

INITIAL LICHEN SURVEY OF KNEPP CASTLE PARK  
WEST SUSSEX  
2020



Draft 1.0  
August 2020  
N A Sanderson BSc MSc  
For Buglife

-----  
**NEIL SANDERSON**  
*Botanical Survey  
and  
Assessment*

-----  
3 GREEN CLOSE  
WOODLANDS  
HAMPSHIRE

SO4O 7HU  
023 8029 3671  
Email: [neilsand@dircon.co.uk](mailto:neilsand@dircon.co.uk)

## INITIAL LICHEN SURVEY OF KNEPP CASTLE PARK, WEST SUSSEX, 2020

### Contents

1.0	INTRODUCTION.....	1
1.1.1	Background.....	1
1.1.2	Brief.....	1
2.0	METHODS.....	2
2.1	Survey Methods.....	2
2.1.1	Timing, Conditions & Personnel.....	2
2.1.2	Areas Surveyed.....	2
2.1.3	Recording Trees of Interest.....	2
2.1.4	Species Recording.....	2
2.1.5	Trees.....	4
2.2	Data Analysis.....	4
2.2.1	Nomenclature.....	4
2.2.2	Ancient Woodland Indicators.....	4
2.2.3	Rarity & Threat.....	5
2.2.4	Communities.....	7
2.2.5	Mapping the Quality of Lichen Interest.....	7
2.2.6	Existing Data.....	8
3.0	SURVEY.....	9
3.1	Lichen Assemblage.....	9
3.1.1	Totals.....	9
3.1.2	Lichen Assemblages.....	9
3.2	Maps.....	12
4.0	NATURE CONSERVATION VALUE AND MANAGEMENT.....	20
4.1	Nature Conservation Value.....	20
4.1.1	Value of Lichen Assemblage.....	20
4.1.2	Distribution of Interest, 2018.....	21
4.2	Management.....	21
4.2.1	Management Requirements of Woodland and Parkland Lichen Floras.....	21
4.2.2	Comments on Management of the Parkland at Knepp Castle Park.....	23
4.3	Future Work.....	23
5.0	REFERENCES.....	24
ANNEX 1	Field Notes.....	26
A1	Knepp park 3/7/2020.....	26
A1.1	Weather.....	26
A1.2	South of House, Park & Riding School, TQ1521.....	26
A1.3	Parkland West of Lake, TQ1521.....	29
A1.4	Pleasure Ground TQ1521 & TQ1522.....	30
A1.5	Fields to North, TQ1522.....	33
A1.6	West Lawn & Capps, TQ1421, TQ1521 & TQ1522.....	36
ANNEX 2	SPECIES LISTS.....	42
	SPECIES LIST 1.....	42

**Cover Photo:** Tree KNP017, a large spreading ancient Oak in a sheltered valley with a very rich lichen assemblage. These included two thalli of the Near Threatened and S41 lichen *Lecanora sublivescens*, new to Knepp. Also found on this tree was the Notable *Pertusaria coronata*, which was new to West Sussex and very rare in England, along with the old woodland/veteran tree specialists *Chaenotheca chrysocephala*, *Chaenotheca trichialis* and *Pachyphiale carneola*. This was the richest tree found during the survey.

# INITIAL LICHEN SURVEY OF KNEPP CASTLE PARK, WEST SUSSEX, 2020

## 1.0 INTRODUCTION

### 1.1.1 Background

Knepp Estate in West Sussex in the Low Weald has a large and impressive rewilding project, mostly created out of former arable land, but including a substantial area of late 18<sup>th</sup> century landscape park designed or inspired by Repton around the Nash house of Knepp Castle but likely including earlier field trees. There has been limited lichen survey of this veteran tree site. Dr Francis Rose recorded a significant lichen interest on veteran Elm trees in the 1960s but these had subsequently been lost to Dutch Elm Disease. Since then limited recording had been carried out by local lichenologists, how recorded very few veteran tree specialist lichens, with only the only species of interest recorded being *Punctelia reddenda* and *Rinodina roboris* var. *roboris* Nb (IR) recorded. A visit by the author in 2008, however, did record the Notable pinhead lichen *Chaenotheca hispidula* on an Ash in the floodplain of Capps Mead on passing during a vascular plant survey. These records suggested that there was at least some surviving lichen interest within the Knepp Castle Park, while the numbers of surviving veteran trees suggested there was likely to be further unrecorded species.

### 1.1.2 Brief

As part of the Back from the Brink, Ancients of the Future project, Buglife contracted Neil A Sanderson, Ecological Planning and Research, to carry out a reconnaissance survey of the lichen interest of the restored 18<sup>th</sup> century designed landscape park with Knepp Estate (**Map 1**). The instructions were to undertake one days lichen survey of suitable habitat in Knepp Castle Estate. This aim to determine the level of lichen interest in areas with concentrations of veteran trees.

Fieldwork was to include:

- The surveyor will spend a day looking at area with veteran trees as directed.
- A species list will be made, notes taken on the ecology of the lichen assemblage and any notable or RDB species would be located with a GPS receiver.

Reporting was to include:

- The locations will be mapped in in the GIS programme QGIS.
- A report detailing the lichen interest recorded and scope for further survey work/management (if appropriate), would be produced.
- A spreadsheet containing raw data.

## 2.0 METHODS

### 2.1 Survey Methods

#### 2.1.1 Timing, Conditions & Personnel

The survey was carried out on the 17<sup>th</sup> July 2020. The weather was dry and sunny and conditions were good for lichen survey.

#### 2.1.2 Areas Surveyed

Areas with veteran tree concentrations were marked on a map (**Map 1**) by the Knepp Estate ecologist Penny Green and these areas were used to plan a circuit around the landscape park. The survey route taken is shown on an OS map base (**Map 2**) and on Google Earth (**Map 3**) as derived from the track logs of a GPS receiver. The survey also swung around to the north, through the Pleasure Grounds, an area not marked by Penny Green, but which also proved to be of interest for veteran tree lichens.

#### 2.1.3 Recording Trees of Interest

The locations of trees supporting species of interest (see section 2.1.4 for definition) were recorded systematically as waypoints using a Garmin GPSmap 64s (**Maps 2, 5 & 6 – 8**). The waypoint was recorded when the indicated accuracy was about  $\pm 5$ m or less.

The codes used for the waypoints were KNP and then a sequential waymark number, e.g. KNP001 etc. The data on the GPS recorder was downloaded to Garmin BaseMap software and manipulated in this software. The final data was then exported as GPX files to the GIS programme QGIS, where it was mapped on to royalty free OS mapping.

For each tree recorded, the tree species, physiological age and habitat was noted.

#### 2.1.4 Species Recording

All epiphytic lichen species and associated fungi visible from the ground were recorded (**Annex 2**). As such the concentration was on the lower trunk habitats, especially on older trees and bushes, particularly in sheltered areas; the typical habitat of species of conservation interest. Habitats that contribute considerably to the lichen diversity, but are normally dominated by commonplace species, such as twigs and branches, inevitably were not so closely examined. As a result, the species list produced will not be complete but epiphytic species of nature conservation interest will have been more thoroughly recorded. Work in Sweden has shown that surveying the bottom 2m of trunks of the fallen trees only recorded about a quarter of the lichens species of conservation interest on the whole trunk (Fritz, 2009). However, he found that most the missed species of interest could be found within 2m of the ground on other trees within the site if an extensive survey was carried out. This indicates that extensive ground based surveys will be likely to adequately sample the total flora of lichens of conservation interest, but could significantly underestimate populations numbers.

Twigs are rapidly colonised by highly mobile species and this can be informative. The composition of the lichen assemblage on the twigs gives an indication of the recent air chemistry, which is not confused by residual effects of past pollution as can occur on trunks (Wolseley et al, 2006). Oak is the best species to observe this, both because of its widespread distribution and its naturally acid bark allows the clear expression of current nitrogen pollution. Where possible the lichen assemblage of Oak twigs was checked to estimate current air pollution levels.

A selection of species, which included all national Threatened or Near Threatened RDB species, the more easily recorded Notable species and some other species of ecological significance, were systematically mapped. It was not possible to so record all national Notable species, as some are not easy to record systematically.

All trees with the systematically recorded species were located using a GPS receiver and mapped as a broad brush monitoring exercise (**Maps 2, 5 & 6 – 8 & Annex 1**). For these species the frequency of occurrence was estimated as D = Dominant, A = Abundant, F = Frequent, O = Occasional and R = Rare. In addition, on these trees, all additional species of conservation interest present were also noted.

#### Systematically Recorded Species:

Species	Conservation Status	Habitats
<i>Bacidia incompta</i>	VU (NS/S41)	Wound Track
<i>Calicium salicinum</i>		Dry Bark
<i>Chaenotheca chrysocephala</i>		Dry Bark
<i>Chaenotheca hispidula</i>	Nb (NS)	Dry Bark
<i>Chaenotheca trichialis</i>		Dry Bark
<i>Chaenothecopsis nigra</i>	Nb (NS)	Lignum
<i>Cladonia cyathomorpha</i>	Nb (NS)	Mesic Bark
<i>Lecanora sublivescens</i>	NT (NS/IR/S7)	Parkland Mesic Bark
<i>Mycocalicium subtile</i>	Nb (NS)	Lignum
<i>Mycoporum antecellens</i>		Mesic Bark
<i>Opegrapha corticola</i>	Nb (IR)	Woodland Base Rich Bark
<i>Pachyphiale carneola</i>		Woodland Base Rich Bark
<i>Pertusaria coronata</i>	Nb (NS)	Mesic Bark
<i>Schismatomma cretaceum</i>	Nb (IR)	Dry Bark
<i>Stenocybe septata</i>		Mesic Bark

Two Notable species, *Porina byssophila* Nb (NS) and *Strigula taylorii* Nb (NS/IR) were not systematic recorded as they are not easy to recorded.

Field notes were made on an iPhone and these been edited and added to the report in **Annex 1**. The species recorded are given in **Species List 1, Annex 2** and the data was converted into a BLS Recorder import spreadsheet to allow importation into the NBN via the BLS database <BLS\_General\_v6f Knepp 2020.xlsx>.

### 2.1.5 Trees

The terms used to describe the physiological age of the tree are explained below. These are based on Harding & Alexander (1993):

- Mature: a tree that has reached its full height and is still vigorous, heart rot likely to be absent.
- Post mature: a tree that is no longer vigorous and has started retrenching by branch die back. Heart rot will have commenced but will not be easily visible.
- Ancient: a tree with major branch die back and or extensive and visible heart rot.

The term 'veteran tree' is taken to include both post mature and ancient trees. This classification reflects the natural processes that older trees go through as a response to balancing their increasing size with the photosynthetic area available. The commencement of heart rot indicates the end of the commercial usefulness of timber. Specialist veteran tree dependent lichens are mainly associated with slow growing bark, as found on older trees after commercial maturity, but can also occur on suppressed younger trees.

## 2.2 Data Analysis

### 2.2.1 Nomenclature

The nomenclature mainly follows Sanderson et al (2018) for lichens and lichenicolous fungi but includes changes accepted by the BLS taxon dictionary since then <<http://www.britishlichensociety.org.uk/resources/lichen-taxon-database>>. New names added since Woods & Coppins (2012) and used in this report are listed below:

<b>New Name</b>	<b>Old Name</b>
<i>Candelariella xanthostigmoides</i>	<i>Candelariella reflexa</i>
<i>Dendrographa decolorans</i>	<i>Schismatomma decolorans</i>
<i>Myriolecis hagenii</i>	<i>Lecanora hagenii</i>
<i>Pachnolepia pruinata</i>	<i>Arthonia pruinata</i>

### 2.2.2 Ancient Woodland Indicators

Dr Francis Rose (Rose, 1992 & Coppins & Coppins, 2002a) devised several indicator lists that can be used to assess the diversity and conservation value of woodland epiphytic lichen assemblages in different climatic areas. These replaced an earlier more general indicator list the 'Relative Index of Ecological Continuity' (RIEC) Rose (1976). The indices are ideally applied to about 100ha of woodland. The indices were recently reviewed (Sanderson, 2018a), mainly with the aim of simplifying the application of the indices, by removing multiple choices. The thresholds for considering sites for SSSIs were also reviewed and updated in preparation for the updated SSSI selection criteria for lichens (Sanderson et al, 2018). Some minor changes were also made to the species used. To reflect the changes, the indices were given new and more informative names.



