Oxfordshire Highways

Cogges Link Road
Terrestrial Invertebrate Survey

B0834600/Doc/CLR/23 April 2008

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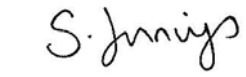
Prepared by	:	Sarah Jennings	
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COGGES LINK ROAD

Terrestrial Invertebrate Survey

B0834600/Doc /PA/CLR/23

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For:
Oxfordshire Highways

3rd April 2008

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Notice to Interested Parties

To achieve the study objectives stated in this report, we were required to base our conclusions on the best information available during the period of the investigation and within the limits prescribed by our client in the agreement.

No investigative method can completely eliminate the possibility of obtaining partially imprecise or incomplete information. Thus, we cannot guarantee that the investigations completely defined the degree or extent of e.g. species abundances or habitat management efficacy described in the report.

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1 EXECUTIVE SUMMARY

1.1 RPS were commissioned by Oxfordshire Highways to undertake investigations into the autumn-season terrestrial invertebrate fauna within the environs of the Cogges Link Road, Oxfordshire. Data from this survey was to be combined with that obtained by RPS during May and June 2003 to enable adequate data to be compiled to formally assess the significance of invertebrate ecology within the study area.

1.2 Invertebrate sampling methods used were: sweep netting, beating trees and bushes, pitfall trapping and suction sampling. Seasonal constraints imposed by the autumn timing of the survey limited the number of invertebrate groups available for survey, and so it was decided to concentrate primarily on the late season Diptera (flies) and on specific pitfall trapping for ground beetles (Carabidae), rove beetles (Staphylinidae) and spiders (Arachnida), in addition to the species recorded in 2003.

1.3 The survey area presents a mosaic of open fields and boundary hedges, with small tree groups and scrub units, as well as a river corridor and its associated riparian vegetation together with a vegetated pond.

1.4 The majority of the site was of low value to invertebrates. Areas of interest for invertebrates were an overgrown pond, damp and riparian vegetation and dead wood associated with hedgerows.

1.5 A total of 97 Diptera, 130 species of Coleoptera and 92 other invertebrate species were recorded in 2003 and 2006, giving an overall total of 319 species.

1.6 No species that are afforded protection under any UK or European legislation were recorded.

1.7 No species listed in the British Red Data Books or which have been elevated to the status of Nationally Endangered, Nationally Vulnerable or Nationally Rare by subsequent formal reviews were recorded.

1.8 None of the species recorded during the present survey are UK Biodiversity Action Plan species.

1.9 One species that is formally placed in Nationally Notable category Na was recorded, the Flax Flea beetle *Longitarsus parvulus*. This is a widespread and common insect in southern Britain, found on many plant species and does not warrant the Notable status it is afforded.

1.10 One species that is formally placed in the Nationally Notable category Nb was recorded, Roesel's Bush-cricket *Metrioptera roeselii*. This species has in recent years undergone a very large expansion of range that is almost certainly climate-driven. The Nationally Notable status is probably no longer warranted.

I.11 Two recorded species of Diptera (*Anagnota bicolour* and *Elachiptera austriaca*) are formally regarded as Nationally Notable, but are unplaced to a category

I.12 Ten species of Diptera, seven types of beetle and two spiders are listed formally as being Nationally Local.

I.13 The Invertebrate Index value for the Cogges Link survey area is 550; this has been derived from a total of 319 species. The Species Quality Index value for the Cogges Link area is 1.72. This is a very low value for a site in lowland England and supports the visual assessment that the overall area is of low interest.

I.14 Whilst most of the survey area may be taken by the road scheme with little or no consequences for invertebrate ecology, the survey results indicate two areas of limited invertebrate interest – the saproxylic (dead wood) assemblage and that associated with wet and damp habitats.

I.15 In areas where deadwood and other saproxylic features may be lost or damaged, these should, ideally, be moved to different locations within the local area prior to work on the scheme commencing. Replacement hedgerow and tree / scrub planting should provide mitigation for areas of these habitats that would be lost during construction.

I.16 Improvements to the very narrow corridor of riparian vegetation alongside the eastern channel of the River Windrush and the creation of a graded transisiton zone from the river to higher ground, and the provision of drainage swales would provide replacement habitat for the overgrown pond and other damp vegetation that would be lost.

I.17 A large area of grassland would be created from arable land to the east of the East Branch of the Windrush to provide compensation for the loss of grassland within the country park. This area will grazed and managed for wildlife purposes, and would provide additional habitat diversity for invertebrates.

I.18 Given the low conservation significance of the invertebrate community recorded, and provided that the mitigation measures outlined above are followed, it is considered that the construction and operation of the Cogges Link is unlikely to have a significant adverse impact on the invertebrate interest of the survey area.

2 INTRODUCTION

2.1 RPS were commissioned by Oxfordshire Highways to undertake investigations into the autumn-season terrestrial invertebrate fauna within the environs of the Cogges Link Road, Oxfordshire. Data from this survey was to be combined with that obtained by RPS during May and June 2003 to enable adequate data to be compiled to formally assess the significance of invertebrate ecology within the study area.

2.2 During the earlier survey, two site visits were undertaken, on 19th May 2003 and 23rd June, by a single surveyor. During 2006, the site was surveyed from 23rd September to 3rd November on a number of dates, each visit being of relatively short duration and coinciding with the sunnier parts of the day in this late period of the year. Three surveyors were involved in the autumn survey.

2.3 In both years, sweep nets and beating trays were used, in addition to making records by direct observation. Pitfall traps were also used to record beetles. During the autumn 2006 survey, suction samplers were also used. These various techniques are discussed in Section 3.

2.4 The unusual weather experienced during 2006 may have affected the success of invertebrate sampling during the autumn phase of this project. July 2006 was the hottest July since records began and created drought conditions from which many invertebrates had not recovered by the autumn of the same year. August was far wetter than typically expected whilst both September and October were atypically warm. The warmer than usual days continued into November.

3 METHODS

3.1 Sampling was undertaken in all the available habitat types within the application area and included improved grassland, various thin hedgerows, a small woodland (containing a moderate dead wood resource), a small marshy grassland area beside the eastern channel of the River Windrush and a pond in an area of amenity grassland.

3.2 The various methods used are summarised below:

Sweep-netting

3.3 A stout hand-held net is moved vigorously through vegetation to dislodge resting insects. The technique may be used semi-quantitatively by timing the number of sweeps through vegetation of a similar type and counting selected groups of species. This technique is effective for many invertebrates, including several beetle families, most plant bug groups and large number of other insects that live in vegetation of this type. However, it does not sample invertebrates that are confined to lower levels such as the

litter layer, which must be sought by careful searching or by sieving litter over a white sheet.

