Hedgerow Survey in the parish of Overton Hampshire

Final Report

Overton Biodiversity Society

March 2005

Summary

Volunteers in the Overton Biodiversity Society carried out a 2-year hedgerow survey following the protocol developed by the Steering Group for the UK Biodiversity Action Plan for Ancient and/or Species-rich Hedgerows. Seventy-seven hedgerows were surveyed throughout the parish of Overton.

Most hedgerows surveyed were well established, 1 to 4 meters wide and over 2 meters high. One third of hedgerows were stockproof, one third had minor gaps and one third was leggy and/or had significant gaps. Most hedgerows (60%) showed signed of recent management (usually flailing or trimming) and those with no sign of recent management were relatively more 'gappy' and leggy.

Trees were not frequent in hedges but the most common species present were oak and ash. In the shrub layer, most hedgerows (61 out of 77) contained 5 or more woody species and thus may be called 'species-rich'. The most common species were hawthorn (found in 83% of hedgerows), blackthorn (71%) and bramble (65%). The body of these hedgerows was made for the most part of hawthorn (26% of the volume of hedgerows), blackthorn (19%) and hazel (13%) with non-woody climbers covering on average 11% of the hedgerows.

The ground flora was surveyed only in the second year (56 hedgerows). On average, 14 species were found per hedgerow. The most frequently occuring species were nettle (found in 73% of hedgerows) and cleavers (61%). Ivy and bramble were common woody species found among the ground flora (both found in 39% of hedgerows). Among grasses rough meadow grass and cocksfoot were the most common.

In most respects our local hedgerows were very representative of hedgerows of the chalky arable landscape of Southern England although, interestingly, they appeared to be more species-rich than the national average.

Acknowledgements

The Overton Biodiversity Society would like to thank all the people who contributed to this project whether by surveying hedgerows, granting access to their land or providing training and resources.

Freya Batchelor, Lawrence Batchelor, Mike Bird (of the Basingstoke & Deane Borough Council), Sue Bryan, Betty Burden, Shirley Cardus, Sue Carter, Mrs Church, Heather Cousins, James Crosbie-Dawson, Kath Doyle, Kevin Doyle, Brian Elkins, Margaret Elkins, Naomi Ewald (of Hampshire and Isle of Wight Wildlife Trust), Mike Fisher, Richard Gibbins, Ralph Hardy, Peter Harrison, Lindy Hatchard, Nick Hatchard, David Hewetson-Brown, Nandita Hoyes, Richard Hoyes, Jay Hutchins, Pat Hutchins, Peter Hutchins, James Kater, Veronique Kerguelen, Laverstoke Estate, Adrian Lewis, Liz Lewis, Liz A. Lewis, Richard Lewis, Jane MacKenzie, Ken MacKenzie, Joy McGregor, Melvyn Milks, Richard Oram, Overton Library, Overton Parish Council, Cyprian Paine (of the Countryside Council for Wales), Nigel Plumtree, Margaret Rainford, John Ross, Sarah Ross, Doris Shoprock, John Smith, Lucy Sloane Williams, Alan Stevens, Valda Stevens, Jim Stickland, Sandy Sykes, Adam Trickett, Elizabeth Ulph, Ian Van Houten, Timi Van Houten, Heritage Lottery Fund, Nationwide Building Society and the Countryside Agency.

Table of Contents

List of figures

1 INTRODUCTION

A hedgerow is defined as 'a line of one or more woody species, which may contain gaps, and includes associated vegetation of adjacent banks, ditches and/or field margins'. (Hampshire Biodiversity Partnership, 2000). Hedgerows are one of the most characteristic features of the British countryside. Of great importance visually, culturally and historically, they provide a rich habitat for many of our native species of plants and animals.

Over the years hedgerows have suffered as farming and land use practices have changed. The total length of hedgerows decreased by 28% in Britain between 1945 and 1974 (Vincent, 1990). This was followed by a net loss of 23% hedgerows (about 130,000 km) between 1984 and 1990. Between 1978 and 1990 on average one plant species was lost from each 10 metres of hedge, an 8% loss of plant species diversity (Department of Environment, 1994). Hence, ancient and species-rich hedgerows have now been identified as 'priority habitats' (The UK Biodiversity Steering Group, 1995). Research and action to protect these features of great importance is now a national priority. Many of the wildlife organisations are at present actively involved in species recording and drawing up action plans for the protection and preservation of hedgerows. It was with all these considerations in mind that the Overton Biodiversity Society (OBS) began to study the hedgerows of the Parish of Overton in 2003.

Members and volunteers of the OBS surveyed a set of hedgerows across the parish in the summer of 2003 and a report was produced the following spring (OBS, 2004). Meanwhile it was decided to survey more hedgerows the following year to make the most of our newly acquired surveying skills and to expand both the geographical range and the type of hedgerows surveyed. In addition, we got involved in the Hampshire Hedgerow Project, a hedgerow survey organised by the Hampshire Wildlife Trust (HWT) and the Campaign to Protect Rural England (CPRE) with the support of East Hampshire, Basingstoke and Deane, and Fareham District councils. More hedgerows were surveyed for this project and whilst the data was passed on to the CPRE to be included in the Hampshire project, it is also included here in our results.

Part of the historical context of Overton's hedgerows was already known in that the Harrow Way – an ancient pre-historic roadway – runs east to west across the parish. This and its associated roads and pathways are lined by some of the oldest hedgerows in the parish. Boundary hedgerows along the eastern and western boundaries of the parish also appear on the O.S. Map of 1872. Many hedgerows nearer the village itself are somewhat younger, due to relatively late enclosures. During the second half of the twentieth century Overton parish, like many others, saw the removal or neglect of hedgerows. This is nothing new for it seems that the first recorded hedgerow removal in the parish took place along the Harrow Way in the eighteenth century. There is hope that the recent relaying and replanting is now reversing this trend.

2 CONTEXT

2.1 GEOLOGY AND LAND USE

Overton parish covers an area of approximately 35 km^2, lying on the western side of the Hampshire downs and including the upper Test valley. The upper soil is made for the most part of chalk with scattered areas of clay-with-flint and some river and valley gravel deposit in the river valley itself (British Geological Survey, 1975, 1980). The village of Overton lies at the centre of the parish on the banks of the river Test and is surrounded by agricultural land dedicated to arable crops and grazing.

2.2 HEDGEROWS

Prior to carrying out a detailed hedgerow survey it was necessary to establish the location of hedgerows within the parish. Information on hedgerow distribution was available from the Geographical Information System database held by Basingstoke and Deane Borough Council. A 1/18000 scale map was produced from the GIS data and volunteers went in the field in the spring of

2003 to verify the information, and when necessary to amend it. All boundary lines of trees and/or shrubs less than 5m wide were treated as hedgerows (Bickmore 2002). Although not all locations where accessible, almost all were visible from a distance and only rarely were the sites impossible to verify. Figure 1 presents a map, showing the network of hedgerows thus identified in the parish.