These lists indicate habitat quality; the total number of species found is the important parameter. The indicator species are associated with late succession stands with veteran trees (old growth stands i.e. stands more than 200 years old), especially those stands with a past continuity of old trees (Alexander et al, 2002). Woods that have been clear felled, but regenerated, within the last 200 years (young growth stands) are therefore likely to be poorer in lichen indicator species than less disturbed stands. The lichen ancient woodland indicator lists are different from similar ancient woodland indicator lists composed of vascular plants or bryophytes. The latter reflect ancient sites rather than stands and are much less effected by the management of the trees.

The appropriate list for Sussex is the Southern Oceanic Woodland Index (SOWI) (formerly the New Index of Ecological Continuity, NIEC). This is designed for oceanic temperate woodland south of the Scottish Highlands. A new index, the Pinhead Lichen Index is also relevant.

- **Southern Oceanic Woodland Index (SOWI):** applies to oceanic temperate woodland south of the Scottish Highlands. Sanderson (in press a) regarded sites with an index score of 20 or more as being national significance, while sites with scoring more than 30 are regarded to be as likely to be of international significance. Such woods are usually old growth stands with a strong continuity of veteran trees. In Sussex, it is recommended that a score of 20 be used as the threshold for considering sites for SSSI status (Sanderson et al, 2018). Sites with 10 – 19 can be regarded as of county importance.
- **Pinhead Lichen Index** (Sanderson et al, 2018). For this the total number of recorded Pinhead species in the genera *Calicium*, *Chaenotheca*, *Chaenothecopsis*, *Microcalicium*, *Mycocalicium* and *Sclerophora* is used as an index score. This index measures the quality of ancient tree and dead wood habitat, sites scoring more than ten are can be regarded as being of national importance and this is also the threshold for considering sites for SSSI status. Sites with 5 – 10 can be regarded as of county importance.

### 2.2.3 Rarity & Threat

The definitions of Red Data Book (RDB) status follows Woods & Coppins (2012), who also added a concept of International Responsibility Species:

- **International Responsibility Species:** this is a new category that recognises that some species are commoner in Britain than elsewhere. They are absent, rare or threatened in the rest of Europe and are thought, on existing data, to have 10% or more of their European or World population in Britain. These could be considered as more important than some Red Data Book species, which are common elsewhere in the world. The significance of these species depends on their actual British and local rarity but special attention needs to be paid to them in management.

The Nationally Rare and Nationally Scarce status in Woods & Coppins (2012) are now out of date but updated assessments are given in Sanderson et al (2018)

Significant populations of threatened species (Vulnerable or higher) or Near Threatened species, which are also International Responsibility species either nationally or within SSSI areas of search can be considered as nationally significant and as potentially notifiable features of an SSSI (Sanderson et al, 2018).

**Notable Species.** Sanderson (2011 & 2018b) has reviewed the measurement of rarity for species not assessed as threatened, or as Near Threatened, species in the RDB. Many declining lichens or those restricted to vulnerable habitats, which are Nationally Scarce, have now been assessed as Threatened or Near Threatened lichen species. In contrast, several ephemeral Nationally Rare species of ruderal habitats are now assessed as least concern. As such the old Nationally Rare/Nationally Scarce assessment was not thought useful any more. As an alternative Sanderson (2011) proposed that all Least Concern or Data Deficient species which were Nationally Rare Nationally Scarce or International Responsibility species be put in a single category "Notable species" (Nb). Sanderson (2018b) reviewed the potential Notable species and excluded those that were clearly under-recorded common species or ruderal species of limited conservation interest. This list is given in Sanderson (2018a) and is followed in this report.

Sanderson (2018b) suggested an alternative scoring system to that of Hodgetts (1992) (Threatened, Near Threatened and Notable (TNTN) scoring). The score is calculated as follows:

**GB Threatened (CR, EN, VU)** – scores 4 points.

**GB Near Threatened** – scores 2 points.

**Notable** – scores 1 point.

None of the above – scores nil.

This scoring system can be used in woodland habitats, but is considered less useful than the woodland indices in this habitat and is recommended mainly for habitats lacking suitable habitat indices. It is not adopted by Sanderson et al (2018) as a priority method of assessing woodland. One habitat present at Knepp Castle Park, which is covered by TNTN assemblage scoring, however, is the habitat "Old Trees of Open Places", covering well-lit veteran trees in parkland, farmland, waysides and hedgerows. SSSI quality sites are expected to score 16 or more in this habitat (Sanderson et al, 2019). Sites scoring 8 or more can be regarded as being of county interest. N.B. the ecologically coherent assemblage for the habitat "old trees of open places" includes only those species strongly associated with the habitat. These include only some of the Threatened, Near Threatened and Notable species recorded at Moccas Park.

**Section 41 Species.** The former BAP list (Biodiversity Reporting and Information Group, 2007) provided the basis of the lichens listed under Section 41 of the Natural Environment & Rural Communities (NERC) Act 2006. Species on this list are considered to be of "principal importance for conservation of biological diversity in England".

The BAP list was revised (Biodiversity Reporting and Information Group, 2007) and, unlike the earlier list, is a reasonably comprehensive list of those lichen species likely to be under particular stress and amenable to conservation action to reverse this. Conservation of these species is regarded as being an important contribution to Britain's obligations under the Rio Convention on Biodiversity. Collectively, however, the Section 41 species list is not an objective tool for assessing conservation importance, habitat indices, RDB populations and the list of Notable species provide this.

Abbreviations used in the text and tables are listed below:

RDB	= Red Data Book Species, (CR, EN, VU & NT Species)
VU	= Vulnerable Red Data Book species
NT	= Near Threatened Red Data Book species
Nb	= Notable species (NR, NS, IR or S41 species of conservation interest not RDB NT or higher)
NR	= Nationally Rare
Nb (NS)	= Nationally Scarce regarded by Sanderson (2018b) as being of significant conservation interest
(NR)	= Nationally Rare lichen not regarded by Sanderson (2018b) as being of significant conservation interest
(NS)	= Nationally Scarce lichen not regarded by Sanderson (2018b) as being of significant conservation interest
[NR]	= Nationally Rare lichenicolous fungus not included in Smith et al (2009) and likely to be very under recorded
[NS]	= Nationally Scarce lichenicolous fungus not included in Smith et al (2009) and likely to be very under recorded
IR	= International Responsibility species
S41	= Section 41 species

#### ***A Lichen Red Data List for England.***

A lichen Red Data List for England, is in initial draft. The differences with the national red list reflect that some species that have stronger populations in Scotland or Wales, but are threatened further south. One nationally Least Concern species found in 2020 at Knepp Castle Park is listed as potentially Vulnerable in England *Pertusaria coronata*.

#### **2.2.4 Communities**

Most lichens species have limited tolerances for bark and habitat conditions. This allows the formation of distinctive communities (James et al, 1977). Simple English names have been invented with the technical names given in brackets.

#### **2.2.5 Mapping the Quality of Lichen Interest**

The conservation interest of the lichen flora at the waypoints was assessed and mapped, with different symbols assigned to different levels of interest in QGIS (**Map 6 & 8**).

**Red:** location with systematically British RDB Vulnerable or Near Threatened species, which is also a Section 41 species.

**Blue:** location with other systematically recorded British Notable species.

**Green:** other species of ecological significance

### 2.2.6 Existing Data

An excel spreadsheet with existing lichen data recorded from Knepp Castle Park was obtained Janet Simkin, the Data Officer of the British Lichen Society. This was not analysed in detail, most of the records are of common species of not conservation significance. The most significant species of interest were recorded by Dr Francis Rose from veteran Elms in 1967 to 1969, now lost to Dutch Elm Disease. These supported *Anaptychia ciliaris* subsp. *ciliaris* EN (NS/S41) and *Gyalecta flotowii* NT (NS). Other species recorded then, that have also been also impacted by Dutch Elm Disease, but not so severely, were *Physconia distorta* and *Pleurosticta acetabulum*. None of these have been recorded since from Knepp. The local Sussex Lichen Recording Group visited in 2005 and 2009, and recorded two lichens of interest; the Southern Oceanic Woodland Indicator *Punctelia reddenda* and *Rinodina roboris* var. *roboris* Nb (IR). Finally during a visit by the author in 2008 the Notable pinhead lichen *Chaenotheca hispidula* was found on an Ash in the floodplain of Capps Mead on passing during a vascular plant survey. These records suggest that there was at least some surviving lichen interest within the Knepp Castle Park, while the numbers of surviving veteran trees suggested there was likely to be further unrecorded species.

## 3.0 SURVEY

### 3.1 Lichen Assemblage

#### 3.1.1 Totals

The list of lichens and associated fungi recorded in 2020 is given in **Species List 1** in **Annex 2**. A total of 106 taxa were recorded during the survey, of these 98 were lichens, three lichen parasites (lichenicolous fungi) and five associated non-lichenised fungi. Of these two of these were new records to Sussex (*Mycocalicium subtile* Nb (NS) and *Protoparmelia hypotremella* (NR), the latter also the second British record) and one was new to West Sussex (*Pertusaria coronata* Nb (NS), fifth recent English record). Many species were new to the Knepp but this has not been analysed.

Epiphytic species of interest recorded in 2020 included eight Southern Oceanic Woodland Index (SOWI) species. In addition, nine species in the Pinhead Lichen index (PLI) were recorded and the Old Trees of Open Places (OTOP) assemblage scored 11. Also, one Vulnerable (*Bacidia incompta* VU (NS/S41)), one Near Threatened (*Lecanora sublivescens* NT (NS/IR/S41)), both Section 41 species, and 10 Notable species were recorded.

One further SOWI species and one Notable species included within the OTOP assemblage have been recorded by other recent visits bring the over all total to eight for the SOWI and 12 for the OTOP assemblage for post 2000 records.

Given this was not a full survey this is quite impressive for a parkland which was not thought to be of great interest previously.

The density of recorded species by 100m grid squares is shown on **Maps 4 & 5**, using the TomBio plugin for QGIS. The total species recorded (**Map 4**) mainly show the greater recording of common species at the beginning of the survey south of the house. **Map 5** shows the distribution of systematically recorded species of conservation interest. This map shows concentrations in the open parkland south of the house and in more sheltered areas around the Pleasure Grounds and about the Capps Meadow area to the west.

#### 3.1.2 Lichen Assemblages

**Exposed more polluted trees:** although the survey did record significant lichen interest within the park, there are large numbers very lichen poor veteran trees. These lichen poor trees are especially prominent in more exposed areas and in grasslands. The latter were mainly in arable before the restoration of the parkland <<https://www.kneppestate.co.uk/restoration-of-a-repton-park>>. The moist bark on the veteran Oaks here has communities dominated by a species poor *Diploicia canescens* – *Amandinea punctata* community (Hyper-eutrophicated Bark Community, *Buellietum punctiformis*). This community is typical of bark that is both acid and subjected to high levels of nutrient enrichment. This impoverished community is likely to reflect a history of pollution by both acidification and nutrient enrichment.

