Ecology in Somerset 2015

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ECOLOGY IN SOMERSET 2015

EDITORIAL

In 2015 it was a General Election. This year it's the referendum to establish whether we wish to stay in Europe or leave. By the time you read this the people of Britain will have spoken. Right now, at the end of April, it's anyone's guess. It seems as good a time as any to reflect on what's gone before, and to think about what the future may hold. 2015 was another busy year for the Natural History section of our Society, but it was also a year tinged with sadness. In May we had news of the death of Derek Briggs, a man who contributed so much to SANHS, and to our committee, over many years. A former President of the Society, he was, for longer than he would have wished, Secretary to our committee – and a very efficient one too. Derek's enthusiasm for rocks and fossils was infectious, and he had a special knack of making geology interesting and fun. We miss him greatly.

Despite this setback, we ran our usual summer programme of field meetings. We visited Vallis Vale, near Frome, in April, while in May and July we held joint meetings with the Somerset Rare Plants Group at Great Breach Wood and Steart Marshes respectively. In June we made our traditional visit to Priddy Pools, in Mendip, to search for dragonflies, while in October Philip Radford once again treated us to a fungus foray in the Quantocks.

Perhaps one of the highlights of the year was in August when David Reid organised a very successful weekend bioblitz at Carymoor, a nature reserve developed on part of a major land-fill site near Castle Cary. For those who may not be familiar with the term, a 'bioblitz' is an event – often run over 24 hours – where people come along to a particular venue and see how many different sorts of organisms they can find there. Luckily for us, David was able to call upon a number of specialist groups and visiting experts, including botanists, arachnologists (spiders), orthopterists (grasshoppers), lepidopterists (butterflies and moths), odonatists (dragonflies) and cecidologists (plant galls). Over two days we recorded more than 440 species, including many that hadn't previously been known to occur on the site, and a few which appear to be 'firsts' for the county. It was a great success, and we have been asked by Carymoor Environmental Centre to organise a second bioblitz there next month.

In September we visited Barford Park, near Enmore. The owners were keen to know what animal and plant life occurs on their estate, but no-one had yet investigated the plant galls – so that's what we did. In all, we found more than 40 species, including several rarities. It was a lovely late-summer's day, and we were made to feel very welcome, with egg sandwiches provided at lunchtime and a cream tea in the walled garden at the end of the day. Did anyone say that natural history wasn't fun?

And that's the point, really. We might talk earnestly about the conservation significance of what we find or about the relationship between shifting distribution patterns and climate change; and it's good to see species records, like those reported in these pages, being used by conservationists, land-managers and planners in the decisions they take. But, to be honest, what motivates many of us more than anything is the simple enjoyment and satisfaction we get from *observing* wildlife – of feeling that we know what lives where, and why. Such observations give us a better understanding and sharper appreciation of where we fit in the scheme of things; quite literally, they help to 'put us in our place'.

In this year's *Ecology in Somerset* we again have two main papers – this time on grassland development at Nettlecombe and on the results of two decades of red deer population monitoring in the Quantocks – plus the usual assortment of natural history reports. Thanks to everyone for their contributions. In the reports you will find many 'county firsts', some of which are illustrated so you can better picture what they look like. And there will doubtless be many more in the years to come. As unlikely as it may sound, last weekend the Botanical Society of Britain and Ireland and Somerset Rare Plants Group ran a 'dandelion workshop' in Somerset. We had the national expert here, plus several highly competent dandelion enthusiasts – let's call them 'taraxacologists' – and we discovered just how rich and varied Somerset's dandelion flora really is. You might think that a dandelion is a dandelion is a dandelion, but in fact there are around 250 species of *Taraxacum* in Britain, and over the weekend we saw around 70 of these, of which 39 were new to one or other of our two vice-counties and more than 20 had never previously been recorded in Somerset. At one of the sites we visited, Ash Priors Common, we found 31 species, including several county firsts; John Richards, the national expert, sat on a roadside bank and declared that the Common was a 'taraxacological paradise'. High praise indeed! I could go on, but you'll have to wait until next year's *Ecology in Somerset* to find out more about where we went and what we found. Eventually, pressed specimens – so-called 'voucher' specimens – of all the dandelions we recorded over the weekend will be placed for safe keeping in the SANHS herbarium at the Somerset Heritage Centre.

We have written before in these pages about the importance of motivating children and young families to become more involved in natural history. We may think that we are getting our message across to a younger audience, but the average age of those present at our meetings remains worryingly high. The latest issue of *British Wildlife* landed on my doormat this morning, and in it Peter Marren has written a perceptive and moving piece about his own childhood in the 1950s and 60s, and about the importance of nature in his life (*British Wildlife* 27, 240-3). We live in very different times, don't we? Today nature is more likely to be experienced on telly or via a mobile phone app than 'in the flesh'. Our growing sense of detachment from nature has much to do with fear. As Marren says, "One of the differences between my childhood and that of today . . . is that we weren't frightened. Of course the country roads were less busy then . . . the outdoors was, to us, one big playground, we weren't afraid of wandering, of climbing trees and rocks, messing about in haystacks and splashing in whatever stretch of mud and water we could find. Parents didn't seem to worry so long as we came home for tea. Today they appear frightened to let their children out of the garden . . ."

He ends his article in reflective mood. "When I was a child, I didn't necessarily feel like a child. I just felt like me. I sense that I am still that same person, grown in years and experience of course, and with a sense of perspective and irony that I would not have had then. But I am glad that I managed to retain the divine spark that awakened my love of nature . . . Like a fire, it may need kindling and refreshing but, properly nurtured, it burns on and thereupon brightens our lives. A love of nature is the most natural thing there is."

Exactly.

SIMON J. LEACH
On behalf of the Natural History Committee
April 2016

THE QUANTOCK HILLS DEER COUNT 1991 TO 2016

JOCHEN LANGBEIN

INTRODUCTION

Red deer (*Cervus elaphus*) are the largest of the six species of deer living in a truly wild state in Great Britain. The largest population of red deer outside of Scotland occurs in west Somerset and north Devon, with the best known and most readily viewed herds being those found within the Exmoor National Park and the Quantock Hills Area of Outstanding Natural Beauty (AONB). Although red deer on the Quantock Hills originate from a number of re-introductions undertaken over the past 150 years, they now form an important part of the ecology and cultural history of the local area. The opportunities to observe red deer, which are far less common elsewhere in England, are valued highly by locals as well as visitors to the area. However, unless carefully managed, excessive deer numbers may build up and lead to detrimental impacts on farming, timber production and biodiversity. Despite their relatively large size, in anything other than entirely open landscapes red deer numbers are notoriously difficult to count accurately, because of the large home ranges of the deer and the tendency of a significant proportion to be missed in concealing cover. To aid management of the population, a systematic visual count of red deer throughout most of the Quantock Hills AONB was introduced in 1991 by the Quantock Deer Management and Conservation Group (QDM&CG). This count, undertaken in late winter by a large number of volunteers, has been repeated annually in a comparable manner ever since. The Quantock deer count, having now taken place over more than 25 years, is one of the longest running visual deer counts in England. This paper describes the approach and methodology of the count, the results and what may be deduced from them, and the value and benefits (and limitations) of such large-scale deer counts undertaken by local volunteers.

