The State of the Orchards: the condition and significance of orchards in eastern England.

A report by Paul Read and Tom Williamson on the Orchards East project, June 2021

Executive Summary

- Orchards are not usually considered to have played a significant role in the history or culture of the eastern counties. But in fact, for centuries they were a ubiquitous feature of the region's landscape, valued for their beauty as well as for the fruit they produced. Locally grown fruit were used to produce a range of distinctive local foods, as well as cider.
- Orchards, at least those which are not intensively managed, also play an important role in sustaining biodiversity. This is especially true of those featuring old trees, even in small numbers. They provide habitats such as wood rot and fruit which are utilized by many native species, including rare 'Red Data Book' invertebrates. Both those orchards featuring tall trees on vigorous rootstocks, and those characterised by smaller, low-growing specimens, have considerable biodiversity value.
- Before the middle of the nineteenth century most orchards were small and attached to farms, although some specialised commercial orchards also existed, especially in west Hertfordshire and the Fenland. The century after c.1850 saw a great expansion in fruit production, with the development of distinctive 'orchard landscapes' in a number of key areas, such as south-west Bedfordshire.
- Since the mid-1950s, the area of orchards in eastern England has fallen dramatically, from *c.*48,000 acres (*c.* 19,400 hectares) to *c.*8,000 acres (*c.* 3,240 hectares) – a decline of around 83 per cent. The loss of old farmhouse orchards has been on a particularly large scale.
- Greater efforts need to be made to arrest and reverse this decline. The efforts of amateur groups and charities in establishing new 'community' orchards need to be supported through, in particular, adjustments to the planning system to ensure that such orchards become a common feature of future housing developments.

Introduction

Orchards East, a project supported by the National Lottery Heritage Fund (then the Heritage Lottery Fund), was set up in 2017 by interested enthusiasts and academics based at the University of East Anglia in Norwich. It had a range of aims, including the establishment of new community orchards and the dissemination of necessary skills like grafting and pruning. But at its core was a desire to understand more about the history of orchards, their role in sustaining biodiversity, and their current numbers and condition in the eastern counties. The project thus involved detailed research in public and private archives, oral history, and biodiversity surveys of selected orchards. Above all, it featured an extensive survey, carried out by around 150 volunteers, who examined the sites of more than 10,000 orchards, known from old maps and other sources. This report presents the results of these endeavours and is divided into two sections. The first gives a brief history of fruit-growing and orchards in the eastern counties, and examines the current condition of the orchard heritage. The second discusses the results of the biodiversity surveys.

'Eastern counties' is used throughout this report to mean the modern administrative counties of Bedfordshire, Cambridgeshire, Essex, Hertfordshire, Norfolk and Suffolk, together with the Unitary Authorities like Luton which are embedded geographically within them. In historical terms, this area includes the old county of Huntingdonshire, together with the Soke of Peterborough.

The work presented here would have been impossible without the generous support of the National Lottery Heritage Fund, the University of East Anglia, the various Local Environmental Records Centres and, above all, a large and active collection of volunteer researchers and surveyors.

Part 1. The History and Condition of Orchards in Eastern England

Types of Orchard

We often talk loosely of 'old orchards', as if they were all much the same thing. But in historical terms, they fall into three or four main types, albeit ones with blurred boundaries..

Farmhouse orchards, usually covering less than 2 acres (0.8 hectares), have been present in eastern England since at least medieval times. They produced fruit for domestic consumption and, in most cases, a small surplus for local sale. Most were under permanent pasture and were dominated by apples, with smaller numbers of pears, plums and (to a lesser extent, in most areas) cherries. They featured tall trees, spaced at intervals of between 6 and 12 metres and many seem to have had borders of cobnuts or plums, in part to provide shelter for the trees. By the sixteenth century, most farms of any size appear to have possessed an orchard, especially towards the south and east of the region – in Hertfordshire, Essex and East Anglia – where settlement was more scattered, and many farms stood within their own land rather than being clustered in nucleated villages.

A typical 'farm' orchard in Norfolk, with trees planted around 120 years ago

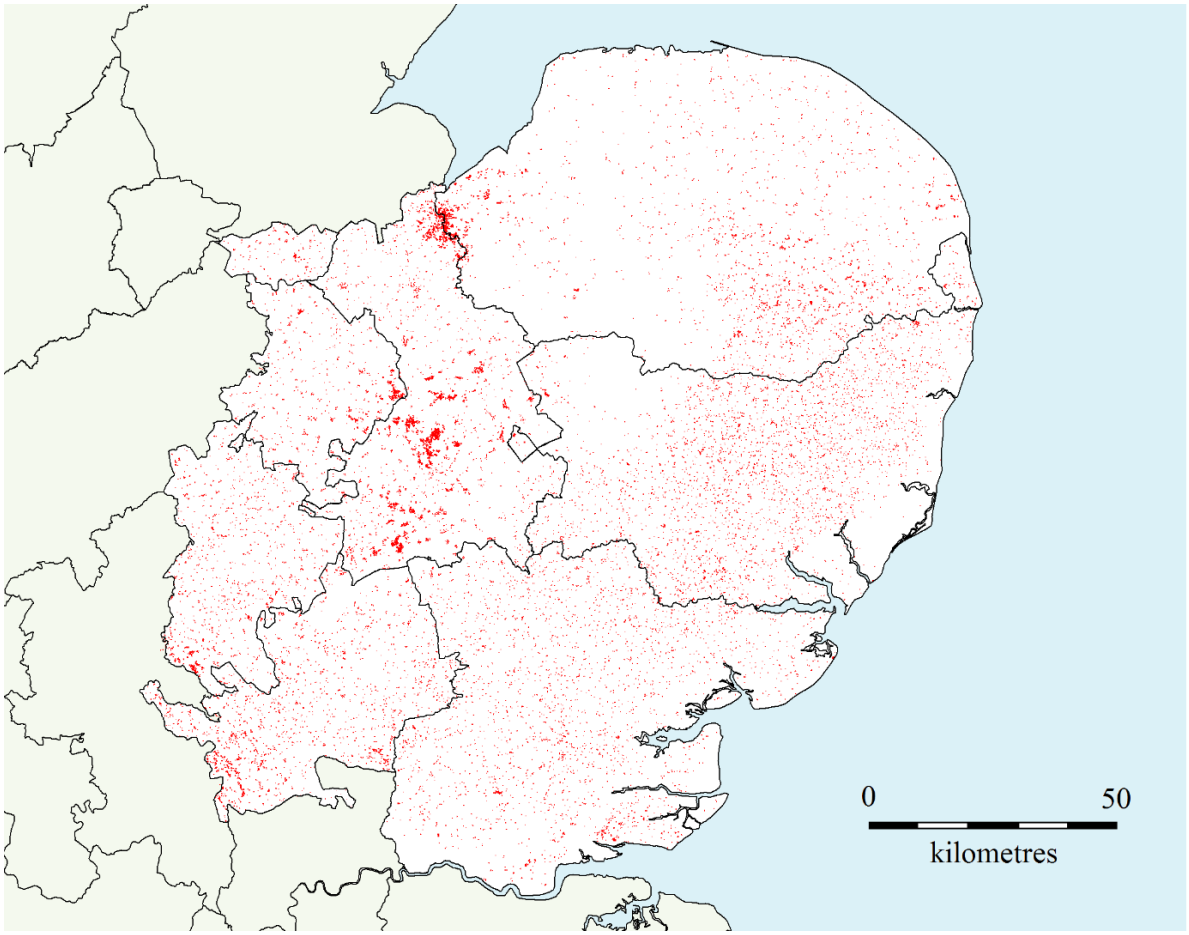
Commercial orchards may be defined as those which formed the main business of the owner or tenant, or a substantial part of it. Smallholdings with orchards appear in our documents, often in urban or suburban contexts, in medieval times but through the seventeenth and eighteenth centuries they became more numerous, and were joined by whole districts in which farms steadily expanded their 'domestic' orchards to provide an additional income stream. This occurred where

soils were well suited to fruit cultivation, and access to major markets existed. In west Hertfordshire, loamy soils overlying chalk provided an ideal environment for the cultivation of cherries, and to an extent apples; London, around 30 kilometres to the south, was an ideal place to sell them. Cherry orchards were extensive here, especially on the smaller farms, by the early eighteenth century but in addition fruit trees were widely planted as hedgerow trees. A number of different varieties of sweet cherry were grown including the Caroon, also known as the Hertfordshire Black (a particular favourite of the local agricultural writer William Ellis: 'Oh! How rich a Fruit is this Black Kerroon Cherry, eaten in a Morning tasting, off the Tree: which, for its noble, pleasant Taste, and laxative, antiscorbutic Quality, is most delicious'). Another early area of commercial production developed around the Fenland town of Wisbech, where apples and to a lesser extent plums were being grown on a significant scale by the eighteenth century. Wisbech was an inland port on the river Nene and the fruit could be shipped by water to a number of markets in eastern England. Smaller scale specialisation is apparent, from an early date, in a number of other districts, including south-east Hertfordshire and parts of south Essex.

One of the surviving 'Prune' orchards of south-west Bedfordshire.

It was, however, the arrival of the railways in the middle of the nineteenth century and the opportunities they presented for getting fruit to distant markets – London, and the industrial connurbations of the Midlands and the North – which saw the real development of commercial orchards. By the start of the twentieth century there were 13,555 acres (5,487 hectares) of commercial orchards in the eastern counties, in addition to around 5,850 acres (2,360 hectares) of

farmhouse and domestic examples. The Fenland orchards had experienced significant expansion, while major centres of production developed on the calcareous loams and clays of south Cambridgeshire (plums and apples), and on the 'islands' of high ground in the southern Fens and on the nearby fen edge (apples and plums). A major fruit-growing industry also emerged in south-west Bedfordshire, devoted to the cultivation of the damsons called 'Aylesbury Prunes', other plums, and apples. Various other, more localised concentrations of fruit-growing emerged, as in the Lea valley and in south-east Essex.



The distribution of orchards in the eastern counties in c.1900, as shown on the Second Edition OS 6-inch maps.

Over the following four decades the area of commercial orchards in the eastern counties increased steadily, reaching 20,161 acres (8,159 hectares) in 1910, 29,875 acres (12,090 hectares) in 1925 and over 36,000 acres (14,570 hectares) on the eve of the Second World War. This phenomenal expansion was driven by a range of forces: agricultural depression, which encouraged farmers to diversify production; continued growth in urban markets; and an increase in the numbers of smallholdings, in part as a consequence of government policies. The period also saw the development, or expansion, of a range of food processing industries, including cider-making and jam production, with the Chivers factory at Histon in Cambridgeshire, and Wilkin and Sons at Tiptree in Essex, providing powerful stimulus for local plum growing. Existing concentrations of commercial

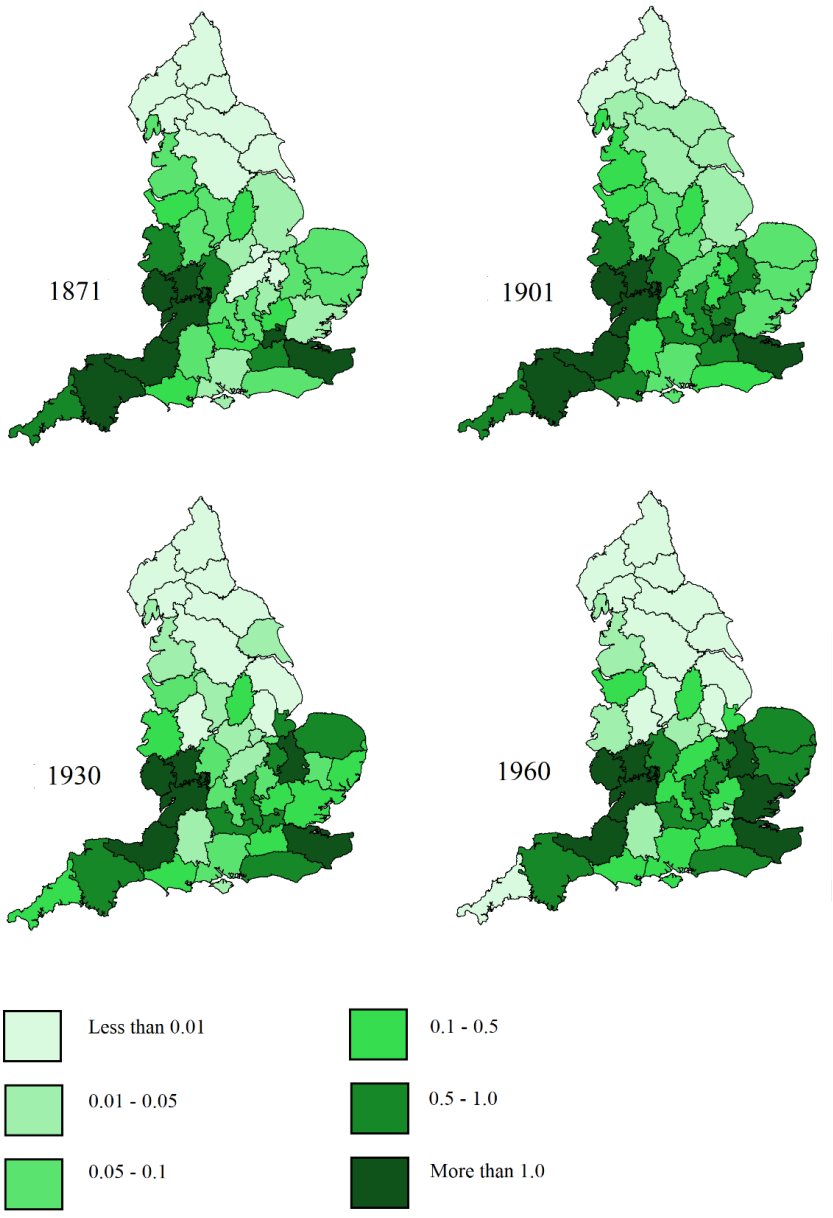
production experienced further growth, although a few stagnated, including west Hertfordshire and, in particular, south-east Essex, which grew into the 1920s but then tended to decline due to the expansion of Southend. But new, localised concentrations also emerged, as in north-east Norfolk and central Essex.

A typical example of a Fenland Bramley's Seedling orchard, Marshland St James, Norfolk. Although planted in the inter-War period, the trees have attained a massive size – a combination of the vigorous habit of the variety, and the moist and fertile local soils.

Much of this twentieth-century growth was associated with small farms and smallholdings, but a number of large producers also emerged. Some were associated with local farming families; some grew through the gradual expansion of smaller fruit-growing enterprises; some were created by local landowners, like the Cubitt family of Honing in Norfolk, or by businessmen from outside the region, such as the infamous Cox's Orange Pippin Company founded by John Whitehead at Cockayne Hatley in Cambridgeshire in the 1930s, with its network of 'treeholder' investors which degenerated into what was, in effect, a pyramid selling scheme.

Following a pause during the Second World War, the growth of the orchard area resumed, with particularly rapid expansion in Essex and Suffolk. The peak probably came around 1955, when there were over 44,000 acres (17,800 hectares) of commercial orchard in the eastern counties, together with around 4,000 acres (1,620 hectares) of small domestic, or neglected farmhouse, examples. The average density of orchards in some eastern counties by this stage rivalled that found in the traditional fruit-growing counties of western England. Much of this last phase of expansion was

associated, not with small farms and smallholdings, but with large commercial enterprises – mirroring to some extent developments more widely in the agricultural industry, towards larger units of production. Over a quarter of the Suffolk acreage by the late 1950s was made up by just seven large businesses.



Orchards as a percentage of county area, from the Agricultural Census. The figures omit unproductive and domestic orchards and those on holdings of less than an acre.

Garden orchards, associated with country houses and the larger middle-class residences, comprises our third category. Orchards of this type were always less numerous than those just discussed but are of considerable historic importance. In the sixteenth and seventeenth centuries great mansions

were surrounded by networks of enclosed gardens laid out in a formal or 'geometric' style, with parterres, topiary and the like. Practical food-producing features, such as fish ponds and dovecotes, were also proudly displayed. Orchards, combining production and beauty, and with trees arranged in a neat grid, had an obvious appeal and regularly formed prominent elements of the grounds of country houses. In addition, fruit trees – especially tender exotics like apricot and peach, but also cherries, plums, pears and apples – were invariably trained against the garden walls. Although some tall fruit trees, on vigorous rootstocks, could be found in the grounds of early-modern country houses, many – especially in walled gardens – were grafted onto dwarfing, or 'paradise', rootstocks.

From the middle decades of the eighteenth century, as wealthy landowners adopted the new, naturalistic landscape style of 'Capability' Brown and his imitators, geometric gardens, walled enclosures and productive facilities were swept away from the immediate vicinity of the mansion, together with fruit trees and orchards. But the wealthy still needed vegetables and fruit. Walled kitchen gardens continued to exist, usually with orchards beside them, although now in more hidden locations, usually screened by shrubberies or plantations and sometimes moved several hundred metres away from the house. They could, nevertheless, usually still be accessed relatively easily from the pleasure grounds, and were visited regularly by owners. Some of the aesthetics of the old formal gardens lived on within them. In particular, the careful training of fruit trees as fans or espaliers against their walls was motivated by ornamental as much as by practical considerations. Right through the later eighteenth and nineteenth centuries landowners continued to lavish money on their fruit trees and orchards, and to amass large collections of varieties. When the Pines estate at Mettingham in Suffolk was put on the market in 1896 the orchard contained 55 different varieties of apples alone, with more growing in the 'highly productive Kitchen Garden'. Many new varieties of fruit, and especially of apple, were developed by estate gardeners.

Orchards became, if anything, even more important elements of designed landscapes with the rise of the 'Arts and Crafts' style of garden design in the late nineteenth century. The 'orchard beautiful', filled with tall fruit trees on vigorous rootstocks and underplanted with 'Daffodils, Snowflakes, Snowdrops, wild Tulips', was a required feature of a garden more generally modelled, if loosely, on the traditional and the vernacular. Such ideas were immensely influential, and most of the larger suburban residences built in the early twentieth century were provided with extensive collections of fruit trees, or even true orchards.

Institutional orchards, our fourth and final category, were even less numerous in the past, but now account for some of the largest and most interesting examples in eastern England. Large residential institutions often had extensive orchards attached, to provide fruit for the table and kitchens. They were a feature of some workhouses in the eighteenth and nineteenth centuries but were especially associated with new types of establishment which developed from the second half of the nineteenth century, especially psychiatric hospitals and children's homes. Surviving orchards of this type tend to cluster towards the south of the region, and include the wonderful examples at The Oval, Harpenden, Hertfordshire (a former children's home); Arlesley, Bedfordshire (a former psychiatric hospital); and the St Elizabeth's Centre at Much Hadham in Hertfordshire. Residents, well into the post-War period, supplied much of the labour: outdoor work was considered to have a therapeutic value but orchards, together with the kitchen gardens and often farms which accompanied them, provided a cheap way of supplying the food required by these places. It is important to emphasise that not every residential institution in the later nineteenth or twentieth century was provided with an orchard. They do not seem to have been a normal feature of boarding schools, nor are examples usually found associated with general medical hospitals. Where residents were too infirm, too

transient, or too wealthy to provide a regular labour force, true orchards were rarely established, although notable exceptions include the magnificent orchard planted in the late nineteenth century at Girton College, Cambridge.