Oak bark on trunks is slowly shed and can reflect the pollution history of several decades. This community probably replaced much richer Mature Mesic Bark Community (*Pertusarietum amarae*) dominated by *Pertusaria* species. Fragments of this survive on a few of the more exposed Oaks, just south of the Castle, but the best example was spotted on a Walnut south of the house (**Map 2**, KNP002). The more base rich bark of Walnut is more buffered against acidifying pollution than Oak. The Walnut supported a substantial colony of the Section 41 lichen *Lecanora sublivescens* NT (NS/IR/S41), only the second record from West Sussex and new to the Low Weald

Dry bark communities have survived better on the more polluted trees south of the house but were absent from West Lawn. These support Dry Bark Communities (*Calicietum hyperelli*) typical of veteran trees and are rich in pinhead lichens of conservation interest. In the area south of the house supported three species of interest, *Chaenotheca chrysocephala*, *Chaenotheca hispidula* Nb (NS) and *Chaenotheca trichialis*, on six Oak trees (**Map 6**). All are rarely recorded species in Sussex. These dry bark and dead wood communities have recently been observed to be recovering from past pollution in the south east England faster than other veteran tree assemblages (Sanderson, 2018c).

Richer communities of Nutrient Rich Bark Community (*Physcietum ascendens*) were noted on less acidic more buffered bark such as on Poplar and Maple. These can support declining species of field trees such as *Anaptychia ciliaris* subsp. *ciliaris* EN (NS/S41), which was recorded from the park in the 1960s. No species of conservation interest were seen in this habitat in 2020, but potentially some could be found on a wider survey.

Twig assemblages on Oak trees were dominated by nitrogen loving species but not excessively so. Some nutrient sensitive species were present, including *Evernia prunastri*, *Flavoparmelia caperata*, *Hypotrachyna afrorevoluta* and *Parmelia saxatilis* s. lat. but with nitrogen loving species predominant including *Physcia adscendens*, *Physcia tenella*, *Physconia grisea* and *Xanthoria parietina*. This confirms that the past problems of acidification from sulphur dioxide are long over, with impacts only lingering only on old trees with stable bark such as Oak, but that nutrient levels are still rather elevated. The APIS website <<http://www.apis.ac.uk>> gives the local background levels of Ammonia as 1.15 µg/m<sup>3</sup>, which is just over the critical levels of lichens of 1.0 µg/m<sup>3</sup>, which matches what was seen in the more exposed areas.

**Exposed more polluted trees:** less pollution impact was seen on more shelter trees in woods and valley bottoms and in the field north of the Pleasure Grounds. As well as being less impacted by air pollution, these trees are in general more humid locations, likely to be more favourable for lichen diversity. General lichen diversity was much better in these situations and the numbers of species of conservation interest were also higher. Mature Mesic Bark Communities (*Pertusarietum amarae*) were better developed on sheltered trees and include two more Oak trees with the Section 41 lichen *Lecanora sublivescens* NT (NS/IR/S41), the second record from West Sussex and new to the Low Weald. Also in this habitat were *Pertusaria coronata* Nb (NS) on Oak, new to West Sussex and rare in England, and the old woodland indicator

*Mycoporum antecellens* on Alder. On one Oak north of the Pleasure Grounds *Protoparmelia hypotremella* (NR) was found in its second known site in Britain. A more acidic oak also supported *Cladonia cyathomorpha* Nb (NS), rare but probably under recorded in the lowlands. Smooth bark on old Holly add the woodland indicator *Stenocybe septata* Nb (IR) (Smooth Bark Community *Graphidetum scriptae*). Base flushed rich bark is a rich habitat for lichens on sheltered veteran trees (Base Rich Bark Woodland Community, *Lobarion pulmonariae*) but is limited in occurrence at Knepp. Fragmentary examples, however, were found on one special Oak (KNP017) and two Maples, with the old woodland indicators *Pachyphiale carneola* found on the Oak and *Opographa corticola* Nb (IR) on the Maples. On one of the Maples *Sporodophoron cretaceum* Nb (NS/IR) was also found on transitions to drier bark. In addition, the Section 41 lichen *Bacidia incompta* VU (NS/S41) was found in a wound track on a broken Holly. This species was formerly an Elm specialist, and was likely to have occurred on this habitat before Dutch Elm Disease removed all the veteran Elms from the park, but was not recorded by Dr Francis Rose in the 1960s.

Dry bark habitat (Dry Bark Communities *Calicietum hyperelli*) are also well developed in this area with the the pinhead lichens *Chaenotheca chrysocephala*, *Chaenotheca hispidula* Nb (NS) and *Chaenotheca trichialis* shared with the trees in the more polluted areas, but with the addition *Calicium salicinum*. In addition, lignum communities of interest (Dry Lignum Communities *Calicietum abietinae*) were also found north of the Pleasure Grounds with two Notable species found *Chaenothecopsis nigra* Nb (NS) and *Mycocalicium subtile* Nb (NS), the latter new to Sussex.

The trees of interest were generally in good condition, but two Oaks in Capps Mead of interest, one with a large colony of the Section 41 lichen *Lecanora sublivescens* NT (NS/IR/S41), had recently died. This appeared to be connected to recent rewetting of the floodplain.

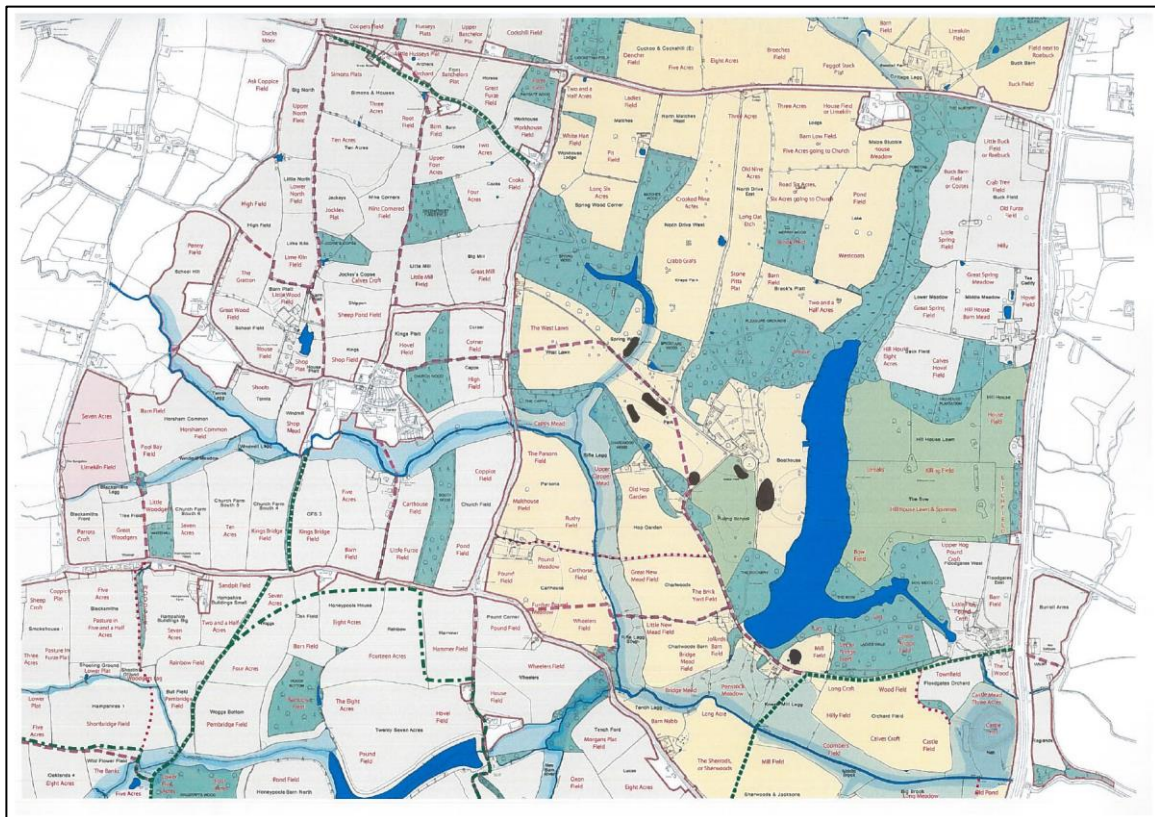
### 3.2 Maps

**Botanical Survey and Assessment**  
**3 Green Close, Woodlands, SO40 7HU**  
**023 8029 3671**

## Knepp Park Lichens 2020

Location

Map 1



Concentrations of veteran trees marked in black by Penny Green, Knepp Ecologist



---

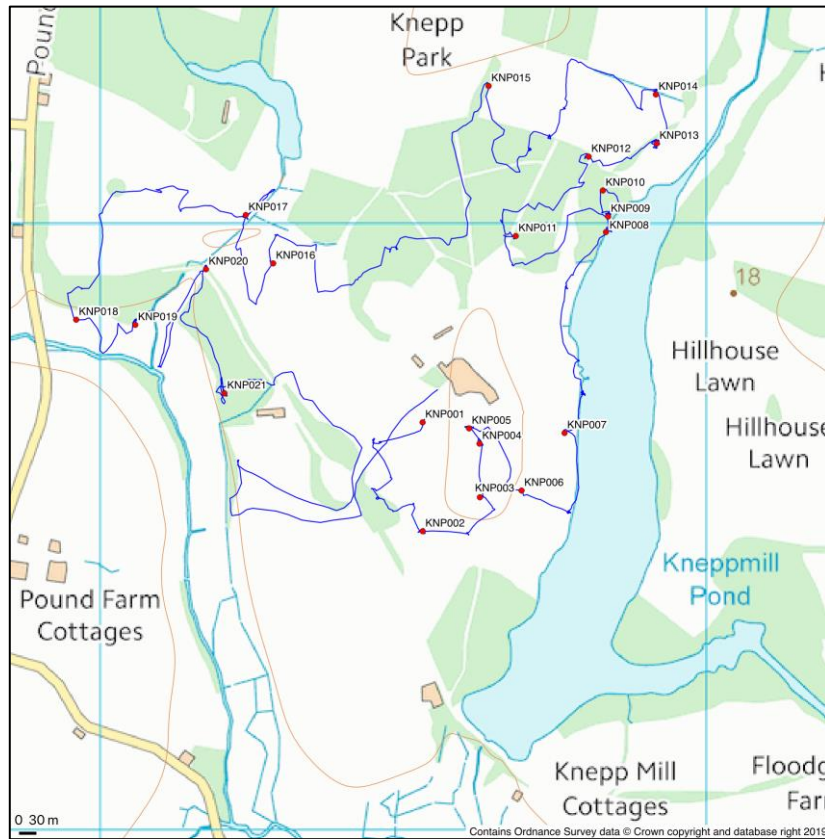
**Botanical Survey and Assessment**  
**3 Green Close, Woodlands, SO40 7HU**  
**023 8029 3671**

