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Cover illustration. Hoverfly *Callicera aurata* by Simon Damant (see page 3)

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EDITORIAL

Regular readers will notice that this year we have some shorter contributions; this is something I am keen to encourage and I would welcome any notes or observations of interest that people wish to send in.

We have two papers on the Kingfisher's Bridge project; one, by Peter Brown and Julian Doberski, on the carabids, which updates a previous paper in this journal, and the other, by James Cadbury, on the lepidoptera which have colonised the area. The hoverflies at Wimpole that depend on wood that is, to a greater or lesser extent, rotten are described by Simon Damant, and Peter Bircham reports on recent breeding bird surveys at the RSPB's Hope Farm project at Knapwell.

R.M. Payne has published several papers on the flora of walls and roofs, and here covers the flora of walls and buildings in the Isle of Ely. Hilary Belcher and Erica Swale examine an overlooked habitat – the surfaces of paths, trees and amongst mosses – for an unjustly overlooked group. These are the algae and other micro-organisms that are found almost everywhere, and so are available for almost anyone to study who equips themselves with a microscope and a copy of the Freshwater Algal Flora, published in 2002 (reviewed in this journal in No. 45 (2003)).

The restoration of the Histon Brook is described by Rob Mungovan, and vegetation survey work at Wicken Fen is covered by Owen Mountford and his colleagues. Tim Parish describes the history of Mare Fen and how it is managed now to maintain its values for wildlife.

Topics covered by shorter papers include the discovery of a rare pseudoscorpion in Cambridge, a recently 'escaped' plant, the need for care in recording natural history events for phenology, and we have two accounts of local taxidermist naturalists.

As usual, we have book reviews, recent records of vascular plants and bryophytes, and weather notes from John Clarke.

Saproxylic Hoverflies at Wimpole Estate

Simon Damant

The Wimpole estate

Wimpole Estate is situated west of Cambridge in a gently rolling landscape overlooking the wide and shallow valley through which the River Rhee runs. Also alongside the Estate is the great Roman road called Ermine Street. The southern part of the Estate is on Gault clay while the northern part is partially on Lower Chalk escarpments, with a glacial Boulder Clay capping on top of the escarpment.

In the 14th century there was a small Deer Park and two mediaeval villages, one of which had effectively gone by the end of the 14th century, probably because of the plague. By the 17th century only Wimpole was left and this was in the form of hamlets situated around the Manor house. This is most easily seen on Benjamin Hare's map of 1638. Also shown on this map is the Deer Park which was split in two, High Park and Low Park. Many trees are also indicated around the Manor and the hamlets; those around the Manor may have been ornamental and working trees while those around the hamlets would probably have been working trees only, used either for fruit, fodder or firewood. It is very likely that there would have been many pollards of elm, Ash or oak. There is the carcass of an old oak pollard in Cobb's Wood - it is here that the mediaeval village of Wratworth was situated, which by 1638 had reverted to woodland on Benjamin Hare's map. Of interest at the nearby deserted village of Clopton is one very large dead elm pollard which lies on the ground. There are other extremely large elm pollards near Wimpole: one at Whaddon church, one at Lolworth church and a number in Westlingworth. There are other pollarded trees of great age at Wimpole - three oak, one Ash and possibly one Sycamore. There used to be more, but most were lost in the 1970s due to Dutch Elm Disease, though some were felled for other reasons. In the 1970s Dutch Elm Disease killed around 40% of the tree cover in the woodlands and Park. A very valuable saproxylic habitat was lost, especially the renowned South Avenue. Up to this point there was almost no information on saproxylic invertebrates.

The initial interest in the saproxylic fauna was in the South Avenue just before it succumbed to Dutch Elm Disease. Ivan Perry bred a nationally scarce hoverfly species, *Myolepta dubia*, from an elm rot-hole in 1980; he also found other flies and rare beetles there. In 1986 Keith Alexander and the National Trust biodiversity team recorded a number of Coleoptera, which allowed English Nature to designate Wimpole Estate Grade C on the Invertebrate Site Register. Since that time there has again been very little survey work carried out so I decided to pursue an interest in invertebrates, but which groups to start with? As a forester and fond of old trees it became apparent that insects associated with various tree microhabitats would be appropriate. The Coleoptera did not have modern user-friendly books, but Alan Stubbs and Steven Falk's book on hoverflies (Stubbs & Falk 2002), with its new taxonomic keys and, most importantly, colour plates, was a good starting point. An added advantage

of hoverflies is that they can easily be seen during the day and can be extremely colourful, mimicking bees, wasps and bumblebees. They also breed and live in many habitats from woodlands to wetlands, grasslands, coastal areas and dung. Some are associated with wasps, ants and bumble bees. Within these habitats the larvae may be predatory on other invertebrates, or may feed on living plant material or bacteria associated with decaying organic matter.

After five years of collecting and recording hoverflies, the list at Wimpole has grown to over seventy common species, forty-two local species, twelve nationally scarce species and four RDB species. Both the nationally scarce species and the RDB species are almost all associated with decaying tree microhabitats. These microhabitats fall in to four categories, rot-holes, sap runs, decaying roots and stumps, deadwood and to some extent fungi on trees.

The main microhabitats

Rot-holes

Rot-holes can be of various sizes and may or may not contain water; the best ones for diptera are those with water. Sometimes the surface may appear dry but deep in the rothole there can be an ideal damp or wet microhabitat. Most commonly seen are the rat-tailed, podgy maggots of *Myathropa florea*, a bee or wasp mimic. These occur throughout the summer but especially in late spring and late summer. This hoverfly would seem to prefer those rot-holes which are flooded most of the year and usually have a smell of rotten eggs. There are usually plenty of leaves in these rot-holes. Water pockets between branches are also used. With *M. florea* can be *Myolepta dubia*, a smaller black hoverfly with orange abdominal markings which is nationally scarce and has been caught in some numbers at Wimpole recently. The larvae have been found in very wet Horse Chestnut rot-holes of large dimensions in the parkland as well as smaller rot-holes in the woodlands. These rot-holes, however, do not normally smell of rotten eggs. The RDB2 species *Pocota personata* is a very good White-tailed Bumblebee mimic. Larvae have been found in damp, white-rot cavities, often associated with bird nests in medium to large cavities and never in completely submerged water-filled rot-holes. Again this species is found both in the Park and the woods. In the woods it has so far only been found in a large woodpecker cavity in a 70 year old Ash. The even rarer RDB1 *Callicera spinola*e is a very beautiful brassy looking social wasp mimic. Very few records exist of *C. spinolae*, a BAP species in the UK. In the past this hoverfly was only known to have bred in wet rot-holes deep in the cavity of Beech in Wandlebury and Anglesey Abbey. At Wimpole both Beech and Horse Chestnut are used with the latter being the most important. Sycamore and Ash are also used occasionally. Rot-holes are usually submerged for most of the year, though they do tend to dry out in the summer. They do not smell of rotten eggs and are usually deep within the tree heartwood, though smaller rot-holes can be used. Mostly only one or two larvae are found, but up to ten larvae can be counted on occasions. They are very active and in fact are probably the most active hoverfly larvae I have seen. The best time to survey for larvae is in the early spring. Stirring the water by hand usually brings the *Callicera* larvae to the surface and they can be easily be

identified by their very active nature, and they are also the only larvae with fused prolegs (Rotheray 1993). Also present at Wimpole is *C. aurata*, a first record for the county.

The last rot-hole species is *Mallota cimbiciformis*. This hoverfly is nationally scarce and inhabits true water-filled rot-holes, that is, those that are deep and contain water all year in most years. The best trees are Horse Chestnut, Sycamore and elm. Occasionally coppice elms in the woodlands have the right type of rot hole, deep, filled to the top with water and generally quite cold.

Sap runs

Sap runs provide another habitat for certain hoverflies; the local species *Ferdinandea cuprea* and the rarer *F. ruficornis* are two very beautiful coppery coloured species with dark wing patches. Three *Brachyopa* species also inhabit sap runs, mainly on Beech, Sycamore and Horse Chestnut, the latter being the most productive. *Brachyopa insensilis* is national scarce while *B. scutellaris* is locally common; both are mainly found in the woods. The latter seems to prefer sap runs that are very low and lives mainly on Yew and Horse Chestnut trees while the former has been reared from larvae high in the canopy of an elm as well as a Horse Chestnut. The larvae of sap run species are known to feed on the micro-organisms in the sap runs and apparently can tolerate periods of desiccation, with the main activity occurring in spring as the sap rises. The RDB2 *B. bicolor* occurs almost exclusively on big trees, being found in the park on both Beech and Horse Chestnut. All *Brachyopa* species occur in the spring and will almost always be found hovering near sap runs.

Another nationally scarce sap run specialist is the larger *Volucella inflata*. This is most frequently found around sap runs on oak trees and can be seen in some numbers when the tree exudes a strong-smelling, bacteria-rich ooze.

Decaying roots and stumps

Decaying roots and stumps are less well known as habitats for diptera, including hoverflies. Many decaying roots underground have the right habitat (wet pulpy wood mould). The handsome *Criorhina* species largely depend on this microhabitat and can be seen in early spring, usually flying low in the woodlands especially around trees with decaying areas just above the ground. Both the local species *C. berberina* and *C. floccosa* have been identified at Wimpole and also *C. asilica*, a nationally scarce species. All species have in part a resemblance to bumblebees. Other local species utilising decaying roots are *Xylota segnis* and *X. sylvarum*; these are elegant, large, rather elongated flies occurring throughout the summer. *Xylota sylvarum* is an outstandingly beautiful hoverfly with its golden-tipped, elongated abdomen. The favoured tree species is apparently Beech but others probably are nearly as good if the conditions are right. However, *C. berberina* does seem to prefer wetter woodlands at Wimpole. A number of rarer species also occur in this microhabitat but are not found at Wimpole.

Deadwood

Deadwood is also another important habitat and again it is at its best for hoverflies when wet or damp. *Chalcosyrphus nemorum* is black with orange markings on the abdomen and prefers deadwood in marshy wet areas or wet woodlands, and this species has been recorded in suitable sites at Wimpole. Again the hoverfly larvae feed on the micro-organisms associated with decaying sap under the bark, which is usually in the right conditions on the bottom side of fallen deadwood. However, this microhabitat does not usually last very long because the bark falls away from the timber and dries up. *Xylota* species and *Myathropa florea* can also use this microhabitat, as do a number of rare species not found at Wimpole. Fresh wood in streams can also accommodate some very rare species.

Fungi associated with trees provide a further microhabitat for certain hoverflies, namely the *Cheilosia* species. *C. scutellata* is known to breed in *Boletus* and *Polyporus* species and this may be true of *C. soror*, a nationally scarce species. Both these have been identified at Wimpole. This last species can be a bit tricky to identify in some cases and the Wimpole specimens need confirmation.

The importance of introduced trees

I think that the much maligned Sycamore and Horse Chestnut have an important rôle to fulfil as an ecological niche for wet rot-hole and sap run diptera. The best Sycamores tend to be old pollards but those that have had large limbs removed and then develop wet rot-holes are also good. It is also possible that pollarded London Plane could be very valuable and further searches in Cambridge could be rewarding. Since the significant loss of the elm trees both Sycamore and Horse Chestnut have allowed the continued survival of some rare and elusive saproxylic hoverflies.

As a point of note, in the last two years I have found *Callicera* larvae at Croydon church in a Sycamore rot-hole and also at Fenstanton church in a Horse Chestnut rot-hole. It may be perfectly possible that the current trend in reducing trees by tree surgery may allow for more wet rot-holes in trees in the future. This should be recognised as an important mechanism for the survival of the saproxylic hoverflies.

Further work

Callicera spinolae is a Biodiversity Action Plan species that Cambridgeshire County Council would like to protect and it would be a good idea to issue a leaflet on *Callicera spinolae* for distribution to aboricultural companies to help in the search for trees containing the larvae in Cambridgeshire. In conjunction with this there could also be information about *Elater ferrugineus*, a large red RDB1 click beetle found mostly in dry rot-holes with bird nests. This beetle should now also be a BAP priority species for Cambridgeshire as I have no doubt that it will be found to occur in most parks west of Cambridge. At present it occurs in less than five sites in the UK outside Cambridgeshire. In the past it was found in Grantchester and Bottisham.

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Appendix

List of hoverflies recorded from the Wimpole estate. Nomenclature follows Stubbs & Falk (2002).

Anasimyia contracta
Anasimyia lineata
Anasimyia transfuga
Baccha elongata
Brachyopa bicolor
Brachyopa insensilis
Brachyopa scutellaris
Callicera aurata
Callicera spinolae
Chalcosyrphus nemorum
Cheilosia albitarsis
Cheilosia bergenstammi
Cheilosia cynocephala
Cheilosia griseiventris
Cheilosia grossa
Cheilosia illustrata
Cheilosia impressa
Cheilosia lasiopa
Cheilosia pagana
Cheilosia proxima
Cheilosia scutellata
Cheilosia soror
Cheilosia variabilis
Cheilosia vernalis
Cheilosia vulpina
Chrysogaster cemiteriorum
Chrysogaster solstitialis
Chrysotoxum bicinctum
Chrysotoxum festivum
Chrysotoxum verralli
Criorhina asilica
Criorhina berberina
Criorhina floccosa
Dasysyrphus albostriatus
Dasysyrphus pinastri
Dasysyrphus tricinctus
Dasysyrphus venustus
Epistrophe diaphana
Epistrophe eligans
Epistrophe grossulariae
Epistrophe nitidicollis
Episyrphus balteatus
Eristalinus sepulchralis
Eristalis abusivus
Eristalis arbustorum
Eristalis horticola
Eristalis interruptus
Eristalis intricarius
Eristalis pertinax
Eristalis tenax
Eumerus funeralis
Eumerus strigatus
Eupeodes corollae
Eupeodes latifasciatus
Eupeodes luniger
Ferdinandea cuprea
Ferdinandea ruficornis
Helophilus hybridus
Helophilus pendulus
Helophilus trivittatus
Heringia heringi
Lejogaster metallina
Lejogaster tarsata
Leucozona glaucia
Leucozona lucorum
Mallota cimbiciformis
Melangyna cincta
Melangyna labiatarum
Melangyna umbellatarum
Melanogaster hirtella
Melanostoma mellinum
Melanostoma scalare

Meliscaeva auricollis
Meliscaeva cinctella
Merodon equestris
Myathropa florea
Myolepta dubia
Neoascia meticulosa
Neoascia podagrica
Neoascia tenur
Orthonevra brevicornis
Paragus haemorrhous
Parasyrphus mallinellus
Parhelophilus frutetorum
Parhelophilus versicolor
Pipiza austriaca
Pipiza bimaculata
Pipiza fenestrata
Pipiza lugubris
Pipiza luteitarsis
Pipiza noctiluca
Pipizella virens
Platycheirus albimanus
Platycheirus angustatus
Platycheirus clypeatus
Platycheirus fulviventris
Platycheirus granditarsus
Platycheirus manicatus
Platycheirus peltatus
Platycheirus rosarum
Platycheirus scambus
Platycheirus scutatus
Platycheirus tarsalis
Pocota personata
Rhingia campestris
Riponnensia splendens
Scaeva pyrastri
Scaeva selenitica
Sphaerophoria rueppellii
Sphaerophoria scripta
Sphegina clunipes
Syrphus ribesii
Syrphus torvus
Syrphus vitripennis
Syritta pipiens
Trichopsomyia flavitarsis
Tropidia scita
Volucella bombylans
Volucella inanis
Volucella inflata
Volucella pellucens
Xanthogramma pedissequum
Xylota segnis
Xylota sylvarum

Lepidoptera colonisation of a wetland created from arable farmland in Cambridgeshire.

C. James Cadbury

Introduction

The Kingfisher's Bridge Wetland Creation Project is a private venture to restore a variety of semi-natural habitats on land that was intensively farmed up to 1995. It is the inspiration of Andrew Green who has dedicated 65 ha of his and his sons' low-lying arable farm to this project. That it is now (2004) firmly established as a wetland owes much to a major advisory and management input from Roger Beecroft, a conservation management consultant.

The site (central grid reference TL543733) lies close to the River Cam, upstream of Ely and only three kilometres from the National Trust's Wicken Fen. Tomkins (1998) has described the background to the project, the construction and preliminary results of programmes to track the development of habitats and the wildlife that these support.

Though bird conservation has been the prime objective of the Project, the habitat creation has benefited a wide range of other wildlife. Birds have been intensively surveyed (Cadbury 2002) but vascular plants, Odonata, Lepidoptera, carabid beetles and recently Orthoptera are other groups that have received attention. This paper reports on Lepidoptera recording that has been undertaken mainly from 2002 until the end of 2004.

Lepidoptera recording methods

For moths, traps usually operated were those designed by HBD Kettlewell and Anglian Lepidopterists Supplies that use mercury-vapour 125 watt bulbs. They were mainly run in three habitats described below:

The Reedbed (TL545734): this consists of a 9.4 ha reed swamp dominated by Common Reed (*Phragmites australis*) with pools of shallow water and stands of other marsh vegetation, including Great Reedmace (*Typha latifolia*), Great Pond Sedge (*Carex riparia*) and Reed Canary-grass (*Phalaris arundinacea*). On the margins there are drier areas of tall fen vegetation such as Great Willowherb (*Epilobium hirsutum*), Water Mint (*Mentha aquatica*) and rushes, mainly *Juncus effusus* and *J. inflexus*. The reedbed became established in 1999.

The Plantation (TL547731): this is a 5 ha mixed broadleaf woodland comprising mostly of Ash (*Fraxinus excelsior*), Field Maple (*Acer campestre*), Wild Cherry (*Prunus avium*) and sallows (*Salix cinerea* and *S. caprea*). There is also some Beech (*Fagus sylvatica*), Crab Apple (*Malus sylvestris*), Whitebeam (*Sorbus intermedia*), Hawthorn (*Crataegus monogyna*), Small-leaved Lime (*Tilia cordata*), Spindle (*Euonymus europaeus*) and Corsican Pine (*Pinus nigra*). Scrub consisting of Bramble (*Rubus fruticosus agg.*), and Eglantine Rose (*Rosa rubiginosa*) has developed between the trees. The woodland has attained a dense thicket phase with only limited glades bordering the main track through the Plantation. Stands of Wood Small-reed (*Calamagrostis epigejos*) occur in these glades. The trees were planted in 1994.

Adjacent to the Plantation is 8.4 ha of dry limestone grassland (TL548733). This is grazed by sheep, Rabbits and Brown Hares. Where the surface has been scraped down to the underlying limestone the vegetation has remained sparse.

The North Pit (TL544727) is a long disused Corallian limestone quarry that has been in existence long before the Kingfishers Bridge Wetland was created. It is flooded and contains a reedbed with Great Pond Sedge, Erect Bur-reed (*Sparganium erectum*), Marsh Bedstraw (*Galium palustre*) and other fen vegetation in addition to Common Reed. The pit has been invaded by scrub, mostly willows *Salix* spp, Hawthorn and Wild Privet (*Ligustrum vulgare*) which is increasingly shading the water. This site is more sheltered

that the other two and has an electric power point, whereas the other two require the use of a generator.

The Poplar Plantation (TL531733) consists of a belt of fast-growing, early leafing varieties of Black Poplar (*Populus nigra* (‘*Beaupre*’ and ‘*robusta*’)) planted close to the east bank of the River Cam. The trees are now about 14 m high. The moths of this habitat have yet to be investigated.

A total of 54 trap nights has been operated over the three years with 24 in the Plantation, eight in the Reedbed, 19 in the North Pit, two by the Peat Mounds and one in the Poplar Plantation. In most instances the traps were run overnight. Trapping has been spread out over the year with the exception of November – January.

Wicken Fen with its extensive reedbeds and fen habitats is only three kilometres to the south. The National Trust reserve is famed for its moth fauna which has been studied for well over a century (Corbett *et al* in Friday 1997).

Results

A total of 221 species of ‘macro’-moths and 44 ‘micros’ has been recorded over the three years. These included one Red Data (known from 15 or fewer 10km squares in Britain), one proposed Red Data, one Nationally Scarce A (recorded from 16–30 10km squares in Britain since 1980), eight Nationally Scarce B (from 31–100 10km squares since 1980) and 23 Local species (from 101–300 10km squares since 1960). At least another 40 widespread and common ‘macros’ can be expected. Some of them will be recorded with better all-round seasonal cover and by extending trapping to other habitats such as the Poplar Plantation. The use of pheromones and a search for emergence holes in poplars and willows may rectify the present lack of clearwing moth (*Sesiidae* spp) records. There is much to be done on ‘micros’ which have received little attention.

The number of ‘macro’ moth species exceeded 40 on 11 out of 39 nights on which traps were operated. The maximum on any one night was 80 species from two traps (Plantation and North Pit) on 3/4 August 2004.

Reedbed species

Within six years of the main reedbed becoming established 13 moth species associated with the habitat have occurred at Kingfishers Bridge. All but one or two of these are probably breeding there. They include eight wainscots. The larvae of the Southern (*Mythimna straminea*) (local), Twin-spotted (*Archanara geminipuncta*) (local), Brown-veined (*A. dissoluta*) (local), Large (*Rhizedra lutosa*), Fen (*Arenostola phragmitidis*) (local) and Silky *Chilodes maritimus*) (local) all feed on Common Reed, though those of the Silky also feed on living and dead invertebrates. The larval of all except the Southern feed internally in the stems or in the case of the Large, the horizontal subterranean rhizomes. The larvae of the Twin-spotted

inhabits Common Reed growing out of water, while that of the Brown-veined occur in dryer reedbeds. At Kingfishers Bridge in 2002 many terminal shoots of Common Reed were dead and brown by July, indicating an infestation of Brown-veined larvae. The larvae of the Bulrush Wainscot (*Nonagria typhae*) usually feeds on Greater Reedmace (*Typha latifolia*) while that of Webb's (*Archanara sparganii*) (Nb) is associated with Greater Reednace, Yellow Iris (*I. pseudacorus*) and Branched Bur-reed (*Sparganium erectum*). Since the first records of Webb's Wainscot were not until July and early August 2004 (two adults) this species may have only recently colonised. It has been largely a moth of the south and east coasts of England, but is increasingly recorded inland.

Other moths with larvae that feed on Common Reed that have occurred at Kingfisher's Bridge are the Reed Dagger *Simyra albovenosa* (Nb), recorded twice in August 2002 and 2004, Reed Leopard *Phragmataecia castanea* (RDB2) and three pyralids; *Chilo phragmitella* (local), *Shoenobius gigantella* (Nb) and *Donacaula forficella*. These three 'micros' appear well established in the Reedbed, *S. gigantella* has also occurred in the North Pit and even the Plantation.

In Britain the Reed Leopard is only known from the Norfolk Broads, one site in Dorset and Wicken and Chippenham Fens in Cambridgeshire. It seems likely the male caught on 15/16 July 2002 in the Plantation, 400 m from the Reedbed, was a stray from Wicken Fen. There is no reason, however, why this species will not colonise the Reedbed at Kingfishers Bridge. Its larvae are internal inhabitants of Reed stems and may take two or three years to develop. The moth therefore requires reedbeds that remain uncut or are harvested on at least three year rotation.

Another eight 'macros' recorded at Kingfishers Bridge, though their larvae do not feed on Reed, are associated with wet habitats. The Water Ermine *Spilosoma urticae* (Nb) is now largely restricted to coastal sites between Norfolk and Sussex. A male occurred in the Plantation in June 2002. The main distribution of the Mere Wainscot *Chortodes fluxa* (Nb) in Oxfordshire, Buckinghamshire, the East Midlands extending into East Anglia, including Cambridgeshire. It is frequent at Wicken Fen. It was therefore not surprising that two adults appeared in the Plantation at Kingfishers Bridge in September 2004, especially as the larval food-plant Wood Small-reed *Calamagrostis epigejos* grows there. The Small Rufous *Coenobia rufa* (local) with a larva that feeds inside the stems of rushes *Juncus* spp, and the Crescent *Celaenia leucostigma* (local) whose larval food-plants are Yellow Iris and Great Pond Sedge are two other noctuids first recorded at Kingfishers Bridge in 2004. The Dotted Fanfoot *Macrochilo cribrumalis* (Nb) is largely confined to marshes in East Anglia, including Wicken Fen, but its range extends to Kent, Sussex and Hampshire. The larva feeds on sedges *Carex* spp. Two adults occurred in the Plantation in June 2002 and a third in the Reedbed in June 2004. The pyralid *Calamotropha paludella* (Nb) is frequent to abundant at Kingfishers Bridge with 51

individuals trapped in the Reedbed on one night in August 2004. Its larvae feed on Reedmace.

Moths associated with trees and shrubs

With a wide mix of native broad-leaved trees and shrubs planted at Kingfishers Bridge together with its tall hedges and wooded limestone pits the site supports a good variety of woodland moths. The Cream-bordered Green Pea *Earias clorana* (Nb) is an attractive little moth. With its green forewings it could be mistaken for the Green Oak Tortrix *T. viridana*. Its larva, however, feeds on the terminal shoots of willow. It is widespread in the Cambridgeshire Fens and at least 13 adults have been trapped at Kingfishers Bridge between mid-June and the second week of August over three years, 2002 – 2004. Both the Dingy Shears *Parastictis ypsillon* and the White Satin moth *Leucoma salicis*, (two local species) with larvae that feed on willows and poplars occur fairly frequently at Kingfishers Bridge. Running a trap early in the year has shown that the Lead-coloured Drab *Orthosia populeti* (local) is well established at the site where Black Poplar *Populus nigra*, the larval food plant, has been planted. Twenty-five individuals were caught in February and March 2004.

The Autumn emerging 'sallow' moths, including Barred *Xamthia aurago* and Centre-barred Sallow *Atethmia centrago*, are well represented at Kingfishers Bridge. The Orange Sallow *X. citrago* – three adults, with lime *Tilia* spp as the larval food-plant, and the Pale-lemon Sallow *X. ocellaris* (Na) – two adults, were both added to the site list in 2004. The range of the Pale-lemon Sallow in Britain extends from north Kent and Surrey to Norfolk, including Cambridgeshire. The larva feeds on the catkins of Black Poplar. The Red-lined Quaker *Agrochola lota* was not recorded at Kingfishers Bridge until 2004 when up to 15 were seen feeding on ripe blackberries after dark on 29 September (I. Barton, K. Rosewarne, B & C Martin pers. com). Another autumn-emerging moth is the Large Thorn *Ennomos autumnaria* (Nb) which is largely restricted to south-east England, including Cambridgeshire. One adult was trapped in the Plantation at Kingfishers Bridge on 1/2 September 2004.

The occurrence of a fresh male White-spotted Pinion *Cosmia diffinis* (pRDB and Biodiversity Action Plan priority) in the Plantation on 7/8 August 2002 was a surprise. The range of this species in Britain has contracted markedly, but its current strongholds are woodlands with Elm *Ulmus* spp in southern Cambridgeshire and Hertfordshire. Another unexpected catch was an Alder Kitten *Furcula bicuspis* (local) on 26/27 June 2002; it is very local in East Anglia but more frequent westwards. Three local geometers recorded at Kingfishers Bridge have larvae that feed on specific shrubs: Yellow-barred Brindle *Acasis viretata* on Wild Privet *Ligustrum vulgare*, the Scorched Carpet *Ligdia adustatata* on Spindle and Dark Umber *Philereme transversata* that is associated with Buckthorn *Rhamnus catharticus* and Alder Buckthorn *Frangula alnus*. Wild Privet is indigenous in the North Pit; Spindle is planted in the Plantation, and the two

buckhorns are frequent at Wicken Fen, but have not been found at Kingfishers Bridge until Buckhorn was recently planted there. Four hawk-moths, Elephant *Deilephila elpenor*, Privet *Sphinx ligustri*, Poplar *Laothoe populi* and Eyed *Smerinthus ocellata*, are all frequent at Kingfishers Bridge, particularly in the Plantation. The Lime Hawk-moth *Mimas tiliae* has yet to be recorded.

The Goat Moth *Cossus cossus* (Nb) is an uncommon moth to lighted moth traps, but seems to be fairly widespread in the Cambridgeshire Fens including at Wicken Fen and the Ouse Washes. Its larvae spend three or four years burrowing in the heartwood of a variety of broad-leaved trees. In early November 2004 the author found large borings (13-15 mm diameter) in recently cut trunks (20 cm diameter) of Crack Willow *Salix fragilis* near the River Cam at Kingfishers Bridge. Also discovered were numerous borings of the larvae of the Lunar Hornet Moth *Sesia bembeciformis* (common) in the pollard stumps of young Crack Willows cut in the winter of 2003/04.

The Herald *Scoliopteryx libatrix* is a common moth with a larva that feeds on willows and poplars. It is one of a limited number of species that overwinters as an adult. During the summer and autumn of 2004 a 25 m long subterranean chamber was excavated in Corallian limestone near the Plantation and capped with arched concrete blocks and limestone to serve as a bat hibernaculum. By the end of October the cool environment of this artifical cave had been selected for hibernation by at least eight adult Heralds as well as six Peacock *Inachis lo* and two Small Tortoiseshell Butterflies *Aglais urticae.*

Moths of more open habitats

Two local dry grassland moths that have been recorded at Kingfishers Bridge are the Yellow Belle *Semiaspilates ochrearia* and the Scarce Footman *Eilema complana*. The Yellow Belle has a largely coastal distribution in Britain but occurs in Birchland (Norfolk and Suffolk). Three local noctuids, Light Brocade *Locanobia w-latinum* (in June), Dog's Tooth *L. suasa* (August) and Large Nutmeg *Apamea anceps* (June), are all frequent at Kingfishers Bridge. Trapping in the Plantation produced 24 Large Nutmegs over two nights in 2002 and 17 in one night in 2004. The Marbled White Spot *Protodeltote pygarga* is a small attractively marked moth that has occurred twice in the Plantation in June with two individuals on each occasion.

Butterflies

Casual observations have produced 22 species at Kingfishers Bridge between 1997 and 2004. Both the Orange-tip *Anthocharis cardamines* and Brimstone *Gonepteryx rhamni* are plentiful in spring. Brimstones may, however, wander from Wicken Fen where the buckthorn food-plants occur in quantity. Seven of the butterflies recorded at Kingfishers Bridge are species undergoing range expansion in Britain (Asher *et al* 2001). The Essex Skipper *Thymelicus lineola* is now locally abundant in Cambridgeshire. The

Brown Argus *Arica agestis* underwent a rapid expansion in central and eastern England in 1990s. So far there is only one record at Kingfishers Bridge. The Speckled Wood *Pararge aegena* was restricted in Cambridgeshire to the Breckland margins around Kentford until the mid-1980s. It is now frequent in the woodlands and large gardens over much of the county. The Ringlet *Aphantopus hyperantus* has likewise spread into the woodland glades and rides in Cambridgeshire. Both species were first recorded in the Plantation at Kingfishers Bridge in 2002.

