

1. Background

1.1 Research was carried out on the agreed target species from the 2002 Annual Review meeting (see minutes of meeting). This work was financially supported by The Countryside Council for Wales, English Nature, The Royal Society for The Protection of Birds and Scottish Natural Heritage in accordance with the relevant Annex a documents, which see for details.

1.2 The earlier sections of the 2003 Report (2-4) deal with non-bumblebee projects and the latter sections (5 on) with the Bumblebee Working Group projects.

1.3 Short reports for individual projects were requested from the lead researcher for each project. These are summarised here. Full copies of each report are available from Dr. M. Howe at The Countryside Council for Wales, Dr. D. Sheppard at English Nature, Dr. J. Sears at the Royal Society for the Protection of Birds as appropriate. We note with sadness the death of Dr. D. Phillips at Scottish Natural Heritage; this means that requests for details of SNH projects concerned with bumblebees will need to be addressed to Dr. M. Macdonald c/o SNH Northern Area Board.

1.4 Projects are reported in the following order of taxonomic group: Ants, Wasps, Bees.

2. Ant Projects

2. 1. *Formica rufibarbis*

2.1.1 John Pontin writes that it was a more hopeful report than last year. The Stickledown Rifle Range site has been rescued by extension of the ideal habitat and removal of *F. sanguinea*, but Chobham Common actions have been less successful. Again no newly mated queens could be obtained and success of a newly introduced nest needs confirmation of its survival in spring 2004.

2.1.2 **Chobham Common.** Visits here were made approximately weekly in Spring, daily during the flight period in July and irregularly during later in the year depending on weather and the progress of experimental introduction of a captive-reared nest.

2.1.3 On 4.6.03 a second captive nest (see 2000 report for the failed first attempt) was introduced to the top of a ridge next to a new scrape (made autumn 2002) with a 25x25cm paving stone placed on top to act as a hotspot. Workers were observed foraging from this nest on 20.6.03, 4.7.03 and 8.7.03. Perhaps unfortunately they moved nest 2m to the south on 11.7.03 and this new site was presumably chosen because it was in the middle of a scrape. They were seen foraging again on 22 and 29.7.03, 13.8.03 and 11.9.03.

2.1.4 Anticipating possible flooding (because the scrape was too flat) a small channel was dug on 29.7.03 down the very gentle slope in an attempt to carry away rainwater. After the first heavy rains (26.11.03), following the exceptionally dry summer, all the scrapes had puddles of standing water which could kill small ant nests by lack of oxygen. The dug channel had been effective, but was partly blocked by silt which was cleared. It remains to be seen whether the introduced nest has survived.

2.1.5 It is recommended that scrapes be made with banks as a future refinement to minimise the potential flooding problem.

2.1.6 The remaining mature nest performed in the same way as it did in 2002. No males were seen, alate females emerged from pupae around 4.7.03 and flew in the period 15-20.7.03. There was suitable weather for flights on 8.7.03 when a major *Lasius niger* flight

took place. Therefore about 10 days are required for *F. rufibarbis* queens to mature (as appeared to be the case in previous years) and this can be used to predict when it is worth making a visit to observe take-off. Individuals flew off radially all round the nest exit.

2.1.7 One other observation is worth recording. A worker was seen to carry a dead beetle 15m back to the nest along a bare scrape. It is therefore necessary to space new introductions further away than this from existing nests perhaps as far as 30m.

2.1.8 **Stickledown Rifle Range.** This area was again difficult to visit, but an adequate number of inspections were made to assess survival and condition of the site.

2.1.9 The earth-moving performed in 2002 is, so far, successful. The newly exposed bank nearly doubles the area suitable for the rare insects including *F. rufibarbis*. No *F. sanguinea* were found on 24.3.03, 2.6.03 and 22.9.03. Two *F. rufibarbis* nests are still present and possibly a third, but the workers seen at one of the old sites may only be foragers from one of the two new sites.

2.1.10 A party of three entomologists, plus one of the Purbright land wardens, made Extensive searches of Purbright Ranges on 1/9/2003. Although no further colonies of *F. rufibarbis* were found, a number of suitable areas, where an extensive fire had created potential open habitat were found.

2.1.11 **Projections for 2004.** I propose to continue with the same regime of visits and still have one captive nest to release if it seems suitable to do so at Chobham.

2.1.12 It would be very valuable to rear more captive nests. Laboratory mating has so far failed completely, so it is pointless to keep the existing captive nest in the hope of future breeding, but males are needed for release at Chobham when new queens are emerging for flight. The captive nest might produce some if it could be increased in size successfully, but this is not very likely. A better solution would be to collect males at Stickledown and release them at Chobham. Perhaps this would potentially increase the gene pool with favourable results. The only other option appears to be: - wait in hope that the Chobham nest(s?) produce males while queens are still being produced.

2.2 *Formica exsecta*. Report from Dr. D. Stradling not available at time of writing.

2.3 *Formica candida*

2.3.1 No specific research was commissioned by the ACG for 2003 on this species.

2.3.2 However, David Baldock, Graham Collins, Jonty Denton and John Pontin discovered *Formica candida* on Colony Bog, Pirbright Ranges - a first Surrey record for a rare species previously known in Britain only from the New Forest, Dorset and S. Wales.

2. 4. Heathland Ant assemblage.

2.4.1 No specific research was commissioned by the ACG for 2003 on this species.

2.4.2 A Surrey location for one target species within this assemblage, *Tapinoma erraticum*, was found by Graham Collins on top of the bank in front of the targets on Century Range, Pirbright Ranges.

2.4.3 A second site for this species, previously unknown in West Sussex, was discovered in 2003 at Lord's Piece, Coates by Mike Edwards. This area was tall bracken ten years earlier and has been the subject of extensive clearance as part of the SRP Field Cricket Project. It is extremely unlikely that the ant was present all along and this record (several workers) represents a new colonisation within the past ten years. Interestingly, the site is regularly, and quite severely, grazed by Exmoor Ponies. It is entirely possible that *T. erraticum* occurs on other dry heathlands nearby and has been missed, although these have

been the subject of extensive recording over the past twenty years.

3. Wasp Projects

3.1 *Chrysis fulgida*

3.1.1 The setting of trap nests in areas where *Symmorphus crassicornis*, the putative host of *C. fulgida*, and/or the chrysid wasp had been seen recently was reported in the 2002 report. These trap nests were being over-wintered at the time of the last ACG meeting and have now been reared out by Mike Edwards.

3.1.2 The project was wildly successful, with ample evidence that *S. crassicornis* was the host of *C. fulgida*; trap nests from Bagmoor (Surrey), Eelmoor and Castle Bottom (Hampshire) all containing the two species in close association. Host associations of several chrysid species with other aculeates, including other eumenids, will be forthcoming when identification of specimens has been completed.

3.1.3 No *C. fulgida* were found in trap nests from sites where the species was previously unknown.

3.1.4 Further trap nests were set during 2003 from further areas where only *S. crassicornis* is known (Chobham Common, Esher Common, Horsell Birch and Brookwood Cemetery).

3.2 *Ceropales variegata*

3.2.1 The indefatigable David Baldock has now found this species on another dry Surrey heathland (Mare Hill Common, Witley, Surrey GR SU936400) This site is well within the known modern distribution of this species.

3.3 *Homonotus sanguinolentus*

3.3.1 No specific research was commissioned by the ACG for 2003 on this species.

3.3.2 Retreats of the spider host *Cheiracanthium erraticum* which had been attacked by *H. sanguinolentus* were found in the area of the monitoring transect by both Mike Edwards and Stuart Roberts, whilst undertaking other research in the area.

3.4 *Cerceris quadricincta*

3.4.1. In Spring 2003, BE Woodhams asked G.W. Allen to identify a small collection of wasps and *Nomada* bees mainly from the Maidstone area. Three female *C. quadricincta* were found at once by sight in this collection, each bearing the data "Maidstone, TQ7555, 17 August 2000" and apparently collected in Woodhams' suburban garden. Further examination located two males, one with the same data as the three females and one as follows: "Maidstone, TQ7655, 5 August 1999". GWA then remembered an unusual male *Cerceris* captured by himself at Maidstone, TQ7556, on 31 July 1996, which had sat with misgivings under *C. arenaria* in his collection. This was re-determined as *C. quadricincta*. It had been captured visiting a flowering umbellifer in a suburban garden. A more detailed grid ref is given here as TQ753562, close to the Buckland Hill Allotments.

