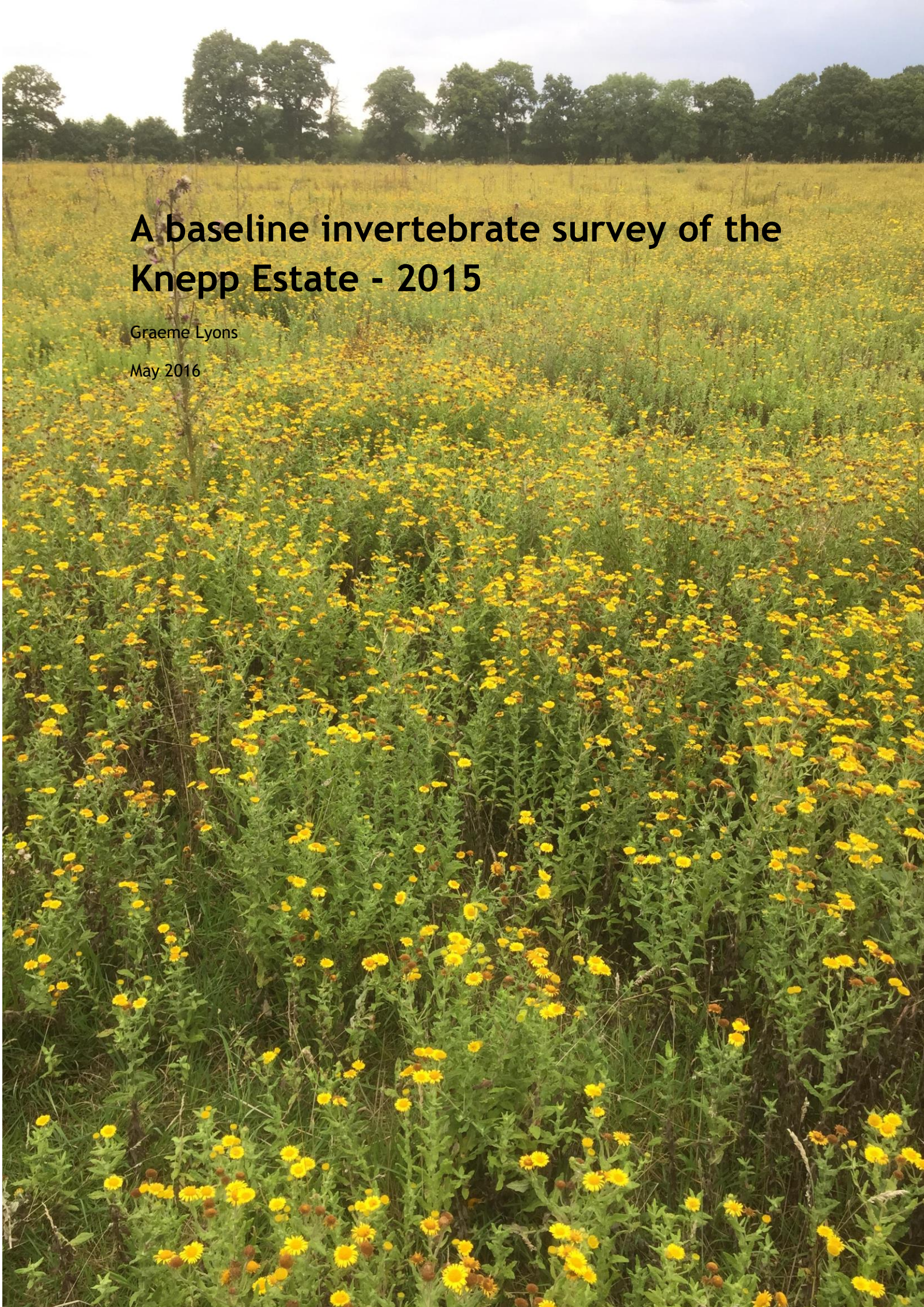

A baseline invertebrate survey of the Knepp Estate - 2015

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Front cover: One of the southern fields showing dominance by Common Fleabane.

0 – Summary

The Knepp Wildlands Project is a large rewilding project where natural processes predominate. Large grazing herbivores drive the ecology of the site and can have a profound impact on invertebrates, both positive and negative. This survey was commissioned in order to assess the site's invertebrate assemblage in a standardised and repeatable way both internally between fields and sections and temporally between years.

Eight fields were selected across the estate with two in the north, two in the central block and four in the southern block (two of which were selected to make a valid comparison with the other blocks). Six visits were made between April and early October. Each field was recorded for 30 minutes. Techniques involved sweeping, beating and active-searching depending on the season and the micro-habitats present. A master spreadsheet was kept and added to after each visit so that each field had its own list, as did each section and the whole estate. The data was then ran through Mike Edwards' invertebrate resource data base to analyse in more detail.

A total 567 species were recorded with beetles being the largest group with 194 species. A total of 35 species with conservation statuses (6.2%) would be low for a nature reserve but is high for a site that has come from arable in short a short time. Ten of these species are associated with dead wood, a rich assemblage on site that has great continuity of management that long predates the project. Perhaps the rarest species of the survey was a single female Lymexylon navale (an RDB2 deadwood beetle) found flying around a huge open grown oak tree in field 3 in July. A Saproxylic Quality Index spreadsheet has been maintained by the author for Knepp for a number of years but is still under 40 species (which is required to give a valid index). However, suggestions are that Knepp is a high quality sight for this key group of invertebrates and is likely to be ranked somewhere in the 10 to 20th best site in the country.

Tab. 1. The summary of the number of invertebrates seen across the fields and blocks. The results are also broken down by key invertebrate orders. The lowest totals are highlighted in red and the greatest in green.

Criteria/Field	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**N**	**C**	**S**	**S All**	**All**
Total species	180	200	187	197	191	189	165	174	285	293	274	390	567
Uniqueness	26	36	38	41	42	35	22	16	67	85	75	142	n/a
Invert. order													
Araneae	18	21	23	19	21	24	21	23	30	36	37	52	68
Odonata	3	1	3	1	7	0	1	1	4	4	1	9	10
Orthoptera	4	6	8	7	7	4	7	6	6	9	7	10	11
Heteroptera	37	40	37	41	33	34	39	37	53	56	45	58	69
Auchenorrhyncha	8	6	8	6	7	7	8	10	8	7	10	10	16
Hymenoptera	9	8	6	8	13	12	7	8	12	12	18	22	27
Coleoptera	58	59	62	68	49	56	37	39	92	101	78	115	194
Diptera	19	18	9	13	22	21	21	17	27	16	26	41	49
Lepidoptera	19	30	24	25	22	27	21	26	40	36	43	57	81

Field 2 had the most species while field 8 had the highest proportion of species with conservation status. Overall, field 3 scored the highest with the most top scores in the resource table above. Field 7 scored the lowest with a remarkable 11 lowest scores and no top scores for any resource category.

The survey produced some unexpected results, typically that it is not a clear cut case that the southern section is better than the other two sections overall for invertebrates. As it stands, three sections are complementary with the best grassland in the north (although limited in extent), the most deadwood associates in the central block and the most tall-herb associates in the south. Over all though, the central block came out as the best block for invertebrates. Having a diverse array of invertebrate assemblages is a good thing but all these habitats and resources could be good across the whole estate with a little tweaking of the grazing project (and several hundred years in the case of the deadwood associates).

The main management recommendation is to reduce the grazing a little overall but also to incorporate if possible 'pulsed' grazing. By relaxing the grazing at different times of the year (particularly summer) and by not grazing year on year with the same intensity, the sward would be likely to improve. The author believes that an open ended rewilding project such as Knepp with undefined outcomes can and should have a sward rich in botanical diversity at each and every step on this journey with a wealth of nectar sources and structure. This can be achieved using the above methods without in anyway deviating from the core principal of rewilding. Continuous feedback is as vital (if not more so) to a rewilding project as it is to a nature reserve because we must not let our own confirmation biases dictate the outcomes of such projects, it has to be driven by expert opinion and this requires constant fine-tuning by observation and changes in management. This could be considered as an analogue to the predator/prey relationship that is missing from the UK and all rewilding projects here.

1 – Introduction

1.1 – Knepp overview

The Knepp Wildlands Project is a large rewilding project "where natural processes predominate and long term financial stability is achieved outside of a conventional agricultural framework". Therefore, wildlife is at the heart of the project.

The whole estate is around 1400 ha with some areas not in the grazing project. 990 hectares is in the grazing project split into three large compartments.

North – 236.67 ha (taken out of production in 2005 and reseeded with grass mix of seven species)

Middle (park) – 280.50 ha (taken out of production in 2001 and reseeded with High Weald Meadow mix)

South – 473.17 ha (taken out of production at various times but the fields surveyed in this report between 2003 and 2005. No reseeding, all natural regeneration).

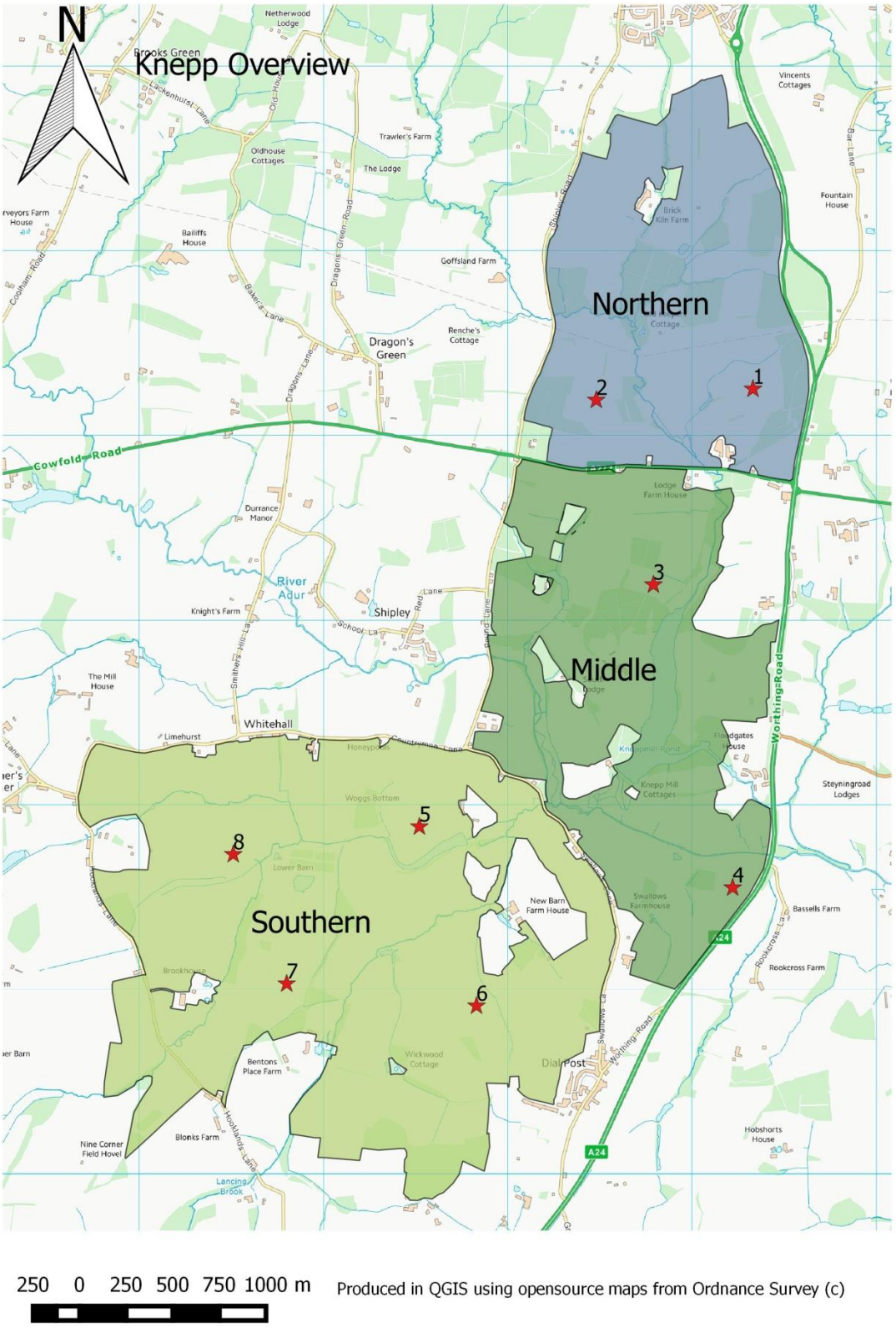

Figure 1. Overview of the grazing project at Knepp.

1.2 - Grazing

The following were the numbers at the time of the surveys. The deer and pig numbers would be at their maximum, being both after they had produced you and before they were culled in the autumn.

Northern block: Long-horn 141

Middle block: Long-horn 81**,** Exmoor Ponies 4**,** Red Deer 30 and Fallow Deer 410 (includes fawns)

Southern block: Long-horn 130, Exmoor Ponies 11, Tamworth Pigs 22, Red Deer 30 and Fallow Deer 235

Plus thousands of Rabbits and probably about 80 Roe Deer across the whole estate

1.2 - Aims of survey

The aims of the survey were as follows:

- To produce an annotated species list for the site, which requires finding as many species as possible in the most time-efficient way possible.
- To create a survey technique that is standardised, robust and repeatable.
- To carry out a survey in a stratified way that delivers equal effort between a number of sites. So that the invertebrate assemblages within these sites are comparable.

Knepp is a huge site and as such it would not be possible to visit every area in detail without spending so much time moving around the site that the costings would be unreasonable and the time would spiral out of control.

Eight 30 minutes plots is a challenge as processing samples, identifying moths (moths lose all their scales in the killing jar and are much easier to identify when alive in most cases) and moving between plots takes time

Eight fields were selected by Charlie Burrell . The fields needed to represent :

- The three different areas of the project: north, central and south.
- The different 'ages' of the field, or how long they have been out of production
- A broad spread across the site whilst maintaining typicallness.