Beating Trees and Bushes

3.4 A cloth tray, held on a folding frame, is positioned below branches of trees or bushes and these are sharply tapped with a stick to dislodge insects. Black or white trays are used depending upon which group of invertebrates has been targeted for search. Insects are collected from the tray using a pooter. This technique is effective in obtaining records of most arboreal species, including many beetle groups, bugs, caterpillars of Lepidoptera, spiders and others. It can be undertaken at any site where there are trees or bushes present although is rendered ineffective if the vegetation is wet or if the weather is windy.

Pitfall Trapping

3.5 This involves placing vending-machine cups or similar containers in the ground with the rim flush with, or slightly below, the surface. A fluid is added, containing ethylene glycol, sodium chloride and formalin with a little detergent to reduce surface tension. Traps may be covered or uncovered and are typically left in position for a month at a time. Holes made in the sides of the cups a couple of centimetres below the rim permit flood or rain water to drain without the traps over-flowing and the catch becoming lost. Invertebrates simply fall into the traps. Traps are typically set in pairs or in groups of three (at the points of an equilateral triangle, usually with a side of 1 metre) and may be positioned along a fixed transect to permit repetition. This is the single most effective means of recording ground beetles (Carabidae) but is also effective for rove beetles (Staphylinidae), some other beetle groups, spiders and most non-insect soil-dwelling arthropods. Unlike pan traps, pitfall traps can be left *in situ* for a couple of weeks before they need to be examined.

Suction Sampling

3.6 This consists of using a converted leaf blower to collect samples from grass and other longer ground vegetation. The sample is then everted into a net bag and the invertebrates removed with a pooter. The advantage of suction sampling is that it catches species, which do not fly readily or which live in deep vegetation. It is particularly productive for Coleoptera, some Diptera and Arachnida.

4 RESULTS

4.1 Invertebrate Habitat Survey

4.1.1 The survey area presents a mosaic of open fields and boundary hedges, with small tree groups and scrub units, as well as a river corridor and its associated riparian vegetation together with a vegetated pond. Adjacent domestic gardens add variety to this overall pastoral landscape. Within this mosaic, some areas clearly contribute to the wider invertebrate ecology to a greater degree than others.

4.1.2 Locations of areas of habitat of invertebrate interest are provided in Figure 1. Also shown on Figure 1 are the target notes from the Phase 1 habitat survey carried out in 2003 (RPS, 2003). The target notes on Figure 1 are:

1. Piles of wood
2. Piles of wood
3. *Salix fragilis* and old dead stumps
4. *Salix fragilis* and dead wood
5. Old *Salix fragilis*
6. Old *Salix fragilis*
7. Old *Salix fragilis*
8. Old *Salix fragilis*
9. Old *Salix fragilis* and dead wood
10. Old *Salix fragilis*, *Quercus robur* and dead wood
11. Old *Quercus robur*
12. *Quercus robur* and three old standards
13. Dead tree standing
14. Dead stump
15. Old *Quercus robur*
16. Four old Quercus robur, a Fraxinus excelsior and dead stumps
17. Dead trees and stumps

4.1.3 Improved grassland and areas under arable cultivation dominate the surveyed area. In particular, amenity grassland occupies a large area to the west of the River Windrush. These habitats support little in the way of invertebrate interest.

4.1.4 The small woodland areas west of the river are most noteworthy, in invertebrate terms, for their saproxylic habitats. Saproxylic invertebrates are those that are dependent, during at least some part of their life-cycle, upon dead or dying wood of usually over-mature, damaged or dead trees (standing or fallen), upon wood-inhabiting fungi or upon other species associated with this habitat or upon microhabitats associated with the process of decay of wood, including sap-runs, rot-holes, fungal hyphae and others. There are over 1,700 species of invertebrate in the UK which depend to a lesser or greater extent on decaying wood habitat for the successful completion of their lifecycle. This number represents 6% of the total UK invertebrate fauna (Alexander, 1999).

4.1.5 Saproxylic habitat is also presented through a number of isolated trees, both living and dead, in the improved grassland field at the northern end of the site. Other mature trees, dead stumps and similar invertebrate features are incorporated into the various hedge lines.

4.1.6 The belt of trees and scrub that forms a visual barrier alongside the A.40 road in the eastern sector of the site appears to be of secondary origin and is scarcely old enough to have developed a diverse invertebrate fauna.

4.1.7 The areas of greatest invertebrate interest are likely to be the vegetated pond within the amenity grassland area and the marshy grassland adjacent to the eastern channel of the River Windrush. This combined area was not sampled during the survey in 2003 as it was at that time heavily grazed by cattle. In 2006 it had obviously been grazed, but only lightly, so that a structural mosaic existed. Whilst late September is not an ideal time of year to survey wetlands such as these areas (mid May and late June to July would have been more productive), the species found nevertheless indicate a potentially interesting good wetland community.

4.2 Species Survey

4.2.1 The seasonal constraints imposed by the autumn part of the survey limited the number of invertebrate groups available for survey, and so it was decided to concentrate primarily on the late season Diptera and on specific pitfall trapping for ground beetles (Carabidae), rove beetles (Staphylinidae) and spiders (Arachnida) – assuming that these groups were indeed caught, in addition to the species recorded in 2003.

4.2.2 A total of 97 Diptera (Appendix 1), 130 species of Coleoptera (Appendix 2) and 92 other invertebrate species (Appendix 3) were recorded in 2003 and 2006, giving an overall total of 319 species. The lists are annotated with National Status Codes; these are explained in Appendix 4. Several

categories of invertebrates are of raised significance in an ecological assessment. These categories are now examined.

4.2.3 No species that are afforded protection under any UK or European legislation were encountered during the survey.

4.2.4 No species listed in the British Red Data Books (Shirt, 1987; Bratton, 1991) or which have been elevated to the status of Nationally Endangered, Nationally Vulnerable or Nationally Rare by subsequent formal reviews are recorded in the present survey.

4.2.5 None of the species recorded during the present survey are UK Biodiversity Action Plan species (UK Biodiversity Group, 1999).

4.2.6 One species that is formally placed in Nationally Notable category Na (see Appendix 4) was recorded:

- **The Flax Flea beetle *Longitarsus parvulus*** is a widespread and common insect in southern Britain, found on many plant species and does not warrant the Notable status it is afforded.

4.2.7 One species that is formally placed in the Nationally Notable category Nb (see Appendix 4) was recorded:

- **Roesel's Bush-cricket *Metrioptera roeselii*** has in recent years undergone a very large expansion of range that is almost certainly climate-driven. In most years the insects develop without the ability to fly, but in favourable (hot) summers the females develop winged forms that are able to disperse after mating and establish populations in new areas. In the south-east of England, this cricket is present in considerable abundance in grassland habitats, including set-a-side, field margins, road verges and lightly grazed pastures where there is plenty of vegetation cover. The Nationally Notable status is probably no longer warranted.

4.2.8 Two recorded species of Diptera are formally regarded as Nationally Notable, but are unplaced to a category (see Appendix 4). These are:

- ***Anagnota bicolor* (Anthomyzidae).** This small fly has been recorded from England, Wales and Scotland and is associated with marshy habitats; it has been found in reedbeds and tussocks of *Carex*.. In this survey it was found in suction samples from the vegetated pond margins. Its life-history is unknown, but related species develop in decaying plant material. In a forthcoming review the species will be downgraded from Notable and should therefore be considered as Local. Management recommendations include maintaining a high, stable water level with a mosaic or succession of vegetation types.