3.4.2 These records represent a previously unknown locality for *C. quadricincta* and is about 15 Km. south of the Upnor site, which was confirmed during 2002.

3.4.3 During 2003 Geof Allen made searches for *C. quadricincta* in relevant parts of Maidstone. Potential sites would include flowering Apiaceae and sandy-clay banks for nesting.

3.4.4 Upper part of Scrubbs Lane. 13th June 2003. This was an old ragstone quarry,

where the Maidstone iguana had been found in 19th Century; it was not far from one of the Woodhams' sites. The date was considered too early for the required species but the visit might have provided information on sites to be searched. Unfortunately, the quarry had disappeared under executive housing some years previously and the area was enclosed by high walls and fences, proving inaccessible. No growing Apiaceae could be found.

3.4.5 Cornwallis Park and lower part of Scrubbs Lane. 20th June 2003. BEW had suggested looking at Cornwallis Park, Maidstone (TQ750555) – a former quarry site – for the *Cerceris*. A search here proved fruitless. GWA relocated his collecting efforts, walking up nearby Bower Street, where BEW lived, to continue the search. A small area was found in an alley at the back of the street, adjacent to the lower part of Scrubbs Lane (TQ751557), where there was an umbellifer believed to be *Oenanthe* sp. in flower. Immediately, small wasps were sighted visiting the umbels and four *Cerceris* males were collected. One of these was identified as *C. rybyensis* in the field. Under the microscope, two of the remainder were determined as *C. quadricincta* and the last as *C. quinquefasciata*, also a species previously unknown in the Maidstone area (see 3.5 below).

3.4.6 A further search of this area was made on 8th July 2003, but nothing more was found, the *Oenanthe* having finished flowering. This walk however, located two fairly large allotment areas nearby, Bower Mount Road and Rocky Hill Allotments which were considered worthy of further investigation.

3.4.7 On 6th August 2003. Geoff and Mike Edwards met for a day to look at the known sites and search for further possibilities for the *Cerceris* in Maidstone. The day chosen proved to be one of the hottest of the year and five sites were surveyed. It also proved to be something of a whistle-stop tour of some of Maidstone's allotments.

3.4.8 BEW's Garden (Bower Street, TQ751555) A brief look at the Woodhams' garden found nothing interesting, although ME sighted a possible *Cerceris* vanishing over the fence.

3.4.9 Searching then moved to Bower Mount Road Allotments (TQ751556). A walk along the alley at the back (west side) of Bower Street towards Scrubbs Lane found several spots which looked suitable nesting areas. These were adjacent to the Bower Mount Road Allotments (which is enclosed by a chain link fence). At one of these spots ME netted a hunting *Cerceris* female which, from the continuous yellow bands on the venter of the abdomen, was identified in the field as *C. quadricincta*. The specimen was retained for confirmation. Continuing to Scrubbs Lane (about 100 m), the site of the captures on 20th June was again surveyed with no result. It was decided to look at the other allotment area identified by GWA.

3.4.10 These were the Rocky Hill Allotments (TQ753556). Walking along an alley between the back (east side) of Bower Street and the allotments, several likely spots within the gardens were identified. Entrance to these allotments (also enclosed by a chain link fence) was negotiated between ME and the wife of an allotment holder. Several potential nesting sites were identified (some with burrows but no wasps) and ME netted a female *C. quadricincta* which was probably hunting. Whilst ME searched for nests, GWA cast an eye over a stand of flowering fennel (*Foeniculum vulgare*). In the space of less than 10 minutes, one female each of *C. quadricincta* and *C. quinquefasciata* were captured on the *Foeniculum*, which teemed with insect life. The bemused wife of the garden holder gave information on other allotments in the Maidstone area and searching these seemed the best course to take.

3.4.11 Searches moved to the Fant Allotments (TQ745547) These are adjacent to the River Medway and probably alluvial rather than greensand. ME once again negotiated entrance – this time with the manager. On inspection, GWA felt that this site did not look as promising. However, after thorough searching, ME found a *C. quadricincta* female, again visiting fennel.

3.4.12 The "Millennium Breathing Space", adjacent to Bower Lane (TQ746567)

This was meant to be a flying visit but longer was spent here than anticipated. No further specimens of *C. quadricincta* were found, however.

3.4.13 Finding it hard to believe the good fortune of 6th August, Geoff returned to the Rocky Hill Allotments on 12th August. There were no gardeners in evidence to allow entrance but a 10 minute search of some fennel growing outside the chain link fence provided two more female *C. quadricincta* and conclusive proof of good numbers at this allotment.

3.4.14 Field work in 2003 recovered two males and six females of *Cerceris quadricincta* from several sites in Maidstone. It is therefore believed that *C. quadricincta* is widely distributed in the area. The records probably represent one diffuse population, the extent and limits of which have yet to be determined.

3.4.15 Allotments are a haven for this *Cerceris*. Whilst individual garden holders and their choice of what to grow will change with time, there will be great continuity in overall plant structure and diversity. The species also exists in suburban gardens but access is not usually possible to these.

3.4.16 There is intense pressure to develop parts of the Maidstone area. Allotments will be viewed as suitable targets for development. At least some of the Maidstone allotment sites need to be protected to ensure the continuance of the *Cerceris* – particularly as the Colchester and Upper Upnor sites are also threatened by development.

3.4.17 Finally, there may be sufficient numbers of the *Cerceris* present at Rocky Hill Allotments to enable an ecological study to be made in the future.

3.4.18 Contact was made with the management group of the Maidstone allotment holders Association to see whether, in principle, they would be amenable to further autecological investigation during 2004. There seems to be no problem with this, in fact several members were very interested; it is proposed that access to the allotments is arranged for Geoff during 2004.

3.5 *Cerceris quinquefasciata*

3.5.1 No specific research was commissioned by the ACG for 2003 on this species.

3.5.2 However, a number of new localities for this wasp were reported during 2003. ME found the wasp at RSPB Cliffe Marshes Reserve. This was not unexpected as it is very close to the large colony at West Tilbury on the Essex side of the Thames; he also found it at Anglesey Abbey NT near Cambridge. It was found at, or close by, a number of its previously known modern localities in the Brecks by several hymenopterists on the summer field meeting. David Baldock found a specimen at Brooklands, Weybridge, the first Surrey record for over 100 years. Finally, as reported in 3.4 above, Geoff Allen found it whilst searching for *C. quadricincta* at Maidstone.

3.5.3 In combination with the confirmation of its presence in 2002 from near Binnegar, Dorset (but in only at one locality, despite this being a relatively well-worked county) and the Tubney area of Oxfordshire it would seem that the geographic spread of *C. quinquefasciata* is similar to the post 1970 spread mapped in the BWARS Provisional Atlas 1, but with fewer known 10km. squares in total.

3.5.4 This should not lead to complacency for this species. Almost all the modern sites have no recognised conservation status and many are under active planning consideration, if not actually destroyed by building. This is a typical insect species associated with a bare-ground/short/tall-grass and developing scrub environment which, although it may not have any botanical rarities associated with it, is extremely valuable insect habitat. Many of the sites are classed as 'Brownfield', which can be planning shorthand for 'up for development', especially in the light of the published guidance from government regarding re-development of brownfield sites.

3.5.5 In this context it is very heartening to hear that English Nature Suffolk Team are actively pursuing the protection of a very large aggregation of this wasp, as well as many other threatened aculeates, at Red Lodge, near Newmarket.

3.6 *Pseudepipona herrichii*

3.6.1 This wasp has been the subject of one of the longest-running ACG projects, ably carried out by Stuart Roberts.

3.6.2 Although its current overall distribution covers as large a range as at any point its historical distribution, this remains within the Dorset Basin heaths and the population trend at many of the sites is downward. In part this is due to heather age-succession and weather-related issues; but there remains major concern at Godlingstone Heath, in particular, with the effects of a significant increase in grazing pressure on heathers. This may be due to increases in local deer populations, introduction of supplementary grazing by domestic animals as part of heathland management, or a combination of both.