1.3 – The eight fields

Field 1 (Mars) – TQ16332325 (Northern Block)

Taken out of production in 2005

This field is very dull botanically with tightly grazed grassland and large patches of thistle. Later in the year some nice patches of Autumn Hawkbit were present. Large but not huge open grown oaks were abundant as was a heavily grazed water margin of a muddy lake, a

well grazed ditch with a variety of aquatic plants that struggled to flower in profusion and several dense Blackthorn hedges. No woody vegetation is establishing in the fields due to the higher grazing pressure here.

By the final visit, a large area of earth had appeared which was confirmed to be the slubbings thrown out from a rotary ditcher.

Fig 2. Field 1 looking north east

Field 2 (Four and a Half Acres) – TQ15482319 (Northern Block)

Taken out of production in 2005

This field was perhaps the only field of the survey that didn't have any open grown trees growing in the middle. It was surrounded on two opposite sides by woodland and the other two sides by ditches with scattered trees along, the northern most edge with scrub between these trees. By late summer, the grassy sward (both in terms of structure and composition) was the best observed across the eight sites and whole of the Knepp estate. Despite being in the same block as Field 1, the grazing pressure is clearly a little lower for whatever reason as some woody vegetation is regenerating in the field.

Fig. 3. Field 2 looking south west

Field 3 (Brook's Plat) – TQ15792219 (Central Block)

Taken out of production 2001

This field had a drier, slightly more acidic nature to the sward with fewer flowers in the sward and a very even structure. A small pond was present. Dead wood was well represented with an interesting red-rotten hollow oak tree (still alive), a large standing dead oak and large fallen dead oak. There were also a number of felled trees and log stacks. The grazing pressure here was too high for any woody vegetation to establish.

Fig. 4 Field 3 looking east

Field 4 (Pitch Pond) - TQ16222055 (Central Block)

Taken out of production in 2001

This field shares an edge with the deer fence adjacent to the A24. The grassland here is more diverse, with a base-rich nature to the sward. Bird's-foot Trefoil, Knapweed and Lady's Bedstraw were present in the sward but were too over-grazed to hold large numbers of invertebrates. Two huge veteran oaks produced some interesting deadwood invertebrates. A large and dense patch of Nettle also produced some interesting records, perhaps more so due to the structure it provided (or the lack of structure in the rest of the field). A thick hedge with Hazel, Hawthorn and Blackthorn added another dimension to the field. Again, no woody vegetation was developing in the field.

Fig. 5 Field 4

Field 5 (Twenty Seven Acres) - TQ14522088 (Southern Block)

Fallow in 2005.

Of the four fields in the Southern Block, this was perhaps the most atypical, with a large lake making up one entire margin of the field. This water margin was very rich for plants and invertebrates with an excellent level of grazing and poaching. The centre of the field is an intricate network of establishing scrub averaging 2 – 3 m and dense stands of Common Fleabane. Grassland itself is extremely restricted and appears to be mostly maintained by Rabbits stopping the spread of fleabane. The issue with this is that what little grassland is available is under very high grazing pressure. A number of large oaks surround the site and large willows are well represented. Dead wood was more limited here.

Fig. 6. Field 5

Field 6 (New Barn 2) - TQ14831991 (Southern Block)

Fallow in 2005

This site was perhaps the most varied across the southern block. Again, mostly dominated by dense stands of Common Fleabane but there was more grassland in 5 and less scrub that was mostly scattered bushes that were easier to walk through than Field 5. Several large but not huge open grown oaks were present but the dead wood resource was more limited. A substantial patch of ungrazed grassland (False Oat-grass) was present, as was a rush-filled ditch and a large platform covered in carrion.

Fig. 7. Field 6

Field 7 (Brookhouse 10)- TQ13802003 (Southern Block)

Fallow in 2005

Field 7 and 8 were very similar. Extremely dense stands of Common Fleabane cover almost all of the site. A tiny patch of Knapweed was recorded against one edge of the field but very few plants other than Common Fleabane and scattered Hoary Ragwort were recorded. Bramble and willow scrub are abundant but were very rarely above waist height. The site is surrounded on almost all sides with oak trees. No open grown trees were present in the field.

Fig. 8. Field 7

Field 8 (Oaklands 4) - TQ13512073 (Southern Block)

Set-aside in 2003

This field is very similar to Field 7 but with more scrub intermediate in height between 7 and 6. One large dead oak tree is present and again, most of the site is surrounded by large but not huge oak trees. A more varied patch of sward to the west of the field holds Knapweed and also a single plant of Pepper-saxifrage.

Fig. 9. Field 8

2- Methodology

The eight fields selected were each visited on six occasions, once a month (and approximately one month apart) from April to September. Due to ill health the September visit drifted into early October but this was thought to have had no discernible effect on the fauna due to the warm autumn. The days selected were still, warm and with limited rain and fortunately, no survey visits had to aborted.

On each visit, the order in which the eight fields were visited was changed, so that no one area benefited from the warmest time of the day for example. On each visit, the most appropriate survey techniques for the season were used. Earlier in the year when the grass and tall-herb vegetation was shorter, more time was spent beating freshly emerged tree

foliage. Later in the year the focus switched to the sward. The resources available to invertebrates in each field were surveyed in proportion to the area they covered. For example, a site with one third grass, one third scrub and one third mature oaks would have had 10 minutes spent on each of the three resources.

Where interesting dead wood resources were present, some time was also spent on these areas too. Other micro or patch habitats that were recorded included ponds and water margins, litter and rush tussocks (where a sieve was used, always best in the April visits), sieving twigs and red-rotten hollow oaks, animal dung, mammal and bird carcasses and direct searching of nectar sources (better in late summer).

On each visit, a new worksheet was produced in the working Excel file accompanying this report. These worksheets were used so that records could be entered at a later date in a way that wouldn't lose information on numbers, stage, sex etc. That is not to say the idea of this survey was to estimate numbers of individuals, far from it. However, where possible, as much information as necessary was gleaned so that this could be entered as records into the Sussex Biodiversity Record Centre. After the production of this first worksheet in April, a copy was made of this sheet and renamed MASTER. Each entry in every cell was replaced with a '1' to show presence of that species in that particular field. On subsequent visit, a new worksheet was made to contain the records for that month while the MASTER sheet was added to accumulatively. Each new species recorded was added as a '1' in the relevant cells. The idea is that as time goes by, a more and more complete picture of the whole site's (plus each individual field's) invertebrate fauna is made.

The modular nature of this survey means that analysis can be made:

- Between each of the eight fields
- Between each of the three sections (by removing two of the fields from the southern section means there are only two fields in each of the three blocks for a fairer comparison)
- Between the whole site over time (and additionally any of the above over time) by repeating this standardised survey in five years time.

In order to get around the site, use was made of the mule (a small 4 x 4 vehicle). Without the use of this vehicle it would have made getting around and surveying eight fields on such a large estate impossible. Without completing all eight visits on the same day during similar conditions would make comparison between the fields impossible.

Tab. 2. Logistics of the 2015 survey.

Visit	Date	Notes
1	18th April	Slightly breezy but warm and sunny
2	22nd May	Very warm, near perfect conditions
3	27th June	Sunny, mild with little breeze
4	25th July	Warm but overcast
5	16th August	Cool for time of year with patchy sun
6	4th October	A slight dew early on warming up later

3 - Results

3.1 - Overview of species recorded

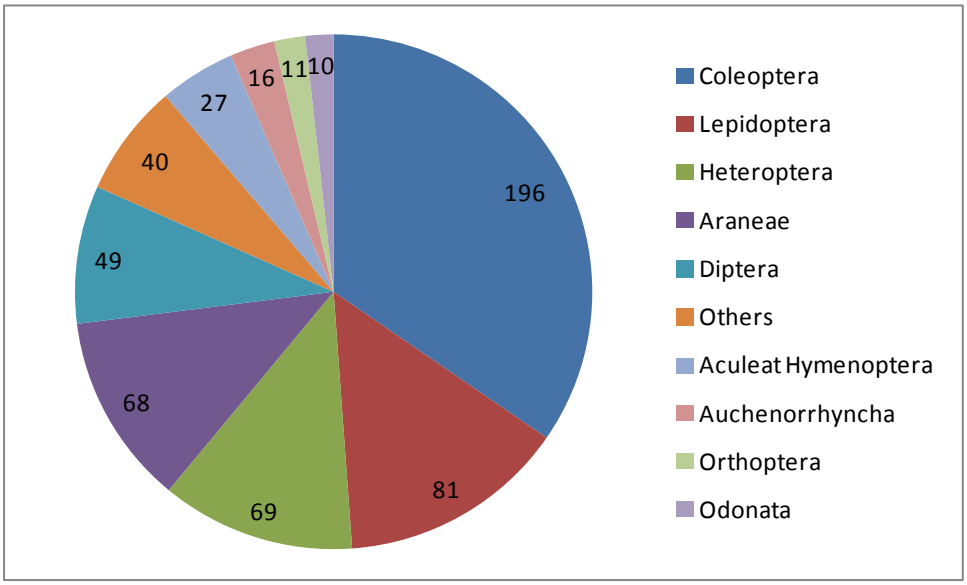

Fig.10. Overview of the main invertebrate groups recorded.

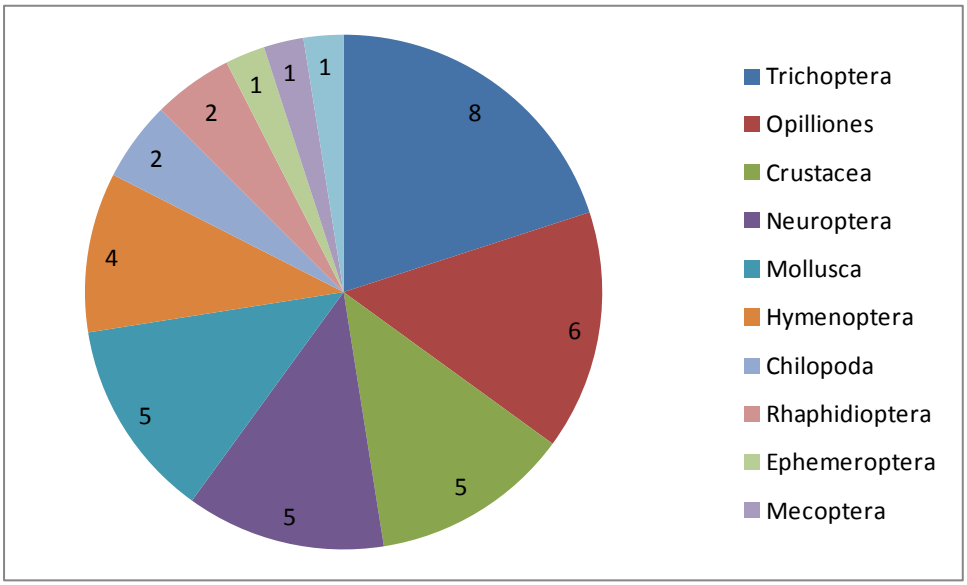

Fig.11. Small invertebrate orders recorded (others)

Clearly, there was a much greater focus on Coleoptera than any other group. However, close behind this was the Heteroptera which were very well represented on the site. The following chart shows the number of species recorded in proportion to the total number of species that exist in the UK.

3.2 – Spread of records throughout the six visits

Tab. 3. Records made in each month

Visit	Species	Records
April	130	209
May	194	347
June	147	282
July	168	337
August	124	174
October	90	127
Total	**567**	**1476**

3.3 - Species accounts for those with conservation status

The proportion of species with conservation status at Knepp was 6.2%. This is low when comparing to a nature reserve which is typically upwards of 10% but is respectable considering where the site has come from in only 10 years.

Conservation status is useful tool for assessing sites but it is very flawed. Many groups have not been updated for years and some groups use slightly different criteria for assessment. Therefore, some species are noted below where their conservation status is out of date. All the once scarce Odonata and Orthoptera have been removed from this analysis as have the research BAP moth species.

Where possible, photographs were taken in the field of rare or unusual species but this was not always possible as invertebrates can be too active. Where this was not possible, the author has used stock photos to illustrate this section of the report. For interesting specimens that were not discovered until they were identified down the microscope, images were taken using a digital camera that attaches to the microscope. All the images in this report can be used by the Estate for any purposes they wish.

Aculeate Hymenoptera

***Lasioglossum pauxillum* – Na**

This small bee is now much more common than the conservation status suggests and in fact, of the five *Lasioglossum* species recorded, this was the most frequently recorded occurring Fields 2, 5 and 8. Occurring in July and August, this species has almost certainly benefited from the grazing and the flowers that this produces.

***Lasioglossum malachurum* – Nb**

This common bee certainly no longer warrants conservation status being widespread in the south east. During the survey it was recorded from fields 5 & 6.

Brown Tree Ant *Lasius brunneus* – Nb

Another species that has expanded its range greatly and really should be considered less significant now. A carton nester in big old trees, this species was recorded in Field 1, 2, 3,

4 and 8. Thus it was represented in all areas but was less frequent in the southern block. This species is likely to have been in the veteran trees before the grazing project started.

***Sphecodes crassus* – Nb**

A cleptoparasite of various *Lasioglossum* bees that is widespread and locally common in the south east (Falk, 2015). It was only recorded once during the survey in field 8.

Diptera

***Myopites inulaedyssentericae* – RDB3**

The fly itself was never recorded during the survey but the distinctive galls in the flower heads of Common Fleabane were recorded in all four of the southern fields.

