Natural England Commissioned Report NECR066

The status of the hazel pot beetle at Sherwood Forest National Nature Reserve

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Foreword

Natural England commission a range of reports from external contractors to provide evidence and advice to assist us in delivering our duties. This work was supported by the SITA Trust's *Enriching Nature* and the Sherwood Forest Trust. The views in this report are those of the authors and do not necessarily represent those of Natural England.

Background

The hazel pot beetle *Cryptocephalus coryli* is a UK BAP Priority Species and is classified as a Red Data Book category 1 species, being considered rare and endangered in the UK. Its rediscovery at Sherwood Forest National Nature Reserve (NNR) in 2008 after an absence of 70 years prompted Natural England to commission a programme of intensive survey work.

A healthy breeding population of the beetle was confirmed to be present in a sheltered and sunlit area of heath-grassland and scrub adjacent to stands of birch woodland.

The findings published in this report are being used to review the conservation management of the NNR to take into account the presence of this species and to prioritise action for its long-term conservation.

These project findings also contribute to a number of actions identified in the original UK BAP Species Action Plan for *Cryptocephalus coryli* and are being published so they can inform the conservation plans for other populations of this beetle.

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Further information
This report can be downloaded from the Natural England website: **www.naturalengland.org.uk**. For information on Natural England publications contact the Natural England Enquiry Service on 0845 600 3078 or e-mail **enquiries@naturalengland.org.uk**.

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1 Background

On 28 May 2008, a female Hazel Pot Beetle *Cryptocephalus coryli* (L.) (Col., Chrysomelidae) was discovered in grassland at Sherwood Forest National Nature Reserve (NNR) by Trevor and Dilys Pendleton after a recorded gap of 70 years, the last known record dating back to 12 June 1938. Whilst this record confirmed Sherwood Forest NNR as a significant locality for this species, it was perhaps not surprising as much of the habitat had remained largely suitable and there was a view that the species could have been overlooked over the years due to the recording focus on the over-mature decaying wood habitat which is so prominent on the NNR.

This record prompted more specific action to ascertain the status and distribution of the species on the NNR. Natural England secured funding from the SITA Trust's *Enriching Nature* fund to commission targeted survey work for this species during 2009 (Binding, 2009). This was supplemented by voluntary recording undertaken by Trevor and Dilys Pendleton. This report seeks to bring together and present the results of surveys from 2008-2010 to highlight the current status of the species at Sherwood Forest NNR.

Cryptocephalus coryli is included as a Priority Species in the UK Biodiversity Action Plan. (JNCC, 2010). This project contributes to a number of actions identified in the original UK BAP Species Action Plan for *Cryptocephalus coryli* (UK BAP Steering Group, 1995):

- Complete survey coverage of UK sites to determine the status of this species, thus delivering this specific UKBAP target.
- Maintain the beetle at extant sites and enhance its populations by 2010.
- Include the requirements of the species when preparing or revising prescriptions for agri-environment or woodland grant schemes.
- Advise landowners and managers of the presence of this species and the importance of beneficial management for its conservation.
- Promote opportunities for the appreciation of the species and the conservation issues associated with its habitat.

2 Ecology and conservation status of *Cryptocephalus coryli*

Ecology

Cryptocephalus coryli is a UK BAP Priority Species and classified as an RDB1 category species (Hayman & Parsons, 1992), being considered rare and endangered. Its inclusion in English Nature's Species Recovery Programme during the mid 1990s prompted a series of projects to review the knowledge of its ecology and habitat requirements (Hodge & Williams, 1997; Piper & Hodge 2002), and also consider the history and characteristics of the extant sites with a view to recommending appropriate and sympathetic management for the species to further its long-term conservation (Piper, 2002). During this time there was also much unpublished work undertaken by Annette and Allan Binding as part of the Species Recovery Programme to captively rear and re-introduce the species to a number of former sites.

At between 6-8mm long, *Cryptocephalus coryli* is known to be one of the largest *Crytocephalus* beetles in the UK. It is known to be a highly thermophilic (warmth-loving) species which requires areas of young scrub in sheltered and sunlit, south-facing pockets, often on calcareous grassland, lowland heathland or acid grassland and woodland rides. The preferred host-plant for both adults and larvae in northern England is considered to be the silver birch (*Betula pendula*), although as this study shows, the beetle can be associated with other species. Sites currently occupied by *Cryptocephalus coryli* are either mainly un-grazed or experience limited rabbit grazing, and as a result vegetation structure can be dynamic as successional processes are unchecked and rabbit numbers fluctuate. Grassy clearings with scrub such as birch and hazel is invariably a feature of these sites. It is also suggested a warm microclimate is critical to *Cryptocephalus coryli* as high daytime temperatures will be necessary for both mating and egg-laying.