The orchard at The Oval, Harpenden, Hertfordshire. The orchard was planted soon after the children's home, then known as Highfield, was opened in 1913.

The Management of Orchards

'Traditional' farm orchards, as noted, usually contained tall, long-lived trees grafted onto vigorous 'crab' or 'wilding' rootstocks. These allowed the orchard grass to be grazed, with the foliage and fruit out of reach of livestock, although many orchards were also cut for hay: the will of Margaret Haward of Writtle in Essex, for example, drawn up in 1729, mentions apples, walnuts and plums in the orchard, and 'one hay cock' standing there. In the eastern counties sheep seem to have been pastured in orchards more often than larger stock like cattle or horses, because of the potential damage which the latter could cause to the trees. Leases often instructed tenants to keep cows out of the orchard. Pigs, presumably ringed or securely housed, were also sporadically kept in orchards and fed on windfalls – in 1612 a property in Diss in Norfolk was conveyed 'with part of an orchard or hogs' yard'. Geese and other poultry would have done little damage and their presence presumably explains the ponds often found in old orchards.

Farm orchards served a number of additional functions. The placing of hives or skeps in the orchard insured both pollination of the fruit and the production of significant amounts of honey and beeswax: when William Baker of Great Chishall in Essex died in 1598 he left to his wife Alice '1 hive of bees standing in my orchard….'. Maps occasionally suggest that the ground between the trees was cultivated, presumably for vegetables or soft frui,t but this was mainly a feature of commercial

orchards. Farm orchards were also, before the nineteenth century, regarded as an important source of fuel, and dead branches and sickly trees were soon removed for burning. Indeed, early writers like Ralph Austen in the seventeenth century emphasised the wood supplied by orchards almost as much as the fruit: 'It is well known how usefull and profitable they are from yeare to yeare, not only in respect of the *Fruits* but likewise for *Fuell*, by the prunings of the *Trees*, and *old dead Trees*'.

A typical example of a modern, intensively-managed commercial orchard in Wisbech St Mary, north Cambridgeshire. The apples are closely-planted and grafted on dwarfing rootstocks and will be replaced before they attain any great age; the ground beneath the trees is sprayed with herbicide and maintained as bare earth.

Even in the seventeenth and eighteenth centuries the management of commercial orchards often differed from that of those on farms. Although some were grazed, or used to run poultry, many were planted with soft fruit, flowers, vegetables or other crops between the trees. A lease for land in Heigham in Norwich from 1684 described it as being 'in form of a triangle planted with 60 fruit trees and 200 gooseberry and currant bushes'. By the late nineteenth century this kind of management was particularly common in Cambridgeshire. One orchard in Ely, put on the market in 1880, was described as being 'planted with a choice selection of apple, pear, plum, and other trees in full profit and bearing; and as undergrowth with gooseberry and current bushes, which produce large quantities of Fruit for the London and Manchester markets.' In the inter war years some examples were interplanted with crops like sugar beet. Commercial orchards were also more intensively managed than those associated with farms and already, by the late nineteenth century, intensively sprayed. One writer in the 1920s described how 'The control of pests and diseases involves, in a

good many cases, the work of spraying the trees with insecticidal, ovicidal and fungicidal washes. Furthermore, the trees are often sprayed with cleansing and "cover" washes, such as caustic-soda preparations, hot lime or lime and salt'.

An absence of livestock ensured that low-growing trees were widely used in commercial orchards by the early twentieth century, facilitating spraying and harvesting. They were grafted on the long-established 'paradise' rootstocks or increasingly, in the inter-war years, on one of the new range of dwarfing rootstocks developed at the Malling research station ('M' types). When, in 1920, the Ministry of Agriculture and Fisheries initiated a scheme to provide apple trees for county council smallholdings they were grafted 'on Paradise and a proportion on Crab stocks'. At Honing in Norfolk in the 1920s and 30s the apples were mainly planted on 'paradise' rootstocks, with only a few on crab. But height was also controlled by pruning. In the old Fen orchards apples, mainly Bramley's Seedlings, were routinely pruned as 'bush' trees from an early date, with branches rising from a low bole less than a metre high, a practise employed elsewhere with this strongly-growing variety, as at Tewin in Hertfordshire.

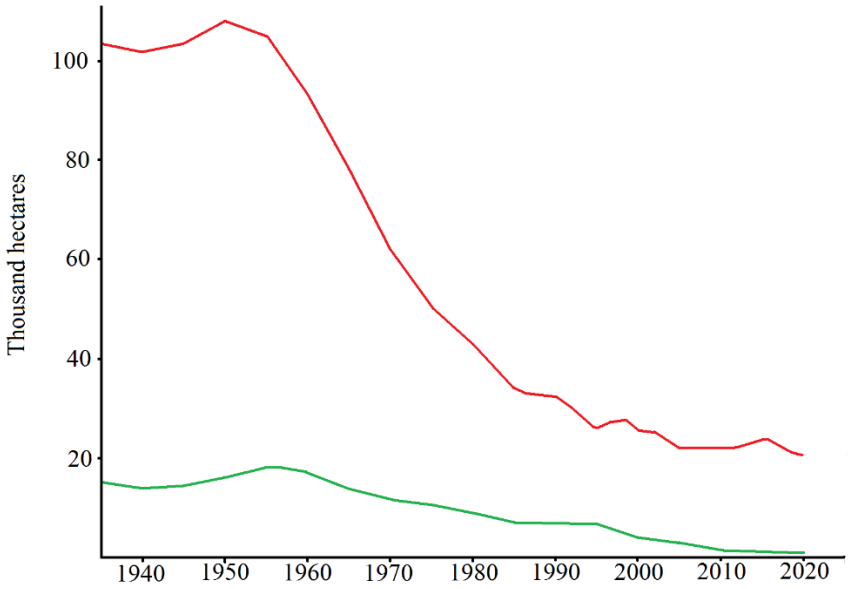
These trends intensified in the post-War period, when the practise of inter-planting seems to have declined and many new orchards comprised close-set trees on dwarfing stocks, often planted in bare earth. By the 1970s, trees pruned as 'spindle' forms were increasingly common. and bare earth was replaced with mown grass, only the area around the trees kept free of vegetation by spraying. Today, the most intensively managed orchards comprise closely-planted, low-growing trees which are usually replaced after two or three decades. Not all commercial orchards planted in the post-War years, however, necessarily contained low-growing trees. The cherry orchards of Hertfordshire, for example, were often planted with trees on vigorous rootstocks, 'headed' at a height of 1.5 – 2 metres.

Surviving country house orchards sometimes contain tall trees on vigorous rootstocks but more often half-standards or occasionally, as at Houghton in Norfolk, bush-pruned trees. The trees growing in garden areas are often on dwarfing rootstocks. 'Institutional' orchards generally contain trees on dwarfing or semi-vigorous rootstock, often pruned as half-standards. In neither of these contexts was the grass between the trees regularly grazed by livestock.

Recent History

Having grown steadily throught the first half of the twentieth century, reaching a peak in the mid-1950s, the area occupied by commercial orchards in eastern England then began to decline as a consequence of a range of factors including the globalisation of trade in food commodities, changes in lifestyles and employment patterns, and structural developments in the retailing sector, especially the rise of the great supermarket chains. The decline had set in before Britain joined the EEC, later the European Community, in 1973, although that body's agricultural policies encouraged further contraction. In 1955 there were around 44,000 acres (17,800 hectares) of commercial orchard in eastern England: by 1985 this had fallen to less than 18,500 acres (c.7,490 hectares); by 2020, the figure was around 3,800 acres (c.1,540 hectares). This reduction in the commercial orchard acreage needs, however, to be distinguished from the decline in the number of small 'traditional' and

farmhouse orchards, which began at an earlier date and had rather different causes. It was in part a consequence of the increasing size, and commercial orientation, of farms in eastern England. Large arable producers were unlikely to waste time marketing small surpluses of fruit, and were as likely as anyone else to buy what fruit they needed from the local greengrocers or, increasingly, the supermarket. But it part it reflected government policy towards what Stamp described in 1948 as 'casual' orchards – 'generally left to look after themselves except for an occasional pruning', and in which 'any control of pests is the exception and spraying is almost unknown'.



The decline of the orchard area in the post-War period. Red line: national area. Green line: eastern England. Source: the Agricultural Census. The figures only include commercial orchards on holdings of 1 acre (0.4 hectares) or more.

Grants for grubbing out small and derelict orchards were initiated during the Second World War and were continued through the following decades. They were accompanied by a barrage of advice on the issue. In 1961 the Ministry of Agriculture, Fisheries and Food asked farmers, rhetorically:

> Is your orchard an asset or a liability? There is no doubt that quite a number of orchards – the smaller ones in particular – are likely to be an embarrassment to the owner rather than a source of gain…. In these days of fierce competition only the quality product can hope to find a paying market. … What can be done with these worn out orchards, those orchards which are so small that they do not warrant the expenditure on spraying tackle and equipment for grading and packing? What can be done with those mis-sited orchards where frost claims the crop three years out of four? … There can only be one answer – grub out and put the land to more profitable use.

Even where old farmhouse orchards survived, often where farms were amalgamated and one became a private dwelling, they were usually neglected. As trees died they were not replaced, and orchards gradually became part of the garden, or a pony paddock.

The post-War decades also witnessed the disappearance of many 'garden' and 'institutional' orchards. Private individuals came to rely more on supermarkets for fresh fruit and vegetables and there was a decline in the home production of such things as apple pies or jam. Country house owners were keen to reduce their labour costs, while in towns, villages and suburbs orchards fell victim to progressive 'infilling', the subdivision and development of larger plots. One of the consequences of the 1947 Town and Country Planning Act was that, by reducing the scope for suburban sprawl, it encouraged higher densities of houses in areas zoned for residential development. At the same time, large residential institutions gradually abandoned the practice of growing their own food. Rather than being seen as 'therapeutic', farm and garden work came to be regarded as both exploitative and of little benefit in health terms. There were also financial benefits to be reaped from selling off the land formerly used for such activities. Indeed, as early as 1948 all hospital boards were urged to dispense with farms not regarded as essential. 'Advances in medical treatment and improvements in the supply of clean milk and vegetables have reduced the need for hospitals to have their own farms'. Almost everywhere, serious management of institutional orchards had ended by the 1970s, and in the 1980s and 90s any surviving examples faced a new threat, as social policies turned against the very existence of large institutions, especially mental hospitals, in favour of smaller, more dispersed units of care. Many of these places constituted prime sites for residential development. Their buildings might be converted into flats and houses, or they might be demolished and their sites developed for housing, but either way their orchards were usually an irrelevance. Only in a few cases were they retained as 'features' within new residential areas.

There were other threats to the orchard heritage. From the 1940s onwards there was widespread official hostility on the part of policy makers and the fruit-growing industry to the wide variety of fruit, especially apples, available. In 1944 the government published lists of apples recommended for planting in new orchards. The 'Primary list' included only Bramley's Seedling, Cox 's Orange Pippin, Edward VII, Grenadier, Laxton Superb, Miller's Seedling and Worcester Pearmain: Laxton's Fortune, and Lord Lambourne were also under consideration, pending the results of field trials. These varieties, nearly half of which had been introduced since 1900 and most since 1850, were considered 'sufficient for most districts', although it was agreed that 'there are places where other varieties are known to succeed'. W.P. Seabrook, the noted nurseryman and fruit grower from Essex, voiced a view of older varieties that seems to have been widely shared when he wrote in December 1943 to Dr Taylor, the Commissioner for Horticulture:

> ….it is quite likely that some old varieties may be worth resuscitating but my father collected several hundreds and fruited them but combed them out some twenty years ago and I do not think he missed anything of real value. I have since gone through what he left and none appear to be of commercial value.

Attempts to reduce the range of varieties grown in English orchards continued, and intensified, through the 1970s and 80s. The Ministry of Agriculture, Fisheries and Food, in a letter sent to fruit growers in February 1981, urged that:

> For the English fruit industry to survive it is vital that the number of varieties is reduced as a matter of urgency. Certainly the multiplicity of dessert varieties marketed during the September - December period is severely depressing prices. Fewer varieties, with improved continuity of supply, can be backed by increased promotion.

The number of varieties being recommended now contracted still further: Cox's Orange Pippin, Discovery and Bramley's Seedling were now the officially preferred apples, Conference and Comice the recommended pears, and the only second choice varieties suggested were the apples Crispin, Spartan and Idared, and even these were to be planted with caution. Research was being undertaken into the future viability of other varieties, but these were few in number - Golden Delicious, Worcester Pearmain, Tydeman's Early and Egremont Russet. 'Growers are strongly urged to consider grubbing varieties not listed above'.

Government policies, at European Community or national level, only partly account for these developments. Changes in lifestyles and in attitudes to food – a decline in the amount of home cooking undertaken as a higher proportion of women entered full-time employment – coupled with the proliferation of ready-processed meals available from large supermarkets, worked symbiotically to reduce demand for diversity. By the 1990s, for most consumers, 'apple' or 'pear' no longer meant a range of varieties with different tastes, uses and properties, but three or four basic types, some of them bland and predictable and more likely to be imported than home grown.

But by this time a reaction was under way. Books like Marion Shoard's *The Theft of the Countryside* (1980) and Richard Mabey's *The Common Ground* (1980) emphasised the deleterious effects of modern food production not only on the environment but on the very quality of life. A new organisation, Common Ground, emerged and in 1988 began its 'Save Our Orchards' campaign, 'intuitively recognising the richness of culture and nature held in the traditional tall tree orchard', in Shoard's words. Orchards were important because they formed a key aspect of 'local distinctiveness', that particular character of place which arose from the interaction of people, over long periods of time, with their immediate environment. Over the following decades a range of organisations in the eastern counties emerged, following a similar agenda. The Norfolk Apples and Orchards Project was set up in 1994 and in 2003 developed into the East of England Apples and Orchards Project (EEAOP), a registered charity working across the whole of the eastern counties. It remains the most important orchard group in the region. EEAOP has undertaken survey and research work but has mainly focused on the planting of new orchards and the identification and propagation of fruit varieties associated with the eastern counties. From the beginning it organised 'apple days', and more than 270 varieties of apple, pear, cherry and plum are now (2021) maintained in the organisation's nursery ground at Raynham in west Norfolk, which are propagated and sold to individuals, community groups and schools. The Hertfordshire Orchards Initiative (HOI) was established as early as 1991; the Cambridgeshire Orchard Group (COG) was founded in 2003 and the Suffolk Traditional Orchards Group (STOG) in 2009, with the Bedfordshire and Luton Orchard Group (BLOG) following in 2010. The most recent development has been the establishment, in 2017, of the 'Orchards East' project.

As a result of these endeavours, and of a more general concern for heritage and the environment, a number of new orchards of 'heritage' varieties have been planted in the eastern counties over the last three decades; some are 'community' orchards, some attached to institutions, some the work of private individuals. But, important though these additions to the landscape have unquestionably been, they collectively cannot compensate for the massive and ongoing destruction of orchards, and especially of 'traditional' orchards, in the eastern counties.

The Current State of Play.

Official figures for the area of orchards surviving in eastern England relate to commercially active examples, many managed on highly intensive lines. The survival and condition of less intensive, more biologically diverse orchards – neglected commercial, farmhouse, garden and institutional - can only be ascertained through a detailed ground survey. As a central part of the Orchards East project, around 150 volunteers were supplied with maps of local areas, prepared by the various Local Environmental Record Centres (LERCS), showing the locations of two types of orchard. The first were examples shown on the Second Edition Ordnance Survey 6-inch maps, produced at the start of the twentieth century. These were mainly farmhouse orchards, and early commercial examples, potentially of the kind often described as 'traditional', characterised by tall, long-lived trees. The second were additional orchards, of twentieth-century date, identified by earlier surveys: one, largely based on aerial photographs, carried out by the People's Trust for Endangered Species; the others undertaken by county orchard groups or LERCS. Volunteers were asked to examine all these sites on the ground and, in addition, to inspect and record any other orchards which they could discover within their allotted areas. The record forms contained a range of questions about the current size, condition and character of those orchards which still survived, and about the kinds of land use that had replaced those examples which had disappeared.

The results of the survey show that there has been a very dramatic loss of orchards in eastern England over the last few decades. In all, the sites of around 10,000 known examples were examined, a figure representing 35 per cent of the total targeted population of 29,000; the parishes surveyed by volunteers amounted to around 30 per cent of the land area of the eastern counties. Only 1,600 of the locations examined, 16 per cent, were considered to still be 'orchards' by the surveyors. In addition, volunteers located 343 new orchards, omitted from the maps with which they had been provided. Around two thirds appear to represent community orchards or private amenity examples, planted since the 1980s; most of the rest, twentieth-century commercial enterprises. Collectively, these cover an area of 550 acres, probably indicating a figure of around 1,800 acres (*c.* 730 hectares) of such orchards existing across the eastern counties overall.

Most of the orchard sites examined by surveyors were ones shown on the second edition Ordnance Survey maps of *c.*1900. Of these, 7,682 had been destroyed and only 657, covering 612 acres (248 hectares), remained: a survival rate of only 8 per cent by number, 9 per cent by area. This suggests that of the 23,890 orchards covering 19,400 acres (7,850 hectares) present at the start of the twentieth century around 1,900, covering perhaps 1,800 acres (*c.*730 hectares), survive today in eastern England. A significant proportion of these, moreover, are no longer in any sense 'traditional' in character, having been re-planted with close-set trees on dwarfing rootstocks. Volunteers also examined the sites of 1,813 of the twentieth-century examples mapped by the PTES study and the county surveys. Around 33 per cent by number, 40 per cent by area, still remained, around 920 acres, probably representing around 2,600 acres (*c.* 1,050 hectares) of surviving orchard. The others had either been destroyed, or had been wrongly identified from aerial photographs.

As noted earlier, government figures suggest that there are now around 3,800 acres (*c.*1,540 hectares) of working commercial orchard in the eastern counties. Around 230 orchards of this kind, covering 690 acres (280 hectares), were included in the examples recorded by the surveyors, probably represent around 2,000 acres (810 hectares) of the government figure. Taking this overlap of datasets into account, the real area of orchards now surviving in the eastern counties, including

domestic, institutional, redundant, derelict and community examples, can be tentatively estimated at around 8,000 acres (*c*. 3,240 hectares). This is made up of 3,800 acres of working commercial examples and 4,200 of other, essentially non-commercial types. The great majority of all surviving orchards in the region clearly originated in the period between 1900 and 1960; perhaps half might reasonably be described as orchards of 'traditional' form. All these figures, we would emphasise, should be treated with extreme caution. But they are probably broadly correct.