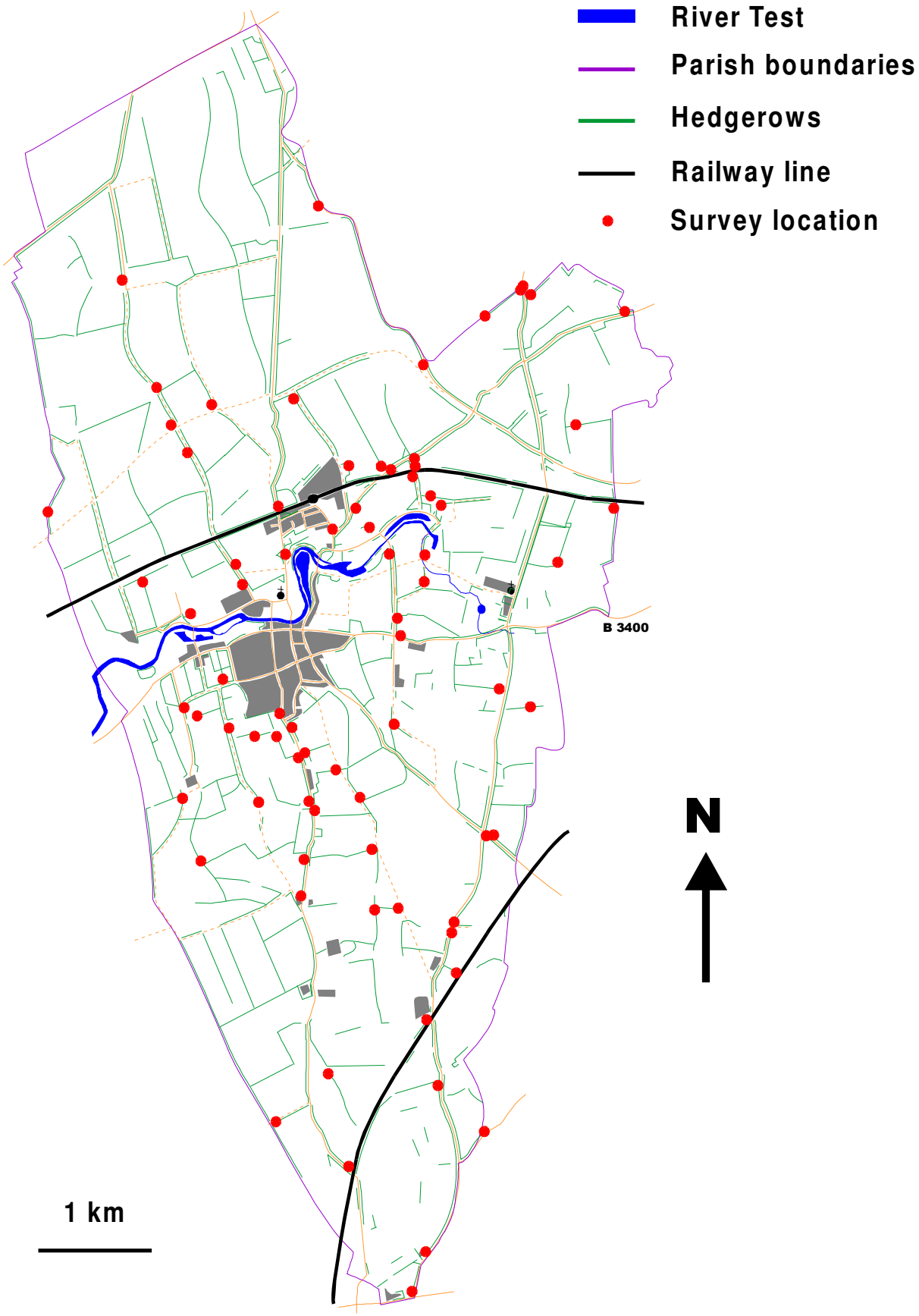

Figure 1: Network of hedgerows in Overton Parish.

Hedgerows were found along the parish boundaries, along roads and tracks, and as field boundaries. The total length of hedgerows in the parish was estimated at 150 km. This estimate was obtained by measuring the length of hedgerows reported on the 1/18000 map. This makes the total length of hedgerows roughly 3 times the total length of roads in the parish (as estimated on a 1:25000 O.S. map). The corresponding density of hedges for the parish is approximately 4 km/km^2. This density is identical to the average hedgerow density estimated for Hampshire (Hampshire Biodiversity Partnership, 2000).

3 METHOD

3.1 PREPARATION

The protocol followed for the hedgerow survey was that developed by the Steering Group for the UK Biodiversity Action Plan for Ancient and/or Species-rich Hedgerows. The first preparation was reading the Survey Handbook distributed by Department for Environment, Food and Rural Affairs (Bickmore, 2002). Then, the Biodiversity Projects Officer from the Hampshire and Isle of Wight Wildlife Trust, Naomi Ewald, kindly assisted us by leading a training session in Overton for a group of volunteers. Training focused on reviewing the survey protocol (including health and safety issues), filling in the survey field sheet and identifying local woody species. The session was organised on a Saturday morning in May 2003 and was carried out both indoors and out of doors. People present at the training session later passed their knowledge on to others who could not attend. The following year Naomi led a 'refresher' training session for members of the OBS management committee who later trained other volunteers.

3.2 SAMPLING

The abundance of hedgerows in the parish precluded surveying all of them and thus we focused on a selection of hedgerows. The full set of hedgerows surveyed is formed of 3 sub-sets: (i) hedgerows surveyed in 2003, (ii) hedgerows surveyed in 2004 for the OBS and (iii) hedgerows surveyed in 2004 for the Hampshire Hedgerow Project. The selection process was slightly different for the three sub-sets and is detailed below.

(i) In 2003 hedgerows were selected among those hedgerows that stand along a public right of way and thus are easily accessible. Furthermore, as we hoped to identify hedgerows of high biodiversity we primarily targeted older hedgerows. Two of them were possibly very old as their location was already reported on a 1615 map**,** 4 were possibly old as they were along old roads and/or on the parish boundary, and a further 2 hedges were visible on a 1909 map. As a contrast, 3 hedges were selected because they were known to be recent (less than 15 years). A further eleven hedges of interest were chosen throughout the parish, including one hedgerow on a bio-site. A total of 21 hedgerows were surveyed in this sub-set.

(ii) In 2004, the OBS decided to survey hedgerows selected at random throughout the parish in order to obtain a fair representation of local hedgerows. The random sampling strategy was described in the Survey Handbook (Bickmore, 2002). Random 6-digit grid references were generated in a spreadsheet tool to determine 'seed points' falling in the parish. Tracking from these points in a defined direction (alternating N, S, W, E for successive points) until a hedge was encountered determined which hedgerows to survey. A total of 40 hedgerows were surveyed in this sub-set.

(iii) For the Hampshire Hedgerow Project, the OBS was allocated two 1-square-kilometre areas in the parish in which hedgerows were selected at random. Nine hedgerows were identified in the first square and 7 in the second one. A total of 16 hedgerows were surveyed in this sub-set.

Altogether we surveyed 77 hedgerows throughout the parish (see Figure 1).

3.3 ACCESS

In 2003 hedgerows were selected along public right of ways so access was unrestricted. In 2004 since hedgerows, and the side to survey, were selected at random many surveys were due to be carried out on private property. Landowners and farm managers were contacted ahead of time to request permission to access. The OBS was pleased to be granted permission to all the hedgerows selected and is very grateful to the landowners and farm managers involved.

3.4 SURVEYING

Hedgerows were surveyed in the summer of 2003 and 2004 by groups of 2 to 6 volunteers. In the field, volunteers followed the protocol detailed in the Survey Handbook (Bickmore, 2002) and summarized here.