3.6.3 The critical period is the window between February and April when the prey tortricid moth *Acleris hyemana* is flying and lays its eggs in the elongating shoots of *Erica* and *Calluna* spp.. Grazing animals which are short of alternative food at this time of the year target these elongating growth tips, removing the egg or young larva of the moth at the same time. Densities of larvae in June have plummeted throughout Godlingstone in the past five years. Densities of *Acleris* larvae have altered after changes in grazing management prescriptions at other monitored sites within the overall range of *P. herrichii*.

3.6.4 In the light of the need to discover how the nature and behaviour of grazing animals affect the *Acleris* resource, a directed programme of research is required with great urgency. This needs to address both the direct impact of grazing and the effects of successional growth on the suitability of heathers for oviposition and subsequent development of the larvae of *Acleris hyemana*. It is vital to develop ways in which essential grazing management of heathland and the continuity of the internationally important population of this strongly heathland-associated wasp can be maintained. A review meeting to discuss this will follow the 2003 ACG Review meeting.

3.6.5 Two new nesting aggregations of *P. herrichii* were discovered in 2003. The first was on part of Bovington Heath, discovered by Andy Schofield and Mike Edwards whilst working on an RSPB contract. The arrival of *P. herrichii* at the adjoining RSPB Grange Heath Reserve after suitable habitat management had been undertaken, and the discovery of the wasp at a gravel working to the north of this area, had already suggested that there should be a undiscovered population in the vicinity. The second site was rather more surprising, being in a less-than ideal locality at East Knighton, hard by Andy Schofield's house! This is the most westward of all known nesting aggregations.

3.7 *Odynerus simillimus*

3.7.1 This very rare potter wasp was added to the ACG brief in 2002 following the discovery of a nesting aggregation near Colchester in 2000.

3.7.2 Research carried out by Peter Harvey, Peter Hodge, Mike Edwards and David Scott during 2002 identified a number of the ecological requirements of this wasp and the location of further nesting aggregations both near Colchester and at Hickling Broad, Norfolk. Although it appeared that the wasp was always obtaining the same larva with which to provision its nest, the identity of this larva remained uncertain, beyond it being one of two *Hypera* species (Coleoptera:

3.7.3 During 2003 Roger Booth and Andy Foster agreed to see if they could identify which *Hypera* species, *H. pollux* or *H. rumicis*, was involved and, if possible, where the wasps were getting their larvae from. They were joined at Colchester by David Scott, who also made further autecological observations on the wasp in the Colchester area.

3.7.4 The research managed to confirm the identification of the weevil larvae as being those of *H. pollux*. This species feed in, or near, the flower-heads of *Apiaceae*, occupying a

web which is spun on the underside of the flower umbel or under leaves.

3.7.5 At Hickling Broad *Hypera pollux* larvae were feeding on extensive patches of Lesser Water Parsnip *Berula erecta*. This plant is present in the more open fen vegetation, but not in closed reed beds. One *O. simillimus* female was observed taking a *H. pollux* larva from the *B. erecta*. Both female and prey are preserved in the NHM (London) collections. Further larvae were taken from females returning to nests. All were confirmed as *H. pollux*.

3.7.6 At the Colchester sites the larval food plant of *H. pollux* proved to be Fool's Watercress *Apium nodiflorum*. Again, females were seen inspecting this plant and *H. pollux* larvae were taken from females returning to their nests.

3.7.7 Other autecological observations arising from the 2003 research include:

Adult wasp nectar at Tufted Vetch *Vicia cracca*. This was observed at both Hickling and Brightlingsea, with wasps biting holes into the base of the flowers.

Hunting for weevil larvae appears to undertaken mostly in the morning and early afternoon.

By mid-late afternoon female wasps seem to concentrate on nest burrow construction and maintenance.

3.7.8 It is likely that *O. simillimus* occurs in other areas of extensive wetland in East Anglia, if suitable stands of wetland umbellifer and areas of exposed clay occur in the same area.

3.7.9 Habitat conservation for *O. simillimus* needs to ensure two, possibly three, things.

i) A supply of suitable forage plants for the *Hypera* larvae. Neither plant utilised in the current study is rare, but both like open sites with plenty of light. Dense reed-bed does not suit. Water-levels need to be maintained as both these plants grow with their feet right in the water.

ii) A supply of exposed clay for nesting. This is most likely to be the restricting factor within the range of *O. simillimus*. The current practice of spreading all ditch slubbings removes potential habitat before it can be used and some stretches of heaped slubbings should be left. New slubbings should not be placed on top of old, occupied ones, as this will bury extant nests. There is no reason why, when slub banks get overgrown, they could not be either knocked down, or re-made with new slubbings; as long as this is carried out on a rotation within the overall area.

iii) In view of the observation of the wasps' extensive use of the flowers of *Vicia cracca*, it may be advisable to maintain stands of this plant. *V. cracca* is a typical later succession or lightly-grazed grassland plant, so stands of longer-established vegetation may well be required, as well as the bare ground for nesting.

3.7.10 Of further interest (particularly in the next section 3.8) the related *O. spinipes* also occupies at least some of the *O. simillimus* nesting sites, although it emerges rather earlier than *O. simillimus* and prefers nesting on more nearly vertical banks. On one occasion an *O. spinipes* female was observed to have an *H. pollux* larva as prey.

3.8 *Odynerus melanocephalus* and *O. spinipes*

3.8.1 All *Odynerus* wasps are considered to have become more restricted in range and less frequent than before 1970. The reasons for these declines are not immediately clear, but neither have the life-histories of these wasps been previously known in any detail.

3.8.2 The life-cycle of *O. simillimus* has been worked out as an ACG project and shown to depend upon two or three factors (see 3.7.9 above) which, individually, would not be rated highly in any conservation action plan. A similar situation exists for the wasps *Pseudepipona herrichii* and *Homonotus sanguinolentus*. The lesson of these, and other, projects is that such relatively high trophic-level organisms usually rely on the integrity of a number of individually frequent resources for their support. Dealing only with individual, specific

species, rather than trophic webs, as the major informant for conservation policy can lead to highly flawed conservation action as the primary resources, being neither rare or valued, is not sufficiently considered in the contexts of landscape and food webs.

3.8.3 In order to start investigation into such a situation the two potter wasps *O. spinipes* and *O. melanocephalus* were selected for initial investigation. The former species is very widespread in the UK, whilst the latter is more restricted. It is hoped that two factors may emerge from these studies

i) A better understanding of the integrity of food-webs required to maintain these species; consequently leading to a more informed input to the relevant Biodiversity Habitat Action Plans and conservation management policies in general.

ii) An understanding of the factors which relate to the observed differences in distribution between these two species and how these factors might affect the development of relevant Biodiversity Habitat Action Plans and conservation management policies in general.

3.8.4 During 2003 a limited amount of survey time was put into searching for current areas where these two species could be found nesting together and separately. This work was undertaken by Stuart Roberts and George Else. Adam Wright also reported on the situation on the Isle of Wight.

3.8.5 All three surveyors visited areas where, in their experience, it had been possible to find one or both species in the past. The counties of Dorset and The Isle of Wight were chosen as target areas for this project. *O. melanocephalus* has been recorded on a number of occasions as visiting the flowers of Bird's-foot Trefoil *Lotus corniculatus*. The presence of this plant, plus areas of exposed clay or sand which form the nesting areas for both species, were taken as preliminary features for survey effort.

3.8.6 Charmouth area, Black Venn and Spittles, 5/6/2003. Soft-rock cliff. Despite the presence of extensive areas of both exposed clay and *Lotus* no sign of either species was found.

3.8.7 Chideock, Wear Cliffs 5/6/2003. Soft-rock cliff. Both species present (as in 1978!), *O. spinipes* female seen visiting *Lotus*. Only one 'nest chimney' found but it was not clear for which species. No female at this nest.

3.8.8 Holt Heath NNR, 12/6/2003. Heathland. A small nesting aggregation of *O. spinipes* present in 1988. Now totally overgrown.

3.8.9 Newton Gulley, 21/6/2003. Heathland. A small nesting aggregation of *O. spinipes* present in exposed clay. One female seen to return to nest, but no prey seen.

