Action for Biodiversity

Hymettus

Supported by the Esmée Fairbairn Foundation

Hymettus Ltd
Research Report for 2008

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1. Background to 2008 Research

1.1 This report deals with the research programme originating in discussions of the Steering Group at the 2007 Hymettus Annual Review meeting and finalised by the coordinator with advice from the Hymettus Board of Trustees. 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, Heritage Lottery Fund, the People's Trust for Endangered Species, RSPB, Scottish Natural Heritage and Syngenta.

1.2 Projects undertaken in 2008 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 and many can be downloaded from the Hymettus website.

2. Ant Projects

2.1 *Formica exsecta*

2.1.1 A nest count on the Chudleigh Knighton site was carried out over 21st August and 22nd August 2008 by Stephen Carroll. At least 41 active nests plus 15 new nests (with many inferred satellite nests) were counted.

2.1.2 Devon Wildlife Trust manages Chudleigh Knighton Heath on a lease from owners WBB minerals company. Until 2004-5 the leasing arrangement was for a 1 year revolving lease which effectively prevented any long term site planning or management. DWT manages two other nature reserves nearby in the Bovey Basin, including two of the main compartments of a former *F. exsecta* site, Bovey Heathfield SSSI. Landscape-scale project funding has been sought as a basis for a more strategic approach in the Bovey Basin, which ultimately might involve several landowners and partner agencies. DWT submitted a £25,000 grant bid to SITA for management works on its Bovey Basin sites, comprising habitat and landscape restoration, landscape links, and specifically targeting *F. exsecta* following Natural England advice. Funding was granted for fencing but not for site condition assessments and other survey work although undertaking the surveys is a stipulated condition of the grant.

2.1.3 Meanwhile ongoing management of Chudleigh Knighton has continued. In 2007-8 scrub was cleared, sections of 1 ha or more were swaled (burnt), and ponds and scrapes were created, combined with pony and cattle grazing. Fencing provided under the SITA grant would allow livestock to be moved to other, currently ungrazed, compartments. Planned works for 2008-9 (from Andrew Bakere, DWT Reserves Officer) are continued thinning of some scrub, rotational burning of the site and grazing re-introduction in compartments C2 and C3 once a fence has gone in.

2.1.4 On 21 October 2008 a meeting was held between Devon County Council, Teignbridge District Council (the local planning authority), RSPB and DWT to discuss developing a Bovey Basin wide strategy. Historical mineral rights, housing provision, and features of conservation importance make this very complicated. TDC aims to produce a Green Infrastructure plan for the

Bovey Basin, to be completed for September 2009.There was general agreement for liaison between the different agencies. A follow up meeting is to take place in December 2008.

2.1.5 Visits to former sites in the Bovey Basin produced no evidence of the presence of *F. exsecta*. A number of sites that appeared suitable for re-establishment of *F. exsecta* were identified.

2.1.6 Recent searches have been concentrated at lower altitude heathland sites. Investigations at other former upland sites on Dartmoor may be worthwhile.

2.2 *Formica rufibarbis*

2.2.1 The Zoological Society of London (ZSL) was awarded a Heritage Lottery Grant of £49,900 in November 2006 to work towards the conservation of *F. rufibarbis* in Great Britain. Along with partners Natural England, Isles of Scilly and Surrey Wildlife Trusts, Hymettus and myrmecologists Dr John Pontin, Dr Nicola Gammans and Dr Ian Beavis they are currently undertaking actions for the protection and recovery of this species. Actions have included overwintering of mated queens collected from St Martins, Isles of Scilly. Nikki Gammans has prepared a report on the project to date and edited extracts from this are included below.

2.2.2 The 3 surviving queens from the 2007 Isle of Scilly collection were released at Burnt Hill (SU968 663) on the 15th August 2008 as a trial. Each colony consisted of a single queen with brood buried within their next boxes. All nests were dug to a depth of 5cm, the soil was crumbled back over the top when the nest box was buried and the nest was tiled. A week after being released, the nest tiles were lifted to check the colonies'progress. After this trial it was decided that all colonies should be released with a minimum of ten workers plus brood due to the risk of being attacked by other ant species, especially *Lasius niger*. It is recommended that the 2009 Isle of Scilly trip collects between 10-15% of worker pupae from each tiled nest. The pupae should be equally shared between collected queens.

2.2.3 On the15th September 2008 a further 20 *F. rufibarbis* colonies, from material collected on St Martins in 2008, were released at Chobham Common. Prior to the release, in early September, individual locations for each colony were selected by staff from SWT and Dr Pontin. Each location was marked with a GPS location and staked. Ten queens were released at Burnt Hill (SU968 663) and a further ten at Staple Hill (SU973 647). Each released colony consisted of a minimum of ten workers plus pupae and larvae. Worker survival was considerably lower as was to be expected with first laid brood. The nest boxes also contained a small number of fish eggs for food and an extra drainage hole was drilled into the bottom of the box. The colonies were released according to Pontin's methodology used on the earlier release. It was considered that other ant species might be attracted to the tiles over the top of the nests after two trial release colonies were thought to have been attacked by *Lasius niger*. Therefore a precautionary decision was taken to tile half the nests and to leave the remaining nests covered with just topsoil.

2.2.4 The preliminary results of genetic analysis suggest that *F. rufibarbis* queens are multiple mated. Of a total of 30 putative queens from 14 nests, half were singly mated and the other half were multiple mated with up to 6 males. This could imply there is limited dispersal of queens. However, polyandry (multiple male matings) can help maintain genetic diversity. Genetic analysis showed that queens within a 'nest' are unrelated yet the males they mate with (multiple matings) are related i.e. brothers. This suggests that queens join other existing queens by

pleiometrosis (cofounding) rather than adoption of queens in subsequent years or daughters remaining within the maternal nest.

2.2.5 Genetic analysis also suggested there is limited polydomous (budding) nest spreading. However on the 2008 Isle of Scilly expedition, nests were observed to have satellites within 30cm of each other. A new *F. rufibarbis* colony was found on Chobham Common on a road side verge which had two nests within 50cm of each other, also suggesting one nest is a satellite.

2.2.6 Population viability analysis determined there was no inbreeding on the Isles of Scilly. Preliminary genetic data suggest that the Chobham Common and Isles of Scilly populations may differ in their origins. However, few colonies were sampled and the locations of the Isle of Scilly nests from which workers were collected is unknown and workers were only collected from one colony on mainland UK.

2.2.7 Clearly more genetic work needs to be completed to clarify the questions arising from the study. In 2008 approximately 70 nests were found on the island of St. Martins and there are reported nests on Great Ganily, Tean and Nornour. In 2009 it is recommended a survey is completed of these surrounding islands and workers are collected along with workers from at least 50 colonies from St. Martins. It is recommended that *F. rufibarbis* workers are collected from the European range for genetic analysis. *F. rufibarbis* is abundant in Brittany (France) and Regensburg (Germany).

2.2.8 Recommended heathland management for *Formica rufibarbis*

2.2.8.1 Scrapes/turf cutting to create bare ground

Management should aim to create areas of re-vegetating ground in a larger area of more mature vegetation. This may include occasional small birch and pine as these provide a source of aphids for *F. rufibarbis*. This should be achieved by creating shallow, linear scrapes and allowing these to re-colonise naturally. Scrapes should run approximately along the contours, be sloping or vertical (to aid drainage), face south and should be about 3m x 6m. All scrapes should be dug to the mineral soil and the humus layer removed. Areas for scrapes should be essentially dry heath; standing water will have a negative impact on *F. rufibarbis* colonies and scrapes may be colonised by *Molinia caerulea.* New scrapes should be created close to existing scrapes and leave buffers of more established vegetation in between. Scrapes should be completed on a cycle around the release site, every 5-8 years depending on the original vegetation type, recolonising vegetation type and nutrient levels within the soil.

2.2.8.2 Grazing

Grazing is a potential management option for maintaining a heathland mosaic, but it is important to ensure appropriate stocking levels. Cattle are preferred as they tend to produce a more varied vegetation structure than that in sheep-grazed areas. Their greater weight will suppress bracken growth, enhance species richness, create uneven aged heathland, suppress growth of *Molinia caerulea* and provide areas of disturbed ground. However, in some cases the introduction of grazing has increased the spread of bracken due to it being avoided by grazers and due to reduced competition from other species. In Europe *F. rufibarbis* has been reported in grazed and cultivated fields. However, sites where establishment of *F. rufibarbis* is attempted should not be grazed by heavy animals, as this risks destruction of the nests. Should establishment be successful then a careful experimental introduction of grazing over a proportion of the established nests may then be considered. This would need strict monitoring. The impact of grazing is variable and complex and it is difficult to predict ant responses.

2.2.8.3 Burning
Burning on lowland heathland is a less favourable method of management as results can be variable and the effect of fire on invertebrate groups is not fully understood. However, burning potentially can be beneficial to most invertebrate species and create a heterogeneous habitat (especially if combined with grazing). If burning is implemented on a site it should be completed during the winter and within small patches on a rotation.

2.2.8.4 Public access
Moderate trampling from walkers can be a management tool in helping to maintain sandy paths/areas, but heather is susceptible to death from excessive trampling.

2.2.9 *Formica sanguinea* management
2.2.9.1 *Formica sanguinea* should be controlled in the short term at any release site to create a window of opportunity for *F. rufibarbis* to become established. If *F. sanguinea* nests are found it should be decided whether translocation is an option or, if the nest density is too high, an alternative release site should be sought.