The Wall *Lasiommata megera* has been subject to considerable fluctuations inland in southern Britain. It suffered a marked decline from the late 1980s until about 1997 (Asher *et al* 2001). Two adults were discovered on the Peat Heaps at Kingfishers Bridge in August 1997.

As elsewhere in many parts of southern Britain, 2003 was one of the better years for the Painted Lady *Vanessa cardui*. By late summer both fresh immigrants and ones that had bred from earlier arrivals were present at Kingfishers Bridge. At least 40 adults where observed sheltering between the banks of a path leading up to a hide on the shore of the lake on 11 August that year.

Conclusions

This paper represents an interim report on Lepidoptera at Kingfishers Bridge, a site where a wetland has been created from intensive arable farmland in the Cambridgeshire Fens. Through the conversion only started over the winter of 1995/96 there is already evidence of rapid colonisation by moths of broadleaf plantation and reedbed habitats. This has been facilitated by the close proximity of Wicken Fen, a biodiversity-rich reserve three km away. This particularly applies to a number of moths associated with reedbeds which appear now to be breeding in the Reedbed. The long disused limestone quarries now flooded and invaded by scrub, together with overgrown hedges have provided reservoirs from which species associated with woodland have been able to colonise the young plantations. There are groups of moths, particularly among the ‘micros’ and clearwings, which offer considerable scope for more focused recording. There are also other habitats such as the poplar plantation and old willows which deserve attention.

This study adds encouraging substance to the evidence provided by much more intensive bird recording at Kingfishers Bridge of the value of recreating semi-natural habitats on farmland. It may also provide a template for monitioring the changes that are taking place at other larger wetland restoration projects on Burwell Fen (National Trust) and at Needingworth on the River Ouse (Hanson and RSPB) in Cambridgeshire and the Great Fen at Woodwalton (English Nature).

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potential for inspired wildlife conservation. This has been aided greatly by the skill and experience of Roger Beecroft in planning, engineering and managing wetlands. I have been privileged to be allowed to study aspects of the changing biodiversity at Kingfishers Bridge. I have valued the enthusiastic contribution to the moth recording by Ian Barton, Kathleen Rosewarne, and Bruce and Chris Martin.

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Management for diversity: the sedge and litter vegetation at Wicken Fen NNR in 2004

Owen Mountford, Adrian Colston and Martin Lester

Introduction

Wicken Fen is amongst the best known and most studied wetlands, certainly in the UK, and probably in Europe, with a remarkable list of nature conservation designations (Friday 1997). These designations require that the site and its features be managed to maintain, and where possible, enhance its biodiversity value. The vegetation of the Fen has been subject to a wide range of management techniques, some applied to maintain traditional practices and others developed to rehabilitate degraded habitats or to increase the diversity within the nature reserve. Management of the semi-natural fen communities was the focus of classic research by Sir Harry Godwin (Godwin 1929, 1941), and later by scientists directly involved in either the National Trust's Local Advisory Panel (LAP) or Local Management Committee (LMC) (Perring *et al.* 1964; Rowell 1983; Rowell *et al.* 1985). Not surprisingly, the greatest complexity of régimes has been applied to the herbaceous communities of the Fen, notably to the sedge (*Cladium mariscus*), litter (dominated by *Molinia caerulea*) and tall-herb

mixed-fen of Sedge and Verrall's Fens (Friday and Harvey 1997; Wicken Fen LMC 1997).

By the end of the 20th century, the management plan for Wicken Fen was about 150 pages long, and some compartments (even relatively small areas) had as many as five distinct régimes applied (Wicken Fen LMC 1997). Such complexity was intended to meet two primary aims:

- To maintain as full a range of fenland communities as possible on the site; but also
- To provide experimental testing of management techniques.

The National Trust marked the centenary of its involvement at Wicken Fen by launching its "100 year Vision", and between 1993 and the present, significant new blocks of arable land were purchased by the Trust and works begun to restore wetland habitats (Colston 2003). In 2004/5, the management plan for the Fen was due for revision and it was clear that, with the new land holdings, the next plan could be an even weightier tome. The LMC decided that the time was ripe to take stock, and make some assessment of how effective different management practices had been in realising nature conservation goals. At the same time, the Wicken LAP was partially replaced by the Recording and Research Group, whose rôle is to stimulate and coordinate investigations on the Fen. There is thus real impetus to increase the detailed knowledge of wildlife communities on the Trust's property resulting in a group of volunteers conducting a vegetation survey of Sedge and Verrall's Fens in 2004, whose objectives were to:

- Characterise the herbaceous vegetation types in terms of the *National Vegetation Classification* (*NVC*: Rodwell 1991-2000),
- Both between and within individual compartments, distribute sampling to assess the impact of different management practices.

This effort was complemented by other survey and research activity on the Trust's land:

I. Jennie Blood-Smyth (National Trust volunteer) conducted an annual survey of the changing flora on the Trust's new holdings (Blood-Smyth 2004).
II. Rachael Mason (Anglia Polytechnic University) studied the impact of horse grazing on the recovery of cleared carr (Mason, *in prep*.).
III. Frank Swain (Cranfield University) investigated the relationship between water-régime and vegetation development on restored wetland (Swain 2004).

The present paper provides a summary description of the *NVC* vegetation types observed in 2004 within the great majority of compartments on Sedge, Verrall's and Little Breed Fens. No attempt was made to survey the surviving carr, and separate surveys of the ditches and droves are planned for 2005 and beyond.

Scope, Methods and Analyses

All ten compartments were surveyed in Sedge Fen, as well as three compartments of Little Breed Fen that lie on the transition from peat to the mineral soils of the Wicken village ridge. Compartment 1 at the southwest extremity of Verrall's Fen was omitted from the survey, but compartments 2-5 were included (*n.b.* compartment numbers follow those mapped by Friday 1997 p. 284). Work took place between 22nd May and 4th July 2004 with six different surveyors, but with the LMC Botanical Secretary (Owen Mountford) present on all occasions.

For each compartment, the approach taken attempted to achieve complete spatial coverage:

1) Make a reconnaissance of the whole compartment, and delineate any distinct areas of vegetation, omitting carr from the survey and taking account of management history (Wicken LMC 1997).
2) Within each distinct vegetation area, distribute five quadrats randomly, other than that no quadrat should be within 4m of the margin of the compartment.
3) Quadrat size $16m^2$, except in drier grassland and where intensive management produced a shorter sward, when a $4m^2$ quadrat was employed.
4) For each quadrat, identify all vascular plant species and all bryophytes, assessing the abundance of each in terms of the Domin scale. Record the extent of bare ground and standing water using the same scale.
5) Using a hand-held GPS, record the location of each quadrat as a 12-figure grid reference *i.e*. theoretically to an accuracy of 1m.
6) Record the management history and any evidence of management, taking particular note of mowing, carr-clearance and grazing.

The preliminary analyses reported here used the Tablefit procedure (Hill 1996) to allocate individual quadrats to the closest *NVC* type, followed by checking through the published *NVC* vegetation keys. These steps were repeated using frequency data derived from all the quadrats recorded in a distinct vegetation area (or compartment). Only where Tablefit goodness-of-fit values were at least 50, and preferably >70, was the vegetation allocated to an *NVC* type. Where the goodness-of-fit values are lower, the results are reported here, but no confidence should be attached to the classification of the vegetation. Future analyses of the data will assess the vegetation composition against a series of management variables, and where possible compare the composition in 2004 against that reported in earlier studies.

Results – the pattern in 2004

Table 1 summarises both the vegetation types found in each compartment or distinct area within a compartment, and the prevailing management régime since 1990. Where goodness-of-fit to a particular *NVC* type is poor, this is indicated.

Table 1: Verrall's, Sedge and Little Breed Fens: summary of management *ca* 1990-2000 and *NVC* types identified through Tablefit in 2004 (results with low goodness-of-fit only given where no samples achieved high goodness-of-fit values).

Compartment Name& number	*Management*	*NVC* communities	
		High goodness-of-fit	Low goodness-of-fit
Verrall's 2	Horses access throughout 1) Carr cleared 2004 2) Annual mowing & cleared in autumn 3) Annual mowing & cuttings removed	1) (none) 2) **M13a** and **S24** 3) **M22a/d**, **S24/c/g** and **S25c**	1) (**S24**, **S25c**, **W2a**)
Verrall's 3	Horses access throughout 1) Burnt 1980, cut for sedge early summer once every 3 years 2) Litter cut once every 2 years	1) **S24g** and **S25c** 2) **M24a**	
Verrall's 4	Horses access throughout 1) Carr cleared 2003 (small plot cleared 1981 & mown once every 2-3 years since then) 2) Burned & bushed out in 1981	1) (none) 2) **S24/c** and **S25a**	1) **S24c** (and **OV28a**)
Verrall's 5	Horses access throughout 1) Mown for litter once every 2 years 2) Mown for sedge once every 3 years 3) Carr cleared 2002 4) Carr cleared 2004	1) **M24a** 2) **S25c** 3) **S24c** (and **M13a**) 4) (none)	4) **M22** varied
Sedge 10	1) Mown for litter once every 2 years 2) Carr cleared 1980s & cut annually (but the season varies)	1) **M24/a** (and **M13a**) 2) **S25a** in west; **M22d** & **S24c** in east; **M24a** by drove	
Sedge 11	Field in SE corner cut for litter 2 years out of three	**S24c** (and **M24a**)	
Sedge 12	Most of field cut for litter 2 years out of three (but 3 régimes present)	**M13a** (uncut margins tend to **S25c**)	
Sedge 13	Most of recorded field cut every 2 years (but 3 régimes present)	**S24c**	
Sedge 14	Most of recorded field cut every 2 years (but 4 régimes present)	**S24c** (and **M22d** where cutting more frequent)	
Sedge 15	1) Nn. part cut once every 2-3 years 2) Southern part cut one year in four	1) **S25/c** (& **S6** or **S24f**) 2) **S24** (and **S25**)	
Sedge 16	Carr cleared in 1990s Rest cut for litter one year in two	**S24c**	
Sedge 17	Cut for sedge one year in every three	**S24c** (and **M24a**)	

Table 1 (continued)

Compartment Name& number	Management	*NVC* communities	
		High goodness-of-fit	Low goodness-of-fit
Sedge 18	Mostly cut one year in 3, but parts one years in 2	**S25c** and **S24c**	
Sedge 19	1) Cut annually in July and baled 2) Cut once every 2-4 years (buck-rake) 3) Carr cleared 1999 and thence uncut	1) **M22d** (and **S25a**, with **S6** in gullies) 2) **S24c/g** 3) **S25/a** (and **S24**)	
Little Breed 20	Cut for litter every year and baled	**MG9** (but varied)	**M1** where drier and **M22c** where moister
Little Breed 21	Cut for litter in autumn every year	**MG1** (but only fair fit)	
Little Breed 22	Cut for hay in July every year	1) **MG1/a** in higher lying drier parts 2) (None)	2) **M22d** (and **S24c**) in lower-lying moist parts

Key to *NVC* types listed in Table 1:

M13a *Schoenus nigricans-Juncus subnodulosus* mire – *Festuca rubra-Juncus acutiflorus* sub-community
M22 *Juncus subnodulosus-Cirsium palustre* fen-meadow (not allotted to a sub-community)
- **M22a** Typical sub-community
- **M22c** *Carex elata* sub-community
- **M22d** *Iris pseudacorus* sub-community

M24 *Molinia caerulea-Cirsium dissectum* fen-meadow (not allotted to a sub-community)
- **M24a** *Eupatorium cannabinum* sub-community

MG1 *Arrhenatherum elatius* grassland (not allotted to a sub-community)
- **MG1a** *Festuca rubra* sub-community

MG9 *Holcus lanatus-Deschampsia cespitosa* grassland (not allotted to a sub-community)
OV28a *Agrostis stolonifera-Ranunculus repens* community – *Persicaria hydropiper-Rorippa sylvestris* sub-community
S6 *Carex riparia* swamp
S24 *Phragmites australis-Peucedanum palustre* tall-herb fen (not allotted to a sub-community)
- **S24c** *Symphytum officinale* sub-community
- **S24f** *Schoenus nigricans* sub-community
- **S24g** *Myrica gale* sub-community

S25 *Phragmites australis-Eupatorium cannabinum* tall-herb fen (not allotted to a sub-community)
- **S25a** *Phragmites australis* sub-community
- **S25c** *Cladium mariscus* sub-community

W2a *Salix cinerea-Betula pubescens-Phragmites australis* woodland – *Alnus glutinosa-Filipendula ulmaria* sub-community

Vegetation and management at Wicken Fen

From Table 1, one can further summarise the management régimes under which five key fen communities occurred at Wicken in 2004, and how these compare with published studies on their habitat requirements, focussing especially on those studies that are at least partly Wicken-based (Godwin 1941; Friday and Harvey 1997; Lock *et al.* 1997; Rodwell 1991-2000; Rowell 1983; Rowell *et al.* 1985; Wheeler *et al.* 2004):

- **M13a** *Schoenus nigricans-Juncus subnodulosus* mire is confined to compartments and especially drove margins that are frequently cut (usually in late summer to autumn) – cut annually, two years in three or one year in two. The goodness-of-fit values for this community are very high despite the absence of *Schoenus* itself, which has been extinct on the Fen for at least 30 years (Mountford *et al*. 2000). **Published studies**: although some sub-communities occur in natural situations, **M13a** is normally found under annual summer mowing, and occasionally light episodic grazing or burning. This sub-community is transitional to fen-meadows such as **M24**.
- **M22** *Juncus subnodulosus-Cirsium palustre* fen-meadow shows no pattern between the three sub-communities observed at Wicken, all of which strongly prefer annual cutting in late summer. **Published studies**: although found in sites with some grazing, the classic extensive examples of this community are found under annual summer mowing. The **M22c/d** sub-communities are probably derived from **S24**/**S25** through mowing.
- **M24** *Molinia caerulea-Cirsium dissectum* fen-meadow is almost entirely represented by the **M24a** sub-community, though some stands cannot be ascribed to a sub-community. This litter meadow is cut rather less frequently, with the most extensive stands being in compartments that are mown in late summer once every two years. However, good **M24** also occurs under an annual cut and in compartments cut two years out of three, as well as where mowing frequency is only once every three years. **Published studies**: **M24** is a secondary vegetation type with no natural analogues that depends on frequent (often annual) mowing. The early studies of Godwin (1941) showed how frequency and timing of mowing deflected the succession, and that annual cutting between July and October would produce a *Molinietum*. This régime is especially widespread at Wicken along the drove margins. The **M24a** sub-community represents a variant of the fen-meadow that is more closely related to tall-herb fens (**S24**/**S25**).
- **S24** *Phragmites australis-Peucedanum palustre* tall-herb rich fen is largely represented at Wicken by the **S24c** *Symphytum* sub-community, though goodness-of-fit values for the *Schoenus* and *Myrica* sub-communities (and that of the undifferentiated community) were often little different. Although somewhat commoner under a biennial summer cut (May-October), representative stands of this community were also identified at mowing frequencies varying from annual to one year in four, and all intermediates. **Published studies**: This tall-herb fen is completely artificial, produced either by the clearance of carr or the management (normally cutting) of partly-drained swamp. Management maintains species richness, and variants of this community that are rich in *Cladium* were managed at Wicken and elsewhere for thatching, with a historical frequency of one cut every four years. The timing of such sedge-field cutting altered during the 20th century – Godwin (1941)

advocated winter cutting, but the work of Rowell (1983) showed that a summer cut (May-August) was much more effective in maintaining the *Cladium*. The sub-communities at Wicken tend to be those of drier peat and mown fens, and **S24c** in particular is often symptomatic of disturbed sites, though this is less pronounced at Wicken. It seems apparent that **S24** vegetation can develop in situations where the management is complex and varies from year to year.

- **S25** *Phragmites australis-Eupatorium cannabinum* tall-herb fen exists under the full range of cutting frequencies from annual to as much as one year in five, though it appears rather more extensive under less frequent mowing *i.e.* once in every three to five years. **Published studies**: In contrast to **S24** tall-herb fen, this community is usually associated with sites that are not liable to cutting or grazing, and is most typical in wetter sites where there has been some nutrient enrichment.

Of the less extensive vegetation types, the mesotrophic grasslands (**MG1** and **MG9**) exist under the same régime as **M13** and **M22**, but they occur in situations with clearly different soil type and drainage (Little Breed Fen). Presence of *Carex riparia* swamp (**S6**) is also determined by hydrology, being found under similar mowing régimes to tall-herb fen but where micro-topography results in standing water remaining well into early summer.

The management régimes listed in Table 1 were applied up to 2000, and in most cases had been established since before 1980. After 2000, much of the Trust's management effort on Sedge and Verrall's Fens was devoted to carr clearance, and some mowing régimes went into abeyance in the next three to four years, except for sedge-fields where previous régimes were strictly maintained. Carr clearance finished in the winter of 2004/5. Where carr used to occur, the present vegetation cannot as yet be satisfactorily classified, although there are very tentative indications that tall-herb fen (especially **S24** but also **S25**) may be developing, possibly in the manner that tall-herb fen originally arose on cleared carr (Rodwell 1991-200; Wheeler *et al.* 2004). Post-clearance management by horse-grazing (Verrall's Fen) or mowing (Sedge Fen) has largely prevented reversion to carr, though a few areas do retain some relationship to **W2** woodland.

Management for the future at Wicken Fen

The objectives of management at Wicken and the methods used are many (Lock *et al*. 1997). In the past 25 years, régimes have become increasingly influenced both by scientific research (Rowell 1983) and by the aims of national and international designation. Under the EU Habitats Directive (92/43/EEC), the presence of *Molinia* meadows on calcareous, peaty or clayey-silt laden soils led to designation as an SAC (Special Area of Conservation), hence requiring targeted management of this feature at Wicken.

The management requirements of such biodiversity features were superimposed upon both experimental approaches and traditional practices

resulting in a very detailed management plan, with much spatial and temporal complexity (Lock *et al*. 1997 – see maps on pp. 233 and 237). Such complexity might prove unwieldy when maintenance management has to give way to rehabilitation management through carr clearance. It was in this context that the *NVC* survey was assessed. Clearly, management through defoliation (clearance, mowing and grazing) is not the only factor that shapes the vegetation communities at Wicken. The most important *NVC* types on the site are also greatly influenced by soil type, and especially by hydrology (Rodwell 1991-2000). Recent research with fens in East Anglia has further characterised and quantified the water-régime requirements of the mires, fen-meadows and tall-herb fens found at Wicken, notably **M13**, **M24** and **S24** (Wheeler *et al*. 2004).

With all such considerations, it is possible to make a preliminary assessment of the need to maintain the present variety of cutting régimes at Wicken Fen. The results of the 2004 *NVC* survey and a review of the literature suggest that the management of Sedge and Verrall's Fens could be simplified to two, flexibly-applied cutting régimes:

I. Annual late-summer mowing for fen-meadows and mires (**M13a**, **M22** and **M24**) to be practised in those compartments where these communities are still extensive, and also along the broad drove margins. The evidence is that these communities will tolerate some irregularity and indeed some variants might thrive in such conditions *e.g.* where other management imperatives lead to parts of the target area being unmown for a season.

II. The sedge fields and compartments with tall-herb fen (**S24** and **S25**) could be cut one year in three during the summer. As with the fen-meadow (litter) areas, occasional enforced or accidental variation in this régime would not be a problem, with cutting frequencies varying from one in two to one in five (or possibly even more) years apparently being tolerated by established tall-herb vegetation.

This simplification of the management plan for cutting has clear operational benefits, and the evidence is that there would be no penalties in terms of reduced vegetation diversity. However, other fundamental environmental factors affect the fen communities and will require management action. Of real immediate concern are the water-supply to Sedge and Verrall's Fens as well as its quality (McCartney *et al*. 2000; Harding *et al.* 2005), but there is also recent evidence of the marked spread of nitrophilous lichens in the fen (Alan Silverside *pers. comm*..), which may reflect a growing problem with fertiliser drift or increased atmospheric inputs from general pollution. Eco-hydrology and nutrient status will play an increasing rôle in adapting the Wicken Fen management plan to a changing environment.

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Ground beetle succession and the conservation status of High Fen (Kingfisher's Bridge)

Brown, P.M.J. and Doberski, J.

Introduction

High Fen (also known as Kingfisher's Bridge) is a 65 ha site by the river Cam, three kilometres from Wicken Fen, Cambridgeshire (TL545755) (Doberski & Lyle, 2002). The site was intensively farmed until the mid 1990s, when the owner decided to convert the arable land into a fenland nature reserve. The intention of the owner is to manage the reserve actively to maximise wildlife by creating a diverse range of wetland habitats (Tomkins, 1998). The reserve provides a mosaic of habitats, primarily wet meadow (accounting for approximately 25% of total site area), reedbed (~17%), open water (~15%) and drier areas of exposed Corallian limestone. There is also a 1 ha fen litter field. The reserve is bordered on three sides by a belt of trees.

The progress of the change from intensively managed field to nature reserve has been documented (see Tomkins, 1998 & 1999). The current paper refers specifically to changes in ground beetle (Coleoptera: Carabidae) assemblages at High Fen and is an update of reports by Doberski & Lyle (2002) and White (2002) which covered the first five years of recording.

Several key questions are addressed in the paper.

- Has the ground beetle assemblage at High Fen stabilised after seven years of fenland regeneration, or is it still in a state of flux?
- Does the site support a significantly more diverse species assemblage than surrounding agricultural land?
- Are the carabid species present now more typical of wetland areas?
- Does the site now have a higher conservation 'value'?

The carabid assemblage data may be used as a tool to assess the success of management techniques at the High Fen reserve. Because of their sensitivity to environmental variation and fast response to habitat change, carabids are considered good indicators for predicting and assessing the effect of management practices (Magura et al, 2000). It has been suggested that the diverse ecological role of carabids (as predators, prey, herbivores and scavengers) makes it reasonable to extrapolate from the ground beetle diversity to the invertebrate diversity as a whole (Blake et al, 2003).

Method

After the initial three years of recording, further surveys of ground beetles were undertaken at year 5 and year 7. Pitfall traps were set in the same six areas of the site (A to F) used in earlier surveys. A seventh site (G) in a neighbouring cereal field was added in years 5 and 7 to allow comparison of the reserve data with a typical arable site. At each site six

pitfall traps were set in a 2x3 grid at 1m spacing. The traps were left open for one week per month from July to October. Vegetation at each site was recorded as the percentage cover per plant species given for the whole 2 m^2 area bounded by the six traps. Further details of method can be found in Doberski & Lyle (2002).

Results

Vegetation

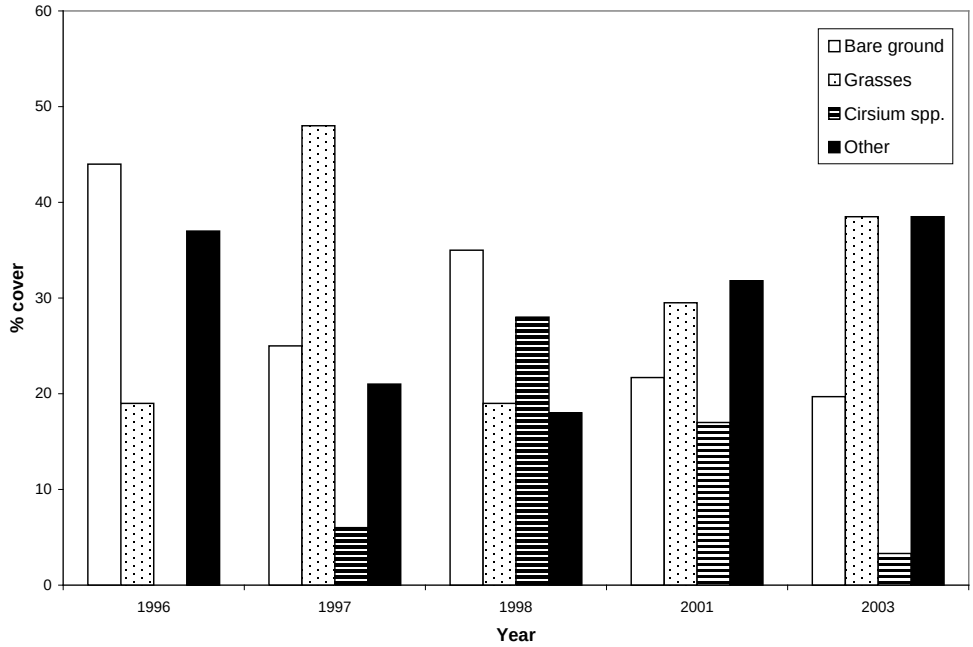

Figure 1 – Overall mean percentage cover of main vegetation types and bare ground from 1996 to 2003 at sites A to F.

Figure 1 shows that there was a general downward trend in bare ground and general upward trends in grasses and 'other' vegetation from 1996 to 2003. Thistles (*Cirsium* species) are shown separately from 'other' vegetation as they were particularly abundant in 1998 but have subsequently declined. 'Other' vegetation in 1996 was dominated by only two species, Cleavers (*Galium aparine*) and Mayweed (*Tripleurospermum inodorum*) accounting for 79% of the total 'other' category in that year. The dominance of grasses in 1997 is partly due to chance in the re-positioning of traps at site B due to varying water levels of the lake.

Key features of each site are as follows:

Site A is dominated by grasses and is relatively dry.

Site B is at the south edge of the lake. Because of varying water levels of the lake and encroaching vegetation, the trap positioning has changed from the muddy 'beach' to amongst the vegetation fringing the lake. This may have

affected catches at this site and makes direct comparison between years subject to a margin of error.

Site C is quite close to the south-east corner of the lake, but higher than site B and quite dry. Tall vegetation (approximately 1 m high) dominated this site in 2003. Grasses and willowherb had become dominant at the expense of thistle which dominated earlier.

Site D is the driest and least vegetated site, situated on elevated and exposed Corallian limestone. Vegetation is patchy and short, but has developed slowly over the years from exposed limestone rubble.

Site E is on a sandy shore by the eastern edge of the lake, with sparse vegetation including grasses and mosses.

Site F is on the northern edge of the reserve. It is planted with young deciduous trees and is relatively shaded and damp, with tall vegetation present such as grasses and nettles.

Site G is on the edge of a nearby cereal field and should be fairly typical of the carabid assemblage present prior to the fenland recreation. In 2001 traps were placed completely within the cereal field but were destroyed at harvest. Because of this, in 2003 three of the traps were dug just inside the crop area, with the other three on a grassy margin around the field.

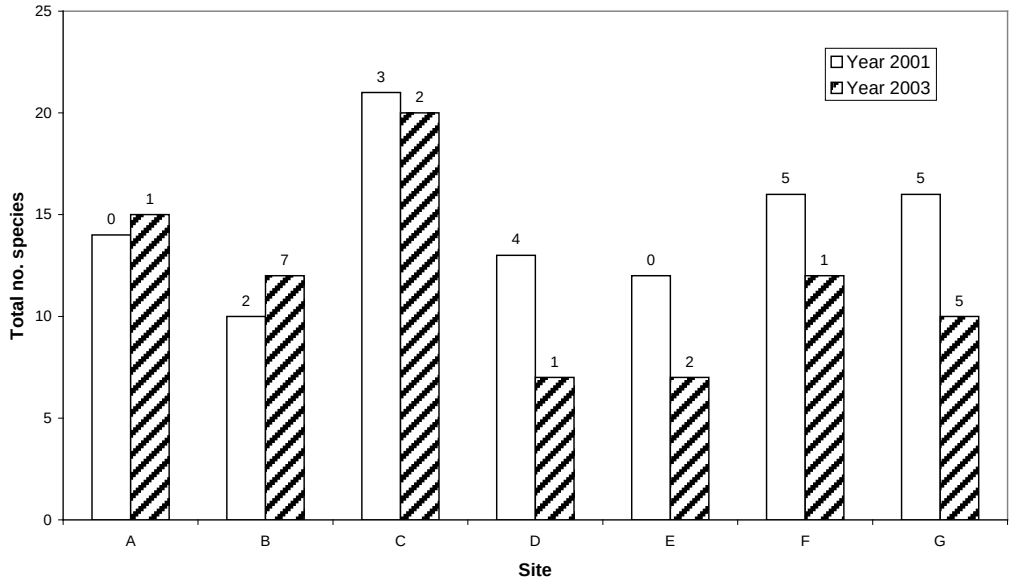

Figure 2 – Number of carabid species trapped and number of unique species at each High Fen site (A to G) in 2001 and 2003. Figures above bars are number of species unique to that site in that year.

Carabid species richness

Overall, site C had the highest species richness in both of the last two surveys, with 21 species being trapped in 2001 (**Figure 2**). Sites D and E declined markedly in species richness between 2001 and 2003, leaving them the least species-rich sites with 7 species each. Sites F and G also decreased in species richness between 2001 and 2003, while sites A and B showed a small increase. Figure 2 also shows that sites B and G had the most distinct species assemblages in 2003, with a high proportion of their species unique to their site. While site G did not change in this regard, with five unique species in each of the last two surveys, site B experienced a large increase, from two unique species in 2001 to seven in 2003.

Carabid species diversity

Table 1 - Comparison of species diversity of sites from 1996 to 2003. The rank is based on the mean ranking of three different diversity indices (Simpson's unbiased, Shannon's and Brillouin's – see Magurran, 2004) where the smaller number indicates higher rank and greater diversity.

	Diversity Rank				
Site	1996	1997	1998	2001	2003
A	4	5	1	2	2
B	1	1	3	6	3
C	6	3	6	1	1
D	5	2	4	5	4
E	3	4	2	3	5
F	2	6	5	4	6

Table 1 shows that site C, followed by site A, had the highest species diversity in both 2001 and 2003. Site C had a major increase in diversity rank from the early years of the study, when it was among the sites with lowest diversity. The diversity rank of B (the wettest site) has substantially increased since 2001, returning it to its earlier status as one of the sites with highest diversity. Site E has had a major decline in diversity rank and in 2003 was ranked only 5, as opposed to 3 in 2001 and 2 in 1998. Site G is excluded from Table 1 as there is only data for it for 2001 and 2003. However, if it was included it would be ranked 4 (out of 7) in both of these years.

