Action for Biodiversity

Hymettus

Supported by the Esmée Fairbairn Foundation

Hymettus Ltd
Research Report for 2007

Compiled by Paul Lee

Hymettus Ltd.
Lea-Side, Carron Lane
MIDHURST
West Sussex GU29 9LB

Hymettus Research Report for 2007

Contents **Page**

1.	**Background**	**1**
2.	**Ant Projects**	**1**
	Formica exsecta	**1**
	Formica rufibarbis	**5**
	Southern Ants	**7**
3.	**Eumenid Wasps**	**15**
	Odynerus melanocephalus /spinipes	**15**
	Odynerus similiimus	**19**
	Pseudepipona herrichii	**19**
4.	**Chrysidid Wasps**	**20**
	Chrysis fulgida* and *Chrysura hirsuta	**20**
5.	**Pompilid Wasps**	**20**
	Homonotus sanguinolentus	**20**
6.	**Sphecid Wasps**	**20**
	Cerceris quadricincta	**20**
	Cerceris quinquefasciata	**21**
7.	**Bees**	**21**
	Andrena marginata/Nomada argentata	**21**
	Colletes floralis	**23**
	Northern bees	**26**
	Osmia inermis	**30**
	Osmia parietina	**33**
	Osmia uncinata	**34**
	Osmia xanthomelana	**34**
	Bumblebees	**34**
	Bombus subterraneus	**34**
	Bombus distinguendus	**34**
8.	**East Anglian Wetland Aculeates**	**35**
9.	**Other projects**	**38**
	Interpretation leaflets and visits to HAP Groups	**38**
	Red Listing	**38**
	BAP Species	**38**
	Genetic profiling	**38**
10.	**Development of Hymettus Ltd**	**39**

Hymettus Report for 2007

1. Background to 2007 Research

1.1 Following the 2006 ACG/Hymettus Annual Review meeting the annual contract to co-ordinate the activities of Hymettus Ltd was let to Paul Lee. The first major role of the co-ordinator was to undertake a review of the priorities for supporting research leading to practical advice and actions for the conservation of target taxa within the aculeate hymenoptera. This review was informed by discussions at the 2006 Review meeting and finalised with advice from Mike Edwards and Stuart Roberts. The projects reported here were mainly drawn from the resulting list of priority actions as sufficient funds became available. This work was made possible by core funding from the Esmée Fairbairn Foundation and research funding through a Memorandum of Agreement with Natural England. Other projects reported here were financially supported by the Cairngorms National Park Authority, the Countryside Council for Wales, RSPB and Scottish Natural Heritage.

1.2 Projects undertaken in 2007 are reported in the following order of taxonomic group: ants, wasps, bees, other projects. Many of the reports submitted are only summarised here but the full reports can be obtained from Paul Lee.

2. Ant Projects

2.1 *Formica exsecta*

2.1.1 Scotland

The following notes are from the minutes of the Wood Ants Steering Group meeting held in Edinburgh in December:

In Glenmore, Forest Enterprise have defined a *F. exsecta* 'conservation zone' which will be managed and monitored to ensure a core population persists during the period when native woodland restoration (largely through natural pine regeneration) is progressing.

In Abernethy, RSPB are looking at similar conservation zones where there will be active management and monitoring for *F. exsecta*.

At Mar Lodge, National Trust for Scotland have carried out intensive surveys for *F. exsecta* and have now recorded a total of 15 nests (including 2 abandoned). This population on the eastern side of the Cairngorms is clearly very small and vulnerable and will require targeted management in the short to medium term. (A copy of the NTS report is available from PL)

At Carrbridge, a number of *F. exsecta* nests are under potential threat from a proposed housing development. Although no nests will be directly built on, a number are very close to proposed access roads, houses and gardens so they may suffer from attritional impacts during construction and both short and long term disturbance. There may also be potentially new habitat created which they may colonise if the canopy of the existing woodland is opened up. Badenoch and Strathspey Conservation Group are currently campaigning against the development and Jonathan Hughes of the Scottish Wildlife Trust (in the capacity of consultant) has mapped the nests and suggested mitigation measures should the application eventually be approved.

A leaflet on *F. exsecta,* funded by Scottish Government's Biodiversity Action Grant Scheme has been produced through the Cairngorms LBAP.

2.1.2 Devon

In 2007 Stephen Carroll was asked to collect samples of *F. exsecta* from Devon for Mark Brown's investigation reported below. He also kindly provided an update on the status of the ant in Devon. The following is an edited version of his report.

Chudleigh Knighton is the last known English site for *Formica exsecta*; Bovey Heathfield had one remaining nest until 2003, and is a site for *Tapinoma erraticum,* which is listed on the 2007 revised BAP. An attempted *F. exsecta* nest translocation from Paignton Zoo in 2003 failed.

With longer term management in place at Chudleigh Knighton the aim over the last 2-3 years has been to re-establish heather and reduce the amount of scrub cover. Present work has been to follow up management in areas recently cleared of scrub; these areas appear to be responding and heather and grasses are starting to return. It would be interesting to see at what point these areas become suitable for *F. exsecta* colonisation.

In the last year major clearance of gorse and birch in compartment 3 has been carried out and followed up with spot-spraying on cut birch. Firebreaks have been cut, new ponds dug, and new fencing erected to allow stock to be moved more easily around the site. Much future work will rely on an active group of volunteers. It is hoped to make openings through scrub so that cattle have connecting access to other compartments. (David Stradling has observed that *F. exsecta* appears to respond to well to burning but is increasingly being threatened by the spread of gorse which is not being adequately kept in check.)

During 2007 fifty nests were counted on Chudleigh Knighton, of which at least 9 were new. Sixteen nests recorded in 2005 were either not found or abandoned/not active in 2007. There may be additional nests other than those found during the present survey. Thirty nests were sampled for genetic analysis in summer 2007. At the same time a survey of nests known from the 2005 survey (the most recent survey data available) was carried out. There appear to be a number of new nests in areas swaled and scrub managed during the previous practical seasons 2003-2006 but it was not clear whether these were new nests or offshoot satellites from existing nests. Some nests had apparently been disturbed by cattle. The majority of new nests recorded were in areas without nests in 2005, extending towards the A38 slip road edge. One of the two new nests discovered in compartment 1, an area where mated queens had been released, had been overtaken by *Lasius* ants, but the other nest was still intact and active. Nests found during 2004-5 in compartment 5 (a glade amongst wooded scrub) had become shaded under dense bracken cover. Some had moved to more open, sunnier spots but it was not possible to re-locate some of the other nests in this compartment. (A full list of the nests surveyed was appended)

A grant from SITA (landfill) was received for heathland restoration, survey and community involvement work at Bovey Heath. Over winter 2007 various projects were carried out to restore the site to 'recovering' and 'unfavourable recovering' status. Targeted *F. excesta* work is included in the current site management plan. From the 2007 Hymettus meeting it was suggested that artificial 'stumperies' for *Formica fusca,* in combination with experimental releases of mated queen *F. exsecta*, might be attempted. Volunteer work parties built four such stumperies on

Bovey Heath, using material cut as part of routine management operations (birch and pine clearing). At least one of these was successfully colonised by ants (*Lasius niger*).

2.1.3 Mating patterns and nest structure in *Formica exsecta*

Dr Mark Brown and his research assistant, Ms Róisín Judge, at the University of Dublin have completed an investigation into mating patterns and nest structure in *Formica exsecta* populations from Devon and Scotland using microsatellite markers. An edited version of their preliminary report follows. Mark stresses that his conclusions regarding colony monogyny/polygyny are preliminary and he will be undertaking more detailed analysis of the data.

Introduction

An important feature of *F. exsecta* (and other *Formica* species) is that colonies differ to each other in the number of gynes per nest and the number of nests per colony. Polygyny (more than one gyne per nest) is thought to arise as an adaptive strategy in certain environmental conditions and polydomy (more than one nest per colony) is probably a consequence of polygyny. In *F. exsecta*, three social types have been described: monodomous-monogynous, monodomous-polygynous and polydomous-polygynous although the middle type may be a temporary stage between the first and the third.

Mating patterns and colony structure have important implications for the conservation of endangered species, as they directly influence the genetic diversity and distribution of the remaining populations. Information on F. exsecta colonies in the UK is therefore required in order to fully assess the nature of action to be taken to conserve this species. Through genetic analysis of F. exsecta colonies from Scotland and England, we aim to answer two questions: 1) are these colonies mono- or polygynous? – and 2) are these colonies mono- or polydomous?

Methods

Ten workers from each of 28 nests from three sites in Scotland and one site in England were taken for analysis. DNA was extracted from each individual and five microsatellite markers were tested on a minimum number of individuals to determine suitability and variability: FE13, FE17, FE38, FE42 and FE49. (From analysis carried out in 2006 by M. Brown, it was already known that FE21 was monomorphic in these populations.)

Data from one marker (FE 42) was used to elucidate mating patterns within nests. As nests with fewer than 4 successfully genotyped individuals were removed from the analysis, a total of 24 nests were examined. Each nest was then examined individually for evidence of polygyny and multiple mating. As mothers are diploid and fathers are haploid, true siblings must share their paternal allele. Therefore nests in which every individual had one allele in common, and which showed no more than 3 alleles in total were assumed to be monogynous and monoandrous. Any nest which showed 2 or 3 alleles but in which every individual did not share at least one allele was assumed to be polyandrous and monogynous. Any nest which showed more than 3 alleles and in which every individual did not share at least one allele was assumed to be polyandrous and polygynous. In certain cases it was ambiguous as to whether allelic variation was caused by multiple queens or multiple males. It is important to note that in using this method, only the minimum numbers of sibling groups, gynes and fathers can be confidently determined. As there is no way of differentiating between two parents with the same allele, much of the time it must be assumed that it is from the same individual.

Data from loci FE42 and FE38 were used in the analysis of colony structure.

Results

Of the 24 nests analysed, 11 were assumed to be monogynous and monoandrous, 3 were probably monoandrous and polygynous and 7 were polyandrous and probably polygynous. Only minimum numbers could be determined as there was probably a substantial amount of convergence in the marker which was used (only 8 alleles in total).

Out of 24 nests, 17 were estimated to be polydomous. Of these 17, 9 were also estimated to be polygynous in the mating pattern analysis. Two to four nest groups were found per population resulting in colony to nest ratios of less than one. It would be expected that some of the pairs are similar by convergence, especially as some of the nests are geographically quite far apart (e.g., Abernethy population, nests 6 and 1 are in a nest group but are actually more than 3 km apart). It would also be expected that some of the remaining 7 nests would be polydomous, sharing colonies with nests that were not included in the samples analysed. For all populations, except for that of Abernethy, most of the variance came from within the nests rather than between the nests.

Discussion

The results of this study report a high degree of social polymorphism (polygyny and polydomy) in the sampled *F. exsecta* colonies in Scotland and England. This is in agreement with a similar study carried out on Scottish *F. exsecta* colonies by Dallas *et al.* (1998: grant report). Using the described techniques it was possible to identify with certainty the polygynous/polyandrous nests; however, for the identification of monogynous/monoandrous nests the most parsimonious solution, i.e., that alleles of the same size belonged to the same individual, had to be assumed. Fortunately, such uncertainties are not serious when assessing the genetic health and conservation status of *F. exsecta*, as there can only be more genetic variation than described here, not less.

Ultimately, the main limitation of this study was funding, which, when the cost of material was subtracted only covered a 6-week work period. As a result, most of that time was spent testing the markers and only 1 – 2 weeks remained to carry out the investigation. The most successful marker (FE42) was larger than expected, but had to be run on gels of a non-optimal density as there was no time to order the more suitable gels; this caused both very slow electrophoresis runs and some illegible bands. More working time in the laboratory would also have allowed more nests to be analysed, yielding more accurate results – with the time given, only approximately one third of ants collected for the study were included in the analyses.

Other limitations arose in the nature of the markers and in the methods employed. The most suitable marker (FE42) and that on which the results are based only showed a total of 8 alleles and a heterozygosity of approximately 0.59. This meant that the likelihood of convergence of alleles was high. Also, it is possible that null alleles occurred in the dataset (most likely at locus FE38 judging from the lack of heterozygosity in the scoring), which could have given false negatives for polygyny and genetic differentiation.

Regarding the methods employed for determining colony structure. The results obtained were probably not accurate due to two main factors: 1) relatedness within each individual nest varied substantially and was not determined, and 2) much of the genetic similarity was probably due to convergence rather than relatedness. In order to obtain a more accurate result, adjacent nests should be sampled as well as those far apart from each other and more loci should be analysed.

Recommendations for future research
Further study is required to assess the genetic demography and the extent of polydomy in the British *F. exsecta* populations. Genetic analysis should be carried out alongside ecological habitat surveys in order to gain a more accurate estimate of the genetic and geographic viability of the populations. Finally, in order to produce more efficient and useful research, more funding should be given to fewer projects.