At the site, volunteers first located the two extremities of the hedgerow (marked by a hedge end, a connecting hedgerow, a track, etc…) and recorded on the field sheet all the information regarding the hedge context (location, adjoining land type use, etc…). Then, volunteers located the 30-metre long sample section and recorded the physical and botanical attributes of that hedge sample. Finally, two areas measuring 1m x 2m were defined (quadrats), 10 metres apart, at the foot of the hedge sample and were surveyed for their ground flora.

3.5 DATA HANDLING

Data from all the field sheets was entered (using Microsoft® Access) into a database developed by the Countryside Council for Wales (2004) and distributed by English Nature (which also distributes the Survey Handbook). All data entry was carried on in the winter following the surveys (in 2003 and in 2004). Because the database requires all mandatory fields to be completed only from a set of pre-specified options, data checking on entry was rigorous. Errors or missing data were identified at this stage and were rectified by reference back to the survey team or by direct observation on site.

For the purpose of this report, data was extracted from the database as spreadsheets from which simple calculations were carried out. Results for the three sub-sets of data were amalgamated as there was little apparent difference among them. The results of this analysis are presented in the following section.

Furthermore, in order to share the information gathered, our data was sent back to the CCW in 2003 and to the Hampshire Biodiversity Information Centre (HBIC) and the Hampshire and Isle of Wight Wildlife Trust in 2004. Data collected for the Hampshire Hedgerow Project was sent to the CPRE.

4 RESULTS AND DISCUSSION

4.1 HEDGE CONTEXT

Two thirds of the hedgerows surveyed (50) stood along a road or track on one side. This reflects both the fact that many hedgerows do line by-ways and the fact that in our initial survey in 2003, hedgerows were selected purposefully for their easy access and thus, were often chosen along roads and tracks (OBS, 2003). On the other side, the land was most frequently arable fields or improved grassland, often with cattle or sheep grazing.

In this study, 47% of surveys (36 out of 76) took place on an arable headland, 32% (24) on a road or track verge and 17% (13) on a grass headland (Figure 2).

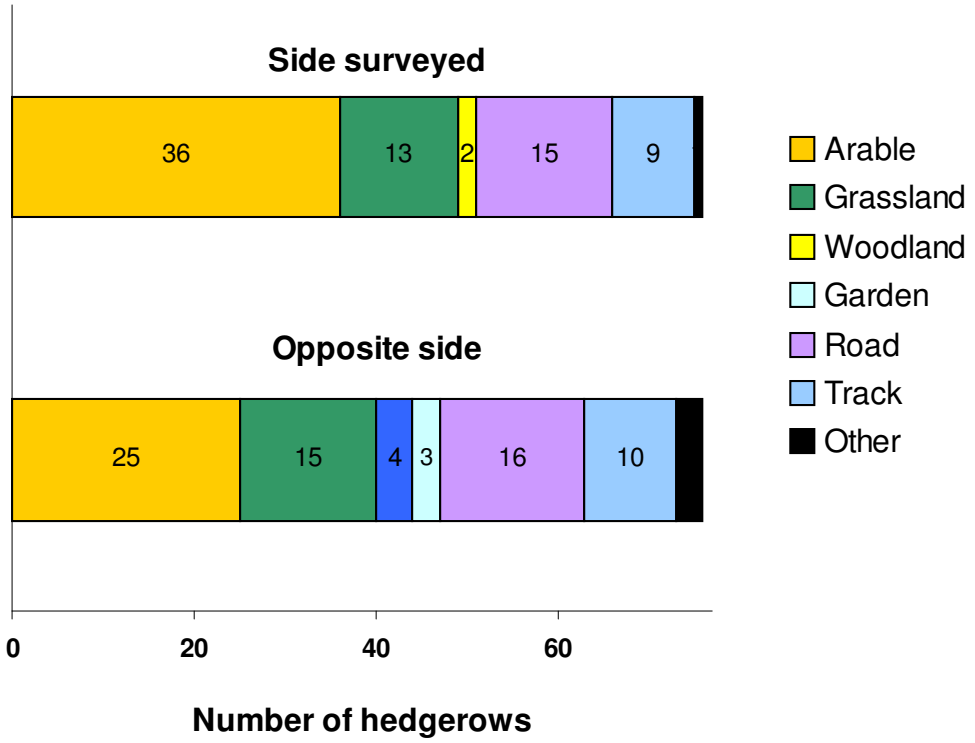

Figure 2: Land use on either side of hedgerows (N=76)

4.2 PHYSICAL CONDITION OF HEDGEROWS

Figure 3 presents the distribution of hedgerows grouped according to their width and height. The size of the dots is proportional to the number of hedgerows in each width x height category. Most hedgerows were between 1 and 4 metres wide (59), and over 2 meters tall (63). Only 4 hedgerows were wider than they were tall ('squat') whereas 41 hedgerows were taller than they were wide ('thin'). The remaining 32 hedges were as wide as they were tall ('square').

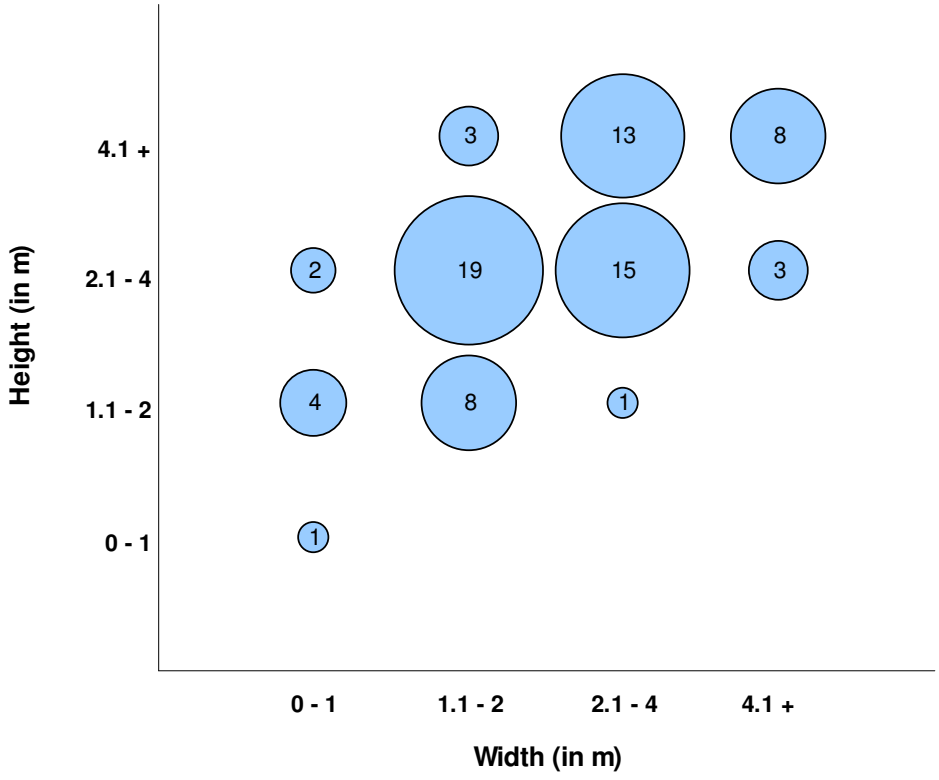

Figure 3: Distribution of hedgerows according to their width and height (in meters)

Most hedgerows (70 %) were stockproof (*i.e.* uninterrupted and dense) or with minor gaps only (see Figure 4). Few hedgerows (18 %) had significant gaps or were significantly leggy.