Carabid species assemblages

The total number of species trapped reached a maximum of 50 in 1998 and has subsequently declined from 38 in 2001 to 35 in 2003. The community still appears to be in a state of flux with species continuing to be ‘gained’ and ‘lost’, although part of this change may be due to sampling effects. Note also the variation in sampling interval.

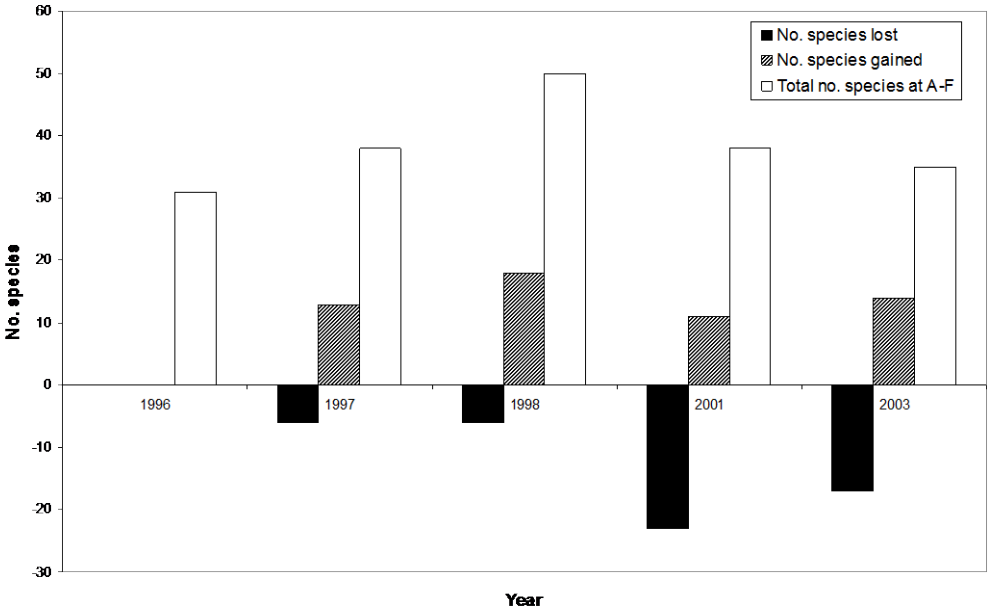

Figure 3 – Total number of species trapped, number of species gained and number of species lost since previous survey, at High Fen sites A to F for all survey years (1996 to 2003).

Table 2 - Top 10 ranking carabid species of each survey with associated habitat types (differentially shaded to indicate wet, intermediate and dry habitat preferences).

		Rank of total A-F catch *				
Species	Wet/ Intermediate/ Dry habitat species	1996	1997	1998	2001	2003
Pterostichus melanarius	I	3	1	1	1	1
Agonum moestum	W	-	-	-	9	2
Pterostichus niger	I	-	-	2	2	3
Bembidion properans	I	-	-	-	-	4
Agonum obscurum	W	-	-	-	8	5
Pterostichus cupreus	I	=8	-	8	5	6
Trechus quadristriatus	D	2	5	7	3	7
Pterostichus strenuus	W	-	-	-	4	=8
Amara aulica	I	-	8	10	7	=8
Pterostichus versicolor	W	-	-	-	-	=10
Loricera pilicornis	W	-	6	-	-	=10
Elaphrus cupreus	W	-	-	-	6	-
Trechus obtusus	D	-	-	-	10	-
Bembidion lampros	I	5	10	3	-	-
Harpalus rufipes	I	7	2	4	-	-
Nebria brevicollis	I	-	7	5	-	-

Calathus fuscipes	I	=8	3	6	-	-
Elaphrus riparius	W	-	9	9	-	-
Amara similata/ ovata	I	4	4	-	-	-
Amara bifrons	D	1	-	-	-	-
Amara eurynota	I	6	-	-	-	-
Amara apricaria	D	10	-	-	-	-

* e.g. Rank 1 is allocated to the species with highest number of individuals caught in that year at High Fen sites A to F.

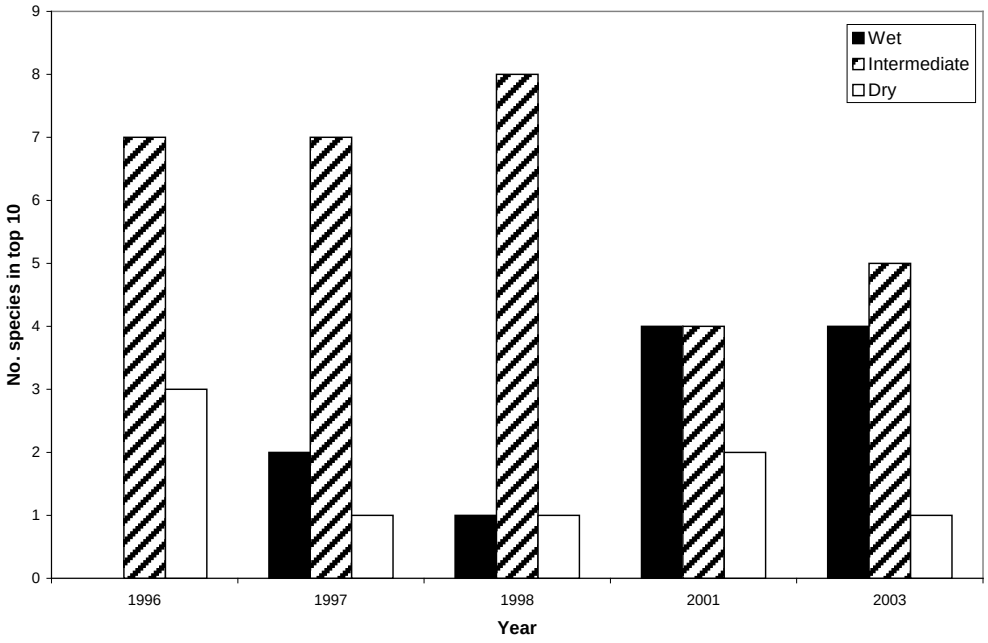

Figure 4 – Top 10 ranking carabid species of each year at High Fen sites A to F grouped by habitat preference. Rankings are calculated from total catch size each year at sites A to F.

Table 2 and **Figure 4** show the top ten highest catch species each year and their habitat preferences. While changes between 2001 and 2003 were fairly small, there was a big shift during the three years between 1998 and 2001, with a decline in intermediate habitat species and an increase in wet habitat species.

Species scoring

In order to make a quantitative assessment of the changing conservation value of the reserve based on the carabid species assemblages, we have devised a scoring system. It is based on rarity of the species in this part of England, and their association with wetland habitat.

Rarity score

Ground beetle distribution data in Luff (1998) were used to assess the rarity of each species. Only the four 100 km squares broadly equating with 'East Anglia' shown in Figure 5 were considered, as these encompass a climatic and topographic region broadly similar to that at the High Fen reserve. The

total number of records (dots within 10 km squares) were summed for each species and found to vary between 2 and 110. Species were allocated to one of eleven 10-dot classes (i.e. 1 to 10 dots, 11 to 20 dots, etc). A score was then assigned to each group, with 11 points for the rarest group (i.e. 1 to 10 dots) and 1 point for the commonest (i.e. 101 to 110 dots).

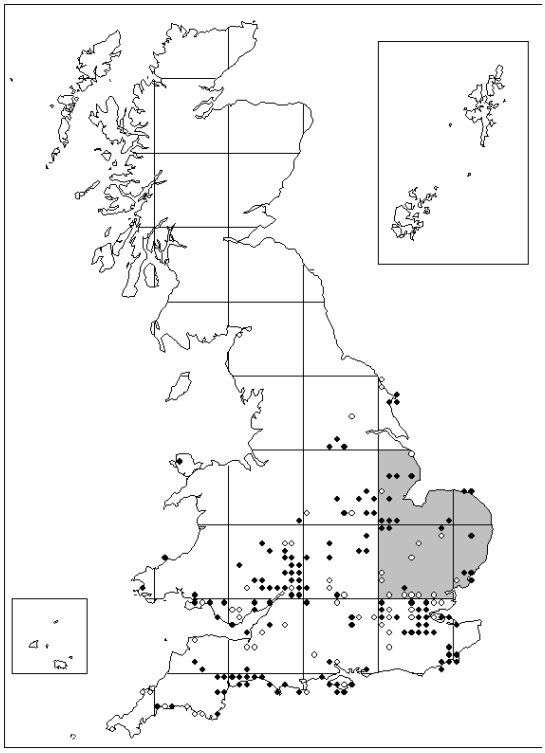

Figure 5 – Example carabid species distribution map adapted from Luff (1998). Species shown is *Chlaenius vestitus.* The four 100 km squares considered for our Rarity score calculations are shaded. Dots represent post-1970 records and circles represent pre-1970 records. Map reproduced with kind permission of Biological Records Centre, CEH Monks Wood.

Habitat score

Species typical of dry and intermediate habitats were assigned 1 point. Since the High Fen reserve is primarily aiming to recreate a wetland habitat, species typical of wetlands should carry more weight in the scoring, so those with a known preference for moist or wet habitats were assigned 3 points.

Overall species score

A total score for each species in each year was calculated as follows –

No. of individuals trapped X Rarity score for species X Habitat score for species

Example 1 - *Chlaenius nigricornis*

2 individuals of this Nationally Scarce wetland species were trapped, making the score for this species in 2003 -

2 (No. trapped) **X 11** (Rarity score) **X 3** (Habitat score) **= 66**

Example 2 - *Trechus quadristriatus*
12 individuals of this common dry habitat species were trapped, making the score for this species in 2003 -
12 (No. trapped) **X 2** (Rarity score) **X 1** (Habitat score) **= 24**

Table 3 - Summary of carabid numbers trapped each year and overall species scores. Site G (arable field) is shown separately as there are only data for it for 2001 and 2003.

	1996 A-F	1997 A-F	1998 A-F	2001 A-F	2001 G	2003 A-F	2003 G
Total no. trapped	597	1431	822	341	178	372	93
Total species score	4488	10130	6033	3415	1002	4682	412
Mean species score per beetle	7.5	7.1	7.3	10.0	5.6	12.6	4.4

In order to make comparisons, the total species scores were calculated for sites A to F for each year, with scores for site G calculated separately for the two years with data (i.e. 2001 and 2003). Because of the very high number of carabids trapped in 1997 (around four times that of 2001 or 2003), this year has the highest total species score. However, this is primarily a result of very high catches of some common species such as *Pterostichus melanarius* (408 individuals scoring a total of 2040 points for that species alone!).

To make a direct comparison independent of catch size, the total species scores for each year were divided by the total catch number for that year. Table 3 shows that the mean species score varied little from 1996 to 1998, but from then there are sharp increases in 2001 and 2003. This is a result of a greater proportion of wetland species and/ or rarer species in the 2001 and 2003 catches. In contrast, the mean figures for site G are the lowest.

Appendix 1 gives the full detail of all species trapped.

Notable species
Wet/ moist habitat species
Figure 6 shows that three of the species with a preference for wet or moist habitats have had increasing catch size, with only one species (*Elaphrus riparius*) showing decreasing catch size since 1997.

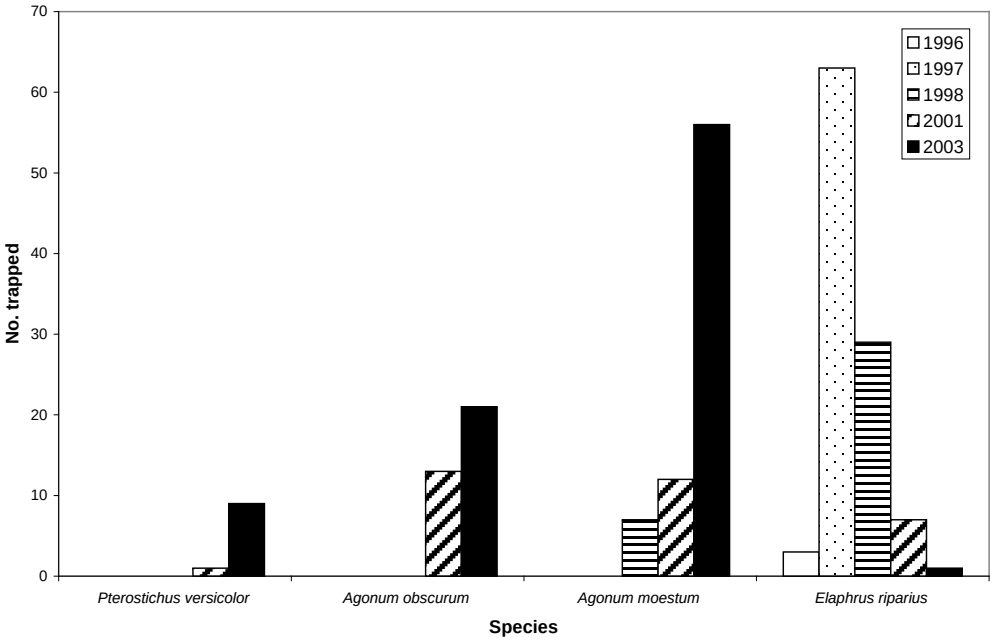

Figure 6 – Total catch size per year of notable wet/ moist habitat species trapped at High Fen sites A to F from 1996 to 2003.

Dry habitat species

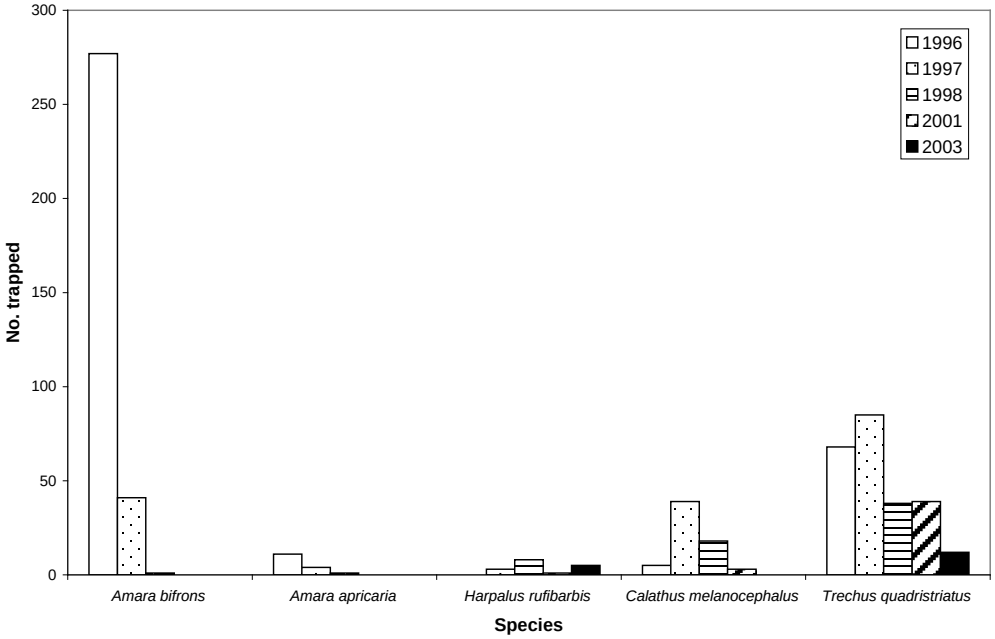

Figure 7 – Total catch size per year of notable dry habitat species trapped at High Fen sites A to F from 1996 to 2003.

Figure 7 shows a decline in catch size of the species with a preference for dry habitats, with four of the five species showing a clear downward trend in recent years.

Spatial dynamics

There was found to be a statistically significant (negative) correlation between 2003 carabid species richness and percentage bare ground at each site. See Figure 8.

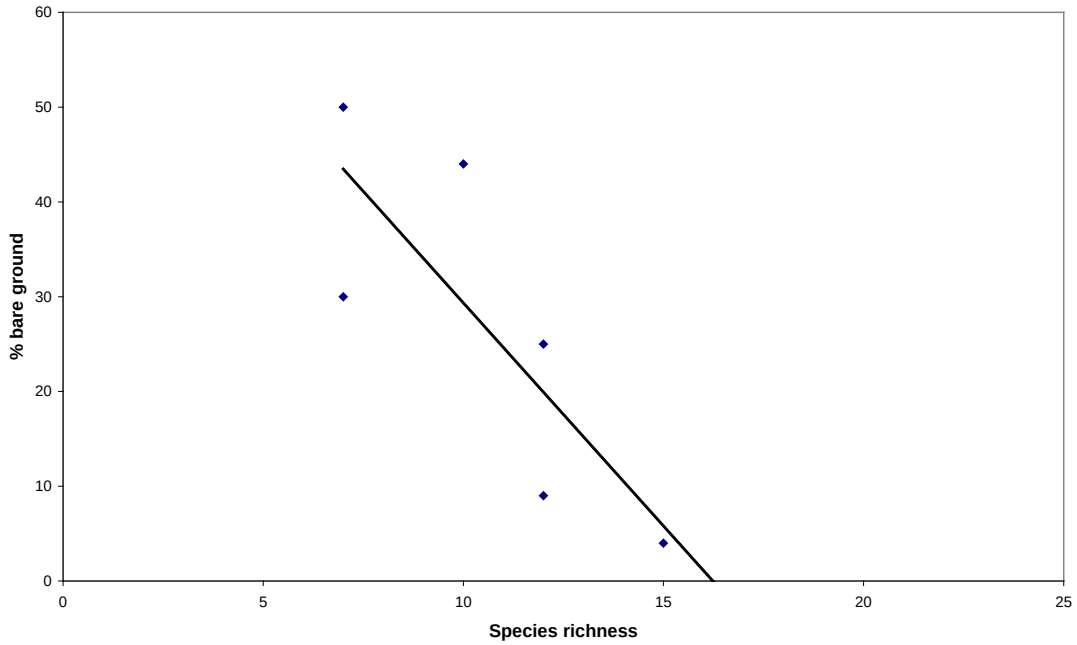

Figure 8 – Correlation between carabid species richness (total number of species) and bare ground at each of sites A to G in 2003. ($P < 0.01$, Spearman's non-parametric test of correlation.)

Discussion

Species richness/ diversity

Increased species richness or diversity is not necessarily a positive feature for a developing nature reserve. Sieren & Fischer (2002) found lower carabid species richness on an important isolated dry grassland nature reserve than in the surrounding agricultural land. However, the species found on the agricultural land tended to be more generalist and of lower conservation value, whereas those on the reserve were more specialist and of higher conservation value. The same can be said of the High Fen carabids. Site G (arable field) has quite high species richness and diversity, but most of the species are eurytopic and typical of arable land. Hence the species scoring system was developed, to give more weight to rarer and/ or wetland species, allowing the conservation value of the reserve in terms of carabids to be compared over the years.

Species assemblages

Figure 3 suggests that the number of carabid species at the site may be settling in the mid 30s. The species assemblage, while still clearly in a state of flux (illustrated by the significant species gains and losses from 2001 to

2003) seems to be stabilising to some extent, with smaller differences between gains and losses than in the past. But clearly, as the habitats at the reserve mature, it seems likely that new species will continue to move in at the expense of some of the early-mid succession species. The data suggest that the overall species count has declined from a peak, perhaps due to a greater uniformity and stability of habitat type.

Figure 4 indicates that more of the dominant types are now wetland species, with lessening numbers of dry and intermediate species in the top ten dominant species. In 1996, unsurprisingly, none of the top 10 species were associated with wet habitats, but by 2001 and 2003, four of the top 10 were. This helps to confirm the changing status of the land from dry arable land to wetland nature reserve.

Notable species

Wet/ moist habitat species (see Figure 6)

Pterostichus versicolor was first trapped in 2001 (only one individual trapped) and appears to be establishing itself, with 9 individuals trapped in 2003 (all but one caught at site A). It is not a true wetland species, being found in varying types of open fields, but has some association with water (Lindroth, 1974). It is much more common in the wetter, westerly parts of Britain, and is only recorded in four 10 km squares in this area, putting it among the rarer ground beetle species in East Anglia.

Catches of *Agonum obscurum* and especially *A. moestum* are increasing and they are now the two most abundant wet habitat species at the reserve, the majority being found at site B. Both were also caught at sites A, C & F (with *A. obscurum* also found at D). Whilst they are not rare species, it is encouraging that the newly formed wetland habitat has encouraged colonisation by these species.

Catches of the riparian species *Elaphrus riparius* have been in steep decline since 1997 (63 trapped), with only one individual trapped in 2003. The decline may be explained by the diminishing amount of bare ground which the species favours (Luff, 1998), as the vegetation develops (especially at site B).

The Nationally Scarce species *Dyschirius nitidus* is mainly found in coastal saltmarshes (Luff, 1998) and has few records anywhere in Britain. As such it was an exciting species to find, although with only one individual caught (for the first time in 2003) it may be that it is not established at the reserve, with the possibility that this was a transient individual (the species can fly). It will be interesting to see if the species is present at the next survey.

Pterostichus gracilis is another Nationally Scarce species recorded at the reserve for the first time in 2003. The lake edge habitat at site B, where it was trapped, is typical for the species, so it may have a good chance of becoming established.

Dry habitat species (see Figure 7)

Four *Amara* species *(A. eurynota, A. aenea, A. apricaria* and *A. bifrons)* found between 1996 and 1998 were not trapped in 2001 and have not reappeared in 2003. Two further species *(A. similata* and *A. plebeja)* appear to have been displaced, being present in 2001 but not trapped in 2003. *A. aulica* is still present but its decline since 1997 has continued, but may be slowing. The only *Amara* species whose catch numbers have increased (though total catch is still small) are *A. communis* and the much more common *A. familiaris.* This can be explained by their greater tolerance of wetter conditions (especially *A. communis*) than most *Amara* species, which tend to be xerophilous. It is not surprising that *Amara* species were strong early colonists at the reserve, liking open ground with only short vegetation (Lindroth, 1974) and being effective fliers (Doberski & Lyle, 1997). Despite being unusual amongst carabids in that they eat plant material (Doberski & Lyle, 1997), it seems that the site is now generally too well vegetated and wet for most *Amara* species.

Calathus melanocephalus was prominent in 1997 and present in small numbers until 2001, but was not trapped in 2003. The very common species *Trechus quadristriatus* (typically associated with arable fields) is still present, but in much smaller numbers than in the past. The habitat at the reserve is evidently becoming too wet and vegetated for these two xerophilous species. The only other xerophilous species with a catch size of 5 or more in 2003 is *Harpalus rufibarbis.*

Spatial dynamics

The spatial dynamics of carabids is important when considering their colonisation of new habitats and subsequent distribution. Generally, distribution patterns arise from a complex interaction of edaphic, physical, anthropogenic (habitat management etc) and ecological factors (Thomas et al, 2001).

Bare ground may deter some species, but there is generally an inverse relationship between numbers of carabids trapped in pitfalls and vegetation complexity (Holmes et al, 1993). The complexity of the vegetation at High Fen is increasing. This is presumably leading to increased variation in microhabitats for carabids and other invertebrates. It may also have an effect in terms of trappability of carabids. Some species are likely to be more active on barer areas, with reduced activity in more complex vegetation where it may be harder to move around. This is evident in the High Fen data; as succession of the vegetation has advanced, fewer carabids have been trapped. Although not implying cause, the negative correlation found between species richness and percentage bare ground at High Fen (see Figure 8), tends to confirm this interpretation and was also present in 2001.

Fragmented fenland: is High Fen large enough?

It has been shown that the number of specialist species increases in fragmented habitats with increasing fragment size (Niemela, 2001). Dispersal of such habitat specialists may be enhanced by the maintenance of connectivity e.g. linear water features. Niemela (2001) states that the minimum size of patch that maintains an intact assemblage of interior carabids, is at least tens of hectares. At 65 ha, the High Fen reserve should be large enough if it were all of a similar habitat type. However, the habitat mosaic that has been created makes areas of similar habitat much smaller than the suggested minimum.

An indication that a habitat patch is suitable and large enough for long-term persistence of populations, (or close enough to other patches to be re-colonised even by poor dispersers), is given by the presence of habitat specialists with poor dispersal ability (Niemela, 2001). Three *Agonum* species fall into this category. The macropterous *A. moestum* colonised in 1998 and seems to be thriving (see Figure 6). Brachypterous species *A. obscurum* and *A. fuliginosum* presumably colonised High Fen by walking and were first trapped in 2001 and 2003 respectively. It is these moist/ wet habitat species with poor dispersal that suggest success for High Fen. The ditches and streams close to High Fen may be the main source of brachypterous wetland species, while Wicken Fen may be an important source of wetland species which can fly.

Temporal dynamics

In a major long-term study for the UK Environmental Change Network, there were found to be strong year to year fluctuations in the proportions of carabid species trapped, and a high proportion of species were observed only sporadically (Scott & Anderson, 2003). High Fen data conforms to these trends. Since many species are sensitive to temperature changes (Scott & Anderson, 2003), there are also likely to be significant changes in carabid abundance in general between years. The large variations in catch totals at High Fen may partly be due to this, but are probably also a reflection of successional changes and sampling effects.

Species scoring

On the basis of the scoring system used, this reserve is increasing in conservation value in terms of wetland carabid species (see Table 3). The reserve clearly has a higher conservation value for this group than the surrounding arable land (i.e. site G).

Conclusion

Our results suggest that after seven years of fenland regeneration, the carabid assemblage at High Fen has started to stabilise to some extent, but is still in a state of flux. Three of the reserve sites support higher species diversity than the agricultural control site, but the other three have lower diversity. However, the reserve supports a number of relatively uncommon species and an increasing proportion of total catch are wet or moist habitat species.

The conservation value of the reserve appears to be improving for carabids in particular, and possibly for the invertebrate fauna in general. The data suggests that the recreation scheme is a success and that with careful management the habitat may continue to improve in conservation terms as it matures. Proximity to Wicken Fen, the river Cam and the system of existing drainage ditches around the reserve may be a positive factor for ground beetle colonisation and high diversity at High Fen.

The variety of habitats at the reserve may prove to be a weak point if each provides insufficient area of any habitat type to sustain long-term populations of species. It is unclear whether this will be an issue for particular carabid species.