Reference
Dallas JF, Gow JL, Jones AM, Young MR (1998) Genetic evidence for social polymorphism in the rare wood ant *Formica exsecta* Nyl. in Scotland. British Ecological Society.

2.2 *Formica rufibarbis*
2.2.1 The situation with *Formica rufibarbis* in Surrey remains uncertain. It is not clear whether the nest at Stickledown is still viable and attempts to gain permission to visit the site were unsuccessful. A survey on the site in 2008 remains a priority.

2.2.2 During 2007 the Zoological Society of London began captive rearing of *Formica rufibarbis* from the Isles of Scilly. Matthew Robertson and Paul Pearce-Kelly have provided an account of this work to date.

2.2.3 Red-barbed Ant *Formica rufibarbis* progress at the Zoological Society of London
Although delayed by a few weeks the Native Insect Quarantine Unit, NIQU, was finally completed on14 July 2007. This new facility with its significantly increased bio-security provided a controlled environment in which the red-barbed ant, *Formica rufibarbis*, could be reared in isolation from non-native species.

On 17 July, as part of the *Heritage Lottery Fund red-barbed ant project*, 34 queens were delivered to the quarantine unit. These had been caught on St Martin's Island in the Isles of Scilly. All were in good condition. 22 queens were guarding eggs, while 10 already had recently hatched larvae.

The queens were kept in clear plastic containers (73mm x 73mm x 35mm). A 10mm diameter ventilation hole covered in 1mm mesh allowed for ventilation. Cotton-wool was placed into a 20mm dish and saturated with filtered water to give the ants access to drinking water and also to increase the ambient humidity of each nucleus colony. Three 10mm x 80mm strips of tissue paper were also provided as substrate for the ants.

The A/C unit that controlled the ant room's environment in NIQU was set to 20˚C. To protect the colonies from heat convection and vibrations they were placed onto sheets of 40mm thick expanded foam. The 34 nucleus colonies were then split into three groups each being covered by a plastic tray to cut the amount of light they are exposed to. UV light traps and sticky traps were deployed around NIQU to prevent possible contamination by other species.

Two queens failed to produce any eggs and it is assumed that these ants were unmated. In addition to these, four queens had already produced eggs before arrival, but these failed to hatch and were subsequently eaten by the respective queens. Again the assumption is that these queens had not been fertilized. However, this can only be confirmed next rearing season.

The first pupae were observed on 26 July and by 7 August no more larvae were observed in any of the nucleus colonies. On 24 August the first callow worker was observed. By 31 August four colonies all had active workers.

Until this point no food had been offered, mimicking the situation we assume to be experienced by these ants in the wild. When food was offered to *F. rufibarbis* it consisted of defrosted pupae of *Lasius flavus*. These had been collected from The Isles of Scilly at the time of the initial collection. By using food items collected, where possible, from the natural range of *F. rufibarbis* the risk of infection with alien pathogens was felt to be greatly reduced. Each colony was offered four pupae. By the following morning the contents of all pupae had been eaten. Because of the similarity between the pupae of *L. flavus* and *F. rufibarbis* none were offered to those colonies that still contained pupae.

Once all the viable pupae had emerged it was decided to try feeding the colonies a 10% solution of Nektar (a complex sugar-based diet used for nectar feeding birds and butterflies). However, after just 5 days of use, significant fungal growth had started to occur. This was despite regular cleaning. The solution also attracted fruit flies. The offering of Nektar was stopped at this point.

On 30 August one queen was found dead. The body was sent for *post mortem* examination in adherence with quarantine protocols. Eleven days later, on 10 September, a second queen was found dead. Again the body was sent for *post mortem*. In both cases no obvious cause of death was discovered. Subsequent to these two deaths there has been only one other fatality. A worker was found dead on 28 September. This was a notable case as the individual had died in a 'life-like' position somewhat reminiscent of ants that have become infected with a certain entomophagus fungi. Fungus was visible around its mandibles. Two species of fungi were isolated from this ant, but positive cause of death could not be determined.

On 2 November the colonies were transferred to an environmental chamber. The colonies were split between four plastic containers each with a 2cm layer of water saturated vermiculite to maintain humidity. The initial temperature of 18˚C was reduced in increments of 0.5˚C every day until the over-wintering temperature of 6˚C was reached on 20 November.

The nucleus colonies will now be kept at 6˚C until March 2008. At this point we propose raising the temperature in increments of 1˚C per day until they reach an ambient temperature of 20˚C. The intention is then to transfer the queens and their workers into several different styles of formicaria in order to ascertain which would be the best for rearing 20+ colonies of *F. rufibarbis*. Considerations that will have to be taken into account are maintenance times and space required for over-wintering. The later of these two points is also intrinsically linked to the proposed stage at which we release the colonies. If they have to be taken through another over-wintering phase how much room will we need?

We would greatly appreciate any comments and advice on the management regime described above. At present it is difficult for us to anticipate what size a *F. rufibarbis* colony will attain in its second or third season. As mentioned above this has a dramatic impact on the number of colonies we will be able to rear (especially as far as the overwintering phase is concerned). A key clarification is to know if it is envisaged that a proportion of these colonies will be released next season.

This *ex situ* summary is a component of the *Heritage Lottery Fund red-barbed ant project* which has made this programme possible. We are most grateful to Dr. John Pontin for his invaluable advice in the establishment of these *ex situ* colonies at ZSL. We are also very grateful to Natural England for their help in realising the Native Insect Quarantine Unit.

2.3 Southern Ants Project

2.3.1 The ant *Temnothorax interruptus* has recently been placed on the U.K. Biodiversity Action Plan priority species list. All four UK sites are on the south coast, with the most inland localities being in the New Forest. Three out of four areas are within gravel ridge systems. The ant is associated with very warm microclimates. It is also very localised in Europe and considered to be rare. Under the Hymettus projects for 2007 *T. interruptus* was to be considered with three other ants associated with similar conditions: *Temnothorax albipennis*, *Tetramorium caespitum* and *Anergates atratulus*.

2.3.2 New Forest

A visit was made by Mike Edwards, John Pontin and Paul Lee to the Matley Passage area of the New Forest on 10 May 2007. This area has been known to John for many years as a good locality for three of the target ant species, although it was over ten years since he had seen *Anergates*. The area identified by John as being of particular importance was about 2 hectares in extent and stretched over both sides of the B3056 at Matley Passage (SU069337). The area to the north of the road had clearly been burnt in the previous five years; that to the south of the road was much older. Both areas had a series of ruts running across them which produced small, open, south-facing cliffs under mature heathers. These south-facing slopes were much more significant, in terms of the locations of ant nests, on the older heathland to the south.

A number of nests of both *Temnothorax interruptus* and *Tetramorium caespitum* were rapidly found on the southern area. The *Tetramorium* nests were associated with small stones in open situations and the *Temnothorax* nests were associated with the rather corky debris at the base of and under old heather plants, providing that these areas were in the sun. Searches of the *Tetramorium* nests (by digging part of the nest with a trowel) failed to reveal any pupae of *Anergates*.

Vegetation in the northern area was shorter (<15 cms) and it quickly became apparent that this was where the higher density of *Tetramorium* nests were located. Less clearly a similar situation held for *Temnothorax* nests. Once again the general division between nests in areas of open bare ground (*Tetramorium*) and at the base of older heather stumps (*Temnothorax*) held overall. Searches in the tallest and densest heather (> 15cms) failed to reveal any nests of either species.

The highlight of the second area was, however, the discovery by Paul of a nest of *Tetramorium* which held the differently-shaped larvae of the guest ant, *Anergates atratulus* (details in Pontin 2005, Ants of Surrey, p.71). This nest was along one of the edges of the ridge noted in **2.3.2**. The location of the nest was noted by GPS and by tying a marker to the heather stems above it, but a subsequent visit by John failed to locate it again.

2.3.6 Dungeness

The extensive survey of Parsons and Morris (1992) of all the shingle-ridge system around Dungeness identified quite a large number of locations where *Temnothorax interruptus* was recorded, mostly in pitfall traps. Mike Edwards and John Pontin visited Dungeness on 11 July

2007 to re-investigate some of these localities and to provide training for Brian Banks who would be carrying out further studies in the area. Although many ant nests were found on this visit, these all proved to be *Tetramorium caespitum* or *Temnothorax albipennis*. No signs of *Anergates atratulus* or *Temnothorax interruptus* were found.

Brian Banks continued to study the ants at Dungeness through the summer of 2007 and extracts from his report are reproduced below.

Summary

- A survey of four ant species (the BAP species *Anergates atratulus*, its host species *Tetramorium caespitum*, the BAP species *Temnothorax interruptus* and the nationally scarce *T. albipennis*) was undertaken, mostly at Dungeness, with limited survey at Rye Harbour.
- At Dungeness the survey involved the use of 0.25cm² quadrats laid along a 5m long transect on areas of dry shingle vegetation, and the distribution of hanging tiles in groups of 20 among patches of relatively homogenous vegetation. Nests were also searched for in dead herbaceous vegetation at Dungeness and Rye Harbour.
- *Anergates atratulus* was not found, a result that was anticipated as this species is a nest parasite occurring at very low densities in the wild.
- *Tetramorium caespitum* was found across all of the open habitats that were surveyed by excavating transects to look for nests, and by the use of tiles placed on the surface of the shingle.
- The highest densities of *T. caespitum* were found on long-term ungrazed *Cladonia* and *Teucrium scorodonia*-rich vegetation. Marginally fewer nests of this species were found on lightly grazed shingle. Very few nests were found on areas that had been heavily grazed in the past, despite the fact that grazing ceased five years ago. The vegetation in the heavily grazed areas was distinct, with low cover of vascular plants and little *Teucrium*.
- *Temnothorax interruptus* was found in areas of coastal *Arrhenatherum* grassland, and lightly grazed lichen dominated grassland with scattered flints on the surface of the vegetation, exposed to sunlight.
- Thirty-five *Temnothorax* nests were found within dead herbaceous plant stems of *Echium vulgare, Digitalis purpurea* and *Crambe maritima at* Dungeness and Rye Harbour. All of these colonies consisted of the species *Temnothorax albipennis*. *T. interruptus* was only found underground. The last two nests were found on 7 November, with both containing larvae.

Survey Methodology

Sampling of ants was undertaken in mid-July using 0.25m² quadrats laid in a transect 5m long on a variety of dry shingle vegetation communities, with different grazing histories. Relatively homogenous vegetation was chosen although some variation in vegetation and bare ground was impossible to avoid. The Dungeness vegetation classification of Ferry, Lodge and Waters (1990) was used to identify plant communities.

The vegetation at Dungeness is naturally patchy, a result of the presence of alternating bands of coarse and fine flint shingle. Furthermore the vegetation communities change as you travel inland. The coastal *Arrhenatherum* grassland, the typical calcifuge grassland, and its variant that grades into wetlands were sampled during this survey. There was insufficient time to sample all

of the vegetation communities on Dungeness so the ones most likely to be attractive to ants were chosen. The vegetation in the plots was recorded and photographed before the shingle was turned over with a trowel. All occurrences of the target species were recorded, with specimens kept to confirm the identification. Transects were recorded at the following locations:

Transect 1	Dungeness Estate TR 09461725. Ridge on coastal *Arrhenatherum* mesotrophic grassland, 230m from the sea. Ungrazed ridges subject to light public pressure. Sampled on 14 July 2007.
Transects 2 & 3	Dungeness Estate TR09371725. Ridge on coastal *Arrhenatherum* mesotrophic grassland, 310m from the sea. Ungrazed ridge subject to light public pressure. Sampled on 21 July 2007.
Transects 4 & 5	Dungeness RSPB Reserve. TR07271866. Ridge on typical calcifuge grassland, 2000m from the sea. Ungrazed ridge with little public pressure. Sampled on 12 and 13 July 2007.
Transects 6 & 7	Dungeness RSPB Reserve. TR06641857. Ridge on typical calcifuge grassland, 1870m from the sea. Lightly grazed ridge with no public pressure. Sampled on 13 and 14 July 2007.
Transect 8	Dungeness RSPB Reserve. TR 06221908. Ridge on recovering typical calcifuge grassland, 2340m from the sea. Until 2002 this ridge was heavily grazed, all year round. Ungrazed since then. Sampled on 12 July 2007.

In order to check that ant nests were not being missed as a result of inexperience, a series of brown hanging tiles was laid down on the shingle for a period of one to three weeks, and these were turned over during warm sunny weather to determine if the various ant species occurred at the same frequency. The following locations were checked:

a. Dungeness RSPB Reserve. TR07271866. Same general area as transect 3 above. Tiles were checked on 19 July 2007 and 22 August 2007.
b. Dungeness RSPB Reserve. TR06641857. Same general area as transect 4 above. Tiles were checked on 19 July 2007 and 22 August 2007.
c. Dungeness RSPB Reserve TR 06221908. Same general area as transect 5 above. Tiles were checked on 28 August 2007.