2.2.9.2 As a last resort, control of *F. sanguinea* can be completed by poison (baiting). Baiting *F. sanguinea* nests should begin in early spring when the colony is at its most hungry, using manufactured ant poisons or borax and honey. *F. sanguinea* nests should be monitored for 3-5 years within a 100m radius of the release site. It is hoped that by short- term control of *F. sanguinea* the *F. rufibarbis* population will become established and eventually be able to co-exist. *F. sanguinea* can be surveyed by visual searching (above 20^{o}C on clear sunny days), baited pitfull traps or baiting with sugar and cheese etc under an up-turned plant pot saucer. Timing and frequency of sampling is largely weather dependant but temperatures in late April/early May should be sufficient for surveying to commence. Several visits to each potential receptor site will be required to ascertain the presence or absence of *F. sanguinea* prior to releasing *F. rufibarbis* nests.

2.3 Southern Ants Project
2.3.1 Dungeness
Brian Banks continued to study the ants at Dungeness through the summer of 2008. He now has a backlog of preserved material to work with over the winter.

3. Eumenid wasps.

3.1 *Odynerus melanocephalus*
3.1.1 No further autecological work or distributional surveys were undertaken for this species in 2008.

3.2 *Odynerus simillimus*
3.2.1 Further monitoring of *Odynerus simillimus* populations in Essex and Norfolk was undertaken in 2008. Tim Strudwick was asked to count nests at the Norfolk locations whilst David Scott continued to monitor the Essex population.

3.2.2 Norfolk
Four sites where *O.simillimus* had been observed nesting in recent years were identified. Two of these sites, at Hickling Broad (discovered 2002) and Sutton Broad (discovered 2007), were

visited by Hymettus workers in 2007. Two other sites at Hickling Broad had been discovered by the Norfolk Wildlife Trust (NWT) Warden, John Blackburn. The first of these on land at Willow Farm owned by local farmer John Tallowin, was discovered in 2006. The second, on the nature reserve (Mrs. Myhill's Marsh), was discovered in 2007.

These sites were visited on 24th July 2008 and 15th August 2008, and the areas were carefully searched, at times on hands and knees, for "active" nests. Nest holes with the distinctive short "chimney" intact were judged to be active. A few holes were observed where a partial or remnant "chimney" was present, and these were considered to be possible nests. Soil types and situation of nest sites and nearby habitat and vegetation were noted.

Some time was also spent searching elsewhere in the vicinity of Hickling Broad, Sutton Broad and Martham Broad, on the above dates and also on 9th August 2008, in an unsuccessful attempt to locate additional nest sites. Aerial photos and OS maps were used to identify banks and dry ground close to fen and ditches, which might provide suitable nesting habitat, to target these searches.

O. simillimus nests were located in a fairly wide range of situations. The soils included sandy silts, pure silts, silty clay and a clay/sand/chalk mix, though none were on pure sand or peat. All were on raised substrates, created by human activity – flood banking, ditch and pond excavation and maintenance. Nest sites were all exposed to the sun for several hours during the middle of the day. Nest sites are always on more or less bare ground, though often small patches within well vegetated ground. Individual nests burrows were close together, even where apparently suitable nest site are not limited. Trees were nearby to all sites – no nests were more than 15m from a tree, and two of the four sites were in well-wooded landscape. This may not be significant, since trees are frequent close to wetland margins in the Broads, but it is possibly indicative of the beneficial microclimate provided by trees in an otherwise open, windswept habitat.

Of the four occupied sites visited, Willow Farm and Sutton Fen appear to provide relatively stable nesting habitat, though at the latter this is dependent on just the right level of grazing and trampling from cattle, and the former site is now threatened with destruction during floodbank strengthening works. The other two sites, on ditching spoil, would seem to be short-lived, possibly only suitable for 1-3 years. Similar ephemeral nesting opportunities should be found quite widely in the Broads, on bare ground created by ditch management, cattle poaching, vehicle activity, cultivation or falling trees, and it is possible that *O.simillimus* does occur more widely, possibly at a low density.

It would seem advisable to attempt to help sustain the Broadland population by providing additional nesting habitat at sites where the species is known to be present. This could be done in minutes if an excavator was on site, or if this was not possible it could easily be done by hand digging. At Hickling Broad NWT Reserve, stripping off a few square metres of turf from the southern side of the vegetated spoil bank at TG422219 would suffice. At Sutton Fen, a new bank could be created across the pond from the existing bank at TG372238. NWT and RSPB should be encouraged to adopt positive management such as this at these reserves.

Given the patchiness of potential nesting habitat, the large search area, the physical difficulties with access and the permissions required, a thorough survey of the potential range of in the Broads would be very expensive. In view of the success that John Blackburn has had in finding nesting aggregations of *O. simillimus* on the NWT reserve, it is likely that an awareness raising

campaign among the numerous conservation and land management staff working in the Broads would identify further sites, if indeed they exist. A leaflet and letter requesting assistance could be sent to staff of the following organisations: Broads Authority, Norfolk Wildlife Trust, RSPB, Broads Internal Drainage Board, Natural England, National Trust, BESL, etc. Farmers and other private landowners would also be worth targeting. Follow up visits could then be made to confirm reports generated by this exercise.

3.2.2 Essex

Four sites where *O.simillimus* had been observed nesting in 2007 were revisited in 2008. Alresford Creek (TM073192) was visited on 14th July, a fine, sunny day. Wasps were seen on both sides of the sluice and 8-10 nest chimneys were found. There appeared to have been a decrease in *Apium nodiflorum* but an increase in *Vicia cracca* on the site.

The site near Brightlingsea sewage works (TM068173) was visited on 15th July, a warm but overcast day. No wasps were seen but approximately 12 chimneys were present.

The sites around The Ford at Alresford Creek (TM064197) were visited on 16th July, a warm bright day. The original site on the sea wall has been covered by spoil, apparently from a pond dug by the owner of Ford Cottage. There were no chimneys present but the area seems suitable for recolonisation. Three possible chimneys were seen on the sea wall 100m to the east. Another 3 were found in the edge of the ploughed field where the wasp has nested in previous years.

Howlands Marsh (TM1116) was visited on 21st July, a fine, sunny day but with a strong breeze. One or two female wasps were seen hunting on *Apium nodiflorum*. The only chimney found was at the edge of a barley field just outside the boundary of the nature reserve.

3.3 *Pseudepipona herrichii*

3.3.1 As in 2006 and 2007 surveillance of *Pseudepipona herrichii* was undertaken by Chris Dieck of the RSPB Dorset Heathland Project and Angela Peters of the NT. 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 at Stoborough Heath NNR (NE & RSPB), Grange Heath (RSPB) and Godlingston Heath NNR (NT). The results have not been statistically analysed.

3.3.2 Additional survey work was undertaken by Stuart Roberts. The main aim of this was to investigate a number of previously unstudied sites within the Poole Basin known to have at least some of the environmental conditions suitable for supporting *Pseudepipona herrichii*. These include:

- The presence of exposed clay as a nesting medium;
- Mid-succession regenerating heathland with Bell Heather (*Erica cinerea*) as a major component of the vegetation;
- The Tortricoid moth *Acleris hyemana*, the sole known larval prey item;
- Water to aid in nest construction.

Sites were selected both within the known historic UK range of the species, and also in the northern parts of the Poole Basin from which no records exist.

3.3.3 Very few wasps were observed during the visits made in 2008. The three sites where wasps were observed were Godlingston Heath, Stoborough Heath and Grange Heath. At other sites,

such as Hartland Moor Tramway and Slepe Heath boundary, signs of sizeable nesting aggregations were found, although no adults were seen. 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.

3.3.4 Several nesting burrows, believed to be those of *P. herrichii* were found on Creech Heath (1st July 2008; SY9265983408). This site lies south of RSPB Stoborough Heath and east of Grange Heath and has areas of bare clay, an abundance of watercourses and sufficient heather. *Acleris* were also found, although only at low densities. It would therefore be unsurprising to find a colony of *P. herrichii* at this site, in between two extant populations.

3.3.5 Further burrows, possibly belonging to *P. herrichii* were found on Ham Common (SY9824990618), another site from which clay was extracted in the past. Ham Common also has a large lake in the centre and has extensive heather cover in the north and west of the site.

3.3.6 An active nest with the characteristic granular spoil was found on Upton Heath (SY987941) on 15th July 2008. The discovery of this new location for the wasp was unexpected.

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 2008.

5. Pompilid wasps

5.1 *Homonotus sanguinolentus*

5.1.1 No further autecological work or distributional surveys were undertaken for this species in 2008.

6. Sphecid wasps.

6.1 *Cerceris quadricincta* and *Cerceris quinquefasciata*

6.1.1 No further autecological work or distributional surveys were undertaken for these species in 2008.

6.2 *Crossocerus palmipes, Crossocerus styrius* and *Crossocerus walkeri*

6.2.1 George Else and Stuart Roberts are involved with autecological studies of the three *Crossocerus* species - *palmipes*, *styrius* and *walkeri*. So far records have been gathered from both the British Isles and overseas (mainly western Europe). This has involved visiting the NHML to extract data from British and overseas material. All national museums in England, Ireland and Wales have been asked for locality and biological data from specimens in their care. In addition all collectors likely to possess such material are being asked for records. Literature searches (taking especial note of any observations relating to nesting biology and habits) are also being undertaken. Provisional distribution maps for all these species have previously been published by BWARS. However, these are highly likely to be incomplete and, of course, do not include

records from elsewhere in Europe. Updated maps will be provided in the final project report next year.

6.2.2 It is proposed that field work will take place in the 2009 season. Known sites for the three species will be visited in an attempt to study their habits in the field. An obvious difficulty in field recording is that all *Crossocerus* species can only be accurately identified under a microscope.

