5. Future work on BAP Priority ground beetles

Over the first four years of the Project, there has been a strong emphasis on the accumulation of information on the distribution and ecology of the various BAP Priority species, with most resources targeted towards the establishment of the various contracts summarised in section 2 of this report. It is important that we review the results of this first four years work, and consider the direction in which future work on ground beetle conservation is taken. Where further work on the individual species discussed in sections 2 and 3 above is deemed necessary, this is noted under each species in those sections. The current section of the report deals with more general issues relating to the future direction of work on UK BAP Priority ground beetles.

5.1. Review of Priority species in the UK BAP

The list of priority species in the UK BAP is due to be reviewed in 2005. This provides an excellent opportunity both to consider the removal of some of the species that are currently included on the BAP Priority list, and also to consider the inclusion of new species. In general terms, the current list of BAP Priority ground beetles is too long, given current levels of conservation resources. It also includes a number of species which, though they may meet the rarity and threat criteria for inclusion in the UK BAP, are extremely cryptic in their habits. Whilst such species may merit BAP status, in practical terms much survey and research effort can be invested for very low returns. Good examples of such species amongst the ground beetles include *Amara famelica*, *Lebia* species and *Panagaeus crux-major*. With the latter species, nearly ten years of work funded by the Countryside Council for Wales and English Nature has resulted in only modest advances in our knowledge of its distribution and autecology. Amongst the BAP Priority ground beetles not studied during this Project, there are probably a number of other cryptic species, possible examples being the *Badister* and *Ophonus* species and *Dromius quadrisignatus*. Inclusion of such species in the UK BAP list is only worthwhile if it is possible to carry out meaningful studies of their British distribution and ecology.

By contrast, a number of the other studies have been very successful in furthering our understanding of the species and its ecology, with good examples of this being *Carabus intricatus*, *Cicindela germanica*, *C hybrida*, *C sylvatica*, *Harpalus froelichii* and *Poecilus kugelanni*. There are also a number of other ground beetles which, on the basis of their decline in British disribution may also be candidates for inclusion in a revised BAP Priority list.

Table 3 includes species of ground beetle listed as nationally scarce or Red Data Book, which have not been found in at least 60% of their historic sites and are not currently included as priority species in the UK BAP. Percentage "decline" has been calculated on the basis of comparing the number of post- 1970 10km squares in which the species has been recorded in the UK carabid atlas (Luff, 1998) as a percentage of the total number of post-1900 10km squares with records.

A "decline" as defined here is almost inevitable, as it is very likely that some old sites for each of the species have not been revisited, or if they have, the species in question, though still present, has not been rediscovered. The latter is especially likely amongst genera such as *Amara* and *Harpalus*, which are both difficult to find and identify. In looking at the list below, we must therefore be mindful of these factors, and it is

probably only amongst some of those species towards the top of the list, with very steep "declines" that we can be really confident that there has been a significant reduction in the UK distribution.

A second good pointer indicating that we can deduce a real decline from the distribution maps is where the proportion of post-1970 to post-1900 records varies from one part of the country to another. A good example of this is provided by *Calosoma inquisitor*, which appears to be holding its own in Wales, north west England and western Scotland, but has almost disappeared from eastern Britain. Where the maps show clear evidence of such regional declines, this has been noted in the table below.

TABLE 3: NON-BAP PRIORITY CARABIDS DECLINING IN THE UK

SPECIES:	STATUS:	PRE 1970/POST 1970	NOTES:
Harpalus cupreus	RDB1	1/0 (Extinct?)	
Dyschirius extensus	RDB1	3/0 (Extinct?)	
Acupalpus elegans	Extinct	6/0	
Harpalus melancholicus	RDB1	14/1 (93%)	Disappeared from all English sites, now only single Welsh site.
Agonum quadripunctatum	RDB1	11/1 (91%)	Possibly an immigrant
Lebia cyanocephala	RDB1	11/1 (91%)	
Harpalus honestus	RDB1	10/1 (90%)	
Callistus lunatus	RDB1	7/1 (86%)	
Harpalus puncticollis	RDB3	28/6 (79%)	
Calosoma inquisitor	Na	68/17 (75%)	Extinct across eastern half of UK
Bembidion quadripustulatum	Nb	46/13 (72%)	Severe decline in northern and eastern England
Harpalus melleti	Na	24/7 (71%)	
Acupalpus flavicollis	Na	28/8 (71%)	Severe decline in all areas except New Forest
Harpalus sabulicola	RDB3	19/6 (68%)	
Amara nitida	Na	19/6 (68%)	
Nebria livida	Na	15/5 (67%)	
Amara fusca	RDB1	3/1 (67%)	
Acupalpus brunnipes	Na	9/3 (67%)	
Carabus monilis	Nb	190/64 (66%)	
Harpalus azureus	Nb	72/26 (64%)	
Amara consularis	Nb	73/28 (62%)	
Dyschirius nitidus	Na	26/10 (62%)	
Pterostichus longicollis	Nb	67/26 (61%)	
Harpalus serripes	Nb	26/10 (61%)	Disappeared from more northerly English sites
Harpalus smaragdinus	Nb	25/10 (60%)	
Acupalpus exiguus	Nb	67/27 (60%)	
Dromius vectensis	RDB3	20/8 (60%)	