Tiles were not laid on Dungeness Estate, partly due to the limited number of tiles available (20), and partly due to limited time during warm sunny weather, but also because it was thought that with higher levels of disturbance on this area there was a risk that they would be removed or broken. One tile was removed from the RSPB reserve which has only limited public pressure.

The tiles were also laid on coastal calcifuge grassland vegetation lacking *Teucrium scorodonia* at TR06551698 and TR06621677 on the Dungeness RSPB Reserve. These were checked on the 9 and 16 September 2007. No ants were found under any of them, although several *T. albipennis* nests were found in dead vegetation stems in the close vicinity. It was concluded that the weather was not warm enough to attract ants to the surface (it was cool and overcast on both visits); consequently this data has not been used in the report.

Tiles were left *in situ* for no more than three weeks to avoid influencing the distribution of nesting ants across the shingle, and were spaced at a minimum distance of 5m apart to reduce the risk of several tiles being used by one large nest, particularly by *T. caespitum.* They were removed at the end of the survey. As alluded to in the preceding paragraph once it was realised that the *Temnothorax* sp. were using dead herbaceous plant stems for nesting, samples were collected whenever nests were encountered. This produced a total of thirty five nests at Dungeness and Rye Harbour.

Choice of areas with different grazing pressures

Differences in grazing pressure have had significant impacts on the vegetation in the three study areas. The three different calcifuge grassland zones were chosen to reflect different grazing pressures. The ungrazed areas (transects 4 and 5) have a thick cover of plants, a sward height of 3-7cm and few stones in amongst the continuous blocks of undisturbed vegetation. Lichens such as *Cladonia* are very prominent in this habitat and form "tall" plants.

The areas of lightly grazed calcifuge grassland (transects 6 and 7) have been managed in this way since the winter of 1999/2000 to benefit some of the BAP bumblebee species that use the site. Stocking densities on this 77 ha shingle unit have varied since then as follows:

Winter Sheep grazing (December – March) over Walkers Outland

Year	**No. ewes**	**Stocking density during winter period**
1999/2000	250	3.2 ewes/ha
2000/2001	240	3.1 ewes/ha
2001/2002	150	1.9 ewes/ha
2002/2003 to 2005/2006	50	0.6 ewes/ha
2006/2007	0	0 ewes/ha

In addition, between 7 and 10 goats have grazed continuously on this area since 2004.

These areas have similar vascular plant composition to the ungrazed areas, but the sward height varied between 1 and 3cm, and a greater number of stones are exposed to sunlight in the vegetation blocks.

The third block of shingle around transect 8 was heavily grazed by sheep all year round in a manner that produced a very short, species-poor sward. Stocking densities are not available for this area. Grazing was permanently removed from this area in 2002. The vegetation has an unusually high cover of *Agrostis canina* and although *Cladonia* species are present they do not form tall bushy plants, with a sward height less than 1cm tall.

Observations during initial visit, 7th July 2007

Specimens of both species of *Temnothorax* were found at Christmas Dell on the RSPB Reserve (TR 06011871). These species were found along the edge of patches of the variant of calcifuge grassland grading into damper shingle, together with *Tetramorium caespitum*. *Temnothorax albipennis* and *Tetramorium caespitum* were found in a mosaic of typical calcifuge grassland and *Cytisus* scrub within the railway loop at approx. TR 090170.

Transect results
Quadrat data from each of the transect runs are summarised in Table 1.

No specimens of *Anergates atratulus* were found in any of the transect runs. The host species of this ant, *Tetramorium caespitum,* was found in each of the transect runs. This species appears to be widely distributed across Dungeness within the coastal *Arrhenatherum* grassland. Nests were found in pure shingle with little or no humic material, on or close to shingle where there was a dense mat of roots from the vegetation. In transects 2 and 3 they were found in shingle covered by *Festuca rubra*, whilst in transect 1 the most frequently recorded vascular plant in the vicinity of the nests was *Pilosella officinarum. Teucrium scorodonia*, a plant which is visited by this species in search of honeydew (Pontin, pers comm.) was generally rare and localized in these transects, apart from one quadrat which had a nest close by. Areas with extensive cover of loose flints were not used for nesting.

The density of nesting ants was greatest in the un-grazed calcifuge grasslands on the RSPB Reserve (east of the open Pits). In contrast to the coastal ridges there was a deep bed of humus and *Teucrium* was frequent and relatively abundant. The other obvious components of the vegetation included a range of lichens, particularly *Cladonia* sp, which was the dominant element of the vegetation, and *Rumex acetosa.* Rumex seeds were regularly found a few centimetres underground and were presumably being used as food by this species. This was also observed in lightly-grazed examples of the same habitat (transects 6 and 7), where again the ants were found in shingle with a deep bed of humus, frequent *Teucrium,* and lichens dominating the vegetation.

Table 1 Summary results of the 5 transect runs

Location	Numbers of quadrats containing							
	Tetramorium caespitum		*Temnothorax* sp.		*T. interruptus*		*T. albipennis*	
	Nests	Foraging workers	Nests	Foraging workers	Nests	Foraging workers	Nests	Foraging workers
Transect 1. Coastal *Arrhenatherum* grassland. 10 quadrats. TR 09461725	4	-	-	1	-	-	-	-
Transects 2-3. Coastal *Arrhenatherum* grassland. 20 quadrats. TR 09371725	4	4	-	2	1	4	1	-
Transects 4-5. Ungrazed typical calcifuge grassland. 20 quadrats. TR 07271866	9	2	-	1	-	-	-	-
Transects 6-7. Lightly grazed typical calcifuge grassland. 20 quadrats. TR 06641857	5	1	-	2	1	-	-	-
Transect 8. Recovering calcifuge grassland. 20 quadrats. TR 06221908	1	-	-	-	-	-	-	-

Where nesting ants were found in several adjacent quadrats it is likely that there was a small number of large nests extending over several metres. Nests were found in up to four adjacent quadrats (covering a distance of 2m). Most of the nests were found underground, with ants active underneath larger pieces of exposed flint. One nest was found within a dead *Cytisus scoparius* stem.

Only one nest was found in transect 8 (the calcifuge grassland left ungrazed for five years following decades of heavy sheep grazing). These quadrats were dominated by lichens and bryophytes (species not identified) and had a low diversity of vascular plant species. *Teucrium* was very rare in this area.

Whereas *Tetramorium* was most abundant in the ungrazed calcifuge grasslands the *Temnothorax* species were noticeably less frequent in the ungrazed calcifuge grassland. One *Temnothorax interruptus* nest was found in the lightly grazed calcifuge grassland, with another just outside of the transect. These were underground and located beneath flints of at least 8cm diameter on the calcifuge grassland. Another nest was found in one of the coastal *Arrhenatherum* grassland transects close to a tussock of *Festuca rubra* and a *Tetramorium* nest. A further four quadrats in the second *Arrhenatherum* grassland transect contained foraging workers of this species.

One nest of *T. albipennis* was found in a dead plant stem (*Echium vulgare*) in transect 2, and three nests were found under flints just outside of the transects through the lightly grazed calcifuge grassland

On several occasions individual *Temnothorax* specimens were observed but disappeared before they could be captured. Consequently they could not be identified. These were found in all transects except transect 5, and were most numerous in transects 2 and 4 – the two transects that contained the *T. interruptus* nests.

Use of tiles

The results of the sampling using tiles are summarised in Table 2. These data show a similar trend to that observed in the transects. No *Anergates* were found. No ant species were found in the calcifuge grassland recovering from heavy grazing. Slightly more nesting *T. caespitum* and foraging workers of the same species were found in the ungrazed calcifuge grassland than in the lightly grazed calcifuge grassland. *T. interruptus* was not found in the ungrazed calcifuge grassland but two tiles revealed one nest and a foraging worker in the lightly grazed calcifuge grassland. One nest of *T. albipennis* was found in the ungrazed and lightly grazed calcifuge grasslands.

Sampling of *Temnothorax* nests in dead herbaceous plant stems

Thirty-five nests containing *Temnothorax* species were found in dead plant stems in a variety of locations on Dungeness and Rye Harbour. Although a small number were upright in growth position the majority were detached stems lying on the shingle. In some of the snapped plants access was obtained from the hollow cavities at either end of the stem, but in the upright stems and some of the snapped stems small entrance holes had been nibbled into the stem to access a hollow cavity on the interior. Plant species that could be positively identified were *Echium vulgare*, *Crambe maritima* and *Digitalis purpurea*. A fourth species *Senecio jacobaea* may also have been involved. All of these nests were found to be *T. albipennis* (see Table 3).

In the vicinity of transect 2, two 5x5m quadrats produced 1 and 3 nests respectively. On Lydd ranges 6 nests were found in a similar sized quadrat.

Table 2 Summary results of ants found under tiles in the RSPB reserve

Location	Numbers of quadrats containing							
	Tetramorium caespitum		*Temnothorax* sp		*T. interruptus*		*T. albipennis*	
	Nests	Foraging workers	Nests	Foraging workers	Nests	Foraging workers	Nests	Foraging workers
Ungrazed typical calcifuge grassland. 20 quadrats. Near TR 07271866	6	2	-	-	-	-	-	1
Lightly grazed typical calcifuge grassland. 20 quadrats. Near TR 06641857	5	1	-	-	1	-	1	1
Recovering calcifuge grassland. 20 quadrats. Near TR 06221908	-	-	-	-	-	-	-	-

Table 3 Comparison of numbers of nests of* Temnothorax *species found in dead herbaceous plant stems

Location	Vegetation community	No stems examined	*T. albipennis* nests	*T. interruptus* nests
Dungeness Estate TR093172	Coastal *Arrhenatherum* grassland	5	5	0
Rye Harbour TQ942178	Coastal *Arrhenatherum* grassland	5	5	0
Lydd Ranges TR063 and TR060174	Typical calcifuge grassland & the variant associated with damper shingle	7	7	0
Dungeness RSPB Reserve TR065169 and TR066167	Typical calcifuge grassland & the variant associated with damper shingle	14	14	0
Dungeness RSPB Reserve TR071185 and TR075183	Mosaic of *Cytisus* scrub, typical calcifuge grassland & the variant associated with damper shingle	4	4	0
Total nests		35	35	0

Anergates atratulus* and *Tetramorium caespitum

As was expected before the project commenced, no specimens of the parasitic *Anergates atratulus* were found. It is rare, occurs at low densities and was not found during the previous survey by Hoy (2001). Excavating transects is not an efficient way of surveying for this species because it takes a prohibitively long time to find a large sample of nests. Morris and Parsons (1992) found small numbers of this species using water traps but this does not enable information to be gathered on the nesting sites. A more efficient way of surveying for this species would be to place a large number of tiles, or small pieces of tin, for short periods of time across the site to increase the chance of finding this species.

The host species *T. caespitum* appeared to be widely distributed across Dungeness in open unshaded grasslands, as was the case during Hoy's study of 2001. The highest densities of this ant were in ungrazed lichen-dominated calcifuge grassland with frequent *Teucrium* and a good depth of humus. Light grazing by goats and sheep appeared to marginally reduce the density of this species whilst heavy grazing pressure appears to have resulted in a significant reduction in the density of the ant, persisting 5 years after grazing was removed. This may reflect the length of time taken for the slow-growing vegetation communities to recover. The species also is locally common in coastal *Arrhenatherum* grassland with a good cover of vegetation where the stones are stabilised by the presence of abundant plant roots.

Temnothorax interruptus* and *T. albipennis

These species showed a slightly different response to grazing to that observed in *Tetramorium caespitum*. They were almost completely absent in the ungrazed transects of the typical calcifuge vegetation and less frequently found under tiles in the ungrazed vegetation compared to the lightly grazed vegetation. This contrasts with the findings of Morris and Parsons who recorded these insects in ungrazed areas of lichen heath in the late 1980s. This may be because the transects were recorded along strips of homogenous vegetation, largely avoiding the vegetation-gravel edge along the strips of vegetation, with the exception of one quadrat.

Both *Temnothorax* species were found along the vegetation margin at Christmas Dell. *T. albipennis* was also found in dead vegetation stems, particularly *Echium vulgare, Crambe maritima* and *Digitalis purpurea*, in areas of disturbed shingle vegetation. These species are known to be thermophilous nesting under stones exposed to sunlight (Hoy 2001). The data suggest that the density of ground nesting *Temnothorax interruptus* may be increased by light grazing. In the grazed areas there was a greater cover of medium sized stones within the blocks of vegetation which would benefit these thermophilous species during sunny weather. (5.8% cover in lightly grazed areas compared to 1.1% cover in ungrazed areas - if one quadrat on the shingle/vegetation margin in one of the ungrazed transects is excluded).

Conversely there is also a clear indication that long-term heavy grazing pressure will eliminate these insects, probably through eliminating the plant species that provide their invertebrate prey.

It was notable that whilst roughly equal numbers of nests of the two *Temnothorax* species were found underground (three *T. interruptus* and four *T. albipennis*) all thirty five of the nests found above ground in dead herbaceous vegetation belonged to *T. albipennis*. Hoy also found *T. albipennis* nesting in sticks, although only one nest was reported. This might represent a difference between the two species, or it may have been influenced by the cool summer weather in 2007 with *T. interruptus* remaining underground. The last two nests were found on 7 November at Rye, both containing larvae.