3.8.10 Stoborough Heath RSPB Reserve, 21/6/2003. Heathland. *O. spinipes* nesting site in recent past, no nests seen on current visit. Area of bare mud extensively trampled by grazing stock.

3.8.11 Two localities for *O. melanocephalus* were found on soft-rock cliffs on the Isle of Wight: Castle Cove and Redcliff. Both sites had abundant *Lotus* present and large amounts of bare ground. There were many more individuals at Redcliff than Castle Cove. Searches of areas near the *Lotus* (and elsewhere) failed to find any nesting burrows.

3.8.12 Mike Edwards adds the following observation: In my experience *O. spinipes* may be more associated with woodland edges and *O. melanocephalus* with more open sites.

4. Bees

4.1 *Colletes floralis*

4.1.1 Searches for *Colletes floralis* in Cumbria had been made during 2002, without any sightings. However, Neil Robinson returned to the locality (Sandscale Haws) where Michael Archer had recorded this species in 1994 and was able to find several flying to the flowers of Hemlock Water-dropwort *Oenanthe crocata*. One of these was retained and sent to Mike

Edwards for confirmation, this specimen was agreed to be *Colletes floralis*.

4.1.2 Searches of likely looking nest sites in the vicinity of the Water Dropwort failed to locate any, Neil hopes to make wider searches in 2004.

4.1.3 During July and August 2003 Janet Hunter, under contract to the RSPB, undertook a survey of areas of potentially suitable habitat on the northern and eastern coasts of Northern Ireland, the first dedicated survey of the species in the province, although Brian Nelson had commented on the presence of apparently suitable habitat in an earlier report concerning *Bombus distinguendus*.

4.1.4 Breeding sites were discovered in four areas on the north coast of Northern Ireland. There are two apparently flourishing populations at Ballymaclary NNR and Portstewart Strand in Co. Londonderry, plus two small, and possibly vulnerable, populations at Bushfoot Strand and White Park Bay, Co. Antrim. On the east coast, no active breeding sites were detected. However, it is possible that the bee had been active earlier in the season at Killard Point and Murlough NNR in Co. Down. Reserve staff will be checking these areas for activity next summer.

4.1.5 Specimens to confirm the identity of *C. floralis* at these locations were forwarded to Mike Edwards.

4.1.6 Most of the active sites discovered in Northern Ireland this year are on existing nature reserves run by the National Trust and the Environment & Heritage Service. Thanks to the protection and habitat management provided by those organisations, sites in Northern Ireland still have areas of suitable habitat. The challenge now is to maintain these suitable conditions through continuing sympathetic management.

4.1.7 A Northern Ireland Species Action Plan for *Colletes floralis* is currently in preparation with support from Environment and Heritage Service.

4.2 *Andrena marginata* and *Nomada argentata*

4.2.1 Survey during 2003 for this host/parasite pair of bees were undertaken by George Else, Stuart Roberts and Adam Wright. Additional data was provided by Mike Edwards and Ian Cross.

4.2.2 The reasons for interest in this pair of species are similar to those outlined under *Odynerus melanocephalus* and *O. spinipes* in section 3.8 above. These bees, which, whilst not critically rare, are definitely restricted within their overall range. One reason for this restriction is undoubtedly the oligolecty of the host bee (*Andrena marginata*) to Small Scabious *Scabiosa columbaria*; Field Scabious *Knaulia arvensis* (rarely); and Devils-bit Scabious, *Succisa pratensis*. It is likely that there are other reasons affecting the utilisation of habitats and this project was a first attempt to see if these could be uncovered.

4.2.2 Stuart and George concentrated on sites on the calcareous grassland of Salisbury Plain, re-visiting previously known localities to get some idea of possible population fluctuations, as well as some apparently suitable habitat with no previous records. These visits confirmed previous observations that *Andrena marginata* is not present at all apparently suitable sites and that populations, once established appear to remain established in the area for at least ten years. They did, however, find sites which had previous records and looked to be currently in suitable condition yet apparently had no *A. marginata* present. There were no immediately obvious patterns in the presence or absence of the bee, which is spread widely throughout Salisbury Plain.

4.2.3 The cleptoparasite *Nomada argentata* was, as expected, less frequent than the host and not always present when the host was.

4.2.4 Following previous observations that the species did not seem to be present in areas which were uniformly tightly-grazed, Adam Wright made specific searches of two hard-grazed areas on the Isle of Wight. These searches confirmed the absence of the species

in these conditions. Adam has previously found *A. marginata* to be apparently restricted to habitats with a mixture of tussocky and short grass, such as parts of Salisbury Plain, Noar Hill, Hants and Culver Down, IOW.

4.2.5 *Scabiosa columbaria* is grazing tolerant, being significantly distasteful, and may be abundant in some situations. However, Mike Edwards would agree that some areas with apparently plenty of the food plant have seemed to be resolutely without *A. marginata*, whilst other areas with less abundance of *S. columbaria*, but a greater structural variety, support the bee. Stuart and George similar effects.

4.2.6 The major outcome of the preliminary survey has been to highlight the presence of two, ecologically distinct, populations of the two bees. Populations which are dependent upon *Scabiosa columbaria* fly during July and early August, which is the flowering period of the plant. Populations which are dependent upon *Succisa pratensis* however, are never present until the middle of August and run on into September.

4.2.7 Furthermore, although both *Scabiosa* and *Succisa* are frequent on Salisbury Plain we have never found *A. marginata* on the *Succisa*, despite intensive searches of the flowers of this plant. Populations dependent upon *Scabiosa* have a more easterly and southerly distribution, although this may just reflect the occurrence of calcareous grassland.

4.2.8 Populations of *A. marginata* dependent upon *Succisa* are associated with acid grassland habitats, often in association with heathland. These range from Cornwall in the west through Dorset (a very large population reported at Corfe Common by Ian Cross) to Hampshire in the east and, recently re-discovered, Speyside in the north.

4.2.9 *Nomada argentata* populations associated with the *Succisa*-visiting *A. marginata* are similarly late in flight period, and, again, much less frequent than the host.

4.3 *Anthophora retusa*

4.3.1 This bee was investigated at its long-known locality at Culver Down on the Isle of Wight, by Adam Wright.

4.3.2 The project started rather late in the flight-period of this bee and the comments are based upon observations made during 2002.

4.3.3 A strong colony of this bee was located on Culver Down, Isle of Wight in 2002, close to the old battery around SZ637856. Individuals were first recorded on 22nd April 2002 and were still active on 5th May. Both males and females were recorded on both visits, with up to 15 specimens being seen on each occasion. All observations of *A. retusa* were of specimens flying fast and low to the ground around patches of Ground Ivy *Glechoma hederacea*. Although some individuals settled on the flowers of this plant, the length of time actually spent stationary was short. Culver Down is a floristically rich area with plenty of chalk downland plants available, and a scrub element including Gorse *Ulex europaea*, but *A. retusa* was not found visiting any plant except Ground Ivy. This contrasts with observations of *Anthophora plumipes*, which was regularly noted at the flowers of Cowslip *Primula veris* and Primrose *Primula vulgaris* on Culver Down.

4.3.4 *A. retusa* was regularly found flying with its close relative *A. plumipes*, which was abundant on site. The flight behaviour ("jizz") of the two species is very similar, and although *A. retusa* generally appears slightly smaller in flight it was deemed prudent to net specimens in order to confirm identity. Easily visible field characters used for separation of the two species were as follows :

Females :

Hind tibial spurs black *A. plumipes*

Hind tibial spurs pale *A. retusa*

Males :

Mid tarsal hair fringe very long

A. plumipes

Mid tarsal hair fringe much shorter and denser *A. retusa*

4.3.5 The existence of a population of *A. retusa* on Culver Down has been known since the early 1980's, although it is uncertain whether the exact location remains the same. However, it does appear that the population is extremely localised, since searches of patches of Ground Ivy on nearby Bembridge Down (SZ631855) on the same dates in 2002 produced only *A. plumipes*. Survey of the amphitheatre at Redcliff (SZ621854) in 2003, where there were also some good areas of Ground Ivy, also failed to yield *A. retusa*.