Red deer

Red deer are by far the largest of deer living wild in Britain. Weights of mature males range from 90 kg to 190 kg, and adult females from 60 kg to 110 kg with height at the shoulder among adults from 115 cm to 140 cm. They are a 'herding' species, which on the Quantocks may often be seen in groups of 10-25 animals, but sightings of herds of 60 or more are not uncommon. Stags and hinds tend to form separate groups outside the autumn mating season, and may move to late-winter and summer ranges that can be several miles away from the rutting areas. The peak mating season (or 'rut') occurs around mid-October, when stags chivvy hinds to collect into a harem which the stags then defend. They may fight with other stags to re-affirm their place in the male hierarchy. During March and April stags shed their antlers, which can weigh as much as 8kg a pair, with a new set re-growing by the end of July. The hinds generally give birth to a single calf (sometimes two) at the beginning of June.

Red deer are well adapted for grazing on pasture and other herbaceous vegetation, and on tree mast and crops, but can also utilise woody vegetation such as tree leaves, twigs and heather. Nowadays, they are as likely to be seen feeding or lying up within grass leys and agricultural crops on low-lying farmland as they are in the woods and moorland on the Hills.

Other deer species on the Quantocks

At the end of the 19th century the red deer was the only deer species known to reside in the Quantock Hills, aside from occasional fallow deer (*Dama dama*) escaped from nearby deer parks at St Audries, Nettlecombe and Dunster. Roe deer (*Capreolus capreolus*) became extinct across much of England during the 17th century but have recolonised most regions since the 1920s, including the West Country. On the Quantocks roe deer were still seen only rarely until the 1960s, but have increased significantly since then, and are now present in small numbers in most woodlands in and around the Quantocks. They are much smaller than red deer, no more than about 70 cm at the shoulder and adults weighing 18-32 kg. Roe deer will utilise a wide range of habitats, but prefer areas offering at least some patches of dense cover. They are more selective feeders than red deer, browsing by choice on nutritious plant parts such as buds and leaves of brambles and roses, herbs, grasses, young tree shoots and leaves of both deciduous and coniferous trees.

Muntjac deer *(Muntiacus reevesi)* is another species which is beginning to colonise the area. These Asian deer were originally introduced to Woburn Park in Hertfordshire, but have now spread through much of England, with numbers in the wild now estimated at over 100,000 nationwide. They were first noted on the Quantocks in the 1980s, and although sightings have been reported at several different locations their numbers appear to remain very low at present. Fallow deer are seen only rarely on the Quantock Hills but are common in the Brendon Hills just a few miles to the west. Sika (*Cervus nippon*) have also been seen only very rarely within the Quantock Hills AONB, although wild populations occur in nearby Dorset with occasional sighting in east Devon and south Somerset.

History of red deer on the Quantocks

Red deer were present throughout much of postglacial Britain (Yalden 1999). In historic times their range contracted, with wild red deer becoming absent from much of England, Wales and the Scottish lowlands by the end of the 18th century (Lowe, 1961). Native red deer herds persisted in the Scottish uplands, and some remnant native reds are also believed to have survived near Exmoor (Lloyd 1975; Allen 1990), but the present day West Country populations have been supplemented with 'new blood' at various times using red deer from other parts of England (Staines *et al*. 2008).

On the Quantock Hills, very few (if any) red deer were present in the middle of the 19th century. Much of their recent history on the Quantocks has been closely linked to hunting with hounds. In 1862 Fenwick Bissett, master of the Devon and Somerset Staghounds, introduced red deer caught on nearby Exmoor. After several further small-scale releases over the next 25 years, The Quantock Staghounds (QSH) were established in 1901, but disbanded again a few years later. Around 30 red deer were present on the hills in 1917 when Sir Dennis Boles, the Baron of Bishops Lydeard and MP for Wellington, was asked to revive the QSH by the Controller of Food in Lloyd George's wartime cabinet (Whitehead 1980). The herd was supplemented at that time with several stags from Warnham Park in Sussex, and it gradually built up to several hundred animals. Numbers of red deer on the Quantocks and Exmoor are thought to have fallen again during the Second World War. Hunting was resumed after the end of the War when positive efforts were apparently made once more by the farming community to encourage deer numbers to increase. However, prior to 1960 the red deer population was never reported to have exceeded 350 animals (QDM&CG 2005).

Although initially introduced purely for sport, hunting later developed as a means of controlling deer numbers through culling; it also helped to disperse large herds from farmland. Alongside rifle culls undertaken by stalkers on behalf of individual landholders, hunting has been a part of deer management on a high proportion of land in and around the Quantock Hills ever since. Legislation introduced by the Hunting Act (2004) came into effect in February 2005 and banned hunting of deer (as well as other mammals such as fox and hare), in the manner in which it was traditionally practised with a full pack of hounds in pursuit. Nevertheless, a more limited form of 'exempt hunting' remains legal and is still undertaken on many local landholdings in and around the Quantocks who give permission of access to the QSH for that purpose.

The QDM&CG was formed in 1991 to promote greater liaison on deer management matters between landholders, environmental organisations, the local hunt, deer stalkers and other interested parties concerned with the welfare and management of deer on the Quantocks. The wish to obtain better independent information on deer numbers across the area led to the first large-scale deer count on the Quantocks being organised on behalf of the QDM&CG by Eric Smith, who was then based on the Quantocks as the Forestry Commission's senior wildlife ranger in Somerset.

COUNTING DEER – APPROACHES AND METHODS

Background

There are many different ways of estimating deer population size. There are various types of direct counting methods – daylight open hill counts, drive counts, vantage point or aerial counts, night-time spotlight counts, and thermal imaging direct counts for example. Indirect approaches include methods based on assessing deer impact levels, track/slot counts, and various methods based on faecal pellet counts. Further information on all of these and their differing merits are reviewed by (Mayle *et al.* 1999). Those giving most accurate information inevitably require the greatest amount of effort, repetition and/or resources, which, though perhaps justifiable for intensive scientific study, may be too costly and more than required by deer management groups for landscape-scale monitoring.