The figure of 8,000 acres (3,240 hectares) represents around 40 per cent of the area occupied by orchards in the eastern counties in *c.*1900. But it is a much smaller fraction of the peak figure, of around 48,000 acres (19,400 hectares), attained in c.1955. The area under fruit trees has thus been reduced by around 84 per cent during the last six decades or so; in reality the decline is significantly greater, for many of the surviving orchards now cover only part of their original area or have been reduced to a handful of trees.

The kinds of land use that have replaced lost orchards provide some indication of the forces fuelling their destruction. No less than 30 per cent of former orchard sites, 26 per cent by area, are occupied by houses and a further 7 per cent, 8 per cent by area, by industrial or commercial premises. Around 25 per cent (15 per cent by area) are now gardens and 12 per cent (as much as 23 per cent by area) are under arable cultivation. Most of the remainder are pasture, scrub or secondary woodland.

Orchards, Culture and Tradition

The loss of orchards, and especially of old orchards, has serious implications for biodiversity, as explained in Part 2 of this report. But it is also important in cultural terms. When most people think of orchards they think of western England, and of the cider orchards of Devon, Somerset, Gloucestershire and Herefordshire. But the long-term cultural importance of orchards in eastern England should not be under-estimated. It is true that most surviving orchards in the region, by number and by area, are of relatively recent date: they were planted in the 'orchard century', between the 1850s and 1950s. It is also true that many of the 'traditional' fruit-growing areas in the region, such as the orchard landscapes of the Bedfordshire 'Prune' country, are not very old. Nevertheless, for centuries orchards were woven into the fabric of daily life, and could, until relatively recently, be found everywhere. They were a normal feature of the farms of yeomen and husbandmen, while smaller groups of fruit trees were regularly associated with lowly cottages. The formulaic wording of early legal documents betrays an underlying assumption that no house of significant size would lack one. In 1574, for example, the manor of Abbots Rippon in Huntingdonshire was granted with '40 messuages, 20 cottages, 60 tofts, 60 gardens 60 orchards'. Orchards and the fruit they contained were deeply woven into the fabric of local life and culture. When early farmers drew up their wills they left their farms to their sons, or sons-in-law, but also made provision for their widows which frequently included a proportion of fruit from the orchard. In 1597 John Battell of Eastwood in Essex left to his wife 'during her widowhood, yearly out of my orchard six bushels of the best apples, if they be growing there'; while the will drawn up in the following year by William Baker of Great Chishall in the far north of the same county (and now in Cambridgeshire) left to Alice his wife 'the use of my twist [intertwined] walnut tree in my garden' and allowed her to take nuts from the orchard and to 'choose 2 of the apple trees in my orchard and gather the apples'. Orchard fruit even featured as elements in rental payments and similar agreements. As late as 1701 part of the payment for a piece of land in Downham Market in Norfolk

comprised ‘3 lbs. potatoes and the fruit of three fruit-trees each year to Thomas Buckingham and his wife for their lives’.

The importance of orchards in part reflected the paucity of other forms of sweet food but orchards had other significances. The ‘forbidden fruit’ in Genesis was commonly if erroneously described as an apple and, on occasions, Eden itself as an orchard, planted with ‘every tree that is pleasant to the sight, and good for food’. At all social levels, orchards were valued for their beauty, William Lawson in the seveteenth century memorably describing how ‘whereas every other pleasure commonly fills some one of our senses, with delight; this makes all our senses swim in pleasure, and that with infinite variety, joined with no less commodity’. And they were part of the lives of the individuals and families who planted and nurtured them. Mary Birkhead, describing in 1734 her daughter’s orchard at Thwaite in Norfolk, noted in passing:

> I have for ten years been at the expence of fencing it round, diging about each tree securing them from Hares, carting fresh Earth … and … now grafting such as stunted after transplanting, the only method I could ever find to cure that evil. But this year I had the pleasure of seing my two Grand Children run a striving which should get most Filberts and such fruit as pleased them, a full recompense for all my past care.

Farmhouse orchards were dominated by apples, followed by pears, and the lesser significance of plums and cherries presumably reflects the extent to which the harvest could be successfully stored,

The ‘Cyder House’ at Aspall, Suffolk, constructed by Clement Chevallier in the 1720s, showing the cyder mill with its great stone trough, brought all the way from the Ilses de Chausse, off the Normandy coast.

without having to be preserved, bottled or converted to jam. The apples were usually culinary and dessert varieties rather than ones particularly suitable for cider making, of the kind common in western England. Beer was always the favoured alcoholic beverage in the east, largely reflecting the abundant opportunities for growing good-quality malting barley. This said, cider was often produced, from at least the seventeenth century, at country houses, as at Hamels in east Hertfordshire (in 1718 the new 'apple mill room' there was boarded with 'feather edged elm boards'). The diary kept by Sir John Wittewronge of Rothamsted in the same county in the 1680s also contains numerous references. Farmers also sporadically produced it, especially in Norfolk. In 1845 White's *Directory* could describe how orchards were 'numerous …especially on the south side of the county, where many of the farmers make cider for their own consumption, and some little for sale'. But cider was also produced in the eastern counties on a commercial scale. In 1722 Clement Chevallier came from Jersey and began commercial production of 'cyder' at Aspall in Suffolk. He declared, several years later, that 'from the year 1728 to 1740, I made, & sold, more Cyder than any Person in the Neighbourhood could have imagined', and he certainly sold his product widely across north Suffolk, and as far afield as Norwich. Other large businesses, principally Routs and Gaymers, developed in Norfolk in the nineteenth century.

While special cider varieties imported from the West Country, and France, were planted by local cider makers, they mostly used ordinary culinary and dessert types. This was the hallmark of the eastern cider tradition. Chevallier thus planted French varieties from his homeland, but mainly used normal culinary or dessert varieties from his own orchards or those of neighbours. As late as 1966 it was said that Gaymer's used 'mixed varieties of dessert and cooking apples, and in this respect differ from the West County cyder manufacturers, with their dependence on specialised cider varieties'. In the 1970s the factory was taking nearly 6,000 tons of 'cull' apples each year from regional growers, of which most came from the area around Wisbech.

Before the nineteenth century there are some references to the domestic production of local fruit-based foods, although how old and 'traditional', and how far peculiar to the eastern counties, is sometimes unclear. The 'Potton Florentine', for example – a kind of rich apple pie, baked in a large metal dish – was by the nineteenth century closely associated with the village of Potton in Bedfordshire, but the florentine originated in France and was widely consumed in England in the seventeenth and eighteenth centuries. Some dishes probably were more local in character. The cherries grown on a significant scale in west Hertfordshire were difficult to preserve and William Hone described in 1832 how people had for centuries made cherry pasties 'which are by them highly esteemed for their delicious flavour', which were eaten at 'pasty feasts'. They appealed, he suggested to all ages but especially to the young, ' whose laughter-teeming visages, begrimed with the exuberant juice, present unmistakeable evidence of their "having a finger in the pie"'. In Norfolk, the apple variety known as the Beefing is recorded from the late seventeenth century and, while it was being marketed right across England by commercial nurseries by the end of the eighteenth century, it remained (and to an extent remains) closely associated with Norfolk. It is a particularly hard, long-keeping apple, which was used to make 'Biffins', not least as a Christmas delicacy, as described by Charles Dickens in *A Christmas Carol.* They were a Norwich speciality, prepared by bakers in their ovens as they cooled after bread-baking. The apples were cooked whole and packed in straw, and gradually flattened and dried; then packed in boxes layered with sugar and sent to London fruiterers, or by post as gifts. They were also made domestically, on a large scale, well within living memory.

Also of note is the 'Bedfordshire Clanger', an elongated pasty containing meat at one end and apple at the other, which was made by the wives of agricultural labourers and taken into the field as a mid-day meal. Clangers were popular in nineteenth-century Bedfordshire but they were also enjoyed, from an early date, well beyond the borders of the county – in Huntingdonshire for example – and they were sometimes described as *Hertfordshire* Clangers. The Clanger shows how 'tradition,' rather than being timeless and unchanging, is in reality in a constant state of development and flux. Sources suggest that clangers were originally entirely savoury in character: what we now think of as the traditional clanger was the ''alf and 'alf', which may have developed quite late in the nineteenth century. Moreover,the clanger continues to change and adapt. Revived in the 1990s by Gunns, a local baker in Sandy, Biggleswade and Bedford, it is now available with a range of fillings, including Bombay Vegetable Curry with Mango.

It is sometimes suggested that old orchards are culturally important because they contain a precious genetic heritage of ancient fruit varieties, local to the area in which they lie, which have been curated and propagated down the centuries by local people through the exchange of scion wood for grafting, or young trees. There is something appealling in such a view, but we need to treat it with a measure of scepticism. In reality, even in the early eighteenth centuries many people obtained their fruit trees from commercial nurseries, and this became more true with the passing decades. It is true that a significant minority of the varieties of apple listed in eastern orchards before the later eighteenth century cannot now be identified. Some bear the names of nearby villages, or individuals, and many were probably local types, obtained from neighbours or purchased from local nurseries. Most, however, were varieties recorded throughout England – Golden Pippin, Golden Pearmain, Nonpareil – with names which may have been broadly descriptive in character, rather than referring to a specific genetic type. Certainly, seventeenth and eighteenth-century people often commented on the uncertain nature of varieties and the shifting character of the terms used to describe them. In 1734 Mary Birkhead of Thwaite in Norfolk remarked that 'I have frequently had the same fruit from several persons by different names'. The rector of North Runcton in the same county bemoaned in 1720 how 'The true Aromatick Golden Russeting is so scarse in this Countrey that I perceive they give the name to any ordinary fruit if it have butt a Russett coat.' Either way, the rise of larger commercial nurseries in the course of the eighteenth and early nineteenth century – firms like Mackie's of Norwich or Rivers of Sawbridgeworth in Hertfordshire - saw a major shift in orchard planting in eastern England. Obscure local varieties disappeared, their place taken by ones long-established or recently developed elsewhere in England, such as the Ribston Pippin or Blenheim Orange; in a similar way, a few varieties local to the east, such as the famous Norfolk Beefing, were now more widely marketed, by commercial nurseries right across the country. Further changes came in the course of the nineteenth century, as the old varieties once common throughout England like Nonparail and Golden Pearmain were eclipsed by new types, developed by expanding commercial nurseries, competing for customers. Indeed, as early as 1851 Robert Hogg observed that 'the Golden Pippin, and all the old varieties of English apple' had been 'allowed to disappear from our orchards' because they were 'not worth perpetuating, and their places supplied by others infinitely superior'. The latter included many first developed in the eastern counties, such as Lane's Prince Albert or Emneth Early. The number of new varieties on offer expanded inexorably. The catalogue produced by Lane's of Berkhamsted in 1862 includes no less than 100 varieties of apple; Daniels of Norwich were advertising 128 apple varieties by 1878; Rivers were supplying 113 in 1861, rising to 132 by 1870 and reaching 161 by 1914.

The evidence suggests that few fruit trees in eastern England are more than 120 years old, and virtually none more than 150. The varieties found in old orchards are not, therefore, likely to be 'ancient' or 'traditional' to the local area. In most orchards we look in vain for Golden Permain, Golden Pippin, Nonpareil, or other widely planted eighteenth-century varieties. Still less do we encounter otherwise unidentified types which might be examples of Lady's Longing, the Thwaite, the Halvergate, 'Mr Walker's Apple', or other obscure varieties which appear in our sources. Instead, the oldest trees are the product of the commercial nurseries of the Victorian and Edwardian periods. They are a testimony to the skill of the nurserymen and gardeners of the eighteenth, nineteenth and early twentieth centuries, and they provide a range of tastes and textures which stands in sharp contrast to the meagre offerings of most retail outlets. But their antiquity, or 'traditional' character, should not be exaggerated.

Antiquity and Biodiversity

As explained in the next section, the survey work carried out as part of the Orchards East project has thrown important new light on the character of old orchards as habitats. But so, too - albeit in a different way – has the associated historical research. A rather simple distinction is sometimes posited between 'traditional' farmhouse orchards, good for biodiversity, and more recent and commercial orchards, which are not. But given that much of the conservation value of orchards derives from their veteran trees, and given that apple trees attain veteran characteristics after six or seven decades and plums and cherries even more quickly, commercial and institutional examples planted in the middle decades of the twentieth century – even those with trees on dwarfing rootstocks, such as Crapes Orchard in Aldham, Essex – can be important for biodiversity. Indeed,

Large old Bramley's Seedling trees at Tewin Orchard, now part of a wildlife reserve owned and managed by the Hertfordshire and Middlesex Wildlife Trust.

many of the examples discussed in the next section fall into these categories. The fact that fruit trees veteranize early both ensures the importance of orchards as habitats and makes them appear older than they really are. The wonderful Tewin Orchard, managed as part of a larger wildlife reserve by the Hertfordshire and Middlesex Wildlife Trust, is described in publicity material as a 'traditional village orchard', and this seems reasonable given the huge size of its great spreading Bramleys. But the orchard was planted as recently as 1933 as a business venture by one William Stenning Hopkyns; his daughter, educated at the Slade art school in London, gave it to the Trust in 1984.

It is arguable that, as in our attitudes to 'semi-natural habitats' more generally, we often confuse and conflate the environmental character of several different things: old, 'traditional' orchards as they are today, with their tall, veteranized trees; such orchards as they would have been in the past, when they were managed on more commercial or at least more productive lines; and orchards recently planted, and as we expect them to develop over future decades. For what we think of as 'traditional' orchards may to some extent have appeared, to our ancestors, over-mature and undermanaged, if not derelict. In particular, the kinds of very decaying trees which are their key feature were almost certainly rarer in the past, when trees were routinely taken down as their productivity declined. 'The reasons given for destroying old trees are generally these two, viz, the one for not bearing good fruit, and the other for bearing little or none', as one eighteenth-century commentator put it. Old trees, hollow and unstable, also posed a threat to their neighbours. A felled tree was not a wasted one, for there was always a demand for firewood in this fuel-hungry world. Diaries and accounts refer to the removal of old and unproductive trees; so too do lease agreements. One for an orchard in Beccles in Suffolk, drawn up in 1786, reserved to the lessor 'free liberty of ingress, egress and regress to cut down and stub up all such old decayed trees that shall have done bearing and to cut and carry away the same'. Contracts made with gardeners at country houses in the seventeenth and eighteenth centuries include similar provisions, as at Harrold Hall in Bedfordshire in 1653 where it was stipulated that 'in case any of the fruite trees either in the Orchyards or gardens shall happen to decaye from tyme to tyme to plant new trees of the Like goodnesse in the roome of such as shall see decay'.

Our 'traditional' orchards in the past, in other words, when more intensively managed than today, would probably have contained fewer hollowed, veteran trees. And they would certainly have lacked much in the way of dead branches and the like. We should be wary, when looking at the spreading, decaying, veteranized trees in an old orchard today, of imagining that the landscape was once full of such places. The reality is perhaps more complex. Above all, an orchard like that at Tewin may be rich in wildlife now, but in its managed heyday, regularly sprayed with herbicides, fungicides and insecticides, it would have been a very different place.

The Value of Orchards

None of the comments made in the two preceeding sections should detract from the importance of orchards. On the contrary: perhaps uniquely as landscape features, they provide multiple benefits within a relatively small space, serving to combine both cultural and natural value. How we treat them crystalises with particular clarity an emerging debate in conservation circles. An earlier generation of ecologists, including people like Oliver Rackam, saw the conservation of historical landscapes, and of wildlife, as working together. The various key habitats, such as ancient woods or

heathland, were shaped over time by successive forms of social and economic organisation, by technologies, needs and practices whose time has now, in many cases, passed. But today, for many conservationists, such ideas and approaches are falling from favour. 'Re-wilding' is the only game in town: the idea that biodiversity is best sustained by creating spaces, preferably extensive ones, in which nature can be left to its own devices. Re-wilding is an admirable objective and will play a major role in conservation in the future. But it must not be allowed to monopolise our energy and attention. Rewilded areas would be discrete and often remote, but wildlife and 'nature' are principally experienced – especially by the poor, the old, the infirm – close to home, on country walks, in the park or in the garden. And that is why orchards are so important. They were, and are, created and maintained by human activities to a greater extent, arguably, than any other 'semi-natural habitat'. Yet they sustain species which have (in the eastern counties especially) few homes elsewhere. Even in terms of the commoner forms of flora and fauna with which they are associated orchards take on a particular significance because – again, to a greater degree than other habitats – they have always been intimately associated with the places where people live, and now in new and exciting ways, with the appearance of community orchards, open to all, in villages, towns and suburbs.

Orchards thus have an important role in wildlife conservation. And they have histories, variously short or long, which tie them to their particular localities. The fruit varieties they contain provide connections with the past, if one less ancient than sometimes suggested. All orchards, moreover, come laden with yet older associations, provide a connection with our earliest, most essential myths. Our ancestors were surrounded by orchards. Their general disappearance over the last few decades represents a profound discontinuity with a long past. Above all, the direct and almost primordial sensory experiences that orchards provide – the tastes of the many varieties of fruit, the beauty of spring blossom, the sound of birdsong, the rough textures of old bark – constitute a powerful antidote to the blandness which characterises so much of modern life. To quote, once again, the words of William Lawson, orchards make 'all our senses swim in pleasure, and that with infinite variety, joined with no less commodity'. We need orchards; we need to sustain a good number of those that remain, re-purposed, where possible, as areas of conservation and public amenity; and we need to plant new ones, and spread the skills required to maintain them into the future. Such work is , in the eastern counties, already being carried out, by activists and enthusiasts. It needs to continue, to broaden, to intensify, and to receive the support and funding that it requires from society as a whole. Above all, proposed changes in planning legislation, concerning the need for 'green infrastructure', need to be developed to ensure that orchards become a frequent and familiar feature of future housing developments.

Part 2. Orchards East Survey of Biodiversity: interim report.

Paul Read

Introduction

An aspect of rescuing our planet from ourselves includes protecting the biodiversity supported by our landscape. Biodiversity, meaning the biological variety of life on Earth, is measured at species, ecosystem and genetic levels. However, orchards have been relatively little researched. What information there is rarely concentrates on the unique features of orchards that separates them from native woodland, their trees, almost all non-native cultivars, set in local or regional agricultural or urban environments, heavily influenced and managed by man.

Orchards East was set up primarily to determine how much of our eastern England historic orchard landscape still exists, and to promote new planting, with the emphasis on non-commercial, traditional, residential and community orchards. This biodiversity project could not attempt the impossible task of surveying the species in *every* interesting site mapped, nor could it attempt to look at total numbers of every species on every tree. The compromise arrived at was to select a limited number of sites, sample several fauna and flora groups that utilized. and in a few cases, depended on, the crop trees, during 2019. Unexpected circumstances, including Covid-19, modified this plan considerably, and this interim report is a summary of the results from summer 2019 and ground flora surveys in 3019/2020. Spring and early summer surveying re-started this year (2021) and is still progressing, and the final report should be ready in spring 2022.