Parsons and Morris demonstrated that the occurrence of *T. interruptus* was skewed towards the coastal *Arrhenatherum* vegetation, whilst Hoy found particularly large numbers of this species in an area of young calcifuge grassland further to the east of the areas sampled near Kerton Road. In this study this species was found in low numbers in both the coastal area and the lightly grazed calcifuge grasslands.

Recommendations for future work

- The use of large numbers of tiles/small tins spread extensively across the Dungeness for short periods of time during the summer to increase the chances of identifying areas of

- Recording of vegetation communities in the vicinity of nests to identify important plant species.
- Further sampling of dead vegetation to test whether or not *T. interruptus* nests are entirely subterranean. This year's data may have been influenced by the low temperatures this summer.

References

Ferry, B., Lodge, N. and Waters, S. (1990) Dungeness: a vegetation survey of a shingle beach. *Research and survey in nature conservation* **26**. NCC

Hoy, S. (2001) *Species Recovery Program Survey for the Ant* Anergates atratulus *(Schenk, 1852) (Hymenoptera: Formicidae) – with reference to other heathland (and coastal) ants of conservation interest Part II (Dungeness Survey report – 2001).* Unpublished English Nature Report.

Morris, R.K.A. and Parsons, M.S. (1992) *A Survey of the Invertebrates on the Shingle of Dungeness, Rye Harbour and Orfordness*. NCC Report **77**. JNCC, Peterborough.

3. Eumenid wasps.

3.1 *Odynerus melanocephalus* and *Odynerus spinipes*

3.1.1 Following on from the research on the prey of *Odynerus melanocephalus* in Warwickshire, undertaken by Steven Falk during 2005 (2005 ACG Report), and in Dorset by John Hunnisett during 2006 (ACG/Hymettus Report 2006) Adam Wright was asked to check whether populations of *O. melanocephalus* on the Isle of Wight also exclusively hunt larvae of the beetle *Hypera postica*. John was asked to extend his studies on the west Dorset Coast around Eype Mouth to investigate the prey of *O. spinipes*. Summaries of both reports are given below following a report from Mike Edwards on observations of both species in north Wales:

3.2 Observations of prey capture in *Odynerus spinipes* and *Odynerus melanocephalus* at Porth Neigle, Llyn Peninsula, North Wales, 24-26 May, 2007.

3.2.1 Nest tubes of *Odynerus spinipes* were readily seen on a number of exposed vertical banks along the path, but finding the smaller, vertical tubes of *O. melanocephalus* required careful searching of small areas of flat, bare ground on the sandy clay of the sea-cliff face itself. In contrast to the fairly dense aggregations of *O. spinipes* tubes, those of *O. melanocephalus* were almost solitary, with at most three tubes visible in half a square metre.

3.2.2 Females of *O. melanocephalus* were observed bringing in larvae of what appear to be *Hypera* weevils at about one per twenty minutes (Figure 1). Two of these larvae were removed from the female wasps and photographed (Figure 2). These larvae were subsequently put in ethanol to preserve them.

3.2.3 Whilst searching for nest tubes of *O. melanocephalus*, a female *O. spinipes* was found searching the leaves and flowers of *Lotus corniculatus*. Figure 3 shows this female as she adjusted a small weevil larva in her jaws, before flying off with it. The larva was not collected, but it appeared to be the same as that which was being used by *O. melanocephalus*.

3.2.4 The dominant leguminous plant on the sea-cliff was *Lotus corniculatus*, indeed no plants of the previously reported host of the *Hypera* prey *Medicago lupulina* were seen. It therefore appears that both plants function effectively as hosts for the required prey of these *Odynerus* species.

3.2.5 The preferred use of these two plants as sources of prey may relate to the phenology of the two *Odynerus* species (*O. melanocephalus* peaks about two weeks before *O. spinipes* (BWARS data and pers. obs.) and the development time of the *Hypera* larvae on the two host plant species. The wasps may be expected take larger prey items in preference to smaller ones, if available (demonstrated well in the sphecid *Ammophila sabulosa*). If the *Hypera* larvae develop quicker, or hatch from egg sooner, on *Medicago lupulina, O. melanocephalus* may appear to hunt on the *Medicago* in preference to *Lotus* because of preferred prey size earlier in the year.

3.3 *Odynerus melanocephalus* on the Isle of Wight

3.3.1 During the Spring and Summer of 2007 an autecological study of *Odynerus melanocephalus* was undertaken to ascertain if larvae of the weevil *Hypera postica* are used to provision *O.melanocephalus* nests on the Isle of Wight. *Odynerus spinipes* was also searched for, but this species appears to be scarce on the Isle of Wight and no specimens were recorded. The author has no "regular" sites for this species on the Island. Records were also amassed for the ruby tailed wasp *Pseudospinolia neglecta* which is a known cleptoparasite of both *O. melanocephalus* and *O. spinipes*.

3.3.2 Survey methods were confined to visual searching, the use of a hand net for spot - sweeping and sweeping, examination of possible host plants for the *Hypera* larvae with which *O. melanocephalus* nests are provisioned and small scale excavation of *O. melanocephalus* nests. Due to the unusually mild Spring, adult activity of *O. melanocephalus* was considerably earlier than usual with the first specimen being found on 18th April and the last on 13th June.

3.3.3 The study showed that good populations of *O. melanocephalus* continue to exist at several sites on the soft rock cliff systems of the south coast of the Isle of Wight, with a particularly strong population occurring at Roughlands (SZ388832). Weevil larvae, collected by interception of a provisioning female *O. melanocephalus* and by vegetation searches, appear to belong to the genus *Hypera*, although they are awaiting confirmation at species level. Larval searches failed to yield *Hypera* larvae from either *Medicago lupulina* or *Trifolium* spp.; all specimens found were collected from *Lotus corniculatus*.

3.4 *Odynerus spinipes* in Dorset

3.4.1 During the year there were only two records of both *O. spinipes* and *O. melanocephalus* in Dorset, three of these were in mid May to early June whilst a single *O. spinipes* was recorded from Portland in mid June. During June and July 10 visits were made to six sites and despite careful searching of likely habitats no signs of entrance tunnels were found at any of the sites. Information regarding Dorset sightings by other hymenopterist this year has been equally disappointing with Andrew Philpot, Steve Morrison and Ian Cross all failing to see *O.spinipes*, although Ian did see entrance tunnels early in May. The very warm April followed by three months of cold wet weather could possibly have affected the life cycle of both these species. As far as a study on the larval food source of *Odynerus spinipes* was concerned this year was in more ways than one a wash out.

Figure 1: Female *Odynerus melanocephalus* returning with prey

Figure 2: *Hypera* larvae removed from *Odynerus melanocephalus* females

Figure3: Female *Odynerus melanocephalus* with *Hypera* larva

Figure 4: Irvine Beach Caravan Park, Ayrshire

Figure 5: *Colletes floralis* on Wild Carrot

3.5 *Odynerus simillimus*

3.3.1 Further observation of *Odynerus simillimus* in 2007 resulted from a survey of aculeates in East Anglian wetlands. The survey is reported later in this document.

3.6 *Pseudepipona herrichii*

3.6.1 As in 2006 a reduced level of surveillance of *Pseudepipona herrichii* was undertaken by Chris Dieck and Rob Neal, many thanks to them and the RSPB Dorset Heathland Project. A summary of their report is given in the next three parargraphs.

3.6.2 All known sites in Dorset were visited during the flight season (mid May to end of August). Each visit was between 9.30am and 2.30pm on warm sunny days. Six vegetation transects, as in previous years were completed for sites: Stoborough Heath NNR (NE & RSPB), Grange Heath (RSPB) and Godlingston Heath NNR (NT). The results have not been statistically analysed.

3.6.3 Very few wasps were observed during the visits made in 2007. The three sites where good numbers were observed were Godlingston Heath, Slepe Heath boundary and Grange Heath. The numbers on Godlingston Heath and Grange Heath appeared to be stable, while the site on the boundary to Slepe Heath showed a marked reduction in numbers. One of the reasons for the low number of animals observed is likely to be the adverse weather persisting throughout a large part of the survey season. Human activity may have had an impact on the population at Slepe Heath, although the track upon which the main colony is found seems relatively undisturbed.

3.6.4 No confirmed new sites were found for *P. herrichii* in 2007. However, it is encouraging that the moth *Acleris hyemana* has once again had a good year and all present sites, many of the historical and potential new sites remain in favourable condition to support *P. herrichii*, even if there were none actually present. On several of the sites, e.g. Grange Heath, the vegetation height needs to be carefully monitored and mowing or burning is advised in the near future.

3.6.5 A full review meeting was kindly hosted by NT at Studland Study Centre on 6th November 2007. Following discussion of the RSPB report, Angela Peters presented a short paper summarising the results of the grazing and burning plot monitoring on Godlingston Heath. This showed the largest number of *Acleris* webs to have been found, post fire, in the all-grazer plots for 2007. However, all plots had shown a decline in web count compared with 2006. It is not clear to what extent weather conditions or ageing of heather growth contributed to this decline. It appeared, however, that the continuing increase in vegetation height in the ungrazed plot was accompanied by a greater fall in the numbers of *Acleris* webs found compared with the grazed plots. In interpreting these results it must be borne in mind that the sample sizes are small and the variability in vegetation composition within and between plots is large. Hence, other effects than grazing type may be affecting the results. It was suggested that the *Acleris* counts for each sample of each plot be corrected for the relative proportions of the known food plants/non food plants within each sample. This may shed some light on whether differences in this factor could account for any of the *Acleris* web count differences.

3.6.6 Fixed point monitoring photographs of the sample plots over the three years since the burn showed clear differences between the all grazed and the ungrazed as well as the partially grazed. On site it was clear that the variability between plot compositions was certainly something which needed accounting for when interpreting *Acleris* counts. There seemed to be a difference between the bushiness of heather plants in the grazed as against the ungrazed samples. This difference may be relevant to the number of *Acleris* webs as the moth oviposits in the growing shoot of the

heather in February. Plants with more shoots overwinter, and hence more growing points, might be expected to hold more *Acleris* webs.

3.6.7 The track running across one of the major centres of the *Acleris* population has been the subject of much discussion, especially in relation to the potential for increased use by horse traffic to destroy areas of bare ground used by *Pseudepipona* as nesting sites. Inspection of this area showed there to be little overall impact on the provision of bare ground along the ridges, with some new trackways being cut into the turf as old ruts become too awkward for use by the horses. Whilst this process does have the potential over time to produce large areas of rutted ground there is clear net benefit for *Pseudepipona* under the current degree of horse pressure. Angela was not aware of any figures for the daily use by horses, but offered to see if she could gain further information from the two major riding schools using the area.

3.6.8 Two areas of scraped clay close to the path have been in place for three years and, so far, no use by *Pseudepipona* has occurred. As this period coincides with a sharp decline in the numbers of the wasp seen on Godlingston, it is not clear to what extent this lack of use indicates the lack of suitability, or the low numbers. The areas are, however, close to known nesting sites from the early 1990s. The uncertainty in the numbers of *Pseudepipona* underlines the need to maintain a very basic count of wasps seen, at least on Godlingston, the major site for this species. This is a very pressing problem as Hymettus seems unlikely to be able to maintain indefinite funding for this species in the light of the need to initiate studies on the new set of BAP aculeates. In this context, Angela expressed an intention to maintain a level of monitoring of *Pseudepipona* at Godlingston, as the National Trust contribution to achieving the BAP targets for this species. Hymettus, as lead partner for *Pseudepipona herrichii,* would be very grateful for this support.

3.6.9 It looks very likely that more widespread yearly monitoring will have to be suspended, with a further overall survey for the presence of *P. herrichii* being undertaken in 2009 before the 2010 BAP review reporting.

4. Chrysidid wasps

4.1 *Chrysis fulgida* and *Chrysura hirsuta*

4.1.1 No further autecological work or distributional surveys were undertaken for these species in 2007 but *Chrysis fulgida* was confirmed from the first site in West Sussex this year.

5. Pompilid wasps

5.1 *Homonotus sanguinolentus*

5.1.1 No further autecological work or distributional surveys were undertaken for this species in 2007 but its presence at Godlingston Heath was confirmed.

6. Sphecid wasps.

6.1 *Cerceris quadricincta*

6.1.1 No further autecological work or distributional surveys were undertaken for this species in 2007.

6.2 *Cerceris quinquefasciata*

6.2.1 Again, no further autecological work was funded by Hymettus in 2007 but Jeremy Early provided some observations on nesting and prey of a female in Reigate, Surrey in the Autumn 2007 BWARS Newsletter.

7. Bees

7.1 *Andrena marginata/Nomada argentata*

7.1.1 During 2007 further samples of *Andrena marginata* were collected for analysis by Phill Watts at Liverpool University. Phill has provided a summary of his progress to date and will update us at the review meeting.