7. Bees

7.1 *Andrena ferox*

7.1.1 Mike Edwards, aided by George Else and Alwyn Stocks, carried out a small project to test the theory that populations of *A. ferox* are limited, within a suitable temperature envelope, by the availability of a succession of oak trees flowering. It is possible that such a situation could arise in areas where the majority of oak woodland is of a plantation nature, rather than a naturally regenerated one.

7.1.2 The investigation set out to look at the timing of flower production in mature plantation woodland in West Sussex, where no records of *A. ferox* exist, and in mature natural woodland in the New Forest, where a population of *A. ferox* exists.

The bee is known to have a strong relationship with Oak *Quercus* sp. flowers, where it collects its pollen. Individual oak trees produce pollen for a very restricted period of less than a week. As female bees are thought to require about a two week period in which to collect sufficient pollen to provision a suitable number of cells to provide the next generation, it follows that a single tree will not provide a sufficient resource.

Whilst flowering, each oak tree will produce vastly more pollen, albeit for a short period, than required by an individual female. This means that a succession of flowering trees is an essential requirement, rather than just lots of trees, and also gives the potential to support a large local population.

Oak flowers do not produce nectar, so an alternative flower resource is also required in order to provide the bee with nectar. Both male and female bees have been seen foraging at Field Maple *Acer campestre* and Hawthorn *Crataegus* sp. flowers

7.1.3 Four samples were taken in West Sussex and four in the New Forest. Each sample consisted of 30 mature trees along a line walked at approximately one-week intervals between 24th April 2008 and 12th May 2008. Three visits were made to each sample site. Along each line the condition of the canopy (not lowest branches) of each tree, as seen through binoculars, was classified according to five categories: in bud; just in leaf (bud showing burst); green flower tassels abundant; flowers open (yellow pollen obvious); flowers finished (brown and withered).

Sample sites were:
West Sussex *A. ferox* unknown: SU877291, Oakreeds Wood; SU876296, Newlands Copse (itself a subject of detailed survey for the Cowdray Estate in 2002 when a good old woodland fauna and flora was recorded); SU864271 S. of Woodmans Green; SU881188, S. of Cocking Causeway.

New Forest *A. ferox* known: SU304044 Hollands Wood camp site (2 samples); SU334058, Denny Wood (2 samples.)

Some exploration of other areas within the New Forest for *A. ferox* was undertaken: Ranmore Enclosure SU3104; Boulderwood, SU247072; Mark Ash SU244077; South Bentley Enclosure, SU2312. No *A. ferox* were found.

7.1.4 The results from the investigation are presented as table 1.

Table 1: Results of sample counts of flowering oak trees in different woodlands between 24/4/08 and 12/5/08

	West Sussex (*A. ferox* unknown)					**New Forest (*A.ferox* known)**			
	site 1 SU877291	**Site 2** SU876296	**Site 3** SU864271	**Site 4** SU881188		**Site 5** SU304044	**Site 6** SU304044	**Site 7** SU334058	**Site 8** SU334058
date: 24 Apr					**date: 28 Apr**				
in bud	8	19	13	9		2	3	2	2
in leaf	11	7	13	8		8	5	3	7
flower tassels	11	4	4	13		11	13	10	12
flowers open	0	0	0	0		9	9	15	9
Total	**30**	**30**	**30**	**30**		**30**	**30**	**30**	**30**
date: 2 May					**date: 6 May**				
in bud	1	0	4	0		0	1	0	0
in leaf	8	1	5	1		1	0	0	0
flower tassels	2	12	9	4		3	3	2	3
flowers open	15	17	12	20		16	21	9	8
flowers finished	4	0	0	5		10	5	19	19
Total	**30**	**30**	**30**	**30**		**30**	**30**	**30**	**30**
date: 8 May					**date: 12 May**				
in bud	0	0	0	0		0	0	0	0
in leaf	0	1	0	0		0	0	0	0
flower tassels	0	2	0	3		0	0	0	0
flowers open	16	14	18	15		5	4	13	11
flowers finished	14	13	12	12		25	26	17	19
Total	**30**	**30**	**30**	**30**		**30**	**30**	**30**	**30**

From this it is clear that extent of flowering time is not a major difference between the two sets of woodland samples and cannot thus explain the presence or absence of *A. ferox* in these areas.

7.1.5 *A. ferox* males (predominantly) and females (very occasionally) were seen visiting Field Maple (mostly) and Hawthorn at Denny Wood. The bees at these flowers were not seen to collect pollen. This is the converse of the situation at this locality reported for other years by George Else (pers comm.). No visits to other flowering plants were recorded at Hollands Wood.

Two entrances to large nesting aggregations were found at Hollands Wood (by tree stump and by side of toilet block). Both had been recorded on previous survey visits for ACG/Hymettus. Returning females always had bright yellow-green pollen loads. This was most likely Oak pollen.

Samples of pollen loads were retained for later analysis. All females took off and headed towards the tree-tops, returning on a similar flight-path. Numbers of females leaving and arriving at the nesting aggregation by the tree stump were recorded over three 20 minute periods on 12th May 2008.

7.1.6 Future work involving the mark and recapture of females would allow foraging and underground provisioning times to be established as well as an index of the numbers of females present.

7.2 *Andrena nigrospina*

7.2.1 Three fields, part of Upper Blackstone Farm, adjacent to the Worcestershire Wildlife Trust's Devil's Spittleful heathland reserve were purchased by the Trust in 2006 with the intention of re-creating heathland as an extension to the reserve. The fields had wide margins containing a variety of wild flowers though the dominant species were poppy (*Papaver rhoeas*) and wild radish (*Raphanus raphinistrum*). Under Worcestershire Wildlife Trust management the arable has been retained whilst feasibility studies for heathland re-creation are carried out but the field margins have been widened and a large area registered as set-a-side. These areas have been cultivated each spring but not re-seeded.

7.2.2 Initial biological surveys were undertaken in 2007 which showed the fields to be important for arable weeds and for invertebrates. Three invertebrate recorders took specimens of a black bee with dark wings which was at first unidentified but which was later found to be *Andrena nigrospina.*

7.2.3 In 2008 a group of recorders with an interest in the hymenoptera was brought together to survey the *A. nigrospina* population with the objectives of establishing:

- The size of the population
- The flight period
- Nectaring and pollen collection preferences
- Nest sites
- The geographical distribution

7.2.4 Techniques were not available for accurate assessment of the population size but bees were encountered throughout June and July with peaks on 15th June and 1st July. Numbers appeared to be related to weather conditions though at no time was *A. nigrospina* abundant suggesting that the population is not large (see table 2).

Table 2: Record of visits to record *Andrena nigrospina*

Date	Number of bees recorded	Site	Notes
6th June	"several"	Field 1	Males and females in evidence. All disappeared when sun went in.
13th June	Nil	Fields 1 & 2	Overcast conditions. Temperature 15°C.
14th June	Nil		Dry. Overcast. Windy. 14°C. About 4 pm.
15th June	10 – 15	Field 2	Sunny. Warm.
20th June	4	Field 1 Wheat field	2 on radish, 1 on hogweed,1 on bramble. All appeared to be nectaring and not pollen collecting. No further data
24th June	1	Field 2	
1st July	5 11	Field 1 Field 2	1 specimen with pollen taken from spider's web. *Nomada fulvicornis bimaculata* taken at nest entrance.
13th July	2	Field with bramble	Photographed
15th July	1 "several"	Field 3 Field 2	 Margin adjacent to disused railway.
29th July	Nil	All fields	Hot, sunny. Calm.

7.2.5 In 2007 the first record was on 29th May and the last in the first week of August whereas in 2008 there were records over a shorter period from 6th June until 15th July with no bees being seen on 29th July when the weather seemed ideal for the species. As several individuals were seen on 6th June the flight period probably started a little earlier but weather conditions had prevented visits to the site prior to this. It would seem, therefore, that the late spring in 2008 did not significantly affect emergence time though the length of the flight period may have been curtailed by bad weather in July. In summary, the flight period would seem to be from late May to early August.

7.2.6 The field margins contain a very high proportion of wild radish and observations of the bees were made almost exclusively on this plant. Individuals were occasionally seen on poppies but these seemed to be resting and not collecting nectar or pollen. There was a single record from hogweed, although it was not certain whether this individual was collecting nectar or pollen and a couple of records from bramble on which nectaring seemed to be taking place. Pollen was collected from several bees for analysis at a specialist laboratory to confirm plant preferences.

7.2.7 Attempts were made to track bees back to their nests but these proved unsuccessful. As direct observation had failed an attempt was made to watch several bees over a period of time to see in which direction they flew with pollen loads. There seemed to be no clear pattern to indicate a colony in a particular place. By chance one bee was seen entering a hole close to a field edge. This was in the cultivated area and not in the uncultivated field margin.

7.2.8 *A. nigrospina* has been found only in the three fields belonging to the Worcestershire Wildlife Trust and a couple of fields across a lane and footpath next to the Trust fields. In all locations there was wild radish, bramble and a rich mix of other wild flowers present. The bee seems totally dependent on these field margins and is therefore vulnerable to changes in farming practice and to heath re-creation, either of which could have an adverse effect.

7.3 *Colletes floralis*

7.3.1 Hymettus provided no direct funding for work on this species in 2008. However, through the partnership (comprising Hymettus, RSPB, BBCT and SNH) established to work on the Species Action Framework for *Bombus distinguendus*, Murdo Macdonald is working with the other partners to set up and train a network of local volunteer recorders and to establish a programme of annual survey and monitoring of *Colletes floralis* in Scotland. Several other individuals and organisations were involved in the survey and research work summarised in the following paragraphs.