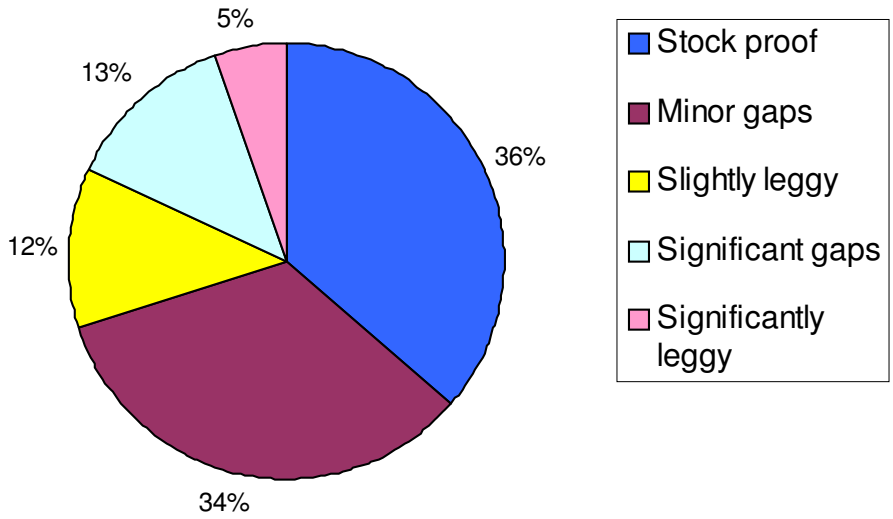

Figure 4: Hedgerow 'integrity' (N=77)

The majority of hedgerows (60%) showed signed of recent management (flailing or trimming). Figure 5 illustrates the relation between management and integrity. Hedgerows managed recently were in the best condition with 39 hedges out of 46 (85 %) with no or few gasps. In contrast only 15 out of 31 hedgerows with no sign of recent management (48%) were stockproof or with minor gaps whilst 16 hedgerows were leggy or presented significant gaps. These results illustrate how unmanaged hedgerows tend to grow tall and leggy and develop gaps. However, managed hedgerows also showed some gaps and 'leggyness' and which indicates that management may not always be adequate.

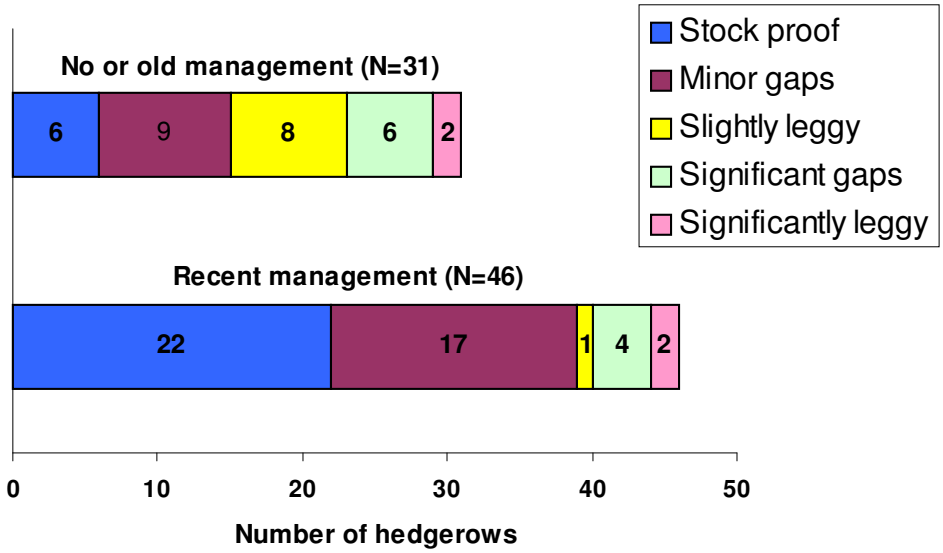

Figure 5: Hedgerow 'integrity' and management (N=76)

Recommendations for hedgerow management have changed over the years as a result of increased understanding of the hedgerow ecosystem and changed attitudes towards biodiversity. Although there is no definitive management strategy, the current recommendations for managing hedgerows to benefit biodiversity include (Hampshire Biodiversity Partnership 2000; Bright and MacPherson, 2002):

-Frequency: avoid annual trimming which reduces habitat quality for birds and invertebrates and reduces flower and fruit yields.

-Timing: Preferably in February in order to allow animals to find shelter and food throughout autumn and most of winter, but before shrubs start putting out new growth, and birds start nesting. The most recent reform of the Common Agricultural Policy includes a ban on trimming hedgerows between 1st March and 31st July.

-Shape: The A-cut (wide base and sides sloping inwards) reduces leggyness as the bottom of the shrubs receives plenty of light and rain otherwise stopped by the higher parts of the plant.

In practice these considerations have to be balanced with such issues as time availability, weather conditions, type of machinery used and cost. Good management of hedgerows requires a lot of skill and commitment.

4.3 BOTANICAL COMPOSITION OF HEDGEROWS

4.3.1 Hedgerow trees

Hedgerow trees were defined as those with a clear stem or twice the height of the hedge (Bickmore, 2002). For each hedgerow surveyed, the number of trees was recorded both for the whole hedge and the 30m section surveyed in that hedge. Results are presented in Figure 6.

Figure 6: Number of hedgerow trees in whole hedges and in hedge surveys (N=77)

A little over a quarter of the hedges (27%) contained no trees at all, the same number contained 1 to 5 trees and nearly half of the hedgerows contained more than five trees (note that hedgerows varied widely in length). Consequently, because trees were relatively rare in hedgerows, most hedge surveys did not contain any tree (42 out of 77), although 13 contained more than 5 trees in the 30m survey. The maximum number of trees in a survey was 28.

The 35 hedge surveys with trees together contained 147 trees belonging to 21 different species listed in Appendix 7.1. The frequency and abundance of each species is presented in Figure 7. Frequency indicates the proportion of hedgerow surveys in which each species was found. Abundance indicates how many trees of each species were found. Overall frequency and abundance appeared somewhat correlated with the most frequent species also the most abundant. The most frequently encountered tree species were ash, oak and field maple. Ash was both the species encountered the most often and found in the highest number (32 trees in 9 surveys). Sycamore was moderately frequent (found in 6 surveys) but very abundant (27 trees overall). This does not seem to be an intrinsic characteristic of the species but rather an artefact as 18 sycamore trees were counted in a rather untypical survey (a shelter belt along a car park).