Approx 110 year old Bramley's Seedling apple tree in the fenland orchard, TF50.

Part of Jeacock's Orchard, Tring, Herts

Previous studies carried out in this region in the past did not concentrate on the trees, but considered the orchard habitat as everything within an orchard's boundaries. Two invertebrate studies in Cambridgeshire that did include specific sampling from trees give us some guidance as to what we might expect from an invertebrate tree species survey.

The results from 2019 are still being evaluated, but already the effort of narrowing our sampling attention to the trees, and the use of prolonged periods of a specialized trapping technique is generating far more species than expected, or it seems, than previously recorded in this region's orchards. The process of separating, where possible, the recorded species into those that utilised, or are dependent on the trees, and those that are casual "passers-by" requires further research. The survey of ground flora, an adjacent ecology to that of the trees, suggests we may need to review the conventional policy that management can achieve high botanical diversity in densely planted orchards.

Condensed examples of the 2019 and 2020 findings so far are listed in the APPENDIX. Complete Excel spreadsheets for 2019/2020 are available for Local Environmental Record Centres now, and those for 2021 will be available early in 2022.

The plan was to select up to 25 sites, and survey over one full growing season April to September 2019, but for several reasons key professional staff were not able to commence until early summer to autumn 2019. We therefore re-scheduled to enable spring surveying to be carried out April to end July 2020. This did not happen due to the Covid-19 restrictions in March 2020, preventing the spring invertebrate survey, and all epiphyte surveys scheduled for early spring. Surveying was

Veteran apple trees at Crapes Fruit Farm, Aldham Essex, about 60 years old on semi-dwarfing rootstock

additionally affected by the vulnerability of elderly surveyors, volunteers and species identifiers... and the author of this report!

During summer 2020 it was possible for lone specialist surveyors to carry out the planned summer ground flora and environs surveys, and now, in June 2021, the spring ground flora surveys are now being done.

The Trials and Tribulations of a Biodiversity Survey

In autumn 2020 Orchards East was extended by the Heritage Lottery Fund to allow the orchard biodiversity component of the Orchards East project to continue to the end of July 2021. It was at this point it was decided not to include the epiphyte surveys (Bryophytes, Lichen and Algae). This was partly for financial reasons; running the project over two seasons 2 years apart had cost implications, but also experienced specialist biodiversity surveyors often limit their activity to their home county, making it difficult to plan a survey in several counties at the same time with different surveyors for each. We had also lost our most experienced orchard bryologist, Robin Stevenson, who had been part of the project from its inception 3 years before, who sadly died in 2019. Bryologists and lichenologists in our region would not have been have been able to provide all the sites in 6 counties with coverage (although we still hope to carry this survey out as a new and separate project).

This INTERIM report refers to summer data collected in 2019 and in 2020, flight interception trapping and manual invertebrate surveys and botanical ground flora surveying. No spring survey data is included, essential to complete the record of both invertebrates and ground flora surveys.

Identification of 2021 catch samples will continue into autumn 2021 and a full report will be available by the start of 2022.

Appr. 85yr old veteran apple trees with protection from accessional grazing sheep at Herts WT Tewin Orchard.

The final project report will be extensive, with details of locations, trees species and cultivars, the microhabitat and dates of specimens recorded, and will be available online on several county orchard websites. Species records as spreadsheets will also be made available to Local Environmental Record Centres , for 2019, 2020, and 2021.

Why Record the Wildlife Biodiversity of Orchard Trees?

Orchards in the past, and now

Orchards have been part of our landscape since, at latest, the Romans. Most fruit trees that are their fundamental components, have always been and still are, ***not*** native to Britain (only sweet cherries are native, but the earliest selected cultivars came from south-eastern Europe). These are all from the family *Rosaceae,* apples, pears, plums, cherries, quince, medlar, apricots, etc., with a sprinkling of two very different nut species, cobnut/hazel and walnut, and less frequently mulberry and sweet chestnut. As with almost all other important tree crops they originated far away, in Central Asia, the Caucasus, China, the mountains of Iran, eastern Europe, many from mountain areas, with the exception of most nuts. Many have changed considerably from their wild ancestor species, domesticated by human selection.

Orchards as a landscape, as we know them, are fundamentally similar across Europe in character, although only recently considered formally to be "a habitat" in the UK. In 2007, when Traditional Orchards were designated (by JNCC) as a Priority Habitat it was with a narrow definition that recognized only large (so-called "standard") trees, and embraced other associated habitats, hedges, ponds, ground flora etc, as key components of the habitat, added grazing and high-diversity grassland as desirable. The designation was ground breaking in the UK, in that it was the first agricultural habitat of introduced crop species to be regarded as a habitat, (lowland hay meadow, with native plants, was the first).

Well before 2007, and to this day, "habitats" have been going through several major re-thinks, driven by habitat and biodiversity loss, climate change, improved conservation awareness, and other recent influences. Rewilding, rewetting flood plains, and arable plantings of wild bird winter food and pollinators are now funded by Defra on once arable farms, and the value of gardens, verges, parks and brownfield sites are now recognized for their biodiversity. In the last 10 years the term "recombinant ecosystems" has entered our vocabulary; a new terminology for plant and animal associations created by human activity, "*deliberately, indirectly or, inadvertently*" (and not previously considered "habitats"). These include associations of non-native/alien and native species, conifer plantations colonised by native species, parks and gardens almost anywhere ...and orchards.

In part this terminology is contributing to action over biodiversity loss, enabling consideration that clear felling trees and replanting, simply because they aren't native to Britain, doesn't contribute to carbon sequestration... we need to retain the wood, we like the landscape, and, at least for orchards, we need the fruit.

The literature on orchard biodiversity in the British Isles is sparse, and what there is are surveys of traditional orchard sites that includes not just the large trees but other habitats, such as ponds and hedges, and often exclude "sub-standard" orchard trees, those with shorter trunks.

Previous orchard biodiversity recording in eastern England

In this region few key surveys have taken place and, except for these two, emphasis has tended not to have been on the trees, but on the associated native wildlife.

<u>NERR025 "Biodiversity studies of six traditional orchards" (Natural England) in 2004</u>

This project surveyed 6 orchards all over England, two were in Devon, 1 in Kent, 2 in the West Midlands, so we were lucky that one was included in our region, Rummers Lane Orchard, in the Cambridgeshire fens. It looked at all biodiversity aspects of trees, and also in the orchard in general, over two days. In terms of the trees, it searched for epiphytes, lichens and bryophytes, the invertebrates of epiphytes, foliage and wood, also recording grassland and hedge fauna (and set a flight interception trap for a short time in summer in some sites, probably not at this site). This survey also used some information from Cambridgeshire's recorders that was the content of the following survey.

<u>Cambridgeshire Orchard Group's Traditional Orchard Survey Phase 1, 2 and 3 Reports,</u>

The project commenced in 2004. Phase 3, published 2012, recorded in a number of Traditional Orchards, surveyed mosses, butterflies and birds, and also carried out a single day tree invertebrate survey in two Cambridgeshire orchards in May 2011. It lists invertebrates from crop trees, especially those with wood decay, as well as from the ground flora and wider associated habitats.

Our Survey Methodology

Principles and objectives of the Orchards East biodiversity survey

A specialist in saproxylic beetles (which depend on rotting fruit tree wood) in orchard trees said to me "*dragonflies like orchards, but they can do without*"! This reflects a key principle of Orchards East's survey.. to concentrate on the unique trees themselves.

The project was originally planned to operate from May to October in 2019:

25 sites were selected from an initial list of over 45 sites using covering a range of orchard landscapes in the region. Specialist habitat surveyors, both professional and county group specialists together with local volunteers, where possible, would survey and record.

Ground flora surveys

Surveyors would visit in spring and summer to record the ground flora species present, their abundance using DAFOR designations, and hedge species separately. They also noted and recorded the environment and surroundings as well as any other habitat inclusion on the site, photograph major trees, hedges and the general environment.

Grassland diversity was subsequently evaluated from 4 factors applied to each ground flora recorders species site list:

1. The total no of ground flora species recorded (less species from any sub-habitat e.g. pond, walls, water courses, hedges etc).
2. The number of grass species (*Graminae*) recorded.
3. The number of key indicator flowering plant species recorded. The indicator species used are those listed by NE in their descriptions of MG5 calcareous and neutral lowland grassland, and other references.
4. We also recorded indications of management policy, footfall, degree of grazing if any, ground compaction and the prevalence of "undesirable weed" species.

Winter and summer views of ground flora at Home Farm, St Michael's, South Elmham orchard, Suffolk.

Invertebrate surveying

Techniques used would be:

1. **Hand surveying** by beating foliage and hand collecting specimens from sheets below beaten foliage, either identified and released, or sampled by hand pooter, and/or preserved for identification later.
2. **Hand searching** bark, wood debris and rot material in rot holes and dead wood.
3. **Using a battery-powered ("vacuum") pooter** on foliage and bark.
4. **Flight Interception traps** (see relevant Appendix)

Every biodiversity project needs to consider their policy of gathering samples of specimens for identification. Most large animals and flowering plants in temperate climates are identifiable without taking, killing or close inspection. In the tropics the large species range may occasionally require a sample to be collected for closer inspection. Photography has largely replaced collection in these situations.

However, invertebrate species everywhere are more numerous, more diverse, often small, and even the most experienced surveyor will need a microscope, or special dissection to identify for a proportion of species. Experience in a particular group or groups helps some identification to be done "by eye", with no sample collection, and some collection into a phial for a hand lens view, with subsequent release, may suffice for others. However, many species require that a killed specimen is needed, usually preserved in alcohol and viewed under a microscope with the references at hand. While there is an incongruity is measuring biodiversity by killing it; there really is no other way at this level of detail; it is best restricted to occasions when the data will have value, and will be retained for later use (and passed to suitable Local Environmental Record Centres).

Species identification

The catch specimens, from hand collecting and trapping, are transferred to tubes of 70% alcohol (sometimes with a small amount of glycerol to prevent specimens from becoming brittle and fragile) and our specialists separate the catch out into taxonomic groups in separate tubes, each labelled with the site and catch date.

The tubes are then sent to the specialist identifiers, who, generally using binocular microscopes, identify the catch species and document them on an Excel spreadsheet. Sometimes specimens cannot be identified because they are too damaged or decayed (actually quite uncommon) or too immature. Some, rare or unfamiliar to the identifier, are sent to even more specialist specialists (and in many cases these were the most interesting). Hundreds of tubes, hours of microscope time, tubes in the post, emailed photographs taken on microscopes…..ultimately over 40 spread sheets back to my PC!

Of course, it does not end there; all the species listed need to be evaluated; which were really from the apple tree the trap was on, and which from dung from sheep grazing the orchard... and so on. Which are ubiquitous, universal and common everywhere, and which a Red Date Book beetle whose larvae depend on predating larvae of other insects that feed on fungi on decaying wood. In many cases our specialists could answer those question, others require literature search (still ongoing), and there are some invertebrate species that have been given names, but whose life histories are still unclear.

That process is still ongoing.

Selecting orchards to survey

Orchards across England, indeed Europe in general, are extraordinarily diverse, and as all orchardists know, and repeatedly state, "***no two orchards are the same***". This not just because of landscape and geology, but because of the tree species present, their varieties, the mix of tree ages, their management and pruning, and the inevitable other activities of man and other animals that take place there. These include sheep or other stock grazing, the presence of chickens, rabbits, badger, deer, grass management regimes, ground compaction from grass cutting and harvesting, weeds, tree seedlings from crop and rootstocks, other non-cropping native or ornamental trees, scrub, brambles, planted garden plants, piles of prunings, dead wood, compost, chippings heaps, fire sites, picnic sites, degrees of tidiness, as well as other inclusive habitats within the boundaries...ponds, native trees and, not least, the boundary hedges.

Old pear trees were sometimes managed as a pollard, to reduce its height for picking. Pear trees can be large, up to 20m and could be up to 130 years old. Old Orchard Girton College, Cambridge.

The sites originally selected included as many categories as the Orchards East mapping survey had recorded, including old and new farm orchards, garden orchards, community and a few commercial sites. That included many sites that would not satisfy the JNCC's definition of a UK Priority Habitat Traditional Orchard. It was noticed during this analysis that the majority, if not all orchard sites contained trees that would not have fitted the definition of being on vigorous rootstocks, as well as those on dwarfing stocks! Thus, we did not feel constrained by the narrow definition of the UK Traditional Orchard Habitat in choosing sites for surveys of biodiversity, and selected a range of *unsprayed* orchard sites with established trees of different ages and managements, all on natural ground cover, with crop species and cultivars typical of the region. Of the 45-50 or so on an original list about 25 were short listed.

The orchards were selected because:

1. There was no record of spraying (for any reason) for at least 10 years.
2. They represented a range of sites and landscapes across the 6 counties.
3. They were created for different purposes e.g. community, gardens or commercial.
4. They have had differing histories, in general orchards with at least some large veteran trees, and included one relatively recently planted orchard, less than 25 years ago.
5. We accept that we did favour sites where general information on the site history, crop species, ages and cultivars was already known.
6. Access for recording was available and welcomed.
7. Volunteers, in some cases, were able to service fauna interception traps etc.

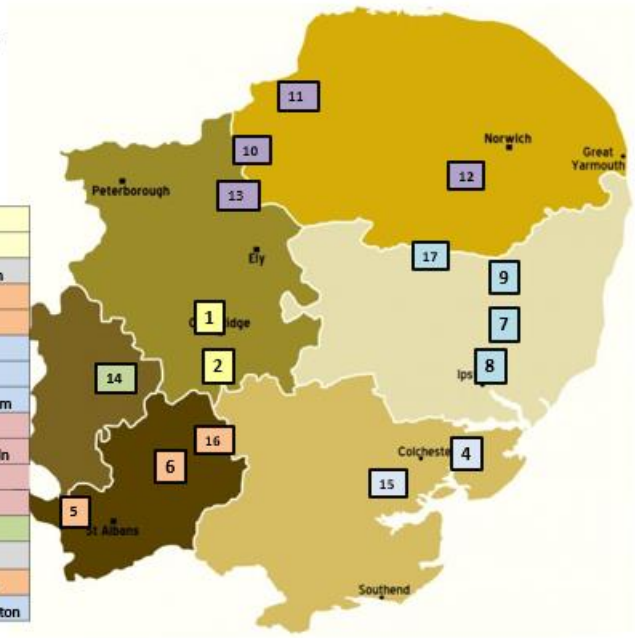
Orchards selected for survey in 2019

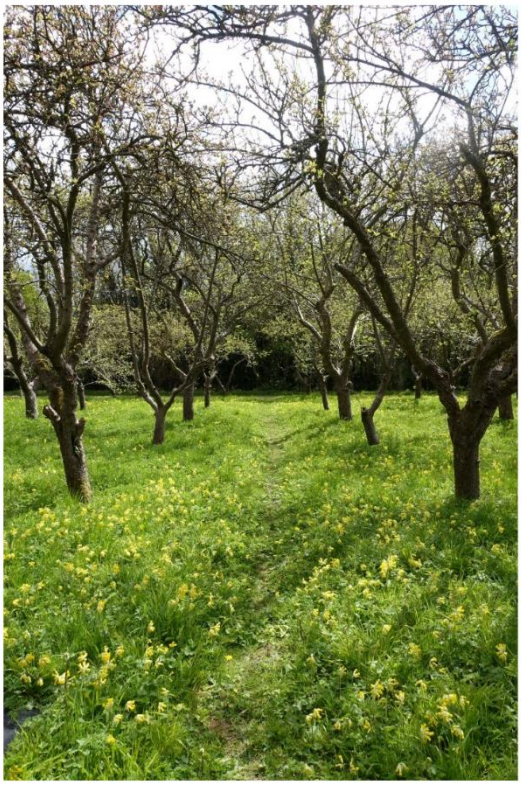
SITES	Grid Ref	Location	BRIEF DESCRIPTION	Area ha	Orchard tree ages yrs	No of fruit trees	No. of Veteran fruit trees
1 Girton College, Old Orchard	TL423611	Cambridge, Cambs	Originally to supply College kitchens with cooking fruit, pre-1900, additional planting in 1930's and post WW2.	1.2ha	3-120+	122 + 26 cobnuts	34 +
2 Wandlebury Ring	TL492534	Shelford, Cambs	3-4 Oldest trees inside walled garden. Later planting outside wall, added to post WW2.	0.4ha	20-120+	C 75 + 22 cobnuts	C16
4 Ricebridge Farm	TM179210	Thorpe-le-Soken, Essx	Farm orchard, oldest trees from C1900, last planting 1970's.	0.5ha	40? -120+	C 70	C 17
5 Jeacock's Orchard	SP937118	Tring, Herts	Small holding from 1925, sheep grazed, wide spaced trees.	0.3ha	25-90	C 25	4
6 Tewin Orchard	TL268156	Tewin, Herts	Commercial planting mid 1930s to 1970 now WT reserve. Later planting	2.4ha	3-85	70+ old & recent	C30
7 Parkgate Farm	TM383660	Kelsale, Sfk	Old farm orchard site, most trees felled post WW2, wide spaced ancient trees. Horse grazed. Site on OS 1885	0.5ha	80-120+	7 & 6 cobnuts	5
8 Foxburrow Farm	TM273519	Melton, Sfk	Ancient farm orchard few original trees, recent planting 20yrs. Wildlife Trust reserve.	0.73ha	12-130+	C 25	7

9 Home Farm, St Michael	TM344836	S Elmham, Sfk	Very old farm orchard site, mix of veterans and recent plantings, part garden setting, Site on OS 1885	0.7ha	2-120+	C25	
10 White House	TF513137	Walpole H, Nfk	Fenland commercial site, C 1910 Bramley apples plus others. Little recent planting. Revival from 1980s	0.5ha	C120	C90	C40
11 Houghton Hall	TF788284	Houghton, Nlk	Country house orchard *outside* walled gdn. Trees, various age but none ancient, unmanaged. Part sheep grazed.	0.4ha	100yrs?	C25	7
12 Oaklands Farm	TG124042	Wymondham, Nfk	Old farm orchard, revived 20th C. Oldest trees 1940's?	0.3	50-70?	C7	?
13 TF50 Fenland	TF 50	Fenland, Nfk	Fenland Bramley orchard (1900), many original trees, additional planting 1930s and post WW2. Rescued 21st C	4.4ha	60-110yrs	C110	C 90
14 Fairfield (east)	TL205351	Fairfeld, Beds	1930 planting of culinary apples for country house, now surrounded by late 20th C housing.	0.6ha	90+	C 40	C20
15 Crapes Fruit Farm	TL914252	Aldham, Essex	Original orchard planted mid 1920s. Current trees from 1960's Part of larger holding.	5.2ha	20-95	1200+	40+ (MM106)
16 Rivers' Orchard	TL471144	Sawbridgeworth, Hts	Records of "mother tree orchard" for supply of graft wood to nursery, 1949. A few earlier and later plantings	5.4ha	50-70+	C650	C 15
17 The Glebe	TM118762	Thrandeston, Sfk	Planted as example of UK Priority Traditional Orchard in 1999-2003. A few recent plantings.	0.4ha	5-22	100	none

Orchards East's Orchard Biodiversity survey orchards. 2019-2021

1	Cambs	Girton College Old Orchard
2	Cambs	Wandlebury Ring Orchard
4	Essex	Ricebridge Farm, Thorpe-le Soken
5	Herts	Jeacock's, Tring
6	Herts	Tewin Orchard
7	Suffolk	Parkgate Farm,Kelsale
8	Suffolk	Foxburrow Farm, Melton
9	Suffolk	Home Farm, St Michael's S Elmham
10	Norfolk	White House, Walpole Highway
11	Norfolk	Houghton Hall, outside walled gdn
12	Norfolk	Oaklands Farm, Wymondham
13	Norfolk	Fenland Orchard TF50
14	Beds	Fairfields, East Orchard
15	Essex	Crapes Fruit Farm,Aldham
16	Herts	Rivers' Orchard, Sawbridgeworth
17	Suff	The Glebe, Home Farm,Thrandeston





Left: Part of the River's Nursery "mother tree" orchard at Sawbridgeworth, Herts. Planted about 1948. Right: Apple Nonpariel at Suffolk Wildlife Trust's Foxburrow Farm, Suffolk. Orchard recorded 1870.