Direct counts carried out simultaneously over large areas of land by teams of observers do not tend to have a high degree of accuracy, unless undertaken in entirely open landscapes, as variable numbers of animals may be missed in concealing cover at the time of the count; and such counts will commonly produce lower figures than estimates extrapolated from, for example, faecal pellet counts or thermal imaging or other distance sampling methods (Langbein 1996; Mayle 1999). Large-scale direct counts do however have the advantage of being able to produce at least a *minimum* figure of total numbers of deer actually seen on the days of the count, and can give an indication also of the proportion of adult males among the herds. This may suffice as an *index* of long-term change in population size and sex ratio, even if the accuracy of figures in individual years will generally be unknown unless repeated several times within the same season.

History and development of Quantock Deer Count

The first large-scale direct count of deer, in May 1991, involved 44 people spread out across the area. That first count returned a figure of 753 red deer, including 677 hinds and followers, and just 76 adult males, as well as 14 roe and one muntjac deer. The timing had been decided on basis of waiting until after the end of the legal culling season which finishes at end of April each year for red deer. However, it was later felt that numbers of adult males may have underestimated due to most of them having already cast their antlers by May. The count in 1992 was therefore brought forward to mid-February, when even the oldest stags still have their antlers. Although not initially planned to become a regular event, members of the QDM&CG felt that the results of these first counts were helpful in providing an independent figure and give reassurance of minimum numbers of deer remaining present in the area, and have continued annually ever since. A trial Exmoor count in 1992 (Langbein and Putman 1992) was subsequently taken up and extended by the Exmoor & District Deer Management Society (E&DDMS) into an

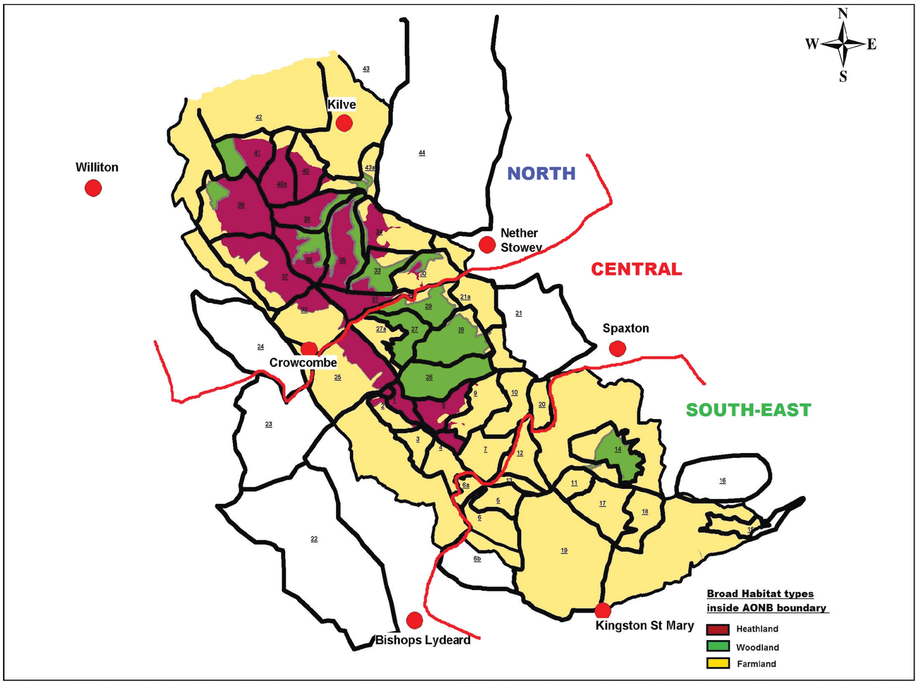


Fig. 1 Map showing deer count blocks and north, central, south-east regions

annual count from 1994 onwards. Since then, between 2500 to 3000 deer have been counted in most years within Exmoor National Park and some surrounding areas on its southern fringe.

The Quantock count continued to be overseen for ten years by Eric Smith, before handing over organisation to me, closely assisted by Andy Harris (Quantock Hills Ranger) until 2011, and a number of AONB rangers (Tim Russell, Owen Jones and Rebekah West) in more recent years. The methodology for the count, which has gradually been refined but maintained closely comparable over the years, is described in further detail below.

Quantock Count Methodology

The Quantock Deer count aims to encompass the main contiguous range of red deer herds based in and around the Quantock Hills AONB. The area is divided up into 44 main count blocks used each year, as shown in Fig. 1, with six sub-divided for assessment by different observers if possible. One or two observers are allocated to each of the main blocks or sub-compartments, with usually 50 to 60 volunteers taking part in total on the morning of the count. The volunteers come from a very wide range of backgrounds, including wildlife watchers and photographers, hunters and deer stalkers, as well as countryside rangers from the AONB, Forestry Commission and National Trust. A high proportion of the counters participates every year, and will often be allocated to the same count block each year. While many counters have now taken part for over ten or even 20 years, up to five novice counters are recruited each year, and as far as possible allocated to join one of the more experienced counters in their area.

The count is usually scheduled to take place during the first week of March, with a back-up date the following weekend in case dense fog or other extreme weather making it impossible to count the deer. The count is undertaken in early morning, within 1.5 to 2 hours of first light. Each observer (or team of two) is provided with i) an A4 OS map copy showing their count block and adjacent areas, ii) an aerial photo of the area for extra context orientation, and iii) a recording form. They will also usually carry binoculars and/or a spotting scope. For most count blocks observers walk a route that enables them to view as much of the area as possible in the time available, starting from the low ground and working up to the ridge that runs the length of the Quantock Hills. In other blocks observers may move between a small number of fixed vantage points that together provide wide views across the area being investigated. Observers are asked

Fig. 2 Young stags, hind and calves

Fig. 3 Older stags ≥ 4years (one 4.5 or 5.5 yrs old; other 10+ yrs old)