4.3.6 In 1995 Mike Edwards, George Else and Martin Jenner made similar observations regarding the apparent fondness of *A. retusa* for *G. hederacea* at another good location for this bee near to Cuckmere Haven, East Sussex.

4.4 *Osmia uncinata*

4.4.1 Update on this species awaited from RSPB

4.5 *Osmia parietina*

4.5.1 No specific research was commissioned by the ACG for 2003 on this species.

4.5.2 However, Neil Robinson has continued to follow the fortunes of this bee in Cumbria and has submitted the following update:

4.5.3 My only sightings this year were at Clawthorpe Fell NNR, where on two occasions I saw a female foraging just inside the entrance in exactly the same place as last year, and on Holmepark Fell, recently acquired by the National Trust. Here, on 11 June I found a male on Bird's-foot Trefoil in the SW corner at S05378791 after about 40 minutes of searching. On 16 June after 20 minutes I caught and released another male at the same place, and after 70 minutes I saw a female.

4.5.4 These sparse sightings suggest that, as for *C. floralis*, the bees were not resident but only visiting - most likely from Clawthorpe Fell NNR from which the site is separated by the chasm of Holme Park Quarry (no problem for bees). I now think that the same applies to my sighting in Holme Park Quarry LNR last year - I cannot believe that there is enough Trefoil there to support a population.

4.5.5 I also examined the two places on the coast near the Ulverston slagbank where Charles Dale saw females last year and reached the same conclusion - that they were only visiting, flying up to 1 km from the natal colony on the slagbank. Carl Clee has come to the same conclusion in North Wales - that at some of the places where they are seen they are only visiting to forage. This is hardly surprising in view of the distance that hive bees are known to fly. Other examples are a male *Colletes succinctus* found in a garden in the centre of Ulverston, and *Bombus monticola* workers found on the coast at Silcroft and visiting a garden in the Lune valley. However, it does suggest that we should be talking about habitat, rather than sites for aculeates.

4.5.6 One practical piece of management has been the removal of 5 small birch from the east end of the glade on the Carnforth Ironworks site where I first found *Osmia parietina* in 1995. They were beginning to shade out a good patch of Bird's-foot trefoil. Permission to remove them was obtained from the owner, Richard Boddy, who had been visited by Mike Edwards earlier in the year, and they were taken out in October by Tony Riden of the Arnside/Silverdale AONB Management Service (as a helpful gesture free of charge although they were not in the AONB).

Bumblebee Working Group

5. Development of and Liaison with Agri-environment schemes and DEFRA; Liaison with academic institutions; Progress with bumblebee distribution project.

5.1 Margin Establishment Experiment, Scotney Court Farm, Romney Marsh

5.1.1 This experiment was set up to investigate the longevity and usefulness of three margin treatments for providing bumblebee forage habitat - natural regeneration; sown, brush-harvested, meadow mix (Weald); agricultural legume mix (prototype WM2). A number of different first-year treatments were applied, in replicate, to each starting point. These involved 3 or 6 mowings in the first year and removal of cuttings or not.

5.1.2 Tim Gardiner of Writtle College has been undertaking botanical transects on a yearly basis and has provided the summary of the first three years' results given below:

5.1.3 It would appear from the results of this three-year study of forage plant establishment that naturally regenerating field margins produce only persistent agricultural weeds, which are neither likely to be a good forage resource for bumblebees or particularly welcomed by farmers. The seed bank at Scotney Court Farm would appear to be impoverished due to years of arable cropping and spraying with herbicides, this is a situation that is representative of most lowland arable land in England. Therefore, naturally regenerating margins probably have very little value as a forage resource for bumblebees and the desired forage species must be sown.

5.1.4 The legume mixture plots had almost 100% coverage of *T. hybridum* and *T. pratense* in 2002 (one year after establishment) which would have provided a valuable forage resource for the local bumblebee population that includes *Bombus humilis*. The dense clover coverage also allowed very few agricultural weed species to become established, therefore providing adequate weed suppression for the farmer. However, by 2003, *T. pratense* had become dominant in the legume margins, with *T. hybridum* much less common, indicating that the former species may be a more successful competitor for environmental resources. This area of clover population dynamics needs further research.

5.1.5 The legume mixture plots were also invaded by various perennial grass species in 2003, and this could have contributed to the reduced number of forage species. It may be that perennial clover species such as *T. hybridum* only persist for one or two years in the sward. Therefore, re-sowing of the margins may have to occur on a fairly regular basis (perhaps every three years) which would make this option quite expensive for farmers and any government grant aid would need to be substantial.

5.1.6 The meadow mixture plots had a higher number of forage species than their legume mixture counterparts in 2002 and 2003. The author suggests that this mixture may be the best option for establishing a longer term forage resource in field margins as many of the perennial species such as *L. corniculatus* may persist for longer than either of the clover species.

5.2 Buzz Margin Project and extension of this project

5.2.1 This project is run by The Farmed Environment company in conjunction with the Centre for Environment and Hydrology. It aims to look at the relative value for a number of organisms, including bumblebees, of a variety of different options for margins under Stewardship. It is also developing appropriate management techniques for these margins. ACG has had a close involvement in this project for two years and has been involved in putting forward the case to DEFRA to develop this into a much wider-scale project with bumblebee resource restoration as its main theme. We have recently heard that this larger project has been given a go-ahead.

5.2.2 One of the most interesting points to come out of this comparative study has

been that different bumblebee species, when presented with a choice of forage plants which are adjacent to each other make strong choices, which are species-specific. This backs up the data which we have been gathering on pollen forage by bumblebees.

(Claire to report further)

5.3 Liaison with academic researchers and DEFRA

5.3.1 Three years ago the Bumblebee Working Group initiated a series of meetings with academic institutions who were actively researching aspects of bumblebee ecology. A meeting has been held in the early spring each year. This meeting has been closely involved in developing proposals to DEFRA for research into providing bumblebee resources under Stewardship (see 5.2).

5.3.2 It has also become a very useful informal discussion forum for matters concerned with bumblebee ecology. A number of our projects have been adapted and developed by the academic community, as well as BWG gaining much useful information. The next meeting is planned for February at CEH Monks Wood and will have the widest coverage of researchers yet.

5.3.3 The BWG has maintained contacts with DEFRA Ecologists over bumblebee matters and has provided distribution data as required. We have been actively involved with the further development of the WM2 Pollen and Nectar Mix for Stewardship and have been consulted regarding the development of the new Agri-environment Scheme.

5.4 Pollen forage database

5.4.1 Further samples were taken and analyzed for their pollen content during 2003. This remains a non-standardised sample, but is sufficiently large that some conclusions concerning forage choices may be drawn from it (see 2002 Report). It is heavily biased toward our target species but some attempt was made during the Dungeness project to counter this by collecting a number of samples from the commoner species.

5.4.2 Dave Goulson at Southampton University has become interested in looking at protein and/or amino acid content of various pollens to see whether this may give some insight in to why some pollens are preferred. To this end he has been provided with all the duplicate samples (pollens determined) from this project and is looking at the protein content of some of these. Preliminary results show that legume pollen is about twice as protein-rich as that from Asteracea and Apiacea, although exact values vary between individual species! Amino acid make-up is more variable between plant family and species.

5.5 Mapping Project

5.5.1 Three years ago one of the projects discussed by the researcher-forum noted in 5.3 above was the possibility of re-running the Bumblebee Mapping Scheme, but with a more detailed remit, the establishment of density information as well as just presence information.

5.5.2 Peter Harvey has been running trial projects with BWARS for the last two years and Mike Edwards and Dave Sheppard had a meeting with David Roy and Tim Sparks at Monks Wood to discuss the statistical implications for data gathering in the spring of 2003. The reaction from Monks wood was very encouraging.

5.5.3 The Invertebrate Conservation Trust (Buglife) expressed interest in running this project, it being too large for either ACG or BWARS and approaches were made to the Heritage Lottery Fund for support. This last stage has taken rather longer than expected, but Buglife now have a go-ahead from the Lottery to develop more detailed proposals.