Acknowledgments

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Appendix 1 – Total of each carabid species trapped at High Fen, sites A to G from 1996 to 2003

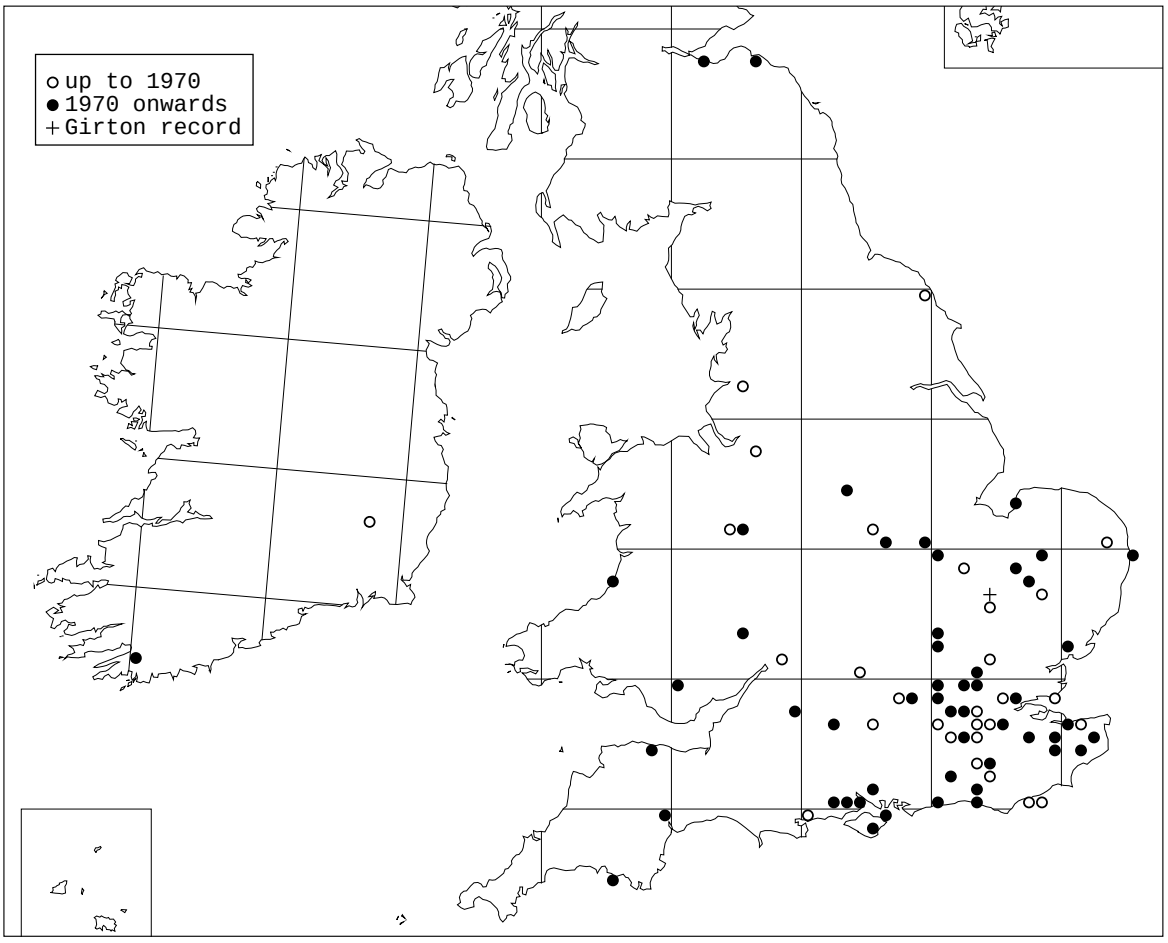
Species	**1996**	**1997**	**1998**	**2001**	**2001**	**2003**	**2003**
	A-F	A-F	A-F	A-F	G	A-F	G
Acupalpus meridianus	0	0	1	0	0	0	0
Agonum albipes	0	0	0	0	0	1	0
Agonum dorsale	0	3	0	0	1	0	0
Agonum fuliginosum	0	0	0	0	0	3	0
Agonum marginatum	1	1	5	0	0	0	0
Agonum moestum	0	0	7	12	0	56	0
Agonum obscurum	0	0	0	13	0	21	0
Amara aenea	1	2	9	0	0	0	0
Amara apricaria	11	4	1	0	0	0	0
Amara aulica	3	77	23	14	2	10	0
Amara bifrons	277	41	1	0	0	0	0
Amara communis	0	0	1	3	0	6	0
Amara convexiuscula	4	1	0	0	0	0	0
Amara eurynota	17	53	6	0	0	0	0
Amara familiaris	0	1	2	0	0	6	0
Amara plebeja	6	0	1	2	1	0	0
Amara similata/ovata	44	96	6	1	0	0	0
Anisodactylus binotatus	0	4	10	0	0	0	0
Asaphidon flavipes	0	0	0	0	1	0	0
Badister bipustulatus	0	0	0	0	0	3	0
Bembidion articulatum	0	0	1	0	0	0	0
Bembidion assimile	0	0	1	0	0	5	0
Bembidion biguttatum	0	0	0	2	0	0	0
Bembidion genei	1	1	1	0	0	0	0

Bembidion lampros	31	58	85	6	5	5	0
Bembidion lunulatum	0	2	0	1	0	0	0
Bembidion obtusum	2	4	8	5	0	5	0
Bembidion properans	0	0	0	0	0	29	0
Bembidion quadrimaculatum	0	0	1	0	1	0	1
Bembidion tetracolum	0	1	0	0	0	0	0
Bembidion varium	1	0	0	0	0	0	0
Blethisa multipunctata	0	0	2	0	0	0	0
Bradycellus harpalinus	0	1	2	0	0	0	0
Bradycellus sharpi	0	1	0	0	0	0	0
Bradycellus verbasci	5	11	4	4	0	0	0
Calathus fuscipes	14	105	44	7	18	0	12
Calathus melanocephalus	5	39	18	3	3	0	0
Chlaenius nigricornis	0	0	3	4	0	2	0
Chlaenius vestitus	4	5	2	0	0	2	0
Clivina fossor	1	0	0	3	0	0	0
Cychrus caraboides	0	1	1	0	0	0	0
Dromius linearis	0	0	1	0	0	0	0
Dyschirius aeneus	0	0	2	0	0	1	0
Dyschirius luedersi	1	1	2	1	0	0	0
Dyschirius nitidus	0	0	0	0	0	1	0
Elaphrus cupreus	0	13	5	18	0	8	0
Elaphrus riparius	3	63	29	7	0	1	0
Harpalus affinis	0	3	2	0	5	1	2
Harpalus ardosiacus	1	0	0	0	0	0	0
Harpalus rubripes	0	0	2	0	0	0	0
Harpalus rufibarbis	0	3	8	1	0	5	0
Harpalus rufipes	16	145	65	9	31	5	7
Harpalus tardus	0	0	1	0	0	0	0
Leistus ferrugineus	1	0	0	5	0	0	0
Leistus fulvibarbis	0	0	0	0	0	1	0
Leistus rufescens	0	0	0	1	0	1	0
Leistus spinibarbis	0	1	0	1	0	0	0
Loricera pilicornis	1	84	15	1	11	9	2
Metabletus truncatellus	2	0	1	0	0	1	0
Microlestes maurus	0	0	0	0	0	0	4
Nebria brevicollis	9	80	51	3	0	0	0
Notiophilus biguttatus	4	10	22	4	0	0	0
Notiophilus germinyi	0	0	0	0	0	4	0
Pterostichus cupreus	14	12	34	20	17	17	2
Pterostichus gracilis	0	0	0	0	0	2	0
Pterostichus madidus	0	0	0	0	17	0	34
Pterostichus melanarius	48	408	185	60	62	94	28
Pterostichus niger	1	7	91	41	2	31	0
Pterostichus nigrita	0	0	13	6	0	0	0
Pterostichus strenuus	0	0	4	21	0	10	0
Pterostichus vernalis	0	0	0	3	0	2	0
Pterostichus versicolor	0	0	0	1	0	9	0
Stenolophus mixtus	0	4	1	1	0	3	0
Stomis pumicatus	0	0	0	7	0	0	1
Trechus micros	0	0	1	1	0	0	0
Trechus obtusus	0	0	3	10	0	0	0
Trechus quadristriatus	68	85	38	39	1	12	0
Total	**597**	**1431**	**822**	**341**	**178**	**372**	**93**

A rare pseudoscorpion in Cambridge

Alex Sparks

In June 2004 I was being pestered by an erratic fly in my Girton home, which I crushed between two of my father's CDs (*Bob Marley and the Wailers Live* and *Standing in the Shadows of Motown*). From its crushed and broken corpse crawled a tiny but impressive creature with enormous (for its size) 'claws' that must have been piggy-backing on the fly. The creature was later identified by Gerald Legg as a species of pseudoscorpion known as the Compost Chernes (*Pselaphochernes scorpioides*).This appears to be the first record for Cambridgeshire for 40 years, the last being a record from the Botanic Garden dated 20 July 1964. The species appears to be rare, though is probably more widespread than the map suggests, reflecting, in part, a lack of recording effort and its tiny size (1.5 – 2.0mm).



Distribution map of *Pselaphochernes scorpioides* produced by the Biological Records Centre, CEH Monks Wood from data supplied by the Pseudoscorpion Recording Scheme

Song Thrushes and Snowdrops: some thoughts on nature recording.

Max Walters

I write this note on a mild winter's day when we can all relax a little and enjoy a temperature of more than 10° C (50° F). There is an impressive dawn chorus every morning, with the characteristic repetitive song of the Song Thrush very clear in our front garden. The thrush song, normally in my experience beginning with the first lengthening of the day in early January, started this year in the first week of December: other records confirm this observation as being widespread and quite unusual. So it makes a good starting point for a little discussion of 'good' and 'bad' records which we, individually and collectively, may contribute to scientific knowledge.

If the early thrush song is a 'good' record, we have only to turn to the pages of newspaper correspondents to find 'bad' records. These arise from carelessness or ignorance, and most obviously concern the early flowering of favourite garden plants. It is manifestly 'bad' recording to say "Snowdrops are in flower already" in December without recording which type of snowdrop is being recorded. A surprisingly large number of people do not know that nowadays our gardens exhibit a whole range of different snowdrops – species of the genus *Galanthus* and variants, and hybrids selected from these. Some of these, particularly *G. reginae-olgae*, are naturally autumn flowerers, usually flowering in October or early November. Others, for example *G. elwesii*, often flower before Christmas. In fact it is quite a late snowdrop year this winter – but you can't tell from many comments in the media.

Keeping a Nature Diary of interesting observation is, of course, a traditional occupation of many English people, from the famous 18th century naturalist Gilbert White onwards. We now have the formal title of Phenology to grace studies of the comparative times of bird-song, adult butterfly appearance, wild and garden flowers etc.. But these phenological studies cannot be respectable unless they are comparing the same things. On the whole we can say that bird and butterfly records are likely to be 'good' whilst many flowering plant records are not. Botany is still a rather neglected area, and there is much ignorance, even amongst those who should, we feel, know better.

So the answer seems to be – be careful, you botanists and gardeners, to make sure that your phenological records make sense by only comparing like with like.

Space for People: Targeting action for woodland access

Tim Sparks

The above is a document published late in 2004 by the Woodland Trust emphasising the importance of recreational space, specifically woodland, for human wellbeing. It contains some interesting statistics on accessibility of woodland to people in Cambridgeshire which is summarised below. Two targets are envisaged; allowing access to 2+ ha woodland within 500m, and to 20+ ha woodland within 4 km. The proportions of the population meetings these targets, the proportions if all woodland were accessible, and the areas of new woodland creation needed to meet these targets are presented.

Not surprisingly, Cambridgeshire compares poorly with England as a whole with only 20% of the population living with 4km of an accessible 20+ ha wood compared with 55%. Within the borough and district councils, less accessibility (presumably less woodland) is available in East Cambs and, particularly, Fenland.

	England	Cambs	Cambridge	East Cambs	Fenland	Hunts	South Cambs
% population with access to 2+ ha wood within 500m	10.2	2.2	0.1	2.6	0.2	2.5	4.9
% population with access to 20+ ha wood within 4 km	55.2	20.0	20.0	4.4	0.0	30.2	29.2
% population within 500m of 2+ ha wood	36.3	19.5	25.0	16.5	4.4	14.1	32.7
% population within 4km of 20+ ha wood	81.9	46.4	37.1	34.2	0.0	72.5	59.6
Woodland creation needed (ha) to meet target for 2+ ha wood		1055	75	187	157	268	368
Woodland creation needed (ha) to meet target for 20+ ha wood		910	20	200	240	220	260

The Flora of Walls and Buildings in the Isle of Ely

R.M. Payne

Introduction

The Isle of Ely, which was of course an administrative entity in its own right for well over 1000 years before being absorbed into Cambridgeshire in the mid-20th century, comprises the northern, mainly fenland, part of the county (v.c. 29), extending as far south as the parishes of Sutton, Haddenham, Wilburton and Stretham. It contains six towns, in order of size Wisbech, March, Ely, Whittlesey, Chatteris and Littleport and, compared with the southern part of Cambridgeshire, a relatively small number of scattered villages.

During the six years 1999 – 2004 vascular plants growing on walls and roofs in every part of the Isle were recorded. Over 750 sites were visited, most of them several times. A previous study in this field (Payne 2000) had made me realize that from a plant's point of view some other man-made structures afford the same sort of habitat as roofs and walls, and the present survey therefore includes also stone ledgers and other elevated structures in old cemeteries, platforms of railway stations and the masonry of canal locks and sluices (treated as retaining walls). A rather different habitat, but essentially a man-made one, is the subterranean area partly visible beneath street gratings: this habitat can perhaps be regarded as a retaining wall below ground level, and it was in fact the subject of a short paper in a previous issue of this journal (Belcher and Swale 1994).

The selection of sites for inclusion in the survey was often a matter of accessibility, but where there was a choice of walls or other structures in a small area, those with a relatively rich flora were chosen, so as to obtain as large a sample as possible of the species colonising such habitats in that part of the county.

Needless to say, every site recorded had at least one plant rooted in it during some part of the survey period, but it was not unusual to find, on a second or later visit, that the structure had been repaired or even demolished, with the partial or total loss of its botanical interest. A site, for the purposes of this survey, might be a church, a churchyard wall, an isolated war-time pillbox in a field, the abutments of a railway bridge, an old graveyard with a number of flat-topped table tombs, a barn in a farmyard, or a row of walls of homogenous construction in an urban street. It was often a matter of judgement to decide whether to lump together as a single site similar structures in close proximity.

Only plants apparently rooted in the wall or on the structure were recorded; so, for example, Ivy (*Hedera helix*) or Bramble (*Rubus* spp) covering a wall or a low building but clearly growing up from the ground would not be included.

Darlington, in his study of the ecology of walls (1981), states that while Ivy is usually rooted in soil near the foot of a wall, it can become established in crevices or on the top without making contact with the ground. He goes on to say that leafy branches secured to wall faces by their adventitious roots sometimes persist for years, and continue to increase in biomass after being separated from their rootstock in the ground.

The principal practical difficulty in a survey of walls and buildings is that of identifying at a distance plants that cannot be reached. This difficulty is all the greater because, as Segal emphasizes in his classic work on wall vegetation (1969), plants growing on walls often remain sterile, so that identifications which require flowers or fruit cannot be made. Some plants, of course, never get beyond the early seedling stage in such a hostile habitat: a good example is afforded by the huge numbers of Sycamore (*Acer pseudoplatanus*) seedlings which can often be seen in roof guttering in March and April, only to die off soon afterwards. However, it is perhaps surprising that a high proportion of the 299 species recorded in this survey were seen in flower in at least one site at one time or another. Most of the non-flowering species were tree or shrub seedlings. But even when flowering, specimens of e.g. Willow-herb (*Epilobium* spp.) or perennial Meadow-grass (*Poa* spp.) high up in roof guttering cannot be named with certainty even with the aid of field-glasses. It must be accepted, therefore, that some species will have been under-recorded in this survey.

On the other hand, common species which flower throughout the year, or which are easily determined at a great distance, may figure higher in the frequency tables below than their relative abundance really justifies. Examples of the first category are Annual Meadow-grass (*Poa annua*) and Groundsel (*Senecio vulgaris*), while the ubiquitous Butterfly-bush (*Buddleja davidii*) is perhaps the best example of the second category. This plant is also easily identifiable at a very early stage.

The complete data from which this paper was compiled are being deposited with the B.S.B.I. recorder for VC29.

Nomenclature of plants, and the sequence of plant families in the Appendix, follow Stace (1999), but in a few cases a more familiar name has been added in brackets.

Comparative Frequency of Species

Upwards of 850 species of plants have been recorded on walls in Great Britain at some time or other, and my studies of wall flora over the past 25 years have convinced me that apart from purely aquatic species almost every British plant may be found on a wall sooner or later!

A complete list of the 299 species seen during this survey is given in the Appendix. Because of the disparate sizes of the recording units, and because with so many and widely scattered sites it was inevitable that some had more

visits than others, it would be ingenuous to suppose that precise numbers of records of each species would be meaningful: the Appendix therefore indicates only relative frequency in percentage bands.

It should be made clear at this stage that none of the figures in this paper has any reference to the number of times the species were seen at sites; they merely indicate that the species was recorded at least once during the six years. Nor has account been taken of the numbers of individual plants at any site (except in the section on ferns), or of the extent of physical coverage of the walls or roofs.

So what species do we find most frequently in these man-made habitats in the Isle of Ely? Only 20 species occurred in more than 10% of the 754 sites, and of these by far the most abundant and widespread was Annual Meadow-grass (*Poa annua*), which was seen in 35% of the sites. The top 20 species are listed below, in order of frequency, with the percentage of sites where they occurred.

1.	*Poa annua*	Annual Meadow-grass	35%
2.	*Taraxacum* agg.	Dandelion	26%
3.	*Buddleja davidii*	Butterfly-bush	25%
4.	*Urtica dioica*	Stinging Nettle	)
5.	*Cardamine hirsuta*	Hairy Bitter-cress	)
6.	*Sambucus nigra*	Elder	)20% - 22%
7.	*Cymbalaria muralis*	Ivy-leaved Toadflax	)
8.	*Senecio vulgaris*	Groundsel	)
9.	*Sonchus oleraceus*	Smooth Sow-thistle	)15% - 21%
10.	*Hedera helix*	Ivy	)
11.	*Galium aparine*	Goosegrass	)
12.	*Pseudofumaria lutea*	Yellow Corydalis	)
13.	*Acer pseudo-platanus*	Sycamore	)
14.	*Stellaria media*	Chickweed	) 12% - 14%
15.	*Sonchus asper*	Prickly Sow-thistle	)
16.	*Dryopteris filix-mas*	Male Fern	)
17.	*Epilobium tetragonum*	Square-stalked Willow-herb	)
18.	*Antirrhinum majus*	Snapdragon	)
19.	*Lamium album*	White Dead-nettle	) 10.2% - 11%
20	*Sedum acre*	Biting Stonecrop	)

To emphasize how a comparatively small number of species dominate the flora of these man-made sites, it is to be noted that 98 species (a third of the total number) were seen in only a single site, and a further 40 in only two sites.

Plants on Walls

Walls (including the walls of buildings) constituted by far the major part of this survey, a total of 608 out of the 754 sites covered. As expected, therefore, the commonest species were, in the main, those already listed above for the survey as a whole. However, within the top three, *Buddleja* headed the list for walls, marginally commoner than Dandelion (*Taraxacum* agg.) and *Poa annua*.

For our purposes, walls are of two kinds, free-standing or retaining. Retaining walls (73 out of the 608) may be expected to support a more luxuriant flora since, being backed by a mass of earth, they will retain moisture and nutrients to a greater extent than free-standing walls. Moreover, they may afford a habitat for plants already well established in the earth backing the wall to spread across and take root in the wall-top. The tops of retaining walls covered with an appreciable depth of soil were, however, not included in the survey, since their flora could scarcely be distinguished from that of the adjoining field or wood.

A distinctive class of retaining walls are those rising from canals, dykes or other stretches of water, where the lower part of the wall is permanently submerged. The following species were only found on such walls:-

Carex otrubae	False Fox-sedge	1 site
Conium maculatum	Hemlock	1 site
Lycopus europaeus	Gipsywort	2 sites
Myosotis laxa	Tufted Forget-me-not	1 site
Persicaria amphibia	Amphibious Bistort	1 site
Phragmites australis	Common Reed	1 site *
Rumex conglomeratus	Clustered Dock	3 sites
Rumex hydrolapathum	Water Dock	1 site
Salix caprea	Goat Willow	4 sites

* A single vegetative shoot was growing out of a small hole in the vertical concrete side of a bridge over a ditch in Laddus Fen, c. 1 foot above the water level.

Excluding water walls, the following species were found solely or mainly on retaining walls:-

Arctium minus	Lesser Burdock	sole site
Calystegia sepium	Hedge Bindweed	2 out of 3 sites
Convolvulus arvensis	Field Bindweed	6 out of 11 sites
Equisetum arvense	Field Horsetail	sole site
Galium verum	Lady's Bedstraw	sole site
Heracleum sphondylium	Hogweed	5 out of 6 sites
Lepidium draba	Hoary Cress	sole site
Phleum bertolonii	Smaller Cat's Tail	its only 2 sites
Trifolium dubium	Lesser Trefoil	its only 4 sites
Trifolium pratense	Red Clover	sole site
Trisetum flavescens	Yellow Oat-grass	2 out of 3 sites
Vicia sativa segetalis	Common Vetch	sole site

A high proportion of the walls included in the survey, particularly in urban areas, were garden walls, but to reduce the chance of recording deliberate plantings by gardeners, only the outside (i.e. non-garden) faces of such walls were surveyed.

Plants on Roofs

The vascular flora of British roofs was the subject of a previous paper (Payne *op. cit.*), but in the Isle of Ely the principal difference between roof and wall floras lies in the comparative frequency of two plant genera *Sedum* and *Saxifraga*. The following lists of the 10 commonest wall and roof species seen during the survey illustrate this difference:-

Walls (608 sites)

Buddleja davidii	Butterfly-bush	29.1% of sites
Taraxacum agg.	Dandelion	28.8%
Poa annua	Annual Meadow-grass	28.6%
Urtica dioica	Stinging Nettle	25.3%
Cymbalaria muralis	Ivy-leaved Toadflax	24.7%
Cardamine hirsuta	Hairy Bitter-cress	23.2%
Sambucus nigra	Elder	21.2%
Sonchus oleraceus	Smooth Sow-thistle	20.9%
Senecio vulgaris	Groundsel	18.4%
Hedera helix	Ivy	18.4%

Roofs (110 sites)

Saxifraga tridactylites	Rue-leaved Saxifrage	23% *
Sedum acre	Biting Stonecrop	19% *
Poa annua	Annual Meadow-grass	16%
Buddleja davidii	Butterfly-bush	15%
Senecio vulgaris	Groundsel	13%
Sedum album	White Stonecrop	11% *
Sambucus nigra	Elder	8%
Stellaria media	Chickweed	8%
Cymbalaria muralis	Ivy-leaved Toadflax	6%
Taraxacum agg.	Dandelion	6%

* on walls, the frequency of these three species was 7%, 5% and 1.5% respectively.

Roof gutters show a different pattern again. Out of 172 sites the following 10 species were the commonest in this habitat:-

Poa annua	Annual Meadow-grass	47%
Sedum acre	Biting Stonecrop	23%
Senecio vulgaris	Groundsel	17%
Acer pseudoplatanus	Sycamore	13%
Epilobium hirsutum	Hairy Willow-herb	9.3%
Sambucus nigra	Elder	9.3%
Sedum album	White Stonecrop	8.7%
Stellaria media	Chickweed	8.7%
Buddleja davidii	Butterfly-bush	7.6%
Saxifraga tridactylites	Rue-leaved Saxifrage	7.6%

Proportion of Alien Plants

Species regarded as aliens, (i.e. originally introduced by man) in the British flora (Kent 1992) constitute 31% of the 299 species recorded during this survey. The great majority of these are garden plants whose seeds have got on to walls or roofs by one of the methods of dispersal mentioned later in this paper; but amongst the 30 commonest aliens are two which surely have never been cultivated in local gardens, Canadian Fleabane (*Conyza canadensis*) and Oxford Ragwort (*Senecio squalidus*).

Pillboxes

Pillboxes and similar defensive structures dating from the Second World War are a sufficiently distinctive habitat to warrant a specific mention in this paper. By definition they will not have been disturbed, cleaned, renovated etc. for at least 60 years. Physically they are unique in having flat roofs made of very thick concrete (usually at least 12 inches). There is also the practical advantage to the botanist that they are low enough to be fully accessible, so that every plant growing on them can be identified!

Many local pillboxes, particularly those situated in woods, are smothered in Ivy (rooted in the ground), to the extent that no other plants are present. Others could not be reached, being on the far side of a wide dyke or in the midst of a growing crop. But 30 of them were both accessible and supported at least one species, rooted either in cracks in the concrete, in patches of moss or, much more often, in the mainly brick side-walls.

Almost all surviving pillboxes in the Isle of Ely are in rural areas, often beside dykes and generally well away from habitations. So it is not surprising that almost all the plants found on them are native species, and indeed of the 63 species recorded from pillboxes only five are aliens, and none of these occurred in more than 2 sites. This is in marked contradiction to the overall pattern, in which, as mentioned above, the alien element of the flora of man-made structures is four times greater (31% compared with 8%). In order of frequency, the commonest species on pillboxes were Stinging Nettle (*Urtica dioica*), False

Oat-grass (*Arrhenatherum elatius*), Cock's-foot (*Dactylis glomerata*), White Dead-nettle (*Lamium album*), Barren Brome-grass (*Anisantha sterilis*), Rough Meadow-grass (*Poa trivialis*) and Dandelion.

Other Habitats

The list of plants found on stone ledgers etc. in 18 old graveyards added only three species to the overall list, single plants of Hornbeam (*Carpinus betulus*) (a seedling), Perforate St. John's-wort (*Hypericum perforatum*) and Slender Speedwell (*Veronica filiformis*) (which had spread up from the mown grass).

A long-disused platform at March station supported 6 species not seen elsewhere during the survey: - Horse-radish (*Armoracia rusticana*), Traveller's Joy (*Clematis vitalba*), Bladder-senna (*Colutea arborescens*) (abundant in the station yard), Wild Carrot (*Daucus carota*), Hedgerow Crane's-bill (*Geranium pyrenaicum*) and Field Pansy (*Viola arvensis*).

Plants seen beneath street gratings are worth discussing more fully. In 1994 Belcher and Swale (*op.cit*.) drew attention to several species of vascular plants growing in drains in the parish of Girton, mainly in "quiet side-roads …. with houses built in the 1930s". During the present survey I recorded plants from this habitat in 92 roads throughout the Isle of Ely, and I can confirm that quiet 1930s type roads were the most productive.

It is often not possible to identify plants seen only dimly beneath these gratings, but nevertheless 39 species were recorded, of which the most frequent were Sycamore (32 sites), Hart's-tongue (*Phyllitis scolopendrium*) (12 sites), Male Fern (*Dryopteris filix-mas*) (10 sites) and Dandelion (10 sites). Interestingly, there is a 19th century record of Hart's-tongue being found "in a well at Ely" (Babington 1860). This is a well-known habitat for this fern throughout Britain (Page 1988) and it is fairly certain that the plant would have occurred in wells all over Cambridgeshire in earlier times. Sycamore seedlings are of course instantly recognizable, but in one site in March there were specimens up to 18 inches high protruding through the grating.

It is not surprising that Horse-chestnut (*Aesculus hippocastanum*) (3 sites, all more or less beneath adult trees) was not seen in any other habitat during the survey, since while the "conkers" can readily fall through a grating on the ground they are scarcely likely to find their way up on to a wall or roof!

Methods of Dispersal

Leaving aside the flora of drains, how did so many plants get up on to roofs and walls? The two major families of plants which together account for almost a quarter of the species recorded during this survey, Asteraceae (Compositae) and Poaceae (grasses), both have seeds predominantly dispersed by air currents. Another family which features prominently in the list is Rosaceae, which

contains many species with fruits attractive to birds, e.g. *Cotoneaster* and brambles. Grime *et al.* (1990) maintain that little is really known about the precise importance of particular vectors of dispersal: however, there is no doubt that the great majority of common weeds are dispersed either on the wind or by birds. There is evidence that of the 25 commonest wall plants in the Isle of Ely at least 20 owe their dispersal to one or other (or both) of these agencies. Ants are known to carry the seeds of Ivy-leaved Toadflax (*Cymbalaria muralis*), Wall Pellitory and Petty Spurge (*Euphorbia peplus*), plants which have attached to them structures called elaiosomes containing fatty or oily substances attractive as food to ants. Goosegrass (*Galium aparine*), which is an increasingly ubiquitous weed in the area, is spread mainly by its adhesive fruits that are readily carried to new sites by agents such as cats and trousers.

Some plants seen growing on walls almost always occur low down, not far from the ground, and these will often have got there by vegetative means. Brambles have arching stems which root at their tips into suitable crevices, and other plants which have procumbent rooting stems and can get on to walls in this way include Creeping Bent-grass (*Agrostis stolonifera*), Ground-ivy (*Glechoma hederacea*), Creeping Cinquefoil (*Potentilla reptans*) and several Wood-sorrels (*Oxalis* spp.).

Apart from the authorities already mentioned, botanists whose works have been consulted on the subject of dispersal include Ridley (1930), Woodall and Rossiter (1959) and Salisbury (1961).

Urban and Rural Species

As in West Norfolk (Payne 1998), some species appear to be predominantly urban and others predominantly rural in their distribution in the Isle of Ely. Of the 754 sites in the survey 431 were in the six towns and 323 in the villages and rural areas. If there were no “preference” one would therefore expect species to show roughly a 60/40 distribution between urban and rural records. Amongst the commonest species the most extreme example of an urban species is Rue-leaved Saxifrage (*Saxifraga tridactylites*), for which 46 of its 48 sites (96%) were in Ely, Wisbech and March, with no less than 37 (77%) in the inner (older) part of Ely. Other examples are Greater Celandine (*Chelidonium majus*) 83% in the towns (almost half in Ely), Purple Toadflax (*Linaria purpurea*) also 83%, Canadian Fleabane (*Conyza canadensis*) and Oxford Ragwort (*Senecio squalidus*) both 82%, Beaked Hawk’s-beard (*Crepis vesicaria*) 79%, Wall Pellitory (*Parietaria judaica*) 78% (mainly in Ely and Whittlesey) and Snapdragon (*Antirrhinum majus*) 76%. Among the less widespread species 7 out of 10 sites for Annual Mercury (*Mercurialis annua*) were in inner Ely (where it was also the commonest of all garden weeds in 2001 – 2002). It is remarkable that Ely also dominates the scene for the grasses *Poa compressa*, with no less

than 11 of the total of 13 wall sites, and *Catapodium rigidum* with 10 out of 13 sites.

Amongst the rural species, where with no preference we should expect a 40% proportion, False Oat-grass (*Arrhenatherum elatius*) has 83% away from the towns, Cock's-foot Grass (*Dactylis glomerata*) 81%, Yorkshire Fog (*Holcus lanatus*) 76%, Cow Parsley (*Anthriscus sylvestris*) 71%, Ribwort Plantain (*Plantago lanceolata*) 67%, White Dead-nettle (*Lamium album*) 64% and Common Ragwort (*Senecio jacobaea*) 62%.

Ferns

Particular attention was paid to ferns, and all previously recorded sites for the less common species in the Isle of Ely were followed up. During the survey 12 species were seen.

The commonest fern on man-made structures, by quite a big margin, was Male Fern (*Dryopteris filix-mas*), with 94 sites. Very widespread on walls, both in the towns and in rural areas, sites often contained only a single plant, and these were usually quite small. A favoured habitat (shared often by other fern species) was behind leaky down-pipes on walls of old buildings.

Hart's-tongue (60 sites) showed a different pattern. It very often grows in colonies and in some sites, as on the east-facing wall of Guyhirn church and on an old building in North Brink, Wisbech, there are huge clusters and some very large specimens. Page (*op.cit.*) says that this species is especially characteristic of retaining walls, but in the Isle of Ely it was only seen on four of the 73 retaining walls in the survey though, as indicated above, it was commonly seen beneath street gratings. Rather surprisingly, it occurred on only four churches.

The commonest of the Spleenworts is Wall Rue (*Asplenium ruta-muraria*) (11 sites during the survey, and a further eight dating from 1910 to 1990 where it could not be re-found). Of the 11 extant sites eight were on churches or churchyard walls. Hundreds of plants were seen in 2004 on the wall at Whittlesey referred to under the next species. Maidenhair Spleenwort (*Asplenium trichomanes*) was seen at eight sites, of which one was a church and one a churchyard wall, but it had apparently disappeared from eight older sites (including Ely Cathedral, where it was last recorded in the 19th century). The present site at Whittlesey, an old stone wall, was believed by Owen Mountford, when he discovered it in 1969, to contain probably the largest colony in Cambridgeshire. There is also a large colony (at least 20 plants) on a wall at Welney.

Black Spleenwort (*Asplenium adiantum-nigrum*) was discussed in detail by Walters (1969) in his paper on wall ferns in Cambridgeshire, in which he associated this species particularly with churches and railways. Since 1969, of course, a high proportion of railway structures in the county have disappeared, and indeed Murrow East station, where Graham Easy recorded all three

spleenworts in 1976 (and *trichomanes* as recently as 1990), has now been entirely destroyed to make room for a housing estate. Of the seven extant sites in the survey area which I have seen, by far the largest colony is on a Baptist churchyard wall in March, but only two other sites are ecclesiastical. A free-standing wall in Ely had some 25 plants when last visited in early 2004.

The very first record of Rustyback (*Ceterach officinalis*) in the Isle of Ely was made in the course of the present survey, when a very large colony (some 30 plants) of this little fern was found on the north-facing buttressed brick wall of an old barn on the extreme edge of Cambridgeshire. A second colony, of about 12 plants, was subsequently discovered in Whittlesey, on the stone wall already known for its huge populations of Wall Rue and Maidenhair Spleenwort

Both Cambridgeshire species of Polypody occur (rarely) in the Isle. *P. interjectum* was identified from four sites, a very large colony on the churchyard wall at Doddington and another in Wisbech with upwards of 20 plants, and single specimens on a wall in Ely and on a tiled roof at Wisbech St. Mary (originally recorded by Graham Easy). *P. vulgare* is on walls at Tydd St. Giles and in March, and another wall in March has a single Polypody plant which is inaccessible and so cannot be positively identified.

Broad Buckler-fern (*Dryopteris dilatata*) is not a typically wall fern, but was seen on three building walls and on one retaining wall, as well as beneath a street grating in Ely.