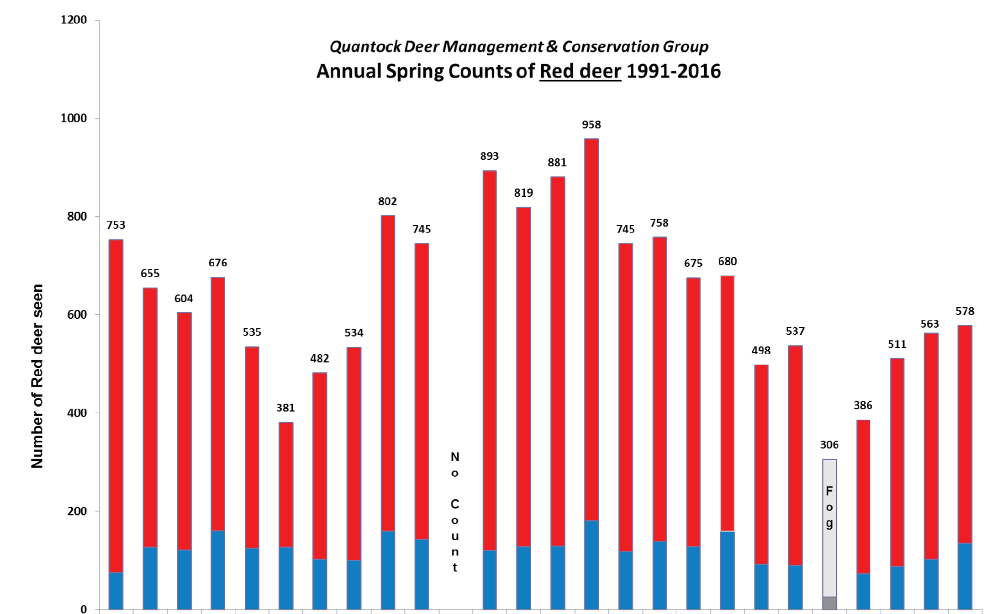
to note the location of each group of deer they see by a numbered cross on the map or by reference to well-known landmarks on the recording form, and to indicate the direction of travel if the deer are on the move and thought likely to move out of that count block before the end of the count. On the recording form the size of each group of deer is recorded, broken down in case of red deer into hinds and calves, prickets (males in their second year carrying only unbranched spike antlers), young stags (estimated to be two to four years old) and older stags (estimated to be five years old or more). Figure 2 gives an indication of what would generally be classed as young stags, and Fig. 3 for older stags, although classification of stags at the boundary of those age bands can be very difficult. For deer other than red deer (roe, fallow, muntjac) the species is recorded in the notes column and broken down if possible into does and adult bucks.

After completion of the count all forms are collected and then assessed by the count organisers, to identify any likely duplicate sightings (e.g. where deer groups of similar size and/or age/sex structure were recorded in adjoining count blocks) before collating total numbers and breakdown by species, age and sex classes.

RESULTS – TRENDS IN DEER NUMBERS, SEX RATIO AND DISTRIBUTION

Trends in total numbers of red deer across years

Following the count in 1991, a large-scale late winter deer count has now been undertaken annually in late February or early March throughout the past 25 years, missing just one year (2001) due to access restrictions during the Foot and Mouth outbreak.. The total number of deer seen each year, and numbers of hinds and calves, prickets and stags, is shown in Fig. 4. This shows that since 1992 red deer totals have never fallen below 300 or exceeded 960 animals. In fact, fewer than 380 red deer were recorded in just one count (in 2012) when dense fog covered the great majority of count blocks on both the initial as well as the scheduled back-up date. Results suggest that there was a decline in numbers between 1992 (650 animals) and 1996 (381), followed by a year-on-year increase over the next decade with a peak count for the 25-year period in 2005 (958). Thereafter, numbers once again declined, with another low in 2013 (386) followed by a steady recovery in the past three years. Possible reasons for these changes are explored in the Discussion below.



	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Hinds&Calves	677	528	482	516	410	254	379	434	643	602		772	691	752	777	626	619	547	521	406	447	280	312	424	460	443
Stags&Prickets	76	127	122	160	125	127	103	100	159	143		121	128	129	181	119	139	128	159	92	90	26	74	87	103	135
Total	753	655	604	676	535	381	482	534	802	745	0	893	819	881	958	745	758	675	680	498	537	306	386	511	563	578

Fig. 4 Red deer totals and breakdown by year 1991–2015

Variation in sex ratio

Much emphasis has been placed on regular assessment of not only total numbers but also the proportion of adult males among any red deer groups seen, as there is concern among local deer enthusiasts and public about the relatively low and possibly falling proportion of fully grown stags among the population. However, accurate assessment of the age of stags in the field is tricky, even for experienced deer watchers, not least when animals are being viewed through binoculars at great distances. At close range it is possible to identify prickets (yearling males), as they will nearly always have unbranched antlers with only a single spike on each side. These spikes vary greatly in length, and while many prickets have spikes 15 to 30 cm long, some even in late winter may only show coronets with spikes less than 5 cm long; these latter animals will be difficult to distinguish at a distance among large groups of hinds. Two and three year old stags tend to be readily classified as 'young stags' (Fig. 2), but classification of those that are four or five years old (often called 'in-betweeners' locally) is much more difficult. Some stags may already have 12-point antlers when four years old, while others at that age may still have far fewer tines and indeed may not necessarily ever grow sets of antlers with more than ten points even when in their prime around eight to ten years old. Nevertheless, Fig. 4 shows that despite the quite wide variation in total numbers observed over the years, the proportion of prickets and stags has remained between 13.5% and 24% throughout the study period, with just one exception being in 1996 (33%). In order to estimate changes in the true sex ratio for the population the (unknown) numbers of male calves within the 'hind and calf' category must be taken into account. From spot counts undertaken by the author on the Quantocks over many years, calves may be estimated commonly to make up approximately 30% of all the animals classified as 'hinds and calves' during the late winter counts, and close to half the calves may safely be assumed to be male. On the assumption therefore that 15% of the 'hinds and calves' will be male calves, an overall sex ratio (including stags and prickets) may

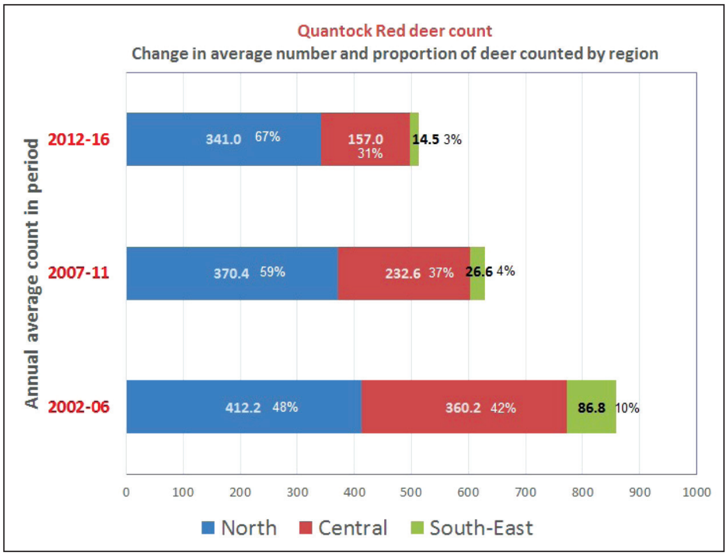


Fig. 5 Red deer abundance change by region

be calculated. On this basis, the overall late winter population sex ratio has remained fairly stable over the past 25 years averaging 2.2 females per male with a standard deviation of just 0.3 (n = 24). If the sex ratio is calculated without factoring in an estimate of males amongst the calves (i.e. yearlings + older hinds: prickets + stags) then the average sex ratio between 1992 and 2016 has been 3.6:1 (females:males) (st. dev 0.8). Whichever method of calculation is used, the results (in Figure 4) show that the proportion of adult males among the population has shown a very slight downward trend if any over the past 25 years.

