	7	24
<i>Peribatodes rhomboidaria</i>	Willow Beauty	6	13
<i>Deileptenia ribeata</i>	Satin Beauty	2	5
<i>Alcis repandata</i>	Mottled Beauty	6	38
<i>Ectropis crepuscularia</i>	Engrailed	3	8
<i>Cabera pusaria</i>	Common White Wave	7	26
<i>Cabera exanthemata</i>	Common Wave	2	2
<i>Lomographa temerata</i>	Clouded Silver	6	21
<i>Campaea margaritaria</i>	Light Emerald	9	24
<i>Hylaea fasciaria</i>	Barred Red	1	1
<i>Cleorodes lichenaria</i>	Brussels Lace	4	15
<i>Pseudoterpna pruinata</i>	Grass Emerald	5	7
<i>Geometra papilionaria</i>	Large Emerald	1	3
<i>Hemithea aestivaria</i>	Common Emerald	2	4
<i>Stauropus fagi</i>	Lobster Moth	5	13
<i>Drymonia dodonaea</i>	Marbled Brown	1	1
<i>Drymonia ruficornis</i>	Lunar Marbled Brown	2	2
<i>Notodonta dromedarius</i>	Iron Prominent	4	4
<i>Peridea anceps</i>	Great Prominent	1	2
<i>Pheosia tremula</i>	Swallow Prominent	1	1
<i>Pheosia gnoma</i>	Lesser Swallow Prominent	4	4
<i>Ptilodon capucina</i>	Coxcomb Prominent	5	7
<i>Phalera bucephala</i>	Buff-tip	6	34
<i>Clostera curtula</i>	Chocolate-tip	1	1
<i>Rivula sericealis</i>	Straw Dot	7	30
<i>Hypena proboscidalis</i>	Snout	10	42
<i>Hypena crassalis</i>	Beautiful Snout	4	6
<i>Lymantria monacha</i>	Black Arches	5	21
<i>Euproctis similis</i>	Yellow-tail	1	1
<i>Calliteara pudibunda</i>	Pale Tussock	5	14
<i>Spilosoma lutea</i>	Buff Ermine	8	68
<i>Spilosoma lubricipeda</i>	White Ermine	4	16
<i>Diaphora mendica</i>	Muslin Moth	3	3
<i>Phragmatobia fuliginosa</i>	Ruby Tiger	4	5
<i>Arctia villica</i>	Cream-spot Tiger	1	1
<i>Euplagia quadripunctaria</i>	Jersey Tiger	1	1

<b>Taxon</b>	<b>Vernacular</b>	<b>Records</b>	<b>Individuals</b>
<i>Tyria jacobaeae</i>	Cinnabar	2	5
<i>Miltochrista miniata</i>	Rosy Footman	3	11
<i>Nudaria mundana</i>	Muslin Footman	3	14
<i>Thumatha senex</i>	Round-winged Muslin	1	1
<i>Cybosia mesomella</i>	Four-dotted Footman	2	3
<i>Lithosia quadra</i>	Four-spotted Footman	3	6
<i>Eilema depressa</i>	Buff Footman	4	22
<i>Eilema griseola</i>	Dingy Footman	5	22
<i>Eilema lurideola</i>	Common Footman	4	18
<i>Eilema complana</i>	Scarce Footman	1	2
<i>Eilema sororcula</i>	Orange Footman	2	3
<i>Herminia tarsipennalis</i>	Fan-foot	5	13
<i>Herminia grisealis</i>	Small Fan-foot	5	12
<i>Schrankia costaestrigalis</i>	Pinion-streaked Snout	1	1
<i>Laspeyria flexula</i>	Beautiful Hook-tip	2	4
<i>Abrostola tripartita</i>	Spectacle	8	12
<i>Abrostola triplasia</i>	Dark Spectacle	1	1
<i>Autographa gamma</i>	Silver Y	2	2
<i>Autographa pulchrina</i>	Beautiful Golden Y	2	3
<i>Autographa jota</i>	Plain Golden Y	1	1
<i>Protodeltote pygarga</i>	Marbled White Spot	7	181
<i>Acronicta tridens</i>	Dark Dagger	1	1
<i>Acronicta psi</i>	Grey Dagger	3	10
<i>Acronicta rumicis</i>	Knot Grass	3	6
<i>Subacronicta megacephala</i>	Poplar Grey	1	1
<i>Craniophora ligustri</i>	Coronet	5	28
<i>Amphipyra berbera</i>	Svensson's Copper Underwing	2	2
<i>Allophyes oxyacanthae</i>	Green-brindled Crescent	1	1
<i>Bryopsis muralis</i>	Marbled Green	1	1
<i>Caradrina morpheus</i>	Mottled Rustic	2	2
<i>Caradrina clavipalpis</i>	Pale Mottled Willow	1	1
<i>Hoplodrina octogenaria</i>	Uncertain	5	30
<i>Hoplodrina blanda</i>	Rustic	4	11
<i>Hoplodrina ambigua</i>	Vine's Rustic	3	13
<i>Charanyca trigrammica</i>	Treble Lines	4	6
<i>Rusina ferruginea</i>	Brown Rustic	4	14
<i>Phlogophora meticulosa</i>	Angle Shades	1	1
<i>Euplexia lucipara</i>	Small Angle Shades	4	29
<i>Gortyna flavago</i>	Frosted Orange	2	3
<i>Hydraecia micacea</i>	Rosy Rustic	2	2
<i>Rhizedra lutosa</i>	Large Wainscot	2	2
<i>Apamea remissa</i>	Dusky Brocade	1	1
<i>Apamea epomidion</i>	Clouded Brindle	4	13
<i>Apamea crenata</i>	Clouded-bordered Brindle	2	3