Cryptocephalus beetles have a unique life history. The larva spends all of its life inside a 'pot' made from its own excreted dung. It begins when the female beetle lays an egg and then covers it in tiny overlapping pieces of dung. When the egg is completely covered she lets the egg fall to the ground. There the egg hatches and the larva begins to feed on the leaf litter. As it grows it enlarges the pot by splitting its pot lengthways and filling this opening with fresh dung. It then lengthens the pot by putting a 'collar' of fresh dung around the opening. When fed on fresh green birch leaves in captivity this enlarging of the pot can be clearly seen as a green collar and stripe down the middle of the pot (see Appendix 2). This darkens as it dries and the pot becomes a uniform dark brown. The larva retreats inside the pot when it feels threatened. The flat surface of its head perfectly fits the opening and seals the pot. This survival behaviour does not always work as predated pots found at the Whisby Nature Park introduction site in Lincolnshire had been opened at the wider end.

The larval stage can last for up to two years in the wild but is usually one year when bred in captivity. When the larva is fully grown it seals the open narrower end of the pot and turns around inside the pot so that it is facing the broader end of the pot. It becomes a chrysalis whilst still within the pot. In the spring the beetle hatches from the chrysalis inside the pot and then has to cut its way out of the domed end. It cuts a circular hole in the end of the pot forming a 'lid' which comes off, allowing the beetle to pull itself out of the pot. The newly hatched beetle then crawls up the nearest available stem

Adult beetles are mainly sedentary, the females being more so than the males. They require very hot temperatures before they fly. The males fly from tree to tree in search of females. Once mated the females begin egg laying and the whole life cycle begins again.

Females in captivity lay an average of 350 to 400 eggs but one female caught at Kirkby Moor Nature Reserve, Lincolnshire in 1999 laid 620 eggs. The beetles are fairly long lived, up to three months in

captivity. A female which was released at the Whisby Nature Park introduction site on 13 May 2000 was later recaptured on 30 June having survived in the wild for seven weeks.

Past and current status in the UK

This leaf beetle was once more widespread across the southern half of England. Hodge & Williams (1997) ascertained that *Cryptocephalus coryli* has been historically recorded from 10 British vice-counties, 9 of which are in England. This included 21 specific localities (Piper & Hodge, 2002). Many of these records are thought to represent single specimens and despite its widespread distribution, the beetle is considered to have always been generally rare, leading to its perceived decline being questioned as a result (Hodge & Williams, 1997).

Nevertheless, the current status of *Cryptocephalus coryli*, which between 1960 - 2008 had been recorded from just 4 localities in North Lincolnshire, Surrey and Oxfordshire, remains fragile. Its distribution across England has contracted significantly as a result. In supporting 3 of the 5 known UK colonies, the East Midlands Region currently forms an important national stronghold for this rare species in the UK. In 2009 Sherwood Forest NNR was the only British site with positive records for the species.

Past status in Nottinghamshire

There are historic Nottinghamshire records from Langford Moor near Newark in 1899 (Carr, 1916) and from Sherwood Forest in the early 1900s (Kidson-Taylor, 1904, 1906, 1909). There are a further four unreferenced records during May and June of 1938. In the early 20th Century, Sherwood Forest was considered by Victorian entomologists and collectors to be a stronghold for the species, with up to 13 beetles taken during a series of visits as reported by Kidson-Taylor (1904, 1906, 1909). Although the precise locality of these records is not always documented, the locality usually referred to as Sherwood Forest during this very active entomological period in the county was the ancient wood-pasture of Birklands, which today forms part of the Sherwood Forest NNR. There is a strong assumption therefore that these early 20th century records relate to the NNR.

Conservation significance of Sherwood Forest NNR

The Sherwood Forest NNR forms part of the Birklands and Bilhaugh Sites of Special Scientific Interest (SSSI), which form a continuous landscape of ancient pasture-woodland (in varying ecological condition) and dry lowland heathland totalling nearly 900 hectares. The woodland areas of the NNR form part of the Birklands and Bilhaugh European Special Area of Conservation (SAC) designated as a northern example of '*old acidophilous oak woodland on sandy plains*'.