Some Interim Evaluations

Ground Flora Diversity 2019-202.

1 **Tree planting density.** A known effect of planting trees, of any species, into existing meadow grassland is for the grassland diversity to diminish as the tree canopies increase and root plates develop. Our surveys confirm a correlation between diversity and open spaces. (During Orchards East several proposed orchards funded by the project were re-designed with wider tree spacing to allow some existing ground flora diversity to be retained. In two cases the proposed site was altered. In another, planting was regretfully refused when no alternative was available, in order to protect an areas of high diversity acid grassland.)

2 **Tree densities in established orchards.** Ground flora diversity varies throughout orchards. The highest orchard grassland diversity is in old established sites with well-spaced-out trees where the light levels are high. Beneath dense, and low, canopies the diversity is lower. Exceptions to this appear to be uncommon.

3 **Ground compaction and footfall.** Most old farmstead orchards are planted close to houses, for protection and convenience, and naturally have higher footfall (pruning trees, picking crops etc.) than woodland, plus the occasional tractor, resulting in hard packed soils, low diversity and increased "weed species", *Senecio jacobaea*, *Urtica dioica* nettle, *Cirsium arvense*, creeping thistle , *Helminthotheca echioides*, bristly ox-tongue, *Aegopodium podagraria,* ground elder. Excessive/over grazing can have a similar effect.

Part of Ricebridge Farm orchard, Thorpe-le-Soken Essex. These trees are 50-80 years old. The oldest trees in the orchard are approx. 120 year old pears. This orchard has the highest ground flora biodiversity in the project.

4 **Orchards as gardens.** Many farmstead orchards became adjuncts to gardens and private family places with intentional, sometimes quite ancient, flower planting. Spring flowers are the most successful, *Galanthus* spp, snowdrops especially, *Crocus*, *Narcissus* spp. daffodils, several *Ornithogalum* species, notably *nutans, Arum italicum* varieties etc., native and introduced species that flower and leaf out early before the tree foliage shades the orchard. (Heritage variety plant collectors favour old orchards as a source of ancient spring ornamental cultivars, especially of old daffodils.)

5 **Most new "traditional" orchards today are planted into existing grassland.** This might explain the enthusiasm for Natural England's emphasis in desiring a diverse natural grassland as the orchard's ground flora, whereas the grassland species diversity falls as the canopy fills out.

The pollard pear at Girton College in late May. Apple blossom in background. Relatively low ground flora in this area is due to extensive canopies.

Invertebrate Biodiversity 2019

6 **Saproxylic beetles.** From the very beginning of the project an objective was to concentrate not just on the trees as habitat, but on veteran and ancient trees as the home of many saproxylic invertebrates (that depend on rotten wood as food or habitat). Saproxylic beetles are well documented for European native trees, but rather less well for orchard trees. The Noble Chafer, *Gnorimus nobilis*, a large metallic green beetle, a saproxylic of plum and apple trees, has tended to hog the orchard limelight, although is yet to be found in this region, or at least not for a century, and even then, not for certain! Our 2019 trapping and hand searching yielded many beetles, on one site 120 beetle species, of which approximately 51 have been recognized as being saproxylic. The two tiny (2mm) wood boring beetles found beneath bark, *Scolytus mali* and *Scolytus rugulosus* appear to

be dependent on Rosaceous fruit tree species. Other saproxylic species recorded are considered generalists but several recorded have been considered specific to other species such as oak.

7 **Other saproxylic groups.** Diptera (flies) are probably the next most numerous saproxylic group, see list in Appendix 3. From the beginning we didn't plan to make direct comparisons between sites; the considerable differences between sites in terms of tree numbers and ages makes that impossible, so we did not limit the number of traps used. We simply aimed for at least two per orchard, so where larger numbers of traps were set up the species count did rise. And in general, the larger the veteran trees, the greater the size of the rot holes and areas of peeling bark and bare wood, the greater the catch and diversity, a not unexpected and long held belief.

8 **Total species diversity.** Lowest recorded number of all recorded species was less than 40, and this was not for the site with the youngest trees at all. It was a small site, although all trees were approaching veteran categoriess showing some early veteran characteristics.

9 **Factors affecting recording.** It also became immediately obvious certain factors influence the number of specific groups of species sampled. One was the enthusiasm of the surveyor for their chosen speciality, Coleoptera (beetles) Hymenoptera (bees, wasps, ants), spiders, etc. means that, particularly when hand searching, a specialist can find more of his chosen group that anyone else. It is a known feature of biological recording, and we have excellent examples of this.

10 **Species designated as rare**. On the large fenland ex-commercial site, TF 50, with many very large veteran trees using hand catching and trapping combined, 5 species were found to be Red Data Book species, and 26 species of invertebrate have a rarity designation of some sort.

11 **Veteran trees don't have to be large trees.** The old still commercial site, Crapes in Essex, has many veteran trees, but all are semi-dwarf trees with relatively small rot holes. However, these still generated a healthy saproxylic species count. It was not comparable to the big tree sites on the fens, although 5 species with a rarity designation were still recorded.

12 **Expected but missing species groups**. Missing from the records are, notably, Lepidoptera (specifically moths and sawflies as caterpillars), and Aphids (sap sucking green and black flies, bugs in the order Hemiptera). In the case of aphids on Rosaceous trees many species are present in spring during leafing, but leave the tree for alternative hosts in ground flora in late spring/early summer, so we expect them in the 2021 survey. That is also the case with the two caterpillar groups; most will have pupated by the end of spring. However, identifying tiny caterpillars is difficult, and they are easily overlooked.

13 **Spiders (and other non-flying invertebrates) in trees.** These specialized invertebrates are often overlooked as tree specialists. The tree centipede *Giophilus carpophagus* was recorded and many spiders (although unfortunately many of these were immature and not safely identifiable to species). These are mostly canopy specialists, many using ballooning on silk parachute threads for distribution between trees, and not specific to a tree species. The sampling methods used are probably not very efficient for spiders. Two species of pseudoscorpion were recorded and almost certainly we are under-recording these for the same reason. They are predators of very small insects and mites and hide in any cracks in bark, fruit and buds. Mites too were under recorded, often simply overlooked in debris. Pseudoscorpions and mites on trees are frequently *phoretic,* i.e. they travel between trees by hitching a lift on flies or beetles, and some were present in traps, presumably when the transporting insect was caught.

120 year old Bramley's Seedling apple trees in the fenland orchard, TF50.

In Conclusion

The spring to summer 2021 surveys are already well underway, despite a very uncertain weather pattern this spring with prolonged frosts that set back orchard tree leafing significantly.

Surveying ends in July and identification starts during autumn 2021. A meeting of surveyors and others will discuss the final paper for online distribution in Jan 2022.

Bearing in mind that this is an interim report of a project that is still continuing, the invertebrate species count for most of the orchards surveyed exceeds previous orchard surveys in this region. This of course may in part be due to our concentration of interest on the trees and the amount of time and effort that is going into the survey at a species level.

It is also possible to suggest that orchards provide as least as many, and as diverse as native woodland, plus some unique to orchards.

The biodiversity, in terms of the number of species that the fruit trees support is increased by the presence of some species endemic to these tree species. Our temperate fruit species, apples, pears, plums and cherries, are almost all close relatives of some of our native trees. This does not add great numbers of species; but does provide the habitat required for some of the most vulnerable species.

Invertebrate species on and in fruit trees especially veteran trees make up a considerable proportion of the species biodiversity of any orchard, providing a waste disposal system, a source food for a wide range of passing birds bats, mammals and invertebrate predators. And the more veteran trees the higher the species diversity.

The survey of ground flora so far suggests that orchards with low density tree planting, allowing increased light and less root pressure to the ground, maintains the highest plant species diversity. This unsurprising conjecture suggests environmental schemes that favour high ground flora diversity should reduce planning density; a policy that might be contrary to conserving invertebrate tree species, the unique feature of orchards.

And all this could not have been done with a great deal of help, so thank you every one: Adrian Knowles, Andrew Tann, Anna Baldwin, Bob Lever, Caroline Chenery, Cathy Smith, Celia Boyle, Colin Carpenter, David Bain, Ed Wombwell, Eugene Keddy, Gen Broad, Hannah Foster, Helen Read, Jane Carruthers, Mark Welch, Martin Collier, Martin Hicks, Michael Clark, Nigel Cumming, Oliver Mann, Penny Daffern, Peter Chenery, Peter Vincent, Ray Larsen, Richard Hewitt, Rob Richardson, Roland Randall, Steven Andrews, Tom Williamson, Tony Irwin.

Appendices

APPENDIX 1: GROUND FLORA AND HEDGE SPECIES DIVERSITY: 2019-20 CONDENSED RESULTS 3 ORCHARD SITES

As an example of the data gathered, here the results of the invertebrate and the ground flora surveys carried out at three contrasting orchards sites; invertebrates in summer 2019, and ground flora in 2020: **Crapes Fruit Farm, Aldham, Essex** and **White House Orchard, Walpole Highway, Norfolk** and **The Glebe, Home Farm, Thrandeston Suffolk**. These are neither the highest or lowest botanical diversities of the orchards we sampled.

Apples on dwarf rootstocks at Crapes Frut Farm. Grass has been allowed to grow up to the trees only in the last 20years.

Crapes Fruit Farm, Aldham, Essex

Crapes Farm was, in the 1920's, a small arable farm on the stony acid clay of north Essex. It was planted as a commercial fruit orchard by a new owner in the late 1920's. Remnants of the early farm are the boundary and internal hedges of 3 old fields, all of which still exist, making today an area of commercial vegetables and approximately 20 acres of commercial fruit trees in traditional lines. Our ground flora survey covered the whole of the fruit tree planted site; the invertebrate survey concentrated on specific trees. (A separate additional field to the west, although considered to be orchard, was not included in the survey.)

None of the trees from the original planting in the 1920's still exist. In keeping with almost every commercial orchard in eastern England, the original trees, on large growing rootstocks, were replaced after WW2 with lines of semi-dwarf and dwarf trees in bare ground strips with grass tracks

between, a characteristic orchard format of this period. The last two generations of owners have been fruit enthusiasts collecting and grafting trees from local sources, so over 250 cultivars are grown today (and sold) although the main crops, the majority of trees, are from about 40 varieties. The rootstocks used for all the trees are known and recorded, the oldest trees are apples on MM106 and pears on Quince A from the 1950s, and other and later plantings of apples are on M9, M26 and M27, all less vigorous than MM106. Plums are on St Julien A, kept to small dimensions by pruning.

From the 1920's, spraying using the choice pesticides and herbicides of the day. was applied until about 1995 when it was reduced. For the last 20 years no chemical of any sort has been applied, and the natural ground flora has been allowed to return to the bare ground strips, leaving cut grass and chipped annual prunings in situ as mulch and returned nutrients. This orchard is not a "traditional orchard" as recognized by NE as the trees are on modern dwarfing stocks, but its management would conform to the designation. The oldest trees, apples on MM106, are the earliest planted, over 60 years old, maintained with a short trunk (quarter- or eighth-standards!) and are developing veteran characteristics.

Crapes has a high floral diversity (62 ground flora species) for an orchard that is still commercial, but would not be regarded as "Traditional" because of the use of dwarfing rootstocks and was once conventionally sprayed.

Apples on semi-dwarf dwarf rootstocks at Crapes Fruit Farm. Most commercial orchards retain a bare ground strip beneath the trees.

Site Name	Crapes Fruit Farm, Aldham			
Date	15/07/2020			
Surveyor	JC			
The ground flora was rabbit-grazed so very short in places.				
Taxon name	Vernacular	DAFOR	GF	HDG
Hedera helix	Common Ivy	LA	1	1
Helminthotheca echioid	Bristly Oxtongue	O	1	
Heracleum sphondyliur	Hogweed	O	1	
Holcus lanatus	Yorkshire-fog	A - LD	1	
Holcus mollis	Creeping Soft-grass	O	1	
Hypericum perforatum	Perforate St John's-v	F	1	
Hypochaeris radicata	Cat's-ear	O	1	
Ilex aquifolium	Holly	O		1
Iris foetidissima	Stinking Iris	O	1	
Juglans regia	Walnut	R		1
Lamium album	White Dead-nettle	LA	1	
Lamium purpureum	Red Dead-nettle	O	1	
Lathyrus pratensis	Meadow Vetchling	R	1	
Linaria vulgaris	Common Toadflax	LF	1	
Lonicera periclymenum	Honeysuckle	R	1	
Malva sylvestris	Common Mallow	O	1	
Matricaria discoidea	Pineappleweed	R	1	
Myosotis arvensis	Field Forget-me-not	O	1	
Ophrys apifera	Bee Orchid	R	1	
Pentaglottis sempervire	Green Alkanet	R	1	
Phleum bertolonii	Smaller Cat's-tail	O	1	
Phleum pratense	Timothy	O	1	
Plantago lanceolata	Ribwort Plantain	F	1	
Plantago major	Greater Plantain	O	1	
Poa trivialis	Rough Meadow-gras	LF	1	
Polygonum aviculare	Knotgrass	LA	1	
Populus nigra 'Italica'	Lombardy-poplar	R	1	
Potentilla reptans	Creeping Cinquefoil	O	1	
Prunella vulgaris	Selfheal	F	1	
Prunus avium	Wild Cherry	O		1
Prunus spinosa	Blackthorn	LA		1
Quercus ilex	Evergreen Oak	O		1
Quercus robur	Pedunculate Oak	F		1
Ranunculus repens	Creeping Buttercup	F	1	
Rosa canina agg.	Dog-rose	O		1
Rubus fruticosus agg.	Bramble	LD	1	1
Rubus laciniatus	Cut-leaved Bramble	R	1	
Rumex acetosella	Sheep's Sorrel	O	1	
Rumex crispus	Curled Dock	O	1	
Rumex obtusifolius	Broad-leaved Dock	O	1	
Rumex sanguineus	Wood Dock	F	1	
Sagina procumbens	Procumbent Pearlwe	O	1	
Salix cinerea	Grey Willow	R		1
Sambucus nigra	Elder	O		1
Scorzoneroides autumn	Autumn Hawkbit	O	1	
Senecio jacobaea	Common Ragwort	O	1	
Senecio vulgaris	Groundsel	O	1	
Silene dioica	Red Campion	LF	1	
Sisymbrium officinale	Hedge Mustard	O	1	
Sonchus asper	Prickly Sow-thistle	O	1	
Stellaria holostea	Greater Stitchwort	R	1	
Stellaria media	Common Chickweed	O	1	
Symphytum x uplandic	Russian Comfrey (S.	O	1	
Tanacetum vulgare	Tansy	O	1	
Trifolium dubium	Lesser Trefoil	LF	1	
Trifolium repens	White Clover	O	1	
Ulmus procera	English Elm	LA		1
Urtica dioica	Common Nettle	LD	1	
Verbascum nigrum	Dark Mullein	R	1	
Veronica arvensis	Wall Speedwell	O	1	
Veronica chamaedrys	Germander Speedwe	LA	1	
Veronica persica	Common Field-speed	O	1	
Veronica serpyllifolia	Thyme-leaved Speed	O	1	
Vicia tetrasperma	Smooth Tare	O	1	
Viola odorata	Sweet Violet	LA	1	
			92	22

White House Orchard, Walpole Highway, Norfolk.

This was probably a fairly typical once commercial fen orchard on heavy fen-edge clay planted around 1905/1910 towards the end of the extensive fen orchard planting, that was dominated by the apple Bramley's Seedling and managed in a style that appears only in the fens of west Norfolk, Cambridge and Lincolnshire. The initial planting was in wide-spaced rows, the trees on vigorous ("traditional") rootstocks, but managed with short trunk and wide-spreading branches, perhaps to minimise wind damage, and also permitting crop picking from the ground. Initially wide-spaced rows allowed crops (arable, vegetables, gooseberries/soft fruit, cut flowers etc) between the rows, but later allowed to grass over, and sometimes, or later in life, sheep or goose grazed. This orchard is not grazed.

Some variation in tree management probably occurred over the years, including allowing a new higher tier of branches to develop in some cases, but heavy cropping continued until after WW2 when many orchards were felled, to be replaced by dwarf trees. Some were just abandoned, built on, or passed into private residential hands, and some struggled more or less intact through the last decades of the 20th C. The apple trees of these fenland sites, include some of the largest apples in girth and wood mass in the UK, with extensive veteran characteristics of hollow trunks and large rot-holes, and so are notable saproxylic habitats.

White House orchard came to new owners in the late 1980's. Exactly when the site was last sprayed and with what is not known, but it is likely that it was subjected to all the fashionable chemicals of the day, until its rescue. By that time the ground flora had spread over the entire area, but as the trees are on vigorous rootstocks that tolerate grassland competition this ground cover could have been present for much of the orchard's life. Although some sites, those isolated in the fens, were purely the apple Bramley's Seedling, perhaps because it may have served a local village market, substantial pear and plum trees also exist, and indications of others from what appear to be grown out old plum rootstocks.

The ground flora is limited, by comparison with a clayland Suffolk or Essex farm orchard of a similar age, around 100 years old, where the highest ground flora species count in our survey was 130. White House orchard, however is substantially more diverse than other orchards of a similar age and tree cover in the fens where the grassland is very poor in species diversity.