6. *Bombus distinguendus*

6.1 Murdo Macdonald reports: Work on *Bombus distinguendus* on the Scottish Mainland to determine its distribution and general ecology was carried in 1999 and 2000. Since then, the effort has been to try to raise awareness of the bee and its requirements and to gain recognition for it in the context of agri-environment schemes and the Highland LBAP.

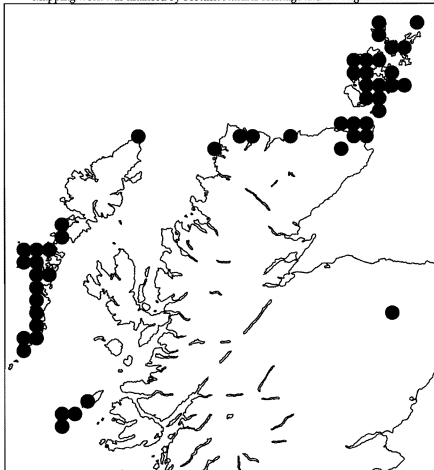
6.2 During mapping work for the Highland Bumblebee Atlas in 2003, there were some significant finds. A worker was seen at *Filipendula ulmaria* in a lay-by on the A9 at Nybster, and a queen found near Westerdale on *Trifolium pratense* on waste ground at the roadside. There was nothing unusual in the flora at either site. These records make it nearly certain that it occurs in such undistinguished sites elsewhere in Caithness and Sutherland where suitable forage (perhaps especially *Trifolium pratense*) occurs in even small and scattered patches. The possibility that *B. distinguendus* might occur inland on roadsides or on waste ground is not new - there is much suitable forage there. In 2000, a survey for the species on Skye identified roadside verges as potential habitat, though the bee was not found anywhere on the island.

6.3 In 2003 *B. distinguendus* was found in a new 10km square near the shore at John o' Groats, and its known range at Durness and Dunnet Bay was increased. Its continued presence at the other known sites on the mainland was confirmed, so we seem not to have lost any of the remaining populations in the past four years.

6.4 It is difficult to survey verges adequately in the Highlands. Distances are large, it is very time-consuming, and perhaps done best on foot or bicycle. Given the size of the area and nature of the task, good coverage is perhaps best achieved by locally-based observers who can to spend a lot of time in small 'parcels' spread over the whole summer, rather than by an intensive searches over a few days when the weather (recent and current) can have a great influence on success in locating the bees.

6.5 This makes the LBAP appropriate for the task of identifying, protecting and enhancing such pieces of habitat. The top candidate must be the superb patch of *Knautia arvensis*, *Centaurea scabiosa* and *C. nigra* behind the old church at Farr at NC715623. This is a stunningly beautiful sight in July, and it supports foraging *B. muscorum* and *B. distinguendus* as well as other species of bumblebee. It is close to the Tourist Information Centre and adjacent to the museum in the old church at Farr, and therefore may be appropriate to include as a feature of interest in that setting as an opportunity for demonstrating the biodiversity agenda. It has sometimes been strimmed for no apparent reason at the peak of its development in July, rendering it completely valueless to bumblebees, so agreement with the landowner/manager in maintaining (and potentially enhancing) the wildlife interest of the site will be essential.

6.6 SNH and those working on the Sutherland LBAP have been alerted to this, and I will maintain pressure over the next year to try to ensure that the importance of the site (and the county as a whole) for *B. distinguendus* is not forgotten. In August, Gill Nisbet and I held a well-attended field workshop on the identification of bumblebees for members of the Caithness Field Club, and we hope to have engendered some long-term interest in the genus as a whole and *B. distinguendus* in particular.



Current known distribution of *Bombus distinguendus* in the UK. The record in Aberdeenshire is of a single individual in one year in a well-observed site, so is likely to be aberrant. The population on the north coast of the mainland is small and sites are scattered. Map produced with DMAP.

6.7 Tom Charman is giving a resume of his initial work at the ACG meeting - a report of this will go here.

7. *Bombus sylvarum*

7.1 CCW commissioned a survey of *B. sylvarum* on the Gwent Levels during 2003. This was carried out by Mark Pavett of the National Museum of Wales, Cardiff.

7.2 There have been a number of modern records of *B. sylvarum* from this area (largely from an alert Mark, whilst supposedly looking in ditches!), but no systematic searches had been made prior to this year. The situation here seems essentially similar to that on the Somerset Levels. Nowhere are there large numbers which make the species immediately obvious, but scattered individuals, probably representing individual nests, are found over

a very wide area. This large size of suitable habitat makes this an important area for the conservation of this bumblebee.

7.3 Update from other areas of Wales (Mike Howe to supply at meeting)

7.4 An update on progress from the Somerset Levels forms a separate item from Janet Boyd.

7.5 A trial to improve the resources provided by sea-wall areas under the management of the Environment Agency in North Kent has been agreed. EA Ecologist Paula Wadsworth has been a driving force for this.

7.6 Following a meeting concerned with the conservation of bumblebees in North Kent, EA engineers expressed interest in looking at ways in which essential management of the sea walls could be adjusted to provide better habitat for bumblebees, whilst maintaining their operational requirements. The main focus of this was *B. sylvarum*, although other species, notably *B. humilis*, *B. muscorum* and *B. ruderarius*, are all likely to benefit from improved foraging habitat.

7.7 Paula and the flood defence team have identified a number of areas along the North Kent Flood Defence Wall where mowing regimes can be adjusted to allow potential area of suitable bumblebee forage to be left uncut in July (normally the entire width of the sea-wall is cut at this time). These areas are based on a nominal density of 100m in 1km.

7.8 To reinforce this provision a supply of native red clover seed was obtained and sown into trial plots in the Spring of 2003.

7.9 A major difficulty at specific sites with this project is the fact that much of the sea-wall, although nominally under EA cutting management, is actually open to grazing stock on the adjacent farmland. This can, and did, can negate the provision of areas of taller grassland and flowers in July at some sections.

7.10 Never-the-less, where the altered regime was able to be established there was a noticeable improvement to the availability of bumblebee forage, most notably at Cliffe Pools RSPB Reserve, where *B. sylvarum* was found several times utilising habitat which would formerly have been cut.

7.11 Although it was too early for the sown clovers to flower, germination was noted at the trial sites.

7.12 This project is initially for two years. An interim report for 2003 is to be presented to EA and it is proposed to review the project with EA Local Teams at the end of the second season (2004). It is unlikely that significant differences in bumblebee usage of these areas will be seen within the initial two-year timescale, but the logistic practicability of the scheme for EA maintenance teams will have been trialed. We hope that the project can be extended for a further five years, by which time benefits for target bumblebee populations should have become clearer.

8 *Bombus humilis*

8.1 No specific autecological research was commissioned by the ACG for 2003 on this species.

8.2 This species was the centre of a project, commissioned by the RSPB, on bumblebee habitat restoration on former gravel workings. A summary of this appears later (

8.3 A number of records of interest have been made in 2003. Jan Boyd and The Somerset Invertebrate Group recorded *B. humilis* from Ham Hill, the first record since 1976, and a good idea of the modern distribution and status of *B. humilis* in Cornwall has been one outcome of work undertaken by Paddy Saunders (report summary, section ***)

9. *Bombus ruderatus*

9.1 Following the discovery of significant populations of what can be recognised as this taxon flying alongside clear *B. hortorum* at the Nene and Ouse Washes and other areas in 2002 (see 2002 Report), efforts were made to investigate further the autecology and, in particular, the genetic profile of *B. ruderatus*. This work was led by Mike Edwards.

9.2 Visits to St. Osyth (5/4/2003), the Ouse Washes (30/4/2003) and the Nene Washes (7/5/2003) were made to search for queens of *B. ruderatus*. Queens were seen at St. Osyth, visiting Red Dead-nettle *Lamium purpureum*, and the Ouse Washes, investigating a hole in the dyke-bank.

9.3 On 14th and 15th July a second visit to the Nene and Ouse washes was made. This was primarily to collect series of workers of both *B. hortorum* and *B. ruderatus* for genetic analysis at Southampton University. The party included three workers who had not had previous experience of *B. ruderatus* in this situation: Brian Banks, Jon Ellis and Bryan Pinchen as well as Mike Edwards. All of us were quickly able to distinguish most individuals of the two taxa in the field, although there were some individuals which remained problematic.