---

## Knepp Park Lichens 2020

Survey

Map 2



Survey route in blue, waymarked trees red dots

---

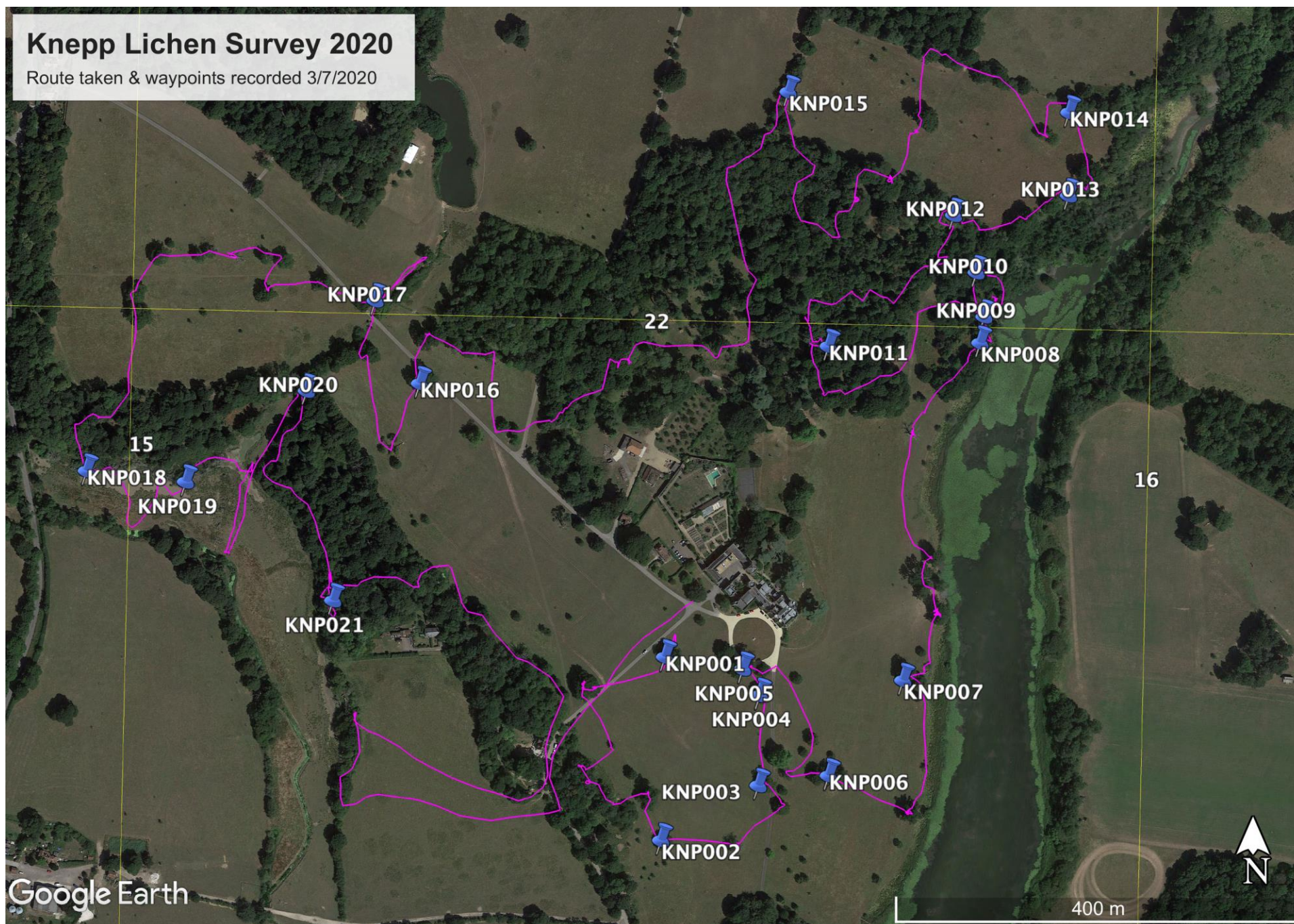
Botanical Survey and Assessment  
3 Green Close, Woodlands, SO40 7HU  
023 8029 3671

---

### Knepp Park Lichens 2020

Survey

Map 3



*August 2020*

*Initial Lichen Survey of Knepp Castle Park 2020  
Botanical Survey & Assessment*

Survey route magenta line, waymark trees blue pins

*August 2020*

---

**Botanical Survey and Assessment**  
**3 Green Close, Woodlands, SO40 7HU**  
**023 8029 3671**

---

## **Knepp Park Lichens 2020**

**Total Species Richness**

**Map 4**

*Initial Lichen Survey of Knepp Castle Park 2020*  
*Botanical Survey & Assessment*

---

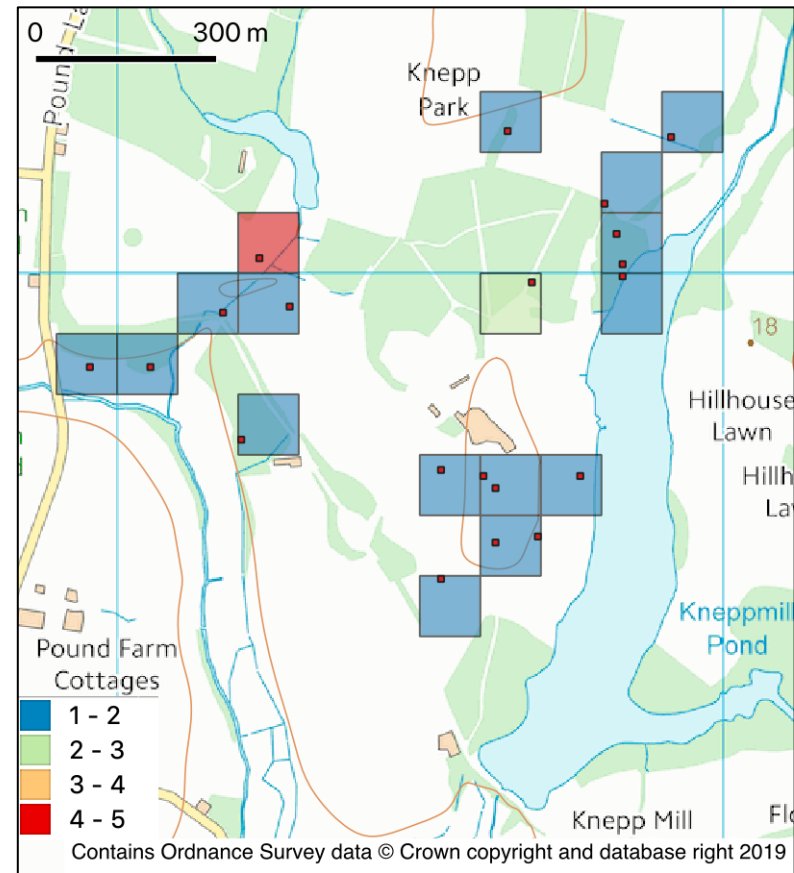
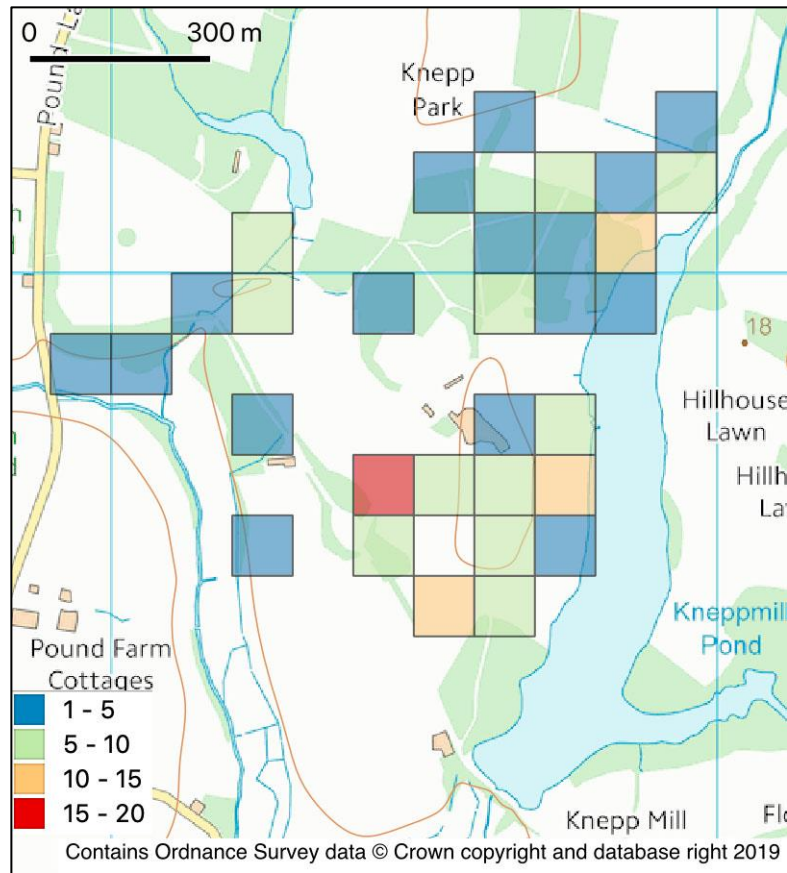
**Botanical Survey and Assessment**  
**3 Green Close, Woodlands, SO40 7HU**  
**023 8029 3671**

---

## **Knepp Park Lichens 2020**

**Species of Conservation Interest**

**Map 5**



---

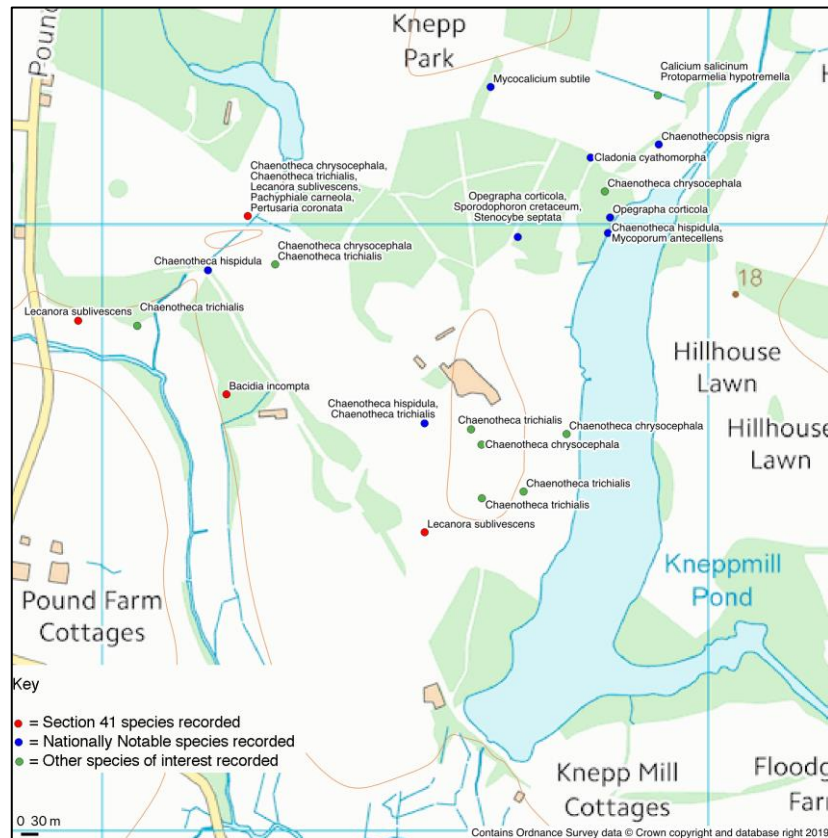
**Botanical Survey and Assessment**  
**3 Green Close, Woodlands, SO40 7HU**  
**023 8029 3671**