Bracken (*Pteridium aquilinum*) looks a very different plant on walls compared with its normal robust growth on heaths and in woodland. It is almost always very small and of delicate, almost lacy, appearance: in this state it can readily be confused with a small Lady Fern (*Athyrium filix-femina*). Only a single specimen was seen during the survey, on the wall of a building in Littleport, but there are earlier records from Ely (three sites, including the Cathedral), Wisbech church and March (St. Wendreda's church).

A single small plant of Lady Fern (*Athyrium filix-femina*) was seen on St. Wendreda's Church, March from 2002 to 2004, and two plants of Ribbon Fern (*Pteris cretica*) behind a down-pipe on Wisbech church in 2004: this is a common pot-plant and not infrequently establishes itself on damp building walls.

Tops and Sides of Walls

Previous papers on wall floras (Payne 1990, 1998) discussed plant preferences for tops or sides of walls, but in this survey, which covers structures with varying degrees of verticality (and even some vertical walls have horizontal ledges), no special attention was paid to this aspect of the subject. However, some very marked preferences could not escape notice.

The flat top of a wall receives more light and more rain, and accumulates more debris, which can lead to the formation of rudimentary soil. Fruits and

seeds evacuated by birds are likely to arrive on the top, not the sides. On the other hand, shade-loving plants are more likely to thrive on the vertical sides of walls, particularly those with a northerly aspect.

Species showing a strong preference for wall-tops included Whitlow-grass (*Erophila verna*) (100% of its sites), all *Cotoneaster* species (89%), Wall Speedwell (*Veronica arvensis*) (86%), Thale Cress (*Arabidopsis thaliana*I and Elder (both 71%). Species favouring the sides of walls and buildings included Wall Pellitory (87% of its sites), Ivy (81%), Yellow Corydalis (81%) and Ivy-leaved Speedwell (*Veronica hederifolia*) (67%), as well as every fern seen except for one or two Male Ferns and Polypodies.

Species not seen during the Survey

The following 16 species, which have been recorded at some time from man-made sites in the Isle of Ely, were not seen during this survey:-

Cotoneaster mairei	Maire's Cotoneaster	Haddenham	G.M.S. Easy , 1986
C. salicifolius	Willow-leaved Cotoneaster	Wisbech	A.C.Leslie, 1984
C. sternianus	Stern's Cotoneaster	Stuntney	A.C. Leslie, 2001
C. vilmorinianus	Vilmorin's Cotoneaster	Wisbech	A.C. Leslie, 2002
Dianthus caryophyllus	Clove Pink	Leverington and Elm	18th and 19th centuries
Erinus alpinus	Fairy Foxglove	Wisbech	R.C. Clarke, 1966
Erodium moschatum	Musk Stork's-bill	Wisbech	W. Skrimshire, 1818
Galium parisiense	Wall Bedstraw	Wisbech Ely	18th and 19th centuries J. Rishbeth, 1946
Petroselinum crispum	Garden Parsley	Ely	C.M. Lemann,1833
Physalis alkekengi	Japanese Lantern	Stuntney	A.C. Leslie, 2001
Polystichum aculeatum	Hard Shield-fern	Wisbech	R.C. Clarke, 1966
Sedum sexangulare	Tasteless Stonecrop	Tydd St. Giles Ely	W. Skrimshire, 1820 Pelham 1820
Senecio x *albescens*	a hybrid Ragwort	Ely	L. Jenyn 1823
Sisymbrium irio	London Rocket	Wisbech	W. Skrimshire, 1797
Seriphidium maritimum	Sea Wormwood	Wisbech	G.M.S. Easy 1993

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Appendix

Complete list of the species recorded during the survey, with an indication of their frequency, as follows:-

1	Seen in 20% to 35% of all sites	8 species
2	10% to 19%	12 species
3	5% to 9%	29 species
4	3% to 4.4%	17 species
5	2% to 2.9%	11 species
6	1% to 1.9%	29 species
7	Less than 1%	193 species

The following letters indicate habitats in which the species were seen:-

W on walls
R on roofs
G in roof guttering
D in drains, i.e. beneath street gratings

Where there is no indication of habitat, the species occurred only in one of the other habitats mentioned in this paper.

PTERIDOPHYTA		
Asplenium adiantum-nigrum	7	W
Asplenium ruta-muraria	6	W
Asplenium trichomanes	6	W
Athyrium filix-femina	7	W
Ceterach officinarum	7	W
Dryopteris dilatata	7	W D
Dryopteris filix-mas	2	W R G D
Equisetum arvense	7	W
Phyllitis scolopendrium	3	W D
Polypodium interjectum	7	W R
Polypodium vulgare	7	W
Polypodium agg.	7	W
Pteridium aquilinum	7	W
Pteris cretica	7	W
PINOPSIDA		
Chamaecyparis lawsoniana	7	W
Taxus baccata	7	W
Thuya plicata	7	W
MAGNOLIOPSIDA		
LAURACEAE		
Laurus nobilis	7	W
RANUNCULACEAE		
Aquilegia vulgaris	7	W
Clematis vitalba	7	
Helleborus foetidus	7	W
Ranunculus acris	7	W
Ranunculus repens	7	W
BERBERIDACEAE		
Mahonia aquifolium	7	W
PAPAVERACEAE		
Chelidonium majus	4	W
Meconopsis cambrica	7	W
Papaver atlanticium	7	W
Papaver lecoqii	7	W R
Papaver rhoeas	7	W
Papaver somniferum	6	W
FUMARIACEAE		
Pseudofumaria (*Corydalis*) *alba*	7	W
Pseudofumaria lutea	2	W R D
PLATANACEAE		
Platanus x *hispanica*	7	W
URTICACEAE		
Parietaria judaica	3	W R D
Soleirolia soleirolii	7	W
Urtica dioica	1	W R G D
FAGACEAE		
Fagus sylvatica	7	W
Quercus robur	7	W D
BETULACEAE		
Betula pendula	3	W R G
Carpinus betulus	7	
CHENOPODIACEAE		
Atriplex patula	7	W D
Chenopodium album	7	R
PORTULACEAE		
Claytonia perfoliata	7	W
CARYOPHYLLACEAE		
Arenaria serpyllifolia	3	W
Cerastium fontanum	4	W
Cerastium glomeratum	4	W R
Cerastium tomentosum	7	W
Herniaria glabra	7	W
Sagina apetala	4	W
Sagina procumbens	3	W
Stellaria media	2	W R G D
POLYGONACEAE		
Muehlenbeckia complexa	7	W
Persicaria (*Polygonum*) *amphibia*	7	W
Persicaria lapathifolia	7	W
Persicaria maculosa (*persicaria*)	7	W G D
Polygonum arenastrum	7	W D
Polygonum aviculare	7	W
Rumex conglomeratus	7	W
Rumex crispus	7	W
Rumex hydrolapathum	7	W
Rumex obtusifolius	6	W G
Rumex sanguineus	7	W
CLUSIACEAE		
Hypericum androsaemum	7	W
Hypericum perforatum	7	
TILIACEAE		
Tilia x *europaea*	7	W G
MALVACEAE		
Malva neglecta	7	W
Malva sylvestris	4	W R
VIOLACEAE		
Viola arvensis	7	

Viola odorata	7	W
Viola reichenbachiana	7	W
Viola riviniana	7	W
CUCURBITACEAE		
Bryonia dioica	7	W
SALICACEAE		
Salix alba	7	W R
Salix caprea	7	W
Salix cinerea	7	W
Salix x *reichardtii*	7	W
BRASSICACEAE		
Alliaria petiolata	7	W
Alyssum saxatile	7	W
Arabidopsis thaliana	5	W
Arabis caucasica	7	W
Armoracia rusticana	7	
Aubrieta deltoidea	7	W
Brassica napus	7	W R G D
Capsella bursa-pastoris	3	W R G
Cardamine flexuosa	7	W
Cardamine hirsuta	1	W R G
Cardamine pratensis	7	W
Cochlearia danica	7	W
Descurainia sophia	7	W
Diplotaxis muralis	7	W
Diplotaxis tenuifolia	7	W
Erophila verna	5	W R G
Erysimum cheiranthoides	7	W
Erysimum (*Cheiranthus*) *cheiri*	6	W
Lepidium draba	7	W
Lepidium ruderale	7	W
Lobularia maritima	7	W
Sinapis arvensis	7	W
Sisymbrium officinale	3	W R G
Sisymbrium orientale	7	W R
GROSSULARIACEAE		
Ribes rubrum	7	W
Ribes sanguineum	6	W
Ribes uva-crispa	7	W
CRASSULACEAE		
Sedum acre	2	W R G
Sedum album	4	W R G
Sedum rupestre	5	W R G
Sedum spurium	7	W G
Sempervivum tectorum	7	W R G
SAXIFRAGACEAE		
Saxifraga tridactyloides	3	W R G
ROSACEAE		
Cotoneaster bullatus	7	W
Cotoneaster dielsianus	6	W
Cotoneaster horizontalis	3	W R

Cotoneaster lacteus	7	W
Cotoneaster simonsii	7	W
Cotoneaster x *watereri*	7	W
Crataegus monogyna	7	W
Fragaria vesca	7	W
Geum urbanum	6	W
Kerria japonica	7	W
Malus cf. *floribunda*	7	W
Potentilla reptans	5	W
Pyracantha coccinea	7	W
Rosa canina	7	W
Rubus fruticosus agg.	3	W R G
Rubus idaeus	7	W
Rubus procera	7	W
Rubus ulmifolius	6	W
Sorbaria aitchisonii	7	W
Sorbus aucuparia	7	W
FABACEAE		
Colutea arborescens	7	
Laburnum anagyroides	7	W G D
Medicago lupulina	7	W
Trifolium dubium	7	W
Trifolium pratense	7	W
ONAGRACEAE		
Chamerion angustifolium	3	W R G D
Epilobium ciliatum	3	W G
Epilobium hirsutum	3	W R G D
Epilobium montanum	3	W G
Epilobium obscurum	7	W
Epilobium parviflorum	3	W R G D
Epilobium roseum	7	W
Epilobium tetragonum	2	W G
AQUIFOLIACEAE		
Ilex aquifolium	4	W G
EUPHORBIACEAE		
Euphorbia peplus	5	W
Mercurialis annua	6	W
VITACEAE		
Parthenocissus tricuspidata	7	W
HIPPOCASTANACEAE		
Aesculus hippocastanum	7	D
ACERACEAE		
Acer platanoides	7	W
Acer pseudoplatanus	2	W R G D
OXALIDACEAE		
Oxalis corniculata	7	W
Oxalis exilis	7	W
Oxalis stricta	7	W
GERANIACEAE		

The Flora of Walls and Buildings in the Isle of Ely
Pteris cretica
Photograph by Bob Ledger Design

The Flora of Walls and Buildings in the Isle of Ely
Phyllitis scolopendrium
Photograph by Bob Ledger Design

Pellitory-of-the woods
Parietaria officinalis

Photograph by W G Last

Work in progress

View of enhanced margin

Erodium cicutarium	7	W
Geranium dissectum	7	W
Geranium molle	7	W D
Geranium pusillum	7	W
Geranium pyrenaicum	7	
Geranium robertianum	3	W R G
Geranium rotundifolium	7	W
TROPAEOLIACEAE		
Tropaeolum speciosum	7	W
ARALIACEAE		
Hedera helix	2	W G D
APIACEAE		
Aegopodium podagraria	7	W
Anthriscus sylvestris	4	W R
Chaerophyllum temulum	7	W
Conium maculatum	7	W
Daucus carota	7	
Foeniculum vulgare	7	W
Heracleum sphondylium	7	W
Torilis nodosa	7	W
APOCYNACEAE		
Vinca major	7	W
SOLANACEAE		
Lycium barbarum	7	W
Solanum dulcamara	7	W
Solanum nigrum	7	W G
CONVOLVULACEAE		
Calystegia sepium	7	W
Convolvulus arvensis	6	W D
BORAGINACEAE		
Myosotis arvensis	7	W
Myosotis laxa	7	W
Myosotis sylvestris	7	W
Omphalodes verna	7	W
Symphytum orientale	7	W
LAMIACEAE		
Ballota nigra	7	W D
Glechoma hederacea	5	W
Lamium album	2	W R
Lamium amplexicaule	7	W
Lamium hybridum	7	W
Lamium maculatum	7	W
Lamium purpureum	3	W R
Lycopus europaeus	7	W
Melissa officinalis	7	W
Prunella vulgaris	7	W
Scutellaria rubicunda	7	W
PLANTAGINACEAE		
Plantago lanceolata	5	W

Plantago major	6	W R D
BUDDLEJACEAE		
Buddleja davidii	1	W R G D
OLEACEAE		
Forsythia x *intermedia*	7	W
Forsythia suspensa	7	W
Fraxinus excelsior	6	W R
Jasminum nudiflorum	7	W
Jasminum officinale	7	W
Syringa vulgaris	7	W
SCROPHULARIACEAE		
Antirrhinum majus	2	W R G
Cymbalaria muralis	1	W R G D
Digitalis purpurea	6	W
Hebe sp. indet.	7	W
Linaria purpurea	4	W R
Linaria vulgaris	7	W
Lobelia erinus	7	W
Mimulus cupreus	7	W
Verbascum thapsus	6	W
Veronica arvensis	3	W
Veronica chamaedrys	7	W
Veronica filiformis	7	
Veronica hederifolia	3	W R D
Veronica persica	7	W
Veronica polita	7	W
CAMPANULACEAE		
Campanula persicifolia	6	W
Campanula portenschlagiana	7	W
Campanula poscharskyana	7	W
Campanula rapunculoides	7	W
RUBIACEAE		
Galium aparine	2	W R G D
Galium verum	7	W
CAPRIFOLIACEAE		
Leycesteria formosa	5	W
Lonicera nitida	7	W
Lonicera peri-clymenum	7	W
Sambucus nigra	1	W R G D
Symphoricarpos x *chenaultii*	7	W
Viburnum rhytidophyllum	7	W
VALERIANACEAE		
Centranthus ruber	3	W R G D
Valerianella locusta	7	W
ASTERACEAE		
Achillea millefolium	6	W R
Arctium minus	7	W
Artemisia vulgaris	6	W R
Aster sp. indet.	7	W
Bellis perennis	6	W

Calendula officinalis	7	W
Cirsium arvense	6	W R
Cirsium vulgare	5	W R G
Conyza canadensis	3	W R G D
Crepis capillaris	4	W
Crepis vesicaria	3	W R G
Erigeron acer	7	W
Erigeron karvinskianus	7	W
Helianthus annuus	7	W
Hypochaeris radicata	7	W
Lactuca serriola		
f. *integrifolia*	3	W G
f. *serriola*	7	W
Lapsana communis	7	W
Leontodon autumnalis	6	W
Leontodon saxatilis (*taraxacoides*)	7	W
Leucanthemum vulgare	7	W
Picris echioides	6	W D
Pilosella officinarum	7	W
Senecio jacobaea	3	W R G
Senecio squalidus	3	W R G
Senecio viscosus	7	W
Senecio vulgaris	1	W R G D
Solidago gigantea	7	W
Sonchus arvensis	7	W
Sonchus asper	2	W R G D
Sonchus oleraceus	2	W R G D
Tanacetum parthenium	4	W D
Taraxacum agg.	1	W R G D
Tripleurospermum inodorum	7	W
Tussilago farfara	7	W
CYPERACEAE		
Carex otrubae	7	W
Carex pendula	7	W
POACEAE		
Agrostis capillaris	7	W
Agrostis castellana	7	W
Agrostis stolonifera	6	W
Alopecurus pratensis	7	W
Anisantha sterilis	3	W R
Arrhenatherum elatius	3	W R G
Avena fatua	7	W D
Bromus hordeaceus	6	W
Calamagrostis epigeios	7	W
Catapodium rigidum	6	W
Cynosurus cristatus	6	W
Dactylis glomerata	3	W R G
Elytrigia repens	5	W R G
Festuca ovina agg.	6	W
Festuca rubra	5	W
Holcus lanatus	4	W R G
Hordeum distichon	7	W
Hordeum murinum	4	W R G
Lolium multiflorum	7	G
Lolium perenne	3	W R G

Phleum bertolonii	7	W
Phragmites australis	7	W
Poa angustifolia	4	W
Poa annua	1	W R G D
Poa compressa	6	W R
Poa humilis	7	W
Poa nemoralis	7	W
Poa pratensis	4	W
Poa trivialis	4	W R
Trisetum flavescens	7	W
Triticum aestivum	7	W R G
Vulpia bromoides	7	W
Vulpia myuros	4	W R G
LILIACEAE		
Asparagus officinalis	6	W R
Muscari armeniacum	7	W

Pellitory-of-the-woods

Philip Oswald

For the last 24 years, on and off, I have been making notes on plants that I see in the University Botanic Garden which I know (or suspect) its staff have not intended to grow there – or at any rate not where I have seen them. Among the species that I recorded here and there was Pellitory-of-the-wall (*Parietaria judaica*), an undistinguished-looking native perennial of walls, rocks, cliffs and steep hedge-banks (Stace, 1997: 118). This caused me no surprise because this is one of the commoner plants in the streets north of the Garden, where I live, growing on or at the foot of walls and in basement areas (Chater, Oswald & Preston, 2000: 7 and 11). (Interestingly, however, during my survey in 2003 and 2004 of 4 km^2 of west Cambridge beyond Grange Road – TL45, tetrad J – for the Botanical Society's Local Change Project, I found the plant in only one site; but this is an area mainly of twentieth-century suburban houses with largish gardens, most of them with hedges rather than walls, quite unlike the Victorian terraces of Newtown.)

I had vaguely noticed that plants of *Parietaria* growing around the trunks of the large Black Pines in the Garden's Old Pinetum were larger and lusher than those in the local streets, but I assumed this was the effect of a different habitat. Then in April 1993 I opened my copy of *B.S.B.I. News* and found a brief article by Brian Wurzell entitled 'Pellitory-of-the-woods' (Wurzell, 1993), reporting "two wild colonies of [his] own observation" of the larger continental species *Parietaria officinalis*, one "in the old woods at Warley Place, Brentwood, Essex" and the other "under an old hedgerow in the grounds of Friern Hospital (formerly Colney Hatch) in Friern Barnet, Middlesex". Instantly I thought of the Old Pinetum, and, sure enough, the plants there turned out to be of this species, evidently seeded from the Systematic Beds, where it is grown and labelled. Since there is a somewhat arbitrary convention among field botanists not to 'count' species growing within gardens (with the possible exception of arable weeds in flower beds), I have never formally reported this record. However, I began to wonder how long it would be before *Parietaria officinalis* 'jumped the wall' in Cambridge, as Wall Lettuce (*Mycelis muralis*) and Round-leaved Crane's-bill (*Geranium rotundifolium*) have before it (Walters, 1991; Oswald, 1996).

Sure enough once again, on 15 June 2002 Alan Leslie found this species growing abundantly "under shrubs by bowling green, Brooklands Avenue, Cambridge, TL455570", adjoining the Botanic Garden (Leslie, 2003), and this is where W.G. Last photographed it (see centre pages).

Wurzell (1993) described "British *Parietaria judaica*" as "typically a squat, small-leaved, short-petioled, bushy, single-rooted perennial of old walls" and "Continental *P. officinalis*" as "typically a tall, large, taper-leaved, long-petioled, rhizomatous perennial of old woods". He said that the latter has "no horticultural merit" but that it "has long been grown in Britain for its medicinal

qualities", and he wondered why, "with its long history and impressive reputation", "it is one of the less commonly grown herbs in this country". Despite its "vegetative vigour", he could recall "no published record of plants escaped or established in the wild". Stace (1997: 118) has included this second species of *Parietaria*, on the basis of Wurzell's two records, giving it the English name "Eastern Pellitory-of-the-wall".

Gerarde (1633: 330–331) seems to make no distinction between the wild plant and the herb, giving "*The Place*" as "neere to old walls in the moist corners of Churches and stone buildings, among rubbish and such like places" and "*The Vertues*" as follows: "Pellitory of the wall boyled, and the decoction of it drunken, helpeth such as are vexed with an old cough, the grauell and stone, and is good against the difficultie of making water, and stopping of the same, not onely inwardly, but also outwardly applied vpon the region of the bladder, in manner of a fomentation or warme bathing, with spunges or double clouts, or such like."

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Some preliminary observations on algae and associated microorganisms of subaerial habitats, particularly among mosses, near Cambridge

Hilary Belcher and Erica Swale

Washpit Lane, Girton, Cambridge (TL412618) was once a well-used by-road connecting the A14 trunk road with the village of Girton, but about 1980 it was closed to through traffic and part of it converted into a footpath. An account of the general topography, the woody plant vegetation, and its development since the road closure, has been given in this journal (Belcher and Swale 2001) and the algal vegetation of a large temporary puddle close to the southern end was also examined (Belcher and Swale 2004). A ditch beside the road on the north-western side also proved of considerable interest (unpublished data).

In our rôle as general microscopists and naturalists, specialists only in freshwater algae, we have attempted a preliminary survey of the algae and other

small organisms in the subaerial habitats of tree and tarmac surfaces and among mosses of the road verges. In particular the moss leaves shelter a community which is comparatively neglected.

A note on methods

Collection from trees and tarmac presented no difficulty. Moss (mainly *Brachythecium rutabulum*, with some *Eurhynchium praelongum*) leaves and stems, excluding the dark soily parts, were mounted in water and observed directly, or were shaken vigorously with purified water and the suspension concentrated by centrifuging, using a miniature battery-driven centrifuge and Eppendorf tubes (Belcher 1993, 1999). Some algae and small animals could be examined in the living state, while samples for diatoms and shelled rhizopods were heated to burn off organic matter and mounted in "Naphrax" diatom mountant. Calcium salts contained in some tap water, including that of Cambridge, damages diatoms during incineration for slide preparation, and distilled water was not available, but in our experience water derived from defrosting a refrigerator was always preferable to that bought for topping up batteries.

Observations

Many trunks and branches along the roadside and the traffic signs at the Girton entrance to the lane have a bright green powdery coating, particularly noticeable in winter. This consisted almost entirely of the green alga *Apatococcus lobatus* (Figure 1A), which occurs as small colonies. This species forms part of what used to be known as *Pleurococcus vulgaris*, and differs from the very similar other component, *Desmococcus olivaceum*, in not possessing pyrenoids. Cells of the unicellular green *Trebouxia aboricola*, (Figure 1B) were also found, particularly on the traffic signs.

The tarmac of the road surface has many crannies between the stones, often containing a yellowish green growth, consisting mainly of the filamentous *Prasiola crispa* (Figure 1F) with some *Trebouxia arboricola*.

At the edge of the tarmac in some places the spectacular blue-green alga (or cyanobacterium) *Nostoc commune* may appear in damp weather, forming dark brown or green convoluted gelatinous colonies up to 50 mm or more across (Belcher & Swale 1988). It has the remarkable property of shrivelling down to little more than a dark stain when dry and resuming its former size and appearance after rain, giving rise to much folklore (Belcher & Swale 1984).

During a long period of wet weather in 1995 a green slippery patch developed on the tarmac in the footpath section of the lane, at the south-west end. This consisted mainly of green filamentous algae, chiefly *Ulothrix tenerrima* (Figure 1E) with a little *Prasiola crispa*. Other green algae between these filaments included small colonies of *Apatococcus lobatus*, presumably fallen from the trees, and a small desmid, *Cylindrocystis brebissonii* var. *minor* (Figure 1D). The identity of this was confirmed by Professor Alan Brook, an authority on desmids. The three cells seen, each 10 μm diameter, were smaller

than the minimum size given in the monograph volume by W and G.S. West (1904), which is 12.5 μm. However, other cells subsequently obtained from moss in two sites in Washpit Lane and from two other nearby sites gave ranges from 10 to 19 μm. It should be pointed out that for absolute certainty the identification of this species needs the presence of zygospores, which were not seen. This variety has not been previously recorded from Cambridgeshire, though the much larger *C. brebissonii* var. *brebissonii* has been found once, in Cherry Hinton chalkpit in 1939 by Professor M.E. Godward (E.A. George, unpublished). This species and its variety *minor* are much commoner in the north of Britain, both in areas with acid and with alkaline soil. A few motile cells of *Chlamydomonas* spp. were also present, but not in sufficient numbers to permit identification.

Blue-green algae (Cyanophyta or Cyanobacteria) also occurred, particularly the common *Phormidium autumnale* (Figure 1M). There were also a few filaments of *Tolypothrix byssoidea* (Figure 1N) and *Calothrix parietina* (Figure 1O), together with occasional hormogones (detached motile portions of filament) of a species of *Nostoc,* probably *N. commune*, which occurred nearby.

Various ciliates were seen swimming or crawling among the filaments, of which *Colpoda cucullus*, *Euplotes affinis* and *Uronema* sp. were identified. Shelled rhizopods (testate amoebae) were conspicuous, the commonest being the comparatively small but very frequent *Trinema lineare* (Figure 2I). This and two other species found here, *Assulina muscorum* (Figure 2F) and *Euglypha rotunda* (Figure 2H) have organic shells covered with a tile-like arrangement of silica plates, while *Arcella discoides* has a beret-like shell of brown organic material with no plates (Figure 2E). These and many others are described in a new guide by Clarke (2003).

Attached or creeping rotifers and nematode worms occurred but were not identified. A tardigrade or “water bear”, *Hypsibius (Hypsibius) novemcinctus* was present, an attractive small creature with its nine reddish stripes and eight paws bearing conspicuous claws. Its slow movements were more like those of a sloth than of a bear (Figure 2K).

Patches of moss growing among the grass along the lane verges and on a small area of concrete by a gate to a farm track proved to have an interesting flora and fauna among the leaves, but the organisms concerned are usually in an inactive state in dry weather and only resume active life when wetted by rain or dew, as mentioned below. The most conspicuous algae of this community are the diatoms *Hantzschia amphioxys, Achnanthes coarctata, Pinnularia borealis* and species of *Luticola* such as *L. muticopsis (Navicula muticopsis).* Figues 2A-D show them in the living state, with yellowish brown chloroplasts. In a previous issue of this journal (Belcher & Swale 1997) they are illustrated as “cleaned”, i.e. with all organic matter removed so that the diagnostic shell markings can be seen, collected from various bryophytes. Species other than diatoms were not dealt with in that article. As was then mentioned, a similar assemblage of diatoms epiphytic in bryophytes has a wide distribution geographically, both in terrestrial habitats and on trees.

Green algae among the moss leaves included species of the green flagellate *Chlamydomonas*, though owing to the small number present *C. asymmetrica* was the only one identified. Short lengths of the filamentous species *Ulothrix tenerrima* and *Prasiola crispa* also occurred, and few-celled filaments of *Klebsormidium flaccidum* (Figures 1F, E, I). Three species of desmid were seen, and although in small numbers were of considerable interest. *Cylindrocystis brebissonii* var. *minor,* discussed above, was also found here. *Actinotaenium curtum* occurred, the only other county record being from a footbridge over the M11 at Coton (Belcher & Swale 1998 (Figure 1C)). Several cells of *Cosmarium holmiense* var. *integrum* were present, only previously recorded for the county at Chippenham Fen over a century ago (G. S. West 1899), although it is common in the north of Britain on wet rocks and among mosses (W. & G.S. West 1904). This species was also seen in moss from the gardens of Lucy Cavendish College, Cambridge, three kilometres to the south-east.

Filamentous blue-green algae were frequent, but usually only in short lengths, usually lacking the calyptra or end cap, an important diagnostic feature. However, several species were tentatively identified, *Phormidium autumnale, P. fragile, Oscillatoria brevis* and *O. splendida.* One rope-like colony of *Microcoleus vaginatus* was seen, its filaments when on a microscope slide spreading outwards at the end and breaking away, when the resemblance to a *Microcoleus* ceased and the fragments appeared like a species of *Phormidium* (Figures 1M, H, K, J, P, Q). Bead-like colonies of *Nostoc punctiforme* were sometimes seen, mostly 10-30 μm across, and densely packed with cells so that the individual filaments could hardly be seen (Figure 1R).

Shelled rhizopods were common in all samples. *Euglypha rotunda* and *Trinema lineare*, with their silica plates, and the almost circular *Arcella discoides* have been described above, and *Centropyxis aerophila,* covered with sand grains, was also present. Of particular interest was *Paraquadrula irregularis,* frequent in the moss from the concrete patch. The rectangular or square plates covering its shell consist of calcium carbonate in the form of calcite instead of silica usually found in these organisms. This species is not illustrated by Clarke (2003), Corbet (1973) or Ogden & Hedley (1980), though the latter authors include it in a list of British species. The possible implication is that it is an uncommon or overlooked species, perhaps occurring only where calcium salts are available. It was easily detected on temporary or permanent slides by using crossed Polaroid filters, when the birefringent calcite plates shone brilliantly, fitting together like the plates of the famous jade suits of certain Chinese emperors. The silicon plates of other genera such as *Euglypha* did not show up in this way under these lighting conditions (Figures 2H, I, E, J, G).