- ***Elachiptera austriaca* (Chloropidae).** This small fly is recorded in a variety of wetland habitats from England and Wales as far north as Yorkshire, usually close to water. In this survey it was found in suction

samples from the pond margin and from the marshy grassland along the river margin. The early stages are unknown, but the larva is thought to live on decaying vegetable matter. In a forthcoming review the species will be downgraded from 'Notable' and should therefore be considered as Local. Management recommendations include maintaining a high, stable water level.

4.2.9 Ten species of Diptera, seven types of beetle and two spiders are listed formally as being Nationally Local (see Appendix 4). Brief ecological notes are given in the Appendices for those whose ecologies are known.

5 DISCUSSION

5.1 Assessment criteria

5.1.1 Criteria for formal assessment of impact on invertebrate ecology are under development. The most recent (2006) revision of the guidelines for this process generated by the Institute for Ecology and Environmental Management (IEEM) omit any mention at all of invertebrates apart from comments submitted to that organisation by Colin Plant Associates (UK) and posted on the IEEM web site.

5.1.2 Those comments put forward invertebrate assessment criteria that have been in use by invertebrate specialists and at present form the only finite guidelines available. They are presented in Table 1, below. Note that the information in Table 1 refers to Great Britain, including offshore islands, but excludes all parts of Ireland.

5.1.3 In arriving at an allocation of significance level using these criteria, the site should always be considered in the context of other sites containing similar macro- and micro-habitats at the same geographical category level.

5.1.4 Criteria below those for National and International significance should be regarded as flexible; in particular, geographical variations in the distributions of species should be taken into account as should real and semi-permanent changes in status that have taken place since the publication of status codings. Sites that do not meet these criteria may nevertheless be significant at the level stated for other reasons. Geographical parameters may need to be altered significantly for sites on offshore islands. For these reasons, an assessment of invertebrate significance should always be performed by a qualified invertebrate specialist with adequate field experience and not by a general ecologist for whom entomology is not a primary discipline.

5.1.5 Within each of the geographical categorisations, the significance may be Moderate, High or Very High (there is no "Low Significance" category - such sites are already defined by the Evaluation Table).

5.1.6 The application of Moderate, High or Very High significance at each geographical level is based on a wide number of factors and does not sit well with a table of pre-defined rules. Additionally, within a site of particular geographical significance, different component parts may have differing levels of actual significance. The allocation of the level of significance should always be performed by, or subsequently approved by, a qualified entomologist.

Table 1. Criteria used to define significance of invertebrate habitat

Significance	Description	Minimum qualifying criteria
International	European important site	Internationally important invertebrate populations present **or** containing RDB 1 (Endangered) species **or** containing any species protected under European legislation **or** containing habitats that are threatened or rare at the European level (including, but not exclusively so, habitats listed on the EU *Habitats Directive*).
National	UK important site	Achieving SSSI invertebrate criteria (NCC, 1989) **or** containing RDB2 (Vulnerable) **or** containing viable populations of RDB 3 (Rare) species **or** containing viable populations of any species protected under UK legislation **or** containing habitats that are threatened or rare nationally (Great Britain) **or** supporting sustainable populations of more than one UK BAP species.
Regional (for border sites, both regions must be taken into account)	Site with populations of invertebrates or invertebrate habitats considered scarce or rare or threatened in south-east England	Habitat that is scarce or threatened in the region **or** which has, or is reasonably expected to have, the presence of an assemblage of invertebrates including at least ten Nationally Notable species **or** at least ten species listed as Regionally Notable for the *English Nature* region in question in the Recorder database or elsewhere **or** a combination of these categories amounting to ten species in total **or** supporting sustainable populations of at least one UK BAP species.
County (for border sites, both counties must be taken into account)	Site with populations of invertebrates or invertebrate habitats considered scarce or rare or threatened in the county in question	Habitat that is scarce or threatened in the county **and/or** which contains or is reasonably expected to contain an assemblage of invertebrates that includes viable populations of at least five Nationally Notable species **or** viable populations of at least five species regarded as Regionally Scarce by the county records centres and/or field club.
District	Site with populations of invertebrates or invertebrate habitats considered scarce or rare or threatened in the administrative District	A rather vague definition of habitats falling below county significance level, but which may be of greater significance than merely Local. They include sites for which Nationally Notable species in the range from 1 to 4 examples are reasonably expected but not yet necessarily recorded and where this omission is considered likely to be partly due to under-recording.
Local	Site with populations of invertebrates or invertebrate habitats considered scarce or rare or threatened in the affected and neighbouring Parishes (except Scotland, where the local area may best be defined as being within a radius of 5 kilometres	Habitats or species unique or of some other significance within the local area.
Low significance	—	Although almost no area is completely without significance these are the areas with nothing more than expected "background" populations of common species and the occasional Nationally Local species.

5.2 Assessment of interest

5.2.1 A visual assessment of the macro-habitats available to invertebrates within the application area immediately suggests that the intrinsic interest of the site is likely to be on the low side.

5.2.2 The eastern part of this site consists of mainly agricultural habitat. It was found to have no invertebrate species of raised interest and has overall low species diversity and numbers; it may have been treated with agrochemicals in the recent past.

5.2.3 The small woodland and several hedges contain a limited saproxylic resource. Saproxylic invertebrates are those that are dependent, during at least some part of their life-cycle, upon dead or dying wood of usually over-mature, damaged or dead trees (standing or fallen), upon wood-inhabiting fungi or upon other species associated with this habitat or upon microhabitats associated with the process of decay of wood, including sap-runs, rot-holes, fungal hyphae and others.

5.2.4 There are over 1,700 species of invertebrate in the UK which depend to a lesser or greater extent on decaying wood habitat for the successful completion of their lifecycle. This number represents 6% of the total UK invertebrate fauna (Alexander, 1999). Coleoptera (beetles) form a major component of this number and it is also of note that 38% of invertebrates associated with decaying wood habitats have a formal conservation status.

5.2.5 Saproxylic micro-habitats were targeted for invertebrates, but no species particularly associated with these were found during the survey. Better results may have been obtained in a different season of the year through the use of flight interception trapping, but most of these areas are isolated and herb-rich nectar sources appear to be absent, and so it is not anticipated that the saproxylic fauna is important other than within a purely local context. Mitigation works connected with the proposed scheme should incorporate the rescue of existing saproxylic features and the future enhancement of saproxylic habitats elsewhere in this part of Oxfordshire.