5.2. Managing sites for BAP Carabids

With those species where the Project has been successful in elucidating aspects of their autecology, there is a clear need to use this information to inform and implement conservation management that aims to both protect existing colonies of the species, and encourage their spread into new areas. This has not been a major focus of effort during the first four years of the Project, as the emphasis has had to be on the gathering of baseline information. However, with species such as the Blue Ground Beetle, the tiger beetles, Kugelann's Ground Beetle and *Harpalus froelichii*, where targets for number of colonies have now been met, this is a key requirement that still needs to be addressed if we are to ensure their conservation in England.

At a broad level, this would involve feeding in the habitat and management requirements of the species to the UK BAP Habitat Action Plans, and also to DEFRA's developing agri-environement schemes, especially the Environmentally Sensitive Area (ESA) schemes. More locally, such information needs to also be made available to English Nature local teams, and to all individual managers of sites supporting good breeding populations of BAP Priority ground beetles.

5.3. Dissemination of information

This is another very important aspect of the BAP process, and again it is one that has formed a relatively minor element of work during the first four years of the SGBP. In order to build support and involvement in the conservation of our ground beetles, it is vitally important that a strategy for dissemination of the information arising out of the Project is developed. Wider and more regular circulation of a newsletter may be one way of generating such interest, and the development of a website and other interpretative materials should also be investigated.

6. Acknowledgments

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Appendix 1: Species Status categories used in this report (from Hyman & Parsons, 1992)

RDB1 – Endangered. Taxa in danger of extinction and whose survival is unlikely if causal factors continue operating.

RDB2 – Vulnerable. Taxa which are known from 15 or fewer 10 km squares of the National Grid and which are decreasing and will become endangered in the near future if the causal factors continue operating.

RDB3 – Rare. Taxa with small populations that are not at present Endangered or Vulnerable, but are at risk.

RDBK – Unknown. Taxa suspected, but not definitely known to be of Red Data Book status in Britain, because of lack of information.

RDB5 – Endemic. Taxa which are not known to occur naturally outside of Britain.

Na – Nationally Scarce Category A. Taxa thought to occur in 15-30 10km squares of the National Grid.

Nb – Nationally Scarce Category B. Taxa thought to occur in between 30 and 100 10 km squares of the National Grid.

Appendix 2: Text of talk to RSPB Lowland Heathland Conference, Bournemouth, 17 Septembe 2001.

The Scarce Ground Beetle Project – Conserving the ground beetle fauna of Britain's lowland heaths

Introduction

Ground beetles all belong to the family Carabidae, and include some of our most familiar British beetles. As their name suggests, most carabids live on the ground, where they prey on a range of other invertebrates, such as grubs and worms. Many ground beetles can be found under stones and logs, but they are extremely diverse in their habitat requirements. For example, a number of species occur in the woodland canopy, whilst others are restricted to the tops of mountains. Wetlands support many species, as do lowland heaths and coastal habitats such as saltmarshes.

There are about 365 species of ground beetles in Britain. Of these, half of the species are considered to be scarce or threatened. Many have shown considerable declines in their abundance this century, primarily as a result of the loss of their habitats to intensive agriculture and forestry, or to inappropriate development. The presence of populations of scarce ground beetles is a very good indication that the quality of the habitat is still high. Carabids are one of the best-studied groups of British beetles, being relatively easy to identify, and including a number of extremely attractive species.