7.3.2 Scotland

Further surveys were organised by RSPB on Islay, Kintyre, Ross of Mull and Iona in 2008. Janet Hunter recorded nesting aggregations of *C. floralis* at Killinallan and Ardnave on Islay and along Machrihanish Bay on the Kintyre peninsula but the bee was not seen on Ross of Mull or Iona. The BAP species *Andrena tarsata* was also recorded from Lower Killeyan on Islay, a location that did not support *C. floralis*.

7.3.3 Factors affecting *Colletes floralis* density on Islay in 2008

Cathy Fiedler investigated the population density of the bee at two sites on the Scottish island of Islay, Ardnave (NR 2973) and Killinallan (NR 3072). She focussed on 5 nest sites at each - all in grey dunes and southerly-facing. Factors that could potentially affect female nesting density were investigated, including what makes 'suitable' nesting habitat and which plants are being used for forage.

At each nesting site, a 50cm quadrat was thrown randomly between 5 and 10 times (depending upon the size of the site) and all *C. floralis* burrows within it counted. The average number of burrows was multiplied by the size of the nesting area (estimated in m^2) to calculate burrow density. At the same time, the amount of bare sand at the nest site was estimated as a percentage. Ten 100m transects were conducted at both Ardnave and Killinallan; the flora was characterised and the floral abundance, species richness and number of inflorescences recorded for each transect. Pollen loads were removed from 30 females at Killinallan for analysis.

There were 27 burrows per m^2 at Killinallan, compared with 13 burrows per m^2 at Ardnave. Burrow density increased significantly with increasing size of the nest site ($F_{6,75} = 7.361$, $p = 0.000$). Burrow density was not significantly affected by the amount of bare sand ($t = 0.297$, df = 72, $p = 0.767$). *C. floralis* were found nesting in the mobile fore-dune and in grey dunes and were nesting in various aspects. Both sites were floristically rich with 27 and 25 species of flowering plant at Ardnave and Killinallan respectively. The number of inflorescences did not differ significantly between sites (ANOVA, $F_{1,180} = 0.922$, $p = 0.339$), but the species composition was significantly different (ANOVA, $F_{46, 180} = 45.362$, $p = 0.000$).

Males were observed nectaring on burnet rose, *Rosa spinosissima*, wild thyme, *Thymus serpylum*, (on which they were most frequently encountered, particularly at the nesting site), creeping

thistle, *Cirsium arvense* and spear thistle, *C. vulgare*. Females were seen nectaring on creeping thistle, spear thistle, and lady's bedstraw, *Galium verum*.

Pollen loads were derived from 14 species of plant; wild thyme (34% of an average pollen load), white clover, *Trifolium repens* (23%), knotted pearlwort, *Sangina nodosa* (16%), sow thistle, *Sonchus* species (5%), seaside centaury, *Centaurium littorale* (5%), buttercup, *Ranunculus* species (5%), common stork's bill, *Erodium cicutarium* (3%) common eyebright *Euphrasia nemorosa* (2%), lady's bedstraw (2%), lady's smock, *Cardamine pratensis* (2%), burnet rose (1%), plantain, *Plantago* species (1%), thistle species (1%), and yarrow, *Achillea millefolium* (<1%). Those represented by 3% or less were discounted as being used for pollen, but may have been visited for nectar. Seven plant families were represented; Lamiaceae, Fabaceae, Rubiaceae, Caryophyllaceae, Asteraceae, Ranunculaceae, and Gentianaceae. The two most dominant species collected were also the dominant plants at the site; wild thyme and white clover made up 20% and 8% of the flora along the transect respectively.

Population density is greater at Killinallan than Ardnave, as there is more nesting habitat available. Forage does not appear to be a limiting factor since species richness, abundance of flowers and the number of inflorescences is similar at both sites. Although the species composition is different, the most dominant plants used for pollen and nectar at Killinallan are also dominant at Ardnave.

Population density increases with increasing size of the nest site, supporting findings that *C. floralis* nests in aggregations, attracted by the strongly scented pheromone, linalool (Albans *et al*., 1980, Dufour's gland and its role in secretion of nest lining in bees of the genus *Colletes*. *Journal of Chemical Ecology*, **6**: 549-564). Aggregations mean that males are in close proximity when sexually receptive females emerge from their burrows, increasing an individual's chance of mating success. Additionally, there was more forage over the nest site itself at the bigger sites. This may be particularly beneficial in periods of poor weather as distance travelled to forage is shorter. This could lead to increased reproductive success compared to sites where individuals have to travel further; more trips could be made in a given time period and so more nest cells provisioned.

C. floralis was found nesting in mobile fore-dune and grey dune areas, which suggests that sand that has been stabilised by vegetation is favoured. Further research is required to determine the point at which the soil becomes too firm to nest in. Nests were found in all aspects, suggesting that aspect is not a primary factor in nest site choice. Pollen was collected from a wide variety of plant species, from 7 different families. *C. floralis* may therefore be buffered against changes in floral abundance (between years and across a site), and in its emergence date since it is not restricted to synchronising with any given flowering period. This may be a favourable characteristic in view of climate change.

7.3.4 Northern Ireland

Emily Davis, a PhD student of Rob Paxton's, recorded *Colletes floralis* on the Umbra (Magilligan Strand) in summer 2008. Rob and Emily are of the opinion that the populations are 'small', in comparison to Western Isles and Republic of Ireland populations. Emily also saw the bee at Portstewart and she saw 'evidence of *floralis*' at White Park Bay and Bushfoot i.e. nest entrances that seemed active. She was at the latter sites on poor weather days so does not have confirmed sightings of the species. She has been evaluating habitat suitability for floralis at all these NI sites as part of her PhD and will continue to do so next year, 2009.

7.4 Northern bees project

7.4.1 An initial survey for the six species *Andrena coitana, A. similis, A. tarsata, Bombus muscorum, Nomada obtusifrons* and *N. robertjeotiana* was undertaken by Andy Jukes in 2007 on the Peak District and Lancashire saltmarshes. Although no evidence was obtained to prove *B. muscorum* was present in the Peak District, only part of the area could be searched in the time available and a number of other locations that had possible suitable habitat for *B.muscorum* were noted. For this reason a second year of funds were made available to continue the search within the Peak District National Park focussing on those areas not surveyed in 2007 and a number of sites thought worthy of a revisit in 2008.

7.4.2 Nine locations within the Peak District National Park were visited on at least one occasion between 20th June 2008 and 25th August 2008. Only one of the target species, *Andrena tarsata*, was recorded during the survey. Two females were seen foraging from *Potentilla erecta* along a roadside verge at Goyt's Moss (SK015726) on 16th August 2008. There was no evidence of any of the other bee species.

7.4.3 After an intensive and extensive survey of most of the suitable locations (open moorland including upland rush pasture) in the Peak District there is no evidence of populations of *B.muscorum*. If the bee is in this area it must be at such low densities that it is hard to find and therefore likely to be on the point of local extinction. The Peak District is a very large, uninterrupted expanse of moorland with associated habitats including scrub, ruderals and species-rich road verges giving rise to ample foraging such as thistles, composites and, in certain areas, trefoils. The Leek Moors SSSI (SK05) in particular stands out as the most intact and diverse moorland with species-rich hay meadows off the moorland tops and very diverse roadside verges. Populations of *B. muscorum* in the Peak District would have access to suitable foraging over a very wide area and there is seemingly room for many nesting queens over this range and therefore enough mixing of genetics to retain viable populations.

7.4.4 Early season forage is restricted to heather in the High Peak but bramble, other shrubs and roadside verge flora are present in the south west. Murdo Macdonald noted that in Scotland *B. muscorum* tended to visit *Erica tetralix* in damp situations rather than *Erica cineria*. *Lotus pedicularis* can also provide early forage for emerging queens. Gardens are an important habitat for all this group of species in Scotland.

7.5 *Osmia inermis*

7.5.1 Hymettus again obtained a grant from CNPA for survey work in connection with the Cairngorms LBAP. The work was coordinated by Murdo Macdonald but the work reported here involved Mike Edwards, Brian Little and Keith Bland visiting the sites on 16th June 2008.

7.5.2 Background

Meall Gruiam (NN890681) a hill which stands immediately to the east of Blair Atholl, has provided extremely suitable forage-habitat conditions for *Osmia inermis* on all visits made since the first one in 1983, but the condition of the area since 2001 had not been checked by the original discoverers other than a very brief visit by Mike Edwards in 2005. The number of suitable rocks lying on south-facing surfaces has been variable over the years. One objective of the current visit was to check the overall condition of this area.

During the period since 1983 searches for *O. inermis* have been made in potential habitats near the original Meall Gruaim site. These have found occupied or old nests in several locations in the

general area. Despite the presence of potential forage and nesting habitats three previous searches of the lower-middle sections of Glen Tilt, a valley running north-east from Blair Atholl and immediately adjacent to Meall Gruaim (NN7088-NN9273), have failed to locate the bee. It was felt that this could have been, in part at least, due to the presence of large numbers of sheep which were removing the flowers of Birds-foot Trefoil *Lotus corniculatus*, the known pollen forage plant of the bee in the Blair Atholl area. Bird's-foot Trefoil was plentiful in several places along the Glen. The stocking density of the Glen has recently been reduced and the second aim of the visit was to search for the presence of the bee again.

A report had been received of numbers of what were presumed to be nests of *Osmia inermis* being found under stones north of Blair Atholl on an extensive stabilised shingle bank of the River Garry (NN847654) in the early 1980s. The site had been visited in 2007 by Murdo Macdonald and the original discoverer, Richard Lyszkowski, but most of it was now mature conifer plantation. However, a second visit to the area was planned, as a small area was thought to have retained its suitability for *O. inermis*.