7.1.2 Background

Species exist as genetically differentiated populations. Much work has focussed on using neutral (or nearly-neutral) genetic markers, such as allozymes or microsatellite loci, to delineate population boundaries and also quantify the extent of genetic similarities among populations. However, it is now clear that the pattern of genetic relationships at these neural markers, whose distribution is largely determined by the forces of gene flow and random genetic drift, does not necessarily, reflect the pattern of adaptive genetic divergence among populations that is driven by natural selection and population response to environmental conditions. Identifying functional gene regions that are associated with ecological specialisation is a non-trivial challenge for evolutionary biology, but the approach is crucial to understand processes that drive adaptation and ultimately speciation. Moreover, characterising the extent of adaptive divergence between putative races is crucial for effective conservation management of species that exist across a wide range of habitats.

One method of identifying possible regions of the genome that are influenced by selection (*i.e*. adaptive regions) in a sample of populations is to conduct a 'genome scan'. In essence, a genome scan compares the pattern of genetic differentiation among populations at many genetic loci. Most loci in the genome will differ through the effects of genetic drift and gene flow, however, some loci will display one of two atypical patterns of genetic divergence: (1) substantially lower genetic divergence among populations, or (2) substantially greater genetic differentiation among populations. The former is a pattern associated with 'balancing selection' that maintains genetic similarities because, for example, the gene has an important function and it would be maladaptive to alter the underlying sequence. Increased genetic divergence among populations is a likely consequence of a selective response to different environments that drives genetic differences among populations as different genetic regions perform better and thus are favoured in different environments.

A key issue to conduct an efficient genome scan is the capability to develop and then screen the genome with a large panel (tens to hundreds, depending on the number of chromosomes) of genetic markers that are randomly situated throughout the genome, as this will detect both neutral and selective patterns. Clearly, simply screening samples with just a few genetic markers (~20 or less) will overlook large genetic regions and likely miss genes associated with key functional traits, and for all but a few model organisms (whose genomes have been sequenced in entirety) this precludes the use of commonly used genetic loci such as microsatellites. At present, the most convenient method of generating a large number of genetic markers is to develop a series of amplified fragment length polymorphisms (AFLPs).

I developed a panel of AFLP markers in *Andrena marginata* and screened the four existing populations using these loci.

7.1.3 Methods

Samples of *Andrena marginata* were collected by George Else from four locations in southern England and stored whole in absolute ethanol. Flight muscle was dissected from individual samples and total genomic DNA was extracted using a standard proteinase-K-salt-extraction protocol. Quality and quantity of DNA was quantified by gel electrophoresis on a 2% agarose gel.

150 ng of genomic DNA (diluted to 30 ngμl^{-1}) was digested with *Mse*I and *Eco*RI restriction enzymes (both New England Biolabs) at 37ºC for 2 hours. Next, the digested DNA was ligated to adaptors (double stranded DNAs made by annealing ECO_ADAP1 CTCGTAGACTGCGTACC with ECO_ADAP2 AATTGGTACGCAGTCTAC, and MSE_ADAP1 GACGATGAGTCCTGAG with MSE_ADAP2 TACTCAGGACTCAT) using T4 Ligase (New England Biolabs), ATP and DTT and a thermal profile of 16ºC for 4 hours, 33ºC for 2 hours and finally 65ºC for 20 minutes. The adaptor-ligated DNA mix was then pre-amplified to provide a stock plate of sufficient material for further AFLP screening. Pre-amplifcation conditions used 2 µl of adaptor-ligated DNA mix in a 15 µl PCR containing the standard New England Biolabs Buffer I, 0.2 mM each dNTP, 0.15 µl Eco+A primer, 1.15 µl Mse+N primer and 0.06 Uµl-1 *Amplitaq* DNA polymerase (Applied Biosystems), where N represents any base (*i.e.* A, C, G or T). Thermal cycling conditions were 72°C for 2 min, 94°C for 3 min, 20 x [94°C, 5s; 56°C, 30s; 72°C, 60 s] and finally hold @ 10°C. The pre-amplification mix was then diluted 10X with sterile distilled water and used to seed selective amplification reactions that generate a scorable number of genetic markers. Selective amplifications used the same PCR conditions described above, but with an *Eco*+ANN fluorescent primer and an *Mse*+NN unlabelled primer, with N representing different combinations of base to amplify different fragments (*i.e*. different genetic markers).

7.1.4 Results

I screened a large combination (24) of selective primer pairs to determine their suitability to generate reliable panels of genetic markers in *A. marginata*.

All samples of *A. marginata* that were collected during 2006 have been analysed using 8 combinations of AFLP primers.

7.1.5 Future Work

Analysis of the AFLP data will indicate the extent of genetic differentiation among samples, and also provide a preliminary indication of whether putative gene regions that differ in adaptive role can be identified.

During 2007 further samples of *Andrena marginata* were obtained by Adrian Knowles, George Else and Stephen Carroll. Adrian Knowles collected specimens (some preserved in RNAlater and some in 100% ethanol) from the King's Forest and Red Lodge in the Suffolk Brecklands, George Else obtained three specimens of *A. marginata*, collected from the Isle of Wight, while Stephen Carroll provided a specimen of *A. marginata* from Woon Gumpus Common, Cornwall (SW401335) (stored in 100% ethanol). David Genoud has also collected some specimens in France which have yet to be transferred to Liverpool. Mike Edwards provided other species of

Bombus and *Andrena* (preserved in RNAlater). RNA will be extracted from these species in 2008, which provides the template material from which the sequences of ecologically-important genes can be obtained, allowing a comparative analysis among species, and also to enable probes (for analysis of gene expression) to be designed.

I also ordered primers to amplify part of the gene Elongation Factor alpha (EFα) in *A. marginata*, to further test the genetic relationships identified using cytochrome oxidase I (*Cox*1) previously, and which did not support the existence of two genetically distinct races of *A. marginata*. The primers have been optimised for use in *A. marginata*, and all samples of *A. marginata* will be sequenced at EFα to explore the consistency of the genetic relationships generated using *Cox*I.

7.1.5 *Andrena marginata* in Scotland

The Autumn 2007 BWARS Newsletter carried details of the discovery by Jane Bowman of a new Scottish population of *A. marginata* in Glenmoriston. Subsequent survey by Jane and Murdo Macdonald confirmed the bee to be flourishing in an area of 15km^2 around Torgyle. A lack of suitable nesting sites in bare sandy soil is proposed as the limiting factor for the bee in Scotland. Although not a UK BAP species, *A.marginata* does appear on the Scottish Biodiversity List and Murdo is attempting to obtain funding for further survey work in 2008.

7.2 *Colletes floralis*

7.2.1 In 2007 Neil Robinson continued his searches for *Colletes floralis* in Cumbria and Dumfries and Galloway. Brian Little was asked to extend the survey northwards to Ayrshire. Edited extracts of their reports are reproduced below.

7.2.1 Cumbria

I visited Sandscale Haws NNR on 9th June, before low pressure arrived. This was earlier than I had ever seen *C. floralis* there (14th June), but the warm spring had brought the Hemlock Water Dropwort into full flower early, and I had hoped that at least the males might be active. A few *Andrena barbilabris, A. scotica* and *A. chrysosceles* were foraging the Dropwort, but no *Colletes* were seen. There was only one further fine day in June, but I was not available to visit.
The first fine day in July was the 8th. By this time the flowers of the Dropwort were almost entirely over; only one small patch remained. By watching this for an hour I sighted five females (at least three individuals). I tubed one for examination and my wife photographed one in flight. No activity was seen at the supposed nest bank. This confirms, as in 2006, that the colony, after its failure to emerge in the cold spring of 2005, is still alive - but extremely depleted. I could continue to monitor the population, but it is now so small that I am not likely to find out anything much about its biology at this site.

7.2.2 Dumfries & Galloway

While staying at Kirkcudbright 10 - 13 July, I looked for but did not find *C. floralis* at Sandyhills or Brighouse Bay. The strip of Dropwort at Brighouse Bay, which I had thought was promising, was completely over but I concluded that *C. floralis* was not present at this site because there were plenty of the other flowers that it is known to visit. I did collect a single female O*smia aurulenta* at Brighouse Bay on 11th July. There is only one 20th century specimen from Scotland (in NMS), by A.B.Duncan, July 1984. There are three 19th century specimens in NHML, for which the only information is 'Scotland'! (George Else, pers. comm.) The specimen was taken, not in the nearby Brighouse Bay SSSI, the calcareous and flower-rich dune system

round the head of the Bay, but on the shingle bank which extends beyond the car park southwards on the west side of the Bay. It was foraging at sparse and scattered Bird's-foot Trefoil just above the tide-line.

I was unable to visit Torrs Warren; the MOD was doing demolition down the Clayshant track, but the appalling weather and the fact that the Dropwort had flowered early and had gone over on the Dumfries & Galloway coast, ruled out success anyway. I am optimistic that access will be easier to obtain next year, but the problems of hitting a fine day when the variable Dropwort is in flower, on a visit in a period that has to be booked well in advance, reduces my likelihood of success.

I anticipate being in Kircudbright for a few days in early July 2008 and I would be willing to make one more try to visit these sites, but for the reasons outlined above it would be more practical for someone more local to take it on, if anyone is available.

7.2.3 Ayrshire

Before this survey work was carried out I had limited knowledge of *C floralis* but was aware that it was a rare bee whose distribution was restricted to coastal northwest UK, particularly the Hebrides. Mike Edwards provided essential background information including an overview of flight period, nesting habits and likely preferred pollen source etc. Since I am not a botanist, plant identification was made by Stephanie Little from a limited number of specimens of those regarded as dominant plant types or important to *Colletes* bees.

Visits were made to sites based on historical data obtained from the NBN Gateway and data labels on named specimens in the National Museums for Scotland collection based at West Granton; searches for areas of likely habitat i.e. dune systems and raised beaches by assessing OS maps and satellite photographs found on the internet; and a list of sites with with even small dune systems received from Graeme Walker, SNH Ayr. Identified search areas included Ayr/Troon, Prestwick Golf Club, Pow Burn, Irvine Beach Park shoreline, Ardeer Spit (Nobel Energetics) and Stevenson Dunes Reserve at the end of Ardeer. Three of these areas were visited in 2007.

The time of visits was guided by expected weather conditions and as far as possible limited to sunny days. Given the rather poor weather during the expected flight period the weather conditions during some visits was less than ideal. Each site was assessed for the presence of suitable forage plants/flowers and for likely nesting areas. Since the pollen preferences of *C.floralis* are well known, searches were concentrated, although not exclusively so, on umbellifers for the presence of any solitary bee. Wherever *Colletes* bees were encountered a search was made of the immediate vicinity for likely nesting areas.

At Irvine Beach Park there is a narrow area of dune along the shore protecting an area which in places is florally quite rich. On the landward side much of this area is bound by amenity grassland. One of the first areas of interest was an area fenced off with chestnut paling. The fencing protected a florally interesting area where the dominant species/ groups were Tufted Vetch, Hogweed, Wild Carrot, hawkweeds and some Scentless Mayweed. Within this area two or three *Colletes* bees were found on both common umbelifers however none could be caught. Just outside the area were a couple of Giant Hogweed plants, one of which also had a foraging *Colletes* sp but this was regrettably out of my reach.

Further south the areas in the lea of the narrow dune belt were in places florally rich with the aforementioned umbelifers, Kidney Vetch, Ragwort, Scentless Mayweed, rose bushes, hawkweed and some scabious. These path-side areas were searched extensively for both bees and signs of nesting behaviour. Occasional *Colletes* were seen on umbels but never on yellow composites which suggested that they may be *C floralis* although none were taken as specimens. It was here that an *Andrena* was collected as it foraged on scabious flowers. The specimen was later identified as *Andrena nigriceps*. There has been as far as my research shows only one previous record of *A.nigriceps* in Scotland, by William Evans in 1890 at Luff Ness Lothian.

Further south there is an area used as a caravan park (Figure 4). There are two areas in the lea of the dune edge where the two common flowering plants were umbels (Hogweed and Wild Carrot) and ragwort. These areas were protected form the prevailing onshore wind and *Colletes* were found to be particularly evident. Four were collected, two were found to be male *C floralis*, two females proved to be *Colletes daviesanus*. In addition a number of *Colletes* were photographed (Figure 5).

Because of the numbers of bees present (of both sexes) I made a lengthy search here for any signs of nesting. Unfortunately no aggregations or even individual burrows were found. The types of areas searched included: any area of sand without significant over-growing vegetation, steep path sides, areas of wind blown sand and areas where sand had been dug out. This failure to find nesting areas may be more to do with a lack of experience of the species and in general of not looking in the right places.

Further to the south again there was a large area of what I would describe as dune grassland with little in the way of flowers. I did walk quite a bit of this area and search on the very few umbels and ragwort plants present but found little sign of solitary bee activity.