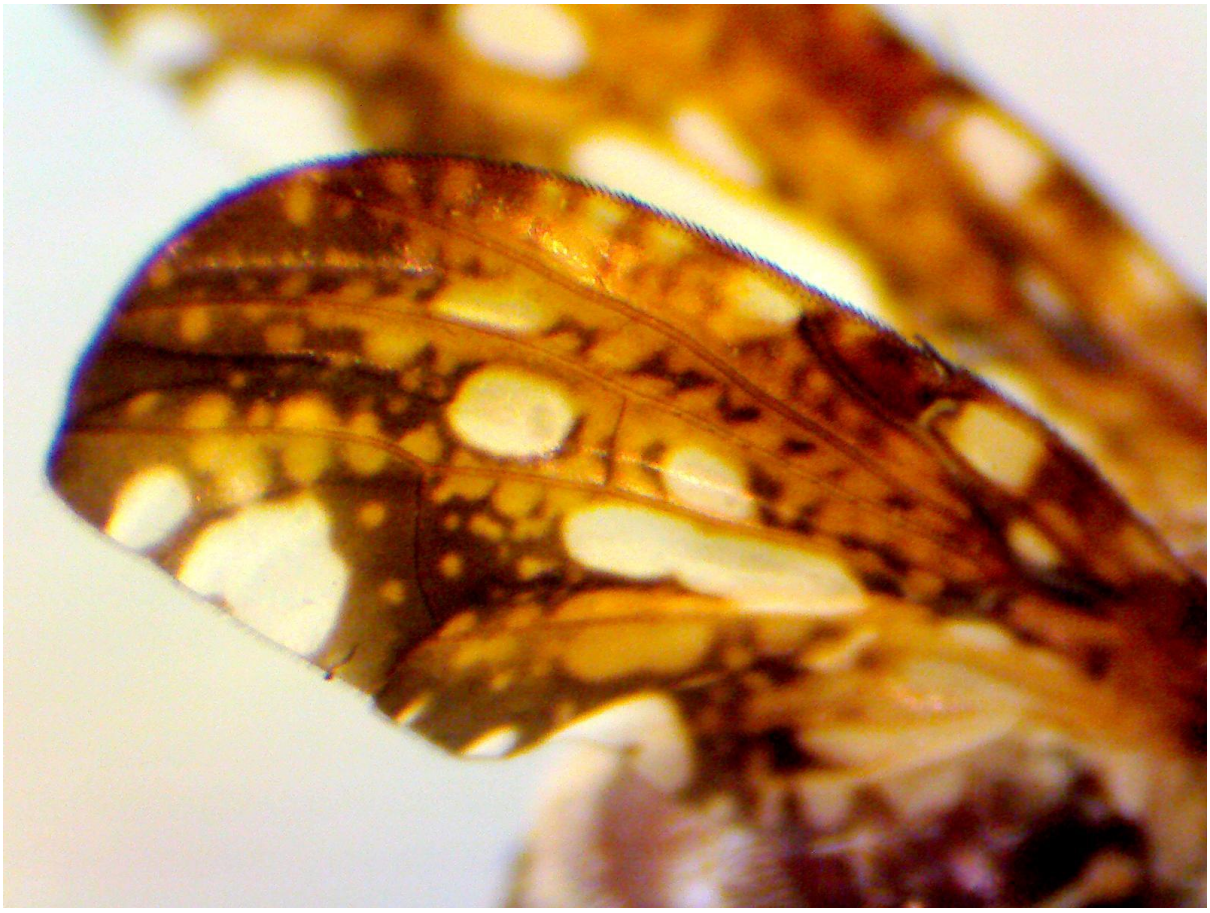

Fig. 12. *Merzomyia westermanni* – nationally scarce

This striking picture-wing fly is associated with Hoary Ragwort and was recorded in fields 5, 6 & 7 during August and October.

Coleoptera

Fig. 13. *Lymexylon navale* – RDB2

This incredible looking beetle was represented on the survey by a single female flying around the same huge oak in Field 3 on 25th July as *Anthribus fasciatus* was beaten from on 22nd May. The author has recorded this species only twice before: crawling on the Idehurst Oak at The Mens and flying around a recently sawn up veteran Beech at Cowdray Park. It would seem there have been no other records in Sussex since the 2011 Cowdray record.

The species is known to like very large old trees and was therefore likely to be present prior to the rewilding of the estate associated with the wealth of old growth oak there is present in a dead or decaying state at Knepp.

***Cantharis fusca* – RDB3**

This is a large species of slate-grey, black and red soldier beetle. It is quite like the much commoner *Cantharis rustica* (strangely not recorded at all during the survey as this is usually one of the most abundant soldier-beetles and with 14 species recorded, they were well covered. i.e. it is unlikely to have been over looked) but where that species has a black spot in the centre of the pronotum surrounded by red, ***fusca*** has the spot shifted forward so that it touches the front of the pronotum. Soldier-beetles are very lively and are difficult to photograph and being as this species is easy to identify in the field, no specimens were taken so a photograph is unavailable.

This species has become much commoner, during the survey it was recorded in Fields 2, 4 and 7, all during the 22nd May visit. Four individuals were recorded in Field 2 where only singletons were noted in the other two fields. This species has likely colonised these fields

since the grazing project has been running as it is associated with grassland rich in invertebrate prey for the larvae and with flowers for the adults to feed on. This species has also started turning up in other places in 2015 in Sussex such as Ebernoe Common, Woods Mill and Malling Down.

Pyrrhidium sanguineum – **RDB2**

This species was first recorded in Sussex on a log stack at Rewell Wood by Paul Brock in 2012. Soon after this in 2013 it was recorded on a log stack at Knepp near the Bothy. This species has traditionally been restricted to Wales but has started spreading, probably through timber being moved around the country as is so often the case with saproxylic beetles. During this survey, four individuals were recorded under logs in a log stack in Field 3.

Fig. 14. *Pyrrhidium sanguineum*

Neophytobius muricatus – **Na**

A single specimen was swept from the vegetation at the edge of the lake in Field 5 on 27th June. Although there is one previous record for this species in Sussex, it has not been seen for many years. It is a very interesting record associated with *Persicaria* spp. In this instance it could well have been associated with Water-pepper growing on the edge of the lake to the south of Field 5. This poached margin is an area that has responded very well to grazing. Having not seen it before the application of grazing, it's hard to say for sure but it looks very rich in species-composition, flowers and structure with areas of bared mud in between. It's hard to see how this edge could look any better.

Fig. 15. *Rhinocyllus conicus* – Na

A single specimen was recorded under the bark of a standing dead tree in Field 2 on 18th April visit and a second specimen was swept from thistle (the food-plant) in Field 1 on 22nd May. Prior to these the author had not recorded this species before until other individuals turned up in 2015 at Woods Mill and Malling Down. Prior to this, there are very few records in Sussex but it is known that this species has recently made a rapid come back and is perhaps not quite as scarce as it once was. The presence of this species is almost directly due to the change in management to a more grazed system.

Fig. 16. ***Ampedus elongantulus*** **– Na**

A single specimen of this saproxylic click-beetle was swept from a dense stand of nettle in field 5 during the 22nd May visit. A small but striking beetle that can be separated from other species in the genus by the extent of black on the tip of the elytra. Only about a tenth is black like it has been dipped in ink. It is often associated with red-rotten oaks but in recent years the author has observed it increasingly on sites lacking this specific resource but always on sites with an abundance of dead and decaying wood. It would almost certainly have been present prior to the rewilding.

Fig. 17. *Pilemostoma fastuosa* – Na

This striking tortoise beetle feeds on Common Fleabane, a plant in abundance in the southern Fields 5 to 8. It was first recorded by the author in 2014 at Knepp
. In 2015, the species was swept from dense stands Common Fleabane in Field 8 (two individuals) on the 22nd May and Field 5 on the 27th June. Given that only three individuals were recorded during the survey, it is clearly not a species that occurs at very high densities, even though the food plant is so abundant. This species is almost certainly present due to the rewiliding.

Fig. 18. ***Anthribus fasciatus*** **– Na**

This is a very scarce species with very few records in Sussex. During the survey, a single specimen (the only one recorded by the author) was beaten from foliage of one of the two veteran oaks in Field 4 during the 22nd May visit.

This species is not saproxylic but is actually a predator of arboreal invertebrates (Morris, 1990). It is likely to have been present on the site prior to the rewilding given it was beaten from a large oak tree.

Fig. 19. *Donacia impressa* – Na

This species was present on the edge of the lake in Field 5 throughout the survey but was first recorded on the 22nd May. Its presence is not likely to be directly due to the re-wilding and is likely to have been on the edge of the lake in the emergent vegetation here for many years. The author has recorded this species before on the lake at Parham Park. This species is dependent on tall herb swamp, in particular the flowers of *Carex* species but in this case, the flowers of Bulrush *Schoenoplectus lacustris*.

Fig. 20. ***Agrilus biguttatus* – Na**

This striking saproxylic beetle was recorded only once as an adult during the survey, netted in flight in Field 1 flying around the author's head on the 27th June. The characteristic D-shaped exit holes were also recorded on the 18th June in the veteran oak tree in Field 4 where so many other interesting species were also recorded. As this species is associated with large open-grown trees, it is unlikely to be affected by grazing.

***Oedostethus quadripustulatus* – Na**

This tiny click beetle, distinctive due to the presence of four yellow spots, was swept from Field 6 on 22nd June. Two mating specimens were swept from a rush-filled ditch. This was the only record for this species during the survey and it remains the only record made by the author.

Longitarsus parvulus – Na
A very common flea beetle that again is not likely to warrant this conservation status now. Known to feed on flax, the spread of this species suggests it may well be feeding on other plants now.

Hypera meles - Na
A once scarce but now widespread weevil that feeds on clovers.

Fig. 21. *Agrilus laticornis* - Nb

This image shows a male under the microscope with the large antennal segments. This is perhaps the most frequently encountered *Agrilus*, regularly being beaten from oak foliage and as a result, a species likely to have been present before the application of grazing. During the survey it was recorded in Fields 1, 2, 3, 7 and 8. This might make it one of the most widespread nationally scarce species recorded on the site.

Fig. 22. *Platystomos albinus* – Nb

A single specimen was found underneath bark on a fallen tree in Field 4 on the 18th April and was not recorded again during the survey. This striking bird dropping mimic fungus weevil is usually encountered by the author three or four times a year. Again, the deadwood association shows that it was likely present on site before the project started.

***Abdera flexuosa* – Nb**

Found only in Field 3 on the 16th August where two specimens were beaten from a large fallen oak tree. This beetle saproxylic was likely to have been present before rewilding started. The author has only ever recorded this species from a veteran oak tree at Cowdray Park prior to this.

***Coeliodes transversealbofasciatus* – Nb**

A single specimen of this small reddish weevil was beaten from oak on the 25th July in Field 3. Being associated with oak foliage, it was likely present on site before the grazing project started.

***Protapion difforme* – Nb**

This species was recorded in Field 6 on the 18th April and Field 2 on the 16th August. This small weevil is associated with damp grassland and is likely to be associated with *Trifolium* sp. (Morris, 1990). It is therefore likely this species has come in with the grazing project.

***Pterostichus anthracinus* – Nb**

This wetland carabid is frequently recorded in areas of suitable habitat. During this survey it was recorded once in Field 4 on the 18th April. This field lies adjacent to a wetland area where the species is likely to have originated. This wetland would predate the rewilding project so it is likely to have been on the site for some time.

***Korynetes caeruleus* – Nb**

A single adult of this predatory saproxylic beetle was sieved from inside a red rotten hollow oak tree in Field 3 on the 22nd May. The author has recorded this species several times before from the Knepp Estate. Other locations in Sussex include similar habitat at Parham Park.

***Longitarsus dorsalis* – Nb**
This highly distinctive flea beetle associated with ragwort almost certainly no longer deserves this conservation status. It's presence is also likely due to the grazing project. It was recorded by sweeping grass in Fields 4 and 5.

Lepidoptera

Purple Emperor *Apatura iris* – IUCN Low Risk Near Threatened
This species, well known from the site was recorded only from Field 8 on the 25th July. The specimen was flying very high from one side of the compartment to the other. This species has required mature oaks and willows, the second of which has developed on site through the rewilding project.

***Ochsenheimeria taurella* – Nb**

A single specimen was swept from an area of long grass in field 6 during the August visit. This species is associated with coarse grasses, perhaps one of the only species recorded during the survey associated with this resource. It's hard to comment whether this species was present before the grazing project started.

Fig. 23. ***Dasycera oliviella*** **– Na**

A striking saproxylic micro moth associated with veteran oak trees, particularly red-rotten oaks. Recording during the survey only from field 3.

Aranaeae

Fig. 24. *Salticus zebraneus* – Na

A genuinely scarce spider that the author has only recorded from Graffham Common and the Knepp estate where it likes the bark of old trees.

Fig. 25. ***Trematocephalus cristatus*** **– Na**
A striking red and blue-black money spider where the males have a hole that passes straight through their head. The spider is mostly restricted to the south east where it seems to be increasing in range. It's mostly associated with trees.

Fig. 26. ***Marpissa muscosa*** **– Nb**

Our largest jumping spider. Common in the south east on tree trunks, deadwood and fence posts.

Fig. 27. *Zilla diodea* – Nb

A distinctive orb weaver found throughout rough grassland and woodland in the south east.

***Philodromus praedatus* – Nb**

An under-recorded crab spider associated with oak trees.

Heteroptera

***Lygus pratensis* – RDB3**

This plant bug was recorded in all fields except 1 and 4. It is now common in widespread in the south east and almost certainly does not deserve conservation status.

***Stictopleurus punctonervosus* RDB-app**

This bug has recently colonised the UK and does not perhaps warrant the conservation status it has. Throughout the survey it was abundant in the four southern fields but not recorded in any of the other blocks. It appears to be associated with the fleabane at Knepp.

Auchenorrhyncha

***Athysanus argentarius* – Nb**

This large leafhopper was swept from Field 2 and is only the second time the author has recorded this species, the other location being East Sussex at Brickfield Meadow.

3.4 – Species recorded in all eight fields

The following species were recorded in all eight fields and are therefore likely to be significant drivers of the ecology across the site.

Araneae
Only one species of spider was recorded in all eight fields.

Anelosimus vittatus
A very common spider very frequently beaten from trees. It is also distinctive earlier in the year before it is fully mature so is often recorded.

Coleoptera
Six species of beetle occurred in all eight fields.