5.2.6 The western area, comprising the vegetated pond in the amenity grassland and the marshy grassland adjacent to the river, had a much richer fauna including significant wetland elements. This area was not sampled during the survey in 2003 as it was at that time heavily grazed by cattle. During that survey it was recorded as containing only short grass. In 2006, it had obviously been grazed, but only lightly, so that a structural mosaic existed. Late September is not an ideal time of year to survey wetlands such as these areas (mid May and late June to July would have been more productive), but the species found indicate a good wetland community. Sampling earlier in the season may have produced more species of conservation interest.

5.2.7 The presence of meniscus midges (Dixidae) in association with the pond indicates that it is relatively unpolluted. These midges are associated with the surface (meniscus) of water bodies and are dependent on emergent vegetation and undisturbed margins in ponds.

5.2.8 The four Nationally Notable species recorded during the seasonally limited survey do nothing to contradict that preliminary conclusion that the invertebrate interest of the site is limited, since none of the four warrants that status afforded (two have been formally designated for downgrading in 2007). In spite of the absence of summer sampling, the present results suggest that the application area and immediate environs of the Cogges Link are of only Local invertebrate interest.

5.2.9 In order to provide a "rough and ready" indication of site quality, an **Invertebrate Index** can be calculated . Using this method, invertebrates recorded are scored according to their national status as follows:

RDB species	100 points
Notable - Na species	50 points
Notable - Nb species	40 points
Notable - N species	40 points
Local species	20 points
Common species	no score

5.2.10 Adding together the scores in each category provides the overall Invertebrate Index.

5.2.11 However, it is plain that increased effort at a site will increase the number of species recorded and in time the Invertebrate Index will also increase, rendering use of the Invertebrate Index alone of limited value unless all the sites in a comparison are thoroughly and equally recorded. In order to take account of the overall number of species recorded (as a measure of recording effort) in assessing the rarity value of a species assemblages, a **Species Quality Index (SQI)** may be calculated through simple division of the Invertebrate Index gained from a site by the number of species recorded at that site. In this way, SQI is effectively the average number of points which each recorded species is worth.

5.2.12 The Invertebrate Index value for the Cogges Link survey area is 550; this has been derived from a total of 319 species (Section 4.2 refers). Thus, the SQI value for the Cogges Link area is 1.72. This is a very low value for a site in lowland England and supports the visual assessment that the overall area is of low interest.

5.2.13 It is important to emphasise that the SQI value relates to the entire survey area. Whilst most of this may be taken by the road scheme with little or no

consequences for invertebrate ecology the few areas highlighted in this report where the interest is higher should be retained where possible.

6 MITIGATION RECOMMENDATIONS

6.1 The survey results indicate two areas of limited invertebrate interest – the saproxylic assemblage and that associated with wet and damp habitats.

6.2 In areas where deadwood and other saproxylic features may be lost or damaged, these should, ideally, be moved to different locations within the local area prior to work on the scheme commencing. The translocation work should follow the requirements to be laid down in a task specific document and should be supervised by an ecologist. An appropriate receptor site would need to be identified.

6.3 Replacement hedgerow and tree / scrub planting should aim to utilise locally sourced native species to provide mitigation for areas of these habitats that would be lost during construction.

6.4 Improvements to the very narrow corridor of riparian vegetation alongside the eastern channel of the River Windrush are considered to be highly desirable if achievable. The nettles and other vegetation typical of highly eutrophic soils could be cut and removed so that less competitive plants are afforded an opportunity to colonise.

6.5 The creation of a graded transisiton zone from the river to higher ground, via reprofiling of the bank to a very shallow gradient in selected locations would create a transition zone from water to land that would colonise naturally – the water preventing invasive terrestrial plants from dominating.

6.6 Wide drainage swales to be provided as part of the Cogges Link scheme would remain wet for most of the year and will provide replacement habitat for the overgrown pond and other damp vegetation that would be lost.

6.7 A large area of grassland would be created from arable land to the east of the East Branch of the Windrush to provide compensation for the loss of grassland within the country park. This area will grazed and managed for wildlife purposes, and would provide additional habitat diversity for invertebrates.

6.8 Given the low conservation significance of the invertebrate community recorded, and provided that the mitigation measures outlined above are followed, it is considered that the construction and operation of the Cogges Link is unlikely to have a significant adverse impact on the invertebrate interest of the survey area.

REFERENCES

Alexander, K.,	1999	The invertebrates of Britain's wood pastures. *British Wildlife*, **11** (2): 108 – 117.
Ball, S.G.	1986	*Terrestrial and freshwater invertebrates with Red Data Book, Notable or habitat indicator status*. Invertebrate Site Register internal report number 66. NCC.
Bratton, J. H.	1991	*British Red Data Books: 3. Invertebrates other than insects*. NCC
Falk, S.	1991a	*A review of the scarce and threatened bees, wasps and ants of Great Britain (part 1).* Research & Survey in Nature Conservation, number **35**. NCC.
Falk, S.	1991b	*A review of the scarce and threatened flies of Great Britain (part 1).*Research & Survey in Nature Conservation, number **39**. NCC.
Hyman, P. S. & Parsons, M.S.	1992	*A review of the scarce and threatened Coleoptera of Great Britain Part 1.* UK Nature Conservation, number **3**. JNCC.
Hyman, P. S. & Parsons, M.S.	1994	*A review of the scarce and threatened Coleoptera of Great Britain Part 2.* UK Nature Conservation, number **12**. JNCC.
NCC,	1989	*Guidelines for the selection of biological SSSIs*. Peterborough.
Parsons, M. S.	1993	*A review of the scarce and threatened pyralid moths of Great Britain* UK Nature Conservation, number 11. JNCC.
RPS	2003	*Terrestrial Invertebrate Survey Of The Witney Cogges Link Road*. Unpublished report.
Shirt, D. B. (ed.)	1987	*British Red Data Books: 2. Insects*. NCC
UK Biodiversity Group	1999	*Tranche 2 action plans. Volume iv - invertebrates*. English Nature.

APPENDICES

Appendix 1: List of Species of Diptera Recorded

For an explanation of the National Status codings refer to Appendix 4.