Because of these threats to our carabid fauna, and the relatively good knowledge that we have of their distribution, habitat and identification, they are well represented in the list of priority species in the UK Biodiversity Action Plan (BAP). In all 33 ground beetles are included in the UK BAP, a full list of these can be found in Table 1 of the Scarce Ground Beetle Project Newsletter, circulated to all delegates. For each of these species, the UK BAP provides a series of actions that will need to be addressed by 2010 in order to maintain and enhance their populations.

The Scarce Ground Beetle Project (SGBP):

These 33 species are the main focus of the Project. However, its remit also includes other Nationally Scarce and Red Data Book carabids, where there is thought to be a pressing need for conservation action. English Nature are charged by government with accomplishing the actions laid out in the UK BAP. They have already initiated work on a number of the priority ground beetles in conjunction with voluntary conservation organisations in the Biodiversity Challenge partnership, and with Invertebrate Link.

The SGBP was set up with funding from English Nature to complement and extend this work. The Project only covers populations of scarce ground beetles occurring in England. It will run from 2000 until 2004. The aims of the Project are as follows:

- To achieve a good understanding of the current distribution, ecology and conservation needs of the 33 priority ground beetles;

- To encourage the adoption of management regimes that will maintain and enhance populations of scarce ground beetles;

- To consider the requirements of other Nationally Scarce or Red Data Book carabids;

- To disseminate the results of the Project to conservation organisations and the general public, primarily through the establishment and servicing of a scarce carabid network.

Scarce Ground Beetles of Lowland Heaths:
In talking about the ground beetle fauna of lowland heaths, I have defined the habitat to include, in addition to lowland heathland in its strict sense, the wet valley mires that are an integral part of the habitat mosaic on most lowland heaths in southern England. For this reason I have included a discussion of the ground beetles of mire habitats in this paper. Certainly, mire habitats are of great importance for scarce ground beetles, with two of the species included in the BAP priority species list being mire specialists, in addition to the four species that are restricted in Britain to dry lowland heath. These six species of carabid are listed below in Table 1, with brief notes on distribution and habitat.

Table 1: Priority BAP Ground Beetles of Lowland Heathland

Amara famelica	Sussex, Warks & Yorks	Lowland heath
Anisodactylus nemorivagus	Dorset, Hants (New Forest), Wilts & Surrey	Lowland heath
Wood Tiger Beetle *Cicindela sylvatica*	Dorset, Hants (New Forest), Sussex & Surrey	Lowland heath with patches of bare sandy ground
Pterostichus aterrimus	Hants (New Forest)	Valley mire & poor fen
Kugelann's Ground Beetle *Pterostichus kugelanni*	Devon, Dorset & Hants (New Forest)	Lowland heath with bare, sandy banks
Tachys edmondsi	Hants (New Forest)	Valley mire

Four of these ground beetles, *Amara famelica*, *Cicindela sylvatica*, *Pterostichus kugelanni* and *Tachys edmondsi*, have been targeted for action in 2001. The remaining three are not currently considered to be a priority for action. Further information on these ground beetles is included in a short discussion of each of them below.

Amara famelica Zimmerman:
Amara is one of the larger genera of British ground beetles, with 31 species being included in Lindroth (1974). It is also one of the more difficult groups to identify, with many of the species, including *A famelica*, being superficially very similar, and requiring close microscopic examination for reliable identification. This species is not covered by the Scarce Ground Beetle Project, as it is already the subject of a study being overseen by the Action for Invertebrates project, supported by Biodiversity Challenge, English Nature and the Joint Committee for the Conservation of British Invertebrates, with survey work undertaken by Dave Hemingway. Thus far this study has not located populations of this extremely elusive insect. There are recent records from three widely spaced sites in England; Ashdown Forest in Sussex, Strensall

Common in Yorkshire (Luff, 1998) and Sutton Park in Warwickshire (Lane, 1999). All these records are from dry/humid *Calluna vulgaris* dominated heathland. There are also scattered pre-1970 records from a number of sites in southern and eastern England. Until established populations are discovered, it is impossible to discuss the ecology of the species, or to formulate conservation management recommendations for it. There is a full Action Plan for *Amara famelica* included in the UK BAP (UK Biodiversity Group, 1999a). The species is rated Red Data Book 3 (Rare) by Hyman and Parsons (1992).