Cantharis nigra
A small and dark soldier beetle that is by far the most abundant soldier beetle as Knepp with hundreds being swept from each field.

7-spot Ladybird *Coccinella septempunctata*
This species needs no introduction and was abundant throughout the survey.

Harlequin Ladybird *Harmonia axyridis*
The introduced species which is now ubiquitous across the south east.

Malthodes marginatus
A small saproxylic solder beetle that requires examination of the genitalia to separate it from closely related species.

14-spot Ladybird *Propylea quatturodecempunctata*
A distinctive black and yellow ladybird with square-ish spots. Mostly found by sweeping.

Rhagonycha fulva
The 'hogweed bonking-beetle'. This extremely common beetle dominates the beetle fauna in late summer where it is regularly seen feeding on umbellifer flowers.

Sitona lineatus
By far the commonest member of the genus of pea weevils.

Diptera

Empis tesselata
A very large empid which is often found by sweeping and is easily identifiable in the field.

Eristalis pertinax
An extremely common fly, especially in early spring. Often seen nectaring and usually in the vicinity of trees.

Heteroptera

Deraeocoris lutescens
This oak specialist bug was beaten from nearly every oak tree beaten on the survey. It was also recorded throughout the survey in almost all months.

Dryophilocoris flavoquadrimaculatus
This species was abundant on oak trees during the May visit only.

Leptopterna dolobrata
Swept from grassland in the earlier part of the summer.

Forest Bug *Pentatoma rufipes*
Beaten from trees, not specifically oak. The nymphs more frequent in the spring, the adults in late summer.

Plagiognathus arbustorum
A small plant bug that is very often beaten from trees or swept from underneath them.

Plagiognathus chrysanthemi
Very similar to above but more usually recorded from sweeping grassland.

Homoptera

Aphrophora alni
Regularly beaten off a wide range of trees.

Common Froghopper *Philaenus spumarius*
Mostly spotted by the cuckoo-spit that protects the young.

Lepidoptera

Meadow Brown *Maniola jurtina*
A very common butterfly that feeds on a variety of grasses.

Gatekeeper *Pyronia tithonus*
A very common butterfly that feeds on a variety of grasses. It is usually seen in the vicinity of woodland edge and scrub.

Opiliones (Harvestmen)

Dicranopalpus ramosus
A very common harvestman with unusual pedipalps and is beaten off trees.

Paroligolophus agrestis
Another common harvestman, particularly on trees.

Orthopteroids

Meadow Grasshopper *Chorthippus parallelus*
This is perhaps the commonest grasshopper in the UK and is easily distinguished by the parallel marks on the pronotum.

Roesel's Bush-cricket
This once scarce cricket is now ubiquitous in rank grassland and vegetation. It is readily picked out by its song.

Common Earwig
Usually encountered beating trees and shrubs.

3.5 – Resource analysis

3.5.1 - Overview

The 567 species were attached to Mike Edwards's database. Around 40 species in this survey were not in the 5999 species already in the database and species account for each of these were created. These were mainly macro-moth larvae and beetles associated with dung and carrion. For each species in the database, a whole range of resource requirements are listed. For example, whether the species requires short herbaceous vegetation, flowers, whether it's a predator or herbivore etc. This allows a sophisticated analysis by comparing all eight fields with each other and also by comparing the three zones with each other. The two tables below show the absolute values and the percentage. The absolute values are useful for looking at what fields/zones are scoring best on a range of selected criteria. The percentages are the best way to make comparisons over time. The proportion of species with conservation status is a useful tool for assessing a sites quality and here it has also been possible to show the proportion of species associated specifically with woody and herbaceous vegetation respectively.

Tab. 4. Absolute values. The highest values are highlighted in green and the lowest in red.

Criteria/Field	1	2	3	4	5	6	7	8	N	C	S	S All	All
Total species	180	200	187	197	191	189	165	174	285	293	274	390	567
Uniqueness	26	36	38	41	42	35	22	16	67	85	75	142	n/a
Invert. order													
Araneae	18	21	23	19	21	24	21	23	30	36	37	52	68
Odonata	3	1	3	1	7	0	1	1	4	4	1	9	10
Orthoptera	4	6	8	7	7	4	7	6	6	9	7	10	11
Heteroptera	37	40	37	41	33	34	39	37	53	56	45	58	69
Auchenorrhyncha	8	6	8	6	7	7	8	10	8	7	10	10	16
Hymenoptera	9	8	6	8	13	12	7	8	12	12	18	22	27
Coleoptera	58	59	62	68	49	56	37	39	92	101	78	115	194
Diptera	19	18	9	13	22	21	21	17	27	16	26	41	49
Lepidoptera	19	30	24	25	22	27	21	26	40	36	43	57	81
Herbivore	82	101	83	106	98	86	74	89	139	141	135	192	274
Predator/parasite	55	62	59	52	65	66	54	55	88	89	90	129	180
Ratio	0.67	0.61	0.71	0.49	0.66	0.77	0.73	0.62	0.63	0.63	0.67	0.67	0.66
Detritivore	24	19	22	17	12	19	19	12	33	30	23	38	62
Specialist	54	67	53	69	59	55	48	61	88	90	87	124	174
Cons. Status	7	12	9	11	10	8	7	12	15	18	17	20	35
Woody vegetation	75	76	88	81	69	76	69	74	112	127	112	149	221
Herbaceous veg.	112	134	97	114	128	123	112	107	178	159	167	238	317
Tall herb	11	12	8	7	14	14	11	11	17	11	20	26	30
Medium herb	18	29	27	32	21	22	21	19	35	42	32	48	70
Short herb	3	9	9	7	8	2	4	4	11	15	6	13	25

Woody tall	9	9	12	10	4	4	3	8	14	18	10	14	30
Woody scrub	6	12	15	16	5	12	11	11	15	26	25	26	30
Carrion	1	0	3	0	0	3	0	0	1	3	3	3	7
Dung	4	3	3	2	3	5	0	1	5	4	5	7	11
Veg. litter	19	16	14	14	12	14	15	14	27	20	22	30	49
Bare ground	6	6	11	9	18	12	7	9	10	17	18	28	35
Flowers	31	24	22	23	36	36	29	24	40	34	45	59	72
Seeds	3	7	3	5	3	7	2	2	9	8	9	10	17
Poaceae	15	22	19	21	11	17	16	20	24	26	24	28	35
Asteraceae	7	7	2	7	13	9	7	8	11	7	13	22	27
Fabaceae	9	16	12	13	3	6	6	8	18	16	12	15	25
Deadwood total	15	9	25	15	6	10	8	11	18	30	20	16	42
Hard-timber	5	2	12	6	4	6	4	4	7	15	8	11	22
Heart rot	1	1	3	2	0	0	0	1	1	3	1	1	4
Sap-layer	3	2	4	2	0	1	1	1	3	6	2	2	6
Bark	3	1	2	1	0	0	0	2	3	2	2	2	3
Rote hole	1	0	0	0	0	1	0	0	1	0	1	1	1
TOTAL GREEN	4	6	9	6	7	7	0	1	8	19	12	n/a	n/a
TOTAL RED	6	5	6	6	12	5	11	5	14	13	17	n/a	n/a
SCORE (DIFFERENCE)	-2	1	3	0	-5	2	-11	-4	-6	6	-5	n/a	n/a

Tab. 5. Percentage values

Criteria/Field	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**N**	**C**	**S**	**S All**	**All**
Total species	31.7	35.3	33.0	34.7	33.7	33.3	29.1	30.7	50.3	51.7	48.3	68.8	100.0
Uniquness	14.4	18.0	20.3	20.8	22.0	18.5	13.3	9.2	23.5	29.0	27.4	36.4	n/a
Invert. order													
Araneae	10.0	10.5	12.3	9.6	11.0	12.7	12.7	13.2	10.5	12.3	13.5	13.3	12.0
Odonata	1.7	0.5	1.6	0.5	3.7	0.0	0.6	0.6	1.4	1.4	0.4	2.3	1.8
Orthoptera	2.2	3.0	4.3	3.6	3.7	2.1	4.2	3.4	2.1	3.1	2.6	2.6	1.9
Heteroptera	20.6	20.0	19.8	20.8	17.3	18.0	23.6	21.3	18.6	19.1	16.4	14.9	15.0
Auchenorrhyncha	4.4	3.0	4.3	3.0	3.7	3.7	4.8	5.7	2.8	2.4	3.6	2.6	2.8
Hymenoptera	5.0	4.0	3.2	4.1	6.8	6.3	4.2	4.6	4.2	4.1	6.6	5.6	4.8
Coleoptera	32.2	29.5	33.2	34.5	25.7	29.6	22.4	22.4	32.3	34.5	28.5	29.5	34.2
Diptera	10.6	9.0	4.8	6.6	11.5	11.1	12.7	9.8	9.5	5.5	9.5	10.5	8.6
Lepidoptera	10.6	15.0	12.8	12.7	11.5	14.3	12.7	14.9	14.0	12.3	15.7	14.6	14.3
Herbivore	45.6	50.5	44.4	53.8	51.3	45.5	44.8	51.1	48.8	48.1	49.3	49.2	48.3
Predator/parasite	30.6	31.0	31.6	26.4	34.0	34.9	32.7	31.6	30.9	30.4	32.8	33.1	31.7
Ratio	0.37	0.31	0.38	0.25	0.35	0.41	0.44	0.36	0.22	0.22	0.24	0.17	0.12
Detritivore	13.3	9.5	11.8	8.6	6.3	10.1	11.5	6.9	11.6	10.2	8.4	9.7	10.9
Specialist	30.0	33.5	28.3	35.0	30.9	29.1	29.1	35.1	30.9	30.7	31.8	31.8	30.7
Cons. Status	3.9	6.0	4.8	5.6	5.2	4.2	4.2	6.9	5.3	6.1	6.2	5.1	6.2

Woody vegetation	41.7	38.0	47.1	41.1	36.1	40.2	41.8	42.5	39.3	43.3	40.9	38.2	39.0
Herbaceous veg.	62.2	67.0	51.9	57.9	67.0	65.1	67.9	61.5	62.5	54.3	60.9	61.0	55.9
Proportion woody vegetation with conservation status	6.7	9.2	11.4	8.6	1.4	1.3	4.3	9.5	8.0	11.8	4.7	6.3	8.1
Proportion herbaceous vegetation with conservation status	1.8	4.5	1.0	2.6	6.3	4.9	3.6	4.7	4.5	2.5	5.4	5.0	5.0
Tall herb	6.1	6.0	4.3	3.6	7.3	7.4	6.7	6.3	6.0	3.8	7.3	6.7	5.3
Medium herb	10.0	14.5	14.4	16.2	11.0	11.6	12.7	10.9	12.3	14.3	11.7	12.3	12.3
Short herb	1.7	4.5	4.8	3.6	4.2	1.1	2.4	2.3	3.9	5.1	2.2	3.3	4.4
Woody tall	5.0	4.5	6.4	5.1	2.1	2.1	1.8	4.6	4.9	6.1	3.6	3.6	5.3
Woody scrub	3.3	6.0	8.0	8.1	2.6	6.3	6.7	6.3	5.3	8.9	9.1	6.7	5.3
Carrion	0.6	0.0	1.6	0.0	0.0	1.6	0.0	0.0	0.4	1.0	1.1	0.8	1.2
Dung	2.2	1.5	1.6	1.0	1.6	2.6	0.0	0.6	1.8	1.4	1.8	1.8	1.9
Veg. litter	10.6	8.0	7.5	7.1	6.3	7.4	9.1	8.0	9.5	6.8	8.0	7.7	8.6
Bare ground	3.3	3.0	5.9	4.6	9.4	6.3	4.2	5.2	3.5	5.8	6.6	7.2	6.2
Flowers	17.2	12.0	11.8	11.7	18.8	19.0	17.6	13.8	14.0	11.6	16.4	15.1	12.7
Seeds	1.7	3.5	1.6	2.5	1.6	3.7	1.2	1.1	3.2	2.7	3.3	2.6	3.0
Poaceae	8.3	11.0	10.2	10.7	5.8	9.0	9.7	11.5	8.4	8.9	8.8	7.2	6.2
Asteraceae	3.9	3.5	1.1	3.6	6.8	4.8	4.2	4.6	3.9	2.4	4.7	5.6	4.8
Fabaceae	5.0	8.0	6.4	6.6	1.6	3.2	3.6	4.6	6.3	5.5	4.4	3.8	4.4
Deadwood total	8.3	4.5	13.4	7.6	3.1	5.3	4.8	6.3	6.3	10.2	7.3	4.1	7.4
Hard-timber	2.8	1.0	6.4	3.0	2.1	3.2	2.4	2.3	2.5	5.1	2.9	2.8	3.9
Heart rot	0.6	0.5	1.6	1.0	0.0	0.0	0.0	0.6	0.4	1.0	0.4	0.3	0.7
Sap-layer	1.7	1.0	2.1	1.0	0.0	0.5	0.6	0.6	1.1	2.0	0.7	0.5	1.1
Bark	1.7	0.5	1.1	0.5	0.0	0.0	0.0	1.1	1.1	0.7	0.7	0.5	0.5
Rote hole	0.6	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.4	0.0	0.4	0.3	0.2

3.5.2 – Field by field analysis

Field 2 had the most species while field 8 had the highest proportion of species with conservation status. Overall, field 3 scored the highest with the most top scores in the resource table above. Field 7 scored the lowest with a remarkable 11 lowest scores and no top scores for any resource category.

Field 1

A fairly average scoring field. It held the most species associated with litter and also detritivores. Also the most species associated with bark. Only one rot hole species was recorded during the whole survey (the common hoverfly *Myathropa florea*) so the significance of the rot-hole score is limited. Field 1 held the lowest proportion of species

with conservation status of any field. It was also low on Lepidoptera, Orthoptera and Araneae and shared the joint lowest number of species associated with bare ground with field 2.