The NNR consists of two contiguous component parts – the ancient pasture-woodland of Birklands Forest (253ha) and the lowland heathland of Budby South Forest (170 ha). The SSSI is specifically notified for a number of special interest features:

- Ancient oak-birch woodland with an exceptionally large population of ancient trees (NVC types W16a penduculate oak *Quercus robur* – silver birch *Betula pendula* – wavy hair-grass *Deschampsia flexuosa* woodland and W10 *Quercus robur* – bracken *Pteridium aquilinum* - bramble *Rubus fruticosus* woodland).
- Wood decay invertebrate assemblage (specifically those assemblages associated with heartwood decay, bark & sapwood decay and fungal fruiting bodies).
- Lowland dry heath (type H9 heather *Calluna vulgaris* – *Deschampsia flexuosa* heath).
- Grass-heath invertebrate assemblage (specifically those assemblages associated with early successional vegetation & grass-heath-scrub transitions).

With such an extensive and continuous resource of dead and decaying wood within the stands of ancient woodland, the associated assemblage of saproxylic invertebrates are particularly significant at the NNR, especially the assemblages associated with decaying heartwood, sapwood, bark and epiphytic fungal fruiting bodies. The list of saproxylic beetles for the site currently stands at 316 species, which compares very well with the list for Windsor Forest and Great Park as the premier British locality for this fauna, which is at least 365 species and includes many southern and south-eastern species which could not be expected to occur as far north as Sherwood. In contrast, Sherwood Forest is notable for species with a northern and western distribution in Britain, along with other species which are not known from Windsor. Sherwood Forest is considered to be an important northern equivalent of Windsor Forest (Alexander, in prep).

The wider Birklands and Bilhaugh SSSI complex of which the NNR forms part is recognised as being amongst the most important localities in Britain for its saproxylic invertebrate fauna. A large number of species present are almost entirely confined to ancient woodland sites with a long history and continuity of over-mature wooded habitat. Such sites can be evaluated using the Index of Ecological Continuity (IEC) (Harding & Alexander, 1994) and on this basis, the SSSI is ranked 7th in Britain (Fowles, 2009).
Similarly, evaluation of the quality of the saproxylic invertebrate assemblage using the Saproxylic Quality Index (SQI) reveals the SSSI is currently ranked 15th in Great Britain (Fowles, 2009), and depending on a bio-geographical judgement, is ranked either 5th in Central England or 1st in northern England.

However the grass-heath invertebrate assemblage of which *Cryptocephalus coryli* forms part is also nationally notable, with significant constituent groups being lepidoptera, arachnida and hymenoptera. This assemblage is associated with the permanently open areas of heathland and grassland and also the open sun-lit glades typical of the ancient woodland-pasture of Birklands. Combined, the assemblages of invertebrates found within the Sherwood Forest NNR, comprising a range of different groups, is exceptional.

Hazel Pot Beetle *Cryptocephalus coryli* survey results 2008-2010

A complete list of records of *Cryptocephalus coryli* from Sherwood Forest NNR between 2008-2010 is provided in Table A (see Appendix 1) and a more detailed commentary is provided below.

2008

Trevor and Dilys Pendleton recorded three females in 2008, the first on 28 May (in grass), one on 29 May (on hawthorn) and one which remained on the same birch tree between 4 and 7 June. This last female was observed and photographed egg laying. The fact that this latter female was egg laying indicated that there was at least one male beetle present in the colony as observations of the beetles' behaviour in captivity show that unmated females lay no covered eggs and only a few uncovered sterile ones, whereas mated females proceed to lay covered eggs within a few hours of mating taking place.

2009

Fourteen visits were made during the year by A E Binding and A Binding between May and July. Separate visits were made by T and D Pendleton during a similar period. Visits were made on days with the best dry and warm weather forecast although two visits saw short rain showers whilst the temperature remained warm. Much of the area where the beetles were found is open but quite sheltered by larger surrounding trees so this helps to keep the temperature high. On most of the visits survey effort was concentrated in the vicinity where the beetles where found in 2008 in order to try to identify a key tree or key area in line with the findings at other sites where *Cryptocephalus coryli* occurs.