7.5.3 Meall Gruaim

The condition of the vegetation on the hill was found to be excellent, with good stands of flowering Bird's-foot Trefoil among areas of close-cropped, springy heather turf. The regeneration of areas which were burnt in 1997/8 as part of grouse management was very favourable, showing the suitability of the management methods and frequency. The structure of the heathers on the most favourable south-facing slopes was also good, but the trend to fewer and fewer suitable stones lying on the surface had continued, with very few being present. Just one old nest with three emerged cells was found in an hour and a half searching. Searches of the whole area were not made.

Whilst the presence of these stones is a great aid to finding nests, it is not clear to what extent the presence of such stones, and their occupation, is a guide to the basic viability of the population. The species is known to nest in crevices and these are likely to be a more reliable, long-term, location. A basic population based on such crevices in small crags and outcrops and using suitable stones as additional resources when available would seem to be the most likely situation. However, there is little doubt that the frequency of suitable nesting sites is limiting in the otherwise ideal habitat of Meall Gruaim.

7.5.4 Glen Tilt

Previous searches for both bees visiting Bird's-foot Trefoil and nests under stones in the middle-lower reaches of the Glen, roughly between Auchgbhal (NN885706) and Forest Lodge (NN932739), had failed to locate the bee. During these earlier searches much of the area was being grazed by large numbers of sheep and there were few flowers present, especially towards Forest Lodge.

For the first section of the Glen the road, up to the bridge at Marble Lodge, is on the southern side of the river with a steep, north-facing hill-side above. Although Bird's-foot Trefoil is frequent, the other habitat requirement of warm sunny nesting locations is not readily accessible, being on the far side of the river. Previous searches of flowers along the road in good conditions have failed to locate the Osmia and it was decided to start at the Forest Lodge end, where the road is on the south-facing side of the Glen, for the current searches. The vegetation here was much less heavily grazed than on previous occasions with scattered flowers of Bird's-foot Trefoil present along much of the section between the Marble Lodge Bridge and Forest Lodge. Searches

were made at three locations along this section: close by Forest Lodge; the wider flat area near the ruin of Clachghlas and the junction of the River Tilt and the Alt Craoinidh opposite Balaneasie.

The area close to Forest Lodge covered the seepage system alongside the road west of the end of the fenced area at NN927737 to NN924734, ending with a section of very warm, sparsely vegetated rocky bluff. The terrain at this end was very suitable, being south-facing with flowering Bird's-foot Trefoil, small crags and stones on the surface of the ground. There were small areas of similar ground towards Marble Lodge, but a lot of the area was seepage and, as such, not very suitable as nesting habitat, although small flowering patches of Bird's-foot Trefoil occurred all along the sides of the road for a distance of about 15m up the hillside. Much excitement was caused by the discovery of a number of Chrysid wasps sunning themselves on rocks and leaves in this area. At the time it was felt that these might prove to be *Chrysura hirsuta*, the cuckoo-wasp associated with *O. inermis*, but closer inspection showed this to be *Chrysis rutiliventris*. The Eumenid wasp *Ansistrocerus oviventris* was also taken here, along with nest cells, also under loose stones, but made of mud and stones, not chewed plant material. This wasp is the likely host of the *Chrysis*. Unfortunately, no sign of nest or adult of *O. inermis* was found.

On the wider area flat area near the ruin of Clachghlas NN920733 to NN917728, the ridge at the northern edge of this area had short heather, flowering Birds-foot Trefoil and loose stones, including in a small quarry. Again, although more *Chrysis rutiliventris* were seen, no sign of *O. inermis* was found.

The confluence of the River Tilt and the Alt Craoinidh opposite Balaneasie (NN909720) also looked very suitable, with the same combination of flowering Bird's-foot Trefoil, small crags and loose stones. Once again, despite the presence of *A. oviventris* and *C. rutiliventris*, no sign of *O. inermis* was found. It should be noted that this area was not searched in the best conditions, by the time we arrived here it was late in the afternoon and the sun was disappearing. Nests, if present in the area, would, however, have been findable, whatever the conditions.

7.5.5 By the River Garry north of Blair Atholl

This area of old shingle bar alongside the river (NN845658 to NN854654) was, as reported, largely planted up to pines, but a strip of open habitat still existed at the western end. This strip had good stands of Bird's-foot Trefoil and many stones. These latter were, however, water-worn and sat on the substrate with little in the way of cavity under them. Although a number of aculeate Hymenoptera were seen here there were no signs of *O. inermis* and we felt that it was more probable that the cells under stones which Richard had seen in the 1970s were those of *A. oviventris.*

7.5.6 Conclusions from the searches in June 2008

The lack of evidence as to the continued presence of *O. inermis* in the searched area was extremely disappointing. It must be said that the overall suitability of the area for *O. inermis* remains high, with Glen Tilt in particular being of a much better quality than on previous visits. The Blair Atholl Estate should be congratulated on their efforts to maintain the required conditions.

It is unlikely that *O. inermis* is no longer present in the general area, although the results of the current searches confirm a long-term downward trend for evidence of the population. This trend correlates with the string of poor weather conditions in June experienced over the past five years

or more. This contrasts with the succession of very good Junes in the early 1980s when this bee was re-discovered. Coupled with the likelihood that nesting under flat stones on short heather is an unusual feature of this bee's biology, nests being more associated with crevices in rocks, and that the numbers of these stones have declined greatly on Meal Gruaim and are scarce elsewhere in the area, it is no surprise that finding evidence of the bee is difficult; it has always been so away from Meal Gruaim. Concentrating searches on the Meal Gruaim area would seem the best option in the short term. Increasing the number of suitable stones lying on top of short heather in warm places is the best way of surveying for them. It may, however, be necessary to wait for several years for the population to build up again, assuming that warm Junes will return.

Meanwhile, wider searches should also continue to be made, including raising awareness generally, both of suitable habitat in the Forests of Atholl and Mar and the appearance of the nests, hoping for a chance discovery to bring new areas to our attention.

7.6 *Osmia parietina*
7.6.1 Hymettus provided no funding for work on this species in 2008.

7.7 *Osmia uncinata*
7.7.1 In 2006 an RSPB project commenced with the aim of establishing the importance of open edges in Caledonian pine woodlands for *Osmia uncinata* and to assess its status through a survey of potential sites in collaboration with ACG/Hymettus and funded by RSPB/SNH. The 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* in 2006 or 2007. It has been concluded that the original experimental plan is not feasible.

7.7.2 Survey work has shown that *O. uncinata* is more widespread than originally thought and occurs in plantation as well as semi-natural Caledonian pine forest. However, known populations are still highly localised and population sizes are unknown.

7.7.3 The RSPB report recommends:

- forest managers are made aware of the requirements of *O. uncinata* and other associated fauna;
- further survey work is considered to better establish the status of the bee;
- further research into foraging requirements of the bee to determine for example whether bees are site-faithful to forage patches and the distances they will travel to forage;
- further research into nesting requirements to determine for example whether the bees can nest in the high stumps produced by timber harvesting;
- experimental investigation of management techniques to maintain woodland edge disturbance required by the bee.

7.8 *Osmia xanthomelana*
7.8.1 The mason bee *Osmia xanthomelana* has been extensively studied and monitored for the last twelve years and during these studies it was noted that many more females than males were recorded. Carl Clee led studies to investigate this imbalance in the male / female ratio in 2008.

7.8.2 On 14th April 2008 four emergence traps were placed over *Osmia xanthomelana* nest burrows whose positions were marked during 2007. Traps were numbered 1 to 4; trap 4 was

damaged during gales in the first week leaving just three remaining traps which were monitored daily until 19th May when they were removed.

7.8.3 Four males and no females were recorded from trap 2 between 27th April and 1st May. Five females and no males were recorded from trap1 between 7th May and 12th May. Females were recorded collecting mud from cliff-base seepages and a new nest location was discovered with up to twenty-eight burrows. Throughout the project weather conditions were very variable alternating between strong winds and rain and sunny and warm conditions, this may have some bearing on the results of the project.

7.8.4 This project has thrown up more questions than answers. The marked males which were released were not recorded again and no other males were recorded anywhere on the site despite the presence of up to twenty-eight females which were busy nest building.

7.9 *Anthophora retusa*

7.9.1 Introduction

The anthophorine bee *Anthophora retusa* was widespread in southern England in the period up to the end of the Second World War. However since then it has declined greatly, until today it has been recorded from just four areas since 1990. It is listed as RDB1 Endangered for the British Isles and is included on the Biodiversity Action Plan Priority Species List. The reasons for the decline of this species within its UK range are not clear, but are thought to have some relationship to the intensification of agricultural over the period since the Second World War. Interestingly, this species is thought to be declining over much of its worldwide range. It is red-listed in 7 out of the 20 countries it is known from (N.B. not all these have red-data lists). The decline appears to mirror those of some of the much more studied bumblebee species. In May 2008 a grant was obtained from PTES for Mike Edwards and Martin Jenner to begin work on elucidating the autecology of the species at Seaford.

7.9.2 Aims

During 2008 the current project had 3 main aims:-
a) Establish the extent of the population between Seaford Head and Seaford. Most previous observations had been made within 100m of the Coastguard Cottages, TV 514975.
b) Make field observations of flower visiting by both male and female bees, including, if possible, distinguishing between visits for nectar only and those where both pollen and nectar was being gathered by female bees.
c) Seek locations where nesting aggregations could be closely observed, with the intention of removing pollen loads from returning female bees in the second phase of the project (2009). Nesting locations were known from the Coastguard Cottages area, but these were all in the Loess deposits on vertical 50m+ cliffs, not very practical for close observation.