Field 2

This field had the most species and the best sward of the survey. It held the most species associated with herbaceous vegetation, short herbaceous vegetation and particularly Fabaceae (mainly clovers and trefoil on this site). Also the most Lepidoptera and the least hoppers. It had the least carrion and shared the least bare ground associated species with field 1. The proportion of species with conservation status was 6%, the second highest of the survey and slightly below the survey average of 6.2%. It also had the most grass associates, despite having a large proportion of flowering plants in the sward.

Field 3

Field 3 was the deadwood hot spot of the survey and this is not surprising as it sits in the parkland area where a great continuity of old, dead and decaying trees are present. Some 25 (13.4%) of the species in this field were associated with deadwood in some way. The grassland was short and slightly acidic, which usually leans to being less species-rich in terms of botanical diversity. This field had the least number of species associated with herbaceous vegetation and the highest associated with woody vegetation. It did however share the most number of species associated with short vegetation with field 2. This field had the most Orthoptera.

Field 4

An interesting field with a rich (slightly base-rich) yet overgrazed sward. It had the second most species in the survey and also held the most species associated with scrub, medium herbaceous vegetation, the most specialists, Coleoptera and Heteroptera. It had the largest number of herbivores and the lowest number of predators of the survey (meaning it had the lowest ratio of predators to herbivores). It had the least number of species associated with tall herbs.

Field 5

This field had many contrasts. It held the most number of Diptera, aculeate Hymenoptera and Odonata. This latter because of the lake edge while the others are accommodated by the large number of flowers present. It did also have the most species associated with flowers and brae ground. There was a great deal of evidence of pigs creating bare ground in this compartment which backs this up. This field had the most species associated with Asteraceae (the composite family – chiefly Common Fleabane but also Creeping Thistle) but was at the expense of the shorter sward requiring Fabaceae of which the field scored the lowest. The field was also lowest on litter associates and detritivores. Surprisingly despite so much developing scrub, the field scored the lowest on species associated with scrub. Due to the presence of the lake edge, it was thought best to remove this field when making a direct comparison with the North and Central blocks, it was for this reason that the field held the most unique species (species found in that field an nowhere else). Over all, this field scored second lowest on the number of top scoring resources.

Field 6

Over all, this field scored second highest in the high scoring resources across the survey and was the best field for this in the southern section. It held the highest number of spiders and because of this was also the highest for predators and had the best ratio of predators to parasites. It did have the lowest Orthoptera and Odonata though. As the vegetation in this field is quite tall in most places, the field had the highest tall-herb associates and the lowest short herb too. It shared the most flower associates with field 5 and also had the most dung and carrion associated species (the latter shared with field 3). This is not surprising as there was a great deal of carrion found in this field. It also shared the second lowest proportion of species with conservation status with field 7.

Field 7

This field was surprisingly poor and didn't hold the highest number for any category. It did however have a large number of low scores. In addition to sharing the second lowest proportion of species with conservation status with field 6, it had the lowest number of species, also the lowest Coleoptera, herbivores, specialists, tall woody-vegetation associates, carrion and dung associates. The dominance of Common Fleabane in this field and the lack of scrub and associated structural variety is clearly limiting fields like this.

Field 8

This field held the highest proportion of species with conservation status at 6.9%, the only field to have greater than the survey average. The most hoppers were recorded in this field but the lowest number of species associated with woody vegetation were recorded. This field held the least number of unique species.

3.5.3 – Comparison of the different blocks

The central block had the most species with southern block having the least. The southern block did have the highest proportion of species with conservation status while the northern block had the least.

North

Collectively fields 1 and 2 held the lowest proportion of species with conservation status than the other blocks. This block had the least number of spiders and the least number of predators. It also had the least woody vegetation and scrub associates, reflecting the more farm like nature of the landscape here with woody vegetation regeneration almost none existent in the field centres. Carrion, bare ground and grass associates were also lowest in the North. The field had the highest Diptera and Odonata (joint with central) of the blocks. Also the highest herbaceous vegetation associates, highest dung and litter associates and species associated with legumes. Most of the positives associated with the north are driven by field 2. Field 2 had a fantastic sward by late summer and this may be due to the livestock not spending much time there in the summer months while pushing it harder over the winter. They clearly spent much more time in the more nutrient rich field 1 as they were often present during the survey but were never recorded in field 2. This limited summer grazing in field 2 is essentially very similar to more conservation grazing

when it comes with a corresponding harder winter graze to open the sward for flowers the following spring. The Northern block had the lowest number of unique species.

Central

Overall the central block scores best on having the most highest scoring resources. It had 18 maximums and 13 minimums and was the only block to have more top scores than bottom scores. This block had the least number of hoppers, aculeate Hymenoptera, Diptera and Lepidoptera. It had the least number of herbaceous vegetation associates, flower requiring species and species using composites. It had the largest number of Odonata, Orthoptera, Heteroptera and Coleoptera. The largest number of herbivores and woody vegetation associates as well as medium and short vegetation associates. This block also had the most carrion (shared with the south block) and the most grass associates. However, the deadwood fauna of this block was the most striking feature and this is to be expected of a park. It also had the highest number of specialists and unique species. Overall, it was clear this block was the best for invertebrates at this stage. A reduction in summer grazing would have a great benefit on invertebrates.

South

The southern block had the lowest number of species and specifically the lowest number of Odonata, Orthoptera, Heteroptera and Coleoptera. The lowest number of herbivores, detritivores and specialists. It had the lowest woody vegetation associates and specifically the lowest tall woody vegetation associates. Also, the lowest medium and short vegetation associates and the least species associated with grasses and legumes. The dominance of the Common Fleabane has greatly reduced the other vegetative resources that could be available in the southern block. The south did have the most spiders, hoppers, aculeate Hymenoptera and Lepidoptera. It had the most associates with tall herbaceous vegetation and composites. The most predators (provided in part by the most spiders – this perhaps due to the structure provided by Common Fleabane). It also did very well with micro-habitats and had the most dung, carrion, bare ground and flower associates. These are in most cases directly due to the array of livestock on the southern block. It is though that the dominance of fleabane could be reduced by pulsing the livestock and this would have a great benefit on invertebrates.

3.7 – Saproxylic Quality Index

The author has a particular interest in saproxylic invertebrates and many were recorded during the survey on the site. Adding to this records made on previous visits, an attempt to create an SQI was made. However, the methodology states that 40 species are need to make a fair assessment and remarkably only 34 have been recorded so far. There are likely to be many more species on the site and could well be more records for saproxylic beetles held by the estate. It is surprising that no records of large and common saproxylic species such as *Rutpela maculata, Rhagium mordax, Denticollis linearis* or any cardinal beetle were made. The author encourages the Estate to enter any species on to the SQI spreadsheet provided with this report. This will help to put the site in the context of other sites in the region with high saproxylic interest.

4 – Conclusions

The Knepp Estate has a rich and varied invertebrate fauna. Many of the species with conservation status were those associated with old growth or wetlands, habitats that were represented on the site when much of it was still in agriculture.

The survey produced some unexpected results, typically that it is not a clear cut case that the southern section is better than the other two sections overall for invertebrates. As it stands, three sections are complementary with the best grassland in the north (although limited in extent), the most deadwood associates in the central block and the most tall-herb associates in the south. Over all though, the central block came out as the best block for invertebrates. Having a diverse array of invertebrate assemblages is a good thing but all these habitats and resources could be good across the whole estate with a little tweaking of the grazing project (and several hundred years in the case of the deadwood associates).

Rewilding is a much more open-ended and hands-off approach to managing land for conservation purposes. Allowing the habitats to develop in atypical and unexpected ways is part of the appeal of this system. Who would have expected the carpets of Common Fleabane in the southern section or the abundance of Purple Emperors? Equally though, as rewilding projects progress through different stages, along very different trajectories to the usual successional sequence of traditionally managed nature reserves, they should still be the best that they can be during each and every one of those stages. In order to get the most out of grazing animals for conservation purposes, the sward should be rich in plant species, abundant in flowers and varied in structure. On a site as large as Knepp, not all areas need to be like this every year but the majority should. However, swards great for invertebrates were few and far between at Knepp. By far, the best looking field was Field 2, a huge surprise to the author as it was in the more heavily grazed northern block which has much less of a rewilding feel to it. It also did not look particularly special until July. It was within the same block and exposed to the same livestock as the rest of the northern block. Underlying soils could also play a large factor in this, the species-richness of the fields was greater in Field 2 than in Field 1. Field 1 had a very enriched feel to it, with a tightly-grazed sward dominated by a few grasses and with dense patches of thistle. Field 2 on the other hand was much rougher, with an intricate mosaic of different species. Most notable were occasional patches of Knapweed and Red Bartsia that were very popular with nectar and pollen requiring invertebrates. As mentioned above, it is highly likely that the draw of lush grassland elsewhere in this block meant that summer grazing was limited in field 2, emulating a type of grazing that conservationists strive for by grazing harder in the autumn and winter and pulling off the animals or reducing the number in spring and summer.

In the following two images, it is clear that field 2 is still a little over-grazed but it is much better than the other fields. Patches of longer herbs exist and flowers are abundant (although they could be even more prolific if lighter grazing was applied in some summers). Patches of short grass between clumps of medium height herbs can also be seen. This should be seen as a much more desirable sward than is seen elsewhere. See the images of the eight fields for comparison above.

Fig. 28. Field 2 in mid-summer showing wealth of different nectar sources and structural types. The amount of grazing here and the sward produced here was the best of the survey.

Fig. 29. A close up of the same sward. Here a wealth of flowering Red Bartsia can be seen which was alive with bees in mid-summer.

The presence of Knapweed here does suggest a different historical management. It could also possibly reflect different seeding. Whatever the reasons, the sward was the best for invertebrates seen of the eight fields. Although weight for weight, the southern fields held many more flowers than this field, they are dominated by a single species with very little variety in structure and all the flowering resource very much restricted to the flowering period of Common Fleabane.

Sweeping dense stands of Common Fleabane was something that had to be done in proportion to the resource available and by July, this was the dominate resource within Field 5 to 8. It yielded remarkably few species and in particular, there were remarkably few species using the flowers. Spiders were also noticeably scarce in these samples. Unsurprisingly, the mature oaks around these fields yielded similar species to elsewhere but it is notable that the two fields with the least number of species were two of the fields dominated by Common Fleabane with the least amount of structure to it (Fields 7 and 8).

Fields 5 and 6 were again in most part dominated by Common Fleabane but they had more variety. Field 5 shared a boundary with a large lake and had a number of interesting species recorded there that were not recorded anywhere else in the survey. Field 6 had more variety too in the form a rush-filled wet ditch and an area of rank grass dominated

by False Oat-grass *Arrhenatherum elatius*. It also had a few open-grown, mature but not veteran trees growing in the field and a thick Blackthorn *Prunus spinosa* hedge.

There were one or two species associated with the Common Fleabane directly, such as *Pilomestema fastuosa*, The Na tortoise beetle. This species was only ever recorded as three individuals from two fields (5 and 8) so this is hardly abundant. Also recorded was the RDB3 fly *Myopites inulaedyssentericae*, recognisable by its distinctive galls, that were more obvious at the start of the season than the end. Beyond this, direct association with Common Fleabane was not recorded but some more species may have been picked up in the resource analysis under the section Asteraceae.

It is therefore thought that dense stands of Common Fleabane are not great for invertebrates. It is clear that a great deal of attention has gone into trying to understand this but as yet, no solution has been found. Looking closely at Field 5, there are small areas of grassland deep within the stands of fleabane that are small in nature and very heavily and tightly grazed. The grazing in these spots looks rather like rabbit-grazing in the most part which is likely to be an added problem. Many of them are deep within stands of fleabane and given how rabbits behave, it is highly unlikely they sought out these areas in the absence of grazing as much as they were already there when the fleabane began to grow up around their warrens. This puts the available grassland resource in greater and great demand and the result is that the disparity between dense stands of fleabane and tightly-grazed grassland with no flowers increases. Increasing the grazing at this stage is not going to tackle the problem of an unpalatable species. Changing nothing is unlikely to change anything in the short term other than prevent an interesting sward developing between the scrub and trees that eventually over top it. The ideal scenario to creating a more interesting sward is then to reduce the grazing density on a long term cycle.

Fig. 30. A rare patch of grass in the southern section. Typically where this occurs in a sea of fleabane it is heavily grazed by rabbits and other livestock.

The more you vary a grazing operation (breeds, numbers, species, timings etc) the chances of favouring one species at the expense of many is greatly reduced. The scenario in the southern block of Knepp is doing the exact opposite and the current stocking levels are producing a far from ideal sward. A much smaller yet very similar project to Knepp is the Sussex Wildlife Trust's Butcherlands site adjacent to Ebernoe Common in West Sussex. This site was arable and has been in conservation hands for a very similar time to Knepp. The soils are typical Wealden Clay like Knepp and the vegetation that is returning to these fields is also similar. However, structurally Butcherlands wins because SWT are able to 'pulse' the grazing. Low intensity grazing is present in mid to late summer most years and much higher through the winter where possible, balanced by pulling back the numbers or not grazing at all in some years. The desired effect is that there are areas where fleabane is present but the species does not dominate entire fields.

The following three photo show Butcherlands. The first two were taken in June and show patches of Ox-eye Daisy and clover and buttercups. As can be seen, the site had a harder graze over the winter so in the early summer the grass is quite short. The third photograph shows a large patch of Knapweed flowering in August. Under the current grazing regime at Butcherlands, this type of flowering is just not possible without varying something.

Fig. 31. A sward of Ox-eye Daisy created at Buctherlands by relaxing the grazing in the spring and early summer after a very hard winter graze.

Fig. 32. A wealth of flowering White Clover and Creeping Buttercup in spring at Butcherlands.

Fig. 33. Large patches of knapweed flowering in mid-summer at Butcherlands.

5 – Management recommendations

It may not be possible to vary the extent of grazing at Knepp in such a short term cycle but it could be something that is done over a much longer cycle. Having the site split into three large compartments does provide the ability to move animals around. The author believes that this level of tweaking easily fits in with the rewilding ethos, mimicking the predator/prey relationship whereby livestock are never really allowed to develop favourite areas as predators move them on.