---

## Knepp Park Lichens 2020

Lichen Species of Interest

Map 6



---

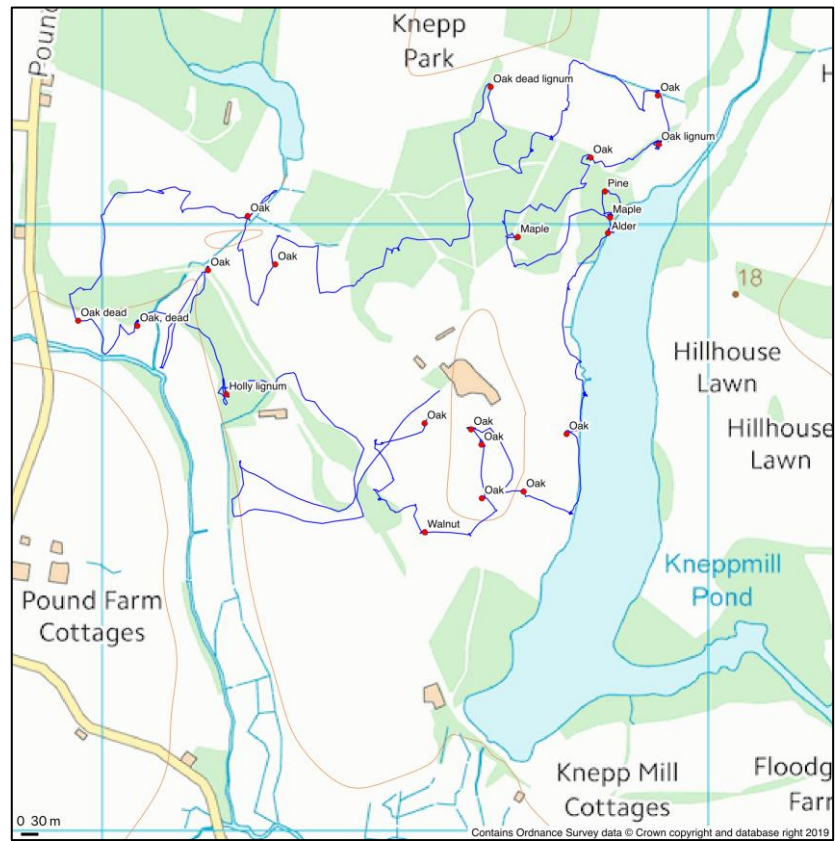
**Botanical Survey and Assessment**  
**3 Green Close, Woodlands, SO40 7HU**  
**023 8029 3671**

---

## Knepp Park Lichens 2020

Habitat of Interest

Map 7



## 4.0 NATURE CONSERVATION VALUE AND MANAGEMENT

### 4.1 Nature Conservation Value

#### 4.1.1 Value of Lichen Assemblage

The measures of biodiversity interest are listed in **Table 1**. The results incorporate the partial survey of 2020 and the few additional species of interest recorded in the 21<sup>st</sup> century. A full survey would produce higher totals, but would not likely increase massively.

The Southern Oceanic Woodland Index (SOWI) score is low, as would be expected of a largely open landscape park, with its origin in farmland with enclosed woods and not pasture woodland. Currently it is only of local value, but further survey is likely to push it into county value.

Some of the other measures are more significant and put the park firmly into county importance or just into national significance. The richest is the Pinhead Lichen Index (PLI), which scoring 9 is just short of the threshold for national interest and is also likely to be the second richest site in the SSSI Area of Search (NCA 121 Low Weald) after Ebernoe Common, which scores 11. Old Trees of Open Places (OTOP) assemblage scores on 11 using the 2020 data and 12 on all the recent data. This is still a bit short of the threshold for national interest, but definitely of county interest.

In terms of rare species, two Section 41 species were found in 2020, *Lecanora sublivescens* NT (NS/IR/S41) and *Bacidia incompta* VU (NS/S41). Both of these are species that can be individually considered as nationally significant and as potentially notifiable features of an SSSI. *Bacidia incompta* has a larger known population within the Area of Search at Ebernoe Common, but Knepp holds the largest known population of *Lecanora sublivescens* in the AoS and is hence of national significance on current data.

**TABLE 1**  
**Biodiversity Measures Knepp Park 2000 – 2020**

Biodiversity Measure	2020 Number or Score	20 <sup>th</sup> C Number or Score	Significance	National Threshold
Total Taxa	106	NA		
Southern Oceanic Woodland Index	8	9	Local	20
Pinhead Lichen Index	9	9	County	10
Old Trees of Open Places assemblage	11	12	County	16
Vulnerable RDB species	1	1	County	Largest population in AOS
Near Threatened RDB species which are also IR	1	1	National	
Notable species	10	10	County	
International Responsibility Species	5	5		
Section 41 species	2	2		



Individual Notable species are not assessed at national level, but some species are important at a county level, including *Pertusaria coronata* Nb (NS), which is new to West Sussex and very rare in England and may be assessed as Vulnerable in the final England Red List. In addition *Mycocalicium subtile* Nb (NS) was new to Sussex and *Protoparmelia hypotremella* (NR) was also new to Sussex and only the second British record. The latter species, however, may be spreading in western Europe and more records are to be expected.

The incomplete lichen survey of 2020 indicates that Knepp Castle Park supports a parkland lichen assemblage which is of value at a county level and supports features of national significance, especially the *Lecanora sublivescens* NT (NS/IR/S41) population.

#### 4.1.2 Distribution of Interest, 2018

The distribution of interest recorded in 2020 is shown on **Map 8**. In the area looked at the interest was greatest in more sheltered areas about and north of the Pleasure Grounds and about Capps Mead. More exposed parkland was found to be either of limited interest as West Lawn or lower interest as was found south of the house. It is important to note that the concentrations of interest are not that strongly related to the distribution of veteran tree concentrations given in **Map 1**. Younger veteran Oaks, and less spectacular tree species such as Walnut and native Maple, especially those in favourable habitats are at least as important as the most visible concentrations of old Oaks, which have also been exposed more to past pollution.

## 4.2 Management

### 4.2.1 Management Requirements of Woodland and Parkland Lichen Floras

The best conditions for woodland lichen assemblages are typically found in extensively grazed pasture woodland with a mixture of open high forest, glades and savannah like stands (Sanderson & Wolseley, 2001). The main positive features appear to be:

- Many trees surviving to senescence.
- Varying, but generally good light levels (with different lichen species having widely different tolerances).
- Shelter producing humid conditions.
- Slow woodland dynamics.

The basic mechanism driving this is a varying browsing pressure on tree regeneration that suppresses regeneration for long periods. A major interaction is between the shrub layer and the browsers; this can rapidly and drastically change the light and humidity levels without immediately altering the canopy layer (Coppins & Coppins 1998). Interactions between browsers and the canopy are much more long term, but frequent glades are required. Glades need to be dynamic but permanent features and slow dynamics are crucial. Coppins & Coppins (2002b), as an initial guide, suggest a requirement for at least 30% glades within the canopy of lichen rich woodlands and

that the glades have a permanence of at least 30 years. In contrast, tree cover of less than 20 to 30% will result in the loss of woodland conditions and the resultant loss of the old growth dependent woodland lichen assemblages. Exceptions to the latter are found in parklands with veteran trees with wide spreading crowns in very sheltered valley bottoms or humid areas. In very wet oceanic areas, woodland conditions can also be maintained with less shelter and in more open areas. In these special conditions woodland lichen assemblages can survive in more open conditions.

There is no reason why such conditions could not be created by management outside of pasture woodlands, but this would not be easy. In particular, it is important to appreciate the scale of management required. Rare lichens typically have very low rates of occupation, as they require specialised niches found on only a few veteran trees. As a result, they tend to occur on very small numbers of trees within large populations of veteran trees. Each veteran tree will have different combinations of niches. Rather than just maintaining a few especially rich trees, sustainable management requires the maintenance of good conditions around dozens or hundreds of trees (depending of the size of the site), both veteran and maturing. To imitate browsing impacts fully, management would also be required to be annual. For example, without browsing, coppice regrowth around haloed veteran trees (trees with shrubs and maturing trees cut from around them) can cast a very dense shade on the lower trunks within three years or so. Extensive grazing appears to be the only practical method of maintaining large blocks of nationally or internationally important lichen rich woodland in the long term. Suitable conditions are unlikely to be found in woodlands managed efficiently for timber. Neither are they likely to be found within true non-intervention woodland with low browsing levels.

Parkland is an artificial habitat that maintains conditions similar to those found in the more open parts of pasture woodlands. The main difference is that natural regeneration is unlikely to occur and new generations of trees need to be provided by tree planting. Alternatively, parks could be rewilded and managed more extensively to allow natural regeneration. The latter would often be beneficial for lichens but would usually be in conflict with the preservation of designed landscapes. As well as woodland lichen assemblages, parklands can also provide a refuge for lichens of old field and wayside trees that were once much more widespread in the general countryside.

Parks are more likely to be negatively impacted by agricultural intensification and the resultant ammonia pollution than woodlands. Extensive grassland management with no or minimal fertiliser applications is required. Parks brought into arable production in the 20<sup>th</sup> century should be put back to permanent grassland. Parks are much more likely than woodlands to suffer from tree generation gaps. In most parks, little tree planting occurred between the agricultural depression of the 1870s and the 1960s. In parks with particularly serious generation gaps simply planting trees now will not solve the problem; many of the current veteran trees will be lost before the planted trees are old enough to be colonised by rare lichen species. In these situations, there may be solutions involving land adjacent to the surviving open parkland. There was often tree planting in adjacent woods during the gap in parkland planting and

mature 19<sup>th</sup> century Oak in adjacent habitats could be promoted as new veteran trees to bridge the gap. In many parks there has also been a tendency to fence off denser areas of veteran trees and patches of pasture woodland with the wider parks over the 19<sup>th</sup> and 20<sup>th</sup> centuries. Ideally conserving or restoring the lichen interest of such areas would involve thinning any dense post enclosure regeneration away from older trees, removing fences, and restoring grazing.

In heavily grazed parks individual trees of groves are sometimes fenced off to prevent direct damage to the trees from the stock. Ideally the grazing intensity should be reduced rather than fencing off the trees. If trees must be fenced off, then it is absolutely essential that the grazing be replaced with grass cutting, scrub control and Ivy control to maintain the parkland conditions around the lower trunks.

#### **4.2.2 Comments on Management of the Parkland at Knepp Castle Park**

As part of a major rewinding scheme, Knepp is in good condition for lichens. In particular nutrient enrichment from intensive agriculture will have been reduced. Opening up woods to grazing is also increasing the numbers of well lit shelter mature to veteran trees. As long as there is future Oak regeneration at some point there are no obvious pressing issues.

A small point noted during the survey were the death of some post mature Oaks, of lichen interest in floodplain habitat in Capps Mead, presumably as result of recent floodplain rewetting. This suggests there is a need to take into account the presence of veteran trees in, and on the edge of, floodplains when planning such otherwise highly beneficial projects.

#### **4.3 Future Work**

The results of this reconnaissance suggest that more survey would be productive, especially if there are further areas with veteran trees, in a wide sense including smaller post mature trees, in sheltered locations in valley bottoms and within and on edges of woodland. Further liaison with Penny Green, the Knepp ecologist would help refine any targeting.

## 5.0 REFERENCES

- Alexander, K. N. A., Smith, M., Stiven & Sanderson, N. A. (2002) *English Nature research Reports No 494. Defining 'Old Growth' in the UK Context*. Peterborough: English Nature.
- Biodiversity Reporting and Information Group (2007) *Report on the Species and Habitat Review, Report to the UK Biodiversity Partnership*. Peterborough: JNCC.
- Coppins, A. M. & Coppins, B. J. (1998) *Lichen Survey of Horner Woods NNR – 1998*. Unpublished Report to the National Trust.
- Coppins A. M. & Coppins, B. J. (2002a) *Indices of Ecological Continuity for Woodland Epiphytic Lichen Habitats in the British Isles*. London: British Lichen Society.
- Coppins A. M. & Coppins, B. J. (2002b) *Watersmeet SSSI (Part of Exmoor & Quantocks cSAC) Lichen Survey in the Hoar Oak Water, Farley Water & East Lyn River March 2002*. An unpublished report to English Nature.
- Fritz, Ö. (2009) Vertical distribution of epiphytic bryophytes and lichens emphasizes the importance of old beeches in conservation. *Biodivers. Conser.* **18**: 289–304
- Harding, P. T. & Alexander, K. N. A. (1993) The saproxylic invertebrates of historic parklands: progress and problems. In: *Dead Wood Matters: the Ecology and Conservation of Saproxylic invertebrates in Britain* (ed. K. J. Kirby & C. M. Drake) 58 – 73. Peterborough: English Nature.
- Hodgetts, N. G. (1992) *Guidelines for Selection of Biological SSSIs: Non-Vascular Plants*. Peterborough: JNCC.
- James, P. W., Hawksworth, D. & Rose, F. (1977) Lichen communities in the British Isles: A preliminary conspectus. In: *Lichen Ecology* (ed. M. R. D., Seaward) 295-413.
- Rose, F. (1976) Lichenological indicators of age and environmental continuity in woodlands. In: *Lichenology: Progress and Problems* (eds: D H Brown, D L Hawksworth & R H Bailey) 279-307
- Rose, F. (1992) Temperate forest management: its effects on bryophytes and lichen floras and habitats. In: *Bryophytes and Lichens in a Changing Environment*. (eds: J W Bates & A M Farmer) 211-233. Oxford: Oxford University Press.
- Sanderson, N. A. (1996) *Lichen Conservation within the New Forest Timber Inclosures*. Eastleigh: Hampshire Wildlife Trust.
- Sanderson, N. A. (2018a) *A review of woodland epiphytic lichen habitat quality indices in the UK*. A report by Botanical Survey and Assessment for Natural England.