Changes in distribution across the Quantock AONB

Details on locations of deer sightings, such as numbers of deer seen per individual count block are not presented here, because of the potential sensitivity of such information with respect to poaching, and in order to maintain confidentiality for landholders who provide access for the counts. However, for reporting purposes the annual results for the last 15 years have generally been broken down into three sub-divisions of the count area – distinguishing between North, Central and South-East sections as shown in Fig. 1. Between about half and two thirds of red deer sightings have nearly always been recorded within the North section (Fig. 5). The North section contains most of the open moorland and semi-natural sessile oak woodland present within the AONB, which are habitats that local red deer tend to occupy at highest concentrations. Here they also have access to lower lying improved grazing and agricultural land nearby. The Central section, has an overall higher proportion of woodland, but a more limited amount of open heathland. It includes the large conifer plantations and mixed woodland that form Great Wood in the centre of the Hills, as well as further substantial areas of mixed woodland around Crowcombe Heathfield. The proportion of deer in the Central section has tended to be between 30% and 45% of the total for the whole study area. The South East section is made up predominantly of undulating farmland with scattered areas of woodland, and has always been the section where fewest red deer have been sighted during the count. Up until 2005, this section generally held between 7% and 12% of the total across the whole area. However, there has been a marked reduction in both numbers and proportion of red deer recorded in this area (Fig. 5), falling from a mean of 10.1% for the period 2002 to 2006, to 4.2% (2007 to 2010), and just 2.8 % for the most recent period (2011 to 2016).

Observations of other deer species

Whilst sightings of roe, muntjac and any other deer are also recorded, the Quantock deer count is primarily aimed and best suited to assessing trends in red deer numbers. Numbers of roe deer recorded during the counts have varied widely from just 14 in 1991 to a maximum of 95 in 2004, with an average of 53 over the last decade. Although it is clear from the counts that roe deer have increased significantly in numbers and spread across the area over the last 25 years, they are most abundant in copses and woodland along the foothills and lowland fringe surrounding the Quantock Hills. I would estimate that numbers of roe deer recorded during our counts are likely to represent no more than perhaps 30% of the actual population, and a count dedicated specifically to assess roe deer and muntjac numbers would be required to obtain better information on these species, both of which have relatively small home ranges and are associated with denser vegetation than red deer.

The first sighting of a muntjac deer on the Quantock Hills was in 1991. Numbers had been expected to rise, but in fact sightings of just one or, at most, two muntjac have been recorded in just five of the last 25 years. A number of reports of muntjac culled or found as road casualties have been reported at other times, and although we cannot offer an estimate of their numbers, it would appear that they are colonising the Quantocks at only a slow rate so far.

DISCUSSION AND CONCLUSIONS

The Quantock Deer Count is one of the longest running landscape-scale deer counts of its kind and has been undertaken annually using a consistent methodology for over 25 years. Similar annual visual counts elsewhere in England include, for example, the counts of fallow deer since late 1970s at Ashridge Forest in the Chilterns (Barton not dated) and in the New Forest (Putman and Langbein 1999), and since 1994 of red deer on nearby Exmoor (Langbein and Putman 1992). Any method of estimating the size of mammal populations based on direct observation over large expanses of mixed habitat is bound to have significant limitations. Although the results presented here may not accurately indicate 'true' population size, it is likely such counts provide a reasonable reflection of at least population trends (Putman and Sharma 1987). They also provide a reasonably robust annual minimum figure for red deer numbers, as well as numbers of adult males, occurring in and around the Quantocks Hills each year. It is helpful to have such information when concerns are raised by the public about seeing fewer deer during the rut, or when localised excessive damage from deer is reported by landowners.

On the Quantocks control of deer numbers through culling by rifle (as for much of England) is undertaken largely independently of one another by numerous different landholders, though in some cases locally in association also with 'exempt' hunting through the QSH. The QDM&CG is a group of landholding organisations, private landholders and other interested parties that provides foremost a forum for exchange of information on deer, but does not have any statutory powers nor does it attempt to set annual cull levels. As part of its policy (QDM&CG 2005) the group supports the view that a population based on between 400–450 red deer noted at the annual spring count constitutes a sustainable population size for the longer term provided it is reasonably well distributed. In addition, the group agreed in 2005 that if consecutive annual counts should ever indicate that numbers are likely to have fallen to below about 300 head the QDM&CG will call on its members and others to introduce minimal or zero cull policies, until such a point that numbers and age/sex breakdown are considered to have recovered. The results presented here show red deer numbers seen during individual counts have fluctuated widely over the years, with around 600 noted in most years during the early 1990s but falling to below 500 later in the same decade. Thereafter counts rose steadily up until 2005 to a peak of 958, but have fallen back again steadily since, to reach a low of 386 during 2013 and recovering again to well over 500 by 2016.

Multiple different reasons are likely to have contributed to the trends observed, including changes in the size, spread and manner in which deer culls have been undertaken, but also variations in farming and cropping practices off the Hills and public pressure on the Hills. It is interesting to note that during the five year period (2002 to 2006) when highest numbers were recorded overall, not just the number but also the highest proportion of deer were noted to have spread into the farmland areas on the south eastern fringe of the Quantocks, but reduced again in recent years as overall numbers have fallen.

Another factor that may have led to a somewhat higher proportion of red deer being missed in recent count years, is the expansion (mostly since 2005) of high Miscanthus (Elephant grass) crops being grown on low lying farmland, particularly south east of the Quantock Hills, though also in some central areas west of the A358 as well as north of the A39. Miscanthus, being a perennial crop that is left standing overwinter and generally not harvested until late spring or summer, provides close to 500 hectares of high, dense cover on low ground surrounding the Quantocks, in which some groups of red deer are known to lie up during daytime. The possibility is being looked into of separate assessment, probably using an unmanned video enabled drone to fly over to these crops, to help determine how many deer may commonly lie up in such fields during late winter. It is feasible that the introduction of the Hunting Act (2004) in early 2005 also led to some lesser tolerance of red deer on some areas of farmland, and may have contributed to the decline noted in overall numbers from 2006 onwards, although average numbers of near 550 in late winter in more recent years are similar to the average numbers counted during the 1990s.

The QDM&CG does not aim to dictate what may be appropriate cull levels for individual landholdings or the Quantocks as a whole. It is hoped nevertheless that the ready accessibility to annual summary results from a consistent and independent community based deer count as outlined here, has aided local landholders in their own deer management decisions over the years. This may have led to more restrictive localised culls overall if and when counts have indicated that total numbers or proportion of adult males in that region of the Quantocks have fallen, or by converse higher culls following years when peak numbers were reported, helping to maintain the overall population near a sustainable level.