Anisodactylus nemorivagus (Duftschmid):
This is a very rare inhabitant of dry sandy heathland. Recent records are from a handful of southern heathland sites in Dorset, Hampshire, Wiltshire and Surrey. It has always had a very restricted southern distribution in Britain, though there are also pre-1970 records from the Norfolk and Suffolk Brecks, and from south Wales (Luff, 1998). This species is only accorded a Species Statement in the UK BAP (UK Biodiversity Group, 1999b), and for this reason is not considered a priority for funded research. It is a spring breeder, with larvae developing over the summer. Both adults and larvae are thought to be seed feeders. Other than this basic ecological information, very little seems to be known of its ecology, and it is not possible to formulate management recommendations for it currently. *A nemorivagus* is listed as Nationally Scarce (A) in the UK Coleoptera Review (Hyman and Parsons, 1992). *A nemorivagus* was recorded by AJW Allen at a new site on the MoD range at Bovington in 2001 in the course of carrying out work on *Cicindela sylvatica* (see below).

Wood Tiger Beetle *Cicindela sylvatica* Linnaeus.
Cicindela sylvatica is the largest British tiger beetle, and is distinguished from other species by its predominantly charcoal-black colouration, and the deep pits that adorn its wing cases. Like most tiger beetles, it flies readily, and is very wary and difficult to approach. The carabid atlas (Luff, 1998) shows that formerly this species had a localised but widespread distribution on the southern heaths of Dorset, Hampshire, Sussex and Surrey, with a handful of sites elsewhere, including a single very isolated locality in Lincolnshire. By contrast, post-1970 records are very sparse, and it appears to have been lost from many of its former sites. In some cases this is clearly the result of the loss of its heathland habitat to intensive agriculture, forestry or development, but worryingly it also seems to have vanished from a number of sites where heathland is still present. In particular, its complete disappearance from the New Forest is perplexing. This species is currently only rated as Nationally Scarce (A). However, it is certain to be updated to Red Data Book status at its next review, on account of its steep decline in the UK.

This is one of the species for which work has been funded under the SGBP during 2001. Fieldwork carried out by AJW Allen, and the RSPB's Dorset Heathland team has resulted in the species being recorded from six sites during the year. Five of these sites are on the lowland heaths of Dorset, with the only other currently known British population being in Surrey. The discovery of the wood tiger beetle on two new areas of heathland on MoD land is particularly encouraging. As with other tiger beetles, *C sylvatica* requires heathland with patches of bare, sandy ground in which the larval burrows can be constructed, and over which the adults are able to hunt. One of the primary reasons for the decline of this species in the UK is thought to be the lower

levels of management disturbance, and consequent reduction in bare ground that this causes. On many of its former sites, lack of grazing and burning in particular, have resulted in the development of large expanses of dense, tall heath, with very little open ground. This point is highlighted by the discovery of wood tiger beetle colonies on two areas of MoD land that are much disturbed by military training, and still have an abundant supply of bare sandy ground. Having discovered good populations in 2001, the challenge in 2002 will be to start to build a better understanding of the ecology of the species and its conservation management **requirements.**

***Pterostichus aterrimus* (Herbst).**
This is a distinctive jet black ground beetle, with a very shiny "varnished" appearance. It has always been considered a great rarity, with sporadic records interspersed with long periods when it has been feared extinct. In the nineteenth century it was thought to be restricted to East Anglia, but in the following century it disappeared from this area as its fenland habitats were drained. However, in 1969, it was found in the New Forest in a bog-moss *Sphagnum* spp.-dominated valley mire surrounded by dry heath. Unfortunately, this bog was drained soon after the species had been discovered, and by 1973, it had become extinct here, and was again feared to be lost as a British species. This remains the case to the present day, though it has recently turned up at a number of sites in Ireland. It is listed as RDB1 in the Coleoptera Review (Hyman and Parsons, 1992). Due to the uncertainty regarding the status of this species in southern England, no work is planned currently. However, the recent discoveries in Ireland indicate that new British colonies may still exist in the New Forest, and possibly elsewhere.

Kugelann's Ground Beetle *.Pterostichus kugelanni* (Panzer).
A striking ground beetle, with metallic green elytrae, contrasting with a metallic coppery-pink forebody. Formerly this species had a widely scattered distribution in southern Britain, ranging from Cornwall and Glamorgan east to the London commons, with outlying populations in Norfolk and Nottinghamshire. During the century, this species has shown a massive contraction in its British distribution, and by the beginning of this project there had only been recent records from two sites in the New Forest, and at two sites in Devon. This decline has resulted in its designation as RDB1 (Endangered) (Hyman and Parsons, 1992).