7.9.3 Results

Despite the restrictions of the weather it was established that the population extended over a much larger distance along the top of the cliff than was previously known (TV5197 to TV4997), a distance of about 2.5 km. Some males were found several hundred meters inland, but most were within a 75m wide coastal strip. Three potential nest observation sites were also identified.

The first visit (9th May 2008) was made in good to excellent conditions. It was clear that the bees were only just emerging, with very fresh males in far greater numbers than females. As has been reported by others, the best way of finding these was examining patches of flowering Ground

Ivy. Using field glasses it was also possible to see males and females patrolling along the cliff about 2m below the top and visiting abundant patches of flowering Kidney Vetch some 5m down the cliff face. Males would fly up and over the edge of the cliff to patrol the Ground Ivy and cliff-top grassland generally. Females were much less so inclined. Great care was needed to be sure that what was being observed was *A. retusa*, as there were always both sexes of the very similar *A. plumipes* present, especially during early May, and specimens were caught for examination at regular intervals, where practical.

Bees were seen visiting Ground Ivy, Houndstongue *Cynoglossum officinale* and Kidney Vetch flowers, but, apart from one female observed through binoculars, which appeared to be transferring pollen to its legs, this was entirely for nectar. Most visits were to Ground Ivy. The ratio of males to females on the cliff-top was of the order 50:1, but on the cliff face it was 3:1.

On the second visit (18th May 2008) bees of both sexes were visiting Houndstongue, Ground Ivy and Thrift *Armeria maritima* on the cliff top and Kidney Vetch on the cliff face. No pollen foraging was observed. Despite a lot of activity, with female bees flying in and out for periods of between 10 and 60 + minutes no females were returning with pollen on their legs. The golden hairs on the back legs made them look as if they had pollen, but netting and having a closer look showed this to be not true. Individual bees generally stayed underground for about 20 to 30 minutes before flying off purposefully.

Some female bees spent a lot of time flying over the nesting site, landing occasionally and doing a short test dig in the soil. Sometimes one would settle down in a particular spot and excavate a burrow, a process which appeared to take about an hour before she would fly off. Sometimes two bees would apparently enter the same burrow, both to emerge in a bit of a tussle. One of the bees would then fly off. As the bees were not marked it was not possible to identify which bee was which, nor whether usurpation really took place, or whether some bees were just rather bad at finding their nest.

No new observations were added on the third visit (2nd June 2008) due to the poor conditions but plentiful observations were made on the final visit (4th June 2008). One female bee was recorded as visiting Bird's-foot Trefoil but not for pollen. However, despite continuing to fly in and out of their nests, the bees were not carrying pollen loads, with the exception of one female with unusually dull legs, noted about to enter a burrow. Netting her proved that she did indeed have pollen and she was transferred to a tube in a cool dark place to see if she would comb off the pollen so that it could be analysed. After about half an hour she was released, having apparently deposited her pollen load on the sides of the tube. Later investigation of the pollen showed it to be a thin film, not the complete load.

The remaining activity of the females was either clear nest-searching/digging behaviour, or, on the last two visits repeated attendances at the nest, carrying no pollen, but staying in the nest hole for about half an hour before flying off for periods between 20 minutes and two hours and then repeating the process. It is not clear what this activity represents.

One nest, which was known to have been entered by a pollen-free female, was carefully excavated in the hope of exposing stored pollen in the cell(s). This nest proved to be empty, with just the characteristic fine mud concretion around the cell. This concretion has two possible sources:
i) It is brought in from an outside source, as is well-known in *Osmia rufa;*

ii) It is manufactured from the surrounding soil of the cell.
No mud was seen to be carried in on any of the observed visits to nests by females. This leaves option ii) as the most likely one. If the fine mud concretion is manufactured within the confines of the cell, it is necessary for the female to have a source of water or liquid to mix with the soil. No obvious sources of water, and consequently observations of females visiting these to gather water, are present in the area, it being dry chalk grassland. There is a possibility that the edge of the sea at the bottom of the cliff is providing this. Enquiries of Paul Westrich, who has studied the life-history of a wide range of bee species, elicited the response that he knew of confirmed water-collection in only one species of *Anthophora*, yet all make this fine mud concretion as a cell-lining.

This leads us to hypothesise that the females are visiting nectar-rich flowers for a source of liquid to mix with the soil in order to make the fine mud lining of the cell. This would explain the regular visits to the nest, apparently carrying nothing and the time spent below the soil surface. It may suggest why the females spend time visiting nectar-rich flowers from which they do not gather pollen. This utilisation of nectar may be direct, or it may be used to fuel the secretion of a solution from the Dufours Gland.

7.9.4 Future research
If further grants are available then the programme in 2009 would be developed to:

- Continue nest-based observations of female-behaviour, including time spent in nest and away from nests;
- Gather further information about pollen-foraging, including more pollen samples recovered from females and observation of bees at flowers;
- Search for evidence of water-gathering by females at the foot of the cliffs;
- Excavate a limited number of nests
    - i) to recover any stored pollen
    - ii) to provide samples of fine-mud cell lining before any pollen is stored. These samples would be tested for the presence of sugars typical of nectar;
- If time and weather conditions allow, investigate any occurrence of *A. retusa* to the east of Cuckmere Haven.

8. Bumblebees

8.1 *Bombus subterraneus*

8.1.1 A partnership of BBCT, Hymettus Ltd., Natural England (funding body) and RSPB was established in September to develop a strategy for the re-establishment of *Bombus subterraneus* in England. A project officer, Dr Nikki Gammans, was appointed in December and will be responsible for seeing the project through to successful completion. She is officially an employee of the University of Stirling (as are all Bumblebee Conservation Trust staff), but will report to the partners on the steering group.

In brief the project requires the steering group and project officer to:

- Assess current availability of suitable habitat at potential reintroduction sites, the first of which is likely to be Dungeness.
- Promote provision of further habitat in these areas through promoting uptake of appropriate agri-environment schemes (e.g. ‘pollen & nectar’ wildflower strips), through

- Investigate the best way to bring the bees back (we need to overcome the seasonal difference in the timing of their lifecycle).
- Reintroduce the bees. This is likely to need repeating on multiple occasions to have a high chance of success.
- Monitor the success of the reintroduction.

The initial time scale for the project involves the first release of queens in June 2010.

8.2 *Bombus distinguendus*

8.2.1 The Species Action Framework (SAF) was developed in Scotland, by Scottish Natural Heritage and the Scottish Government, and launched in January 2007. It sets out a strategic approach to species management in Scotland, and provides a list of 32 species identified as the focus of new management action for five years from 2007. *Bombus distinguendus* is one of the 32 species, among only 6 invertebrates (the others are Freshwater Pearl Mussel *Margaritifera margaritifera*, Marsh Fritillary *Euphydryas aurinia*, Pearl-bordered Fritillary *Boloria euphrosyne*, Pine Hoverfly *Blera fallax*, Slender Scotch Burnet *Zygaena loti scotica*).

8.2.2 A partnership comprising Hymettus, RSPB, BBCT and SNH has been created to push forward new management actions for *B. distinguendus*. The partners are supported by a number of other organisations on the Project Steering Group namely Highland Council Ranger Service, FWAG, Orkney LBAP, Sutherland LBAP, Caithness LBAP, Western Isles LBAP and Argyll LBAP. Initiating work on the Project was delayed by several months because key individuals in SNH and RSPB (respectively) went on sabbatical, and changed responsibilities.

8.2.3 The objectives of the *B. distinguendus* Project are (summarised from the Memorandum of Agreement):

- To implement some specific actions which will ultimately inform and support the taking forward of other actions in the implementation plan
- To set up and train a network of local volunteer recorders and to establish a programme of annual survey and monitoring of *Bombus distinguendus* and *Colletes floralis*.
- To begin the process of creating demonstration plots of *Bombus distinguendus* habitat along the North coast.
- To distribute education packs for primary schools and posters and leaflets for crofters.

8.2.4 Hymettus has responsibility for overall project management (Steering Group chaired by Murdo Macdonald, and the budget handled by Paul Lee), general advice, and practical involvement with the implementation. Hymettus is required to produce 2 reports per year, the first due in February 2009.

8.2.5 The Steering Group met for the first time on 4th June 2008, and again on 8th October. The next meeting is expected to take place in March 2009. By that time we should have progressed to the point where we have final implementation plans for each of the four aspects, and be in a position to begin work in summer 2009. The implementation of the creation of demonstration plots will rely heavily on the involvement of crofters, and support through the new SRDP agricultural support system.

8.3 *Bombus ruderarius*

8.3.1 Ted Benton has been undertaking some initial work on identifying the causes of decline in *Bombus ruderarius*. The notes below are adapted from his draft report on his work. The final report will be available through the Hymettus website.

8.3.2 Introduction

There is little doubt that *B. ruderarius* is a rapidly declining species both in the UK and in large parts of central, western and northern Europe. Formerly it was widespread in the UK, but with a strong bias toward the south-east.

In the UK and elsewhere in Europe, the bee is found in a wide range of habitats: open, flower-rich (especially calcareous) grasslands, coastal dunes, wetlands, grazing marshes and sea-defences, less intensively managed farmland, and urban/ suburban brown-field sites, ruderal habitats and gardens. Toward the southern edge of its range in Europe it may sometimes be common in a variety of grassland and forest-edge habitats in mountains.