9.4 Pollen and foraging data was recorded for each sample insect. Pollens being used were Boraginaceae (*Symphytum officinale*); Fabaceae (*Trifolium pratense*); Lamiaceae (*Stachys palustris*), which were the same plants as those which the majority of the bees of both *B. ruderatus* and *B. hortorum* were foraging at. The sample was small and further research is required, especially over the entire flight period of both species at these localities.

9.5 Each sample insect was killed by freezing overnight. The three RHS legs of each specimen were then removed to alcohol for later genetic analysis by Dave Goulson and Jon Ellis at Southampton. The main insect was mounted. Each insect and leg sample was given identical labels. All mounted insects were then identified (blind) using structural features by Ted Benton, Mike Edwards, Dave Goulson, Jon Ellis and Ben Darvel and the outcome tabulated. They are now awaiting similar treatment from George Else and Paul Williams. So far the agreement on identification has been in excess of 80% of the total sample. The outcome of the genetic analysis will be added to the structural one and the whole process evaluated.

9.6 Although it was not at all clear in the spring whether there was any phenological separation between *B. hortorum* and *B. ruderatus* queens (too few queens being found) it was apparent that *B. hortorum* was completing its life-cycle before *B. ruderatus* during the July visits. It was very hard to find workers of *B. hortorum* at either site, most examples being males; conversely, few males and many workers of *B. ruderatus* were present at both sites.

10. *Bombus monticola*

10.1 Autecological observations of the *B. monticola* population at Birch Tor, Dartmoor were made by Ted Benton and Mike Edwards on 16/4/2003, 2/7/2003 and 5/8/2003. These were primarily concerned with obtaining foraging information at queen, developing nest and mature nest stages.

10.2 On the April visit over 100 queens were found visiting the group of *Salix* trees noted in the 2003 report. None had pollen loads, or were seen to gather pollen from the *Salix*. This agrees with the observations made in several localities and reported from 2002.

10.3 From the number of queens observed during April we expected to find many foraging workers on the July visit. In fact they were few and far between. We interpret this to mean that the *Salix* provided queen resources for a *B. monticola* population which is effectively spread over a very wide region.

10.4 We did find one nest, this was in the moss and litter at the base of a tall Bilberry bush and may have extended underground. The rate of worker traffic was about one worker going and coming every five minutes. Not all workers returned with pollen. Four

samples (all very small) were taken from workers returning to this nest. These contained *Erica cinerea* and *Trifolium repens* pollen. Other workers were found foraging for both pollen and nectar at *Trifolium repens* and *Lotus corniculatus*. Martin Jenner and Paddy Saunders joined us for this visit.

10.5 On our last visit males were still not very much in evidence, although there were more workers. These were seen foraging entirely at *Erica cinerea* on this occasion, although we took no pollen samples to confirm this. Several fresh queens were also on the *E. cinerea*.

10.6 The nest which we had found previously had been investigated but was obviously not accessible to the predator, as there was still a lot of activity. Whilst we were watching the nest a small shower occurred and a number of fresh queens shot back into the nest. Several of these were seen to leave again as the sun came out.

11. *Bombus muscorum*

11.1 No specific autecological research was commissioned by the ACG for 2003 on this species. However, information on this species forms part of the four final, area-based, reports below.

12. *Bombus ruderals*

12.1 No specific autecological research was commissioned by the ACG for 2003 on this species. However, information on this species forms part of the four final, area-based, reports below.

13. *Bombus soroeensis*

13.1 No specific autecological research was commissioned by the ACG for 2003 on this species. However, information on this species forms part of the four final, area-based, reports below.

14. *Bombus subterraneus* and *B. ruderals* in New Zealand

14.1 Populations of both these species were established in New Zealand from UK stock at the end of the 19th century in order to promote the fertilisation of Red Clover seed crops (the plant being used as a pasture-improver). An investigation into the current status and biology of these species in New Zealand was commissioned from Dave Goulson of Southampton University and the discussion section from his report is summarised below.

14.2 Patterns of distribution and abundance for the four bumblebee species in New Zealand are comparable to their UK status. For all sites combined, and within sites where all species occur, abundance was generally ranked in the order *B. terrestris*, *B. hortorum*, *B. ruderals* and *B. subterraneus*. This suggests that the carrying capacity of all habitats is low for the rarer species.

14.3 One possible explanation might be that the rarer species are more specialized in their requirements. It is certainly true that *B. terrestris* is more generalized in its foraging behaviour than all other bumblebee species that have been studied in detail (Goulson and Darvill, in press). By exploiting a greater range of flowers, it can persist in a wider range of habitats, and maintain a higher population size within habitats. It would seem that the other 3 New Zealand species are all very much more specialized in their foraging preferences. All three depend very heavily on *T. pratense* as a source of both pollen and nectar. It has long been known that *B. hortorum* strongly favours *T. pratense* as a food source in regions as diverse as Scotland, Finland, Sweden and Denmark (Skovgaard 1936; Brian 1951; Teras 1985; Jennersten et al. 1988). Bumblebee species richness in Finnish farmland

was recently found to be strongly correlated with abundance of zigzag clover, *Trifolium medium* (Backman and Tiainen 2002). Indeed, Rasmont (1988) argued that the decline of several long-tongued bumblebees in France and Belgium is largely attributable to a decline in the area of leguminous fodder crops once grown to feed horses.

14.4 What is not clear from studies to date is why *B. hortorum*, a seemingly specialized bumblebee species, remains fairly widespread and abundant in Europe and in New Zealand, while other species with long tongues and similar foraging preferences have declined. At present we are unable to discern any marked ecological differences between, for example, *B. hortorum* and *B. ruderatus*, yet they differ greatly in abundance and distribution. Similarly, *B. subterraneus* remains very restricted in range in New Zealand and is extinct in the UK, yet its forage requirements appear very similar to *B. hortorum*. Presumably the rare species are specialized in other aspects of their biology.

14.5 One obvious difference between *B. ruderatus* and *B. subterraneus* on the one hand, and *B. hortorum* and *B. terrestris*, on the other, is that the latter species emerge earlier from hibernation. Indeed, all of the common bumblebee species in the UK tend to emerge fairly early in the year, while the rare BAP species emerge later. By emerging later, these species have less time for nest growth and thus it seems likely that their nests attain smaller sizes and produce fewer reproductives. This in itself could explain lower population sizes, and greater susceptibility to habitat change. Of course, this begs the question why they emerge later. They may be limited by availability of forage early in the season, since most legumes, and *T. pratense* in particular, do not flower until late spring. It was in full flower at the time of our visit in January, and we would guess that it does not begin to flower until December in New Zealand. The flaw in this argument is that *B. hortorum* is also a *T. pratense* specialist, yet it probably emerges earlier than *B. subterraneus*, and it is much more abundant. The crucial ecological differences between *B. hortorum* and the rarer species *B. ruderatus* and *B. subterraneus* have yet to be discovered.

14.6 It is at present unclear why *B. subterraneus* should be associated with lake edges in New Zealand. Lake edges do provide flushes of *T. pratense*, but this plant is found elsewhere (for example roadside verges), along with *E. vulgare*. This requires further investigation. One possibility is that these areas provide more reliable forage, particularly in late season when the vegetation elsewhere is withered. Even at the time of our study in January, areas away from the lakes in central Otago were very brown and plants were beginning to wither.

14.7 Compared to the distribution of *B. subterraneus* described by MacFarland and Ourr (1995), it would seem that the species may be declining in New Zealand. They recorded *B. subterraneus* further North and East than we did, notably in the areas of Lake Coleridge and Fairlie. Despite conducting several searches in these areas, targeted as closely as possible to the locations of their records, we found no *B. subterraneus*. Agricultural intensification is occurring in New Zealand as it did in Europe, so the same processes that drove *B. subterraneus* to extinction in the UK may be at work. This is clearly of concern since these are the only surviving *B. subterraneus* of UK origin.

14.8 We identified 4 distinct populations of *B. subterraneus* (although one of these was represented by just one worker). In the areas of Twizel, workers were found scattered across an area of perhaps 40 km². The area is not intensively farmed. It contains many man-made lakes created for HEP, the margins of which are largely used for amenity purposes (boating, fishing etc. . .). Between the lakes, the land is mostly stony sheep country, dominated by *E. vulgare*. The area seems unlikely to change, so it seems probable that this *B. subterraneus* population will persist for some years.