Spring in White House Orchard, rows of Bramley's Seedling

White House Orchard, Walpole Highway, Norfolk						
GB 28/07/2020						
			dafor			
Genus	Sp	Common N	Gf	Hdg	GF	HDG
Agropyron	repens	Couch/twitch	O		1	
Anthriscus	sylvestris	Cow Parsley	O		1	
Ballota	nigra	Black Horehound	R		1	
Blitum	bonus-henricus	Good-King-Henry	R		1	
Calystegia	sepium	Hedge Bindweed	O		1	
Chelidonium	majus	Greater celandine	O		1	
Cirsium	arvense	Creeping thistle	O		1	
Convolvulus	arvensis	Field Bindweed	O		1	
Corylus	avellana	hazel		R		1
Crataegus	monogyna	Hawthorn		A		1
Dipsacus	fullonum	Teasel	R		1	
Galium	aparine	Cleavers/goosegrass	A		1	
Geranium	dissectum	Cut leaved cranesbill	O		1	
Geranium	robertianum	Herb Robert	O		1	
Geum	urbanum	Herb bennet	O		1	
Glechoma	hederacea	Ground Ivy/Alehoof	A		1	
Hedera	helix	ivy	F		1	
Heraclium	sphondylium	Hogweed	O		1	
Hieracium	aurantiacum	Fox and Cubs	O		1	
Holcus	lanatus	Yorkshire Fog	O		1	
Hypericum	calcinum	Rose of Sharon	R		1	
Lamium	album	White Deadnettle	F		1	
Lamium	purpureum	Red Deadnettle	O		1	
Leucanthemu	vulgare	Ox Eye daisy	R		1	
Mysotis	sp.	Forget-me-not	O		1	
Picris	echioides	Bristly oxtongue	O		1	
Potentilla	indica	Indian strawberry	A		1	
Primula	veris	Cowslip	R		1	
Prunus	cerasifera	cherry plum		F		1
Ranunculus	repens	Creeping Buttercup	O		1	
Ribes	sylvestre	red currant	R		1	
Rosa	canina	dog rose		O		1
Rubus	fruticosus agg.	bramble		F		1
Rumex	obtusifolia	Broadleaved Dock	O		1	
Sambucus	nigra	Elder		F		1
Silene	dioica	Red Campion	R		1	
Sonchus	arvensis	Perennial Sow thistle	O		1	
Stachys	sylvatica	Hedge Woundwort	O		1	
Symphytum	x uplandicum	(Russian) Comfrey	R		1	
Taraxacum	officinale	Dandelion	O		1	
Urtica	dioica	Nettle	A		1	
Viola	odorata	Sweet Violet	R		1	
Viola	riviniana	Dog Violet	F		1	
					37	6

The Glebe, Home Farm, Thrandeston, Suffolk

The Glebe has been a “traditional orchard” only since about 1999/8. All the crop trees are less than 21 years old. This orchard was selected as representing a new planting with no veteran trees.

The site was one (or two) sections/strips of medieval strip field, 0.44ha (1.08acres, 22m x 200m) one of 40 strips shown on the 1936 Thrandeston tithe map, on heavy marly clayland soil. It was owned by the Diocese of Norwich and was recorded as incumbent Rector of the parish’s allotment. When purchased in 1998 it had been used as rick/stack yard for many decades, and was a silage store. It was chisel ploughed to reduce compaction, allowed to grass down by natural regeneration, and planted with 100 fruit trees grafted on “traditional orchard” rootstocks, 2000-2004 as advised by NE subsequently in 2007, and the orchard management was grant aided as a Traditional Orchard in Higher Level Stewardship 2005/6 to 2015/16.

Apples are grafted onto MM111 and M25, pears on “wild pear” seedling, plums on St Julien A, and all are managed as half-standards, with 1.2-1.5m clear stem, 6m apart, pears 9m. There is no spraying or chemical use at all. Initial formative pruning was to ensure a reasonably balanced canopy, but after the third year the only pruning has been emergency rebalancing, and tidying up storm and wind damage and occasional sheep browsing. The grassland ground cover is sheep grazed after July and in winter.

The short end hedges were planted as windbreaks, and on one long side a neighbouring field hedge owner laid a newly planted boundary hedge, and kept it to 1.5m-3m. The other long side has sheep netting and an arable field, and no hedge. This site was selected to provide a “control”, a site with no veteran trees, new ground flora and hedge; approximately representing a typical (if large) community orchard similar to many being planted today throughout the region.

Spring in The Glebe, Thrandeston, 20 year old traditional orchard apples pears, plums and quince.

Ground flora & hedge records for THE GLEBE, Thrandeston Suffolk							
Surveyed 7/6/2019 and 9/08/2020			TM11767518				
Genus	Sp	v/f	Common N	Location	daforn	Orchard	Hedges
Acer	campestris		Hedge Maple	hedges	o		1
Acer	pseudoplatanus		sycamore	hedges	o		1
Agropyron	repens		Couch/twitch		lf	1	
Agrostis	stolonifera		Creeping Bent		o	1	
Alliaria	petiolata		Hedge Garlic		r	1	
Anthoxanthum	odoratum		Sweet Vernal Grass		r	1	
Anthriscus	sylvestris		Cow Parsley		o	1	
Arctium	minor		lesser burdock (hollow petioles		o	1	
Arrhenaterum	elatius		False Oat grass		id or ia	1	
Artemisia	vulgaris		Mugwort		o	1	
Arum	maculatum		Cuckoo pint		r		1
Bromus	mollis/hordeaceus		Soft brome/Lopgrass		o	1	
Bromus	sterilis		Sterile brome		r	1	
Bryonia	dioica		White Bryony		r		1
Calystegia	sepium		Hedge Bindweed		o	1	
Carduus	crispus acanthioides		Welted thistle		o	1	
Cerastium	glomeratum		Sticky Mouse-ear		o	1	
Chaerophyllum	temulentum		Rough Chervil		r	1	
Cirsium	arvense		Creeping thistle		o	1	
Cirsium	vulgare		Spear thistle		o	1	
Convolvulus	arvensis		Field Bindweed		o	1	
Cornus	sanguinea		Dogwood	hedges	o		1
Corylus	avellana		hazel	hedges	o		1
Crataegus	monogyna		Hawthorn	hedges	o		1
Cynosurus	cristatus		Crested Dog's tail		r	1	
Dactylis	glomeratus		Cocksfoot		f	1	
Euonymus	europea		Spindle	hedges N	r		1
Euphorbia	peplis		Petty Spurge		r	1	
Festuca	pratensis		Meadow Fescue		o	1	
Fraxinus	excelsior		Ash	hedges	o		1
Galium	aparine		Cleavers/goosegrass		o	1	
Geranium	dissectum		Cut leaved cranesbill		o	1	
Geranium	robertianum		Herb Robert		o	1	
Glechoma	hederacea		Ground Ivy/Alehoof		o	1	
Hedera	helix		Ivy	hedges	o		1
Heracllum	sphondyllum		Hogweed		o	1	
Hieracium	sp		a Hawkweed		o	1	
Holcus	lanatus		Yorkshire Fog		ia	1	
Hordeum	murinum		Wall Barley		r	1	
Lamium	album		White Deadnettle		r	1	
Lamium	purpureum		Red Deadnettle		o	1	
Lapsana	communis		Nipplewort		o	1	
Lolium	perenne		Perrenial Ryegrass		f	1	
Malus	domestica		apple	hedge	r		1
Myosotis	arvensis		Field Forget-me-not		o	1	
Phleum	bertoloni/berrtolonii		Small Cats-tail		o	1	
Plantago	lanceolata		Ribwort		o	1	
Poa	annua		Annual meadow grass		o	1	
Poa	trivialis		Rough Meadow grass		lf	1	
Populus	sp		Poplar	hedge	r		1
Prunus	cerasifera		cherry plum	hedge	r		1
Prunus	institia		bullace	hedge & g	o		1
Prunus	spinosa		Blackthorn/sloe	hedge	o		1
Pyrus	communis		Pear	hedge	x1		1
Quercus	robur		Oak	hedge	o		1
Ranunculus	repens		Creeping Buttercup		o	1	
Rosa	canina		dog rose	hedge bf	o	1	
Rubus	fruticosus agg.		bramble	hedge	f	1	
Rumex	acetosa		Sorrel		o	1	
Rumex	crispus		Curled Dock		o	1	
Rumex	latifollus		Broadleaved Dock		o	1	
Sambucus	nigra		Elder		o		1
Silene	alba		White Campion		r	1	
Silene	dioica		Red Campion		r	1	
Silene	vulgaris		Bladder Campion		r	1	
Sonchus	arvensis		Perennial Sow thistle		r	1	
Stellaria	graminea		Lesser Stitchwort		r	1	
Stellaria	media		Common Chickweed		r	1	
Taraxacum	officinale		Dandelion		r	1	
Torilis	japonica		Upright Hedge parsley		r	1	
Ulmus	procera /minor		English elm	hedge	a		1
Urtica	dioica		Nettle		ia	1	
Veronica	persica		Field Speedwell		r	1	
					Totals	54	19

APPENDIX 2: INVERTEBRATE DIVERSITY ON ORCHARD TREES: 2019-20 CONDENSED RESULTS for 3 ORCHARD SITES

The invertebrate records from the same 3 orchards, **Crapes Fruit Farm, Aldham, Essex**, **White House Orchard, Walpole Highway, Norfolk** and **The Glebe, Home Farm, Thrandeston Suffolk**, are shown below

These spreadsheets have been condensed. The version we make available to Local Envionmental Record Centres , ecologists and orchard specialists show the date of capture, the capture method, tree species, cultivar names and location for each species. The species are listed alphabetically in the following order of insect orders followed by non-insect orders:

Coleoptera (Insects) Beetles. Many plant eaters and predators
Dermaptera (Insects) Earwigs omnivorous and predators
Diptera (Insects) Flies (with 2 wings) plant eaters and predators and blood suckers
Hemiptera (Insects) Bugs (aphids, planthoppers, shield bugs) mostly plant suckers and eaters, some blood feeders
Hymenoptera (Insects) bees wasps ants etc with 4 wings. Wide range of food and habitats, some parasites
Neuropteran (Insects) Lacewings, larvae are mostly predators
Orthoptera (Insects) grasshoppers, crickets, cockroaches. Eat plants and insects. In trees mostly predators.
Spiders (Arachnids) Predators
Harvestmen (Arachnids) Also predators, like spiders with a single body segment
Mites, (Arachnids) tiny plant-eaters, rarely captured, overlooked, although often present in large numbers. Includes ticks
Pseudoscorpions (Arachnids**)** predators that look like tiny scorpions
Centipedes predators.
Isopoda woodlice etc, mostly omnivorous eating anything decaying
Collembola. Springtails, once considered to be insects, most eat anything decaying, also overlooked

***Elater ferrugineus*, 17-20mm Rusty Click Beetle. Red Data Book. Larvae predate various rotting-wood eating beetle larvae. Recorded at Foxburrow Farm orchard, Suffolk.** "Elater ferrugineus - Rusty Click-beetle" by Mark Gurney is licensed under CC BY-NC-SA 2.0

Worker of *Lasius brunneus* Tree Ant. Tends tree aphids and said to prefer oak, but we found it on apples. Flies earlier than other ants. "Lasius brunneus" by Ryszard I is licensed under CC BY-NC 2.0

Pseudocistela ceramboides, 10-13mm, a Darkling Beetle. Nationally Scarce. Larvae eat rotting wood, said to favour oak. Recorded at Foxburrow Farm, orchard, Suffolk. "Pseudocistela ceramboides (Linnaeus, 1761)" by urisa is licensed under CC BY-SA 2.0

***Scolytus mali*, 2mm, Apple Shot-hole Beetle. Restricted to Rosaceous fruit trees. Larvae bore into dead wood. Found in several orchards.** "Scolytus mali (Bechstein 1805)" by urisa is licensed under CC BY-SA 2.0

The empty cells await information being researched, where available. One column is for rare, notable or scarce species and their designation. Columns headed SQI and IEC are for scoring systems or indications relating to the significance of a species to the saproxylic habitat; the decaying wood habitat of veteran trees. The Breeding Habits and Comment column will show the significance of the species being found in a tree, where the literature has data on the species. This is slow searching online and in texts and is still ongoing.

Crapes Farm, Aldham, Essex, 1 of 1.

SITE NO 15 : CRAPE'S FRUIT FARM, ALDHAM, ESSEX												
Order	Family	Species	Vernacular name	Pantheon and rarity status	SQI	IEC	Breeding habitat & comments - key species	Total No	Summer 2019 HAND caugh	Summer 2019 TRAP caught	Coll	ID
Coleoptera	Ciidae	Cis bilamellatus						1	0	1	AK	AK
	Ciidae	Cis boleti						1	0	1	AK	AK
	Chrysomelidae	Psylliodes chrysocephala						1	1	0	AK	AK
	Cleridae	Tillus elongatus		NS				1	0	1	AK	AK
	Coccinellidae	Adalia decempunctata	10-spot ladybird					1	0	1	AK	AK
		Coccinella septempunctata	7-spot Ladybird					5	4	1	AK	AK
		Exochomus quadripustulatus	Pine Ladybird					3	0	3	AK	AK
		Harmonia axyridis	Harlequin Ladybird					2	1	1	AK	AK
		Propylea quatuordecimpunctata	14-spot ladybird					1	1	0	AK	AK
	Cryptophagidae	Cryptophagus dentatus						1	0	1	AK	AK
	Curculionidae	Involvulus caeruleus						2	1	1	AK	AK
		Scolytus rugulosus						1	0	1	AK	AK
	Helophoridae	Helophorus grandis						1	0	1	AK	AK
	Latridiidae	Cortinicara gibbosa						1	0	1	AK	AK
		Enicmus brevicornis		NS				1	0	1	AK	AK
	Nitidulidae	Epuraea aestiva						2	0	2	AK	AK
		Epurea biguttata						2	0	2	AK	AK
		Meligethes aeneus						1	0	1	AK	AK
		Meligethes flavimanus						4	0	4	AK	AK
	Ptinidae	Anobium punctatum						4	0	4	AK	AK
		Ochina ptinoides						2	0	2	AK	AK
	Rhynchitidae	Involvulus caeruleus						1	0	1	AK	AK
	Scraptiidae	Anaspis rufilabris						1	0	1	AK	AK
	Staphylinidae	Aleochara sparsa						1	0	1	AK	AK
		Tachyporus nitidulus						1	0	1	AK	AK
		Tachyporus pusillus						2	0	2	AK	AK
Dermaptera	Forficulidae	Forficula auricularia	Common Earwig					19	7	12	AK	AK
		Forficula lesnei	Lesne's Earwig	[NS]				0	0	0	AK	AK
Diptera	Asilidae	Leptogaster cylindrica						1	0	1	AK	PV
		Machimus atricapillus						1	0	1	AK	PV
	Dolichopodidae	Medetera jacula		DD				4	0	4	AK	PV
		Sciapus platypterus						1	0	1	AK	PV
	Drosophilidae	Drosophila immigrans						1	0	1	AK	PV
		Drosophila subobscura						20	0	20	AK	PV
		Scaptomyza pallida						1	1	0	AK	PV
	Keroplatidae	Macrocera stigmoides						1	1	0	AK	PV
	Lauxaniidae	Calliopum simillimum						2	2	0	AK	PV
	Platypezidae	Lindneromyia dorsalis						1	1	0	AK	PV
	Sciaridae	Schwenckfeldina carbonaria						1	1	0	AK	PV
	Tephritidae	Anomoia purmunda						1	1	0	AK	PV
Hemiptera	Anthocoridae	Cardiastethus fasciiventris						1	1	0	AK	AK
		Orius majusculus						10	10	0	AK	AK
	Issidae	Issus coleoptratus						1	0	1	AK	AK
	Lygaeidae	Heterogaster urticae						1	0	1	AK	AK
	Miridae	Deraeocoris lutescens	a bug					1	1	0	AK	AK
		Phytocoris tiliae	a bug					2	2	0	AK	AK
	Pentatomidae	Palomena prasina	Green Shieldbug					2	2	0	AK	AK
		Pentatoma rufipes	Forest Bug					4	4	0	AK	AK
	Tingidae	Physatocheila dumetorum	a lacebug					6	6	0	AK	AK
Hymenoptera	Formicidae	Lasius brunneus	Tree ant	Na				1	0	1	AK	AK
		Lasius niger s.s.	an ant					1	1	0	AK	AK
		Myrmica scabrinodis	an ant					4	4	0	AK	AK
Neuroptera	Chrysopidae	Chrysoperla carnea	a lacewing					3	1	2	AK	AK
		Chrysoperla lucasina	a lacewing					2	1	1	AK	AK
Orthoptera	Tettigoniidae	Meconema thalassinum	Oak Bush-cricket					3	1	2	AK	AK
Spiders		Immature Linyphiidae/Theridiidae/Aranaeidae						47	1	46	AK	HR
	Tetragnathidae	*Metallina* imm						2	0	2	AK	HR
	Tetragnathidae	Immature Tetragnathidae						3	0	3	AK	HR
	Araneidae	*Gibbaranea gibbosa*					Woodland, hedges, spins an orb web on trees & shrubs. F in SE Eng	1	0	1	AK	HR
	Araneidae	*Araniella cucurbitina*					Most common on trees, especially oak, and bushes. Cmmn	0	0	1	AK	HR
	Araneidae	Clubionidae Imm						16	0	16	AK	HR
	Araneidae	*Philodromus praedatus**		Was notable B			Typically on old oak trees in open/wood pasture. Associated with oak branches where foliage attacked & leaves curled	2	0	2	AK	HR
	Thomiscidae	*Diaea dorsata*		Widespread in S and E			Strongly associated with woodland. On leaves of trees like oak.	8	0	8	AK	HR
	Thomiscidae	Thomisidae/Philodromidae Imm						106	0	106	AK	HR
Harvestmen		*Oligolophus tridens*					Common	3	0	3	AK	HR
		Opilio saxatilis					Common	1	0	1	AK	HR
		Mitopus morio/Opilio canestrini ?						2	0	2	AK	HR
		Dicranopalpus ramosus agg.					Recent introduction	11	0	11	AK	HR
Isopoda	Armadillidiidae	Armadillidium vulgare	a woodlouse					1	0	1	AK	AK
	Porcellionidae	Porcellio scaber	Common Rough Woodlouse					3	0		AK	AK
NOTES:	*Checked by Peter Harvey Spider recording scheme											

White House, Walpole Highway, Norfolk, 1 of 4.