- Sanderson, N. A. (2018b) *The development of TNTN lichen assemblage scoring*. A report by Botanical Survey and Assessment for Natural England.
- Sanderson, N. A. (2018c) *Lichen Survey of Windsor Forest and Great Park SSSI, Berkshire*. A report by Botanical Survey & Assessment to the English Nature.
- Sanderson, N. A. Wilkins, T., Bosanquet, S. & Genney, D. (2018) *Guidelines for the Selection of Biological SSSIs. Part 2: Detailed Guidelines for Habitats and Species Groups. Chapter 13 Lichens and associated microfungi*. Joint Nature Conservation Committee 2018: Peterborough <jncc.defra.gov.uk/page-2303>
- Sanderson, N. A. & Wolseley, P. (2001). Management of pasture woodlands for lichens. In: *Habitat Management for Lichens*. (ed. A. Fletcher) 05-1 – 05-25. London: British Lichen Society.
- Smith, C. W., Aptroot, A., Coppins, B. J., Fletcher, A., Gilbert, O. L., James P.W. & Wolseley, P. A. (2009) *The Lichens of Great Britain and Ireland*. London: British Lichen Society.
- Wolseley, P. A., James, P. A., Theobald, M. R. & Sutton, M. A. (2006) Detecting Changes in epiphytic lichen communities at sites effected by atmospheric ammonia from agricultural sources. *The Lichenologist*. **38**: 161-176.
- Woods, R. G. & Coppins, B. J. (2012) *Species Status No. 13 A Conservation Evaluation of British Lichens and Lichenicolous Fungi*. Peterborough: JNCC.

**ANNEX 1 Field Notes****Key:****General**

Coll. = Collected to confirm identity. Herb. = Collected specimen retained in author's herbarium. fr. = fertile.

**Substrates**

Ac = Maple, Ae = Horse Chestnut, Al = Alder, Cb = Hornbeam, Co = Hazel, Ct = Hawthorn, Fx = Ash, Ix = Holly, Ju = Walnut, Pn = Black Pine, Pp = Poplar, Prs = Blackthorn, Q = Oak, Qi = Turkey Oak, Sx = Sallow, Ti = Lime, L = Lignum (as prefix) & Tw = twigs & branches.

**Hosts for lichenicolous fungi**

Z0429 = *Cliostomum griffithii*, Z0533 = *Graphis scripta*, Z0685 = *Lecanora argentata*, Z0987 = *Flavoparmelia caperata*, Z2506 = *Lecanora hybocarpa*.

**Species in bold** = systematically recorded species

**A1 Knepp park 3/7/2020****A1.1 Weather**

Dry and sunny.

**A1.2 South of House, Park & Riding School, TQ1521**

Scattered veteran Oak in parkland, moist bark on Oaks mainly dominated by nutrient enriched *Diploicia canescens* – *Amandinea punctata* communities. A few less damaged moist bark communities, including an important record of *Lecanora sublivescens* on a Walnut. Dry bark locally better, with some Pinhead Lichens of interest.

**TQ155 217**

**KNP001** (TQ15531 21679, 22m): post mature Pedunculate Oak in parkland *Diploicia canescens* – *Amandinea punctata* community dominant on moist bark but pinhead interest on dry bark

*Chaenotheca hispidula* Q R

*Chaenotheca trichialis* Q O

Also

*Amandinea punctata* Q

*Dendrographa decolorans* Q

*Diploicia canescens* Q

*Lecanora expallens* Q

*Pachnolepia pruinata* Q

*Phaeophyscia orbicularis* Q

*Physconia perisidiosa*

**TQ154 216**

Oak branch	
<i>Candelariella xanthostigmoides</i>	Q Tw
<i>Evernia prunastri</i>	Q Tw R
<i>Flavoparmelia caperata</i>	Q Tw
<i>Hypotrachyna afrorevoluta</i>	Q Tw
<i>Lecanora barkmaniana</i>	Q Tw
<i>Lecanora expallens</i>	Q Tw
<i>Lecanora hybocarpa</i>	Q Tw Coll. 1 Epipsamma crystals extending into the hymenium
<i>Melanohalea elegantula</i>	Q Tw
<i>Parmelia saxatilis</i> s. lat.	Q Tw
<i>Parmelia sulcata</i>	Q Tw
<i>Physcia adscendens</i>	Q Tw
<i>Physcia tenella</i>	Q Tw
<i>Physconia grisea</i>	Q Tw
<i>Punctelia subrudecta</i> s. str.	Q Tw
<i>Xanthoria parietina</i>	Q Tw

**Other Species**

<i>Arthonia spadicea</i>	Q
<i>Cliostomum griffithii</i>	Q
<i>Dendrographa decolorans</i>	Q
<i>Opegrapha vulgata</i>	Q
<i>Pyrrhospora quernea</i>	Q

**TQ154 215**

<i>Flavoparmelia caperata</i>	Fx
<i>Lecanora hybocarpa</i>	Pp Coll. 2 Epipsamma crystals extending into the hymenium
<i>Lecidella elaeochroma</i> f. <i>elaeochroma</i>	Sx
<i>Opegrapha varia</i>	Pp Coll. 2
<i>Phlyctis argena</i>	Pp, Fx, Sc
<i>Porina byssophila</i>	Sx
<i>Punctelia jeckeri</i>	Q
<i>Pyrrhospora quernea</i>	Fx
<i>Ramalina farinacea</i>	Q Tw
<i>Ramalina fastigiata</i>	Q Tw

**TQ155 215**

**KNP002** (TQ15531 21499, 14m): post mature Walnut in parkland,

<i>Lecanora sublivescens</i>	Ju O	In two streaks, on junctions of moist and dry bark	Coll. 3	Herb. Sanderson 2765
------------------------------	------	--	---------	----------------------

Also

<i>Lecanora hybocarpa</i>	Q	Coll. 1 Epipsamma crystals extending into the hymenium
---------------------------	---	--

<i>Lecidella elaeochroma</i> f. <i>elaeochroma</i>	Ju	
<i>Opegrapha atra</i>	Ju	
<i>Opegrapha vulgata</i>	Ju	Coll.
<i>Pertusaria albescens</i> var. <i>corallina</i>	Ju	
<i>Pertusaria coccodes</i>	Ju	
<i>Pertusaria hymenea</i>	Ju	
<i>Phaeophyscia orbicularis</i>	Ju	
<i>Pyrenula chlorospila</i>	Ju	
<i>Vouauxiella lichenicola</i>	Q, Z2506	Parasitic on <i>Lecanora hybocarpa</i>
<i>Xanthoria parietina</i>	Ju	

Photos 2020-07-03-01 & 11



Photos 2020-07-03-01 & 11: KNP002, a post mature Walnut in parkland, with the Near Threatened and S41 lichen *Lecanora sublivescens* growing in two streaks on the junctions of moist and dry bark. One streak is in the centre of the trunk on the right hand photo. A close up *Lecanora sublivescens* to the left (cream-green and pale yellow), also shows a black pycnidia parasitising the apothecia of *Lecanora hybocarpa* to the right hand edge.

#### TQ156 214

<i>Amandinea punctata</i>	Ae	
<i>Diploicia canescens</i>	Ae	
<i>Hyperphyscia adglutinata</i>	Ae	
<i>Lecania cyrtella</i>	Ae	
<i>Lecidella elaeochroma</i> f. <i>elaeochroma</i>	Ae	Ae
<i>Myriolecis hagenii</i>	Ae	
<i>Xanthoria parietina</i>	Ae	



**TQ156 215**

<i>Amandinea punctata</i>	Ti
<i>Dendrographa decolorans</i>	Ti
<i>Diploicia canescens</i>	Ti, Q
<i>Pachnolepia pruinata</i>	Ti

**KNP003** (TQ15625 21555, 18m): post mature Pedunculate Oak in parkland

*Chaenotheca trichialis* Q R

Also

*Melanelixia glabratula* Q

*Pertusaria coccodes* Q

*Varicellaria hemisphaerica* Q

**KNP006** (TQ15694 21566, 15m): post mature Pedunculate Oak in parkland east of road. Tag 00345

*Chaenotheca trichialis* Q F

**TQ156 216**

**KNP004** (TQ15624 21644, 18m): post mature Pedunculate Oak in parkland. Tag 00554

*Chaenotheca chrysocephala* Q O

Also

*Dendrographa decolorans* Q

**KNP005** (TQ15607 21669, 16m): post mature Pedunculate Oak by House

*Chaenotheca trichialis* Q O

Also

*Abrothallus microspermus* Q, Z0987

*Flavoparmelia caperata* Q

*Parmotrema perlatum* Q

*Parmotrema reticulatum* Q

*Pertusaria flavida* Q

**Other Species**

*Cladonia fimbriata* LQ

*Cladonia polydactyla* var. *polydactyla* LQ

*Trapeliopsis flexuosa* LQ

**A1.3 Parkland West of Lake, TQ1521**

Scattered parkland trees with lichen interest on one Oak. A stand of Grey Poplar added to the over all diversity.

**TQ157 215**

*Bacidia rubella* LAc

*Calicium viride* Q

*Chrysothrix flavovirens* Q

**TQ157 216****KNP007** (TQ15765 21661, 9m): post mature Pedunculate Oak near lake.*Chaenotheca chrysocephala* Q R

Also

*Chaenotheca ferruginea* Q*Chrysothrix candelaris* Q*Ochrolechia subviridis* Q*Parmotrema reticulatum* Q*Pertusaria pertusa* Q**Other Species***Buellia griseovirens* LQ*Cliostomum griffithii* LCt*Diploicia canescens* Ct*Lecanora pulicaris* LQ*Lecidella elaeochroma* f. *elaeochroma* Ct*Parmotrema perlatum* Ct*Pyrrhospora quernea* LQ, Ct**TQ157 217***Candelaria concolor* Pp*Candelariella vitellina* f. *vitellina* Pp*Hypogymnia physodes* Pp*Lecanora argentata* Pp Coll. 4 Herb. Sanderson 2768. No epipsamma crystals, very rough margins places this in the morph *Lecanora subrugosa**Lecidella elaeochroma* f. *elaeochroma* Pp*Parmotrema reticulatum* Pp*Pertusaria albescens* var. *albescens* Pp*Pseudoschismatomma rufescens* Pp Coll. 4*Vouauxiella lichenicola* Pp, Z0685 Parasitic on *Lecanora argentata***TQ157 219***Amandinea punctata* LQ Coll. 5*Placynthiella icmalea* LQ**A1.4 Pleasure Ground TQ1521 & TQ1522**

Open grazed woodland with some interesting old Maples with Notable species, also old Alder, Holly and Hornbeams, with varied interest.