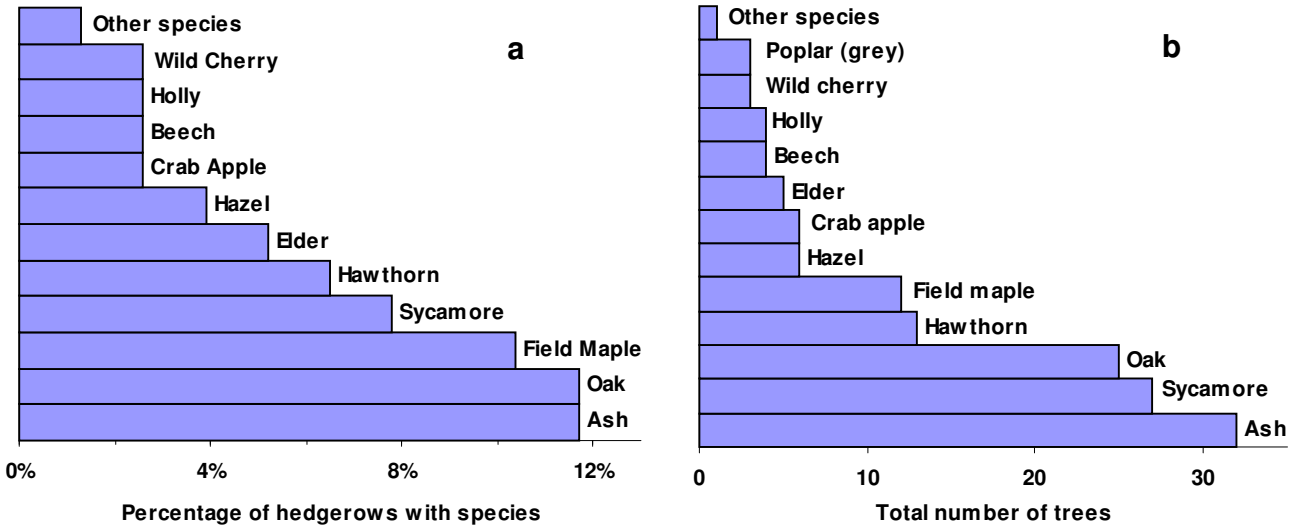

Figure 7: Frequency (a) and abundance (b) of tree species in 30m surveys (N=35)

All these species are indigenous and are common locally on chalky soils (Hampshire County Council Environment, 2000). Nationally, oak and ash trees represent together 65% of hedgerow trees in England (Barr *et al*., 2002).

4.3.2 Shrub layer

Species richness

Within the 77 hedgerow surveys, 34 woody species and 5 species of climbers were recorded in the shrub layer (Appendix 7.2). Most species are native and common in the area. (Buddleia, Conifer 1, Conifer 2 and Garden hedging are garden species.)

The number of woody species found in any one hedge survey ranged from 1 to 11 (average 6). Figure 8 shows the number of hedge samples with different numbers of species in the shrub layer.

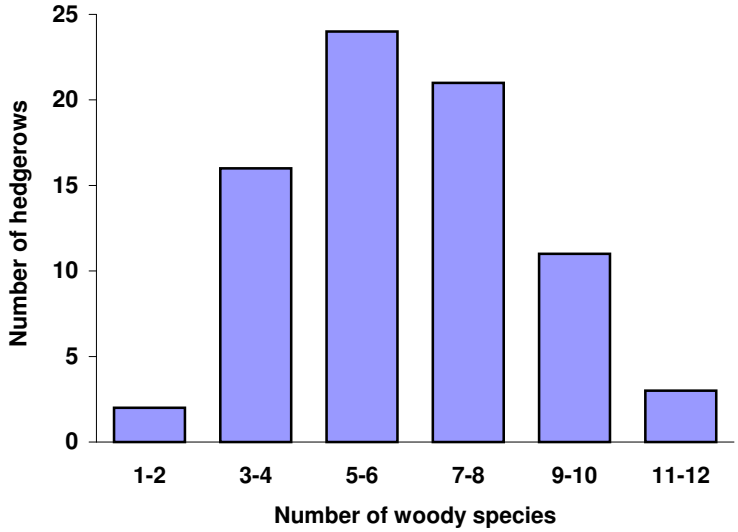

Figure 8: Number of woody species per hedgerow survey (N=77)

The most common number of woody species in a survey was 5 or 6. Overall, 59 surveys (77%) contained five or more woody species and thus may be qualified as species-rich (Bickmore, 2002). These figures are slightly lower than those obtained in the original 2003 survey (O.B.S, 2004) for two reasons. First, in 2003 figures were reported for all species of the shrub layer, including a few

climbers. Here only woody species are included in the figure above. Second, in 2003 many hedgerows were surveyed because they were thought to be diverse thus the sample was clearly biased towards highly diverse hedgerows. The present results, including a large number of randomly selected hedgerows, present a more balanced picture. It is quite remarkable then, that these results differ significantly from recent national results, which indicated that only 26% of hedges sampled in Great Britain for the Countryside Survey 2000 were considered species-rich hedges (Haynes-Young *et al.*, 2000), and approximately a third of hedges contained only one or two woody species per 30m.

An often-quoted rule states that one may expect to find one woody species in 30 yards for each 100 years the hedge has been growing (Rackham, 1997). This rule suffers many exceptions and can only been used as an approximation. Yet, it illustrates why some of the hedges we surveyed were species-rich as they were old hedgerows. However, other factors beside age may contribute to the species-richness of a hedgerow, for example local traditions in planting, soil fertility and management practices. Further work would be necessary to establish the role of these factors on our local hedgerows.

Frequency and abundance of species

Figure 9 presents the frequency and abundance of species in the shrub layer. Frequency is represented by the percentage of hedges in which these species were found. Abundance is represented by the average percentage of the hedgerow area covered by these species in the 30m stretch surveyed.

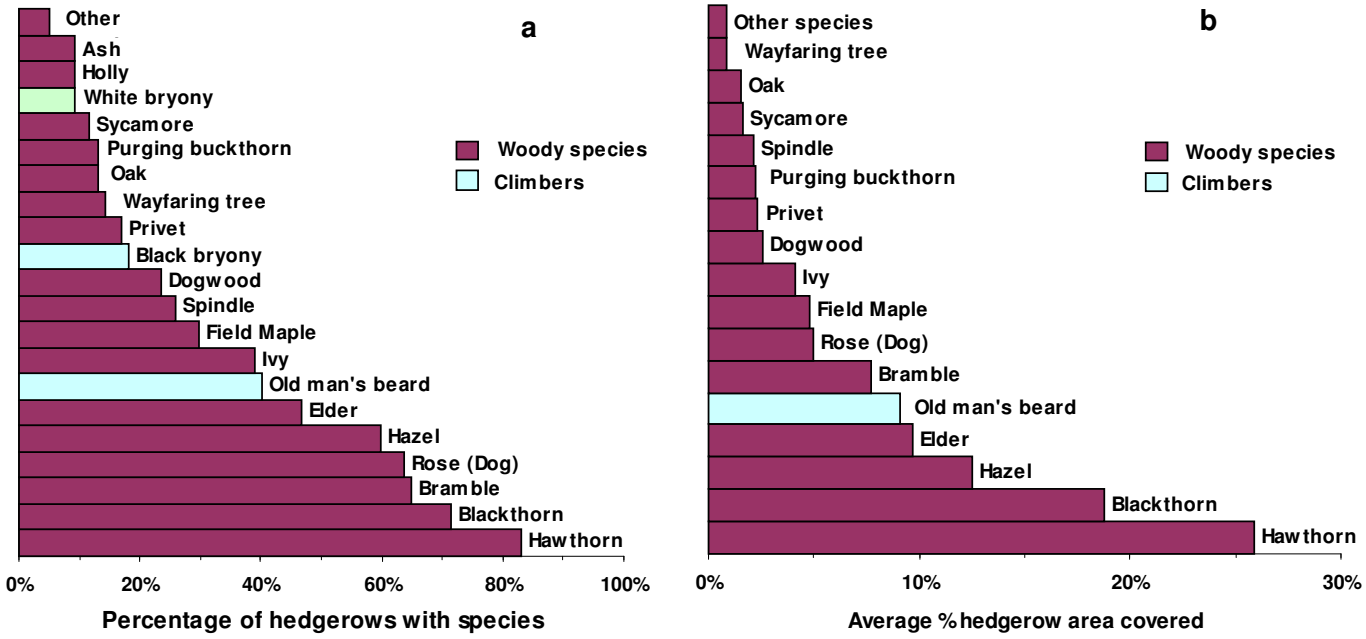

Figure 9: Frequency (a) and abundance (b) of species in the shrub layer (N=77)

The three most frequently occurring species were hawthorn, blackthorn and bramble (in 83, 71, and 65% of all hedgerows, respectively). Hawthorn is also the most frequent woody species in hedgerows in the lowlands of South and East England (and in Great Britain) where it is found in 90% of hedgerows (Barr *et al.*, 2002). In fact, if one excludes bramble, for which there are no regional figures, the five most frequent woody species in our survey were also the five most frequent woody species at the regional scale, although figures were usually higher in our survey. This is consistent with the observation that our hedgerows contained more species than average, thus a given species should be encountered more often. In the 2003 survey both dog rose and old man's beard were significantly more frequent than in our overall results (86 and 68% in 2003, 65 and 40% in 2004, respectively).