SITE NO: 10 WHITE HOUSE, WALPOLE HIGHWAY, NORFOLK.												
Order	Family	Species	Vernacular name	Pantheon/British rarity Status	SQI	IEC	Breeding habitat & comments - key species	Total No	Summer 2019 HAND caught Nos	Summer 2019 TRAP caught Nos	Coll	ID
Coleoptera	Apionidae	Ceratapion onopordi						2	2	0	MC	MC
	Apionidae	Protapion assimile						1	1	0	MC	MC
	Apionidae	Protapion fulvipes						1	1	0	MC	MC
	Byturidae	Byturus tomentosus						2	2	0	MC	MC
	Cantharidae	Cantharis decipiens						1	1	0	MC	MC
	Cantharidae	Cantharis figurata						1	1	0	MC	MC
	Carabidae	Dromius meridionalis						2	2	0	MC	MC
	Carabidae	Dromius quadrimaculatus						1	1	0	MC	MC
	Carabidae	Paradromius linearis						1	1	0	MC	MC
	Cerambycidae	Grammoptera ruficornis			1		Dead twigs and small branches	7	6	1	MC	MC
	Cerambycidae	Tetrops praeustus			2		Dead branches	3	2	1	MC	MC
	Chrysomelidae	Bruchidius varius						1	1	0	MC	MC
	Chrysomelidae	Bruchus rufimanus						7	7	0	MC	MC
	Chrysomelidae	Chaetocnema concinna						2	2	0	MC	MC
	Chrysomelidae	Crepidodera aurata						8	8	0	MC	MC
	Chrysomelidae	Crepidodera fulvicornis						1	1	0	MC	MC
	Chrysomelidae	Crepidodera plutus						2	2	0	MC	MC
	Chrysomelidae	Epitrix pubescens						1	1	0	MC	MC
	Chrysomelidae	Longitarsus parvulus						4	3	1	MC	MC
	Chrysomelidae	Longitarsus suturellus						3	3	0	MC	MC
	Chrysomelidae	Oulema melanopus						3	2	1	MC	MC
	Chrysomelidae	Phyllotreta atra						1	1	0	MC	MC
	Chrysomelidae	Psylliodes chrysocephala						3	2	1	MC	MC
	Cisidae	Cis bilamellatus					Bracket fungi	1	1	0	MC	MC
	Cisidae	Cis castaneus (= nitidus)			2		Bracket fungi, esp *Ganoderma*	1	1	0	MC	MC
	Cisidae	Octotemnus glabriculus			1		Bracket fungi	1	0	1	MC	MC
	Coccinellidae	Adalia decempunctata						1	1	0	MC	MC
	Coccinellidae	Chilocorus renipustulatus						1	1	0	MC	MC
	Coccinellidae	Coccinella septempunctata						1	1	0	MC	MC
	Coccinellidae	Propylea quattuordecimpunctata						2	1	1	MC	MC
	Coccinellidae	Rhyzobius litura						1	1	0	MC	MC
	Corylophidae	Orthoperus nigrescens			4		Fungoid bark, bracket fungi	5	0	5	MC	MC
	Corylophidae	Sericoderus brevicornis						33	0	33	MC	MC
	Corylophidae	Sericoderus brevicornis/lateralis (female)						33	0	33	MC	MC
	Cryptophagidae	Atomaria fuscata						1	0	1	MC	MC
	Cryptophagidae	Atomaria linearis						8	3	5	MC	MC
	Cryptophagidae	Atomaria testacea						1	0	1	MC	MC
	Cryptophagidae	Cryptophagus dentatus			1		In fungi	1	0	1	MC	MC
	Cryptophagidae	Cryptophagus scanicus						1	0	1	MC	MC
	Curculionidae	Ceutorhynchus obstrictus						1	0	1	MC	MC
	Curculionidae	Dorytomus dejeani						1	1	0	MC	MC
	Curculionidae	Exomias pellucidus						1	0	1	MC	MC
	Curculionidae	Isochnus sequensi						1	1	0	MC	MC
	Curculionidae	Mecinus pyraster						1	1	0	MC	MC
	Curculionidae	Nedyus quadrimaculatus						2	2	0	MC	MC
	Curculionidae	Scolytus mali			8		Under bark, mainly fruit trees	1	0	1	MC	MC
	Curculionidae	Scolytus rugulosus			2		Bark, mainly fruit trees	1	0	1	MC	MC
	Curculionidae	Sitona lineatus						7	7	0	MC	MC
	Dermestidae	Anthrenus verbasci						1	1	0	MC	MC
	Elateridae	Agriotes acuminatus						4	4	0	MC	MC
	Elateridae	Agriotes sputator						1	1	0	MC	MC
	Elateridae	Athous bicolor						1	0	1	MC	MC
	Elateridae	Melanotus castanipes			1		Decaying wood, especially red-rot	1	0	1	MC	MC
	Erotylidae	Dacne bipustulata			2		Bracket fungi	1	0	1	MC	MC
	Kateretidae	Brachypterus glaber						2	2	0	MC	MC
	Kateretidae	Brachypterus urticae						2	2	0	MC	MC
	Latridiidae	Cartodere bifasciata						35	3	32	MC	MC
	Latridiidae	Cartodere nodifer						6	0	6	MC	MC
	Latridiidae	Cortinicara gibbosa						115	16	99	MC	MC
	Latridiidae	Enicmus histrio						2	2	0	MC	MC
	Latridiidae	Enicmus testaceus			2		In slime moulds	3	0	3	MC	MC
	Latridiidae	Enicmus transversus						1	0	1	MC	MC
	Leiodidae	Catops fuliginosus						1	0	1	MC	MC
	Leiodidae	Sciodrepoides watsoni						1	0	1	MC	MC
	Melandryidae	Anisoxya fuscula			16	3	Dead branches and twigs	1	1	0	MC	MC
	Melandryidae	Orchesia micans			4		Polypore fungi, especially *Inotus*	1	0	1	MC	MC
	Mycetophagidae	Mycetophagus populi			16	2	Prob fungal mycelia in decaying wood; first modern Norfolk record	1	0	1	MC	MC
	Nitidulidae	Epuraea aestiva						4	4	0	MC	MC

SITE NO: 10 WHITE HOUSE, WALPOLE HIGHWAY, NORFOLK.												
Order	Family	Species	Vernacular name	Pantheon/British rarity Status	SQI	IEC	Breeding habitat & comments - key species	Total Nos	Summer 2019 HAND caught Nos	Summer 2019 TRAP caught Nos	Coll	ID
	Nitidulidae	Epuraea aestiva									MC	MC
	Nitidulidae	Epuraea biguttata			2		Under bark, on dead wood and bracket fungi	23	1	22	MC	MC
	Nitidulidae	Epuraea marseuli			1		Under bark, on dead wood and bracket fungi	1	0	1	MC	MC
	Nitidulidae	Epuraea pallescens			2		Under bark, on dead wood and bracket fungi	1	1	0	MC	MC
	Nitidulidae	Meligethes aeneus						12	4	8	MC	MC
	Nitidulidae	Meligethes nigrescens						2	1	1	MC	MC
	Phalacridae	Stilbus testaceus						3	1	2	MC	MC
	Ptinidae	Anobium punctatum			1		Exposed dead sapwood	9	0	9	MC	MC
	Ptinidae	Dorcatoma dresdensis			16	2	Hard bracket fungi e.g. *Ganoderma*	1	0	1	MC	MC
	Ptinidae	Ochina ptinoides			2		Thick dead stems of ivy	1	0	1	MC	MC
	Rhynchitidae	Neocoenorrhinus aequatus						2	2	0	MC	MC
	Salpingidae	Salpingus planirostris			1		Under bark	22	2	20	MC	MC
	Scraptiidae	Anaspis frontalis			1		Rotten wood; adults on flowers/foliage	1	0	1	MC	MC
	Scraptiidae	Anaspis garneysi						1	1	0	MC	MC
	Scraptiidae	Anaspis maculata						11	5	6	MC	MC
	Scraptiidae	Anaspis regimbarti						3	1	2	MC	MC
	Scraptiidae	Anaspis thoracica			8		Rotten wood; adults on flowers/foliage	1	0	1	MC	MC
	Staphylinidae	Aleochara kamila						1	0	1	MC	MC
	Staphylinidae	Aleochara sparsa						5	0	5	MC	MC
	Staphylinidae	Aleochara stichai						2	0	2	MC	MC
	Staphylinidae	Aloconota gregaria						7	0	7	MC	MC
	Staphylinidae	Atheta crassicornis						2	0	2	MC	MC
	Staphylinidae	Autalia rivularis						1	1	0	MC	MC
	Staphylinidae	Dalotia coriaria						1	0	1	MC	MC
	Staphylinidae	Dropephylla ioptera			1		Under bark of dead branches. Adults on flowers.	5	4	1	MC	MC
	Staphylinidae	Euplectus piceus			2		Under bark and in red-rot, mainly oak	1	0	1	MC	MC
	Staphylinidae	Hapalaraea pygmaea			2		Bracket fungi, bird nests and rotten wood	2	0	2	MC	MC
	Staphylinidae	Haploglossa villosula			2		Bird nests in hollow trees	75	0	75	MC	MC
	Staphylinidae	Micropeplus fulvus						1	1	0	MC	MC
	Staphylinidae	Mocyta fungi agg.						2	0	2	MC	MC
	Staphylinidae	Oligota apicata						1	0	1	MC	MC
	Staphylinidae	Omalium excavatum						1	1	0	MC	MC
	Staphylinidae	Phyllodrepa floralis						1	1	0	MC	MC
	Staphylinidae	Quedius cruentus						1	1	0	MC	MC
	Staphylinidae	Tachinus rufipes						1	0	1	MC	MC
	Staphylinidae	Tachyporus hypnorum						2	1	1	MC	MC
	Staphylinidae	Tachyporus pallidus						1	0	1	MC	MC
	Staphylinidae	Xantholinus gallicus						1	0	1	MC	MC
	Staphylinidae	Xantholinus linearis						1	0	1	MC	MC
	Throscidae	Trixagus obtusus						6	0	6	MC	MC
					103			565				
					27							
					381.481481							

SITE NO: 10 WHITE HOUSE, WALPOLE HIGHWAY, NORFOLK.												
Order	Family	Species	Vernacular name	Pantheon/British rarity Status	SQI	IEC	Breeding habitat & comments - key species	Total No	Summer 2019 HAND caught Nos	Summer 2019 TRAP caught Nos	Coll	ID
Dermaptera	Forficulidae	Forficula auricularia						7			MC	AK
DIPTERA	Anisopodidae	Sylvicola cinctus						1	0	1	MC	TI
	Anisopodidae	Sylvicola punctatus						1	0	1	MC	TI
	Asteiidae	Asteia amoena						1	0	1	MC	TI
	Asteiidae	Leiomyza laevigata						1	0	1	MC	TI
	Asteiidae	Leiomyza scatophagina						1	0	1	MC	TI
	Bibionidae	Dilophus febrilis						1	0	1	MC	TI
	Culicidae	Anopheles maculipennis complex						1	0	1	MC	TI
	Culicidae	Culex pipiens group						12	0	12	MC	TI
	Culicidae	Culiseta annulata						5	0	5	MC	TI
	Dolichopodidae	Chrysotus blepharosceles						1	0	1	MC	TI
	Dolichopodidae	Medetera muralis						3	0	3	MC	TI
	Dolichopodidae	Medetera truncorum						2	0	2	MC	TI
	Dolichopodidae	Sciapus platypterus						7	0	7	MC	TI
	Empididae	Empis caudatula						2	0	2	MC	TI
	Empididae	Empis livida						3	0	3	MC	TI
	Empididae	Empis scutellata						1	0	1	MC	TI
	Empididae	Leptopeza flavipes						1	0	1	MC	TI
	Heleomyzidae	Heteromyza rotundicornis						116	0	116	MC	TI
	Heleomyzidae	Suillia bicolor						1	0	1	MC	TI
	Heleomyzidae	Tephrochlamys flavipes						12	0	12	MC	TI
	Heleomyzidae	Tephrochlamys rufiventris						9	0	9	MC	TI
	Hippoboscidae	Ornithomya avicularia						1	0	1	MC	TI
	Hybotidae	Elaphropeza ephippiata						1	0	1	MC	TI
	Hybotidae	Platypalpus albicornis						1	0	1	MC	TI
	Hybotidae	Platypalpus sp.?						1	0	1	MC	TI
	Hybotidae	Tachypeza fuscipennis						3	0	3	MC	TI
	Hybotidae	Tachypeza nubila						16	0	16	MC	TI
	Lauxaniidae	Calliopum aeneum						2	0	2	MC	TI
	Lauxaniidae	Meiosimyza decempunctata						37	0	37	MC	TI
	Lauxaniidae	Meiosimyza rorida						4	0	4	MC	TI
	Lauxaniidae	Minettia fasciata						1	0	1	MC	TI
	Lauxaniidae	Tricholauxania praeusta						11	0	11	MC	TI
	Limoniidae	Neolimonia dumetorum						1	0	1	MC	TI
	Limoniidae	Ormosia nodulosa						25	0	25	MC	TI
	Limoniidae	Rhipidia maculata						1	0	1	MC	TI
	Lonchaeidae	Lonchaea palposa						1	0	1	MC	TI
	Lonchaeidae	Silba fumosa						84	0	84	MC	TI
	Lonchopteridae	Lonchoptera lutea						1	0	1	MC	TI
	Mycetobiidae	Mycetobia pallipes						1	0	1	MC	TI
	Opomyzidae	Opomyza florum						1	0	1	MC	TI
	Pallopteridae	Palloptera modesta						2	0	2	MC	TI
	Pallopteridae	Palloptera muleibris						4	0	4	MC	TI
	Pallopteridae	Palloptera umbellatarum						2	0	2	MC	TI
	Periscelididae	Periscelis annulata						1	0	1	MC	TI
	Psilidae	Chamaepsila rosae						5	0	5	MC	TI
	Rhagionidae	Ptiolina obscura						1	0	1	MC	TI
	Sciomyzidae	Tetanocera robusta						2	0	2	MC	TI
	Stratiomyidae	Pachygaster leachii						4	0	4	MC	TI
	STREPSIPTERA	Elenchus tenuicornis						1	0	1	MC	TI
	Syrphidae	Episyrphus balteatus						3	0	3	MC	TI
	Tipulidae	Nephrotoma quadrifaria						2	0	2	MC	TI
	Trixoscelididae	Trixoscelis frontalis						17	0	17	MC	TI
	Trixoscelididae	Trixoscelis similis						1	0	1	MC	TI
	Ulidiidae	Seioptera vibrans						3	0	3	MC	TI
Hemiptera	Anthocoridae	Anthocoris nemorum						1	0	1	MC	AK
Hemiptera	Anthocoridae	Buchananiella continua						1	0	1	MC	AK
Hemiptera	Anthocoridae	Orius sp. Female						1	0	1	MC	AK
Hemiptera	Anthocoridae	Orius majusculus						1	0	1	MC	AK
Hemiptera	Miridae	Campylomma verbasci						1	0	1	MC	AK
Hemiptera	Miridae	Deraeocoris lutescens						1	0	1	MC	AK
Hemiptera	Nabidae	Himacerus apterus						1	0	1	MC	AK
								0	0	0		
Hymenoptera	Andrenidae	Andrena scotica						1	0	1	MC	AK
Hymenoptera	Apidae	Apis mellifera						1	0	1	MC	AK
Hymenoptera	Apidae	Bombus hypnorum						3	0	3	MC	AK
Hymenoptera	Crabronidae	Crossocerus congener						2	0	2	MC	AK
Hymenoptera	Crabronidae	Crossocerus quadrimaculatus						1	0	1	MC	AK
Hymenoptera	Crabronidae	Passaloecus singularis						1	0	1	MC	AK
Hymenoptera	Crabronidae	Ectemnius cavifrons						1	0	1	MC	AK
Hymenoptera	Formicidae	Myrmica ruginodis						13	0	13	MC	AK
Hymenoptera	Vespidae	Dolichovespula media		Na			Does not warrant this status	1	0	1	MC	AK
Hymenoptera	Vespidae	Vespula vulgaris						8	0	8	MC	AK
								0	0	0		
Mecoptera	Panorpidae	Panorpa communis						1	0	1	MC	AK
Mecoptera	Panorpidae	Panorpa germanica						3	0	3	MC	AK
								0	0	0		
Neuroptera	Chrysopidae	Chrysotropia ciliata						1	0	1	MC	AK
Neuroptera	Hemerobiidae	Hemerobius humulinus						2	0	2	MC	AK

SITE NO: 10 WHITE HOUSE, WALPOLE HIGHWAY, NORFOLK.												
Order	Family	Species	Vernacular name	Pantheon/British rarity Status	SQI	IEC	Breeding habitat & comments - key species	Total No	Summer 2019 HAND caught Nos	Summer 2019 TRAP caught Nos	Coll	ID
Isopoda	Porcellionidae	Porcellio scaber						1	0	1	MC	AK
Spiders		Immature Linyphiidae/Theridiidae/Aranaeidae						1	0	1	MC	HR
	Clubionidae	*Clubiona comta*					Common, Trees, under bark and in canopy	2	0	2	MC	HR
		Clubionidae Imm						2	0	2	MC	HR
		Thomisidae/Philodromidae Imm						2	0	2	MC	HR
Harvestmen	Harvestmen	*Odiellus spinosus*					Established introduction	2	0	2	MC	HR
	Harvestmen	Harvestman imm/ too battered to ID						1	0	1	MC	HR
Mites	Mites	Mesostigmata mite (other)						1	0	1	MC	HR
Woodlice	Woodlice	*Porcellio scaber*					Very common	1	0	1	MC	HR
Millipedes	Millipedes	Millipede too decayed to ID						1	0	1	MC	HR
Collembola	Collembola							1	0	1	MC	HR

Flight interception trap in White House orchard

The Glebe, Home Farm, Thrandeston, Suffolk, 1 o 1.