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TEMPORAL CHANGES IN A GRASSLAND SWARD

JOHN CROTHERS

INTRODUCTION

When I was in my teens, my father delegated to me the responsibility for mowing our lawn. He was concerned about the abundance of moss (species never determined) and imagined that it could be eliminated by ever-more-frequent mowing. At the time I had no reason to doubt his management plan. If only I had had available, then, the data that I present in this paper!

When, in 1967, the Field Studies Council established its ninth Residential Field Centre in Nettlecombe Court, Dr John Carthy, the Scientific Director, was keen to encourage an experimental approach in the field teaching of ecology (to augment the traditional observational recording) and negotiated the inclusion of a small area of Court Field adjacent to the old croquet lawn within the lease (Fig. 1). It was much easier to devise a worthwhile botanical experiment for that site than any zoological alternative, so most of the area was given over to a long-term investigation into the effects of different mowing regimes on a previously uniform grassland sward.

It must be emphasised that this was always envisaged as a teaching experiment; nobody ever imagined that it might generate data of wider interest. After all, the data were to be collected by students and thus, according to the perceived wisdom of the 1960s, expected to contain so many errors as to be worthless for further study. Undoubtedly, there are errors in the data set under consideration but, I contend, they do not materially influence the conclusions to be drawn from the data.

METHODS

The students

As all the data that form the meat of this paper were collected by students, it is worth recording who they were and why they collected them.

The Field Studies Council is an educational charity founded, as the Council for the Promotion of Field Studies, in 1943 thanks to the determination of a London County Council Inspector of Schools, Francis Butler. Placed in charge of a group of evacuee children in the autumn of 1939, Butler became forcibly aware of their ignorance concerning almost everything about the countryside and of the absence of anybody who might enlighten them. In his vision for a post-war education system he foresaw a network of residential Field Centres across the Country staffed by natural historians.

The problem, of course, was how to finance the vision and the embryo Council's first four Centres faced some very lean years in the early 1950s. Better times followed the introduction of a fieldwork component into A-level Biology and Geography syllabi. The Council offered courses to suit that component and more Centres were opened.

In the late 1960s, week-long (Wednesday to Wednesday) A-level field courses were arranged in almost every week from March until October (although June and August were always slack months). Demand for places on the courses was such that schools were rationed to two or three places and the students were not accompanied by their own staff. As each course was made up of a mixture of first and second year students, probably studying a range of syllabi, it was impossible to 'teach to the syllabus.'

Later on, when supply of courses more nearly matched the demand for them, a school would book a course for the whole A-level class (often on an annual basis) and the school staff became closely involved with preparation and delivery of the course.

Whilst most of the data were collected by A-level students, some are thanks to a Middle School (observed by Post Graduate Certificate in Education students) and others to various Open University Summer Schools.

Comparatively few of the students lived in Somerset; most being from the London area or the Midlands. The only things they had in common were their temporary residence in Nettlecombe Court and the fact that they had never done any investigation of grassland before.

Fig. 1 The newly-enclosed Experimental Plot, 30 March 1968, before the plots had been marked out. It appeared to be reasonably uniform in nature, although the land at the foot of the slope presumably received more nutrients from run-off at times of heavy rain. At this time, the rest of Court Field was let for grazing each summer

Experimental Design

The general layout of the experiment (Fig. 2) was modelled on a comparable set of plots that had been devised at Preston Montford Field Centre (Shropshire) by Charles Sinker (and were well established when I first saw them in 1964); modified, of course, to fit the area available and the plants present.

The object of the exercise was to teach a particular method of recording plant abundance. Nothing is much more boring than to be taught a technique in the abstract; so a long-term experiment was established to compare four 'treatments' applied to the sward of the experimental plot.

It didn't matter what the treatments were, provided they altered the vegetation in different ways and, as the Field Centre already owned grass cutting machinery, the obvious solution was to apply different mowing regimes.

The experimental plot had been mown, along with the rest of Court Field in the autumn of 1967 and appeared fairly homogeneous in March 1968 (Fig. 1) but there were probably local differences in

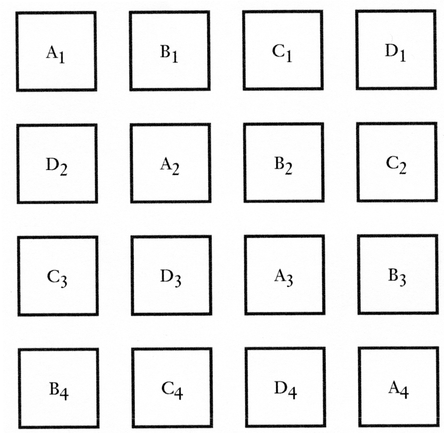

Fig. 2 The 4x4 Latin Square. Each plot was 10 feet square and separated from its neighbours by paths 4 feet wide. 'A' plots were mown fortnightly during the growing season (as was the croquet lawn), 'B' plots annually in June, 'C' plots were unmown whilst the turf was removed from the 'D' plots which were then left unmown

soil depth, drainage, nutrient levels or whatever so, to cancel these out as far as possible, sixteen plots were marked out; four each of treatments A, B, C, D arranged in a Latin Square so that each treatment occurs once in each column and in each row (Fig. 2).

The 'A' plots were mown fortnightly during the growing season, at the same setting as for the croquet lawn. The 'B' plots were mown annually, in June, when local farmers took their hay crop. The 'C' plots were left unmown, whilst the turf was removed from the 'D' plots which were then left unmown. I realised, too late, that I should have randomised the order of the treatments within the rows – because there is a diagonal alliance (across the slope).

Data Collection

No previous experience of British plant species could be assumed (on the part of the students) so identification could have presented a problem, especially in the closely mown 'A' plots. Being more interested in teaching the technique than in the results, at least initially, I decided to work with six distinctive taxa: Cock's-foot (*Dactylis glomerata*); Yorkshire Fog (*Holcus lanatus*); Creeping Buttercup (*Ranunculus repens*); White Clover (*Trifolium repens*); Yarrow (*Achillea millefolium*) and moss – almost all Springy Turf-moss (*Rhytidiadelphus squarrosus*). In addition there were two 'dustbin' categories: 'other grasses' and 'other plants apart from grasses'.

The number of taxa (eight) was selected for convenience. The class would be divided into eight groups; each group would sample two adjacent plots then, back in the lab, when the data had been pooled (initially on the blackboard, latterly on a computer) each group would be allocated a taxon and asked to explain in what way (and why) the different mowing regimes had altered the performance of 'their' plant.