Some of the area south of the golf course at Prestwick was florally quite rich but given the change in the weather few bees were seen during the entire visit. There were only a few areas of umbelifers here, some on the golf course side of the fence. At the start of the path there were a few larger areas of mayweed. In other areas hawkweeds and clovers were more abundant. As far as possible all areas with flowers were checked for any bee activity. Three specimens were collected in this area, two proved to be female *C.daviesanus* with a single rather worn and wet female *C.floralis*.

Because the weather was less than ideal for bee activity for most of the visit more effort was made in looking for evidence of breeding areas. There were a couple of steep banks on the edge of the golf course fence line where likely holes were found. At one large area of sand bank caused by erosion an attempt was being made to encourage sand deposition by staking cut gorse bushes. There was significantly more flower in some of the areas inside the golf course boundary. It might be possible to encourage the course to manage some areas with *Colletes floralis* in mind. The path at the mouth of Pow Burn followed the south bank of the burn which was steep and mostly inaccessible although florally quite good. At the head of the peninsula bound by the burn and the coast there was a very interesting area with much hogweed, thistle, bramble, yellow compositae and bindweed. Regrettably only a few bumble bees were active. Because of the rather poor weather I made every effort to search likely nesting areas along the narrow coastal dune strip, unfortunately without any success. At the head of the driving range is a large area that was florally the busiest area I had visited and had what appeared to be the best diversity. It is regrettable that the weather was against bee survey work. Based solely on the richness of the flora

this is certainly an area that needs another visit for both *Colletes floralis* and *Bombus distinguendus*. I am not sure if this is part of the golf course, if so they should be encouraged to keep it the way it is.

If required I would be keen to visit the area again in 2008. With this in mind I have written to the contact I was given at Nobel Energetics with the hope of organising access to the Ardeer spit. Regardless of the response a visit to the coastal area outside the boundary fence should give an idea of how productive the spit as a whole may be. The Pow Burn area looked so good that it warrants another visit in good weather conditions.

7.2.4 RSPB work

Surveys organised by RSPB have extended the known range of *C. floralis* with the discovery of several large populations on islands in Western Scotland (especially on Tiree and Islay) and four small and highly localised populations in Northern Ireland. In 2007, a new population was discovered at Macrihanish at the southern end of Kintyre; the first colony on the Scottish mainland. Most Scottish populations appear stable or increasing, although some are very isolated. A PhD study at Queen's University Belfast into population genetics found very low levels of gene-flow and some evidence of a recent genetic bottleneck within the four populations studied; three from Western Ireland and the fourth from Tiree. Many areas of apparently suitable habitat in the Western Isles and northern mainland Scotland are unoccupied. In 2007, several new colonies have been found in both North and South Uists. The number of known colonies in North Uist has increased from one colony in 2005 to over 20 colonies in 2007.

Plans to extend the survey of Islay and re-visit Gunna in 2007 were postponed. On the Uists, opportunistic searches by RSPB staff revealed several more colonies including:

- two small colonies at Drismore Farm, South Uist;
- a second colony at Balranald RSPB reserve, North Uist;
- two colonies (one large) on Vallay Island;
- nine colonies on Eriskay;
- several potential and confirmed colonies on Baleshear including a large colony of 250-300 holes in the north of the island.

Site occupancy was monitored for the seventh year running on the The Reef RSPB reserve, Tiree, where ten out of 13 sites visited were active.There was no monitoring of the Coll population due to staff changes.Two small colonies were active on Oronsay.

Future plans are:

- to complete the survey of Islay to establish the size and extent of populations;
- to continue to monitor site occupancy on the RSPB reserves on Coll, The Reef (Tiree), Ardnave and L. Killeyan *(*Islay) and Balranald;
- to ensure all known sites are safeguarded and encourage suitable habitat management.

7.3 Northern bees project

7.3.1 This new project was initiated in 2007. Surveys for a suite of six bees (the BAP species *Bombus muscorum* and *Andrena tarsata*, also *Andrena coitana*, *Andrena similis*, *Nomada roberjeotiana* and *Nomada obtusifrons*) were undertaken at four locations across northern England. The aims were firstly to identify sites that could be used in a monitoring programme looking at population changes associated with climate change and secondly to identify

populations for autecological study. Andy Jukes was asked to survey the Peak District and the Lancashire coast, Ian Cheeseborough surveyed the Shropshire Hills / Welsh Marches and Harry Eales surveyed sites in Northumberland and Durham. Summaries of their reports are given below.

7.3.2 Peak District

Despite extensive searches of many areas in the Peak District including the High Peak and South-west Peak only two of the six target species were recorded. Mam Tor (SK125835) was the only location that yielded successful recording of the target species, *A.tarsata* and *A.coitana*. Mam Tor is grazed acid grassland. It contains discrete patches of tormentil on the south facing slopes and where there are paths, overhanging path edges form small clifflets that contain, what appeared to be, aculeate nesting holes. Three foraging female of *A.tarsata* were located but none could be found entering or exiting holes along the paths. One female *A.coitana* was also recorded. This, along with the *A.tarsata*, was observed foraging on tormentil. A nomad bee (*Nomada* sp) was seen (18/08/07) but could not be retained for detailed investigation of its species identity. Further visits were undertaken but no further evidence of the bees could be found.

A number of the survey sites also revealed the presence of *Bombus monticola*. This species was found throughout the Peak Distinct from Swallow Moss across to Goldsitch Moss in the South-west Peak (high and extensive population) to Hulme Moss (High Peak).

Despite there being large areas of what is believed to be suitable and in some cases optimal habitat, particularly in the South-west Peak, the presence of any other species including the main focus, *B.muscorum*, was not detected. It is unclear why but in some cases the management of the moorland may be a contributing factor to the apparent lack of *B.muscorum* and others. Much of the heather moorland surveyed including large areas of Axe Edge Moor (west of Buxton at SK025705) is managed for grouse, mainly through burning. This is an effective way of managing a moor for grouse but can render the moorland less productive for a number of other species and groups, including aculeates that often depend upon a tight mosaic of structure heights and a range of foraging sources through any one season. Heather burning produces areas of similar aged heather and bilberry rich in new shoots for grouse foraging but reduces species diversity and renders areas devoid of a mixed age range and structure of heather. This reduces the opportunities for flowering plants to colonise and establish amongst the over mature and senescent phases of heather. It is also possible that heather burning may affect *Sphagnum* and other moss development, which will affect the nesting success of *B.muscorum*. Bryophytes, including *Sphagnum*, appear to be more successful where they can colonise over mature and senescent heather. The sheltered conditions of the degenerate heather phases create a micro-climate with raised humidity levels, beneficial to *Sphagnum* development. The burning of heather moorland reduces the opportunity for these conditions to develop as they are maintained, wherever possible, towards the early phases of heather (building phase) and therefore possibly inhibits the success of *Sphagnum* to form into extensive mats, ideal for this surface nesting *Bombus*.

It is suggested that further survey work is carried out in the Swallow Moss area since this appears to contain the best quality habitat and foraging features in a small area for aculeates in the whole of the Peak District surveyed so far.

Mam Tor, the site of *A.tarsata* and *A.coitana*, is an obvious point from which to extend survey work to find other nearby sites and undertake autecological studies. The possible presence of their nomad bees also requires further study at Mam Tor.

Burbage Moor and its surrounds is a large and extensive area of heather moorland that could not be thoroughly searched during this survey. It is suggested that further work could focus on this area from Sheffield to Bamford.

The area of high moorland above Snake Pass (Hope Forest and Alport Moor) was visited during sub-optimal weather conditions at a sub-optimal time (September, 2007). It is suggested that this area of moorland form part of further survey work, should it be deemed necessary.

High Peak (east of Derwent Water) is an area devoid of roads and has extensive areas of high moorland. This is a huge area that would benefit from at least a scoping visit to assess the habitat and potential for the species suite.

The Peak District National Park Authority, in collaboration with Leeds University, is undertaking a National Park wide "Moorlands for the Future" project. Part of this project has been a public participation survey of common moorland bees including *Bombus monticola*. There is potential for collaborative works with this project that would benefit the goals of the northern bee survey amongst possible other projects for Hymettus Ltd.

7.3.3 Morecambe Bay

Morecambe Bay has large areas of saltmarsh backed by flower-rich habitat including limestone outcrops and vegetated tidal defences. Despite there being good quality foraging and some intact areas of saltmarsh, no evidence of *B.muscorum* could be found. Reasons for this are unclear though as with the Peak District, management of the saltmarsh may be an issue. Saltmarsh lamb is becoming more profitable and popular and as a result has driven farmers to gain the most from their land. Historically, this habitat would have largely been extensively rather than intensively grazed. Areas such as Heald Brow and Arnside have either a high density of sheep on the saltmarsh or are possibly grazed constantly throughout the year, the result being a reduced sward height, structure, and loss of diversity. These high levels of disturbance to the habitat may be a reason for the lack of evidence of *B.muscorum* particularly as the bee tends to nest on the surface and excessive grazing would reduce cover and protection for the nest from inclement coastal weather.

Red Bank Farm and Heald Brow stand out as two areas that would benefit from further survey as these posses good foraging and in the case of Red Bank farm, good quality saltmarsh.

7.3.4 Northumberland & Durham

An examination of known distribution maps of the target species in this survey show that none of the species, with the exception of *Bombus muscorum*, have apparently been recorded north of central Yorkshire. However, I have noted in my own recording during the past half century, that there have been considerable changes in the distribution of many insect species, particularly in the last thirty years, and it is quite conceivable that some of the target species may well have expanded their range northwards, and this may not have been noticed due to the lack of recorders of the Aculeata in the two most northerly counties of eastern England.

I tried to cover as many different habitat types as possible, ranging from Magnesium Limestone grassland on the Durham coast to the thin peat soils overlying glacial clays in the uplands of the county. Rich agricultural land where a species rich flora existed to a roadside verge built over coal mine pit heap spoil and certain 'brownfield sites'.

The numbers of bee species of all genera seen during the survey period were very few in numbers, even the hardy and usually weather tolerant common bumblebees were found to be very much reduced in number. Indeed I cannot recollect any year out of the last forty that I have seen smaller numbers of this genus.

Very few of any of the smaller solitary bees were seen and captured. I have retained the few of those that were taken for later identification and verification. These total just eight in number, all appear to be the same species and not the target species.

The only highlight of the survey was the detection of two new tetrad records for *Bombus muscorum*. These were taken on or immediately adjacent to damp acid grassland/moorland, the usual habitat for this species in north-east England. Both these specimens were freshly emerged queens. These are considered by me as very unusual captures at such an early date. I would not expect to see fresh queens of this species much before mid August under normal climatic conditions.

The lack of success on locating the target species may be due to several reasons:

- That the sites examined are still beyond the current northerly range of these target species, and therefore the species are absent from these counties.
- That if the target species do occur on any of the sites surveyed, they emerged earlier in the year and were over before the survey took place.
- The climatic conditions prevailing before and during the survey period may have delayed emergence or even drowned the specimens waiting to emerge. Much of the ground on the sites examined was heavily waterlogged.

7.3.5 Shropshire

During the past five years *Andrena coitana*, *A. similis*, *A. tarsata* and *Nomada obtusifrons* have been recorded at various sites in the targeted area. The sites surveyed had produced records in previous years during independent work or appeared to have potential for the species concerned. The only target species seen in 2007 was *A. coitana*. Two females of this bee were observed on 19th June at Bury Ditches (SO330838, Elevation 352m) resting on Bramble (*Rubus fruticosus*). Further females were observed on 4th August at Bucknell Woods (SO 343736, Elevation 215m) visiting Tormentil (*Potentilla erecta*); again at Bury Ditches (SO329837, Elevation 382m) foraging at bramble and in a private garden at Brokenstones (SO419877, Elevation 247m) foraging at Upright Hedge Parsley (*Torilis japonica*). *A. coitana* had been recorded in previous years from Brokenstones (2004), from Bucknell Woods (2006) and from Rhos Fiddle (SO211852, Elevation 408m) in 2002. Rhos Fiddle also produced records of *A. tarsata* in 2002 and in 2005 a nesting aggregation of *A. tarsata* was found here. The same area was re-visited to photograph the nesting site in 2007, but due to heavy trampling by grazing cattle the site was no longer evident. Although neither *A.tarsata* nor *A.coitana* were found at Lower Short Ditch (SO224872, Elevation 463m), their cleptoparasite *Nomada obtusifrons* was collected here in 2005. Finally, *A. similis* was recorded on the Long Mynd in 2002 and again in 2003

7.3.6 Cumbria

Although not part of the main project, Neil Robinson was asked to look out for *Andrena tarsata* during his survey work. He did not find it then, but provided the following information about a population in Cumbria.

This bee was recorded by the Carlisle Naturalists in the north of the county early in the 20th century. The only recent record was North Walney in 1994 (Michael Archer) until a Liverpool Museum Survey found it in 2001 at Burns Beck Moss Cumbria Wildlife Trust Reserve (SD5987). On the 16th July 2005 I found a female at Burns Beck Moss foraging Tormentil on the drier edge of the Moss beside the road, adjacent to the circular walk round the Reserve.