The most abundant species in the shrub layer were hawthorn (covering on average 26% of each hedge, that is just under 8m of each 30m section surveyed), blackthorn (19%), hazel (13%) and elder (10%). The pattern was similar to that observed in the 2003 survey although the abundance of

each species was generally higher in 2003. Adding up the average abundance for all species one would expect a total of 100% (or close to 100 if one allows for the imprecision in estimating the area covered in the field). The total was 124% (with 29 species) in the preliminary 2003 results but was 115% (with 40 species altogether) in the overall results. This suggests that the hedgerows surveyed in 2003 had a more complex three-dimensional structure with more species growing through or on top of other species so that a given area of the hedgerow was covered by several species. Another explanation is that surveyors may have overestimated these areas in 2003 more than in 2004.

Elder was the only species to be much less abundant in the preliminary results (2% area covered) than in the final results (10%). Although, it is a good colonizer in hedgerow it is also a relatively short-lived species so that its presence in older hedgerows is variable (Rackham, 1997). This may explain its low abundance in the 2003 survey in which many 'older' hedgerows were surveyed.

Non-woody climbing species altogether covered on average 11% of the hedgerow area surveyed (3.3m out of 30m).

In general there was a correlation between frequency and abundance again, the most frequently encountered species being the most abundant also, although both bramble and dog rose were very frequent but not so abundant.

4.3.3 Ground flora

Species richness

Very little data was collected on the ground flora in the first survey, as most surveyors lacked the necessary expertise. Collecting ground flora data was therefore a goal in the 2004 survey. Thus, a training session was specifically dedicated to surveying the ground flora before surveying started. The surveying experience acquired in the first year also allowed surveyors to devote more attention to this task in the second year. As a result we did collect a lot of ground flora data, although identifying grasses remained a problem. The results below present the data for the two quadrats of each hedgerow combined.

On average, 14 species were found growing at the foot of hedgerows surveyed: 7 herbaceous species, 2 grass species and 5 woody species. The number of species found was very variable however, with a minimum of only 2 species (cleavers and nettles) and a maximum of 26 species (16 herbaceous plants, 5 grasses and 5 woody species).

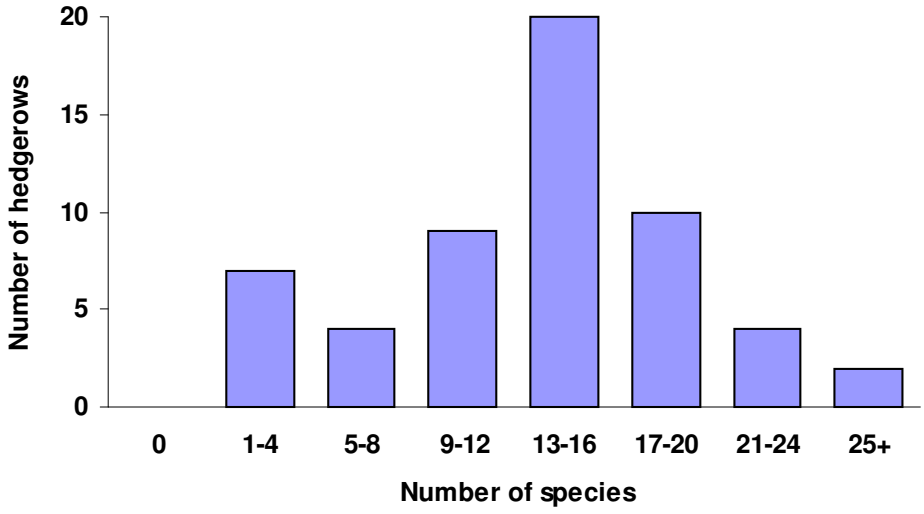

Figure 10: Number of species in 2 quadrats (N=56)

Overall 94 species of herbaceous plants, 13 species of grasses, 13 woody species and one fern species were identified (see Appendix 7.3). A few more species were not identified.

Frequency of species

The most frequently encountered species were nettle and cleavers, which were found at most hedgerows (Fig. 11). They were followed by two woody species with climbing habits, bramble and ivy (both found in 39% of hedgerows).

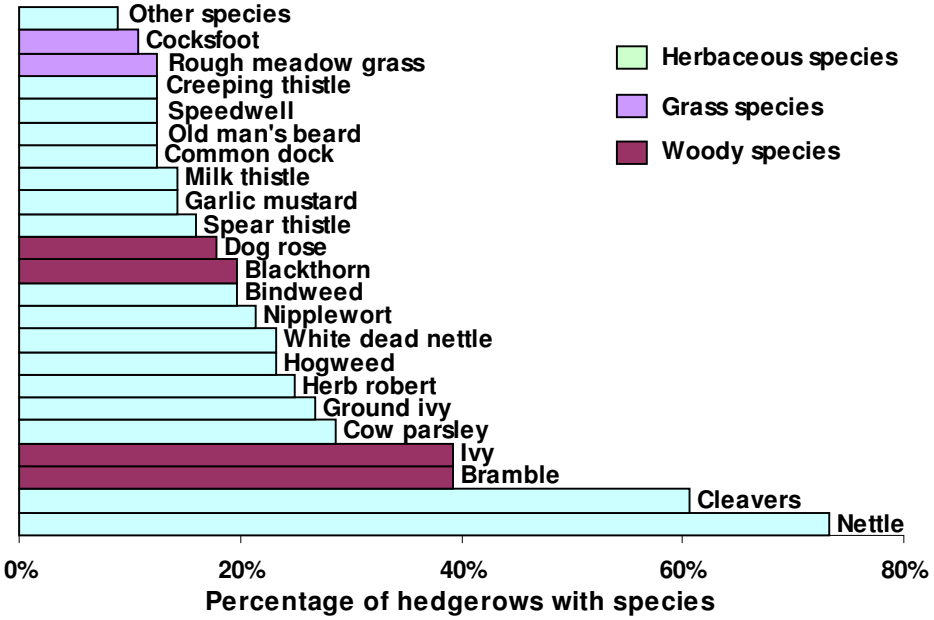

Figure 11: Frequency of species in 2 quadrats (N=56)

Note that since grasses were difficult to identify for most surveyors the results must be interpreted with caution. For some hedgerows only the number of species was recorded, for others some species were identified and others were only counted, in others still only the overall coverage by grasses was recorded but not the number of species. As a result, the exact number of species across two quadrats and the frequency of occurrence of each species were impossible to establish unambiguously. Among those grasses that were identified, rough meadow grass and cocksfoot were the most common.