**TQ158 219****KNP008** (TQ15833 21993, 14m): Mature Alder on lake edge*Chaenotheca hispidula* Al R*Mycoporum antecellens* Al R

**Photo** 2020-07-03-02 behind first Alder

**Other Species**

*Stenocybe pullatula* Al Tw

**TQ156 219**

**KNP011** (TQ15684 21986, 18m): post mature Maple grown from coppice stool

*Opegrapha corticola* Ac O

*Sporodophoron cretaceum* Ac F

Also

*Bacidina phacodes* Ac

*Opegrapha vermicellifera* Ac

Adjacent Holly

*Stenocybe septata* lx

**Other Species**

*Cladonia coniocraea* LQ

*Enterographa crassa* lx

*Opegrapha vulgata* lx

*Varicellaria hemisphaerica* Q

**TQ1522**

**TQ158 220**

**KNP009** (TQ15837 22018, 13m): post mature Maple near lake

*Opegrapha corticola* Ac

Also

*Acrocordia gemmata* Ac

*Bacidina phacodes* Ac Coll. 6

*Dendrothele acerina* Ac

*Enterographa crassa* Ac

*Gyalecta truncigena* Ac

*Lepraria vouauxii* Ac

*Psoroglaena stigonemoides* Ac

Bryophyte

*Leptodon smithii* Ac

**Photo** 2020-07-03-02



Photo 2020-07-03-02: KNP008 & KNP009, a rich veteran Maple to the right foreground (KNP009), with the Notable lichen *Opegrapha corticola*. KNP008 is the Alder on the lakeshore behind the first visible Alder. This supported the Notable *Chaenotheca hispidula* and the ancient woodland species *Mycoporum antecellens*.

KNP010 (TQ15828 22061, 12m): big Black Pine in open woodland

*Chaenotheca chrysocephala* P

Also

*Chrysothrix flavovirens* P

#### Other Species

*Arthonia spadicea* Al

*Opegrapha vermicellifera* lx, Llx

*Pertusaria leioplaca* Co

#### TQ156 220

*Arthonia didyma* Co

*Dendrographa decolorans* Qi

*Enterographa crassa* Qi

*Graphis scripta* Co

#### TQ157 220

TQ1578 2207 Hornbeam stool

*Strigula taylorii* Cb

#### TQ158 221

**KNP012** (TQ15805 22117, 13m): post mature Pedunculate Oak on edge of wood

*Cladonia cyathomorpha* Q

Also

*Dendrographa decolorans* Q fr.

#### Other Species

*Lecanora argentata* Pra Coll. 8 No epipsamma crystals TQ1588  
2218

#### TQ157 221

*Bacidia rubella* Ac

*Dendrographa decolorans* Ac

*Dendrothele acerina* Ac

*Enterographa crassa* Cb, Ac

*Graphis elegans* Cb

*Lecanora hybocarpa* Cb Coll. 8 Epipsamma crystals extending  
into the hymenium SU1570 2213

*Opegrapha varia* Ac

*Psoroglaena stigonemoides* Ac

#### TQ155 221

*Enterographa crassa* Cb

*Opegrapha soredeiifera* Cb

*Strigula taylorii* Cb TQ1558 2215

#### TQ1521

#### TQ154 219

*Enterographa crassa* Cb

*Graphis scripta* Cb (*Graphis pulverulenta* morph)

*Taeniolella punctata* Cb, Z0533 On *Graphis scripta* (*Graphis  
pulverulenta* morph)

### A1.5 Fields to North, TQ1522

Field trees to north less polluted and also of interest. Includes interest on lignum on two trees and a possible new or second record to Britain.

#### TQ159 221

**KNP013** (TQ15917 22139, 9m): ancient Pedunculate Oak on the edge of the swamp,  
with exposed lignum

*Chaenothecopsis nigra* LQ Coll. 7 One septate spores with septa  
darker than cell wall

Also

*Calicium glaucellum* LQ

*Calicium viride* LQ

*Chrysothrix flavovirens* LQ fr.

<i>Cladonia macilenta</i>	LQ
<i>Dendrographa decolorans</i>	Q
<i>Lecanora confusa</i>	LQ
<i>Ochrolechia microstictoides</i>	LQ
<i>Pertusaria coccodes</i>	LQ
<i>Placynthiella icmalea</i>	LQ
Photo 2020-07-03-03	



Photo 2020-07-03-03: KNP013, an ancient Pedunculate Oak on the edge of the swamp, with exposed lignum supporting the Notable pinhead fungus *Chaenothecopsis nigra*. Associated fallen dead wood added to the lichen interest.

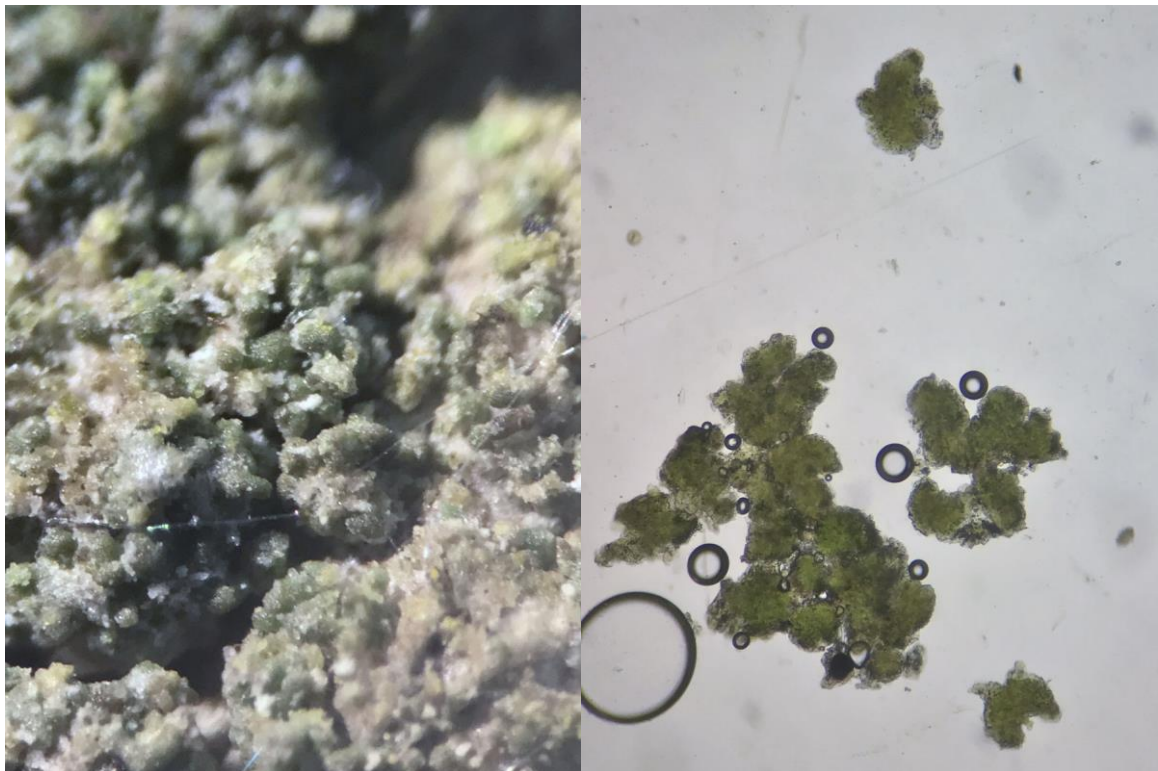
TQ159 222

KNP014 (TQ15916 22220, 11m): post mature former hedgerow Pedunculate Oak

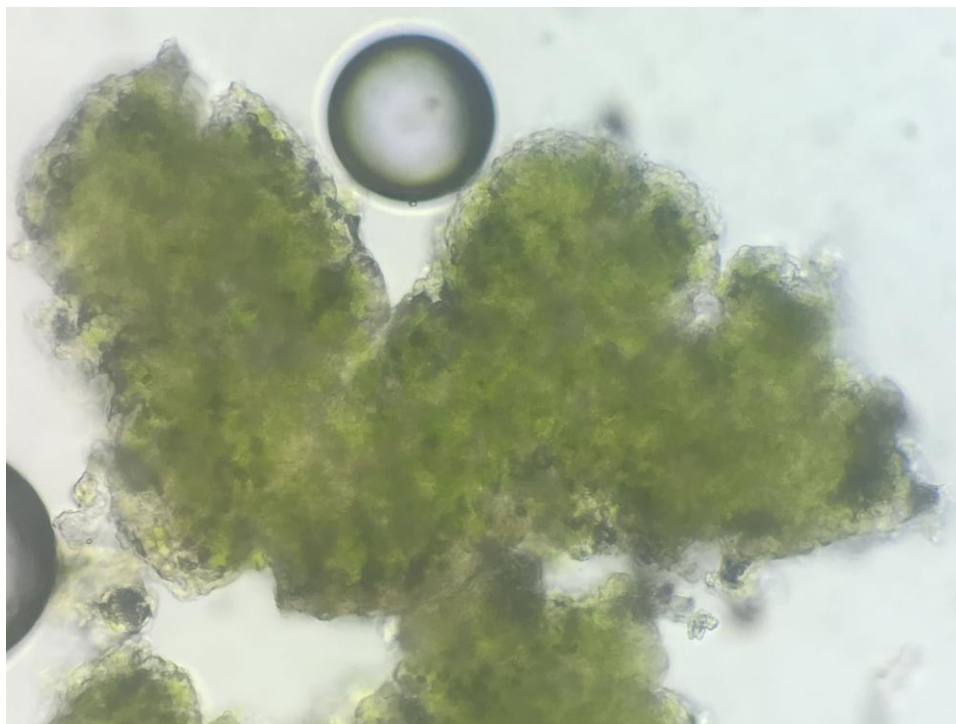
*Calicium salicinum* Q R On *Cliostomum griffithii*?

Also

*Protoparmelia hypotremella* Coll. 8 Herb. Sanderson 2766. Thallus with larger paler brown squamules compared to *Protoparmelia oleagina*, no 'oily' reaction to K. New to Britain/second British record. Det. A Aptroot. Photos 2020-07-03-12 – 15



**Photos 2020-07-03-12 – 14: KNP014**, specimen Herb. Sanderson 2766 of *Protoparmelia hypotremella*, second British record of a lichen spreading in western Europe and expected to be found in Britain. Shows the squamulose granules, which are partly isidia like and are larger and a paler brown than the similar *Protoparmelia oleagina*.



**Photo 2020-07-03-15: KNP014**, specimen Herb. Sanderson 2766 of *Protoparmelia hypotremella*, second British record of a lichen spreading in western Europe and expected to be found in Britain. Shows a larger more squamule like granule.

#### TQ156 222

**KNP015** (TQ15640 22234, 15m): standing dead former hedgerow Oak

*Mycocalicium subtile* LQ R Coll. 9 Simple brown spores with pointed ends, 6 – 8 x 3µm. On quite recently exposed, lignum. New to Sussex

#### A1.6 West Lawn & Capps, TQ1421, TQ1521 & TQ1522

Park to west, flood plain and adjacent woodland. Exposed trees are lichen poor but some sheltered as very rich, with two section 41 species found and a new Notable species to Sussex.

#### TQ152 219

**KNP016** (TQ15284 21941, 10m): post mature Pedunculate Oak in parkland

*Chaenotheca chrysocephala* Q O

*Chaenotheca trichialis* Q F

Also

*Calicium viride* Q

*Chrysothrix candelaris* Q

*Dendrographa decolorans* Q

*Pertusaria coccodes* Q



**Other Species***Chaenotheca ferruginea* Q**TQ1522****TQ152 220****KNP017** (TQ15239 22021, 10m): large diameter spreading post mature Pedunculate Oak by ditch

<i>Chaenotheca chrysocephala</i>	Q	R	
<i>Chaenotheca trichialis</i>	Q	F	
<i>Lecanora sublivescens</i>	Q	R	Two thalli west side, see photos
<i>Pachyphiale carneola</i>	Q	R	
<i>Pertusaria coronata</i>	Q	F	On wetter flush on south side, new to West Sussex

Also

*Calicium viride* Q*Dendrographa decolorans* Q*Dimerella pineti* Q*Normandina pulchella* Q*Pachnolepia pruinata* Q**Photos** 2020-07-03-04 & 5



Photo 2020-07-03-04 & 5: KNP017, a large spreading ancient Oak in a sheltered valley with a very rich lichen assemblage. These included two thalli of the Near Threatened and S41 lichen *Lecanora sublivescens*, arrowed in the top photo and the yellowish thalli right by the pins in the lower photo. Also found on this tree was the Notable *Pertusaria coronata*, new to West Sussex and very rare in England, along with the old woodland/veteran tree specialists *Chaenotheca chrysocephala*, *Chaenotheca trichialis* and *Pachyphiale carneola*. This was the richest tree in species of interest found during the survey.