The main method employed by all recorders during the survey was general observation, although the beetles can be difficult to see despite being brick red in colour and sitting on green leaves (see Appendix 2). Beating was only used as a last resort since previous experience has shown that a beetle beaten from the vegetation will spread its wings and take flight before it hits the beating tray. Any beetles which do fall to the ground tend to lay upside down and are extremely difficult to spot as they are black underneath and do not show up very well on either soil or in leaf litter. Grubbing in leaf litter under the trees and bushes where female *Cryptocephalus coryli* were observed in 2008 was also tried. Grubbing for larval pots can sometimes be successful but none were located using this method at Sherwood Forest.

Five females and one male were recorded by A E and A Binding between 12 May and 11 June. Sites where beetles were found were tagged. The first female was found on 12 May sitting on a birch leaf about 12 feet up on a mature tree in compartment C13 of the NNR. It was checked using binoculars and photographed. Also on 12 May, a second female was found on a small hawthorn bush In C15, the same bush where a beetle had been found in 2008. This area became known as the 'triangle'. On 18 May, a female was once again found on the small hawthorn at the triangle. It is not possible to say for certain whether this individual was the same one as on the 12 May or not as the beetles were not marked in any way.

On 21 May a female was located coming up in the grasses close by the path, again in the triangle area. Trevor and Dilys found two more females on a large hawthorn bush in the same area. The 24 May was very hot and sunny. It was hoped to find several *Cryptocephalus coryli* beetles but were only able to find one male flying readily about 15 feet up on a mature birch tree. This beetle was found where Trevor Pendleton had earlier tagged a grass stem.

The last *Cryptocephalus coryli* was recorded on 11 June, a female on a small birch bush in a sunny glade about 25 feet in from the track in area C16. The day was warm and quite windy in the open but sheltered in the vicinity of the small birch bush. Further visits to the NNR were made until the beginning of July but although weather conditions appeared ideal there were no further *records of Cryptocephalus coryli*.
All beetles were found in the afternoon as were most of those found by Trevor and Dilys Pendleton. In captivity it has been found that the vast majority of beetles hatch in the afternoon.

Similar woodland glades within the NNR with a good deal of birch and occasional hawthorn which preferably faced south and was reasonably sheltered were also located on the north-west side of the NNR, quite a distance from the area where *Cryptocephalus coryli* were originally found. The ground vegetation consists of native grasses with some bramble and bracken. There are also areas of heathland plants such as heath bedstraw and tormentil on the edge of the western side of the NNR. Birch, hawthorn and oak plus leaf litter in between the grass clumps which appeared suitable for *Cryptocephalus coryli* larvae were checked. No *Cryptocephalus coryli* beetles were recorded.

Trevor and Dilys Pendleton found their last beetles, a male and female, on 12 June.

2010

Following the coldest winter period for many years, Trevor and Dilys Pendleton began searching for beetles in April but cold weather conditions persisted into early May. A female beetle was located on a small birch adjacent to a south-facing section of open woodland on 16 May, followed by a male on 19 June on re-growth from a young oak tree felled the previous autumn.

3 Discussion

It is worth noting that *Cryptocephalus coryli* beetles at the NNR were found to be not just associated with silver birch, but also with oak, hawthorn and coarse native grasses such as cock's-foot *Dactylis glomerata*. Records from Sherwood in the 1900s show that the beetles were found on oak and the 2008-2010 surveys also found beetles on oak. Given the abundance of oak at the NNR, this bodes well for their future survival, though as has been said elsewhere in this report, given the choice *Cryptocephalus coryli* beetles appear to select silver birch.

In comparison with other sites where *Cryptocephalus coryli* has been found, the Sherwood Forest NNR site does not immediately look suitable. The only similarities are that the site is south-facing and fairly sheltered. The Lincolnshire sites have a large amount of young and coppiced birch, whereas the Sherwood Forest site is largely characterised by more mature birch. Young or coppiced birch was thought to be essential for *Cryptocephalus coryli*. Also at the Sherwood NNR, the grass layer is thick and tall which again was thought to be detrimental to the development of the larvae. Tall grass was thought to give cover for predators such as wood mice so a short sward with small areas of bare ground and lots of leaf litter would give the larvae a better chance of survival. Finding adult beetles coming up in the long grass and females being observed by Trevor & Dilys Pendleton is a first, as egg laying from a grass stem has never been observed at the Lincolnshire sites. There is an abundance of leaf litter underneath the grasses so food for the developing larvae is not in question.