On each sampling occasion, percentage cover of each of the eight taxa was recorded at 100 randomly-distributed point quadrats in each plot (see Chalmers and Parker (1989) for a description of the method). Point quadrats were preferred to frame quadrats because their use does not, of itself, alter plant cover and because they greatly reduce the subjective element in sampling. Most of the plot area could be sampled when kneeling on the surrounding path and trampling was further reduced by placing the central pin of the quadrat in each of 25 randomly-selected positions and examining 4 points about it, at the corners of an imaginary square. This experimental design is an example of stratified random sampling.

A degree of scepticism was expressed by most groups of students as to whether it is possible for records taken at 100 points to represent the vegetation in 100 square feet of plot. But all sampling regimes are a compromise between the ideal number of samples versus the damage caused to the site by sampling and the time involved. In general, the longer it takes the poorer the quality of the result.

To counter this scepticism, I decided to keep a record of the data obtained by each course – to be able to show that comparable figures were obtained each time. Moreover, we thought that people would take more care if they knew that their data would be kept and used over and over again.

When using a point quadrat, you lower your point – 'a position with no area' – mounted at the tip of a sharpened pin into the vegetation until it touches something. It might seem obvious simply to record what the 'something' was that was first hit by the pin. However, this was found to lead to mistaken conclusions regarding the nature of the plant communities present.

Table 1 shows the first three data sets, recorded using the 'first hit' technique. Comparing the average figures, the first set, taken before any 'treatment' had been applied, confirm that we were studying grassland and that there was little difference between the plots (moss averages are 4, 7 and 2). But in the third data set it seems that moss had disappeared whereas simple observation would suggest that moss was thriving. Clearly, 'first hit' recording is akin to surveying rain forest by satellite imagery; only the canopy vegetation is recorded.

The solution appeared to be to record all the plants touched by the point as it was lowered through the sward (Table 2). (This change coincided with a visit from Charles Sinker "You can't simply call it all grass!")

As expected, moss reappeared in the record but, very soon, the sheer volume of data became excessively tedious to collect. That group on 6 July 1968 spent seven hours (in total) on the plots – it was a fine day – and I am very grateful to them because they unequivocally established the fact that this is an impractical technique. Very few groups of students would have stuck at it for so long and in the real world, it would be unaffordable.

TABLE 1 – THE FIRST THREE SETS OF DATA, SCORING ‘FIRST HIT’ ON EACH TAXON.
THE ‘D’ PLOTS WERE BARE GROUND AT THIS TIME. (from Crothers, 1991)

	A Plots					B Plots					C Plots				
	1	2	3	4	Av.	1	2	3	4	Av.	1	2	3	4	Av.
1. April 1968 – only the paths had been mown.															
grass	88	90	74	44	74	78	92	77	56	76	87	92	80	73	83
moss	1	1	9	6	4	0	0	7	22	7	0	0	0	7	2
buttercup	3	5	8	11	7	10	5	6	2	6	2	3	11	4	5
clover	0	0	6	19	6	4	0	8	13	6	0	0	0	10	3
yarrow	0	1	1	2	1	0	0	1	0	0	0	1	3	0	1
other plants	0	1	0	0	0	0	1	1	0	1	0	1	1	3	1
2. 6 May 1968 – after the first mowing of the A plots (29 April)															
grass	92	95	74	71	83	76	75	65	66	71	76	55	68	51	63
moss	0	0	3	1	1	0	0	5	2	2	1	9	0	5	4
buttercup	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
clover	0	0	6	38	11	3	5	24	21	13	0	5	0	16	5
other plants	3	2	12	13	8	4	8	5	11	7	0	1	5	4	3
3. 20 May 1968 – after the second mowing of the A plots (6 May)															
grass	98	98	85	51	83	96	97	91	96	95	93	90	88	84	89
moss	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
buttercup	2	1	3	7	3	2	3	4	2	3	7	4	4	3	5
clover	0	0	10	31	10	2	0	4	2	2	0	5	0	13	5
other plants	0	1	2	0	1	0	0	0	0	0	0	1	2	0	1

TABLE 2 – THE SECOND ATTEMPT, SCORING 'ALL HITS' ON EACH TAXON. (from Crothers, 1991)

	A Plots 1	2	3	4	Av.	B Plots 1	2	3	4	Av.	C Plots 1	2	3	4	Av.	D Plots 1	2	3	4	Av.
4. 25 May 1968 – after the third mowing of the A plots.																				
Cock's-foot	6	14	16	18	14	38	27	7	16	22	55	30	26	1	28					
Yorkshire Fog	7	5	3	1	4	16	3	0	11	8	17	11	11	6	11					
other grasses	95	86	90	84	89	72	88	79	69	77	86	59	97	96	85					
moss	3	7	18	19	12	5	0	37	24	17	0	19	2	37	15					
Buttercup	6	10	18	19	13	6	6	19	25	14	4	18	8	7	9					
White Clover	1	0	15	55	18	7	2	16	24	12	0	8	0	35	11					
Yarrow	0	4	1	1	2	0	0	5	8	3	0	4	3	1	2					
other plants	0	1	0	3	1	1	0	0	0	0	0	0	0	1	0					
5. 22 June 1968 – A plots mown 5 times, B Plots once.																				
Cock's-foot	0	18	37	13	17	25	49	35	32	35	11	17	18	5	13	0	0	0	0	0
Yorkshire Fog	5	10	32	7	14	7	41	23	45	29	27	23	41	58	37	3	6	0	12	5
other grasses	50	28	26	72	44	45	48	25	231	87	67	20	141	588	204	18	45	95	46	51
moss	7	16	0	15	10	0	0	4	41	11	0	0	28	53	20	6	0	49	0	14
Buttercup	17	0	10	21	12	26	23	9	10	17	0	4	31	14	12	1	13	21	47	21
White Clover	11	0	16	47	19	12	10	13	18	13	1	5	5	55	17	5	4	1	5	6
Yarrow	0	0	0	3	1	12	12	2	2	7	0	0	0	0	0	0	4	0	15	5
other plants	0	6	0	9	4	0	2	0	0	1	1	0	0	0	0	3	11	2	18	9
6. 6 July 1968 – A plots mown 6 times, B Plots once.																				
Cock's-foot	49	99	0	0	37	69	99	34	37	60	63	169	92	4	82	27	26	4	0	14
Yorkshire Fog	23	3	0	0	7	27	25	40	0	23	28	88	24	24	41	30	2	14	1	12
other grasses	77	184	259	362	221	239	377	476	240	333	465	1115	885	1064	882	222	420	214	220	269
moss	0	2	24	36	16	0	2	18	15	9	4	4	1	35	11	43	47	52	59	50
Buttercup	11	7	20	15	13	7	5	18	2	8	2	17	17	32	17	4	6	18	42	18
White Clover	9	0	17	91	29	10	1	42	38	23	0	4	0	51	14	48	10	1	9	6
Yarrow	0	4	2	1	2	0	0	13	5	5	0	0	0	0	0	2	2	2	0	2
other plants	1	0	1	4	2	4	2	8	3	4	3	2	3	5	3	1	2	15	6	6