#### Other Species

*Calicium viride* Q

Exposed old Oaks on West Lawn were not of interest

### The Capps

TQ1421

TQ149 218

*Enterographa crassa* Q

### Capps Mead

Bottom of wood on edge of flood plain

**KNP018** (TQ14959 21848, 10m): a post mature Oak on edge of the floodplain, recently dead, impacted by floodplain rewetting?

*Lecanora sublivescens* Q F

Photos 2020-07-03-06 & 8



**Photos 2020-07-03-06 & 8:** KNP018, a recently dead post mature Oak on edge of the floodplain, which appears to have been impacted by floodplain rewetting?. The bark is mostly still intact and supported a large population of the Near Threatened and S41 lichen *Lecanora sublivescens*, (close up right, all the yellowish thalli). Sadly this was the largest colony of this lichen seen during the survey.

TQ1521

**TQ150 218**

More dead post mature Oak on edge of flood plain. The Ash with *Chaenotheca hispidula* seen by the river in 2008 was also dead, although the reason was not apparent.

**KNP019** (TQ15056 21840, 10m): recently dead Oak, impacted by rewetting?

*Chaenotheca trichialis* Q O

Also

*Pertusaria flavida* Q

**TQ151 219**

Junction of flood plain and side valley

**KNP020** (TQ15173 21931, 10m): post mature Pedunculate Oak in valley bottom

*Chaenotheca hispidula* Q R

Also

*Dendrographa decolorans* Q

*Opegrapha sorediifera* Q

**Other Species**

*Bacidia rubella* Ac

**Charlwood**

Fenced off, walked along bottom no old trees by flood plain.

**TQ152 217**

**KNP021** (TQ15203 21727, 10m): broken Holly, with wound on exposed lignum

*Bacidia incompta* Llx O Sterile

Photos 2020-07-03-09 & 10



Photos 2020-07-03-09 & 10: KNP021, a broken Holly in ungrazed rather shaded woodland, with a wound on exposed lignum, which supported the Vulnerable and S41 lichen *Bacidia incompta*, which may have once occurred on the parks lost veteran Elms.

**Other Species**

*Arthonia radiata* Cb Tw

Back on flood plain edge Maple pollards but no rare species

**TQ152 215**

*Bacidina phacodes* Ac

*Pachnolepia pruinata* Ac

## ANNEX 2 SPECIES LISTS

## General Key

## Species

- s. str. = In the strict sense, a recently split up species, recorded in the new tighter definition
- s. lat. = In the loose sense, a species previously recorded on a wider definition than now and subsequently split up

## SOWI

- 1 = Species used to calculate the Southern Oceanic Woodland Index (based on the former NIEC with minor modifications)

## PLI

- 1 = Species used to calculate the Pinhead Lichen Index

## OTOP

- 1, 2 or 4 = Species used to calculate the score for the Old Trees of Open Places assemblage

## Conservation Status

- VU = Vulnerable Red Data Book species
- NT = Near Threatened Red Data Book species
- Nb = Notable species (NR, NS, or IR species of conservation significance which are not RDB NT or higher)
- NR = Nationally Rare
- NS = Nationally Scarce
- IR = International Responsibility species
- (NR) = Nationally Rare species not regarded as a Notable species, an under recorded or ruderal species of limited conservation significance
- (NS) = Nationally Scarce species not regarded as a Notable species, an under recorded or ruderal species of limited conservation significance
- [NR] = Nationally Rare lichenicolous (fungal parasite of a lichen), likely to be very under recorded
- [NS] = Nationally Scarce lichenicolous (fungal parasite of a lichen), likely to be very under recorded

## Substrates

- Ac = Maple, Ae = Horse Chestnut, Al = Alder, Cb = Hornbeam, Co = Hazel, Ct = Hawthorn, Fx = Ash, Ix = Holly, Ju = Walnut, Pn = Black Pine, Pp = Poplar, Prs = Blackthorn, Q = Oak, Qi = Turkey Oak, Sx = Sallow, Ti = Lime, L = Lignum (as prefix) & Tw = twigs & branches

## Hosts for lichenicolous fungi

- Z0429 = *Cliostomum griffithii*, Z0533 = *Graphis scripta*, Z0685 = *Lecanora argentata*, Z0987 = *Flavoparmelia caperata*, Z2506 = *Lecanora hybocarpa*

SPECIES LIST 1  
Knepp Park, 2000

Species	Substrate	SOWI	PLI	OTOP	Conservation Status
<i>Abrothallus microspermus</i>	CQ, Z0987				[NS]
<i>Acrocordia gemmata</i>	Ac				
<i>Amandinea punctata</i>	Q, Ae, Ti, LQ				
<i>Arthonia didyma</i>	Co				

Species	Substrate	SOWI	PLI	OTOP	Conservation Status
<i>Arthonia radiata</i>	Cb Tw				
<i>Arthonia spadicea</i>	Q, Al				
<i>Bacidia incompta</i>	Llx			4	VU (NS/S41)
<i>Bacidia rubella</i>	LAc, Ac				
<i>Bacidina phacodes</i>	Ac				
<i>Buellia griseovirens</i>	LQ				
<i>Calicium glaucellum</i>	LQ		1		
<i>Calicium salicinum</i>	Q, Z0429		1		
<i>Calicium viride</i>	Q, LQ		1		
<i>Candelaria concolor</i>	Pp				
<i>Candelariella vitellina f. vitellina</i>	Pp				
<i>Candelariella xanthostigmoides</i>	Q Tw				
<i>Chaenotheca chrysocephala</i>	Q, P	1	1		
<i>Chaenotheca ferruginea</i>	Q		1		
<i>Chaenotheca hispidula</i>	Q, Al	1	1	1	Nb (NS)
<i>Chaenotheca trichialis</i>	Q	1	1		
<i>Chaenothecopsis nigra</i>	LQ		1		Nb (NS)
<i>Chrysothrix candelaris</i>	Q				
<i>Chrysothrix flavovirens</i>	Q, LQ, P				
<i>Cladonia coniocraea</i>	LQ				
<i>Cladonia cyathomorpha</i>	Q				Nb (NS)
<i>Cladonia fimbriata</i>	LQ				
<i>Cladonia macilenta</i>	LQ				
<i>Cladonia polydactyla</i>	LQ				
<i>Cliostomum griffithii</i>	Q, LCt				
<i>Dendrographa decolorans</i>	Q, Ti, Qi, Ac				
<i>Dendrothele acerina</i>	Ac				
<i>Dimerella pineti</i>	Q				
<i>Diploicia canescens</i>	Q, Ae, Ti, Ct				
<i>Enterographa crassa</i>	lx, Ac, Qi, Cb, Ac, Cb, Q				
<i>Evernia prunastri</i>	Q Tw				
<i>Flavoparmelia caperata</i>	Q Tw, Fx, Q				
<i>Graphis elegans</i>	Cb				
<i>Graphis scripta</i>	Co, Cb				
<i>Gyalecta truncigena</i>	Ac				
<i>Hyperphyscia adglutinata</i>	Ae				
<i>Hypogymnia physodes</i>	Pp				
<i>Hypotrachyna afrorevoluta</i>	Q Tw				
<i>Lecania cyrtella</i>	Ae				
<i>Lecanora argentata</i>	Q, Pra				(NS)
<i>Lecanora barkmaniana</i>	Q Tw				(NS)
<i>Lecanora confusa</i>	LQ				
<i>Lecanora expallens</i>	Q, Q Tw				
<i>Lecanora hybocarpa</i>	Q Tw, Pp, Q, Cb				(NR)
<i>Lecanora pulicaris</i>	LQ				
<i>Lecanora sublivescens</i>	Ju, Q	1		2	NT (NS/IR/S41)
<i>Lecidella elaeochroma f. elaeochroma</i>	Sx, Ju, Ae, Ct, Q				

Species	Substrate	SOWI	PLI	OTOP	Conservation Status
Lepraria vouauxii	Ac				
Melanelixia glabrata	Q				
Melanohalea elegantula	Q Tw				
Mycocalicium subtile	LQ		1		Nb (NS)
Mycoporum antecellens	Al	1			
Myriolecis hagenii	Ae				
Normandina pulchella	Q				
Ochrolechia microstictoides	LQ				
Ochrolechia subviridis	Q				
Opegrapha atra	Ju				
Opegrapha corticola	Ac	1		1	Nb (IR)
Opegrapha soreidiifera	Cb, Q				
Opegrapha varia	Pp, Ac				
Opegrapha vermicellifera	Ac, lx, Llx				
Opegrapha vulgata	Q, Ju, lx				
Pachnolepia pruinata	Q, Ti, Ac				
Pachyphiale carneola	Q	1			
Parmelia saxatilis s. lat.	Q Tw				
Parmelia sulcata	Q Tw				
Parmotrema perlatum	Q, Ct				
Parmotrema reticulatum	Q				
Pertusaria albescens var. albescens	Q				
Pertusaria albescens var. corallina	Ju				
Pertusaria coccodes	Ju, Q, LQ				
Pertusaria coronata	Q			1	Nb (NS)
Pertusaria flavida	Q				
Pertusaria hymenea	Ju				
Pertusaria leioplaca	Co				
Pertusaria pertusa	Q				
Phaeophyscia orbicularis	Q, Ju				
Phlyctis argena	Pp, Fx, Sc				
Physcia adscendens	Q Tw				
Physcia tenella	Q Tw				
Physconia grisea	Q Tw				
Physconia perisidiosa	Q				
Placynthiella icmalea	LQ				
Porina byssophila	Sx				Nb (NS)
Protoparmelia hypotremella	Q				(NR)
Pseudoschismatomma rufescens	Pp				
Psoroglaena stigonemoides	Ac				
Punctelia jeckeri	Q				
Punctelia subrudecta s. str.	Q Tw				
Pyrenula chlorospila	Ju				
Pyrrhospora quernea	Q, Fx, LQ, Ct				
Ramalina farinacea	Q Tw				
Ramalina fastigiata	Q Tw				
Sporodophoron cretaceum	Ac			1	Nb (IR)
Stenocybe pullatula	Al Tw				



Species	Substrate	SOWI	PLI	OTOP	Conservation Status
<i>Stenocybe septata</i>	lx	1			Nb (IR)
<i>Strigula taylorii</i>	Cb			1	Nb (NS/IR)
<i>Taeniolella punctata</i>	CCb, Z0533				[NR]
<i>Trapeliopsis flexuosa</i>	LQ				
<i>Varicellaria hemisphaerica</i>	Q				
<i>Vouauxiella lichenicola</i>	CQ, Z2506, Z0685				
<i>Xanthoria parietina</i>	Q Tw, Ju, Ae				
Biodiversity Measure	Number or Score				Significance
Total Taxa	106				
Southern Oceanic Woodland Index	8				Low
Pinhead Lichen Index	9				County
Old Trees of Open Places assemblage	11				County
Vulnerable RDB species	1				County
Near Threatened RDB species	1				National
Notable species	10				
International Responsibility Species	5				
Section 41 species	2				National