Nesting habitat is generally in tall, tussocky grassland, often close to scrub or woodland edge. The nest is usually on the surface or just below, made of grass-clippings and mosses, and often founded on an old mouse or vole nest. Nests are small in size, and it seems likely that at maturity the number of workers is small compared with many other UK species (possibly 20-50 individuals?).

Queens emerge from hibernation a little later than species such as *B. terrestris*, *B. pratorum,* and *B. pascuorum* (though some authors say it flies earlier than *pascuorum*), in early April (somewhat later in 'late' localities), but earlier than the other scarce 'carder' bumblebees (*B. sylvarum, B. muscorum, B. ruderatus*). The colony cycle is short, with males and young queens emerging from early July onwards.

There is some evidence that *ruderarius* is especially generalist in its use of forage sources. However, most data sets so far do not discriminate between nectar and pollen collection. Such evidence as is available suggests a strong reliance on a range of species in the families Scrophulariaceae, Fabaceae, and Lamiaceae for pollen. *B. ruderarius* is usually classified as a medium tongue-length species.

With a small number of exceptions, *ruderarius* appears to be one of the scarcest species of bumblebees wherever it occurs in the UK. The known exceptions are sand-dune habitats at Shoreham in the early 1980s, and on the machair at Tiree. In southern Europe, it is one of the commonest species in the rich bumblebee community of the Pyrennean Eyne valley. However, in other studied bumblebee communities studied in mainland Europe, *ruderarius* is generally among the least abundant and more localised species.

Little is known about its vulnerability to predators and parasites, though its vulnerability to wax-moth infestations has been noted.

The species has a wide geographical distribution from north to south in Europe, and this may also reflect a wide climatic range, given its presence through an upper altitudinal range of more than 1200m in the Pyrenees (sites below 1480m were not studied).

8.3.3 Discussion of causes of decline

The position of *ruderarius* is rather anomalous in relation to each of the hypotheses generally advanced to explain bumblebee decline. It is not close to the edge of its climatic range in Britain (and certainly not in the south-east, where its recent decline has been pronounced), and nor does it appear to have a narrow climatic range. It does not belong to the long-tongued group, being usually classified as medium-length in this respect, it appears to be a generalist in its foraging preferences, it emerges relatively early from hibernation, and does not fit easily into the woodland-edge/ open grassland division in terms of habitat preferences.

As *B. ruderarius* shares many common features of its biology with the other 'carder' bumblebees (sub-genus *Thoracobombus*) it may be illuminating to compare its distribution, status and pattern of decline with theirs. *B. pascuorum* is similarly generalist in its use of forage plants and in the range of habitats it inhabits. It too emerges early from hibernation, is a surface nester, and, as a long-tongued species, tends to forage from deep flowers. Both *pascuorum* and *ruderarius* survive in urban and suburban areas, both nesting in gardens, and using garden plants as forage sources. As would be expected on the habitat specialisation hypothesis, *pascuorum* remains ubiquitous and shows no evident signs of decline.

This may, indeed, be a partial explanation of the belated timing of the decline of *ruderarius*, but does not appear to explain why an apparent collapse should have occurred in the last 2 to 3 decades – a decline also evidenced in other parts of north/ west Europe. Here, comparison with two other 'carder' species may be relevant. *Bombus sylvarum* and *B. humilis* are both long-tongued species of open flower-rich grassland, and both quite close to the northern edge of their climatic range. *B. ruderarius* differs from these close relatives in several respects. First, while it clearly does survive in extensive open, flower-rich grasslands, as well as the Thames estuary complex, it is rarely abundant there, and it also occurs in a wide range of other habitats – less intensive farmland, coastal dunes and marshes, hedgerows, roadside banks, urban and suburban open spaces, 'wasteground', and gardens. Whilst both *humilis* and *sylvarum* can be found foraging in gardens, these are generally close to areas of uncultivated ground where their populations are centred, and there is little or no evidence of nesting in gardens. Second, *ruderarius* has a quite different phenology. Queens emerge earlier in spring and establish nests earlier than the other two, and have a relatively short colony cycle. It is less dependent, therefore on either late-flowering grasslands or access to garden flowers late in the season. Both these features (together with its hypothesised generalism as a forager) would lead us to expect it to survive agricultural intensification more successfully than either *humilis* or *sylvarum*.

In its range of habitats, generalism in its foraging preferences and nesting biology *ruderarius* has much in common with its close relative *B. pascuorum*. There is no evidence of a decline in range or abundance for *pascuorum*, but a steep recent decline in the case of *ruderarius*. If we consider that ability to survive in urban and semi-urban habitats, gardens, roadside banks etc has been a factor in the continued abundance of *pascuorum*, and, possibly, the reason why *ruderarius* maintained its status in the south and south-east for longer than *sylvarum* or *humilis*, then attention should focus on changes in the urban environment. In the UK recent decades have seen very rapid growth in housing (and, to a lesser extent, infra-structural) development. This has been constrained by policy guidelines that prioritise development on brownfield, (ie generally urban) sites, rather than 'greenfield' (ie intensive agricultural monocultures). This has had three consequences that may be of significance for the conservation of urban/ suburban bumblebee populations, including *B. ruderarius*. First, patches of relatively low-intensity management in urban areas are subject to 'infilling' housing development, so increasing the fragmentation of

suitable nesting and foraging sites. Second, remaining areas of 'green' open space become subject to more intensive forms of 'amenity' management for sports-fields, formal gardens, play areas and the like as the density of human population increases relative to remaining open spaces. Third, untidy, neglected or blighted 'edgelands' that have provided important habitat requirements alongside suburban gardens and open spaces are progressively eliminated or subjected to more formal management routines.

It could be that the identification of this species as one of open grasslands is misleading, and that it survives best in the complex habitats formed by later stages of succession from grassland to scrub. Informal and low-intensity management of many urban and urban-fringe open spaces and 'wasteground' would have provided just this sort of habitat complex, as would have less-intensively managed mixed farmland.

8.3.4 Recommendations

One possibility that could be investigated is that *B. pascuorum* is (so far) better able to maintain the integrity of meta-populations across increasingly hostile and fragmented urban/ suburban habitats than is *ruderarius*. One route for such an investigation would be to estimate both foraging distances of workers from their nests, and dispersal distances of queens. We already have some measures of the former for *pascuorum*, but not for *ruderarius*.

Another possibility might relate to the striking differences between the two species in their phenology. *B. pascuorum* queens usually emerge slightly earlier than *ruderarius* queens from hibernation (disputed by some authors). Does this give them an advantage in finding nest-sites? Might there be competition between *ruderarius* and *pascuorum* for nest-sites in their urban habitats? Slight anecdotal evidence for this is the relative frequency with which worn-looking queen *ruderarius* may still be seen foraging as late as the end of May (indeed, might there be competition between *ruderarius* and the other, scarcer, carders, where they coexist? There appear, for example, to be no confirmed records of *B. pascuorum* on Tiree, where *ruderarius* is common, despite being close to the edge of its geographical range).

Another difference in phenology is that *B. pascuorum* nests are often still active into late October in southerly locations, whereas the *B. ruderarius* nest cycle is often complete by mid-July, with only few sightings of workers after the end of August. The period during which male and young queens of *ruderarius* are on the wing is much shorter than is the case with *pascuorum*. The first sexuals of this species may be seen from June through to early November. Given that male *ruderarius* will need to locate nests of their own species (presumably other than the 'home' nest) in anticipation of the emergence of possible mates, a high degree of fragmentation of nesting habitat may be a severe limit to reproductive success. It remains unclear, if, and if so, how, the extended seasonal activity-cycle of *B. pascuorum* benefits it.

Finally, there is very little evidence concerning predation (including possible nest predation by mammals), parasitism or infestation by microbial pathogens. Apparently some losses of other bumblebee ranges reported from the USA can be attributed to such causes, rather than climatic variables or habitat loss. This is, of course, a real possibility as a factor in the decline of *B. ruderarius*, but there is little if any recent relevant evidence.

Close study of the foraging and nesting behaviour and habitat of *B. ruderarius* is urgently needed. This, of course, will require location of a study-site where regular sighting of *ruderarius* can be relied upon.

8.4 *Bombus muscorum* and *Bombus humilis*

8.4.1 *B. muscorum* was lost from the Chichester Harbour area during the late 1980s and *B. humilis* was subsequently discovered there (it was always adjacent on Portsdown Hill). This was assumed to be a one off event. However, during the spring of 2007 Mike Edwards went to RSPB Eastborough Farm (TQ7676) where *B. muscorum* had been the only one of these two bees present in previous years. He was surprised to find large numbers of *B. sylvarum* queens (10+) and that most of the brown queens appeared to be *B. humilis*. At the same time a number of reports of the expansion of *B. humilis* into new areas were also being received. Many of the changes did not involve *B. humilis* moving back into areas where it had previously recently existed, but had gone extinct, but areas where there were no, or very few, records. The question arose whether this modern movement was part of a much more general retreat on the part of *B. muscorum* and an advance on the part of *B. humilis* and, if so, what could be driving it.

8.4.2 To try and shed more light on the situation an appeal was made to BWARS members to provide records of both species in 2008; Andy Jukes continued to search for *B. muscorum* in the Peak District (see Northern Bees report above); Mike Edwards was commissioned to look at *B. humilis / muscorum* distributions in the North Kent Marshes area and Paddy Saunders was asked to do the same in SW England.

8.4.3 Mike Edwards, accompanied by David Baldock, re-visited Sandwich Bay, TR3538; Graveney Marshes, TR0564; Oare Marshes, TR0062; RSPB Elmley, Spitend Marshes, TQ9667 (2 samples); Eastborough Farm, TQ7676. These sample sites had been surveyed previously at least twice. All these sites had previously only recorded *B. muscorum*, although some had *B. sylvarum* present as well. At each site bees of each species were counted on a round walk.