The species associations found at the foot of our hedgerows were typical of the flora found along hedgerows and boundaries between crops in the arable landscape of Southern England (Bunce *et al.,* 1999). Nettles, cleavers, false oat-grass are typical representative of these species thriving in highly fertile, moderately disturbed habitats on alkaline soil. Nationally, the frequency of weeds such as cleavers and sterile brome has increased in hedges between 1978 and 1990 over the whole of Britain, and particularly in the arable landscape, as a result of increased nutrients (eutrophication) resulting from modern agriculture (Firbank *et al*., 2000).

4.3.4 Influence of geology

At a global scale the principal factor determining the distribution of plants on land is climate (Vincent, 1990). However, at the local scale, the overriding factors that determine the composition of British vegetation are soil fertility, light and soil moisture (Bunce *et al*., 1999b). Soil has a strong influence on plant distribution as it provides minerals and water to rooted plants and the acidity of the soil determines the availability of these minerals (Vincent, 1990).

Hedgerows surveyed in this study grew on the three types of soil present in the parish: chalk, 54 hedges; river & valley gravel, 4 hedges; clay-with-flint, 15 hedges (4 hedgerows were on the edge of two soil types). We had hoped to observe soil-related variation in the composition of hedgerows and their associated ground flora but the small sample sizes combined with a large difference in sample size between the 3 soil types did not allow that. The contribution of a single hedgerow to the results for the 'river & valley gravel' soil type is much higher (1/4) than the contribution of one hedgerow for the

'chalk' soil type (1/56). Therefore, it was not possible to compare species frequency reliably across soil types.

5 CONCLUSION

Although hedgerows are ubiquitous in the parish, few people would have had much to say about them before this survey took place. Two years on, we now have a clearer picture of these important features. In most respects this picture is very representative of hedgerows in the chalky arable landscape of Southern England, although interestingly, our local hedgerows appeared to be more species-rich than the national average.

This project has been extremely successful in that it has generated a lot of interest and involvement within the local community. In 2 years a wealth of information has been gathered and much knowledge has come out of the analysis presented in this report. Yet more may remain hidden within the data.

6 REFERENCES

Barr C.J., R.C. Stuart & L.G. Firbank (2002). *Module 3 – Results from MAFF-funded work in the CS2000 Programme*. DETR, London. ISBN 1-85112-460-8. http://www.cs2000.org.uk/Final_reports/M03_Hedgerows_final_report.htm

Bickmore C.J. (2002). *Hedgerow Survey Handbook: a standard procedure for local surveys in the UK*. Countryside Council for Wales, Bangor. ISBN 1-86169-108-4.

Bright P. & D. MacPherson (2002). *Hedgerow management, dormice and biodiversity*. English Nature Research Reports no 454.

British Geological Survey (1975). *Geological survey of Great Britain* (England and Wales), Andover, Sheet 283. 1:50 000 Series. Map.

British Geological Survey (1981). *Geological survey of Great Britain* (England and Wales), Basingstoke, Sheet 284. 1:50 000 Series. Map.

Bunce R G H, C J Barr, M K Gillespie, D C Howard, W A Scott, S M Smart, H M van de Poll & J W Watkins (1999). *Vegetation of the British countryside - the Countryside Vegetation System.* ECOFACT Volume 1. Department of the Environment, Transport and the Regions, London. pp 224. ISBN 1-851121-55-2.

Bunce R.G.H., S.M. Smart, H.M. van de Poll, J.W. Watkins, & W.A. Scott (1999b). Measuring Change in British Vegetation. ECOFACT Volume 2. Institute of Terrestrial Ecology, Huntingdon. pp144. ISBN 1-870393473.

Countryside Council for Wales (2004). http://www.ccw.gov.uk. Bangor, Wales. [Accessed March 2005].

Department of Environment (1994). *Biodiversity -The UK Action Plan*. HMSO. ISBN 0-10-124282-4.

Firbank L.G, S.M. Smart, H.M. van de Poll, R.G.H. Bunce, M.O. Hill, D.C. Howard, J.W. Watkins & G.J. Stark (2000). Causes of Change in British Vegetation. ECOFACT Volume 3. Institute of Terrestrial Ecology, Huntingdon. pp98. ISBN 1-870393511.

Haines-Young R.H., C.J. Barr, H.I.J. Black, D.J. Briggs, R.G.H. Bunce, R.T. Clarke, A. Cooper, F.H. Dawson, L.G. Firbank, R.M. Fuller, M.T. Furse, M.K. Gillespie, R. Hill, M. Hornung, D.C. Howard, T. McCann, M.D. Morecroft, S. Petit, A.R.J. Sier, S.M. Smart, G.M. Smith, A.P. Stott, R.C. Stuart & J.W. Watkins (2000). *Accounting for nature: assessing habitats in the UK countryside*. DETR, London. ISBN 1-85112-460-8.

Hampshire Biodiversity Partnership (2000). Biodiversity Action Plan for Hampshire: Volume Two. Hampshire County Council, Winchester. ISBN X200025494.

Hampshire County Council, Environment. (2000). *The Hampshire Landscape: a strategy for the future*. Hampshire County Council, Winchester. ISBN 1-85975-402-3.

OBS (2004). Hedgerow survey in the Parish of Overton, Preliminary report. http://www.overton-biodiversity.org. [Accessed March 2005].

Rackham O. (1997). *The Illustrated History Of the Countryside*. Phoenix. ISBN 1-85799-953-3.

The UK Biodiversity Steering Group (1995). *Biodiversity: The UK Steering Group Report* - Volume II: Action Plans. HMSO London. ISBN 011-7532282.

Vincent P. (1990). *The Biogeography of the British Isles. An introduction*. Routledge, London. 315pp. ISBN 0-415-03470-1.

7 APPENDICES

7.1 TREE SPECIES IDENTIFIED (77 SURVEYS)

Common name	Scientific name	Common name	Scientific name
Ash	*Fraxinus excelsior*	Oak	*Quercus robur*
Beech	*Fagus sylvatica*	Poplar (grey)	*Populus canescens*
Blackthorn	*Prunus spinosa*	Purging buckthorn	*Rhamnus catharticus*
Cherry	*Prunus sp.*	Scots pine	*Pinus sylvestris*
Crab Apple	*Malus sylvestris*	Sessile oak	*Quercus petraea*
Elder	*Sambuscus nigra*	Sycamore	*Acer pseudoplatanus*
Field Maple	*Acer campestre*	Wayfaring-tree	*Viburnum lantana*
Hawthorn	*Crataegus monogyna*	Wild cherry	*Prunus avium*
Hazel	*Corylus avellana*	Willow	*Salix sp.*
Holly	*Ilex aquifolium*	Yew	*Taxus baccata*
Italian alder	*Alnus cordata*		