<b>Taxon</b>	<b>Vernacular</b>	<b>Records</b>	<b>Individuals</b>
<i>Apamea sordens</i>	Rustic Shoulder-knot	1	1
<i>Apamea scolopacina</i>	Slender Brindle	3	5
<i>Apamea monoglypha</i>	Dark Arches	7	23
<i>Mesoligia furuncula</i>	Cloaked Minor	5	5
<i>Tiliacea aurago</i>	Barred Sallow	3	6
<i>Agrochola lychnidis</i>	Beaded Chestnut	1	4
<i>Anchoscelis helvola</i>	Flounced Chestnut	2	3
<i>Leptologia lota</i>	Red-line Quaker	1	1
<i>Leptologia macilenta</i>	Yellow-line Quaker	1	1
<i>Omphaloscelis lunosa</i>	Lunar Underwing	3	15
<i>Conistra vaccinii</i>	Chestnut	2	5
<i>Eupsilia transversa</i>	Satellite	1	1
<i>Cosmia trapezina</i>	Dun-bar	3	3
<i>Griposia aprilina</i>	Merveille du Jour	1	5
<i>Aporophyla nigra</i>	Black Rustic	1	2
<i>Polia nebulosa</i>	Grey Arches	5	58
<i>Lacanobia oleracea</i>	Bright-line Brown-eye	6	37
<i>Melanchra persicariae</i>	Dot Moth	3	6
<i>Ceramica pisi</i>	Broom Moth	4	11
<i>Mythimna turca</i>	Double Line	6	27
<i>Mythimna pallens</i>	Common Wainscot	5	31
<i>Mythimna impura</i>	Smoky Wainscot	4	20
<i>Mythimna ferrago</i>	Clay	4	12
<i>Leucania comma</i>	Shoulder-striped Wainscot	4	16
<i>Agrotis exclamationis</i>	Heart and Dart	6	41
<i>Agrotis segetum</i>	Turnip Moth	2	2
<i>Agrotis puta</i>	Shuttle-shaped Dart	2	2
<i>Axylia putris</i>	Flame	5	38
<i>Ochropleura plecta</i>	Flame Shoulder	12	101
<i>Diarsia brunnea</i>	Purple Clay	5	27
<i>Diarsia mendica</i>	Ingrailed Clay	4	6
<i>Diarsia rubi</i>	Small Square-spot	9	27
<i>Lycophotia porphyrea</i>	True Lover's Knot	3	116
<i>Noctua pronuba</i>	Large Yellow Underwing	15	118
<i>Noctua fimbriata</i>	Broad-bordered Yellow Underwing	1	1
<i>Noctua comes</i>	Lesser Yellow Underwing	1	2
<i>Noctua interjecta</i>	Least Yellow Underwing	1	1
<i>Noctua janthe</i>	Lesser Broad-bordered Yellow Underwing	6	63
<i>Anaplectoides prasina</i>	Green Arches	3	10
<i>Xestia baja</i>	Dotted Clay	2	6
<i>Xestia xanthographa</i>	Square-spot Rustic	7	23
<i>Xestia sexstrigata</i>	Six-striped Rustic	2	3
<i>Xestia c-nigrum</i>	Setaceous Hebrew Character	5	23
<i>Xestia ditrapezium</i>	Triple-spotted Clay	3	45

<b>Taxon</b>	<b>Vernacular</b>	<b>Records</b>	<b>Individuals</b>
<i>Xestia triangulum</i>	Double Square-spot	5	48
<i>Pseudoips prasinana</i>	Green Silver-lines	4	8
<i>Nycteola revayana</i>	Oak Nycteoline	2	2

## Appendix 3 – Photographs



Photo A1.1. Cream-spot tiger *Arctia villica*. Although not currently assessed as threatened, this species has a decreasing distribution trend since 1990.



Photo A1.2. A male four-spotted footman *Lithosia quadra*. The range of this species has increased rapidly in recent decades, in common with some other lichen-feeding moths.





Photo A1.3. A female four-spotted footman *Lithosia quadra*, showing the sexual dimorphism which gives the species its name.



Photo A1.4. Double line *Mythimna turca*. A local species mostly recorded in south-west England and Wales, where it is associated with tussocky unimproved grassland.





Photo A1.5. Green arches *Anaplectoides prasina*.



Photo A1.6. Triple-spotted clay *Xestia ditrapezium*. A local and predominately western species of damp woodland in Britain.

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