Ciliates and colourless flagellates were not conspicuous in our fresh mounts, though they developed later in cultures prepared from the moss washings. The most common multicellular organisms encountered were rotifers, creeping among the leaves or attached to them. They resumed active life within thirty minutes of dry moss fragments being mounted in water. They were not identified in detail but appeared to be bdelloid types, especially *Habrotrocha*

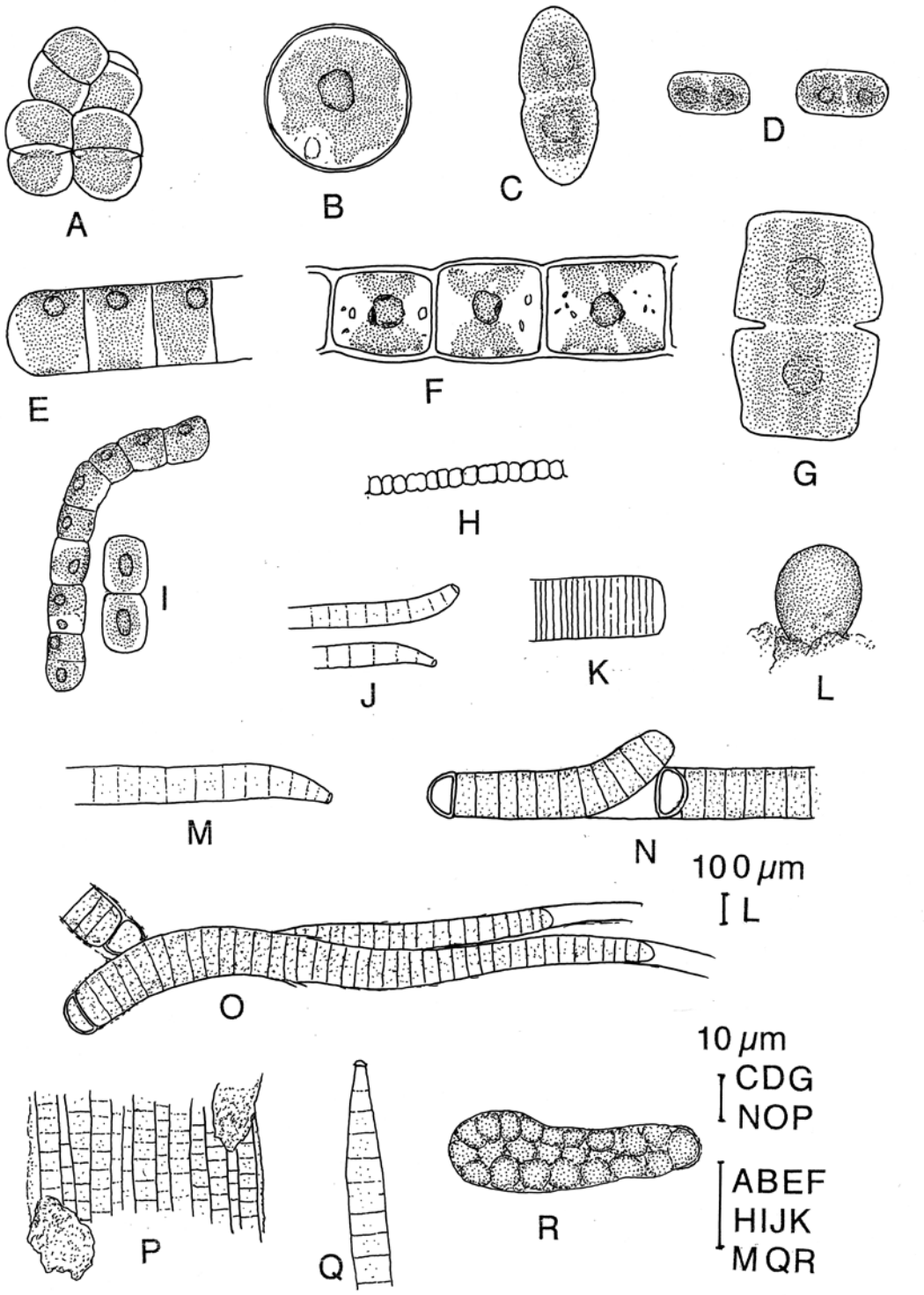

Figure 1. Subaerial algae, mostly from mosses
A: *Apatococcus lobatus*, x 2000; B: *Trebouxia arboricola*, x 2000; C: *Actinotaenium curtum*, x 1000; D: *Cylindrocystis brebissonii* var. *minor*, x 1000; E: *Ulothrix tenerrima*, x 2000; F: *Prasiola crispa*, x 2000; G: *Cosmarium holmiense* var. *integrum*, x 1000; H: *Phormidium fragile*, x 2000; I: *Klebsormidium flaccidum*, x 2000; J: *Oscillatoria splendida* x 2000; K: *Oscillatoria brevis*, x 2000; L: *Botrydium granulatum*, x c. 70; M: *Phormidium autumnale*, x 2000; N: *Tolypothrix byssoidea*, x 1000; O: *Calothrix parietina*, x 1000; P: *Microcoleus vaginatus*, bundle of filaments, x 1000; Q: *M. vaginatus*, end of single filament, x 2000; (note similarity to M); R: *Nostoc punctiforme*, x 2000.

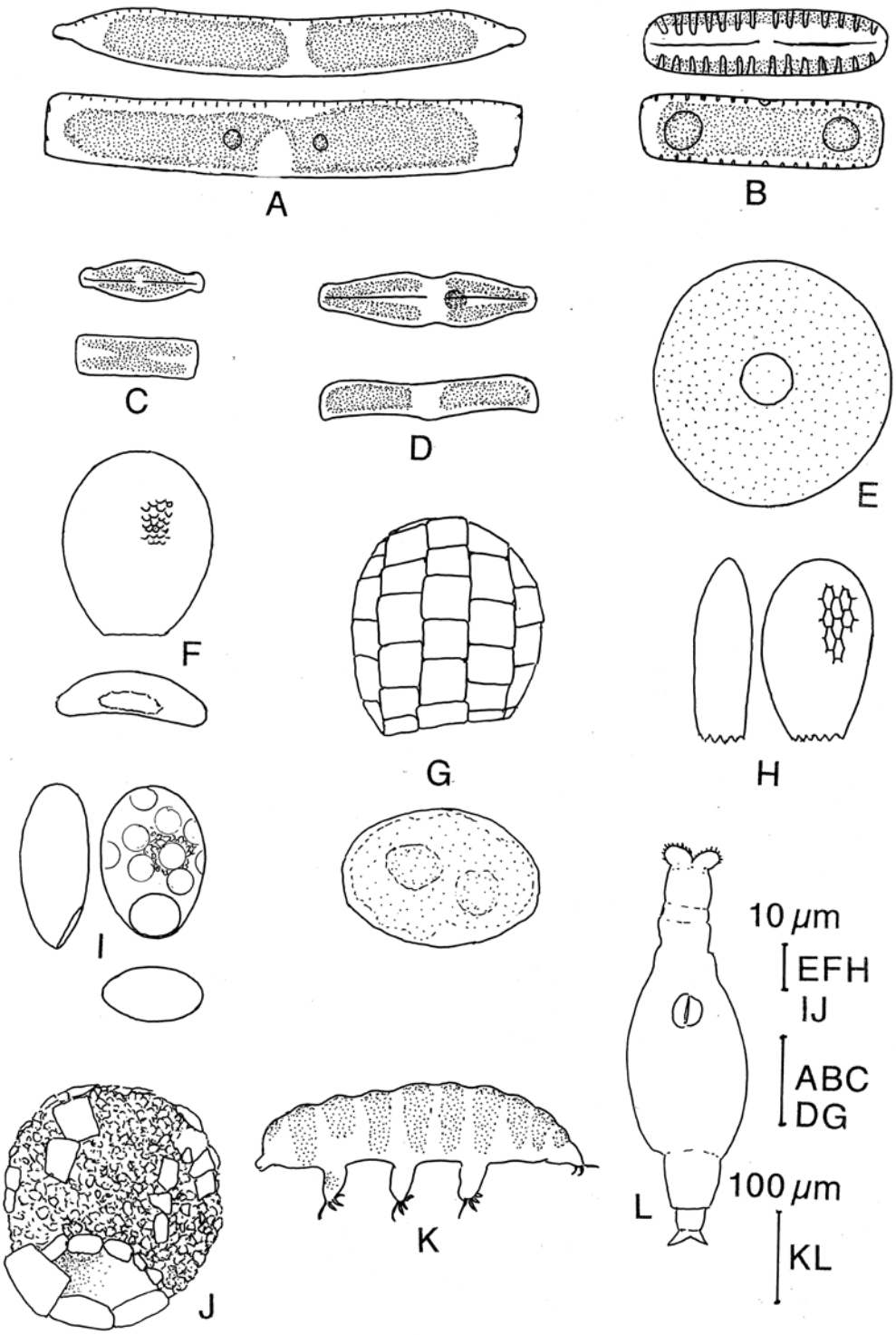

Figure 2.
A-D: Diatoms from mosses, in living state, with brown chloroplasts x 2000; A,
A: *Hantzschia amphioxys*; B: *Pinnularia borealis*; C: *Luticola muticopsis;*
D: *Achnanthes coarctata*: E-J: Shelled rhizopods (testate amoebae); E: *Arcella discoides*, x 1000; F: *Assulina muscorum*, x 1000; G: *Paraquadrula irregularis*, slightly distorted by mounting, x 2000; H: *Euglypha rotunda*, x 1000; I: *Trinema lineare*, x 1000; J: *Centropyxis aerophila*, x 1000; K: Tardigrade, *Hypsibius (Hypsibius) novemcinctus*, x 200, sketched from life; L: Rotifer *Habrotrocha* sp, sketched from moving animal.

(Figure 2L) and *Philodina* spp. (Donner, 1966, discusses problems faced by moss rotifers). Tardigrades, mentioned above, included a bright red species of *Echiniscus* which could not be identified to species. Occasional nematode worms were encountered, but identification was not attempted.

For comparison we examined a number of moss samples from nearby localities. Their flora and fauna were surprisingly uniform, with the exception of moss from a damp shaded slope at Lucy Cavendish College. This had over twice as many species of diatoms, predominantly ones found in soil (Lund 1946).

The epiphytic flora of moss does not appear to have been much studied in this country, except for the diatoms. Near Malham Tarn, Yorkshire, mucilaginous slimes containing *Mesotaenium* and *Coccomyxa* spp. were often found on mosses, and sometimes interfered with their growth (Lund 1961). These two genera were not met with among our mosses. Possibly more species of algae might be found among Cambridgeshire mosses in a wet season.

Finally mention should be made of a curious alga belonging to the Xanthophyta or yellow-green algae, *Botrydium granulatum* (Figure 1L). This was seen once, not in the lane but in a field beside it, where a broken cattle trough was surrounded by a damp muddy area, providing suitable conditions for its growth. It occurs only sporadically owing to its requirement for drying mud. West & Fritsch (1927) give a good description. There are three Cambridgeshire records, none later than 1913.

It will be apparent from the small numbers of Cambridgeshire records that algae are under-recorded compared with bryophytes, lichens, fungi etc., because of the lack of interest in this group. Armed with the new algal flora (John *et al.* 2002) and a good microscope there is much scope for the study of this fascinating and beautiful group. We would be prepared to help anyone who wishes to take it up.

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Species recorded

Chlorophyta (green algae), desmids (Zygnematales)

Actinotaenium curtum (Bébisson) Teiling
Cosmarium holmiense P. Lundell var. *integrum* P. Lundell
Cylindrocystis brebissonii (Meneghinii) de Bary var. *minor* W. et G.S. West

Chlorophyta, other groups

Apatococcus lobatus (Chodat) J.B. Petersen
Chlamydomonas asymmetrica Korshikov
Klebsormidium flaccidum (Kützing) P. C. Silva, Mattox et W.H. Blackwell
Prasiola crispa (Lightfoot) Kützing
Trebouxia arboricola Puymaly
Ulothrix tenerrima Kützing

Xanthophyta (yellow-green algae)

Botrydium granulatum (Linnaeus) Greville

Bacillariophyta (diatoms)

Achnanthes coarctata (Brébisson) Grunow
Hantzschia amphioxys (Ehrenberg) Grunow
Luticola muticopsis (Van Heurck) D.G. Mann
Pinnularia borealis Ehrenberg

Cyanophyta or Cyanobacteria (blue-green algae)

Calothrix parietina (Thuret) Bornet et Flahault
Microcoleus vaginatus (Vaucher) Gomont
Nostoc commune (Vaucher) Bornet et Flahault
Nostoc punctiforme (Kützing) Hariot
Oscillatoria brevis (Kützing) Gomont
Oscillatoria splendida (Greville) Gomont
Phormidium autumnale (C.A. Agardh) Gomont
Phormidium fragile (Meneghinii) Gomont
Tolypothrix byssoidea (Hassall) Kirchner

Shelled rhizopods (testate amoebae)

Arcella discoides Ehrenberg
Assulina muscorum Greeff
Centropyxis aerophila Deflandre
Euglypha rotunda Wailes
Paraquadrula irregularis (Archer)
Trinema lineare Penard

Ciliates

Colpoda cucullus O.F. Müller
Euplotes affinis Dujardin

Tardigrade

Hypsibius (Hypsibius) novemcinctus Marcus

Bird populations and communities at Hope Farm, Knapwell 2003-2004

Peter Bircham

Introduction

'Hope Farm' Knapwell was purchased by the RSPB to provide an opportunity to monitor the effects of modern farming methods on bird populations and to research ways in which the declines of the past thirty years might be halted or even reversed within a commercially viable environment.

The purpose of this study was to gather data to compare with a previous farmland study at Madingley and to provide a baseline for future monitoring to try to detect any effects on bird population changes consequent on changes in the farming operations.

Methods

The methodology was identical to that employed at Madingley (Bircham, Weedon, Weedon and Murfitt 1994).

Counting method. A transect walk was designed to take the observer through a representative section of all habitats of the farm, although time constraints prevented coverage of the whole farm, approximately two-thirds being counted. All contacts visual and aural were identified and noted; a very few contacts (<1%) were unidentified. All birds flying over were ignored and only birds showing use of the farm were counted. The transect was 4.58 km long and took an average time of 1.75hours.

Timing. Almost all counts were commenced 2-3 hrs after dawn. It has long been established that bird activity is at its most intense within the period after first light. The route was frequently reversed in an attempt to prevent the timing of the observer being a significant factor in the nature of the contacts. (If the count commenced at 8am on a day when first light was at 6am and took 2 hrs the final section would not be counted until 10am which would be 4 hours after first light. For that reason the number of birds contacted at the end of the count could be greatly reduced by the fall-off in activity).

Seasons and dates. The counts were undertaken so that they could be divided into two seasons: Winter, October to mid March and Summer, mid-March to July. No counts were undertaken in August and September. The first count was in December 2002 and the last count was in July 2004.

Weather. No counts were carried out in adverse weather conditions such as rain or high wind. However, temperatures varied within seasons and one winter count was undertaken when the ground was frozen.

The farm. Almost the entire farm was arable, with one or two small paddocks for horses. Set on boulder clay the farm was cropped with wheat, barley, oil seed rape and field beans during the survey period. Fields were neither small nor large. Although there were one or two small scrub copses, there was very limited mature hedgerow and an almost complete absence of standard trees in the hedgerow. The overall design was open but not ‘prairie’ farmland. Some additional hedgerow has been planted but remains no more than c400cms high at the highest. In one corner there is a permanent pond. This triangular section of the farm has the best hedgerow mostly hawthorn with 1-2 ash standards and abuts a mature wood of predominantly Ash (not part of the farm). During the survey period this triangular corner was either left ‘wild’ or planted with barley as bird food.

Results

Nine counts were carried out in the winter, three in 2002-03 and six in 2003-04. Seven counts in summer were three in 2003 and four in 2004.

The table below shows the results of the counts and these are expressed as mean number of birds km^{-1} with standard error of the mean. Those species with an occurrence of less than 0.1 km^{-1} have been summarised below the table.

SPECIES	Winter Mean km^{-1}	S.E.	Summer Mean km^{-1}	S.E.
Mallard			0.26	0.14
Red-legged Partridge	1.45	0.35	0.44	0.29
Common Pheasant	0.95	0.24	2.00	0.70
Common Kestrel	0.17	0.07	<0.1	
Eurasian Sparrowhawk	<0.1		0.21	0.16
Common Moorhen	<0.1		0.31	0.12
Stock Pigeon	<0.1		0.22	0.11
Common Wood Pigeon	15.83	5.46	8.12	2.20
Eurasian Collared Dove	0.41	0.10	0.57	0.16
Barn Swallow			0.82	0.12
Sky Lark	3.96	1.26	3.37	1.01
Pied Wagtail			0.22	0.13
Winter Wren	0.87	0.33	1.79	0.74
Hedge Accentor	1.15	0.18	1.09	0.57
European Robin	2.02	0.33	2.40	0.61
Common Blackbird	5.19	0.67	3.58	0.91
Fieldfare	3.03	1.45		
Song Thrush	1.09	0.25	<0.1	
Redwing	0.22	0.12		
Lesser Whitethroat			0.51	0.08
Common Whitethroat			2.04	0.32
Blackcap			0.22	0.13
Common Chiffchaff			0.57	0.25
Willow Warbler			0.59	0.07
Goldcrest	0.14	0.09	0.13	0.13
Blue Tit	1.48	0.30	1.92	0.56
Great Tit	0.74	0.21	1.53	0.44
Eurasian Jay	<0.1		0.18	0.13
Black-billed Magpie	0.19	0.07	0.13	0.05
Eurasian Jackdaw	1.06	1.03	0.44	0.39
Rook	0.93	0.93	<0.1	
Carrion Crow	3.36	0.61	2.56	0.87
Common Starling	0.49	0.35	0.70	0.30
House Sparrow	<0.1		0.74	0.21
Chaffinch	9.12	1.76	6.77	1.88
European Greenfinch	0.28	0.11	1.35	0.30
European Goldfinch	0.44	0.26	0.48	0.11
Common Linnet	1.12	1.09	1.35	0.75
Common Bullfinch	0.38	0.13	0.52	0.43
Yellowhammer	4.07	1.27	4.16	0.33
Reed Bunting			0.40	0.13

Species also recorded: Eurasian Woodcock, Meadow Pipit, Mistle Thrush, Sedge Warbler.

In addition the relative abundance figures were calculated to give an idea of the bird community in both winter and summer. These are presented in the table below in descending order of abundance. Relative abundance is calculated by dividing the total contacts of a species per season by the total number of contacts of all the birds in that season. This figure, when multiplied by 100 provides a percentage.

Relative abundances of all species that made up at least 1% of the community.

Winter		**Summer**	
Common Wood Pigeon	26.6%	Common Wood Pigeon	12.13%
Chaffinch	13.9%	Chaffinch	10.16%
European Blackbird	8.71%	European Blackbird	5.34%
Yellowhammer	6.83%	Sky Lark	5.02%
Sky Lark	6.65%	Carrion Crow	5.02%
Carrion Crow	5.64%	Yellowhammer	5.02%
Fieldfare	5.10%	European Robin	3.65%
European Robin	3.40%	Common Pheasant	3.00%
Blue Tit	2.50%	Blue Tit	2.87%
Red-legged Partridge	2.43%	Winter Wren	2.67%
Hedge Accentor	1.90%	Common Whitethroat	2.60%
Common Linnet	1.88%	Great Tit	2.28%
Eurasian Jackdaw	1.80%	European Greenfinch	2.02%
Common Pheasant	1.70%	Common Linnet	2.02%
Song Thrush	1.70%	Hedge Accentor	1.63%
Rook	1.60%	Long tailed Tit	1.30%
Great Tit	1.20%	Barn Swallow	1.24%
		House Sparrow	1.10%
		Common Starling	1.04%

How do these results compare with the survey at Madingley?

First a note of warning. The Madingley survey was undertaken in the early 1990s and although the national data on farmland birds, gathered by the British Trust for Ornithology, have indicated few, if any, gross changes in the ensuing ten year period, comparisons of data gathered in different seasons must be treated with caution.

In winter.
With one or two exceptions there was a remarkable similarity in the occurrence of the birds on the two farmland areas for example:

	Knapwell	Madingley
Common Woodpigeon	15.83 +/- 5.46	14.62 +/- 7.28
Sky Lark	3.96 +/- 1.26	4.83 +/- 0.90
Common Blackbird	5.19 +/- 0.67	6.52 +/- 0.70
Hedge Accentor	1.15 +/- 0.18	1.30 +/- 0.17
Winter Wren	0.87 +/- 0.33	1.35 +/- 0.18
Carrion Crow	3.36 +/- 0.61	2.29 +/- 0.25
European Greenfinch	0.28 +/- 0.11	0.28 +/- 0.09

The largest differences were in:

Redwing	0.22 +/- 0.12	3.64 +/- 0.35
Blue Tit	1.48 +/- 0.30	5.04 +/- 0.57
Great Tit	0.74 +/- 0.21	2.38 +/- 0.40
Chaffinch	9.12 +/- 1.76	3.07 +/- 0.39
Yellowhammer	4.07 +/- 1.27	0.56 +/- 0.14

These differences show Redwing, Blue Tit and Great Tit with a population almost three times higher at Madingley which can be explained by the increased amount and maturity of hedgerow (with heavy berry crop for Redwing) and more small areas of woodland at that site.

Conversely numbers of Chaffinches and Yellowhammers were three times higher at Knapwell which reflects the deliberate attempts at Knapwell to leave seed for feeding in winter and the extra seed food provided by the RSPB staff at a field edge feeding station.

Overall counts were reasonably similar with a mean of 59.50 birds km^{-1} (+/- 6.8) at Knapwell compared with a mean of 71.58 birds km^{-1} (+/- 6.2) at Madingley showing a higher number of birds at Madingley which, once again may be a reflection of the extra berry-laden hedgerow attracting thrushes in the first half of winter.

In summer

As in winter so in summer most of the species were recorded in remarkably similar densities, examples being:

	Knapwell			Madingley		
Common Woodpigeon	8.12	+/-	2.20	6.69	+/-	2.23
Sky Lark	3.37		1.01	3.41		1.02
Common Blackbird	3.58		.91	5.76		1.78
European Robin	2.40		0.61	2.94		0.58
Winter Wren	1.79		.74	2.17		0.58
Great Tit	1.53		0.44	1.69		0.39
Carrion Crow	2.56		0.87	2.95		0.36

Those showing greatest differences were:

	Knapwell			Madingley		
Hedge Accentor	1.09	+/-	5.46	0.21	+/-	0.07
Common Whitethroat	2.04		0.32	0.30		0.09
Blue Tit	1.92		0.56	4.76		1.23
Chaffinch	6.77		1.88	4.06		0.98
Yellowhammer	4.16		0.33	1.20		0.54

Three of these five species were also the most different in winter suggesting permanent differences between the two sites. The higher numbers of Common Whitethroat at Knapwell probably reflect the increase that has taken place in the national population over the past ten years.
The overall densities were once again similar with 54.82 birds km^{-1} at Knapwell (+/- 5.68) and 44.90 birds km^{-1} at Madingley (+/- 5.23).

These results were reflected in the comparison of the communities at the two sites. In both winter and summer Chaffinch and Yellowhammer featured far more prominently at Knapwell than at Madingley, Blue Tit, the reverse.

In summary: Comparison of the two farmland areas, about fifteen miles apart but on the same soil type with similar cropping regimes show a general similarity in their avifauna. Variations were all attributable either to structural differences between the two farms or to the effect of the provision of winter food.

Acknowledgments: I would like to thank the RSPB for the opportunity to carry out these counts and particularly Will Kirby who shared his results and ideas as well as serving as my contact at Hope Farm.

Reference:

Bircham, P.M.M., Weedon, A.A., Weedon, G.P. & Murfitt, T.J. Bird populations and communities in Madingley parish. *Nature in Cambs* **36**. 1994.

Restoring Histon Brook – a report of the first year

Rob Mungovan

Introduction

Those who visit Histon Village Green will no doubt be familiar with the village pond. It forms the centrepiece of the Green and provides a habitat for upwards of eighty ducks at some points during the winter months. Many looking at the pond will also not realise that it is actually a watercourse. It is in fact an

over-widened confluence of two streams, hence why it is known locally as “the Brook”.

Stresses Impacting upon the Brook

The fact that the “pond” is actually the Brook is also part of its downfall. The two feeder streams collect water from a now increasingly urbanised catchment of Histon and Impington. Run-off from the surrounding land has delivered silt which settles on the bed of the Brook giving it a black appearance. Unfortunately, oil contamination is also apparent at times. The diffuse pollution from a network of drains beneath Histon is extremely hard to control.

Additional factors influencing the water quality of the Brook include the numerous ducks and the bread that they are fed. The ducks add faeces to the water and continually stir up the sediment. The suspension of fine sediments reduces the penetration of sunlight into the water, preventing submerged plants from growing. Several mature Horse Chestnut trees line the bank of the Brook. Whilst the shading effect may prevent summer water temperatures from becoming too high, the volume of leaves that they collectively drop will no doubt contribute a significant amount of organic matter. The breakdown of this organic matter will then remove oxygen from the water.

In summary, stresses facing the water quality of the Brook can be listed as: run-off from an urbanised catchment; nutrient enrichment from an artificially large population of ducks; a high leaf-fall input leading to the build-up of anaerobic silt. Combined, these factors perpetuate the cycle of poor water quality.

The maintenance of the Brook falls to the South Cambridgeshire District Council as one of its Awarded Watercourses. The Green itself is owned by the Histon Parish Council. In the summer of 2002 the Parish Council expressed a desire to try and address some of the perceived problems of the Brook. The Parish Council were keen to see the Brook maintained in a sensitive manner, and to have its visual and ecological value enhanced.

An assessment of the present ecological value of the Brook was made. A dip net was used to assess the invertebrate population of the pond. It was found to be extremely impoverished. Only species tolerant of partial oxygen depletion, such as bloodworm (*Chironomus sp.)* and Water Hog-louse (*Asellus aquaticus*) were present. However, a low number of fish were observed including Pike and Perch. A frog was also found. There were no signs of Water Voles.

With regard to aquatic plant life, only filamentous algae (Cladophora spp) were growing. These algae had floated to the surface and were rotting, causing the release of foul smells. Wooden revetments, constructed in the mid 1980s, meant there was no marginal plant cover. Whilst the revetments were successful in protecting the banks in periods of high flow, they contributed little to the ecological functioning of the Brook. The lack of marginal plants was of concern as vegetated margins are an important ecological feature of any waterbody.

The Approach to the Brook's Restoration

It was concluded that the accumulation of silt within the Brook had to be addressed if its biodiversity value was to be enhanced. Removal of the silt would also be beneficial to the amenity value of the Green and to the efficiency of the watercourse. However, the removal of silt from the site would incur a great expense to the Council. There would also be various technical and logistical problems to overcome in moving large volumes of wet silt. Additionally, the high probability that the silt contains traces of contaminants meant that it would be unlikely that it would be fit to be spread on farmland. Removal of the silt to a licensed tip was neither desirable nor sustainable.

It was therefore proposed that the silt be utilised on-site to create aquatic ledges. They in turn would provide an area from which marginal plants could grow and would also provide space for further dredgings to be deposited in the future. When considering the range of methods available (see **Table 1**) to reform the banks, many different options were initially considered. A technique was included whereby a combination of synthetic and biodegradable materials could be installed to create a number of silt reception "bays" using a synthetic mesh product called Nico-span. These bays could then be filled with the dredged silt and allowed to consolidate. Aquatic plants could then be introduced to the newly formed bays by means of pre-planted mats, pre-planted biodegradable rolls and additional pot grown plants.

Many aquatic plants are able to put on relatively rapid growth rates in order to colonise newly exposed riverine habitats. It was expected that with the right choice of plant a rapid cover of vegetation could be achieved in the first season to give a green screen to the newly formed margins.

More plants would then be introduced at a later stage to diversify the flora and to introduce a range of different colours across several seasons.

The implementation of the project had to be considered carefully. Either an external contract could be let or the District Council's in-house workforce could be utilised. The flexibility offered by the in-house workforce was considered to be an important factor in an innovative project for the district, and so it was decided that the work should be undertaken in-house.

The section of Brook proposed for the work was a reach 124m long. In addition to the wooden revetments, a significant length had previously been concreted in order to provide a firm edge for the public. The proposed enhancement measures would have to conceal this hard edge.

Table 1. This presents a summary of the available options to reform the banks, and demonstrates why Nico-span was thought to be the most appropriate technique in this particular situatione

Method and estimated cost per metre	**Benefits**	**Disadvantages**
Spiling (willow weaving) £50	·Can be installed to create a living screening, thus lasting longer than "dead" wood. ·Provides good habitat for small fish and invertebrates. ·Looks attractive and traditional. ·The weaving process can closely fit with any undulations in the bed of the pond.	·Gaps formed between the weave are unlikely to hold the fine silts dredged from the pond. ·A screen of fresh willow might obstruct views and need management. ·Might only last 10-15 years if kept wet. Parts exposed to air due to water fluctuation will decay relatively quickly. ·The weaving of willow is relatively time consuming and requires a very large amount of suitable material to be brought on site. ·Vertical posts needed at approx 0.4m gaps in order to hold the spiling.
Hurdles (woven wooden fences) £40	·Can be installed relatively quickly. ·Can be bought and transported to the site as required. ·Provides good habitat for small fish and invertebrates. ·Looks attractive and traditional.	·Gaps formed between the weave are unlikely to hold the fine silts dredged from the pond. ·May only last 10-15 years if kept wet. Parts exposed to air due to water fluctuation will decay relatively quickly. ·Hurdles tend to come in standard sizes that may not "fit" the varying dimensions of the pond.
Faggots (bundles of cut hazel) £20	·Can be installed relatively quickly. ·Provides good habitat for small fish and invertebrates. Looks attractive and traditional. ·The flexible nature of the bundles may allow them to fit with any undulations in the bed of the pond. ·Can be bought and transported to the site as required.	·The gaps formed between the brushwood may not adequately hold the fine silts dredged from the pond. ·May only last 10-15 years if kept wet. ·Parts exposed to air due to water fluctuation will decay relatively quickly.
Concrete or stone edging £60	·Very strong and robust. Can be installed by non-specialist contractor. ·Would hold dredged silts if an additional frontage were created.	·Provides a more degraded habitat to that which is already present. ·Looks unsightly and urban. ·Would not allow wet silt to dewater.
Wooden revetment £60	·Relatively strong and robust. ·Can be installed by non-specialist contractor. ·Would hold dredged silts if an additional frontage were created.	·Provides no change from that which is already present.

Nico-span £12.90	·Very strong and robust as it is specifically designed for the purpose of silt retention. ·Relatively unobtrusive in appearance, being black. ·Becomes partially vegetated in time. ·Relatively easy to install by non-specialist contractors. ·The flexible nature of the material enables it to be fitted to the varying nature of the pond's bed.	·It is a relatively new technique for the district with few suitable examples.

The project was scheduled to begin in late autumn 2003. This allowed for the water temperature to drop, thus lessening the risk of oxygen depletion that could occur as a result of anaerobic silts being disturbed. Oxygen depletion could have been disastrous for the remaining fish. Implementation of the project was planned to follow three general phases:

1) The construction phase, which would necessitate the installation of silt reception areas
2) The desilting phase, together with the placement of topsoil
3) The "greening" phase, undertaken by volunteers from the village

The Construction Phase

In essence this required the stretching of the Nico-span between vertical posts. Nico-span is a tightly woven polypropylene mesh. The mesh is double layered so that at intervals of 0.5m a vertical post can be inserted, thus holding the Nico-span vertical when the mesh is stapled to the post. Several hundred posts had to be driven into the gravel bed of the Brook in order to follow the sinuous curves of the design drawings. The relatively hard gravel bed necessitated the use of a vibrating hammer attached to the arm of an Atlas excavator. The creation of the Nico-span "wall" alone would not have been enough to retain the significant weight of wet silt. The silt would have bellowed out at the point where Nico-span came into contact with the bed. It was necessary to place another synthetic membrane at the landside interface of the Nico-span and bed. For this a product called Lotrak was used.