7.2 SPECIES IDENTIFIED IN THE SHRUB LAYER (77 SURVEYS)

Common name	Scientific name	Common name	Scientific name
Alder	*Alnus glutinosa*	Gooseberry	*Ribes grossularia*
Alder buckthorn	*Frangula alnus*	Guelder-rose	*Viburnum opulus*
Ash	*Fraxinus excelsior*	Hawthorn	*Crataegus monogyna*
Beech	*Fagus sylvatica*	Hazel	*Corylus avellana*
*Bindweed	*Convolvulus arvensis*	Holly	*Ilex aquifolium*
*Bittersweet	*Solanum dulcamara*	Honeysuckle	*Lonicera periclymenum*
*Black bryony	*Tamus communis*	Ivy	*Hedera helix*
Blackthorn	*Prunus spinosa*	Oak	*Quercus robur*
Bramble	*Rubus fruticosus*	*Old man's beard	*Clematis vitalba*
Buddleia	*Buddleia sp.*	Privet	*Ligustrum vulgare*
Conifer 1		Purging buckthorn	*Rhamnus cathartica*
Conifer 2		Rose (Dog)	*Rosa canina*
Crab Apple	*Malus sylvestris*	Rose (Field)	*Rosa arvensis*
*Deadly nightshade	*Atropa belladonna*	Spindle	*Euonymus europaeus*
Dogwood	*Cornus sanguinea*	Sycamore	*Acer pseudoplatanus*
Elder	*Sambuscus nigra*	Wayfaring-tree	*Viburnum lantana*
Elm (English)	*Ulmus procera*	*White Bryony	*Bryonia dioica*
Elm (Wych)	*Ulmus glabra*	Whitebeam	*Sorbus aria*
Field Maple	*Acer campestre*	Wild Cherry	*Prunus avium*
Garden hedging	*Lonicera nitida*	Willow	*Salix sp.*

*Non-woody climbers

7.3 SPECIES IDENTIFIED IN THE GROUND FLORA (56 SURVEYS)

Common name	Scientific name	Common name	Scientific name
Herbaceous plants			
Agrimony	*Agrimonia eupatoria*	Hedge mustard	*Sisymbrium officinale*
Bedstraw (heath)	*Galium saxatile*	Hedge woundwort	*Stachys sylvatica*
Bedstraw (hedge)	*Galium mollugo*	Herb Robert	*Geranium robertianum*
Bindweed	*Convolvulus arvensis*	Hogweed	*Heracleum sphondylium*
Bittersweet	*Solanum dulcamara*	Knotgrass	*Polygonum aviculare*
Black bindweed	*Fallopia convolvulus*	Lesser burdock	*Arctium minus*
Buttercup	*Ranunculus sp.*	Longstalk cranesbill	*Geranium columbinum*
Campion (white)	*Silene latifolia*	Lords & ladies	*Arum maculatum*
Campion	*Silene sp.*	Mayweed (scentless)	*Tripleurospermum maritimum*
Cat's ear	*Hypochaeris sp.*	Milk thistle	*Silybum marianum*
Charlock	*Sinapis arvensis*	Mugwort	*Artemisia vulgaris*
Chervil	*Chaerophyllum*	Musk mallow	*Malva moschata*
Chickweed	*Stellaria sp.*	Nettle	*Urtica dioica*
Chicory	*Cichorium intybus*	Nipplewort	*Lapsana communis*
Cleavers	*Galium aparine*	Old man's beard	*Clematis vitalba*
Clover (red)	*Trifolium pratense*	Perennial sow-thistle	*Sonchus arvensis*
Clover (white)	*Trifolium repens*	Petty spurge	*Euphorbia peplus*
Coltsfoot	*Tussilago farfara*	Plantain (greater)	*Plantago major*
Common chickweed	*Stellaria media*	Plantain (ribwort)	*Plantago lanceolata*
Common dock	*Rumex obtusifolius*	Poppy	*Papaver sp.*
Common field speedwell	*Veronica persica*	Prickly sow-thistle	*Sonchus asper*
Common stork's-bill	*Erodium cicutarium*	Ragwort	*Senecio jacobaea*
Common vetch	*Vicia sativa*	Red dead nettle	*Lamium purpureum*
Cow parsley	*Anthriscus sylvestris*	Red hemp-nettle	*Galeopsis angustifolia*
Cranesbill	*Geranium sp.*	Rosebay willow-herb	*Chamerion angustifolium*
Cranesbill (cut leaf)	*Geranium dissectum*	Salad burnet	*Sanguisorba minor*
Cranesbill (dove's foot)	*Geranium molle*	Scarlet pimpernel	*Anagallis arvensis*
Creeping buttercup	*Ranunculus repens*	Scented mayweed	*Matricaria perforata*
Creeping cinquefoil	*Potentilla reptans*	Self-heal	*Prunella vulgaris*
Dandelion	*Taraxacum officinale*	Sheep's sorrel	*Rumex acetosella*
Dead nettle	*Lamium sp.*	Sheperd's purse	*Capsella bursa-pastoris*
Deadly nightshade	*Atropa belladonna*	Smooth hawk's-beard	*Crepis capillaris*
Dock	*Rumex sp.*	Speedwell sp.	*Veronica*
Dog's mercury	*Mercurialis perennis*	Speedwell (heath)	*Veronica officinalis*
Euphorbia	*Euphorbia sp.*	St. John's wort	*Hypericum sp.*
Fat hen	*Chenopodium album*	Thistle	*Cirsium sp.*
Field forget-me-not	*Myosotis arvensis*	Thistle (creeping)	*Cirsium arvense*
Field pansy	*Viola arvensis*	Thistle (spear)	*Cirsium vulgare*
Fool's parsley	*Aethusa cynapium*	Tufted vetch	*Vicia cracca*
Forget-me-not	*Myosotis sp.*	Violet	*Viola sp.*
Garlic mustard	*Alliaria petiolata*	Welted thistle	*Carduus crispus*
Great stichwort	*Stellaria holostea*	White dead nettle	*Lamium album*
Great willowherb	*Epilobium hirsutum*	Wild marjoram	*Origanum vulgare*
Greater burdock	*Arctium lappa*	Wild parsnip	*Pastinica sativa sativa*
Ground ivy	*Glechoma hederacea*	Wild strawberry	*Fragaria vesca*
Groundsel	*Senecio vulgaris*	Wood avens	*Geum urbanum*
Hedge bindweed	*Calystegia sepium*	Yarrow	*Achillea millefolium*

Continued…

…Continued

Common name	Scientific name	Common name	Scientific name
Grasses			
Annual Meadow Grass	*Poa annua*	Oat	*Avena sp.*
Barren Brome	*Bromus sterilis*	Perennial ryegrass	*Lolium perenne*
Bent	*Agrostis sp.*	Red fescue	*Festuca rubra*
Brome	*Bromus sp.*	Rough meadow grass	*Poa trivialis*
Cocksfoot	*Dactylis glomerata*	Sweet vernal grass	*Anthoxanthum odoratum*
False oat grass	*Arrhenatherum elatius*	Tufted hairgrass	*Deschampsia flexuosa*
Fescue	*Festuca sp.*	Wild oats	*Avena fatua*
Meadow foxtail	*Alopecurus pratensis*		
Woody species			
Blackthorn	*Prunus spinosa*	Oak	*Quercus robur*
Bramble	*Rubus fruticosus agg.*	Poplar (grey)	*Populus alba canescens*
Dogwood	*Cornus sanguinea*	Purging buckthorn	*Rhamnus cathartica*
Elder	*Sambucus nigra*	Rose (Dog)	*Rosa canina*
Hawthorn	*Crataegus monogyna*	Spindle	*Euonymus europaeus*
Hazel	*Corylus avellana*	Sycamore	*Acer pseudoplatanus*
Ivy	*Hedera helix*		
Others			
Bryophytes			
Rusty-back fern	*Ceterach officinarum*		