Family	Species	National status	Ecological associations, etc
Anisopodidae	*Sylvicola punctatus*		Common, on dung
Anisopodidae	*Anthomyzidae*		
Anisopodidae	*Anagnota bicolor*	N	Local in wetland habitats
Anisopodidae	*Asilidae*		
Anisopodidae	*Leptogaster cylindrica*		
Asteiidae	*Asteia amoena*		Common in woodlands
Asteiidae	*Calliphoridae*		
Asteiidae	*Calliphora vicina*		Common everywhere, on carrion
Chloropidae	*Chlorops limbatus*		Common, larvae in grass stems
Chloropidae	*Elachiptera austriaca*	N	Local in wetland habitats
Chloropidae	*Elachiptera brevipennis*	Local	Local in wetland habitats and wet grassland
Chloropidae	*Elachiptera diastema*		Frequent in long grass
Chloropidae	*Elachiptera megaspis*	Local	Local in wetlands, larvae in watercress
Chloropidae	*Elachiptera sp. nr cornuta*	Local	Local in wetland habitats
Chloropidae	*Oscinella frit*		Common, larvae in grass stems
Chloropidae	*Oscinisoma cognatum*		Local in wetland habitats
Chloropidae	*Thaumatomyia notata*		Common, larvae attack homoptera
Chloropidae	*Tricimba cincta*		Common, larvae in fungi
Chloropidae	*Tricimba lineella*		Common, larvae in fungi
Dixidae	*Dixella martinii*		Water bodies, larvae in meniscus
Dixidae	*Dolichopodidae*		
Dixidae	*Achalcus cinereus*	Local	Local in wetland habitats
Dixidae	*Achalcus flavicollis*	Local	Local in wetland habitats
Dixidae	*Campsicnemus curvipes*		Common
Dixidae	*Dolichopus festivus*		
Dixidae	*Dolichopus popularis*		
Dixidae	*Poecilobothrus nobilitatus*		
Dixidae	*Scellus notatus*	Local	
Drosophilidae	*Drosophila andalusiaca*		Common in grasslands
Drosophilidae	*Drosophila picta*		Associated with reed beds
Drosophilidae	*Scaptomyza pallida*		Common everywhere, leaf miner

Family	Species	National status	Ecological associations, etc
Empididae	*Dolichocephala oblongoguttata*		
Empididae	*Kritempis livida*		
Empididae	*Pachymeria femorata*		
Empididae	*Rhamphomyia erythrophthalma*	Local	
Ephydridae	*Axysta cesta*	Local	Local in wetlands
Ephydridae	*Psilopa nitidula*		Common
Ephydridae	*Trimerina madizans*	Local	Local, grasslands and wetlands
Ephydridae	*Heleomyzidae*		
Ephydridae	*Suillia variegata*		Common, larvae in fungi
Hippoboscidae	*Lipoptena cervi*		Parasite of deer, widespread
Hippoboscidae	*Hybotidae*		
Hippoboscidae	*Bicellaria vana*		
Hippoboscidae	*Lauxaniidae*		
Hippoboscidae	*Calliopum aeneum*		Common, larvae in decaying plant material
Hippoboscidae	*Lyciella rorida*		Common, larvae in decaying plant material
Hippoboscidae	*Minettia rivosa*		
Hippoboscidae	*Tricholauxania praeusta*		
Limoniidae	*Paradelphomyia senilis*		Widespread in wet woodland and at seepages
Lonchopteridae	*Lonchoptera furcata*		Common
Lonchopteridae	*Lonchoptera lutea*		Common everywhere
Muscidae	*Myospila meditabunda*		Common, on dung
Muscidae	*Thricops simplex*		Common
Mycetophilidae	*Leia fascipennis*		Common
Opomyzidae	*Geomyza tripunctata*		Common, larvae in grass stems
Opomyzidae	*Opomyza florum*		Common, larvae in grass stems
Opomyzidae	*Opomyza germinationis*		Common, larvae in grass stems
Pallopteridae	*Palloptera muliebris*	Local	
Pediciidae	*Tricyphona immaculata*		Common
Pediciidae	*Ptychopteridae*		
Pediciidae	*Ptychoptera albimana*		
Pediciidae	*Ptychoptera contaminata*		
Rhagionidae	*Chrysopilus cristatus*		
Rhagionidae	*Rhagio scolopaceus*		
Scathophagidae	*Scathophaga stercoraria*		Ubiquitous, on dung

Family	Species	National status	Ecological associations, etc
Sepsidae	*Sepsis punctum*		Common, on dung
Sphaeroceridae	*Copromyza equina*		Common, on dung
Sphaeroceridae	*Leptocera nigra*		Common, larvae in dung
Sphaeroceridae	*Limosina silvatica*		Common, on dung
Sphaeroceridae	*Opacifrons coxata*		Common in wetlands
Sphaeroceridae	*Pteremis fenestralis*		Common, on dung
Sphaeroceridae	*Pullimosina pullula*		Common in long grass
Sphaeroceridae	*Spelobia clunipes*		Common everywhere
Stratiomyidae	*Beris vallata*		
Stratiomyidae	*Syrphidae*		
Stratiomyidae	*Cheilosia albitarsis*		
Stratiomyidae	*Cheilosia pagana*		
Stratiomyidae	*Cheilosia ranunculi*		
Stratiomyidae	*Chrysogaster cemiteriorum*		
Stratiomyidae	*Episyrphus balteatus*		
Stratiomyidae	*Eristalis arbustorum*		
Stratiomyidae	*Eristalis horticola*		
Stratiomyidae	*Eristalis interrupta*		
Stratiomyidae	*Eristalis pertinax*		
Stratiomyidae	*Eristalis tenax*		
Stratiomyidae	*Helophilus pendulus*		
Stratiomyidae	*Melanogaster hirtella*		
Stratiomyidae	*Melanostoma mellinum*		
Stratiomyidae	*Melanostoma scalare*		
Stratiomyidae	*Meliscaeva auricollis*		
Stratiomyidae	*Myathropa florea*		
Stratiomyidae	*Neoascia podagrica*		
Stratiomyidae	*Platycheirus albimanus*		
Stratiomyidae	*Platycheirus clypeatus*		
Stratiomyidae	*Platycheirus scutatus s. str.*		
Stratiomyidae	*Rhingia campestris*		
Stratiomyidae	*Sphaerophoria scripta*		
Stratiomyidae	*Syritta pipiens*		
Stratiomyidae	*Syrphus ribesii*		
Stratiomyidae	*Syrphus vitripennis*		
Tipulidae	*Tipulidae*		
Tipulidae	*Acutipula fulvipennis*		
Tipulidae	*Acutipula luna*		

Family	Species	National status	Ecological associations, etc
Tipulidae	*Lunatipula lunata*		
Tipulidae	*Nigrotipula nigra*	Local	
Tipulidae	*Tipula oleracea*		
Tipulidae	*Tipula paludosa*		Common, larva in grasslands

Appendix 2: List of Species of Coleoptera Recorded

For an explanation of the National Status codings refer to Appendix 4.