It was acknowledged from the outset that Nico-span is not a particularly "green" product. It is designed to have a life span of several decades before it starts to be broken down by UV light (I am aware of some Nico-span on the Hobson's Brook adjacent to the Botanical Gardens that has been in place since the early 1990s and still looks strong). In order to soften the appearance of the Nico-span wall a fringe of pre-planted coir rolls was to be created.

Coir is the same product that coconut doormats are made from. When it is bound in a tightly compressed roll it provides a rooting substrate for marginal plants. The coir rolls were to be secured to the outside of the Nico-span wall with further vertical posts. Their correct height in the water was to be achieved

by positioning them on hazel faggots (three metre long bound bundles of cut hazel brushwood).

The erection of duck-proof netting was also to be required from the outset in order to prevent the pre-planted rolls from being degraded by duck feet and their faeces, or the plants within the coir rolls being eaten by the ducks. Chicken wire netting was to be positioned so that the ducks could not rest upon the rolls or nibble at fresh shoots.

The Desilting Phase

This was largely as one would expect. However, the reach of the Atlas excavator was little more than ten metres so the very middle of the Brook could not be reached. The wet silt was dropped behind the Nico-span wall and filled to the appropriate level and left for twenty four hours to dewater. The silt would settle down and a further load could be dredged and deposited.

In order to create a smooth transition from the water to the top of the Green, and also to firm up the silt in places, several tonnes of topsoil were brought on to the site. A suitable gradation was created from the top of bank down to the water's edge.

As the Green is an area that is well used by the public, a special membrane was laid on the seeded topsoil to create a reinforced turf (the effect is similar to the "grasscrete" product but much less intrusive). The seed that was sown on this area was a native wild flower meadow mix, EM1, obtained from Emorsgate Seeds.

The Greening Phase

This phase took place in two stages. In January 2004, volunteers were used to position one hundred and four pre-planted coir mats. These mats gave cover to the exposed silt and would reduce the amount of washout if the water level rose rapidly. The imbedded plants would assist rapid vegetation cover. Five hundred potted plants of Greater Pond Sedge (*Carex riparia*), Lesser Pond Sedge (*Carex acutiformis*), Yellow Flag (*Iris pseudacorus*), and Reed Canary Grass (*Phalaris arundinacea*) were also planted in a random arrangement in the deposited silt.

In order to diversify the selection of plants, and to give a greater amount of colour throughout the year, a further five hundred plants were purchased from a specialist supplier of native plants. These plants were planted out in June 2004 by a further group of volunteers.

The selection of plants was made to include some that could also tolerate drier conditions and could thus be planted slightly higher up the bank of the Green. The desired effect was to create a lush marginal fringe of aquatic plants followed by those tolerant of damp soil leading to a two metre strip of sown meadow mix. **Table 2** shows the range of species that was introduced. A mixture of pot grown plants and plugs was used in order to provide a visual impact within the first season.

Partnership Working

The project demonstrated an excellent example of partnership working. The District Council's Ecology Officer was able to provide an innovative solution to a particular problem at Histon Green. The proposed technique was then refined with the input of the Land Drainage Manager and the Parish Council. The Environment Agency was able to supply a very large amount of coir rolls, pre-planted mats and pot grown plants. The Parish Council were able to co-ordinate the purchase of further specialist materials and hold them until required. The Parish Council were also crucial to undertaking the process of local liaison and raised a significant amount of money. Notices were erected of the proposal, including an artist's impression of the end result. The level of local support and interest was also particularly encouraging, particularly through the Red Lion pub's "Beer Festival Brook Fund".

The level of funding contribution can be summarised as such:
£8,500 from Parish Council (including Red Lion fund)
£6,500 from Environment Agency (estimate of materials provided)
£1,000 from SCDC's Wildlife Enhancement Scheme

£16,000 Estimate of total project cost
Plus one week of labour from SC Land Drainage Team

Table 2 – Introduced plants

Ajuga reptans	Bugle	*Mentha aquatica*	Water Mint
Alisma plantago-aquatica	Water Plantain	*Myosotis scorpioides*	Water Forget-me-not
Angelica sylvestris	Angelica	*Polygonum amphibia*	Amphibious Bistort
Butomus umbellatus	Flowering Rush	*Pulicaria dysenterica*	Fleabane
Caltha palustris	Marsh Marigold	*Scrophularia auriculata*	Water Figwort
Carex pendula	Pendulous Sedge	*Stachys palustris*	Marsh Woundwort
Epilobium hirsutum	Greater Willowherb	*Valeriana officinalis*	Valerian
Eupatorium cannabinum	Hemp Agrimony	*Veronica beccabunga*	Brooklime
Filipendula ulmaria	Meadowsweet	*Cardamine pratensis*	Cuckoo Flower
Iris pseudacorus	Sweet Flag	*Centaurea scabious*	Greater Knapweed
Juncus inflexus	Hard Rush	*Galium verum*	Lady's Bedstraw
Lycopus europaeus	Gypsywort	*Succisa pratensis*	Devil's-bit Scabious
Lythrum salicaria	Purple Loosestrife		

Measuring the Success of the Project

The involvement of the Histon Parish Council meant that all local people and residents living adjacent to the Green were fully informed of the project before it had started. The undertaking of the project should be considered a success as no letters or calls of complaint were received.

The growth of the plants within the coir rolls was satisfactory with regard to the above water growth as the desired “green fringe” was achieved by mid-July. However, the amount of underwater growth in the form of roots penetrating out and down in to deeper water was slower than expected. In the second season one would expect dense root systems to become apparent. These in turn should provide a habitat for macro-invertebrates and fish. Sweep net sampling should be undertaken to assess this in spring and summer 2005.

Due to the silty and unknown hazardous nature of the pond (such as dumped bicycles) it would have been rather difficult to undertake an electric fishing survey prior to the desilting, thus there are no fish data for the pond. However, no fish mortalities occurred in the summer of 2004, as had been the case in many previous years. A fish survey of the pond would be an interesting starting point for measuring the future recovery of the pond’s fauna.

The duck-proof netting performed satisfactorily. The ducks were prevented from eating the new shoots of the plants and from trampling the young plants. At the time of writing (Jan 2005) the net fronting the coir rolls is still in place in order to reduce the impact of the increased number of over-wintering ducks that use the pond. It is hoped that the entire netting can be removed by spring 2005.

It will be interesting to undertake a survey of the plants known to have been introduced to the site in 2004. It is likely to take several years for the seed mix to become properly established.

Mare Fen - A brief history of a wet place

Tim Parish

OS Sheet 154 TL 366 698 – 42 acres (17 hectares) of species-poor meadow liable to flood (Reserve no. 47).

The above description would not generate much interest either to visitors or potential purchasers; however it does put the site on the map.

Mare Fen is a remnant of the vast tracts of marsh and wet grassland which used to border the River Great Ouse as far downstream as Over and then spreading across the fens to Ely and beyond. For centuries the flood waters of this river system have been increasingly confined to the river corridor in the interests primarily of improved agriculture. This has lead to more rapid, frequent and deeper flooding.

By the time the Act of Enclosure for Swavesey was implemented in 1838, the Bedford Level Corporation Barrier Bank linked the high ground of Over with a continuous bank channelling the River Great Ouse to the sea. This protected the fens of Over, Willingham and Ely from flooding, but placed Swavesey, and areas up-stream, in the mouth of a funnel. The river flow which used to spread across the flood-plain was now confined to a relatively narrow channel which is in fact tidal up to Brownshill Staunch near Over.

As part of the Act of Enclosure, a plan was devised to reduce the risk of flooding in Swavesey Fens by straightening the existing meandering water courses and embanking sections of the fens to form separate sub-catchments, receiving only the rain falling on that area. Each one had an internal ditch system linked to the main drainage channels by one or more narrow wooden sluice gates known as “fobs”. These discharged into the improved channels carrying the water from surrounding higher ground and could be opened and closed manually when river levels were appropriate. Most of these sub-catchments were sub-divided by hedges and ditches into small fields for arable and mixed farming, which gradually became less successful as flooding increased. Mare Fen was apparently never sub-divided, but had an internal ditch network created with drainage, controlled again by fobs. It therefore remained an extensively managed area of wet grassland, perhaps so wet that the name used by many of the local residents - ***Mere Fen*** - may have been more appropriate.

For many years Mare Fen was the site of choice for the local and national speed ice-skating championships, featuring a course of one and a half miles in only three turns. The owner was expected to flood the Fen, if possible from December, until there was little chance of severe frost. There was great rivalry between skaters from Swavesey and Over (Mare Fen) and skaters from Earith who wanted the skating on their site (Bury Fen). This lead to late night sabotage raids to lift the fobs or sluices to release the flood water and ruin the ice. In the 1920s there were prolonged periods of skating in most years, with up to six weeks on one occasion when special trains were operated from Cambridge to Swavesey Station for the benefit of undergraduates and Cambridge people. Ice-skating was a boost to the local economy: the supply of refreshments; the repairing, sharpening and selling of ice-skates; looking after horses and subsequently the providing of car-parking.

From the late 1950s to 1985 unpredictable winters in terms of flooding or frost, or both, combined with changes of ownership, led to attempts to minimise flooding and improve the pasture. Herbicides and fertilizers were used and one owner even ploughed a trial furrow across the Fen with a view either to re-seed grass or to grow arable crops. Fortunately for us the soil appeared unsuitable and the old pasture remained.

For several years prior to 1985, a pump drainage scheme had been proposed to include Cow Fen and Mare Fen, thus enabling the area to be used for arable farming. Local farmers were divided about this scheme, with many preferring the existing low-input hay and grazing regime. However, the scheme was

approved in 1985 in spite of local opposition and the fact that by then there was already a European “Wheat Mountain”.

As a result of pressure from Friends of the Earth, local conservation bodies and local people, the Ministry of Agriculture agreed that Mare Fen could be excluded from the scheme, although on the larger area, Cow Fen, it would go ahead. Cambridgeshire County Council, The Wildlife Trust and Countryside Commission were able to raise funds to buy Mare Fen, which was opened as a Local Nature Reserve by Sir David Attenborough in November 1985.

In February 1986 some 100 people attended an indoor workshop at Swavesey to learn about Mare Fen but very few braved the icy blast for an afternoon around the Fen. Controlled winter flooding over several years encouraged large numbers of wildfowl to use the shallow flood water and the “stars” of the “Save Mare Fen” competition – Bewick’s swans – were regular visitors. In recent years these swans appear to have abandoned Mare Fen in favour of the “Haute Cuisine” and larger audiences at Welney and the Ouse Washes.

Over the past ten years, winter flooding has often been difficult to achieve and control, with generally low river levels at the critical periods. Over the same period, flooding at undesirable times of the year, such as Easter, the autumn or March through to June, seem to have been more prevalent. The latter had disastrous effects on the grass sward and drain flora, smothering everything with black anaerobic silt and algae. Recovery from this has been slow and a profusion of docks and thistles makes it necessary to “top” the vegetation each summer.

The high summer water level in the improved internal ditch network is maintained by letting in water from the Swavesey Drain. The preferred source would have been Church End Drain on the other side of the Fen where the water quality is good, but summer flow proved inadequate. The summer flow in the Swavesey Drain is mainly from the Uttons Drove Sewage Treatment Works, 6km up stream. Although the nitrate and phosphate levels may be attenuated by up to 50% by the drain vegetation during the 6km flow to Mare Fen, the levels are still much higher than desirable. Nevertheless water is water and it is essential to maintain levels within 20cm of the surface of this wet fen vegetation. Nitrate and phosphate from water flowing into the Fen is further reduced as it flows along the internal drain system. This results in a very vigorous growth of marginal plants and a light-excluding scum of duck weed and algae, so there is a local price to pay for the more general wetting of the fen.

Since 1987 the same local grazier has used a small herd of mostly British White rare breed cattle to graze the Fen and the high water-table has assured a continuous supply of grass each summer. A conservation plan for Mare Fen under the Countryside Stewardship Scheme ensures that the best options for the site are maintained. In addition to controlled water levels, grazing is limited to one adult animal per acre and the grazing season is restricted to favour breeding waders and limit soil poaching by livestock. There is no use of fertilizers or herbicides except for the agreed spot treatment of noxious weeds. It is not cut for hay and the topping of parts of the pasture has been permitted in recent years until the recovering sward again dominates the high populations of docks and thistles.

Educational access was an important feature of the Countryside Stewardship Scheme and various information leaflets and guides for teachers were produced, but it seems that curriculum changes and the paperwork involved to get insurance and parental consent for such visits means that this facility will rarely if ever be used again.

After a century in which the climate does appear to have changed, and even the twenty years of Mare Fen as a local nature reserve, it seems that its value as a local amenity and as a winter wildlife haven will be realised less frequently.

Sympathetic management by restricted grazing and careful water level control should, however, retain and enhance its value as an example of wet fen grassland with its associated flora and fauna.

William Farren (1865 – 1952), taxidermist: do you know this man?

P A Morris

William Farren was a significant figure in local natural history circles and he left a legacy of his fine taxidermy from his trade, much of which still survives today. However, little seems to have been recorded about him. This article incorporates all that can be easily traced about William Farren, and serves as an invitation to anyone who may know more to get in touch with the author.

William had a taxidermy business in Regent Street, Cambridge (at number 23, 1900 – 1903, thereafter number 76). He was listed in Trade Directories from 1900 – 1925, but he had earlier (1897) been awarded a medal for his taxidermy and a trade label dated 1898 gives his address as 14 Market Passage. Dated examples of his work show that he was still active as late as 1940. His shop was always a centre for wildlife gossip, an important meeting place for professional and amateur naturalists alike.

Farren seems to have worked for Rowland Ward in London, and some of his early cases were of similar construction to Ward’s. The most distinctive style feature of Farren’s own cases of taxidermy was the painted backboard, which was often coloured with shades of yellowish-buff, with streaks of mauve. No other British taxidermist used this combination of colours to create a cloudy sky effect, but not all of Farren’s cases did either.

From 1901 until at least 1926 his trade label featured advice about checking for moth damage and offering to replace the specimen if such damage occurred within one year of preparation. Most of his work seems to have been birds, but also included a few fish and deer trophies. An album of photographs showing Farren’s work turned up for sale at an antiques fair in Cambridge in 1984. It includes a mounted horse head and a full-mount Orang-utan, but large items by Farren are rare, although examples of his birds are fairly frequent in the antiques

trade. Farren's letterhead indicates that he also dealt in Lepidoptera, birds' eggs and in dressing furs to be made into muffs and rugs.

Farren described himself as "Naturalist and Taxidermist", reflecting wider interests, and he was evidently closely associated with the University. He was an early member of the Cambridge Natural History Society and did not support the establishment of a separate Cambridge Bird Club, although he did later agree to become its President. He seems not to have published much; the only item so far traced being some recollections of Wicken Fen (Farren, 1932). In his teens he seems almost to have lived there, avidly collecting insects, and his memoir is full of detail about what he collected and with whom he worked. He is credited (Rothschild, 1983) with initiating Nathaniel Charles Rothschild's interest in fleas by supplying a specimen to him in 1889. (Charles later became a Cambridge undergraduate and notable entomologist).

Farren was also a keen photographer and one of his pictures (of Reed Warblers at their nest) was turned into a personalised postcard. The birds look real and are labelled as 'photographed from life'. For many years Farren gave the opening lecture at the start of the season to the Cambridge Photographic Club and illustrated accounts of his travels to Spain, the Scottish highlands and to the Dutch meres. Some of his photographs were published in the 'Weekly News' (4 July 1991) with acknowledgment to the University of Cambridge, with whom they had been deposited. 'The sparrowhawk in pictures' using Farren's photographs was published in this journal (Walters, M., 1994)

There appear to be no photographs of Farren himself, although a caricaturist friend drew him with a pronounced hooked nose and chin "that would meet when he was 70". This was hidden in later life by a small pointed beard. He seems to have been a pleasant man, with a white tie and infectious enthusiasm for everything related to natural history. He was a linchpin of the Cambridge Natural History Society, having progressively performed the rôle of all its officers, a vital link between amateurs and University academics. His specialist interest was in micro-moths, but he was also a significant ornithologist, a contributor (warblers and waders) to Kirkman's *British Bird Book*.

His father, also called William, was a well-known and indefatigable collector of insects, but later became a rose specialist. Although not a University man himself, William's own son had better educational opportunities and became Sir William Farren FRS, a distinguished aeronautical engineer.

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The performance of self-sown and planted ash *Fraxinus excelsior* trees in Girton Wood

Tim Sparks and Phil Croxton

Girton Wood (TL426624, 2.36 ha) is one of the Woodland Trust's "Woods on your Doorstep", see www.woodland-trust.org.uk. After acquisition, the former arable field was planted with a mix of native species in December 2000. Along the southern boundary a 10m strip was left unplanted to allow for natural regeneration. The adjacent hedge contains seven mature, live, ash trees that produced plentiful seedlings (>1/m^2 on average) in the strip.

In 2002 we recorded the heights of a sample of 147 self-sown ash trees in the strip and 74 planted ash trees in the area adjacent to the strip. The trees were individually marked with permanent marker pen on the tree guards. Unfortunately the permanent marker proved far from permanent. By 2003 the numbers were no longer legible and at the end of the growing season we recorded heights of a random sample of 66 live trees from both the self-sown and planted ash trees. In November 2004 we measured heights in a random sample of 60 trees from both types. The results are shown below.

When a tree sapling died it was not possible to determine the species that had occupied the tree guard and we failed to number the trees, as noted above. Hence our measurements do not measure growth, but they do measure the heights of the surviving population. These results suggest that natural regeneration may be a viable and cost-effective alternative to tree planting in new woods. The maximum height recorded in 2004 was 287 cm in the self-sown trees and 261 cm in the planted trees.

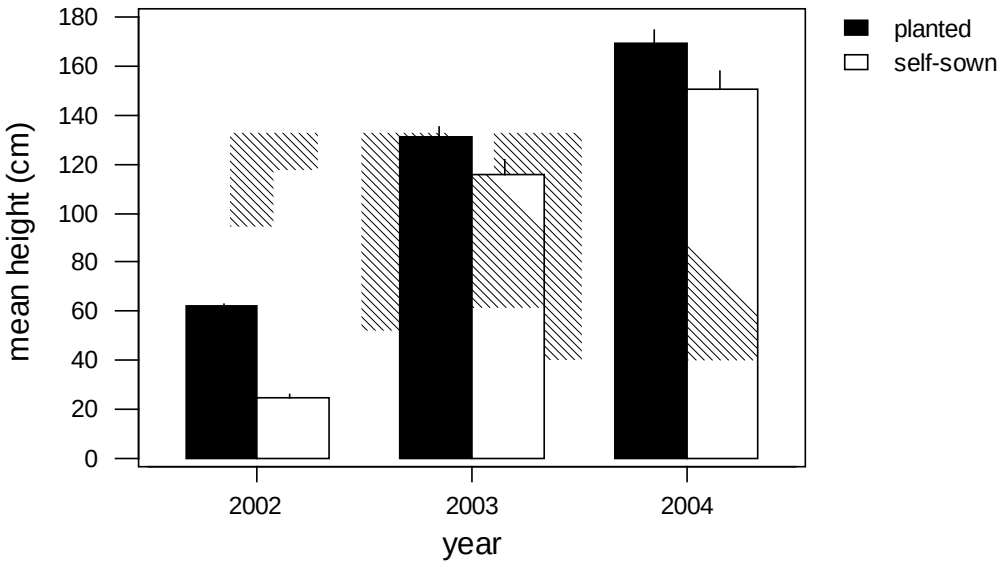

Figure 1. Mean (+SE) heights of ash saplings in Girton Wood

Doggett – the Cambridge animal doctor and taxidermist

P A Morris

F(rancis?) Doggett was a taxidermist, listed in Cambridge Trade Directories as being in business in Cairns Street between 1879 and 1916. A photograph of his establishment, with the man himself, turned up among the stock of a Surrey postcard dealer in 1992. Signs painted on the wall beside the front door show that he was operating an animal clinic as well as a taxidermy business, the latter being a poor advertisement for the former. The sign says ‘established 1867’, but this could have been under a previous proprietor. The ‘Cambridge Medical Institute for Animals Birds etc’ offered ‘operations carefully performed under anaesthetic’ and ‘attendance 10am to 10pm’. Doggett also apparently presided over an ‘institution for precise anatomy, ornithology, trophy mounting a speciality’, with advice given on the purchase of pets and poultry. Other photographs, labelled ‘Doggett of Cambridge’, show the same man handling a tame fox. The pictures show a small, middle-aged man with a drooping moustache, wearing boots and a cloth cap. His appearance is that of an artisan, not part of the academic or middle class fraternity like William Farren, another Cambridge taxidermist.

I know nothing else about him except that his son William accompanied Sir Harry Johnstone on his explorations in Uganda as a valued artist, taxidermist and photographer. (see **Johnstone, H.** (1902) *The Uganda Protectorate*. Hutchinson, London)

This short note is an invitation to anyone who may know more to get in touch with the author.

Vascular Plant Records

Alan Leslie

There can be little doubt that the star plant in this list is the record of Clustered Clover, *Trifolium glomeratum*, found last summer in the old Chippenham gravel pits by Bob Ellis & Robin Stevenson. This is a new native species for Cambridgeshire and was discovered growing in company with other very scarce plants on the Breckland fringe of the county including *Medicago minima*, *Vulpia ciliata* ssp. *ambigua* and *Hypochaeris glabra*. The late David Coombe found this clover at three sites just across the Suffolk border (at Cavenham in 1949, at Tuddenham in 1953 and at Icklingham in 1981), so phytogeographically this slight westward extension of range is not too surprising.

Equally welcome is the news that Ron Payne has unearthed another Fenland site for the fern *Ceterach officinarum*, this time on a wall at Whittlesey: our only other extant locality was his find at Outwell in 2002.

Although not reflected directly in the records listed below, which are largely confined to first and second records for the vice-county of Cambridgeshire (v.c. 29), there are a number of recorders who continue to send in invaluable updates on rare and interesting plants within the county. James Cadbury in particular continues his investigation of Sawston Fen, where he was able to confirm the presence of a range of plants, many of which have a long recorded history at the site: *Trifolium medium*, *Hydrocotyle vulgaris*, *Silaum silaus*, *Serratula tinctoria*, *Carex distans* and *C. nigra* amongst them. He promises a paper on the area for this journal in due course. His list also charts the continuing success of the Water Germander, *Teucrium scordium*, at two introduced sites (Kingfishers Bridge and Bassenhally Fen) and the decline of the native site at North Pit, Upware where shading by scrub and reed-swamp vegetation is taking its toll.

John Rathmell too has supplied recent counts for a host of rare and local plants, including *Veronica spicata* at Newmarket (8 spikes in 2004) and *Melampyrum cristatum* on the verge near Whitensmere Farm at Castle Camps, which he estimated at c1400 plants, crowding right up to the road edge.

The bulk of our new records are, however, once again aliens. Many of these we owe to Graham Easy who has been scouring his notebooks for plants not previously submitted. There are also still more cotoneasters continuing to be found birdsown in the county, whilst the old St Ives railway line produces yet more surprises: it will be a great loss if and when it disappears under the proposed guided bus scheme.

For the dedicated team of bramble enthusiasts our 2004 excursion with Alec Bull concentrated on visiting sites near Newmarket and Wicken for the new species mentioned in these notes last year. In the course of this investigation we stopped to eat our picnic lunches with Gigi Crompton at Swaffham Bulbeck, whereupon Alec discovered *Rubus surrejanus*, new to v.c. 29, growing uninvited in her drive! This was not the only isolated clump of a new plant for the county in 2004 as *R. scabripes* turned up in the centre of Cambridge city, passed by hundreds of people each day on their way to and from the Grafton Centre.

Two other significant events deserve to be mentioned here. Firstly the successful completion of the recording needed for the BSBI Local Change survey. The survey has raised mixed emotions nationally but the team of local recorders did a sterling job in covering our required squares and produced many useful records. Nick Millar has borne the brunt of co-ordinating our efforts and getting the records into a suitable state to pass on to the BSBI team. Secondly, 2004 saw the completion of Gigi Crompton's *magnum opus* – the *Catalogue of Cambridgeshire Flora Records since 1538*, which can be found on her website at www.mnlg.com/gc. This is an achievement that has taken many years of hard work; future botanists in the county owe her a huge debt for having sifted, ordered and entered so much data. No other county has a resource quite like it.

Do use it and be sure to pass on any new record, or an updating of an old one, either to me or Nick Millar.

Acroclinium roseum (*Helipterum roseum*) Refuse tip, Milton, TL478620, G.M.S. Easy, 1.10.1987, **Herb. G.M.S. Easy**. First v.c. record for this Western Australian annual grown for its white or pink 'everlasting' flowers.

Aralia elata Scattered on graves in graveyard of chapel, Gorefield, TF418119, G.M.S. Easy, 5.9.2004, **Herb. G.M.S. Easy**. First v.c. record for this shrubby, spiny, asiatic ivy relative.

Asarina procumbens Naturalised in several places on SE-facing side of a brick wall behind 54 Coronation Street, Cambridge, TL45575757, A.C. Leslie, 23.5.2004. First v.c. record for the pale yellow-flowered Trailing Snapdragon.

Asphodelus fistulosus One flowering plant on waste ground at junction of Union Lane and Scotland Road, Cambridge, TL46195997, G.M.S. Easy, 12.9.2004, **Herb. G.M.S. Easy**. First v.c. record since 1875.

Calceolaria chelidonioides Invasive garden weed, Histon, TL436633, G.M.S. Easy, 28.8.1982, **Herb. G.M.S. Easy**. First v.c. record for Slipperwort, a pretty yellow-flowered annual from S. America.

Ceterach officinarum About 12 small plants on an E-facing wall, Portland Place, Whittlesey, TL271968, R.M. Payne, 3.2.2003. Third v.c record: a remarkable find hot on the heels of the same recorder's discovery of this species at Outwell in 2002.

Chenopodium botrys Weed on Unwins showground, Impington, TL444635, G.M.S. Easy, 4.10.1985, **Herb. G.M.S. Easy**. First v.c. record for the Sticky Goosefoot.

Choisya ternata Waste heap, Gorefield, TF401101, G.M.S. Easy, 26.10.2004, **Herb. G.M.S. Easy**. First v.c. record for the shrubby evergreen Mexican orange.

Clarkia amoena Refuse tip, Waterbeach, TL482685, G.M.S. Easy, 22.7.1973, **Herb. G.M.S. Easy**. First v.c. record for a colourful North American annual, perhaps better known as Godetia.

Cotoneaster bacillaris Several plants birdsown along railings of St John's College sports ground, Madingley Road, Cambridge, TL44215904-44325901, A.C. Leslie, 25.7.2004, **CGE**. Second v.c. record for this deciduous, black-fruited species. The parent is planted nearby.

Cotoneaster boisianus One birdsown shrub in the crown of a pollard *Salix alba*, Sheep's Green, Cambridge, TL448575, A.C. Leslie, 7.9.2003, **CGE**, det. J. Fryer. First v.c. record of this bullate-leaved species with orange-red fruits.

Cotoneaster roseus Several birdsown shrubs at base of railings by old car park for Newmarket railway station, TL644626, A.C. Leslie & P.R. Green, 16.1.2005, **CGE**, det. J. Fryer (specimen collected by ACL 19.4.2003 from probable parent, planted nearby). First v.c. record and first UK record for another deciduous species

Cotula coronopifolia Garden centre weed, Shepreth, TL396464, G.M.S. Easy, 12.11.2004, **Herb. G.M.S. Easy**. Buttonweed has previously been recorded as a weed in the University Botanic Garden (1987) and Christ's College (1942) and is likely now to turn up elsewhere as a garden weed bought in with other plants.

Doronicum × *willdenowii* (*D. pardalianches* × *D. plantagineum*) One large patch now well-established in woodland beside Shepreth Road (just SE of A10), NW of Fowlmere, TL40304728, A.C. Leslie, 21.2.2004, **CGE**. First v.c. record for a garden hybrid Leopardsbane.

Dracunculus vulgaris Two plants beside brook, north of Brookfields, Cambridge, TL475576, G.M.S. Easy, 7.6.2004, **Herb. G.M.S. Easy**. Second v.c. record.

Dryopteris affinis Two large plants in now heavily shaded, overgrown old apple orchard, SE of Oakington Road, Cottenham, TL43476584, A.C. Leslie & J.L. Sharman, 28.11.2004. Growing with numerous *D. filix-mas* and *D. dilatata* and a reminder of the continued slow spread in the county of a species not recorded before 1964.

Elaeagnus macrophylla Apparently regenerating along a tree belt planted near Addenbrooke's Hospital, Cambridge, TL465550, G.M.S. Easy, 10.2.1992, **Herb. G.M.S. Easy**. First v.c. record for this evergreen shrub: an earlier record from Chesterton sidings is now considered to be *E. umbellata*.

Eragrostis cilianensis Soil heap at field edge, off Fen Road, Milton, TL482627, G.M.S. Easy, 14.10.2002, **Herb. G.M.S. Easy**. Second v.c. record.

Euphorbia serrulata Four plants on a wall, beside car park of Ickleton Lion (public house), Ickleton, TL49254370, A.C. Leslie, 4.7.2004. First v.c. record for an ornamental spurge that can rapidly approach weed status in cultivation!

Garrya × *issaquahensis* (*G. elliptica* × *G. fremontii*) One, presumably birdsown, shrub (c1 foot tall) at wall base, in front of St Alban's Roman Catholic School, Union Road, Cambridge, TL45495767, P.H. Oswald, 4.2004; **CGE** (specimen collected by A.C. Leslie, 23.4.2004). First v.c. record and probably first British record for an unusual evergreen garden shrub.

Gypsophila repens Pavement weed along river, Ely, TL544796, G.M.S. Easy, 2.10.2002, **Herb. G.M.S. Easy**. First v.c. record for this mat-forming perennial from the mountains of central and southern Europe.

Hedera colchica 'Dentata' Spread over a substantial area of woodland margin (and up trees) beside old railway, Histon, TL44286254, A.C. Leslie & P.R. Green, 24.10.2004. First v.c. record for this variant of the Persian Ivy.

Hibiscus syriacus Presumed self sown in gutter, Ditton Walk, Cambridge, TL474596, G.M.S. Easy, 21.8.1999, **Herb. G.M.S. Easy**. First v.c. record for another popular garden shrub, which despite its name is Asian not Middle Eastern in origin.

Hydrocharis morsus-ranae (a) Ditch close to Old Bedford River, SW of Mepal, TL43388088, C.J. Cadbury, 6.8.2003; (b) locally frequent in the Cradge Bank ditch, on SW side of Welney Road, TL533927, C.J. Cadbury, P.H. Oswald & U3A excursion, 25.8.2003: spread to several further neighbouring ditches, C.J. Cadbury, 9.2004. The first records for Frogbit from the Ouse Washes since 1973.