SITE NO: 17 THE GLEBE, THRANDESTON, SUFFOLK										
Order	Family	Species	Vernacular name	Pantheon Status	Breeding habitat & comments - key species	Total Nos	Summer 2019 HAND caught Nos	Summer 2019 TRAP caught Nos	Coll	ID
Coleoptera	Cantharidae	Cantharis rustica				1	0	1	AK	AK
	Carabidae	Demetrias atricapillus				1	0	1	AK	AK
		Dromius meridionalis				1	0	1	AK	AK
	Cerambycidae	Phymatodes testaceus				1	0	1	AK	AK
	Chrysomelidae	Psylliodes chrysocephala				5	0	5	AK	AK
	Coccinellidae	Adalia decempunctata	10-spot ladybird			3	3	0	AK	AK
		Coccinella septempunctata	7-spot Ladybird			3	3	0	AK	AK
		Harmonia axyridis	Harlequin L'bird			3	3	0	AK	AK
		Propylea quatuordecimpunctat	14-spot ladybird			2	1	1	AK	AK
	Cryptophagidae	Atomaria linearis				2	0	2	AK	AK
	Curculionidae	Ceutorhynchus resedae		[Nb]		1	0	1	AK	AK
		Curculio nucum	a weevil			1	1	0	AK	AK
		Magdalis ruficornis				1	0	1	AK	AK
	Latridiidae	Cortinicara gibbosa				3	0	3	AK	AK
	Nitidulidae	Epuraea aestiva				8	0	8	AK	AK
		Glischrochilus hortensis				4	0	4	AK	AK
		Meligethes aeneus				1	0	1	AK	AK
		Soronia grisea				1	0	1	AK	AK
	Oedemeridae	Oedemera nobilis				0	0	1	AK	AK
	Ptinidae	Anobium punctatum				1	0	1	AK	AK
		Ptilinus pectinicornis				5	0	5	AK	AK
	Scraptiidae	Anaspis garneysi				2	0	2	AK	AK
	Staphylinidae	Aleochara sparsa				4	0	4	AK	AK
		Quedius cruentus				3	0	3	AK	AK
	Rhynchitidae	Ivolvulus caeruleus				1	0	1	AK	AK
	Throscidae	Trixagus dermestoides				1	0	1	AK	AK
Dermaptera	Forficulidae	Forficula auricularia	Common Earwig			18	9	9	AK	AK
Diptera	Calliphoridae	Pollenia angustigena				2	2	0	AK	PV
	Chloropidae	Elachiptera cornuta agg.				1	1	0	AK	PV
		Oscinella frit				2	2	0	AK	PV
		Thaumatomyia notata				9	9	0	AK	PV
	Drosophilidae	Drosophila immigrans				1	0	1	AK	PV
		Drosophila subobscura				52	0	52	AK	PV
	Heleomyzidae	Suillia affinis				1	0	1	AK	PV
	Opomyzidae	Opomyza florum				1	1	0	AK	PV
	Lauxaniidae	Calliopum simillimum				1	1	0	AK	PV
	Scathophagidae	Scathophaga stercoraria				1	0	1	AK	PV
	Scatopsidae	Coboldia fuscipes				13	3	10	AK	PV
	Stratiomyidae	Pachygaster leachii				4	2	2	AK	PV
	Ulidiidae	Physiphora alceae				0	0	0	AK	PV
Hemiptera	Anhocoridae	Anthocoris confusus				4	4	0	AK	AK
		Anthocoris nemorum				1	1	0	AK	AK
		Orius majusculus				1	1	0	AK	AK
	Lygaeidae	Heterogaster urticae				1	1	0	AK	AK
	Miridae	Campyloneura virgata				5	0	5	AK	AK
		Deraeocoris lutescens				1	1	0	AK	AK
		Heterotoma planicornis				1	0	1	AK	AK
		Miris striatus				2	0	2	AK	AK
		Pinalitus cervinus				5	0	5	AK	AK
		Phytocoris tiliae				8	8	0	AK	AK
	Pentatomidae	Palomena prasina	Green Shieldbug			2	1	1	AK	AK
		Pentatoma rufipes	Forest Bug			1	1	0	AK	AK
	Aphrophoridae	Aphrophora alni				4	0	4	AK	AK
Hymenoptera	Formicidae	Lasius niger	an ant			9	1	8	AK	AK
		Myrmica scabrinodis				0	0	0	AK	AK
Neuroptera	Chrysopidae	Chrysoperla carnea	a lacewing			3	2	1	AK	AK
	Hemerobiidae	Micromus variegatus	a lacewing			2	2	0	AK	AK
Orthoptera	Tettigoniidae	Leptophyes punctatissima	Speckled Bush-cricket			1	1	0	AK	AK
		Meconema thalassinum	Oak Bush-cricket			2	2	0	AK	AK
Spiders	Theridiidae	*Theridion pinastri* *		pinastri NS RDBK	mystaceum - on trunks of trees & foliage; pinastri - broadleaved trees like oak or beech	0	0	0	AK	HR
	Theridiidae	*Theridion varians*			C on trees & shrubs	0	0	0	AK	HR
	Theridiidae	*Paidiscura pallens*			C. Webs on shrubs & low branches in a variety of habitats	0	0	0	AK	HR
	Theridiidae	Imm Therid looks like pinastri, V. red				1	1	0	AK	HR
	Linyphiidae	*Erigone atra*			Ubiquitous, regularly balloons. VC	0	0	0	AK	HR
	Linyphiidae	*Bathyphantes gracilis*			Ubiquitous in grassland, heath & woodland . Common aeronaut	0	0	0	AK	HR
	Linyphiidae	*Tenuiyphantes tenuis*			Ubiquitous wide range of habitats incl grassland & woodland	0	0	0	AK	HR
	Linyphiidae	Immature Linyphiidae/Theridiidae/Aranaeidae				77	75	2	AK	HR
	Tetragnathidae	Immature Tetragnathidae				19	19	0	AK	HR
	Araneidae	*Araniella opisthographa*			Most common on trees, especially oak, and bushes	0	0	0	AK	HR
	Clubionidae	Clubionidae Imm				5	5	0	AK	HR
	Thomiscidae	Thomisidae/Philodromidae Imm				36	36	0	AK	HR
Harvestmen	Harvestmen	*Odiellus spinosus*			Established introduction	10	10	0	AK	HR
		Dicranopalpus ramosus agg.			Recent introduction	11	11	0	AK	HR
	Harvestmen	Harvestman imm/ too battered to ID				2	0	2	AK	HR
Mites	Mites	Mesostigmata mite (other)				2	0	2	AK	HR
Isopoda	Woodlice	*Porcellio scaber*			Very common	5	5	0	AK	HR
		Philoscia muscorum/affinis			Very common	1	1	0	AK	HR

APPENDIX 3: EXAMPLE OF POST-IDENTIFICATION EVALUATION OF SPECIES BIODIVERSITY RECORDS: Diptera

Family	Species	Larval development	Adult behaviour
Anisopodidae	**Sylvicola cinctus**	decaying plant roots, fungi, tree rot holes and dung	na
Anisopodidae	**Sylvicola punctatus**	decaying plant roots, fungi, tree rot holes and dung	
Anthomyiidae	**Anthomyia liturata**	birds nests	
Anthomyiidae	**Anthomyia pluvialis**	birds nests	
Anthomyiidae	**Anthomyia procellaris**	birds nests	
Anthomyiidae	**Botanophila brunneilinea**	unknown - possibly fungus or saprophagous	
Anthomyiidae	**Botanophila fugax**	possibly saprophagous	
Anthomyiidae	**Delia coarctata**	pest of wheat	
Anthomyiidae	**Delia platura**	decaying vegetation	
Anthomyiidae	**Delia radicum**	pest of brassicas	
Anthomyiidae	**Hylemya vagans**	coprophagus	
Anthomyiidae	**Hylemyza partita**	coprophagus	
Anthomyiidae	**Pegomya bicolor**	leaf miner on Polygonaceae	
Anthomyiidae	**Pegoplata annulata**	coprophagus	
Asilidae	**Leptogaster cylindrica**	soil dwelling	robberfly - insects
Asilidae	**Machimus atricapillus**	soil dwelling	robberfly - insects
Asteiidae	**Asteia amoena**	unknown - possibly fungus or saprophagous	flowers and vegetation
Calliphoridae	**Calliphora vicina**	necrophagous	
Calliphoridae	**Calliphora vomitoria**	necrophagous	
Calliphoridae	**Lucilia caesar**	necrophagous	
Calliphoridae	**Pollenia angustigena**	earthworm parasitoids	
Calliphoridae	**Pollenia pediculata**	earthworm parasitoids	
Calliphoridae	**Pollenia rudis**	earthworm parasitoids	
Chloropidae	**Elachiptera cornuta agg.**	saprophytophagus	hibernate in birds nests, behind tree bark etc
Chloropidae	**Meromyza sp**	phytophagus - shoots of grasses	

Chloropidae	**Oscinella frit**	phytophagus - shoots of grasses	
Chloropidae	**Thaumatomyia notata**	carnivorous - root aphids	
Culicidae	**Anopheles claviger**	aquatic	
Dolichopodidae	**Dolichopus festivus**	soil dwelling	
Dolichopodidae	**Medetera sp**	possibly in rot holes and under bark	predaceous on small insects on tree stems
Dolichopodidae	**Medetera jacula**	possibly in rot holes and under bark	predaceous on small insects on tree stems
Dolichopodidae	**Medetera petrophiloides**	possibly in rot holes and under bark	predaceous on small insects on tree stems
Dolichopodidae	**Medetera saxatilis**	possibly in rot holes and under bark	predaceous on small insects on tree stems
Dolichopodidae	**Medetera truncorum**	possibly in rot holes and under bark	predaceous on small insects on tree stems
Dolichopodidae	**Sciapus platypterus**	unknown	predaceous on small insects using tree stems to hunt
Drosophilidae	**Drosophila funebris**	unknown - probably decaying plant material	attracted to decomposing and fermenting fruit and vegetables
Drosophilidae	**Drosophila immigrans**	decaying plant material including fruit	attracted to decomposing and fermenting fruit and vegetables
Drosophilidae	**Drosophila subobscura**	decaying plant material including fruit	attracted to decomposing and fermenting fruit and vegetables
Drosophilidae	**Scaptomyza pallida**	decaying plant material including fruit	attracted to decomposing and fermenting fruit and vegetables
Fanniidae	**Fannia canicularis**	saprophagous	
Fanniidae	**Fannia manicata**	saprophagous	
Fanniidae	**Piezura pardalina**	saprophagous	
Heleomyzidae	**Suillia affinis**	saprophagous	
Family	**Species**	**Larval development**	**Adult behaviour**
Hybotidae	**Drapetis assimilis**	possibly in rot holes and under bark	predaceous on small insects on tree stems

Hybotidae	**Drapetis ephippiata**	possibly in rot holes and under bark	predaceous on small insects on tree stems
Keroplatidae	**Macrocera stigmoides**		
Lauxaniidae	**Calliopum simillimum**	saprophagous - fallen leaves, decaying grasss, under bark	shady leafy places
Lauxaniidae	**Meiosimyza decempunctata**	saprophagous - fallen leaves, decaying grasss, under bark	shady leafy places
Lauxaniidae	**Meiosimyza rorida**	saprophagous - fallen leaves, decaying grasss, under bark	shady leafy places
Lauxaniidae	**Minettia fasciata**	saprophagous - fallen leaves, decaying grasss, under bark	shady leafy places
Lauxaniidae	**Sapromyza halidayi**	saprophagous - fallen leaves, decaying grasss, under bark	shady leafy places
Lauxaniidae	**Sapromyza quadripunctata**	saprophagous - fallen leaves, decaying grasss, under bark	shady leafy places
Muscidae	**Graphomya maculata**	liquid or semi-liquid	damp woodland
Muscidae	**Helina lasiophthalma**		
Muscidae	**Muscina levida**	saprophagous	woodland
Muscidae	**Phaonia cincta**	true saproxylic (Nationally Scarce)	sap runs on horse chestnut
Muscidae	**Phaonia pallida**	tree fungi/ rotten wood	woodland
Muscidae	**Phaonia rufiventris**	tree fungi/ rotten wood	woodland
Muscidae	**Phaonia subventa**	tree fungi/ rotten wood	woodland
Muscidae	**Stomoxys calcitrans**	saprophagous and coprophagous	
Odiniidae	**Odinia sp**	tunnels of wood boring insects	
Opomyzidae	**Opomyza florum**	oligophagous stem borer	grassland
Pallopteridae	**Palloptera ustulata/anderssoni**	phytophagus	shady leafy places also visits flowers
Phoridae	**Anevrina thoracica**	carrion of small vertebrates	
Phoridae	**Megaselia sp**		
Platypezidae	**Lindneromyia dorsalis**	fungivores	damp woodland
Rhinophoridae	**Phyto melanocephala**	endoparasite of woodlice	open sites with flowers, will bask on tree trunks
Sarcophagidae	**Sarcophaga crassimargo**	saprophagous	

Sarcophagidae	**Sarcophaga haemorrhoa**	saprophagous	
Sarcophagidae	**Sarcophaga incisilobata**	saprophagous	
Sarcophagidae	**Sarcophaga variegata**	saprophagous	
Scathophagidae	**Scathophaga stercoraria**	saprophagous	
Scatopsidae	**Coboldia fuscipes**	saprophagous	
Sciaridae	**Schwenckfeldina carbonaria**	saprophagous	
Sciaridae	**Sciaridae sp**		
Sciomyzidae	**Dichetophora finlandica**	predators of pulmonate snails	woodland with lush ground cover
Stratiomyidae	**Pachygaster leachii**	plant roots and bases; rotten wood	woodland
Syrphididae	**Episyrphus balteatus**	aphidophagus	flower feeder
Syrphididae	**Melanostoma scalare**	aphidophagus	flower feeder
Syrphididae	**Syrphus vitripennis**	aphidophagus	flower feeder
Tachinidae	**Eriothrix rufomaculata**	moth parasitoids	flower feeder
Tephritidae	**Anomoia purmunda**	phytophagus - fruits of *Crataegus* sp (poosibly other Rosaceae	
Trixoscelididae	**Trixoscelis frontalis**		sparse vegetation with bare areas
Ulidiidae	**Herina nigrina**	probably saprophagous	sparse vegetation with bare areas
Ulidiidae	**Physiphora alceae**	saprophagous	lush vegetation

KEY

saprophytophagus: eats decaying plant material

phytophagus: eats plants

aphidophagus: eats aphids

oligophagous: eats a limited range, within a species or family

coprophagous: eats dung

saprophagous: eats decaying organic matter

APPENDIX 4: A NOTE ON FLIGHT INTERCEPTION TRAPPING

Interception traps of many kinds have been devised for sampling flying insects and ballooning spiders These are of two distinct types, those that trap fauna that drop when hitting an obstruction (beetles, bugs, some flies, and spiders) and those that attempt to fly over an obstruction (mostly flies, butterflies, and some moths, bees wasps etc). Most tree rot species and many foliage species fall into the first category and this was the method selected. These Interception traps come in many forms from large window panes to small vane traps and all collect the samples at the base using a trapping liquid which kills the catch. Large vane traps can be expensive to make and maintain, but can't always be located close to tree trunks or rot holes, and so tend not to be selective to a small habitat, such as tree rot hole.

We chose from a number of easily-made designs from the many papers on the subject, and because we intended to use a minimum of two per site, made our own. Two of our specialist surveyors designed and made their own traps, and during 2018 we tested several compact designs that could be located close to rot holes (even inside large ones) or mounted on tree trunks.

Left: flight interception trap in old apple stump in Home Farm orchard, Suffolk, with high diversity grassland and wide range of tree ages and condition. Right: flight interception trap in an old pear tree in Parkgate Farm orchard, Suffolk. Only a few ancient trees are left in heavily grazed low diversity grassland.

Although other designs were also used, we made over 40 of our chosen design in 2019, and more in 2021. These are 5L upside-down plastic water containers (Morrisons, other supermarkets are available!) with 3 sides cut out, and acetate sheet stapled inside as vanes, so that an insect hitting a vane drops into a collecting bottle through the opening below. The separate removeable collecting bottle is part-filled with a collecting fluid, 5% acetic acid (i.e. the same strength as vinegar!), that kills the catch, later removed to transfer the catch into preserving fluid (70% iso-propyl alcohol, or ethanol) for later identification. The traps were left in situ for several weeks before collecting the

samples. Because the traps are in place for a long time a trap's catch potentially far exceeds in species diversity any hand caught samples, although specialist surveyors experienced in specific invertebrate groups will always be able find more of their special groups, than others. This variability makes comparison of data from site to site difficult , but this project was not designed to provide comparative data, although sometimes it can be inferred.

APPENDIX 5: A NOTE ON ORCHARDS AS A "HABITAT" AND TRADITIONAL ORCHARDS

Definitions

Biodiversity is the biological variety and variability of life on Earth. **Biodiversity** is measured by variation at the genetic, species, and ecosystem level.

An **ecosystem** is a community of living organisms in conjunction with the non-living components of their environment, interacting as a system. These biotic and abiotic components are linked together through nutrient cycles and energy flows.

Left: a mix of old trees in old grassland surrounded by housing, Fairfield East Orchard, Bedfordshire. Right: a "postern" Orchard, outside the walled garden at Wandlebury Ring. a wide mix of rootstocks and age

The difference between **habitat** and **ecosystem** is that the habitat is the natural home of an animal, a plant or any other living organism, while an ecosystem is the interaction and interrelationships between living organisms and physical environment. Also, one ecosystem includes many habitats.In ecology, the term habitat summarises the array of resources, physical and biotic factors that are present in an area, such as to support the survival and reproduction of a particular species. A species habitat can be seen as the physical manifestation of its ecological niche.

> *UK BAP priority habitats cover a wide range of semi-natural habitat types, and were those that were identified as being the most threatened and requiring conservation action under the UK Biodiversity Action Plan (UK BAP). …. In review of UK BAP processes and priorities, which included a review of the priority species and habitats lists – ……. Following the review, the list of UK BAP priority habitats increased from 49 to 65.* ***(Natural England 2008****) (Traditional Orchards are No 64).*

The initial definition of a "traditional orchard", produced by Natural England, was proscriptive and clearly referred to west county unsprayed "standard" tree orchards (trunks branching at over 1.8-2.0m, in natural grassland, often grazed, and with canopies less than 20m apart. It excluded trees managed to branch lower, or further apart. Also, from the start, the "habitat" was understood to

include the many “other” habitats that may, or may not, be found within the boundaries of an orchard, such as hedges, ponds and grassland. Later changes to the definition have retained emphasis on these subordinate habitats. Cobnut plats were also included in the definition without recognizing several of their unique characters which do not fit traditional apple, pear, cherry or plum orchards. (Cobnut cultivars are either native, or hybrids with native hazel, grown on their own roots and managed by very different techniques). In addition, there was an emphasis on management by routine manual pruning for crop production.

An initial push-back response from ecologists in eastern (and other) region resulted in a modification of the habitat definition to include trees that were not full standards (i.e. managed by pruning to have 2m of bare trunk, largely a feature of cattle grazed cider and perry orchards) and to include trees on lower trunks where sheep, geese etc, or no grazing was intended, and where easier picking prompted lower trunks. Windy, un-grazed fenland apple orchards have the lowest trunks, and include some of the largest and oldest of all veteran orchard trees in the UK.

Collapsed veteran apple tree (Annie Elizabeth) at Jeacock’s Tring Herts.

In NERC077 published by Natural England 2011 the definition had become the more relaxed and inclusive “*Traditional orchards are defined, for priority habitat purposes, as groups of fruit and nut trees planted on vigorous rootstocks at low densities in permanent grassland; and managed in a low intensity way. Cobnut plats are also included*”, but emphasis remains on wide tree spacing, tall trees and retention of dead wood.

Subsequently Countryside and Environmental Stewardship farm grants for managing and planting new Traditional Orchards has progressively tightened the definition by restricting payments to a narrowing range of planting specifications. These include promoting the reduction of tree planting density so that grass is less shaded by trees, eliminating acceptance of tree rootstocks that were previously permitted, and requiring the planting of 2 year old trees with “standard” 2m trunks. The narrowing range of large-growing rootstocks include some rarely widely, if ever, used in our region! As a result, trees as specified for planting under rigorous Countryside Stewardship rules for UK Priority Traditional Orchard planting are becoming increasingly difficult to source.