Also of note is the fact that *Cryptocephalus coryli* beetles at Sherwood have also been shown to feed on hawthorn. Whilst there is hawthorn at the Lincolnshire *Cryptocephalus coryli* sites, the beetles have never been seen on it. However in captivity the adult beetles were seen to feed on hawthorn although both adults and larvae prefer silver birch if given a choice. Adult beetles have also been seen on mature silver birch and oak trees at Sherwood Forest NNR. There are only one or two records in Lincolnshire of the beetles being found on mature trees.

Habitat management for *Cryptocephalus coryli*

The main colony of *Cryptocephalus coryli* in Sherwood Forest NNR appears to be restricted to an open area of grass-heath running the full length of the south-facing edge of birch-dominated woodland in the north-east part of Birklands. This shallow, east-west valley feature is known to be prone to frost, which can occur into May and on occasion June. The habitat can be considered to be a grass-heath-scrub transition, characterised by open coarse acid grassland with patches of heather *Calluna vulagris* with scattered young oak scrub, occasional mature hawthorn and scattered birch trees. occurring in-between stands of closed canopy birch woodland to the north, south and west.

It also appears from aerial photographs taken in 1955 that this part of the NNR was formerly much more open (in common with the rest of the NNR), with more scattered tree cover and open space, and woodland cover in this particular locality of the NNR has significantly increased in the last 50 years in response to a decline in grazing animals (most significantly, rabbits) and measures undertaken in the 1970s to increase the cover of oak by planting. It can therefore be assumed that the records from the NNR in the early 1900s would have been made in more extensive and open grass-heath habitat as opposed to the woodland edge habitat of the present.

Although the beetles were found on grasses, hawthorn, oak and birch, previous studies have shown that they prefer silver birch (Piper & Hodge, 2002). In Lincolnshire *Cryptocephalus coryli* have only been found on silver birch despite the presence of hawthorn at the site. Therefore it seems essential to maintain silver birch in this area and if possible encourage the growth of new small birches. Also young oaks may need to be cut back in order to maintain open, but sheltered sunny glades for the beetles. Bracken should be managed too as the presence of bracken has been associated with the absence of any *Cryptocephalus* species. This is possibly because the bracken would excessively shade the ground beneath it, causing the underlying leaf litter to be cooler and damper and therefore

not suitable for the ground living larvae. In captivity mould growth on the pots in damper conditions has been found to be usually fatal, although it has also been shown that the larvae need moisture to survive.

Key trees have been found in association with *Cryptocephalus* beetles, but it was not possible to pinpoint a single key tree at Sherwood Forest NNR, although there is a key locality identified for the species. It is possible that one or more of the mature birch trees is a key tree but the trees are too high to study this. Birch, however, remains the most important plant species for *Cryptocephalus coryli*.

Piper (2002) suggested that the most important factor to consider in managing sites for *Cryptocephalus coryli* was the maintenance of a warm micro-climate in areas where beetles were resident. Sheltering windbreaks should be maintained and glades should be large enough to maximise the hours of sunlight possible, especially in the key months of May and June when the beetles were most active. The presence of birch scrub in these sheltered areas was also important, and young birch growth should be encouraged to provide a network of scattered trees and shrubs. Such an approach would be relevant to the transitional scrub habitat at Sherwood, and could here be widened to include the promotion of young oak growth also, and already management of the adjacent woodland areas has been modified in response to these surveys to ensure young scrub is retained and management operations avoid areas where beetles have been recorded. The management of heathland and grassland within the NNR should also seek to recognise young scrub transitions as being a desirable component of these features, and should allow for some future natural regeneration of trees and shrubs in their management.

A moderation of grazing, preferably by rabbits, around host trees was also recommended by Piper (2002) to provide a high proportion of bare ground for larvae to burrow into and to reduce vegetation cover for predatory small mammals. It is suggested that excessive trampling of vegetation by larger grazing animals may be detrimental. In Lincolnshire *Cryptocephalus coryli* has been found in both grazed and un-grazed sites. Kirkby Moor Nature Reserve had been occasionally grazed by sheep in the areas where the beetles had been found. At that time it was thought that grazing sheep was detrimental to *Cryptocephalus coryli* as the sheep were thought to be eating the larval pots as well as the grass. No grazing was done during the following eight years and the beetles appeared to thrive. At Linwood Warren Nature Reserve the area where the beetles are found has been occasionally grazed by sheep and was being grazed at the time we found *Cryptocephalus coryli*. At Moor Farm Nature Reserve the area where the beetles were found has also been occasionally grazed. This area has been clear-felled in the past. None of the three Lincolnshire sites where *Cryptocephalus coryli* have been found have been grazed by cattle. Grazing has been performed by sheep and wild rabbits. It appears that some light occasional grazing may help to keep an area open, although the benefit or otherwise of grazing seems to be inconclusive.