Impatiens walleriana (*I. sultanii*) Presumably self sown and growing along pavement slab joints, just SE of junction of Portugal Street and Park Parade, Cambridge, TL449590, G.M.S.

Easy, 29.10.2004, **Herb. G.M.S. Easy**. First v.c. record for the Busy Lizzie, a very popular hanging basket and bedding subject.

Ipomaea lacunosa Garden weed, probably of bird seed origin, 11 Landbeach Road, Milton, TL478632, G.M.S. Easy, 1985, **Herb. G.M.S. Easy**. First v.c. record for a species of Morning Glory.

Lathyrus heterophyllus var. *unijugus* Chalk pit, Cherry Hinton, TL4855, S.M. Walters, 13.7.1960, **CGE**, det. P.D. Sell, 2003. First v.c. record for the least common of the Everlasting Peas.

Lavatera arborea Several apparently self sown plants, on verge of Harvest Way, Cambridge, TL464589, A.C. Leslie, 11.1.2004, **CGE**. First v.c. record for the Tree Mallow.

Lychnis chalcedonica Waste ground, near Methodist Church, Gorefield, TF418119, G.M.S. Easy, 5.9.2004, **Herb. G.M.S. Easy**. First v.c. record for the Maltese Cross, a widely-grown scarlet-flowered herbaceous perennial.

Malus coronaria One 15ft shrub, possibly birdsown beside old railway line, NW of Milton Road level crossing, Cambridge, TL46506138, A.C. Leslie & P.R. Green, 24.10.2004, **CGE**. First v.c. record for an ornamental crab with some lobed leaves and large, very pale greenish yellow fruits.

Medicago minima About nine plants on the former Chippenham gravel pits site, Kennett, TL68436882, R.W. Ellis & C.R. Stevenson, 2.6.2004. First record from this site for this rare native since 1966.

Minuartia hybrida On walls, at wall bases and on roofs, Abbey Street, Ickleton, TL49294376, A.C. Leslie, 4.7.2004, **CGE**. Last recorded at Ickleton in 1860.

Orobanche hederae One plant opposite Henry Holt's grave, at south end of main walk, Mill Road cemetery, Cambridge, TL46155811, P.H. Oswald, 30.8.2002. A new site for the Ivy Broomrape, well known from the University Botanic Garden and around Girton college, perhaps overlooked elsewhere.

Pennisetum sphacelatum Pavement edge, Old School Lane, Milton, TL478627, G.M.S. Easy, 9.10.2004, **Herb. G.M.S. Easy**. First v.c. record for an ornamental African grass, best known as a wool alien.

Phlox paniculata Refuse tip, Thriplow, TL444447, G.M.S. Easy, 31.8.1971, **Herb. G.M.S. Easy**. First v.c. record for the perennial border phlox.

Poa annua f. *purpurea* (a) Weed in paving below window box, 20 Norwich Street, Cambridge, TL 45575744, A.C. Leslie, 11.3.2004; (b) frequent weed in pots and on standing ground, Monksilver Nursery, Oakington Road, Cottenham, TL437663, A.C. Leslie, 13.3.2004. First and second v.c. records for this purple-suffused variant of Annual Meadowgrass which is becoming a common nursery/garden weed.

Prunus mahaleb One large multi-stemmed tree beside old railway line, NW of Milton Road level crossing, Cambridge, TL46066160, A.C. Leslie, 26.10.2003, **CGE**. First v.c. record for the St Lucie Cherry; the status of the tree is unclear, but a smaller plant (c2½ ft tall) some distance away is likely to be self/birdsown from this parent.

Rubus phoenicolasius Weed in garden adjacent to Green Man (public house), Trumpington, TL446552, G.M.S. Easy, 4.1988, **Herb. G.M.S. Easy**. First v.c. record for the Japanese Wineberry and clearly birdsown from a quantity present in the pub garden.

Rubus scabripes Beneath planted shrubs, S side of New Square, Cambridge, TL45475861, A.C. Leslie, 13.6.2004, **CGE**, det. A. Newton. First v.c. record for a bramble whose main distribution is in SW England, S Wales and parts of the Midlands. Many other birdsown, berried shrubs also present here so it may have had a similar origin.

Rubus surrejanus Presumably birdsown on side of drive, 103 Commercial End, Swaffham Bulbeck, TL557624, A.L. Bull, 23.6.2004, **Herb. A.L. Bull**, conf. A. Newton. First v.c. record for a species with a few other East Anglian records, but chiefly found in more southern counties.

Salix × *sepulcralis* nothovar. *chrysocoma* One multi-stemmed small tree in ditch on W side of old railway, just SE of A14 bridge, King's Hedges, Cambridge, TL45516189, J.L. Sharman, 3.2004; **CGE** (specimen collected by A.C. Leslie, 21.3.2004). Widely recorded as a planted tree in the county, but this seems to be the first record of this yellow-twigged willow that must have arisen independently, perhaps from windblown twigs, as its positioning seems to rule out deliberate introduction.

Scutellaria rubicunda One plant on brick wall, opposite signal box on March to Peterborough line, Whittlesey, TL244971, R.M. Payne, 7.2003, det. K.A. Beckett (from plants grown from seed from this site). First v.c. record for a skullcap originating in C. & S. Italy and the Balkans and closely related to the more familiar *S. altissima*. Probably the first British record.

Solanum villosum subsp. *miniatum* Weed in school grounds, Coton, TL4058, S. Wilkins, 12.2004. Record communicated by J.L. Sharman, det. A.C. Leslie. First v.c. record for this eglandular form of Red Nightshade.

Sutera cordata Self sown on pavement/building edge, old market, Wisbech, TF460097, G.M.S. Easy, 24.10.2004, **Herb. G.M.S. Easy**. First v.c. record for what is currently a very popular hanging basket plant: a white-flowered, African member of the *Scrophulariaceae*.

Tellima grandiflora Base of wall, Trinity Lane, Cambridge, TL447586, A.C. Leslie, 25.7.2004. First v.c. record.

Thuja occidentalis Self sown in pavement some distance from hedge of probable parent, path off Mulberry Lane, Chesterton, Cambridge, TL457602, G.M.S. Easy, 12.9.2004, **Herb. G.M.S. Easy**. First v.c. record for a conifer rarely recorded as self-seeding.

Thymus vulgaris Self sown in gutter, in front of 49 Parsonage Lane, Burwell, TL58596665, A.C. Leslie & P.R. Green, 14.11.2004. First v.c. record for an upright shrubby thyme, grown as a garden herb.

Trifolium glomeratum One plant on a bank within the old Chippenham gravel pits, Kennett, TL68416881, R.W. Ellis & C.R. Stevenson, 2.6.2004. First v.c. record and fulfilling an expectation expressed in the 1964 Flora that this species 'may well be found in the Chippenham area'.

Bryophyte records

C.D. Preston and M.O. Hill

A notable feature of the Cambridgeshire bryophyte records in recent years has been the steady trickle of new vice-county records. Most of these have been well-understood native species, rather than invasive aliens or the results of taxonomic revisions. The fact that we are still adding such species to the county list after many years of relatively intensive study probably reflects in part the difficulty of detecting small plants which are sometimes found in cryptic habitats, and in part the changing distributions of species which are readily dispersed and are spreading into the county in response to changing environmental conditions. This year we report no fewer than five species new to the county. Two of these were discovered by Robin Stevenson in his study of the bryophytes growing in East Anglian orchards; the remaining three were detected during fieldwork for the proposed new bryophyte flora of the county.

We are now more than half way through the planned 10 years of fieldwork for the new flora, and the coverage achieved so far is summarised in Figure 1. In connection with this project, we have started to re-examine herbarium specimens of the species that have not been recorded in the county since 2000. J.J. Graham joined us to check Cambridgeshire material of some wetland Amblystegiaceae at a taxonomic workshop led by L. Hedenäs at Anglia Polytechnic University in February 2005, and some results of this investigation are included below.

Mosses

Campylium stellatum var. *stellatum* Gamlingay, 27.4.1827 and 29.5.1838, Mus. Henslow, **CGE**, conf. L. Hedenäs & M.O.H. Although this taxon is recorded from several 10-km squares since 1950 in the 1964 *Flora* and the 1983 *Checklist*, these fine fruiting specimens appear to be the only correctly named specimens from the vice-county. There are earlier records in Relhan's Floras from 'Turfy Bogs' at Hinton, Chippenham and Shelford Moors which may also be correct, but all later specimens in CGE are misidentified. These include material from Great Abington, which is *Drepanocladus polygamus* (see below), and plants from Chippenham Fen (1990), Quy Fen (1955), Thriplow marsh (1956), Wicken Fen (1951, 1957) and Wilbraham Fen (1880) which are var. *protensum*. Although there are numerous records of var. *stellatum* which are not supported by specimens, especially from Wicken Fen, there is no reason to believe that they are any more reliable. Var. *stellatum* must therefore be regarded as extinct in Cambridgeshire. These varieties are now treated as species by many authorities.

Drepanocladus polygamus Old gravel pit, Great Abington, TL524491, H.L.K. Whitehouse, 27.1.1957, **CGE** as *Campylium stellatum*, redetermined by J.J. Graham & M.O.H., 2005. This provides an additional historical record for this species in the county. It has not been seen since 1957, when it was collected at Wicken Fen as well as Great Abington. The record from TF40 in the 1964 *Flora* must be deleted – it is based on a specimen in **CGE** from Gray's Moor Pits, TF414007, collected by B. Reeve on 3.10.1959, which has been redetermined by M.O.H. as *Leptodictyum riparium*.

Hennediella macrophylla Steep, eroding bank of River Kennett near Upend, TL702579, M.O.H., 13.3.2005. Trampled, shaded soil at base of lime trees near entrance to Clare College, Queen's Road, Cambridge, TL443583, C.D.P., 19.3.2005. This alien moss was first found in Cambridgeshire in 2003 on a trampled path in Ely. It grows in a number of tourist attractions near the Thames in London, including Hampton Court and the Kennedy Memorial at Runnymede, so it has always seemed a likely species to spread to Cambridge. However, its discovery in a semi-natural habitat by the Kennett was less predictable.

Herzogiella seligeri Decaying log immediately south of main ride, Hardwick Wood, TL353576, M.O.H., 6.2.2005. The only previous records of this species since 1970 have been from Chippenham Fen.

Leucodon sciuroides Base of apple tree in old orchard N. of Rummers Lane, Wisbech St Mary, TF416075, C.R. Stevenson, 12 & 19.5.2004. Although *L. sciuroides* is known on stone substrates in a few places in the county, this is the first record as an epiphyte since E.W. Jones found it at two sites in 1933: on the base of a tree at Barrington and on an oak near Stetchworth.

Pylaisia polyantha Fruiting plants on apple trees in old orchard N. of Rummers Lane, Wisbech St Mary, TF414074, TF415074 and TF417074, C.R. Stevenson, 12 & 19.5.2004, **BBSUK**, conf. G.P. Rothero. The first vice-county records of an uncommon epiphyte.

Rhynchostegiella curviseta Silty brickwork under bridge over R. Kennett near Upend, TL702580, M.O.H., 13.3.2005. This pleurocarpous moss is rare in East Anglia, and in our county has hitherto been found only in Cambridge. It still (2005) survives in at least one of its Cambridge localities, Little St Mary's churchyard.

Rhynchostegiella teneriffae Fruiting plants with *Fissidens crassipes* and *Rhynchostegium riparioides* just above the water level on bridge over R. Mel, Melbourn village, TL380449, M.O.H., 13.3.2005. The second vice-county record of a species which, like *R. curviseta*, was hitherto known only from Cambridge city.

Sanionia uncinata Apple tree in old orchard N. of Rummers Lane, Wisbech St Mary, TF415074, C.R. Stevenson, 12.5.2004, BBSUK, conf. G.P. Rothero. Apple tree in orchard planted c.1916, S.W. fringe of Wisbech, TF447076, C.R. Stevenson, 30.12.2004. The first vice-county records of an epiphyte which may be spreading in eastern England.

Scleropodium cespitans Abundant at the edges of old asphalt drive and in a band along the centre of the drive, entrance to Moat Farm, Upend, TL701585, M.O.H., 13.3.2005. We have reported the rediscovery of this species in its natural habitat, trees by water, in the last three reports. In the highly artificial habitat at Upend it was accompanied by two other species which also appear to spread from riverside habitats to asphalt paths, *Didymodon nicholsonii* and *Syntrichia latifolia*.

Seligeria donniana Plants with dehiscing capsules on chalk pebble in rabbit hole on S-facing chalk grassland slope, Devil's Ditch N. of A1304, TL6161, R.J. Fisk, 19.2.2005, **BBSUK**, conf. G.P. Rothero. New vice-county record. Two species of *Seligeria* are well-known on chalk in the county but *S. donniana* is generally regarded as avoiding chalk, although it occurs on northern limestones and more locally on other calcareous rocks in Britain. Richard Fisk found it by putting his hand in the rabbit hole and bringing out for examination any chalk

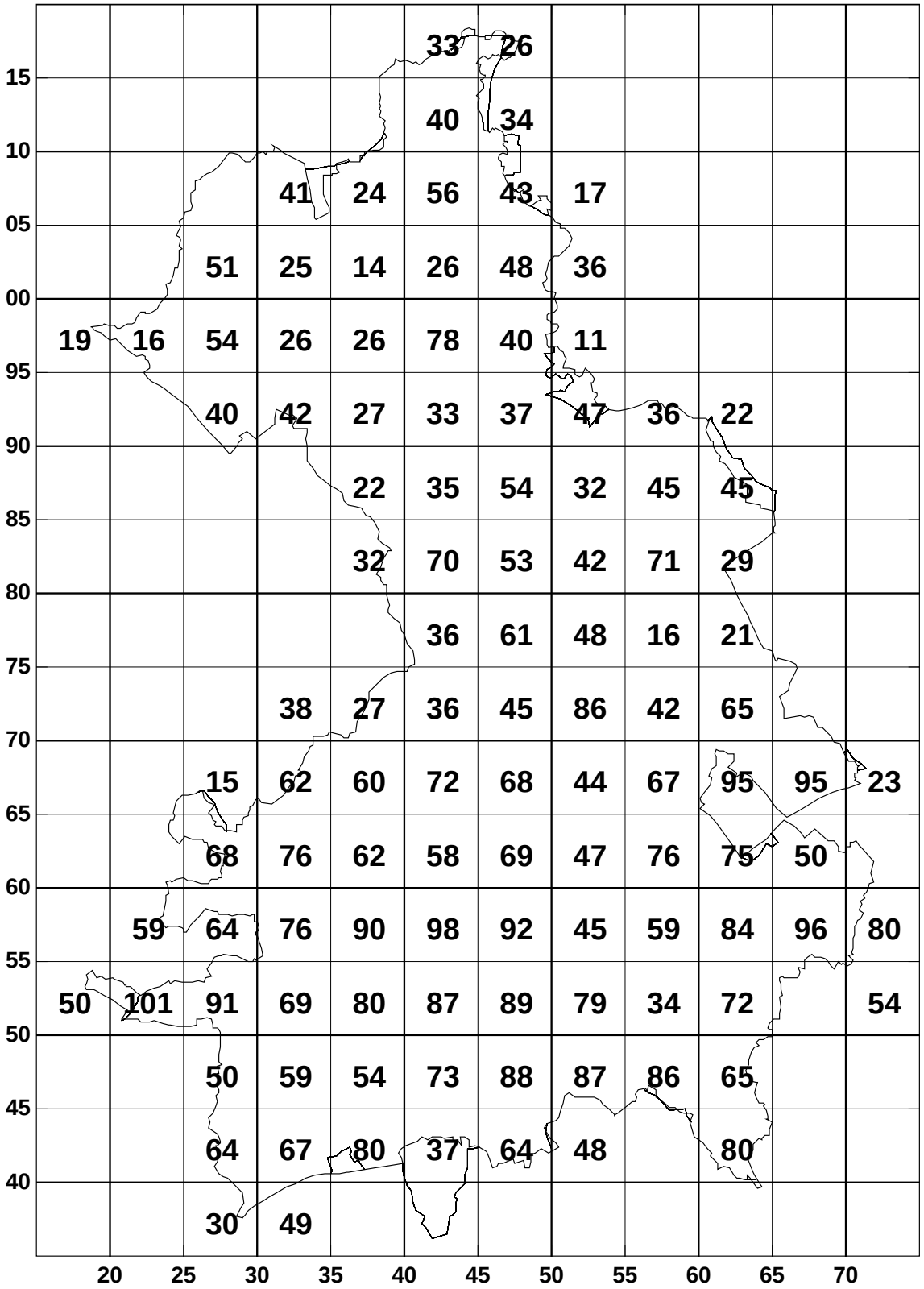

Figure 1. Number of bryophyte taxa recorded in each 5 x 5 square, 1 January 2000 – 3 April 2005.

stones he could feel; it is not surprising that it has escaped less thorough observers at this well-known locality.

Syntrichia latifolia Plants abundant, and fruiting sparingly, on elders in scrub by footbridge over R. Cam, Croydon, TL306475, M.O.H. & C.D.P., 2.4.2005. This species has not previously been found fruiting in the county; indeed, it was one of the species "in which capsules are of very rare occurrence in the British Isles" listed in the 1964 Flora. The fruits had not dehisced in the field, but were clearly about to do so as one dehisced in M.O.H.'s collecting tin on his journey home.

Thuidium philibertii Unimproved, slightly calcareous back garden lawn, 51 Hills Avenue, Cambridge, TL468561, J.J. Graham, 4.2001, det. M.O.H. Edge of lawn by oolitic limestone balustrade, Longstowe Hall, TL308557, C.R. Stevenson, 17.10.2004. Scattered stems at marshy edge of calcareous pool, with *Campylium protensum, Drepanocladus aduncus, Fissidens adianthoides* and *Mentha aquatica*, Bassenhally Pit, Whittlesey, TL287985, J.J. Graham & P. Stroh, 23.3.2005. This species was formerly known from the lawn at Hildersham Hall, where it appears to be extinct; these new records are therefore particularly welcome. The 2001 record was inadvertently omitted from our earlier reports.

Zygodon rupestris Near base of ash in secondary woodland, N. side of chalk pit, Morden Grange, Steeple Morden, TL296402, C.D.P., 2.1.2005, **BBSUK**, conf. G.P. Rothero. The first vice-county record of the rarest of the three widespread *Zygodon* species in England.

Liverworts

Cephalozia lunulifolia With *Orthotrichum lineare* on rotting tree stump, Hardwick Wood, TL353576, C.D.P., 6.2.2005, **BBSUK**, conf. T.H. Blackstock. This is a new vice-county record for a calcifuge species which is rare in East Anglia and the English Midlands. The plants at Hardwick were highly gemmiferous.

Lophozia perssonii On the surface of chalk rocks and on thin soil over chalk, with *Leiocolea turbinata* and *Seligeria calcarea*, Station Quarry, Steeple Morden, TL300388, C.D.P., 4.12.2004. This is the third Cambridgeshire locality for this rare liverwort, which was still present in small quantity at Cherry Hinton in 2001 but has not been seen at Fleam Dyke since 1981.

BOOK REVIEWS

Freshwater fishes in Britain: the species and their distribution. Compiled and edited by C. Davies, J. Shelley, P. Harding, I. McLean, R. Gardiner and G. Peirson. pp. 176. Harley Books, Martins, Great Horkesley. 2004. Hardback. £25.00 ISBN 0-94658-976-3

This book is much more than just an atlas of fish distribution. After comprehensive, useful and readable introductory chapters, each fish species receives its own account, written by an appropriate author. The inclusion of accurate 10km square grid distribution maps alone makes this book of use to anyone interested in British freshwater fishes, but this is supplemented by

information on fish morphology, biology and behaviour, habitat, world distribution, status, hybrids, relatives and information on commercial and other human values. A fascinating read, full of wonderful titbits of information: Tench (*Tinca tinca*) used to be known as 'nurse fish' because of the purported healing properties of mucus on their skin, Sturgeon (*Acipenser sturio*) caught in Britain must be offered to the reigning monarch and a research project is purported to have sampled Three-spined Stickleback (*Gasterosteus aculeatus*) with a shotgun! The distribution maps are worth special mention as they show historical trends in distribution, a very useful feature and quite alarming for some species. These maps are accompanied by notes on the patchiness and variation in data collection.

The book closes with a chapter on conservation and management followed by a series of very useful appendices listing useful publications, relevant legislation, online resources and a glossary. There is also an interesting bookmark, A5 in size, listing the rod-caught records for the fishes in the book. Cambridgeshire can be proud of its record, with the largest Bleak (*Alburnus alburnus*), Zander (*Sander lucioperca*), Bitterling (*Rhodeus sericeus*) and Three-spined Stickleback, the latter weighing in at a mighty 7 g, a record that may well be broken any day now.

A review would not be complete without a note of some omissions I would have liked to have seen. There is no key for identification, although an excellent one is available in Maitland & Campbell (1992). Only three of the 16 colour plates in the introduction, showing habitats and sampling methods, contain fish, and all of them are pictures of salmon. Personally I would have preferred diagnostic colour pictures, especially of some of the rarer fishes. Finally there seem to be some curious omissions. There is a check list of species in the introduction and five of these fail to get their own entries in the book; Houting (*Coregonus oxyrinchus*), Silver Carp (*Hypophthalmichthys molitrix*), Pink Salmon (*Oncorhynchus gorbuscha*), Bass (*Dicentrarchus labrax*) and Rock Bass (*Ambloplites rupestris*). The absence of Houting is explained. Silver Carp and Pink Salmon may have been omitted because they are introduced species but then other introduced species have entries. Rock Bass may have been omitted because it is thought to be extinct in Britain but then so is the Redbelly Tilapia (*Tilapia zillii*) which has its own entry. I look forward to seeing these entries in the next edition.

I am very glad to have this book on my shelf and expect to be dipping into it on a regular basis. I can recommend it unreservedly as an essential resource to anyone interested in the fishes of Britain, be they anglers, river managers, biologists or natural historians.

Maitland, P.S. (1972) A key to the freshwater fishes of the British isles. *Scientific Publications of the Freshwater Biological Association.* **27**, 1-137

Maitland, P.S. & Campbell, R.N. (1992) *Freshwater Fishes*. Harper Collins.

Toby Carter

100 Years of Plant Sciences in Cambridge: 1904–2004

Peter J. Grubb, E. Anne Stow & S. Max Walters. Department of Plant Sciences, University of Cambridge, 2004; designed and printed by Cambridge Printing (CUP). 32 pp. and card cover with flap, with text, photos and drawings. Unpriced. No ISBN.

This attractively produced booklet was published "to celebrate the centenary of the University building that houses the Department of Plant Sciences or, to use its earlier name, the Botany School". But it "also commemorates the life and work of Harry Marshall Ward, whose vision led to the opening of the new building by the King and Queen on 1 March 1904". We are immediately told that his story is both remarkable and tragic: he was elected FRS at the age of 34, "transformed his branch of botany", phytopathology, and died at the age of 52, apparently from the effects of diabetes, after being Professor of Botany from 1895 till 1906. After working in Ceylon, where he proved that the rust fungus *Hemileia vastatrix* (literally the female layer-waste) caused the leaf-fall disease then ravaging the coffee plantations, back in Britain he "conducted an amazing number of seminal studies on parasitic, saprophytic and mutualistic fungi".

Ward's predecessor, C.C. Babington, had clung on to the Chair until the age of 87, ignoring "the exciting new discoveries being made in Germany in both the morphology and the physiology of plants" and showing interest only in his Herbarium. So the time was ripe for modernisation, which had begun with the appointment of the physiologist S.H. Vines as Fellow and Lecturer of Christ's College in 1876; but what was most needed was adequate accommodation. The third chapter of this booklet, by Anne Stow, ably outlines the previous history of buildings for Botany and the story of the present building on the Downing Site, designed by W.C. Marshall, "erected on a steel frame" and costing over £25,000.

Most of the remainder of the booklet is devoted to a series of brief histories, most of them by Peter Grubb, of "seven major sub-disciplines" (Plant Systematics, Morphology, Microbiology and Plant Pathology, Physiology, Genetics, Ecology and Quaternary Studies), followed by accounts of "the parts played by the Assistant Staff, and by the Botanic Garden [by Max Walters, a former Director], for teaching and research across the whole subject". In these pages appear potted accounts, with photographs or portraits, of twenty giants of the past, including (in the order in which they are given) Humphrey Gilbert-Carter, all three of the trio of his pupils who produced what was till 1991 the standard British Flora (Clapham, Tutin & Warburg), Agnes Arber of *Herbals* (1912) fame (only the third woman to be elected FRS but never given a post in the Department), E. John H. Corner, Professor F.T. Brooks, Professor Percy Brian of antibiotics fame, the plant physiologist F.F. Blackman and his student Professor G.E. Briggs, the early geneticist Edith Saunders (Fellow of Newnham

but again never a member of the Department), the ecologists Sir Arthur Tansley and A.S. ('Sandy') Watt, and Professor Sir Harry Godwin.

Clearly it was convenient to divide the book up into discrete chapters, but this treatment fails to emphasise what has been one of the greatest strengths of Cambridge Botany, namely its interdisciplinary nature, though admittedly there are a few references to past botanists within chapters other than 'their own' (e.g. to John Corner under "nature conservation" in the Plant Systematics chapter and concerning tropical fungi under Microbiology and Plant Pathology, as well as in Morphology) and Godwin's interdisciplinary approach is mentioned (though in the context of "uniting ecologists with geologists and archaeologists"). It seems particularly sad that the Sub-Department of Quaternary Research, which he founded in 1948 and which his pupil Professor Richard West carried forward into new territory, was hived off in 1998 partly to Earth Sciences and partly to Geography. However, it is encouraging that the chapter entitled 'Recent developments and future plans', by Professors John Gray and Roger Leigh, says that "the emphasis on individual achievement is changing to one that promotes more collaborative interactions between groups".

Lest present members of the Department be discouraged by the galaxy of past luminaries, they may be reassured by the statement that the authors "say little about those who are doing outstanding work now" and they can admire the cheerful faces of no less than five current Professors under the flap of the front cover.

Philip Oswald

Weather Notes for Cambridgeshire 2004

John Clarke

JANUARY Changeable, mild and wet to 27th. Frost with snow showers and thunder in the last four days. Three days with snow lying. Rainfall more than one inch above average. Mean minimum temperature above average. Mean maximum temperature average.

FEBRUARY Unsettled and very mild (63° F on 4th) to 9th. Anticyclonic, fine and settled, mild at first becoming colder with night frost after 21st. Unsettled after 27th with snow and sleet showers in the last three days. Rainfall average. Mean minimum temperature 3° F above average. Mean maximum temperature about average.

MARCH Anticyclonic and fine with sharp night frosts (22° F on 1st) in the first three days. Mainly unsettled and mild thereafter to the end of the month. Rainfall slightly below average. Mean minimum temperature 4° F above average. Mean maximum temperature slightly above average.

APRIL Changeable and wet to 11th. Anticyclonic and fine thereafter, apart from unsettled 18th – 22nd, and wet last three days. Rainfall half an inch above average. Mean minimum temperature 3° F above average. Mean maximum temperature 3° F above average.
MAY Unsettled, dull and wet to 11th. Anticyclonic, fine and warm thereafter to the end of the month. Rainfall average on 11 days. Mean minimum temperature 1° F above average. Mean maximum temperature about average.
JUNE Unsettled first four days. Anticyclonic, fine and very warm (87° F on 8th) to 18th. Changeable and rather cool thereafter. Rainfall 0.7 inches below average. Mean minimum temperature 3° F above average. Mean maximum temperature 3.5° F above average.
JULY Changeable, wet and often cool to 26th. Anticyclonic, fine and very warm in the last five days. Rainfall half an inch above average. Mean minimum temperature 1° F above average. Mean maximum temperature about average.
AUGUST Anticyclonic, hot (86° F on 7th and 8th) and humid to 8th, thereafter becoming unsettled and thundery to 31st, cooler in the last few days. Rainfall almost one inch above average. Mean minimum temperature 4° F above average. Mean maximum temperature 3° F above average.
SEPTEMBER Anticyclonic, fine and warm in first ten days (81° F on 5th). Unsettled thereafter, but with very little rainfall. Rainfall half an inch on seven days. Mean minimum temperature 3° F above average. Mean maximum temperature 2° F above average.
OCTOBER Unsettled and wet until anticyclonic and fine in the last two days. Rainfall one inch above average on seventeen days. Mean minimum temperature 3° F above average. Mean maximum temperature about average.
NOVEMBER Mainly mild with several anticyclonic fine spells and few night frosts. Rainfall average. Mean minimum temperature 2° F above average. Mean maximum temperature 1° F above average.
DECEMBER Anticyclonic, fine and mild to 15th. Changeable thereafter. Very little frost or fog. Rainfall a little below average. Mean minimum temperature 1° F above average. Mean maximum temperature 1.6° F above average.

Weather records at Swaffham Prior 2004

	Mean Max	Mean Min	Highest	Lowest	Rain (Inches)	Rain days	Thunder days
January	45.58	35.03	54 on 31st	24 on 28th and 29th	2.86	23	1
February	45.62	37.20	63 on 4th	24 on 26th	1.40	13	-
March	50.67	38.00	66 on 31st	22 on 1st	1.19	13	-
April	58.06	41.00	69 on 24th	32 on 11th	1.80	16	-
May	63.26	45.30	73 on 17th	35 on 22nd	1.75	11	-
June	70.50	51.80	87 on 8th	41 on 18th	1.32	7	1
July	71.33	53.06	82 on 29th	44 on 6th	2.74	13	2
August	73.90	56.13	86 on 8th	47 on 21st	3.16	17	7
September	68.46	51.50	81 on 5th	40 on 25th	0.50	7	-
October	58.67	45.48	64 on 5th	35 on 9th	3.06	16	1
November	50.30	39.32	57 on 3rd	26 on 21st	2.01	14	-
December	46.60	36.06	55 on 23rd	27 on 27th	1.37	9	-
Annual Means	58.56	44.15	Totals		23.16	159	12

Number of days over 80º F	11
Number of days over 70º F	78
Number of days with a maximum under 32º F	none
Number of days with a minimum under 32º F	46
Last air frost of the spring	11th April
First air frost of the autumn	14th November
Days with snow lying	3
Days with fog persisting all day	none
Warmest day	8th June (87° F)
Coldest night	1st March (22° F)