Table 3. Counts of *B. humilis* and *B. muscorum* at sample sites in North Kent.

Site	**Date**	**Time**	**Distance**	***B. muscorum***		***B. humilis***		***B. sylvarum***
				workers	males	workers	males	
Elmley 1	8/8/08	90min	1km	4	26	0	0	no
Elmley 2	8/8/08	30min	0.5km	0	7	0	0	yes, as before
Eastborough Farm	8/8/08	90min	1km	0	1	11	1	yes, not before
Sandwich	27/8/08	120min	1.5 km	5	11	0	0	no
Graveney	27/8/08	45min	0.5km	2	0	1	0	yes, not before
Oare	27/8/08	90min	1km	7, 1q	0	1	0	yes, as before

The time spent on and distance of each walk was noted, but this was not standard as different sites required different walks. All visits had two persons recording. The results of this are presented in Table 3.

8.4.4 Paddy Saunders visited 15 sites in Cornwall. Some of these sites had been visited during bee survey work in 2006. At each site a timed walk was used to count the numbers of each species seen. The additional count data from 2006 is included with the 2008 results in Table 4.

Table 4: Counts of *B. humilis* and *B. muscorum* at sample sites in Cornwall.

Site	**Date**	***Bombus humilis***		***Bombus humilis /muscorum***		***Bombus muscorum***	
		workers	males	workers	males	workers	males
Crugmeer SW9077	8/8/08	6	7	1	2		
Cubert Common SW7859	20/7/08	8	1			1	1
Doyden Port Quin SW9680	21/7/08	1					
Forabury Tintagel SX0990	15/7/08	4		2			
Glebe Cliff Tintagel SX0588	15/7/08	5				1	
Godrevy Head SW5843	24/7/08	5		1	1		
Gwithian Towans SW5841	24/7/08	4	2	1		1	
Park Head SW8470	11/7/08	6		1			
Park Head SW8470	25/7/06	20	1	1q	6	1	
Penhale Point SW7559	20/7/08	2		4		6, 1q	4
Penhale Sands SW7656	26/7/06	2				1	
Port Gaverne SX0080	21/7/08	3					
Port Quinn SW9780	21/7/08	1q, 3					
Tintagel Head SX0488	21/8/06	1q, 11	6				
Trevose Head (headland) SW8576	8/8/08	2q, 12				5	1
Trevose Head SW8575	8/8/08	18	4	2	2	5	1
Trevose Head SW8576	11/7/08	1q, 11		3		5	1
Trevose Head SW8576	30/6/06	19				2	
Trevose Head SW8576	8/8/06	25	2			5	
Upton Towans SW5739	24/7/08	4	1				
West Pentire SW7778	20/7/08		1	1q			
Kelsey Head SW7660	20/7/08					1q	

8.4.5 It was very clear that, in North Kent at least, nests of *B. muscorum* complete their development before those of *B. humilis*, although there was overlap. Whether this reflects a different timing of queen founding or a different length of colony cycle is not known. The earlier

recording period in Cornwall prevented direct comparision of results but the proportion of males of either species seen was lower.

8.4.6 The field identification of specimens of two very similar species was a problem for both surveys but more so in Cornwall. Samples of males and workers were retained for microscopic examination to confirm field identifications. All specimens from Kent agreed with the original determination but there were some discrepancies in the Cornish samples.

8.4.7 In Cornwall there was no evidence to support the theory that *B. humilis* is expanding at the expense of *B. muscorum*. However, *B. humilis* was more numerous than *B. muscorum* along all the transects apart from one. *B. muscorum* had the highest counts on sites with both heathland / species rich grassland and near dune systems. Possibly *humilis* can tolerate lower quality, more isolated or smaller sites than *muscorum* is able to in the region.

8.4.8 The results from North Kent show that on three out of five sites *B. humilis* was present in areas where it had previously been absent. *B. muscorum* was still present on all five sites. BWARS data provide little further insight although *B. humilis* was reported from the Wye Valley and from Liverpool for the first time in 2008.

8.4.9 The situation on the managed grassland at Eastborough Farm was very interesting. When first surveyed this had been in a fairly intensive, 'autumn wader' regime of hay cut and hard sheep grazing. There was very little in the way of flowers. On this visit the changes were very apparent. Apart from the numbers of *B. humilis* and, particularly, *B. sylvarum* present, there were large stands of Narrow-leaved Bird's-foot Trefoil *Lotus glaber* throughout. In discussion with the RSBP staff it was established that the major change had been to a less intensive, more-or less continuous cattle-grazing regime, with occasional topping. Although this had not been established for bumblebees, the overall habitat improvement compared with the simple, but severe, 'keep it short at all times' regime of former years, was most marked.

8.5 *Bombus sylvarum*

8.5.1 Hymettus funded no work specific to *Bombus sylvarum* in 2008 although work on *B. humilis* and *B. muscorum* in north Kent and Somerset, described above, did generate further records of the bee.

8.5.2 Included here is a brief summary of her work for BBCT on the species, kindly provided by Lucie Southern.

8.5.3 In September 2007 the Bumblebee Conservation Trust was successful in securing funding from the Esmée Fairbairn Foundation. This project is targeted at conserving the UK's two most threatened bumblebee species, *Bombus distinguendus* and *Bombus sylvarum*. Recent research suggests that the surviving populations of both species are of a very low effective population size, that the populations are largely isolated from one another, and that some populations are suffering from inbreeding. The main aim of this project is thus to expand the area of suitable habitat in which the remaining populations survive, with the goal of increasing the size and degree of connectivity of existing populations. The mechanism for doing so is primarily via indirect land management initiatives. The project officially started at the end of March 2008, and is in its early stages. A variety of outreach programmes are being designed to encourage the improvement of both rural and urban habitats for bumblebees, with a particular focus on encouraging sympathetic land management in and around remaining populations.

8.5.4 With regards to *B. sylvarum*, on a national level, initial meetings with FWAG and NFU have been very encouraging. Both organisations have offered their support, and intend to help BBCT make direct contact with their members, in particular those that farm or manage land in and around known *B. sylvarum* populations.

8.5.5 A number of preliminary regional visits also bore early dividends. For example, the Somerset branch of FWAG were particularly supportive and have since submitted a funding bid to promote the conservation of *B. sylvarum* throughout the Somerset Levels and Moors. The BBCT also engaged successfully with the Ministry of Defence, provided articles for NFU, FWAG and MOD publications and ran guided walks for the public to raise awareness and encourage local 'ownership' of *B. sylvarum*. Research work during winter 2008/9 will underpin a more comprehensive campaign of outreach and advocacy throughout 2009 and 2010.

8 East Anglian wetland aculeates

8.1 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 continued at wetland locations across East Anglia in 2008.

8.2 It was reported previously that fieldwork in 2007 was badly disrupted by the poor weather conditions, and despite recording visits to nineteen East Anglian sites, these visits failed to detect the presence of three of the target species (*Anoplius caviventris, Passaloecus clypealis* and *Rhopalum gracile*). However, all three species were collected by Martin Drake in 2007 whilst sweep netting for Diptera in June and July. *Anoplius caviventris* was taken only from Sutton Fen (TG371237) but *Rhopalum gracile* occurred at Catfield Fen (TG366212), Sutton Fen (TG368231) and Upton Fen (TG385136) and *Passaloecus clypealis* was collected from Woodbastwick Fen (TG338165) and Hickling Broad (TG425217) in addition to these three sites.

8.3 In late June 2008 an attempt was made to replicate the success of the sweeping technique. A total of 17 sites in the Norfolk Broads were sampled by Paul Lee and Paddy Saunders over the course of four days. In addition, 25 trap nests consisting of 15cm lengths of reed bundled inside 5cm diameter plastic pipe were tied to vegetation at five of the more accessible locations. Samples of cigar gall were also collected from each location. Return visits were also made to the Suffolk Wildlife Trust reserves at Carlton Marshes, Lowestoft and Redgrave and Lopham Fens.

8.4 Sweep netting in June failed to replicate the success Martin Drake had in 2007. In fact very few specimens were collected in this way.

8.5 Again *Hylaeus pectoralis* was the most widespread of the target species in East Anglian wetlands having emerged from galls collected at five of the Norfolk sites visited. It was also collected from the two SWT reserves. Good populations of *Macropis europaea* were identified on both of the SWT reserves visited.

8.6 The results from the trap nests were disappointing. Most of the traps contained large numbers of the common wetland spider *Clubiona phragmitis*. Small numbers of other invertebrates were found including the uncommon tachinid fly *Siphona pauciseta*, a known parasite of cigar gall larvae. No hymenoptera were collected.

9. Development of Hymettus Ltd.

9.1 An Annual Report and accounts for the year from 1st April 2007 to 31st March 2008 have been submitted to Companies House as required by law. The report stated that:
The company is now firmly established, having developed partnerships with a wide range of statutory agencies, NGO's and voluntary bodies concerned with invertebrate and habitat conservation. Development of the UK and local Biodiversity Action Plans is a vital element for species conservation and the company has worked to obtain greater representation on both Habitat Action Plan (HAP) and Local Biodiversity Action Plan (LBAP) groups. It has also collaborated with the Joint Nature Conservation Committee (JNCC) on revision of the UK BAP list and the Aculeate Red Data List.

9.2 On 21st June 2008, Hymettus Ltd gained charitable status. This led to the Board members taking on the role of trustees and to the appointment of Jeremy Early and Tristan Bantock as new trustees. With charitable status Hymettus is eligible to apply to a greater range of funding bodies and may benefit from other fundraising activities.