Grassland is so often assessed solely in terms of the species of vascular plant that are found there. However, this is only part of the story and a site rich in flowering plants that are actually flowering is far healthier than one that isn't. Additionally, a site rich in invertebrates in both species and biomass is going to have many species that feed on them present too. Therefore, maximising the sward's potential for this huge, key and often-ignored group of animals is vital. One way of doing this is to assess the sward simply, quickly and effectively on an annual basis using a Rapid Grazing Assessment. This simple system uses visual triggers and ecological markers to assess just how good the grazing is within a compartment in reference to its individual potential. i.e. a field with good structure and many nectar sources coming from a management history of a Rye-grass ley

would score more highly than a floristically rich hay meadow grazed within an inch of its life.

This system will really help pinpoint where the conservation gains are happening and may even help show why. Given that this system only takes a short amount of time, it would be well worth conducting across all the fields at Knepp. Using the mule it would take very little time indeed to cover a single field and the information could be displayed visually using GIS. The system the author developed for SWT could be used directly and is provided below:

-2: Heavily under-grazed

Signs of this habitat include large areas of developing scrub, dense grass, often comprised of only a few coarse species. Large

-1: Slightly under-grazed

Intermediate between 0 and -2. Dwindling ratio of flowers to grass and a build up of thatch are often early indicators.

0: Just right

A perfect balance of grazing with a wealth of structural types, maximised potential of flowers on the flowering species present. Large numbers and diversity of invertebrates present too.

+1: Slightly over-grazed

Intermediate between 0 and +2. A reduction in maximum flower potential is often an indicator.

+2: Heavily over-grazed

Structure is often completely lacking and grazing reduces many flowers to a fraction of their usual height, if they manage to flower. Developing scrub is usually kept in check.

This is a very crude and simplistic system and it does not matter what system is adopted but as grassland is set to be an integral part of the Knepp rewiliding project, some assessment of the quality of the grassland should be made to fine tune the project and assess success both spatially and over time. Relying solely on quadrats and vegetation surveys does not provide this kind of assessment.

Although rewilding projects are more open-ended, there are 'limits of acceptable change'. Extreme examples of this would be scenarios where all of the estate turned to woodland, whereby the grazing intensity would be increased and/or a change in species applied before this happened. Equally if after a number of years, no woody regeneration at all was occurring across the whole estate, then the grazing density would be decreased. These are hypothetical and extreme scenarios that prove a point that it's OK to react in a rewilding project if something isn't developing in an acceptable direction. Most of the fields surveyed would have scored at -2 or -1.

It is the author's belief that such a 'limit of acceptable change' has been reached at Knepp and that the grazing intensity is generally too high and too continuous. If it were possible to rotate animals around the three compartments, it could allow a scenario where each year, one compartment is pushed harder, one is left alone and one is grazed somewhere in between. In fact, this could be said to more reflect a natural grazing system as these movements could be the equivalent of predator/prey relationships.

The author greatly enjoyed this survey and would very much like to repeat it in five years to see how the different fields are progressing.

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Appendices

Saproxylic Quality Index is attached as a separate spreadsheet. The author's records for the site are just shy of the threshold of 40 species required for an SQI to be valid. The estate may already have enough records to reach this and more.

SITE NAME	**Knepp**				**To calculate indices, enter '1' in 'Presence' column for relevant species**
VICE-COUNTY GRID REFERENCE		SOURCES:		DATES:	

Sequence and nomenclature follow Duff (2008). Conifer saproxylics are *italicised*. Species deleted from the British list or lumped are ~~struck through~~.

	SPECIES	STATUS	Rarity score	PRESENCE	Rarity score	IEC (1994)	IEC (2004)
1	**CARABIDAE**						
2	Calosoma inquisitor	Na				0	
3	Carabus intricatus	RDB1	32		0		
4	**HISTERIDAE**						
5	Abraeus granulum	Na	8		0	0	0
6	Abraeus perpusillus	Local	4		0		
7	Plegaderus dissectus	Nb	8		0	0	0
8	Acritus homoeopathicus	RDB3	24		0		
9	Aeletes atomarius	RDB3	16		0	0	0
10	Teretrius fabricii	RDB1	32		0		
11	Paromalus flavicornis	Local	2		0		
12	Paromalus parallelepipedus	RDB1	32		0		
13	Epierus comptus	RDBK	16		0		
14	**PTILIIDAE**						
15	Nossidium pilosellum	Nb	8		0		
16	Ptenidium gressneri	Nb	8		0	0	0
17	Ptenidium turgidum	RDBK	16		0	0	0
18	*Ptiliolum caledonicum*	RDBK	16		0		
19	Micridium halidaii	RDBK	16		0	0	0
20	Ptinella aptera	Local	2		0		
21	Ptinella denticollis	Nb	8		0		

22	Ptinella limbata	RDBK	16		0	0	0
23	Pteryx suturalis	Local	2		0		
24	**LEIODIDAE**						
25	*Anisotoma castanea*	Local	2		0		
26	*Anisotoma glabra*	Local	2		0		
27	Anisotoma humeralis	Local	2		0		
28	Anisotoma orbicularis	Local	2		0		
29	Agathidium arcticum	RDBK	16		0		
30	Agathidium confusum	RDBi	24		0		
31	Agathidium nigrinum	Local	2		0		
32	Agathidium nigripenne	Local	2		0		
33	Agathidium pisanum	RDBK	16		0		
34	Agathidium rotundatum	Local	2		0		
35	Agathidium seminulum	Local	2		0		
36	Agathidium varians	Local	2		0		
37	Nemadus colonoides	Local	2		0		
38	**SCYDMAENIDAE**						
39	Eutheia formicetorum	RDB1	32		0	0	0
40	Eutheia linearis	RDB1	32		0	0	0
41	Euconnus pragensis	RDB1	32		0	0	0
42	Microscydmus minimus	RDB3	24		0	0	0
43	Microscydmus nanus	RIEC2					0
44	Neuraphes plicicollis	Nb	8		0		
45	Stenichnus bicolor	Local	4		0	0	0
46	Stenichnus godarti	RDB3	24		0	0	0
47	Scydmaenus rufus	RDB2	24		0	0	0
48	**STAPHYLINIDAE: Omaliinae**						
49	Phyllodrepoidea crenata	Nb	8		0		
50	Coryphium angusticolle	Local	2		0		
51	Acrulia inflata	Local	2		0		
52	Dropephylla devillei	Local	2		0		
53	*Dropephylla heerii*	Nb	8		0		
54	Dropephylla ioptera	Common	1		0		
55	Dropephylla koltzei/ vilis	Common	1		0		
56	Hapalaraea pygmaea	Local	2		0		
57	Phloeonomus punctipennis	Local	2		0		
58	*Phloeonomus pusillus*	Local	2		0		
59	*Phloeostiba lapponica*	Local	2		0		
60	Phloeostiba plana	Local	2		0		
61	Phyllodrepa nigra	RDBi	24		0	0	0
62	Xylodromus testaceus	RDB1	32		0		
63	Xylostiba monilicornis	Nb	8		0		
64	**STAPHYLINIDAE: Proteininae**						
65	Megarthrus hemipterus	Na	16		0		
66	**STAPHYLINIDAE: Pselaphinae**						
67	Batrisodes adnexus	RDB1	32		0	0	0
68	Batrisodes delaporti	RDB1	32		0	0	0
69	Batrisodes venustus	Na	8		0	0	0
70	Euplectus bescidicus	RDBK	16		0		
71	Euplectus bonvouloiri	Nb	8		0		
72	Euplectus brunneus	RDB1	32		0	0	

73	Euplectus infirmus	Local	2		0		
74	Euplectus karstenii	Local	2		0		
75	Euplectus kirbii	Nb	8		0		
76	Euplectus mutator	Nb	8		0		
77	Euplectus nanus	RDBi	24		0	0	0
78	Euplectus piceus	Common	2		0		
79	Euplectus punctatus	RDB3	24		0	0	0
80	Plectophloeus nitidus	RDB2	32		0	0	0
81	Bibloporus bicolor	Local	2		0		
82	Bibloporus minutus	Nb	8		0	0	0
83	Trichonyx sulcicollis	RDB2	32		0	0	
84	**STAPHYLINIDAE: Phloeocharinae**						
85	Phloeocharis subtilissima	Local	2		0		
86	**STAPHYLINIDAE: Tachyporinae**						
87	Sepedophilus bipunctatus	Nb	8		0		
88	Sepedophilus littoreus	Local	2		0		
89	Sepedophilus lusitanicus	Local	2		0		
90	Sepedophilus testaceus	Nb	8		0		
91	Tachinus bipustulatus	RDB1	32		0		
92	**STAPHYLINIDAE: Aleocharinae**						
93	Alaobia subglabra	Local	2		0		
94	Atheta autumnalis	RDBK	16		0		
95	*Atheta boletophila*	RDBK	16		0		
96	Atheta liturata	Local	2		0		
97	*Cadaverota hansseni*	RDBK	16		0		
98	Dadobia immersa	Local	2		0		
99	Dinaraea aequata	Common	1		0		
100	Dinaraea linearis	Local	2		0		
101	*Paranopleta inhabilis*	RDBK	16		0		
102	Thamiaraea cinnamomea	Local	2		0		
103	Thamiaraea hospita	Nb	8		0		
104	Bolitochara lucida	Local	2		0		
105	Bolitochara mulsanti	Nb	8		0		
106	Bolitochara pulchra	Nb	8		0		
107	~~Bolitochara reyi~~	~~RDBi~~	~~24~~		~~0~~		
108	Euryusa optabilis	RDBi	24		0	0	0
109	Euryusa sinuata	RDBi	24		0	0	0
110	Leptusa fumida	Common	1		0		
111	Leptusa norvegica	Nb	8		0		
112	Leptusa pulchella	Local	2		0		
113	Leptusa ruficollis	Common	1		0		
114	Tachyusida gracilis	RDB1	32		0	0	0
115	Agaricochara latissima	Local	2		0		
116	Gyrophaena bihamata	Local	2		0		

117	Gyrophaena congrua	Nb	8		0		
118	Gyrophaena joyi	Nb	8		0		
119	Gyrophaena lucidula	Nb	8		0		
120	Gyrophaena manca	Nb	8		0		
121	Gyrophaena minima	Local	2		0		
122	Gyrophaena munsteri	RDBK	16		0		
123	Gyrophaena poweri	RDBK	16		0		
124	Gyrophaena pseudonana	RDBi	24		0		
125	Gyrophaena pulchella	RDBK	16		0		
126	Gyrophaena strictula	Nb	8		0		
127	Anomognathus cuspidatus	Common	2		0		
128	Cyphea curtula	Uncertain	4		0		
129	Homalota plana	Local	2		0		
130	Silusa rubiginosa	Nb	8		0		
131	Amarochara bonnairei	RDBi	24		0		
132	Dexiogyia corticina	Nb	8		0		
133	Haploglossa gentilis	Local	2		0		
134	Haploglossa marginalis	Nb	8		0		
135	Ischnoglossa obscura	Uncertain	16		0		
136	Ischnoglossa prolixa	Local	2		0		
137	Ischnoglossa turcica	Local	2		0		
138	Phloeopora concolor	RDBi	24		0		
139	Phloeopora corticalis	Nb	8		0		
140	Phloeopora scribae	Local	2		0		
141	Phloeopora testacea	Common	1		0		
142	Stichoglossa semirufa	RDBi	24		0		
143	*Placusa depressa*	Nb	8		0		
144	Placusa pumilio	Local	2		0		
145	Placusa tachyporoides	Nb	8		0		
146	**STAPHYLINIDAE: Scaphidiinae**						
147	Scaphidium quadrimaculatum	Local	2		0		
148	Scaphisoma agaricinum	Local	2		0		
149	Scaphisoma assimile	RDBi	24		0		
150	Scaphisoma boleti	Nb	8		0		
151	**STAPHYLINIDAE: Piestinae**						
152	Siagonium quadricorne	Local	2		0		
153	**STAPHYLINIDAE: Staphylininae**						

3							
154	Atrecus affinis	Common	1		0		
155	Bisnius subuliformis	Local	2		0		
156	Gabrius splendidulus	Common	1		0		
157	Quedius aetolicus	Na	16		0	0	0
158	Quedius brevicornis	Nb	8		0		
159	Quedius maurus	Local	4		0	0	0
160	Quedius microps	Nb	8		0	0	0
161	Quedius plagiatus	Local	2		0		
162	Quedius scitus	Nb	8		0	0	0
163	Quedius truncicola	Nb	8		0	0	0
164	Quedius xanthopus	Nb	4		0	0	0
165	Velleius dilatatus	RDB1	32		0	0	0
166	Hypnogyra angularis	Na	16		0	0	0
167	Nudobius lentus	Local	2		0		
168	**LUCANIDAE**						
169	Sinodendron cylindricum	Common	2		0	0	
170	Lucanus cervus	Nb	8		0		
171	Dorcus parallelipipedus	Local	2		0		
172	**SCARABAEIDAE**						
173	Gnorimus nobilis	RDB2	32		0		0
174	Gnorimus variabilis	RDB1	32		0	0	0
175	Trichius fasciatus	Local	2		0		
176	**SCIRTIDAE**						
177	Prionocyphon serricornis	Nb	8		0	0	0
178	**BUPRESTIDAE**						
179	Anthaxia nitidula	RDB1	32		0		
180	Melanophila acuminata	Local	2		0		
181	Agrilus angustulus	Nb	8		0		
182	Agrilus biguttatus	Na	8	1	8	2	
183	Agrilus laticornis	Nb	8	1	8		
184	Agrilus sinuatus	Na	4		0		
185	Agrilus viridis	Na	24		0		
186	**EUCNEMIDAE**						
187	Melasis buprestoides	Nb	4		0	0	0
188	Hylis cariniceps	RDB1	32		0		
189	Hylis olexai	RDB3	24		0		