This year I made further investigation of the population. July was a notably cloudy and wet month and on the 24th I found only the common solitary bees *Andrena minutula* and *Lasioglossum fratellum* visiting the Tormentil. However, on 9th August in the morning under a blue sky I found that single *A. tarsata* females were visiting the Tormentil every few minutes, usually only one per clump. They are slightly larger than the *A. minutula* and their behaviour is different: they go quickly from flower to flower, with a fast scrabbling action while they are on the flower. The fine white posterior hair bands on the tergites are visible on fresh individuals but only persist as vestiges at the sides in worn specimens. Individual Tormentil flowers must only provide tiny amounts of pollen because the bees forage for several minutes before the scopae on their hind legs and the hairs on the side of the thorax become full of yellow pollen. By 1.00 p.m. there was more activity and there were sometimes two females on the same clump. On 27th August there were still a few females foraging, but by 3rd September only *A. minutula* females and males were seen; the *A. tarsata* had evidently completed its flight period.
Looking for the nest site, which was unlikely to be on the mossland, on 9th August I examined the steep open bank across the road on the lower slopes of Hill's Plantation. This is an old Larch plantation on a ridge of Silurian rock which I understand is now owned by the Woodland Trust. Much of the slope is covered by Larch regeneration and Bracken, but there there is an open area near the road with thin soil and Wavy Hair-grass. It faces west, but receives sun from midmorning onwards. This bank is clearly a valuable nest site for aculeates: it was swarming with patrolling males of *A. minutula* and females were flying in and out. I saw one female *A. tarsata*, but what clinched the matter was that I caught a female *Nomada robertjeotiana* prowling the surface. This is the specific cleptoparasite of *A. tarsata*, which indicates that it is nesting there. It is rated as Nationally Rare (RDB3) and this was the first time I have seen it. It has not been recorded in Cumbria since 1920.

7.4 *Osmia inermis*

7.4.1 Tayside LBAP leaflet

Richard Lockett, a FWAG farm conservation adviser in Perthshire contacted Mike Edwards in February 2007. He was co-coordinating the production of a leaflet for the Tayside LBAP aimed at farmers and highlighting some species linked to agricultural activity and important in the biodiversity context within Tayside. One of the species to be included in the leaflet was *Osmia inermis*. Mike was able to provide photos for the leaflet but no end product has appeared yet.

7.4.2 Cairngorms National Park study

Hymettus obtained a grant from CPNA for survey work in connection with the Caingorms LBAP. The work was undertaken by Murdo Macdonald and extracts from his report are reproduced below:

Aims
The aims of this exercise were:

- to determine that *Osmia inermis* was still present, or at least that the habitat was still in good condition, at Meall Ghruaim and Tulach Hill;
- to establish contact with the current landowners/managers at Meall Ghruaim and Tulach Hill
- to ensure that they were aware of the presence of the bee, its importance, and appropriate management;
- to familiarise the surveyor with the habitat where *Osmia inermis* is known to occur,
- to assist site assessement elsewhere;
- to assess the suitability of the habitat for *Osmia inermis* and, if possible, the presence of the bee at other sites in the CNPA area;
- to identify opportunities for future work on the species in the Cairngorms LBAP area.

Site descriptions
Cuaich, NN655867-NN664865. 9 July 2007, 1600h-1645h. Variable sunshine, 15°C, cool breeze. Like those elsewhere in the immediate area, this site at the north end of Drumochter was considered worthy of examination because of the potential for *Lotus corniculatus* to be present on disturbed ground, in this case the course of the road following the aqueduct leading from the A9 to the dam on the Allt Cuaich.There was indeed scattered Lotus, but flowering was confined to plants on the narrow strip between the fence and the aqueduct, where it was protected from the sheep grazing on the other side of the track. The plants which were in flower were generally very robust and healthy. There was a lack of obvious suitable nest sites.
Conclusion: This site is unlikely to be suitable for *Osmia inermis* and should not be considered a priority for future surveys.

Quarry road, NN640821-NN645813. 9 July 2007, 1300h-1545h. Variable sunshine, 15°C, coolbreeze.
The access road leading from the A9 to the disused quartz quarry at 890m on the Cairn na Caim - A' Bhuidheanach Bheag ridge shows substantial evidence of basic flushing along its course, with an abundance of *Saxifraga aizoides* in particular, and some *Lotus*. The latter is visible from the roadside, and it was considered essential that the suitability of the habitat should be properly assessed. The road was followed to 530m, but although the *S. aizoides* and *Thymus polytrichus* were abundant on the disturbed tracksides, *Lotus* was present only in very small quantities. Plants were well-scattered to 500m, were concentrated in the very lowest sections of the track. Even there, the abundance did not live up to initial expectations. The *Lotus* was examined for foraging bees, but the only solitary bees seen were two *Andrena lapponica* feeding at *T. polytrichus* and *S. aizoides*. There seemed to be potential nest sites in the quarry spoil and in natural rock.
Conclusion: This site is unlikely to be suitable for *Osmia inermis* and should not be considered a priority for future surveys. However, if the opportunity arose, further searches in the *Lotus* in the lower part of the track would be appropriate.

A9 roadside, Balsporran to the Dalnaspidal junction, NN628792-NN645733. 9 July 2007, 1700h-1715h. Variable sunshine, 15°C, cool breeze.
The roadside verges between Balsporran and the Dalnaspidal junction contain much *Lotus*. This area was assessed principally from the car, but a walk was made from Layby 84 on the southbound side at NN627787 to Balsporran. The late hour and relatively low temperature made it unlikely that any bee activity would be encountered. On the east side of the road much rock,

both as scree and outcrops, is evident, so there is the potential for nest sites within a short distance of the pollen sources.
Conclusion: This site is worth exploring further, perhaps best by walking the verges in good foraging weather during June. A slow walk down one side returning by the other should be practical, the distance totalling around 12 km.

Meall Ghruaim, NN8968. 10 July 2007, 1030h-1300h. Variable sunshine, 16°C, cool breeze.
This site is close to, but not in, the Glen Fender Meadow SSSI, and the Tulach Hill and Glen Fender Meadows SAC, and part is under an RSS agreement. Since the visit in 2001, the land manager on the site has changed, and it was considered important to ensure that the site was still in appropriate condition. It was hoped additionally that evidence of the current presence of the bee would be obtained, either by sight records or by finding nest cells. The contact is David Greer, Atholl Estate Office, Blair Atholl, Perthshire. In the event, no *Osmia* were seen, and no nest cells were found, but in the circumstances (cool weather, shortage of time) no great importance should be laid on this. The site still seemed in appropriate condition, with substantial *Lotus* in flower and some potential nest-sites. Two sources of concern were noted. A few sheep were grazing on an area where grazing should have been excluded in the summer, apparently a consequence of ineffective fencing; and there was evidence of recent casual off-road activity, apparently recreational, on a restricted part of the land. One queen *Bombus muscorum*, a new addition to the UK BAP list, was seen foraging on *Erica tetralix*, a key forage plant for this species inland in Scotland.
Conclusion: The site appears to remain suitable for the bee. Management should ensure continued suitability for the bee as well. In particular, summer grazing must be restricted to allow *Lotus* to flower freely, and not just persist vegetatively, while winter grazing should ensure that encroachment by scrub is checked.

Tulach Hill, NN8663. 10 July 2007, 1330h-1445h. Cloudy, 14°C, cool breeze.
This is part of the Tulach Hill SSSI, and the Tulach Hill and Glen Fender Meadows SAC. *Osmia inermis* is known from this site (Edwards 1999, 2001), but does not feature in the designations for the SSSI or SAC. Part of the site is under an RSS agreement, formerly an ESA agreement. The owner is Andrew Barbour, Fincastle House, Glenfincastle, Killiecrankie, Perthshire. The aim of this visit was to ensure that the site was still in appropriate condition. It was hoped additionally that evidence of the current presence of the bee would be obtained, either by sight records or by finding nest cells. In the event, no *Osmia* were seen, and no nest cells were found, but in the circumstances (cool weather, shortage of time) no great importance should be laid on this. The site still seemed in appropriate condition, with substantial *Lotus* in flower and some potential nest-sites. Two queen *Bombus muscorum*, a new addition to the UK BAP list, were seen foraging on *Erica tetralix*, a key forage plant for this species inland in Scotland, and one queen on *Thymus polytrichus*.
Conclusion: The site appears to remain suitable for the bee. It should be emphasised to SNH (as overseers for the SSSI and SAC interests, and Joint Lead Partners for the SAP) that management for the notified features should ensure continued suitability for the bee as well. In particular, summer grazing must be restricted to allow *Lotus* to flower freely, and not just persist vegetatively, while winter grazing should ensure that encroachment by scrub is checked. It is recommended that the respective LBAP officers discuss with SNH the appropriate mechanism for co-ordinating the separate demands of SAC and SSSI management on the one hand, with the requirements of the *Osmia* SAP on the other.

Black Island, Blair Atholl, NN846658-NN856655. 10 July 2007, 1500h-1630h. Warm in sunshine, 17°C.
This site was notified as having potential for *Osmia* by Richard Lyszkowski who remembered having seen cells similar to those of *Osmia* while searching for beetles some 20 years ago. The west end of the site, between the railway and the river, looked very interesting with plentiful *Lotus* in the sandy soil, but very quickly this gave way to a much more enclosed habitat with dense conifers.
Conclusion: This site is unlikely to be suitable for *Osmia inermis*, but the habitat was sufficiently unusual to bear further survey for other scarce or restricted species (possibly *O. parietina* and its parasitoid, also a priority species, *Chrysura hirsuta*).

Bruar, NN8265. 10 July 2007, 1700h-1730h. Cool sunshine, 15°C.
This site, the land between the A9 and the River Garry, was notified as having potential for *Osmia* by a colleague of Christine Hall. In the event, it proved to be quite unsuitable, with a lack of both *Lotus* and suitable nest-sites
Conclusion: This site is unsuitable for *Osmia inermis*, and need not be visited again.

Future work
Funds should be sought in 2008 and beyond to extend the survey and to try to find positive indicators, either nests cells or live bees, of *Osmia inermis*.
The work should include:

- site visits occupying 1 day each at Meall Ghruaim and Tulach Hill in good weather conditions and with at least 2 surveyors to try to find the bee or its nests;
- a walk in good weather conditions on the A9 at Drumochter between Balsporran and the Dalnaspidal junction as a visual survey for foraging bees, and searches in the rocks and screes for nests;
- repeat survey of potential sites visited by Edwards (1999, 2001) near Spittal of Glenshee, Trinafour, Drumchastle Farm, Keltneyburn;
- visits to areas identified by Edwards (1999, 2001) but not visited at Loch Valigan and Killiecrankie;
- discussions involving relevant partners (Tayside BAP, Cairngorms LBAP, SNH, Hymettus, SAC and the landowners) on how best to manage the known key sites.

References
Edwards, M. 1999. Report of searches for the Biodiversity Action Plan (second list) bees *Colletes floralis* and *Osmia inermis* in Scotland, June to July 1998. Scottish Natural Heritage Commissioned Report F98AC320 (Unpublished report).
Edwards, M. 2001. Survey of three Biodiversity Action Plan bee species (*Colletes floralis, Osmia inermis, O. uncinata*) in Scotland, 2001. Unpublished report to Scottish Natural Heritage and Royal Society for the Protection of Birds).

7.5 *Osmia parietina*
7.5.1 Hymettus provided no funding for work on this species in 2007. Updates on the species in Scotland and Wales may be provided at the meeting.

7.6 *Osmia uncinata*

7.6.1. Jane Sears of RSPB reports that *Osmia uncinata* is probably fairly widespread throughout Strathspey and Deeside. New records during 2005 suggested it is less dependent on mature pines and *Lotus corniculatus* than previously thought. Pollen analysis suggests it may use up to 10 plant species. In 2006 a project commenced to establish the importance of open edges in Caledonian pine woodlands for the bee and to assess its status through a survey of potential sites, in collaboration with ACG/Hymettus and funded by RSPB/SNH. The preliminary pilot study in Abernethy Forest, to assess the use of 'trap-nests' so as to avoid destroying nests sites during the main study, recorded no occupancy of trap-nests by *O. uncinata* and so was repeated in 2007 using a larger number of trap nest at each of four locations where the bee is known to occur. The occupancy results are awaited.

7.6.2. Survey work continued in 2007 with visits to 43 potential sites and one previously known location. *O. uncinata* was seen at the known site and at eight new locations; five of which were within one forest.

7.6.3. Depending on the results of the second pilot study, will begin on the full experiment. Recommendations from the project will be fed into the Abernethy Forest management plan. The requirements of *O. uncinata* and other associated fauna will be highlighted to forest managers.