14.9 The other populations were apparently confined to smaller areas, although we may have failed to locate some areas of suitable habitat. The largest number of *B. subterraneus* found in a single site search (11) were found on the shores of Lake Tekapo, and appeared to

be confined to a strip of *T. pratense* and *E. vulgare* growing amongst the stones on the lake shore. Much of the lake shore is inaccessible except on foot, and the lake is over 30 km long, so the *B. subterraneus* population could be large.

14.10 An interesting feature of the relative geographic distributions of *B. hortorum* and *B. ruderatus* in New Zealand is that they are reversed compared to Europe. In New Zealand, *B. ruderatus* is found mainly in the mountains (60-93 1m), while *B. hortorum* is common in the lowlands (5-827m). In Europe, *B. ruderatus* is a more southerly species than *B. hortorum*. Perhaps the absence of *B. ruderatus* from the lowlands of New Zealand is simply a result of the more intensive farming that occurs in these areas.

14.11 In summary, *B. subterraneus* is rare in New Zealand, existing in at least 4 low density populations in the hills of central South Island. All sites were close to lakes, and bees were often foraging in the marginal vegetation. Foraging preferences appear to be narrow. The favoured pollen sources were *T. pratense* and *L. corniculatus*, while nectar was collected primarily from *T. pratense* and *E. vulgare*.

15. Northumberland

15.1 We have a lot of systematic data based on commissioned survey for bumblebees in the southern and midland areas of England, southern Wales and northern Scotland. We have little systematic data, however, on the modern situation in northern England (with the exception of Cumbria), non-highland Scotland or northern Wales. In order to work towards remedying this situation Harry Eales was asked to survey Northumberland and Durham specifically for *Bombus monticola*, *B. muscorum*, *B. ruderarius* and *B. soroeensis*.

15.2 *Bombus monticola* was found in eight locations. However few individuals were found at each location and Harry is firmly of the opinion that this species has declined dramatically since the beginning of the 1990s. He suggests that a series of hard and widespread frosts in the early 1990s may have been involved, as these kill the flowers of Bilberry, the major forage plant for *B. monticola* queens in the Spring.

15.5 *Bombus muscorum*. This is the most widespread and frequently recorded of the target species. However, its distribution and recorded density (never very high) show modern decline since 1990, with the greatest decline being in County Durham. It is closely associated with areas of bog, mire and moorland which is dominated by heathers. Harry echoes Murdo's comments on the dangers of recording very pale individuals of *B. pascuorum* as *B. muscorum*.

15.6 *Bombus ruderarius* was not found in any of its former locations. This confirms Harry's previous conclusion that the species is extinct in Northumberland and Durham (last record 1979).

15.7 *Bombus soroeensis*. There are very few historical records for this species and the location data is poor for most of these. Those sites which were traceable had all been *Calluna*-dominated moorland or bog/mires at the time of the record. One site was found during the 2003 survey. Harry cautions that difficulties in field identification, together with the shortage of active bumblebee recorders in these counties, may well make this species appear less frequent than it really is.

16. Dungeness and Romney Marsh Bryan Pinchen

Report summary awaited

17. Somerset

17.1 For 2003 Janet was asked to continue with the research and advisory role she had developed in the Somerset Levels.

17.2 Two landowners made contact following the article on *B. sylvarum* published in the DEFRA newsletter in 2002. Both sites were visited and advice and information given about establishing areas of Red Clover.

17.3 A short presentation was given at a FWAG field meeting at a site where *B. sylvarum* had been recorded in 2002. About twenty landowners attended, two of whom subsequently requested visits to their land. This was done and advice and information given, although one of the sites was already well managed for bumblebees and the farmer only needed encouragement to continue as before. Both *B. muscorum* and *B. ruderarius* were recorded on his land.

17.4 Following the presentation FWAG requested training for their project officers in the shape of a workshop and field meeting. This could not be arranged before the season finished and will take place during the 2004 season.

17.5 Eight Somerset Wildlife Trust grassland nature reserves were surveyed and *B. sylvarum* was recorded in good numbers at one of them. This is the first record of *B. sylvarum* on a SWT nature reserve and it is hoped that it will stimulate the Trust's interest in the species.

17.6 Walton Common was surveyed. This is a reserve managed by Avon Wildlife Trust but situated in North Somerset.

17.7 Two areas were surveyed by car, stopping to examine likely patches of grassland and verges.

17.8 A search was made for *B. monticola* at Dunster, Exmoor but none were recorded. Permission was given by SWT to survey their reserve at Mountsey, Exmoor but a visit could not be arranged in time. I would like to reapply for permission and visit in the 2004 season.

17.9 *B. humilis* was recorded at Ham Hill during a meeting arranged by Somerset Invertebrate Group 17/8/03. This was attended in order to raise awareness of the Bumblebee project with others who are actively recording insects from other orders. This was the first record of this species in Somerset since 1976 (Robin Williams pers. com.). Several other specimens were subsequently recorded by others on this site (Dave Gibbs pers. com.).

17.10 Management advice was given to the landowner at Warren Covert adjacent to Ham Hill.

17.11 DEFRA requested written comments on two Countryside Stewardship applications regarding land in the area on the Somerset Moors where *B. sylvarum* had been recorded.

17.12 Two landowners reported bumblebee nests on their land - these were investigated and found to be *B. pascuorum* and *B. lapidarius*.

17.13 Ten nest pots were set out and monitored at the RSPB Nature Reserve at Ham Wall but they were not used. The site was checked in other areas to make sure that *B. sylvarum* was still present - several workers were recorded.

17.14 *B. soroeensis* was not recorded on any survey.

18. Cornwall and Devon

18.1 During 2003 Paddy Saunders undertook a survey of Cornwall (predominately) and Devon to establish the modern status of target bumblebee species. Although both these counties appear to be well-covered in post 1970 atlas data, the vast majority of records are pre 1990.

18.2 *Bombus humilis* is still widespread on the North Cornwall coast, a situation previously reported by Mike Edwards during surveys for the National Trust in the early 1990s. There are very few inland records and surprisingly few records on the south coast, most notably in areas such as The Lizard.

18.3 Paddy felt that the presence of Kidney Vetch *Anthyllis vulneraria* was vitally important to queens on coastal heath sites. Later in the season Betony *Stachys officinalis*, Sawwort *Serratula tinctoria* and Knapweeds *Centaurea* spp. are used. Mike Edwards comments that the presence of *B. humilis* on these coastal heaths is mirrored in many area of South Wales, with a similar range of forage plants being utilised.

18.4 On the cliff-tops, areas of semi-improved pasture with white clover were also utilised.

18.5 *Bombus monticola*. This species was only recorded once during the survey, in Paddy's garden on the south coast at Looe! As it is associated with upland areas with extensive *Vaccinium* / *Erica* stands it is unlikely to have been resident here. The most likely area, within Cornwall is Bodmin Moor, although the current survey found that areas were too hard-grazed for the Bilberry to flower extensively. It is possible that Paddy's specimen came from Dartmoor.

18.6 *Bombus muscorum* was found to be intermingled with *B. humilis* on the north coast only. There are records (2000) for The Lizard and Dodman Point, but no examples were found on this survey. Confusion between these species in the historical records is likely. It was generally less frequent than *B. humilis* where the two were flying together (as on Salisbury Plain ME) and there were fewer localities in all. At Braunton Burrows (Devon) *B. muscorum* appeared to be more frequent than *B. humilis*.

18.7 The habitat utilised appeared to be similar to that utilised by *B. humilis*.

18.8 *Bombus ruderarius* was not found at any location during the survey, there being only two relatively modern records for this species in any case.

18.9 *Bombus soroensis* was not found at any location during the survey, there being only two relatively modern records for this species in any case.

18.10 Paddy also reviews the modern distribution for *B. ruderatus*, *B. sylvarum* and *B. subterraneus* (no post 1990 records), *B. rupestris* (present, but few records) and *B. jonellus* (widespread, both inland and coastal).