Family	Species	National status	Ecological associations, etc
Anobiidae	*Anobium punctatum*		Larvae feed in dead timber
Bruchidae	*Bruchus loti*		Larvae on bird's-foot trefoil; adults at various flowers
Byrrhidae	*Byrrhus pilula*	Local	Associated with moss or rabbit grazed turf, in open situations.
Byturidae	*Byturus tomentosus*		Brambles and raspberries
Cantharidae	*Cantharis cryptica*		Tall vegetation, especially at the woodland/grassland interface
Cantharidae	*Cantharis decipiens*		Adults in grassland but larvae associated with woodland
Cantharidae	*Cantharis lateralis*		Damp grasslands and wetlands
Cantharidae	*Cantharis nigra*		Lowland marsh, rushy pastures, damp hay meadows etc
Cantharidae	*Cantharis nigricans*		Tussocky grassland, especially if damp
Cantharidae	*Cantharis pallida*		Widespread wetland species
Cantharidae	*Cantharis pellucida*		Largely restricted to woodland
Cantharidae	*Cantharis rustica*		Lowland grassland - but always in association with scrub
Cantharidae	*Malthodes minimus*		Woodland or scrub - especially on limestone
Cantharidae	*Rhagonycha fulva*		Tall, rank vegetation in lowland areas
Cantharidae	*Rhagonycha lignosa*		An arboreal species
Cantharidae	*Rhagonycha limbata*		Dry grasslands (formerly called *Rhagonycha femoralis*)
Carabidae	*Acupalpus meridianus*	Local	A predator on open ground
Carabidae	*Agonum obscurum*		Reed litter and similar
Carabidae	*Amara aenea*		Phytophagous species of dry, sandy ground
Carabidae	*Amara communis*		Ubiquitous, but especially in grasslands
Carabidae	*Amara familiaris*		Phytophagous species of gardens and other open, dry and sunny habitats
Carabidae	*Bembidion aeneum*		Damp clay soils on the coast and at inland woods and grassland near water
Carabidae	*Bembidion biguttatum*		Usually near water or in damp grassland
Carabidae	*Bembidion dentellum*		Damp habitats
Carabidae	*Bembidion guttula*		Found most habitats that are not excessively dry
Carabidae	*Bembidion obtusum*	Local	Open ground, including arable fields
Carabidae	*Bembidion tetracolum*		Ubiquitous in sites that are not excessively dry
Carabidae	*Calathus fuscipes*		Widespread and common species of dry open ground

Family	Species	National status	Ecological associations, etc
Carabidae	*Carabus nemoralis*	Local	Ubiquitous spring species
Carabidae	*Carabus violaceus*		Fairly widespread in most habitats
Carabidae	*Clivinia fossor*		Open, partly vegetated ground, mainly in lowland grasslands
Carabidae	*Harpalus affinis (= aeneus)*		A species typically of dry grasslands
Carabidae	*Harpalus rufipes*		Ubiquitous
Carabidae	*Leistus ferrugineus*		An autumn breeding grassland species, also found in woodlands
Carabidae	*Leistus fulvibarbis*		Primarily a damp woodland species
Carabidae	*Leistus rufescens*		Ubiquitous in grassland and woodland
Carabidae	*Loricera pilicornis*		Ubiquitous, but especially near water and in damp grassland; feeds on springtails
Carabidae	*Nebria brevicollis*		Ubiquitous late summer and autumn species
Carabidae	*Notiophilus biguttatus*		Most open ground habitats
Carabidae	*Notiophilus palustris*	Local	Damp habitats are preferred
Carabidae	*Pterostichus (Poecilus) cupreus*	Local	Open grassy habitats - usually where damp
Carabidae	*Pterostichus madidus*		Ubiquitous
Carabidae	*Pterostichus melanarius*		Ubiquitous
Carabidae	*Pterostichus strenuus*		Most habitats that are not too dry
Chrysomelidae	*Altica lythri*		Widespread on many plant species
Chrysomelidae	*Aphthona euphorbiae*	Local	Widespread on many plant species
Chrysomelidae	*Cassida rubiginosa*		Thistles
Chrysomelidae	*Chaetocnema hortensis*		Grassland
Chrysomelidae	*Crepidodera ferruginea*		Phytophagous species - on thistles
Chrysomelidae	*Crepidodera transversa*		Phytophagous species - on thistles
Chrysomelidae	*Lochmaea crataegi*		Hawthorn - larvae mine the berries
Chrysomelidae	*Longitarsus luridus*		Feeds on many plant species
Chrysomelidae	*Longitarsus parvulus*	Na	Feeds on many plant species
Chrysomelidae	*Phyllotreta atra*		Various cruciferae
Chrysomelidae	*Phyllotreta undulata*		Various cruciferae
Chrysomelidae	*Plagiodera versicolora*		Willows, typically in marshes and fens
Chrysomelidae	*Sphaeroderma testaceum*		Mainly on thistles
Coccinellidae	*Adalia 2-punctata*		Predatory on other insects
Coccinellidae	*Anisostica 19-punctata*		Wetland habitats
Coccinellidae	*Coccinella 7-punctata*		Predatory on other insects
Coccinellidae	*Halyzia 16-guttata*		Predatory on other insects

Family	Species	National status	Ecological associations, etc
Coccinellidae	*Micraspis (Tytthaspis) 16-punctata*		Predatory on other insects
Coccinellidae	*Propylea 14-punctata*		Predatory on other insects
Coccinellidae	*Scymnus frontalis*		Predatory on other insects
Coccinellidae	*Scymnus suturalis*		Predatory on other insects
Coccinellidae	*Subcoccinella 24 - punctata*		Predatory on other insects
Coccinellidae	*Thea 22-punctata*		Feeds on mildews
Curculionidae	*Barypeithes pellucidus*		Amongst litter in woodland, occasionally in dry grassland
Curculionidae	*Ceutorhynchus quadridens*		Various cruciferae
Curculionidae	*Nedyus quadrimaculatus*		Nettles - feeding on the flowers
Curculionidae	*Phyllobius pomaceus*		Nettles
Curculionidae	*Phyllobius pyri*		Larvae develop in the ground an adults feed on a variety of herbage and tree leaves
Curculionidae	*Phyllobius roboretanus*		Nettle - feeding on the leaves and flowers
Curculionidae	*Phyllobius viridiaeris*		Typically in hedges and other edge habitats
Curculionidae	*Polydrusus cervinus*		Trees and shrubs - feeding on the leaves
Curculionidae	*Rhamphus oxyacanthae*		Larva mines in leaves of hawthorn
Curculionidae	*Rhamphus pulicarius*		
Curculionidae	*Sitona hispidulus*		Larvae feed in the root nodules of clover and other legumes
Curculionidae	*Sitona lineatus*		Various legumes
Curculionidae	*Sitona regensteinensis*		Feeds on the flowers and foliage of gorse and broom
Curculionidae	*Strophosomus melanogrammum*		Feeds on the leaves of trees, especially hazel
Elateridae	*Agriotes acuminatus*		Larvae feed on grass roots
Elateridae	*Agriotes obscurus*		Larvae feed on grass roots
Elateridae	*Agriotes pallidulus*		Larvae feed on grass roots
Elateridae	*Athous haemorrhoidalis*		The larva feeds on the roots of grasses
Elateridae	*Dalopius marginatus*		Damp habitats
Elateridae	*Denticollis linearis*		Larvae feed in decaying wood
Latridiidae	*Aridius bifasciatus*		Litter, compost, tussocks etc - more or less ubiquitous
Latridiidae	*Cortinicara gibbosa*		Amongst plant litter
Latridiidae	*Enicmus transversus*		Associated with fungi under bark and in other places
Lucanidae	*Dorcus parallelepipedus*	Local	Larvae feed in soft, rotten timber of broad-leaved trees
Melyridae	*Malachius bipustulatus*		Grasslands