At Sherwood, the *Cryptocephalus coryli* locality is currently not grazed and has not been for a number of decades since the 1950s. However, grazing with native breeds of cattle has been recently re-introduced elsewhere within the NNR, with a long-term aim to extend that grazing into the remaining stands of wood-pasture within the NNR. Some limited survey effort within the grazed areas has so far not produced any records of *Cryptocephalus coryli* to date. Clearly, the programme of extensive grazing planned for the NNR will now need to be sensitive to the presence of this beetle in specific areas.

4 Conclusions

The number of *Cryptocephalus coryli* beetles found during the 2008-2010 surveys, and particularly in 2009, suggest that Sherwood Forest NNR supports a healthy, resident population. The fact that *Cryptocephalus coryli* beetles have been found at Sherwood in good numbers for such a rare species suggests that the current conditions in that area suit their needs. Whilst it is never possible to find all the individuals present at a site a good estimate as to the size of a colony can be made from the number of beetles found, and although it is possible that some of these beetles were the same ones recorded twice or more, it never the less indicates that there is a good population present.

Beetles at Sherwood Forest were found to be associated with their preferred host-plant, silver birch, but also oak, hawthorn and coarse grasses such as cock's-foot *Dactylis glomerata*.

The highest number of beetles found on a single visit to Sherwood Forest was 4 found by Trevor and Dilys Pendleton on 10 May 2009. At the Lincolnshire sites which support populations of *Cryptocephalus coryli* the average number of beetles found on a single visit is about 4. Here, only at Kirkby Moor have the beetles been found in higher numbers with the highest known count being 19 recorded on 19 June 2001 but even here the average per visit is between 4 and 5 beetles. At both Linwood Warren and Moor Farm Nature Reserves in Lincolnshire the main populations were confined to a small area within the reserve, whereas at Kirkby Moor Nature Reserve the beetles were much more widespread.

Nationally the beetle is very scarce and it appears there are no recent records from its extant sites. No *Cryptocephalus coryli* have been found at their Lincolnshire sites in recent years. If this is the case, the significance of Sherwood Forest NNR for this species becomes even greater.

The rediscovery of the population of *Cryptocephalus coryli* at Sherwood after a gap of approximately 70 years is a very important find as it appears that this is the only site in the East Midlands and possibly in Britain which has current records of this rare and endangered beetle. There may be other populations within the Sherwood Forest NNR which have yet to be discovered but finding these elusive beetles with their specific habitat requirements may take some time and requires continued survey and monitoring effort.

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Appendix 1 Figures and Table

Figure A General location of Sherwood Forest NNR and *Cryptocephalus coryli* colony

Figure B Compartment map of the Sherwood Forest NNR managed by Nottinghamshire County Council