190	Epiphanis cornutus	Local	8		0		
191	Microrhagus pygmaeus	RDB3	8		0	0	0
192	Eucnemis capucina	RDB1	32		0	0	0
193	**THROSCIDAE**						
194	Aulonothroscus brevicollis	RDB3	24		0	0	0
195	**ELATERIDAE**						
196	Lacon querceus	RDB1	32		0	0	0
197	Calambus bipustulatus	Nb	8	1	8	1	1
198	Limoniscus violaceus	RDB1	32		0	0	0
199	Denticollis linearis	Common	1		0		
200	Diacanthous undulatus	Nb	8		0		
201	Stenagostus rhombeus	Local	4	1	4	1	1
202	Ampedus balteatus	Local	2		0		
203	Ampedus cardinalis	RDB2	32		0	0	0
204	Ampedus cinnabarinus	RDB3	16		0	0	0
205	Ampedus elongantulus	Na	8	1	8	1	1
206	Ampedus nigerrimus	RDB1	32		0	0	0
207	*Ampedus nigrinus*	Nb	8		0		
208	Ampedus pomorum	Nb	8		0	0	0
209	Ampedus quercicola	Nb	8		0	0	0
210	Ampedus rufipennis	RDB2	24		0	0	0
211	*Ampedus sanguineus*	RDB Extinct	32		0		
212	Ampedus sanguinolentus	Na	16		0		
213	*Ampedus tristis*	RDB2	32		0		
214	Brachygonus ruficeps	RDB1	32		0	0	0
215	Ischnodes sanguinicollis	Na	16		0	0	0
216	Megapenthes lugens	RDB1	32		0	0	0
217	Procraerus tibialis	RDB3	16		0	0	0
218	Elater ferrugineus	RDB1	32		0	0	0
219	Melanotus castanipes/ villosus	Common	1	1	1		
220	Cardiophorus gramineus	RDB Extinct	32		0		
221	Cardiophorus ruficollis	RDB Extinct	32		0		
222	**LYCIDAE**						
223	*Dictyoptera aurora*	Nb	16		0		
224	Pyropterus nigroruber	Na	16		0	0	0
225	Platycis cosnardi	RDBi	24		0	0	0
22	Platycis minutus	Nb	8		0	0	0

226							
227	**CANTHARIDAE**						
228	Malthinus balteatus	Nb	8		0		
229	Malthinus flaveolus	Common	1		0		
230	Malthinus frontalis	Nb	8		0		
231	Malthinus seriepunctatus	Local	2		0		
232	Malthodes crassicornis	RDB3	24		0	0	0
233	Malthodes dispar	Local	2		0		
234	Malthodes fibulatus	Nb	8		0		
235	Malthodes flavoguttatus	Local	2		0		
236	Malthodes fuscus	Local	2		0		
237	Malthodes guttifer	Nb	8		0		
238	Malthodes marginatus	Common	1	1	1		
239	Malthodes maurus	Nb	16		0		
240	Malthodes minimus	Common	1		0		
241	Malthodes mysticus	Local	2		0		
242	Malthodes pumilus	Local	2		0		
243	**DERMESTIDAE**						
244	Globicornis nigripes	RDB1	32		0	0	0
245	Megatoma undata	Nb	8		0		
246	Ctesias serra	Nb	4		0	0	
247	Trinodes hirtus	RDB3	24		0	0	0
248	**BOSTRICHIDAE**						
249	Bostrichus capucinus	RDB Extinct	32		0		
250	Lyctus brunneus	Local	4		0	0	0
251	Lyctus linearis	Nb	8		0		
252	**ANOBIIDAE**						
253	Hedobia imperialis	Nb	8	1	8		
254	Ptinus lichenum	RDB3	24		0		
255	Ptinus palliatus	Na	16		0	0	
256	Ptinus subpilosus	Nb	8		0	0	0
257	Grynobius planus	Local	2		0		
258	*Dryophilus pusillus*	Local	2		0		
259	Ochina ptinoides	Local	2		0		
260	Xestobium rufovillosum	Common	4	1	4	1	1
261	*Ernobius mollis*	Local	2		0		
262	*Ernobius nigrinus*	Local	2		0		

263	Gastrallus immarginatus	RDB1	32		0	0	0
264	Anobium fulvicorne	Common	1	1	1		
265	Anobium inexspectatum	Nb	8		0		
266	Anobium nitidum	RDBi	24		0		
267	Anobium punctatum	Common	1	1	1		
268	Hadrobregmus denticollis	Nb	8		0		
269	Ptilinus pectinicornis	Common	1	1	1		
270	Xyletinus longitarsis	RDB2	32		0	0	
271	Dorcatoma ambjoerni	RDBK	16		0		0
272	Dorcatoma chrysomelina	Local	4		0	0	0
273	Dorcatoma dresdensis	Na	16		0	0	0
274	Dorcatoma flavicornis	Nb	8		0	0	0
275	Dorcatoma substriata	Na	16		0	0	0
276	Anitys rubens	Nb	8		0	0	0
277	**LYMEXYLIDAE**						
278	Hylecoetus dermestoides	Nb	4		0	0	0
279	Lymexylon navale	RDB2	32	1	32	3	2
280	**PHLOIOPHILIDAE**						
281	Phloiophilus edwardsi	Nb	8		0	0	0
282	**TROGOSSITIDAE**						
283	*Ostoma ferrugineum*	RDB1	32		0		
284	Thymalus limbatus	Nb	8		0	0	0
285	Nemozoma elongatum	RDB3	24		0		
286	**CLERIDAE**						
287	Tillus elongatus	Nb	8		0	0	0
288	Tilloidea unifasciata	RDB Extinct	32		0		
289	Opilo mollis	Nb	8		0	0	0
290	*Thanasimus femoralis*	RDB3	24		0		
291	Thanasimus formicarius	Local	4		0	0	0
292	Tarsostenus univittatus	RDB Extinct	32		0		
293	Korynetes caeruleus	Nb	8	1	8	1	1
294	**DASYTIDAE**						
295	Aplocnemus impressus	Nb	8		0	0	0
296	Aplocnemus nigricornis	Na	16		0	0	0
297	Dasytes aeratus	Local	2		0		
298	Dasytes niger	Na	16	1	16		
299	Dasytes plumbeus	Nb	8		0		

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300	**MALACHIIDAE**						
301	Hypebaeus flavipes	RDB1	32		0	0	0
302	Axinotarsus ruficollis	Local	4		0		
303	Malachius bipustulatus	Common	1	1	1		
304	Sphinginus lobatus	RDBK	16		0		
305	Anthocomus fasciatus	Local	4		0		
306	**SPHINDIDAE**						
307	Sphindus dubius	Nb	8		0		
308	Aspidiphorus orbiculatus	Local	2		0		
309	**NITIDULIDAE**						
310	Carpophilus sexpustulatus	Local	8		0	0	0
311	Epuraea angustula	Nb	8		0	0	0
312	Epuraea biguttata	Local	2		0		
313	Epuraea distincta	Na	8		0		
314	Epuraea fuscicollis	Nb	8		0		
315	Epuraea guttata	Nb	8		0		
316	Epuraea limbata	Local	2		0		
317	Epuraea longula	Nb	8		0		
318	Epuraea marseuli	Common	1		0		
319	Epuraea neglecta	RDBi	24		0		
320	Epuraea pallescens	Local	2		0		
321	Epuraea rufomarginata	Local	2		0		
322	Epuraea silacea	Common	1		0		
323	Epuraea terminalis	Nb	8		0		
324	*Epuraea thoracica*	Nb	8		0		
325	Epuraea variegata	RDBK	16		0		
326	Soronia grisea	Local	2		0		
327	Soronia punctatissima	Local	2		0		
328	Cryptarcha strigata	Nb	8		0		
329	Cryptarcha undata	Nb	8		0		
330	Glischrochilus quadriguttatus	Local	2		0		
331	Glischrochilus quadripunctatus	Local	2		0		
332	*Pityophagus ferrugineus*	Local	2		0		
333	**MONOTOMIDAE**						
334	Rhizophagus bipustulatus	Common	1		0		
335	Rhizophagus cribratus	Local	2		0		

336	*Rhizophagus depressus*	Local	2		0		
337	Rhizophagus dispar	Common	1		0		
338	Rhizophagus fenestralis	RDB3	24		0		
339	Rhizophagus ferrugineus	Local	2		0		
340	Rhizophagus nitidulus	Nb	4		0	0	0
341	Rhizophagus oblongicollis	RDB1	24		0	0	0
342	Rhizophagus parallelocollis	Local	2		0		
343	Rhizophagus perforatus	Local	2		0		
344	Rhizophagus picipes	Na	16		0		
345	Cyanostolus aeneus	Na	16		0		
346	**SILVANIDAE**						
347	Uleiota planata	Na	16		0	0	0
348	Dendrophagus crenatus	Nb	8		0		
349	Silvanus bidentatus	Nb	8		0	0	0
350	Silvanus unidentatus	Local	4		0	0	0
351	Silvanoprus fagi	RDB1	32		0		
352	**CUCUJIDAE**						
353	Pediacus depressus	Na	16		0	0	0
354	Pediacus dermestoides	Local	4	1	4	1	1
355	**LAEMOPHLOEIDAE**						
356	Laemophloeus monilis	RDB1	32		0	0	
357	Cryptolestes duplicatus	Local	2		0		
358	Cryptolestes ferrugineus	Common	2		0		
359	Notolaemus unifasciatus	Na	16		0	0	0
360	**CRYPTOPHAGIDAE**						
361	Henoticus serratus	Local	2		0		
362	Cryptophagus confusus	RDBK	16		0		
363	Cryptophagus corticinus	RDBi	24		0		
364	Cryptophagus dentatus	Common	1		0		
365	Cryptophagus falcozi	RDBi	24		0		
366	Cryptophagus insulicola	Local	8		0		
367	Cryptophagus intermedius	RDBK	16		0		
368	Cryptophagus labilis	N	8		0		
369	Cryptophagus micaceus	RDBK	16		0	0	0
370	*Cryptophagus parallelus*	N	8		0		
371	Cryptophagus ruficornis	N	8		0		
372	*Micrambe bimaculata*	RDBK	16		0		

2							
373	Caenoscelis sibirica	Uncertain	4		0		
374	*Atomaria badia*	RDBi	24		0		
375	*Atomaria lohsei*	RDBK	16		0	0	
376	Atomaria longicornis	RDBK	16		0		
377	Atomaria puncticollis	RDBK	16		0		
378	Atomaria vespertina	Local	2		0		
379	Atomaria morio	RDBK	16		0		
380	**EROTYLIDAE**						
381	Dacne bipustulata	Local	2		0		
382	Dacne rufifrons	Local	2		0		
383	Triplax aenea	Local	2		0	0	
384	Triplax lacordairii	RDB3	24		0	0	0
385	Triplax russica	Local	4		0	0	0
386	Triplax scutellaris	RDB3	32		0	0	0
387	Tritoma bipustulata	Na	16		0	0	0
388	**BIPHYLLIDAE**						
389	Biphyllus lunatus	Local	4		0	0	0
390	Diplocoelus fagi	Nb	8		0	0	0
391	**BOTHRIDERIDAE**						
392	Teredus cylindricus	RDB1	32		0	0	0
393	Oxylaemus cylindricus	RDB Extinct	32		0	0	
394	Oxylaemus variolosus	RDB3	24		0	0	0
395	**CERYLONIDAE**						
396	Cerylon fagi	Nb	8		0	0	0
397	Cerylon ferrugineum	Local	2		0		
398	Cerylon histeroides	Local	4	1	4		
399	**ENDOMYCHIDAE**						
400	Endomychus coccineus	Local	2		0		
401	Symbiotes latus	Nb	8		0	0	0
402	Mycetaea subterranea	Local	2		0		
403	**CORYLOPHIDAE**						
404	Orthoperus aequalis	~~RDBK~~	16		0		
405	Orthoperus corticalis	Local	4		0		
406	**LATRIDIIDAE**						
407	Stephostethus alternans	Uncertain	4		0		
408	Cartodere constricta	Local	4		0		

409	Latridius consimilis	Nb	8		0	0	0
410	Enicmus brevicornis	Nb	8		0	0	0
411	Enicmus fungicola	Nb	8		0		
412	Enicmus rugosus	Nb	8		0	0	0
413	Enicmus testaceus	Local	2		0		
414	Dienerella clathrata	H&R2				0	
415	Corticaria alleni	Nb	8		0	0	0
416	Corticaria fagi	RDBi	24		0	0	
417	Corticaria longicollis	RDBK	16		0	0	
418	Corticaria polypori	Uncertain	16		0		
419	Corticaria rubripes	Nb	8		0		
420	**MYCETOPHAGIDAE**						
421	Pseudotriphyllus suturalis	Local	4		0	0	0
422	Triphyllus bicolor	Local	4		0	0	0
423	Litargus connexus	Local	2	1	2		
424	Mycetophagus atomarius	Local	2		0	0	0
425	Mycetophagus fulvicollis	RDB Extinct	32		0		
426	Mycetophagus multipunctatus	Local	2		0		
427	Mycetophagus piceus	Nb	4		0	0	0
428	Mycetophagus populi	Na	16		0		0
429	Mycetophagus quadriguttatus	Na	16		0		0
430	Mycetophagus quadripustulatus	Local	2		0		
431	**CIIDAE**						
432	Octotemnus glabriculus	Common	1		0		
433	Ropalodontus perforatus	RDB3	24		0		
434	Sulcacis affinis	Local	2		0		
435	Strigocis bicornis	Nb	8		0		
436	Orthocis alni	Local	2		0		
437	Orthocis coluber	RDB3	24		0	0	0
438	Cis bidentatus	Local	2		0		
439	Cis boleti	Common	1		0		
440	Cis dentatus	RDB3	24		0		
441	Cis fagi	Local	2		0		
442	Cis festivus	Nb	2		0		
443	Cis hispidus	Local	4		0		
444	Cis jacquemartii	Nb	8		0		
44	Cis lineatocribratus	Nb	8		0		