Family	Species	National status	Ecological associations, etc
Melyridae	*Malachius viridis*	Local	A common grassland species
Nitidulidae	*Brachypterus glaber*		Nettles
Nitidulidae	*Brachypterus urticae*		Nettles
Nitidulidae	*Meligethes aeneus*		Various flowers
Oedemeridae	*Oedemera lurida*	Local	A common grassland species
Oedemeridae	*Oedemera nobilis*		A common grassland species
Scarabaeidae	*Amphimallon solstitialis*		Grassland
Scolytidae	*Scolytus scolytus*		Under elm bark
Scraptiidae	*Anaspis humeralis*		Ecology unclear - adults usually at spring flowers
Scraptiidae	*Anaspis maculata*		Develops in small girth deciduous branch wood
Scraptiidae	*Anaspis pulicaria*		Probably feeds inside dead twigs
Scraptiidae	*Anaspis regimbarti*		Larvae feed inside dead stems of plants
Silphidae	*Necrodes littoralis*		Carrion
Staphylinidae	*Aleochara bipustulata*		Dung, carrion, leaf litter, etc
Staphylinidae	*Aleochara curtula*		Leaf litter, decaying vegetation etc
Staphylinidae	*Aloconota gregaria*		Plant litter - ubiquitous
Staphylinidae	*Anotylus rugosus*		A detritus-feeding rove beetle
Staphylinidae	*Anotylus sculpturatus*		Grass tussocks, litter, dung etc
Staphylinidae	*Anotylus tetracarinatus*		Leaf litter, carrion, dung and similar
Staphylinidae	*Atheta (Dimetrota) atramentaria*		Larvae feed in animal dung - very common
Staphylinidae	*Atheta (Mocyta) fungi*		A detritus-feeding rove beetle
Staphylinidae	*Atheta hepatica*		A detritus-feeding rove beetle
Staphylinidae	*Atheta laticollis*		A detritus-feeding rove beetle
Staphylinidae	*Lathrobium brunnipes*		Grass tussocks, litter, dung etc
Staphylinidae	*Ocypus (Tasgius) ater*		Carrion, dung, etc
Staphylinidae	*Ocypus olens*		Carrion
Staphylinidae	*Paederus littoralis*		On mud at water margins. Local in the north
Staphylinidae	*Philonthus fimetarius*		Found in a wide range of habitats
Staphylinidae	*Quedius boops*		Moss and litter
Staphylinidae	*Sepedophilus marshami*		Leaf mould, grass litter etc - very common
Staphylinidae	*Stenus boops*		Wet habitats, especially pond margins
Staphylinidae	*Stenus impressus*		Usually in marshy places
Staphylinidae	*Stenus juno*		Found in wet habitats
Staphylinidae	*Tachyporus chrysomelinus*		Grass litter and tussocks
Staphylinidae	*Tachyporus dispar*		A detritus-feeding rove beetle
Staphylinidae	*Tachyporus hypnorum*		Leaf litter, grass tussocks and similar micro-habitats
Staphylinidae	*Xantholinus linearis*		Leaf litter, grass tussocks and similar micro-habitats

Family	Species	National status	Ecological associations, etc
Staphylinidae	*Xantholinus longiventris*		Leaf litter, grass tussocks and similar micro-habitats - very common

Appendix 3: List of Other Invertebrate Species Recorded

For an explanation of the National Status codings refer to Appendix 4.

Group / species	English name (if available)	National status	Ecological associations etc
ARACHNIDA: ARANEA			
Anyphaenidae			
Anyphaena accentuata			Woodland, scrub and hedges etc
Araneidae			
Araneus diadematus	The garden spider		Ubiquitous
Araniella cucurbitina s.str.	A spider		Trees and bushes
Clubionidae			
Clubiona lutescens			Found in a wide variety of habitats
Dictynidae			
Dictyna arundinacea			Field edges etc amongst dry or dead vegetation
Dictyna uncinata			Spins a mesh web across leaves of trees and bushes
Dysderidae			
Harpactea hombergi			Under stones, amongst dry litter, hedge bases etc
Linyphiidae			
Walckenaeria acuminata			In the ground layer of almost every habitat type
Lycosidae			
Pardosa amentata			A wide range of habitats - but especially if damp
Pardosa prativaga	A spider		Lives on open ground and amongst herbage
Philodromidae			
Philodromus dispar			Wooded habitats, overwintering in leaf litter under hedges etc
Pisauridae			
Pisaura mirabilis	A spider		More or less ubiquitous, but likes tall vegetation
Tetragnathidae			
Pachygnatha degeeri			Low vegetation
Tetragnatha montana		Local	Trees and bushes
Theridiidae			
Enoplognatha ovata s.str.			Bushes and low plants in more open habitats
Theridion tinctum		Local	
ARACHNIDA: ACARI			
Eriophyidae			
Aceria cephalonius			Causes galls on leaves of sycamore
Aceria convolvuli			Causes galls on leaves of bindweed
Aceria crataegi			Causes galls on leaves of hawthorn
Aceria pseudoplatani			Causes galls on leaves of sycamore
Aceria ulmifolia			Causes galls on leaves of elm

Group / species	English name (if available)	National status	Ecological associations etc
Epitrimerus trilobus			Causes galls on leaves of elder
Eriophyes goniothorax			Causes galls on leaves of hawthorn
Eriophyes macrorhynchos			Causes galls on leaves of sycamore
Eriophyes prunospinosae			Causes galls on leaves of blackthorn
ARACHNIDA: OPILIONES			
Leiobunidae			
Leiobunum rotundum			Ubiquitous - under stones, logs etc
Phalangiidae			
Mitopus morio			
Oligolophus tridens			
Paroligolophus agrestis			Under stones and other objects
Phalangium opilio	A harvestman		Under stones or other objects
CRUSTACEA: ISOPODA			
Armadillidiidae			
Armadillidium vulgare	The pill bug		Under stones etc
Oniscidae			
Oniscus asellus	A woodlouse		Damp, but not wet, habitats everywhere
Philosciidae			
Philoscia muscorum	A woodlouse		Under stones etc
Porcellionidae			
Porcellio scaber	A woodlouse		Under stones etc
Trichoniscidae			
Trichoniscus pusillus	A woodlouse		Under stones, bark, etc
DERMAPTERA			
Forficulidae			
Forficula auricularia	Common earwig		Generalist species
HETEROPTERA			
Anthocoridae			
Anthocoris nemoralis			Trees and shrubs
Anthocoris nemorum			Low vegetation
Lygaeidae			
Heterogaster urticae			Nettles
Kleidocerys resedae			Trees and shrubs generally
Miridae			
Calocoris norvegicus			Polyphagous
Liocoris tripustulatus			Stinging nettle
Plagiognathus arbustorum			Polyphagous, but usually associated with stinging nettles
Stenodema laevigatum			Grasslands
Stenotus binotatus			Grasslands
HOMOPTERA			
Cercopidae			
Philaenus spumarius	Spittle-bug/cuckoo-spit bug		Larvae feed under froth on a wide range of herbaceous plants
HYMENOPTERA: ACULEATA			
Apidae			