The ecology of this species is broadly similar to that of the wood tiger beetle, as it is also a denizen of lowland heathland with a requirement for bare ground. Kugelann's ground beetle is another of those species that is the subject of ongoing research as part of this Project, with John Walters being contracted to carry out the work. As with the other species, the initial focus has been on establishing the extent of the British distribution. This has proved to be very successful, with additional populations, being discovered at two further sites in Dorset, and another small colony being located in Devon. One of the Dorset sites is on MoD land at Bovington, where populations of the two other dry heathland BAP priority species *Anisodactylus nemorivagus* and *Cicindela sylvatica* were also found in 2001, making this a site of outstanding importance for the conservation of rare ground beetles.

More detailed autecological studies have begun at the population of this species on Dartmoor. The habitat here is heavily grazed and frequently burnt dry heath, with abundant patches of peaty and rocky bare ground. This conforms to its habitat

elsewhere in England, though on the lowland heaths of Dorset and the New Forest, it generally occurs on heathland with patches of bare sandy ground, and at another Devon site, it is found on pebblebed formations. The wider range of substrates it is able to utilise helps to explain its wider British distribution in comparison to *A nemorivagus* and *C sylvatica*, which are confined to sandy substrates. In all cases, Kugelann's ground beetle is found on south-facing slopes, and is clearly extremely thermophilous. In the New Forest, it has been noted visiting the burrows of solitary bees on a south-facing sandy bank, though this relationship has not been observed at other sites. An association with the dung of grazing animals has also been postulated, and though this is clearly not an obligate relationship either, it is nonetheless interesting that much the densest population occurs on common land on Dartmoor, where grazing pressure is still quite high. At this site, adults may be readily observed during sunny days from March through to July. Adults have been recorded feeding on small bugs (Heteroptera), and on the darkling beetle *Cylindrinotus laevioctostriatus*. Larvae have also been found, and have been reared through to the adult stage in captivity on a range of invertebrate prey. As with other rare heathland invertebrates, its decline is probably attributable to the withdrawal of management from many of our lowland heaths, and the consequent reduction in bare ground that this has created.

Edmond's ground beetle *Tachys edmondsi* Moore.
Edmond's ground beetle is a tiny, dark reddish-brown Carabid. It is a great rarity that has only ever been recorded from the New Forest. It was discovered in a valley mire here in the 1912, with the last record being by AM Massee in 1936. After this, there was a long hiatus during which time it was feared that it had become extinct. However, in 2000, a Coleopterist's meeting organised in the New Forest rediscovered *T edmondsi* in a small valley mire quite close to the historical site.

For many years it was thought that this was our only endemic species of ground beetle, however recent research suggests that once a thorough taxonomic revision of this group is undertaken, *T edmondsi* will be shown to be conspecific with other members of the subgenus *Paratachys* already known to occur in south western Europe and north Africa (Hammond, 2000). Currently its UK status remains RDB3/5 (Rare and Endemic).

Bryan Pinchen is undertaking further work on this species funded by this Project. A major element has been to attempt to find further populations, and thus far he has discovered two new "sites", though both of these are very close to the original colony, and probably constitute sub-populations. In the following years, more emphasis will be placed on elucidating the ecology of the species, though with such a small and cryptic beetle, this will present a major challenge. The most interesting point to emerge from investigations thus far is that *T edmondsi* appears to favour hummocks of bog-moss lying on the interface between valley mire and humid heath habitats. Such hummocks become very warm over the summer, and given the southern distribution of many members of this sub-genus, it seems probable that this is a thermophilous species, with "relict" populations in the New Forest. Sites favoured are generally very sheltered by scrub and bracken, which also helps to create an extremely warm microhabitat.

Conclusion:

The UK BAP has provided a major stimulus promoting work on the scarce and threatened ground beetles of our lowland heaths. Thus far, work carried out by English Nature's Scarce Ground Beetle Project has aimed to try and better understand the British distribution of the 33 BAP priority ground beetles. To this end, the Project has already been extremely successful, and in lowland heathland habitats, new colonies of *Cicindela sylvatica*, *Pterostichus kugelanni* and *Tachys edmondsi* have been located during 2001. The challenge in future years of the Project will be to build on this information, particularly by developing our understanding of the ecology of lowland heathland ground beetles, and thus to inform our conservation management decisions.

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