445							
446	Cis micans	Local	4		0		
447	Cis nitidus	Local	2		0		
448	*Cis punctulatus*	Local	4		0		
449	Cis pygmaeus	Local	2		0		
450	Cis vestitus	Local	2		0		
451	Cis villosulus	Local	2		0		
452	Ennearthron cornutum	Local	2		0		
453	**TETRATOMIDAE**						
454	Hallomenus binotatus	Nb	8		0	0	0
455	Tetratoma ancora	Nb	8		0	0	0
456	Tetratoma desmarestii	Na	16		0	0	0
457	Tetratoma fungorum	Local	2		0	0	
458	**MELANDRYIDAE**						
459	Orchesia micans	Nb	4		0		
460	Orchesia minor	Nb	8		0		
461	Orchesia undulata	Local	4		0	0	0
462	Anisoxya fuscula	Na	16		0	0	0
463	Abdera affinis	RDB1	32		0		
464	Abdera biflexuosa	Nb	8		0	0	0
465	Abdera flexuosa	Nb	8	1	8		
466	Abdera quadrifasciata	Na	16		0	0	0
467	*Abdera triguttata*	Na	16		0		
468	Phloiotrya vaudoueri	Nb	8		0	0	0
469	*Xylita laevigata*	Na	16		0		
470	Hypulus quercinus	RDB2	16		0	0	0
471	*Zilora ferruginea*	Nb	8		0		
472	Melandrya barbata	RDB1	32		0	0	0
473	Melandrya caraboides	Nb	4		0	0	0
474	Conopalpus testaceus	Nb	8		0	0	0
475	Osphya bipunctata	RDB3	16		0		
476	**MORDELLIDAE**						
477	Tomoxia bucephala	Na	16		0	0	0
478	Mordella holomelaena	RDBK				0	
479	Mordella leucaspis	RDBK				0	
480	Variimorda villosa	Nb				0	
481	Mordellistena neuwaldeggiana	RDBK	16		0		0

482	Mordellistena variegata	Local	8		0		
483	Mordellochroa abdominalis	Local	4	1	4		
484	**COLYDIIDAE**						
485	Synchita humeralis	Nb	8		0	0	0
486	Synchita separanda	RDB3	24		0	0	0
487	Cicones variegatus	Na	8		0	0	0
488	Bitoma crenata	Local	4	1	4	1	1
489	Endophloeus markovichianus	RDB1	32		0		
490	Colydium elongatum	RDB3	16		0	0	
491	Aulonium trisulcus	Na	16		0		
492	**TENEBRIONIDAE**						
493	Bolitophagus reticulatus	RDB3	16		0		
494	Eledona agricola	Nb	4		0	0	0
495	Helops caeruleus	Nb	8		0		
496	Corticeus bicolor	Local	8		0		
497	Corticeus unicolor	RDB3	24	1	24	2	2
498	Pentaphyllus testaceus	Uncertain	4		0		
499	Platydema violaceum	RDB1	32		0		
500	Diaperis boleti	RDB2	24		0		
501	Prionychus ater	Nb	8		0	0	0
502	Prionychus melanarius	RDB2	32		0	0	0
503	Gonodera luperus	Local	2		0		
504	Pseudocistela ceramboides	Nb	8		0	0	0
505	Mycetochara humeralis	Na	16		0	0	0
506	**OEDEMERIDAE**						
507	*Chrysanthia nigricornis*	RDB1	32		0		
508	Ischnomera caerulea	RDB3	24		0	0	0
509	Ischnomera cinerascens	RDB2	32		0	0	0
510	Ischnomera cyanea	Nb	4		0	0	0
511	Ischnomera sanguinicollis	Nb	8		0	0	0
512	Oedemera femoralis	Nb	8		0		
513	Oedemera virescens	RDB2	24		0		
514	**PYTHIDAE**						
515	*Pytho depressus*	Na	16		0		
516	**PYROCHROIDAE**						
517	Pyrochroa coccinea	Nb	4		0	0	0
51	Pyrochroa serraticornis	Commo	1	1	1		

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519	Schizotus pectinicornis	Na	16		0		
520	**SALPINGIDAE**						
521	Lissodema cursor	Na	16		0		
522	Lissodema denticolle	Nb	8		0		
523	Rabocerus foveolatus	Na	16		0		
524	Rabocerus gabrieli	Nb	8		0		
525	Sphaeriestes ater	Local	2		0		
526	*Sphaeriestes castaneus*	Local	2		0		
527	Sphaeriestes reyi	Local	2		0		
528	Vincenzellus ruficollis	Local	2		0		
529	Salpingus planirostris	Common	1	1	1		
530	Salpingus ruficollis	Common	1		0		
531	**ADERIDAE**						
532	Aderus populneus	Nb	8		0		
533	Euglenes oculatus	Nb	8		0	0	0
534	Vanonus brevicornis	RDB2	32		0	0	0
535	**SCRAPTIIDAE**						
536	Scraptia dubia	RDB Extinct	32		0	0	
537	Scraptia fuscula	RDB1	32		0	0	0
538	Scraptia testacea	RDB3	16		0	0	0
539	*Anaspis bohemica*	RDBK	16		0		
540	Anaspis costai	Common	2		0		
541	Anaspis fasciata	Common	2	1	2		
542	Anaspis frontalis	Common	1		0		
543	Anaspis lurida	Local	2		0		
544	~~Anaspis melanostoma~~	~~RDBK~~	~~16~~	-	~~0~~	-	-
545	Anaspis pulicaria	Common	1		0		
546	Anaspis rufilabris	Common	1		0		
547	~~Anaspis septentrionalis (= schilskyana)~~	~~RDBi~~	~~24~~	-	~~0~~	-	~~0~~
548	Anaspis thoracica	Na	8		0		
549	**CERAMBYCIDAE**						
550	Prionus coriarius	Na	16		0	0	0
551	Rhagium bifasciatum	Common	1		0		
552	*Rhagium inquisitor*	Nb	8		0		
553	Rhagium mordax	Common	1		0		
554	Stenocorus meridianus	Local	2	1	2		

555	Dinoptera collaris	RDB1	32		0			
556	Grammoptera abdominalis	Na	24		0	0	0	
557	Grammoptera ruficornis	Common	1	1	1			
558	Grammoptera ustulata	RDB3	24		0	0	0	
559	Pedostrangalia revestita	RDB1	32		0	0	0	
560	*Lepturobosca virens*	RDB Extinct	32		0			
561	Leptura aurulenta	Na	16	1	16	1	1	23/07/2016
562	Leptura quadrifasciata	Local	2	1	2	1	1	23/07/2016
563	*Anastrangalia sanguinolenta*	RDB3	24		0			
564	Stictoleptura scutellata	Na	16		0	0	0	
565	Paracorymbia fulva	RDB3	24		0			
566	Anoplodera sexguttata	RDB3	24		0		0	
567	*Judolia sexmaculata*	Na	24		0			
568	Pachytodes cerambyciformis	Local	2		0			
569	Alosterna tabacicolor	Local	2		0			
570	Rutpela maculata	Common	1		0			
571	Stenurella melanura	Local	2		0			
572	Stenurella nigra	Na	24		0			
573	*Asemum striatum*	Local	2		0			
574	*Arhopalus rusticus*	Local	2		0			
575	Obrium cantharinum	RDB Extinct	32		0			
576	Glaphyra umbellatarum	Na	16		0			
577	Aromia moschata	Nb	8		0			
578	Pyrrhidium sanguineum	RDB2	24	1	24	3	3	
579	Phymatodes testaceus	Local	4		0	0	0	
580	Poecilium alni	Nb	16		0			
581	Clytus arietis	Common	1	1	1			
582	Plagionotus arcuatus	RDB Extinct	32		0			
583	Anaglyptus mysticus	Nb	4		0			
584	Mesosa nebulosa	RDB3	24		0	0	0	
585	Lamia textor	RDB1	32		0			
586	*Pogonocherus fasciculatus*	Nb	16		0			
587	Pogonocherus hispidulus	Local	2		0			
588	Pogonocherus hispidus	Local	2		0			
589	*Acanthocinus aedilis*	Nb	8		0			
590	Leiopus linnei/ nebulosus	Local	2	1	2			
59	Saperda carcharias	Na	16		0			

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592	Saperda scalaris	Na	8		0	0	0
593	Stenostola dubia	Nb	8		0		
594	Tetrops praeustus	Local	2	1	2		
595	Tetrops starkii	RDBK	16		0		
596	**CHRYSOMELIDAE**						
597	Cryptocephalus querceti	RDB2				0	
598	**ANTHRIBIDAE**						
599	Platyrhinus resinosus	Nb	4		0	0	0
600	Platystomos albinus	Nb	8	1	8	1	1
601	Enedreytes sepicola	RDB2	32		0	0	0
602	Dissoleucas niveirostris	RDB2	32		0	0	0
603	Choragus sheppardi	Na	16		0		
604	**DRYOPHTHORIDAE**						
605	Dryophthorus corticalis	RDB1	32		0	0	0
606	**CURCULIONIDAE**						
607	Cossonus linearis	Na	16		0		
608	Cossonus parallelepipedus	Nb	8		0	0	0
609	Rhopalomesites tardyi	Nb	8		0	0	0
610	Pseudophloeophagus aeneopiceus	Local	2		0		
611	Stereocorynes truncorum	Na	16		0	0	0
612	Pentarthrum huttoni	Local				0	
613	*Rhyncolus ater*	Local	8		0		
614	~~Phloeophagus gracilis~~	~~RDB Extinct~~	~~32~~	-	~~0~~	-	- -
615	Phloeophagus lignarius	Local	2		0		
616	Acalles misellus	Local	2		0		
617	Kyklioacalles roboris	Nb	8		0		
618	Magdalis armigera	Local	2		0		
619	Magdalis barbicornis	Na	8		0		
620	Magdalis carbonaria	Nb	4		0		
621	Magdalis cerasi	Nb	4		0		
622	*Magdalis duplicata*	Na	16		0		
623	*Magdalis phlegmatica*	Na	8		0		
624	Magdalis ruficornis	Local	2	1	2		
625	*Hylobius abietis*	Common	1		0		
626	*Pissodes castaneus*	Local	2		0		
627	*Pissodes pini*	Common	2		0		

Trachodes hispidus	Nb	8		0	0	0
CURCULIONIDAE: Scolytinae						
Scolytus intricatus	Local	2		0		
Scolytus mali	Nb	8		0		
Scolytus multistriatus	Common	1		0		
Scolytus ratzeburgi	Nb	8		0		
Scolytus rugulosus	Local	2		0		
Scolytus scolytus	Common	2		0		
Pityophthorus lichtensteinii	RDB3	24		0		
Pityophthorus pubescens	Local	2		0		
Ernoporicus caucasicus	RDB1	16		0	0	0
Ernoporicus fagi	Na	8		0	0	0
Ernoporus tiliae	RDB1	32		0		0
Trypophloeus binodulus	Na	16		0		
~~Trypophloeus granulatus~~	~~RDB Extinct~~	~~32~~	-	~~0~~	-	- -
Dryocoetes alni	Na	16		0		
Dryocoetes autographus	Local	2		0		
Dryocoetes villosus	Local	2		0		
Lymantor coryli	RDB1	32		0		
Taphrorychus bicolor	Na	8		0		
Ips acuminatus	Local	2		0		
Orthotomicus suturalis	Local	2		0		
Pityogenes bidentatus	Local	2		0		
Pityogenes quadridens	Na	16		0		
Pityogenes trepanatus	Na	8		0		
Xyleborinus saxesenii	Local	4		0	0	0
Xyleborus dispar	Nb	8		0	0	0
Xyleborus dryographus	Nb	8		0	0	0
Trypodendron domesticum	Local	2		0	0	0
Trypodendron lineatum	Local	2		0	0	
Trypodendron signatum	Nb	8		0	0	0
Hylesinus crenatus	Local	2		0		
Hylesinus orni	Nb	8		0		
Hylesinus toranio	Local	2		0		
Hylesinus varius	Common	1		0		
Kissophagus hederae	Nb	8		0		
Pteleobius vittatus	Local	2		0		

4							
665	*Hylastes ater*	Common	1		0		
666	*Hylastes brunneus*	Local	2		0		
667	Hylastes opacus	Local	2		0		
668	*Hylurgops palliatus*	Common	1		0		
669	*Tomicus minor*	RDB3	24		0		
670	*Tomicus piniperda*	Common	1		0		
671	**PLATYPODIDAE**						
672	Platypus cylindrus	Nb	8		0	0	0

673

674 **Numbers of species**

675	Number of broad-leaved SQI-scoring spp:	36
676	Number of coniferous SQI-scoring spp:	0
677	Number of SQI-scoring spp:	36
678	Number of IEC (1994) spp:	14
679	Number of IEC (2004) spp:	13
680	Number of SQI &/or IEC (94/04) spp:	36

- Qualifying threshold is 40 species.

- Qualifying threshold is 40 species.

681

682 **Species Quality Scores**

683	Broad-leaved SQI-scoring spp:	224
684	Coniferous SQI-scoring spp:	0
685	All SQI-scoring spp:	224

686

687 **Species Quality Indices**

688	Broad-leaved SQI:	622.2
689	Coniferous SQI:	0
690	Broad-leaved and Coniferous SQI:	622.2

691 See http://thasos.users.btopenworld.com/sqi.htm to compare to other sites.

692

693 **Index of Ecological Continuity (1994)**

694	Number of Grade 1 species	2
695	Number of Grade 2 species	2
696	Number of Grade 3 species	10
697	Index of Ecological Continuity (1994)	20

698

699 **Index of Ecological Continuity (2004)**

700	Number of Grade 1 species	1

701	Number of Grade 2 species	2
702	Number of Grade 3 species	10
703	Index of Ecological Continuity (2004)	17
704	An IEC (2004) >15 indicates Regional Importance.	
705	An IEC (2004) >25 indicates National Importance.	
706	An IEC (2004) >80 indicates International Importance.	