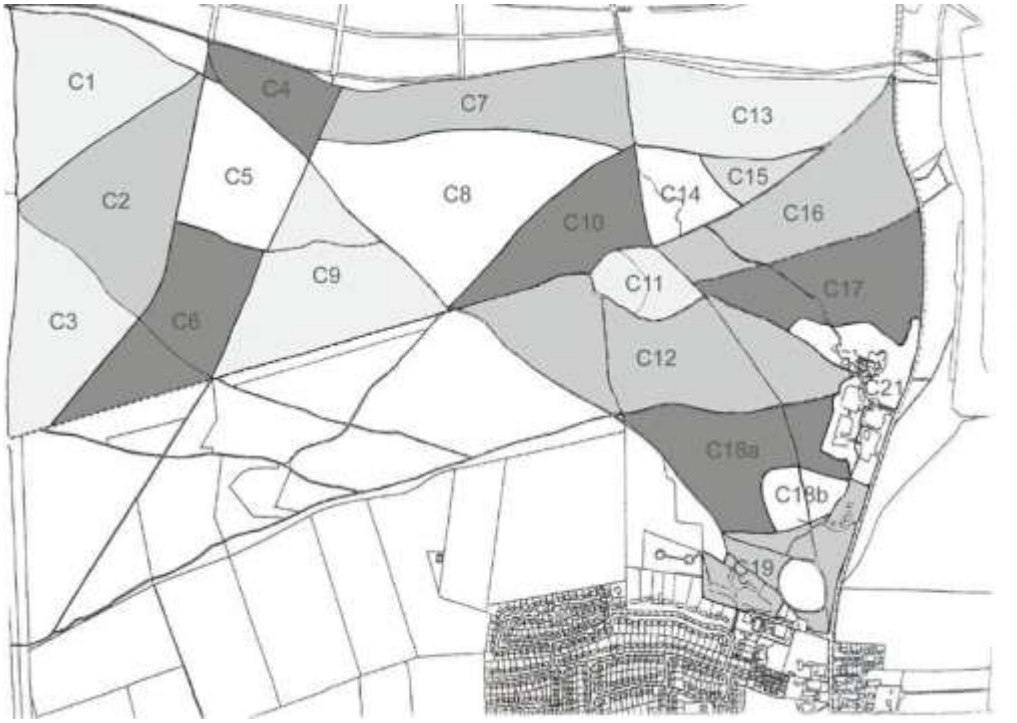

Table A Summary of *Cryptocephalus coryli* records at Sherwood Forest NNR during the period 2008-2010

Visit Dates	Weather	Results	Recorder(s)
28/05/2008	Sunny	1 female on grass in C15	T & D Pendleton
29/05/2008	Sunny	1 female on small hawthorn at the triangle C15	T & D Pendleton
04/06/2008	Sunny and warm	1 female on young birch at southern edge of C13, egg laying observed.	T & D Pendleton
10/05/2009	Sunny and warm	Male on grass, southern edge of C13	T & D Pendleton
10/05/2009	Sunny and warm	Female on small birch as used in 2008, southern edge of C13	T & D Pendleton
10/05/2009	Sunny and warm	Female on small hawthorn in triangle C15	T & D Pendleton
10/05/2009	Sunny and warm	Male on grass on western edge of C16	T & D Pendleton
12.05.2009	Sunny/breezy	1 female seen on leaf approx 12 feet up on mature birch C13	A E & A Binding
12.05.2009	Sunny/breezy	1 female on small hawthorn at the triangle C15	A E & A Binding
18.05.2009	Warm/breezy after rain	1 female on small hawthorn C15	A E & A Binding
20/05/2009	Partly overcast, later sunny	Male on small oak	T & D Pendleton
21.05.2009	Short sunny spells with heavy rain showers, warm sun by midday	1 female found at 4.35pm in grass near triangle C13	A E & A Binding
21/05/2009	Overcast, with occasional sunny spells and warm	Female on hawthorn in triangle C15 from late morning to early afternoon	T & D Pendleton
21/05/2009	Overcast, with occasional sunny spells and warm	Female on grass on southern edge of C13	T & D Pendleton
23/05/2009	Sunny	Female on grass, flew to small oak	T & D Pendleton
24/05/2009	Sunny and very warm	Female on grass	T & D Pendleton
24.05.2009	Very warm - 27°C in full sun	Male seen in flight 15ft up in birch tree C13	A E & A Binding
04/06/2009	Sunny and quite warm	Female on grass on western edge of C16, egg-laying observed	T & D Pendleton
08/06/2009	Sunny with cloud and warm	Female on small birch, remained until 11/06/09, when also found by AE & A Binding	T & D Pendleton

Visit Dates	Weather	Results	Recorder(s)
11.06.2009	Sunny and warm - Surveyed usual area and areas C1 to C4	1 female found in area C16 on small birch	A E & A Binding
12/06/2009	Sunny and warm	Female on grass	T & D Pendleton
12/06/2009	Sunny and warm	Male on grass	T & D Pendleton
16.05.2010	n/a	Female on small birch	T & D Pendleton
19.06.2010	Cool and breezy	Male on young oak re-growth	T & D Pendleton

Appendix 2 Images of *Cryptocephalus coryli* at Sherwood Forest NNR in 2009 (copyright Allan Binding unless otherwise stated)

Plate A Above: Female *Crytocephalus coryli* on the small silver birch in the centre of the picture below

Plate B Female *Crytocephalus coryli* emerging from grassland in area C13

Plate C *Crytocephalus coryli* pots showing the green newly built up collars and expanded pot sides

Plate D Above: Location of the main *Crytocephalus coryli* locality showing hawthorn scrub where beetles were found, as illustrated below