Group / species	English name (if available)	National status	Ecological associations etc
Apis mellifera	Honey bee		Flowers in general
Bombus lapidarius	Red-tailed bumble bee		Ubiquitous
Bombus lucorum	White-tailed bumble bee		Ubiquitous
Bombus pascuorum	Common carder bee		Ubiquitous
Bombus terrestris	Buff-tailed bumble bee		Ubiquitous
Formicidae			
Lasius niger	Common black ant.		Generalist species
Myrmica scabrinodis			Grassland - preferring shorter, damp turf
Vespidae			
Vespula germanica	A common social wasp		Ubiquitous
HYMENOPTERA: SYMPHYTA			
Tenthredinidae			
Pontania proxima			Makes galls on sallow - mainly southern
LEPIDOPTERA: BUTTERFLIES			
Hesperiidae			
Thymelicus sylvestris	Small skipper		Grassland
Lycaenidae			
Celastrina argiolus	Holly blue		Both holly and ivy are required - as there are two generations per year
Nymphalidae			
Cynthia cardui	Painted lady		Immigrant species
Pararge aegeria	Speckled wood		Grasses in light woodland or scrub
Pyronia tithonus	Gatekeeper		Larvae feed on coarse grasses
Vanessa atalanta	Red admiral		Most often recorded as an immigrant from overseas
Pieridae			
Pieris brassicae	Large white		Various cruciferae
Pieris napi	Green-veined white		Ubiquitous
Pieris rapae	Small white		Ubiquitous
LEPIDOPTERA: MOTHS			
Choreutidae			
Anthophila fabriciana	Nettle-tap		Nettles
Geometridae			
Camptogramma bilineata	Yellow shell		Herbaceous plants
Scotopteryx chenopodiata	Shaded broad-bar		Vetches and clovers
Xanthorhoe montanata	Silver-ground carpet		Herbaceous plants - especially bedstraws
Pyralidae			
Crambus lathoniellus			Grasses
Crambus pascuella			Grasses

Group / species	English name (if available)	National status	Ecological associations etc
Crambus perlella			Grasses
Udea olivalis			Herbaceous plants
MECOPTERA			
Panorpidae			
Panorpa germanica			Edge habitats
MOLLUSCA			
Arionidae			
Arion ater			Widely polyphagous
Cochlicopidae			
Cochlicopa lubrica			Most damp habitats
Helicidae			
Cepaea nemoralis	Brown-lipped snail		Amongst herbage generally
Limacidae			
Deroceras reticulatum			General herbivore
Limax maximus	The great grey slug		General herbivore
Milacidae			
Milax budapestensis	A slug		Widely herbivorous
Milax sowerbyi			General herbivore
MYRIAPODA: CHILOPODA			
Cryptopidae			
Cryptops hortensis	A centipede		Amongst litter - often synanthropic
Lithobiidae			
Lithobius forficatus	The common centipede		Many habitats
Lithobius melanops			
MYRIAPODA: DIPLOPODA			
Julidae			
Cylindroiulus punctatus			Detritivorous
NEUROPTERA			
Chrysopidae			
Chrysoperla carnea			Aphid predator of trees and bushes
Chrysoperla lucasina			Arboreal species
Nineta flava			Thought to be associated with oak, feeding on aphids on the leaves
Hemerobiidae			
Hemerobius humulinus			Trees and bushes, hedges, etc
Hemerobius lutescens			Trees and bushes, hedges, etc
ORTHOPTERA			
Acrididae			
Chorthippus brunneus	Field grasshopper		Grassland
Tettigoniidae			
Meconema thalassinum	Oak bush-cricket		Oak trees, especially when at the woodland edge
Metrioptera roeselii	Roesel's bush-Cricket	Nb	Long grassland

Appendix 4: Explanation of National Status Codes used in the Species List

NATIONALLY RARE species are those falling within the Status categories defined in the *British Red Data Books* (Bratton, 1991; Shirt, 1987). These are internationally recognised species listed in the various *Red Data Books* published by, or under the auspices of, the International Union for the Conservation of Nature (IUCN). Species included may not be informally removed or transferred between categories. There are four categories as follows:

- **RDB 1 – "Endangered"** Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. These include Species known from only a single locality since 1970, species restricted to habitats which are especially vulnerable species which have shown a rapid and continuous decline in the last twenty years and are now estimated to exist in five or fewer localities and species believed extinct but which would need protection if re-discovered.

- **RDB 2 "Vulnerable".** Taxa believed likely to move into the Endangered category in the near future if the causal factors continue operating. These include species declining throughout their range, species in vulnerable habitats and species whose populations are low.

- **RDB 3 "Rare".** Taxa with small populations which are not at present endangered or vulnerable but which are at risk. These are species which are estimated to occur in fifteen or fewer localities.

- **RDB K. "Unknown"** Taxa suspected to fall within the RDB categories but which are at present insufficiently known to enable placement.

NATIONALLY SCARCE species are those falling within the Nationally Notable categories introduced by Ball (1986). They are species which are estimated to occur within the range of 16 to 100 ten-kilometre squares of the British National Grid system since 1970. The specific categorisations of species have been revised since their inception for a number of taxa; those revisions are taken into account in the present report.

Notable species are subdivided as follows:

- **Na**: species estimated to occur within the range of 16 to 30 10-kilometre squares of the National Grid System.

- **Nb**: species estimated to occur within the range 31 to 100 10-kilometre squares of the National Grid System.

- **N**: Diptera for which there are not sufficient data to permit separation into the Na and Nb categories.

NATIONALLY LOCAL species are those which, whilst fairly common, are evidently less widespread than truly common species, but also not qualifying as Nationally

Notable having been recorded from over one hundred, but less than three hundred, ten-kilometre squares of the UK National Grid.

Remaining species have either been formally declared “Common” or else are listed as “Unknown” where insufficient data is available to assign a species to any category.

436000 436500 437000

209500 209000

Overgrown pond

Damp vegetation

Legend

- Main Phase 1 survey area (2003)
- Damp vegetation
- Overgrown pond
- Dead wood
- Pitfall trap transect
- Riparian vegetation
- Dead wood associated with hedgerows
- Target note (*with number*)

Rev:	Date:	Amendment:	Name:	Checked:

Data Source: RPS 2008

Status: **FINAL**

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Client: Oxfordshire Highways

Project: Witney Cogges Link Road

Title: Location of areas of invertebrate interest
B0834600/PA/DOC/CLR/23 Fig 1

Scale: 1:5,000 @A3

0 25 50 100 150 200 250 m

Projection: British National Grid Datum: OSGB36

Date: 08/04/2008 Drawn: NE Checked: MF

Job Ref: **JPP1405** Figure No: **1** Revision: **B**

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Project Ref: V:\JPPxxxx\GIS\JPPxxxx_file.mxd

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