7.7 *Osmia xanthomelana*

7.7.1 Carl Clee will update the meeting on work on this species in Wales.

7.8 Bumblebees

7.8.1 During 2007 Hymettus did not fund any bumblebee-specific projects. However, *Bombus muscorum* was one of the species targeted in the Northern Bees project that is reported above.

7.8.2 *Bombus subterraneus*

A meeting was held in October 2007 to discuss the possibility of reintroducing *Bombus subterraneus* to England from populations in New Zealand. This meeting involved representatives of BCT, Hymettus and Natural England. As a result, BCT is taking the lead in drawing up a bid to the Heritage Lottery Fund to support a reintroduction.

7.8.3. *Bombus distinguendus*

Jane Sears of RSPB reports that *B. distinguendus* continues to be present on all the reserves where it was recorded previously and is now present on almost all RSPB reserve holdings in Orkney. Overall, the bee is considered to be declining based on partial survey, but numbers are variable between years.

The University of Cambridge/Institute of Zoology PhD study, funded by RSPB/NERC, into the ecology and conservation of the great yellow bumblebee was completed and the thesis now needs to be published.

A new RSPB co-funded PhD, with the University of Stirling and BCT, to develop effective management prescriptions for restoring degraded or abandoned machair to its former, floristically rich state, was started in 2007. A pilot experiment was set up to test a range of arable and wildflower seed mixtures on degraded grassland on Oronsay in-bye. Soil cores were collected to

ascertain the impact of various agricultural practices on the diversity and abundance of species in the seed bank and the potential for natural regeneration of machair plant communities. Additional data from Orkney was collected through a sabbatical project.
2007 was the final year of a 3 year project to enhance and create suitable habitat on RSPB reserves, funded by the Esmée Fairbairn Foundation (in collaboration with the Glasgow Natural History Society and ACG/Hymettus), Heritage Lottery Fund and Forward Scotland. Surveys were undertaken to look at the suitability and use of RSPB management agreement and reserve areas managed for corncrakes and bumblebees. Existing corncrake cover plots were enhanced to make them suitable for great yellow bumblebee and their success was assessed on Orkney, Coll and Uists. On Orkney, bird cover crops (flowering brassicas such as mustards, rape and neeps), were used in spring for foraging by newly emerged queens, when little else was available. On the Uists, areas of knapweed established from seed were used extensively in late summer by queens prior to hibernation.

On Orkney, RSPB attempted to enhance bird crop mixtures to provide better foraging for bees by switching from *Phacelia* to Bugloss. This was not successful in winter bird crops but using the bugloss in arable and bird crop headlands proved to be a much better option. Habitat management and creation on Orkney reserves was reviewed. Rotational management of corncrake and bee corridors has been introduced at Onziebust. Bumblebee monitoring techniques were trialled on Orkney; bees were found to be active in all but the harshest of weathers.

Collaborative work was undertaken with BCT at Vane Fm (historic GYBB site), to establish c.10ha wildflower meadow with local provenance seed from Scotia Seeds. The first summer's growth was used by *B.monticola*, newly discovered on the reserve.

Further work planned includes:
- to further develop the programme of habitat creation and management on RSPB reserves;
- to develop the creation of suitable seed mixes;
- to establish a monitoring programme to evaluate the success of the habitat work;
- to extend the inter-population genetics study concentrating on northern mainland Scotland and Lewis;
- to produce an advisory leaflet and information pack;
- to implement the education programme in collaboration with BCT;
- to implement sympathetic habitat management to maintain large and continuous forage areas, e.g. through agri-environment schemes.

8 East Anglian wetland aculeates

8.1 Introduction
8.1.1 This project was undertaken by Paul Lee and David Scott. Surveys for a suite of six aculeates (the BAP species *Odynerus simillimus* also *Anoplius caviventris*, *Hylaeus pectoralis*, *Macropis europaea*, *Passaloecus clypealis*, and *Rhopalum gracile*) were undertaken at wetland locations across East Anglia. The aims were firstly to identify sites / populations for future autecological investigations to inform conservation actions and for monitoring of the impacts of different management regimes. Secondary aims were to monitor the known nesting sites of *Odynerus simillimus* and to gather *ad hoc* ecological data on any of the species encountered.

8.1.2 The initial selection of sites for fieldwork was based on identifying known sites for the target species, especially those where *Odynerus simillimus* and *Rhopalum gracile* had been recorded previously. Further sites with similar characteristics, including botanical resources, were then identified through discussion with Nick Sibbett of Natural England and Dorothy Casey of the Suffolk Wildlife Trust. A chance meeting with Tim Strudwick, RSPB warden at Strumpshaw Fen, as part of work being undertaken for the Broads Authority, provided further assistance. During sabbatical leave, Tim was undertaking aculeate hymenoptera surveys on a number of RSPB reserves. As well as his valuable input into site selection, Tim was able to provide important records of our target species from his own work.

8.2 Results

8.2.1 Although fieldwork in 2007 was badly disrupted by the poor weather conditions, recording visits to nineteen East Anglian sites were still undertaken. These visits failed to detect the presence of three of the target species (*Anoplius caviventris, Passaloecus clypealis* and *Rhopalum gracile*) but the remaining three species (*Hylaeus pectoralis*, *Macropis europaea* and *Odynerus simillimus*) were recorded from between four and seven of the sites. One site, Sutton Fen, supported all three species but none of the target species were detected at four sites.

8.2.2 *Hylaeus pectoralis* appears to be the most widespread of the target species in East Anglian wetlands having been captured at seven of the sites visited. No further information was gained on the pollen used by the bee.

8.2.3 Good populations of *Macropis europaea* were identified on RSPB reserves in the Norfolk Broads and at Lakenheath in NW Suffolk. However, the bee was not seen at any of the other sites in Cambridgeshire, Essex or Suffolk despite the presence of apparently suitable habitat and resources at several of the sites. Poor weather conditions may have been relevant but availability of nest sites may be a limiting factor as with *Odynerus simillimus.*

8.2.4 As a result of *ad hoc* monitoring of *Odynerus simillimus* populations in the Tendring District of north Essex, David Scott is of the opinion that the wasp is at the least maintaining its population overall despite variations in individual nesting aggregations from year to year. The discovery of a new nesting aggregation at the Alresford Creek site and confirmation of a breeding population at Howlands Marsh balancing apparent declines at the Brightlingsea and Alresford Ford Lane sites support this view. The same appears true of the Norfolk populations where declines at the original Hickling Broad sites are set against the discovery of new nesting aggregations there and at Sutton Fen. A standardised system for monitoring populations of the wasp should be established.

8.2.5 Hickling Broad is a Norfolk Wildlife Trust reserve. Nesting aggregations were originally found in two parts of the reserve in 2002 in ditch dredgings and bare soil exposed by grazing. No wasps were observed when these sites were visited in 2007 and the area of suitably exposed substrate appeared low compared to the sites in North Essex. Discussion with John Blackburn, the NWT warden, confirmed the decline of the original colonies although small numbers of wasps had been observed earlier in the season. John also reported the discovery of a strong new colony on private land outside the reserve boundary (TG415220). The nesting aggregation is in wheel ruts along a bank used for access in a 4x4 vehicle. We were unable to gain access permission in time to observe the aggregation firsthand.

8.2.6 Sutton Fen is a recently acquired RSPB reserve comprising large areas of reed and sedge fen. Tim Strudwick visited the northern edge of the reserve, accessible by public footpath, on 7

August. A belt of woodland marks the boundary here where the wet fen interfaces with drier conditions on marginally higher ground. A female *Odynerus simillimus* was observed patrolling a bank of sandy silt adjacent to the wet fen. Eight female *Macropis europaea* were seen visiting nest holes in the same bank and *Hylaeus pectoralis* was also recorded from the same location. Returning to the site on 9 August Tim found three *O. simillimus* chimneys at the top of a short section of bank, c.1.5m high and facing due south (TG372238). The bank was of a slightly sandy silt material and was kept free of tall vegetation by cattle grazing. It was in a very sheltered situation, in a small clearing in the almost continuous woodland belt. *Berula erecta* was abundant in the vicinity.

8.3 Discussion

8.3.1 Although ditch slubbings can provide nesting sites for *O. simillimus*, they may not be as important as has been suggested in previous reports. Only the original Hickling Broad nest aggregations have been found in ditch slubbings and clearly the wasp is able to capitalise on a range of potential sites from temporary wheel ruts and ploughed furrows to the more permanent small cliffs along ditch banks. The substrate does appear to be important in choice of nest site; chimneys have been found in clay and silty soils. Although this includes sandy silt, no nests have so far been reported from sandy or peaty banks. If, as Booth & Foster (2003) suggested, nest sites are a limiting resource, more work to determine the exact requirements of the wasp would be beneficial. The use of nest site resources by *Macropis europaea* could be undertaken at the same time.

8.3.2 In the first place this could involve creation of areas of bare soil close to existing nesting aggregations. Discussion with land managers could identify a range of different methods to be tested, e.g. dumping of ditch slubbings, livestock grazing, scraping, ploughing, earth bank creation, and uptake by the aculeates would be monitored. An investigation of substrate texture preferences could be attempted alongside this study. A longer term aim may be the creation of new habitat away from known populations as a guard against threats from climate change and sea level rise in particular.

8.3.3 A second aspect of the ecology of *O. simillimus* that still needs elucidation is the extent and location of foraging habitat required by a nesting aggregation. Booth & Foster (2003) commented that there appeared to be insufficient forage at habitat at the Brightlingsea site to support the nesting aggregation. This raises two questions, firstly what constitutes sufficient forage habitat and secondly how far will females fly to collect weevils? Some of the Tendring nest aggregations appear to be a long distance from the nearest known patches of *Apium nodiflorum*.

8.3.4 Further surveys based on the winter collection of cigar galls and plant stems potentially used as nests by *Anoplius caviventris*, *Hylaeus pectoralis*, *Passaloecus clypealis* and *Rhopalum gracile* would increase the chances of detecting populations of these species suitable for further study. Another technique that could be tried is the use of trap nests. However, if these species can only be found through such approaches it does suggest that further autecological work will be difficult.

9. Other Projects.

9.1 Interpretation leaflets

9.1.1 Progress with the production of further leaflets has not been as rapid as intended in 2007. A new leaflet providing information for farmers on bumblebee friendly field margins was published by Hymettus Ltd. with financial support from the Esmée Fairbairn Foundation, Natural England and Scottish Natural Heritage.

9.1.2 Stuart Roberts has been leading an international collaboration in producing an information sheet on *Colletes halophilus*. The idea would be to have the same information available in all of the countries in which *C. halophilus* occurs, and in the various national languages. The UK version will be available as a pdf through the Hymettus web page on the BWARS website.

9.1.3 Further leaflets on *Nomada armata* and *Homonotus sanguinolentus* should be available through the website before long. Leaflets on *Chrysis fulgida, Ceropales variegata, Pseudepipona herrichii, Cerceris quadricincta, Cerceris quinquefasciata, Colletes floralis, Osmia parietina, Osmia uncinata* and *Osmia xanthomelana* are in the pipeline.

9.2 Red listing

9.2.1 JNCC has asked Hymettus Ltd. to work with BWARS to produce a National Review of Bee, Ant and Wasp Species in Great Britain. This conservation status assessment will be undertaken over the next few months.

9.3 BAP species

9.3.1 2008 sees what should be the final reporting round based on the original list of BAP species. The details of this reporting round have yet to be circulated but we have been told it will take place between 1 September and 30 November 2008.

9.3.2 Now that the definitive list of new BAP species is published there is a need to review the research requirements of these. An initial attempt at identifying these research needs has been produced as a basis for discussion by the Hymettus Steering Group.

9.4 Genetic profiling

9.4.1 As reported earlier, the two projects involving the genetic analysis of *Formica exsecta* and *Andrena marginata* have continued during 2007.

9.4.2 During 2008 Hymettus Ltd. is looking to develop a larger scale project investigating genetic mechanisms unlying the responses of various aculeate species to climate change.

10. Development of Hymettus Ltd.

10.1 An Annual Report and accounts for the year from 1st April 2006 to 31st March 2007 have been submitted to Companies House as required by law. The report stated that:
Overall, the company has had a very successful first year. Financially the company has been supported by contracts and grants from Natural England (formerly English Nature) which has enabled important projects to be implemented. At the end of the year notification was received that a bid to the Esmée Fairbairn Foundation had been successful. This opened the way for the appointment of a consultant to draft and implement a 3 year business plan covering scientific and financial aspects of the business. The initial appointment to the end of the financial year 2006/7 was funded from the Natural England grant but the Esmée Fairbairn Foundation grant will support the post thereafter.

10.2 During 2007, Rosemary Winnall resigned as Treasurer to the Board and has been replaced by John Flynn. We are especially grateful that John agreed to sort out the annual accounts for 2006/7 as well as to become a director.

10.3 In the course of searching for alternative sources of funding it has become apparent that Hymettus Ltd would benefit from gaining charitable status. With charitable status Hymettus would become eligible to apply to a greater range of funding bodies than is possible at present. An application to the Charity Commissioners is in preparation.