TABLE 3 – AN EARLY EXAMPLE OF THE SYSTEM USED IN ALL SUBSEQUENT YEARS, SCORING 'FIRST HIT ON EACH TAXON' (from Crothers, 1991)

	A Plots					B Plots					C Plots					D Plots				
	1	2	3	4	Av.	1	2	3	4	Av.	1	2	3	4	Av.	1	2	3	4	Av.
9. 27 August 1968.																				
Cock's-foot	26	33	33	25	29	37	37	27	20	30	55	68	60	2	46	2	9	0	1	3
Yorkshire Fog	12	2	0	25	10	19	0	8	15	11	0	22	12	0	9	24	4	0	2	8
other grasses	24	75	99	86	71	88	97	79	75	85	87	99	85	99	93	99	41	97	97	84
moss	13	15	46	99	43	12	2	64	40	30	6	7	5	15	8	71	35	50	27	46
Buttercup	13	23	28	60	31	15	22	63	13	28	6	26	16	27	19	4	12	27	67	28
White Clover	10	1	21	59	23	4	1	42	38	21	0	1	0	15	4	31	20	6	15	18
Yarrow	1	5	8	23	9	0	0	14	0	4	0	2	0	0	1	1	6	0	3	3
other plants	0	0	6	19	6	0	4	10	15	7	1	3	6	0	3	32	10	0	3	11

TABLE 4 – A LATER SET OF DATA TO ILLUSTRATE THE OBVIOUS LONG-TERM CHANGES
ONLY SEVEN GROUPS OF STUDENTS WERE AVAILABLE, SO TWO PLOTS WERE NOT SAMPLED ON THIS OCCASION

	A Plots					B Plots					C Plots					D Plots				
	1	2	3	4	Av.	1	2	3	4	Av.	1	2	3	4	Av.	1	2	3	4	Av.
231. 13 July, 2001.																				
Cock's-foot	0	0	0	0	0	0	3	3	3	2	0		0	9	3		0	14	0	5
Yorkshire Fog	11	71	0	0	21	45	4	1	1	13	19		3	25	16		28	0	3	10
other grasses	91	1	90	83	66	19	72	41	73	51	70		80	55	68		97	72	54	74
moss	75	7	0	28	28	5	5	39	26	19	10		20	1	10		43	7	8	19
Buttercup	0	3	0	1	1	26	2	0	9	9	0		5	4	3		0	5	0	2
White Clover	50	33	84	75	61	25	2	0	0	7	0		0	0	0		34	3	19	19
Yarrow	41	0	23	67	33	14	3	32	55	26	4		29	24	19		29	23	4	19
other plants	21	19	23	35	25	11	81	24	35	38	34		47	31	37		44	33	5	27

The compromise was to score 'first hit on each taxon' (Table 3). There is nothing surprising about this conclusion, but comparable tables displaying what happens otherwise are rarely published. One positive feature is that the maximum score for each taxon is 100 so the averages make sense in ordinary English. Thus, in Table 3, Cock's-foot showed 46% cover of 'C' plots compared to 29% and 30% in 'A' and 'B' but only 3% in the 'D' plots. In other words, this large tussock-forming grass grows best when unmown but was slow to colonise from seed.

Table 4 displays the data from the last summer group of students taught by me on the plots. Clearly there had been changes over the years. Cock's-foot is rare or absent and the 'other plants' category is the second most abundant, but the feature that surprised me most was the differences that remained between the 'C' and 'D' plots which were 'managed' in exactly the same way throughout the 33 years between data in Tables 3 and 4 (for example, Fig. 3). The past history of a site has a much greater influence on the present vegetation than is often appreciated.

Looking at any of these data sets, one suspects that one can see errors. In Table 4, for instance, the group studying 'A2' appear to have had problems in identifying Yorkshire Fog; 71% cover in an 'A' plot is highly unlikely but the associated 1% cover of 'other grasses' is simply wrong. Such discrepancies, if less dramatic, were apparent whenever the class results were compiled, and those inclined to doubt the value of surveying by the use of point quadrats (or of student data) were quick to discredit the results. That was the original reason why I kept the data and was often able to produce very comparable figures for a similar date in a previous year.

Data presentation

I have 230 sets of data recording percentage cover of the eight taxa, spanning 33 years; a considerable improvement on the 120 sets available for an earlier paper (Crothers 1991).

To take account of the obvious seasonal changes that occur every year, I worked with separate annual averages for spring (February to April), summer (May to July) and autumn (August to October) in all the years for which sufficient data had been recorded. The summer record is the most complete and so I will concentrate on that. At the outset, we assumed (as most people who design experiments assume) that the different mowing regimes would account for the differences in plant cover and so I summarised the data in the form of pie charts (e.g. Fig. 3).

A glance at Fig. 4 shows that, whilst the mowing regime has had an effect, it is certainly not the only variable affecting plant performance. The same glance confirms that these are 'noisy' data. They contain errors, as was always to be expected, which tend to obscure the overall picture. The figures plotted in Fig. 4 are the average percentages cover recorded from May to July in the year concerned. But the number of data sets involved in those averages varies considerably. To smooth out some of these wilder fluctuations, I then calculated three year averages. Thus in Fig. 5, and subsequently, the value shown for 1990 is the mean of 1989+1990+1991, that for 1991 is the mean for 1990+1991+1992, and so on. (I used this technique to similarly smooth the student data on the growth of Common Top-shells on Gore Point (Crothers 2001).)

A common first reaction to a graph such as Fig. 11 is to assume the involvement of a weather-related factor. There is no shortage of local weather records available as a Meteorological Office Class 3 climatological station was established in the Experimental Plot in the spring of 1968 (Ratsey 1973) and data were recorded at 0900 GMT daily throughout the period concerned. Suffice it to say that the vegetational fluctuations do not relate to anything in the met data that has been identified to date. Many people have looked, including members of Met. Office staff.

RESULTS

Cock's-foot (*Dactylis glomerata*)

This large, perennial, tussock-forming grass was the dominant plant in the grassland of Court Field when the experiment began and had been an important component of the seed mixture sown during the early 1960s when the former Deer Park was reclaimed for agriculture. It produces more bulk than any other of our grasses (Moore 1966) and is thus a useful forage crop for cattle.

We had expected this plant to dominate the 'C' plots, initially, for it to follow suit in the 'D' plots later on and for it to be depressed by mowing. In fact (Fig. 3) overall cover in 'B' and 'C' plots was essentially the same.

Its success in 'B' plots can be ascribed to the fact that the maximum spurt of growth in *D. glomerata* occurs from mid-April to mid-May (Moore 1966). So, by the time the plots were cut in June the

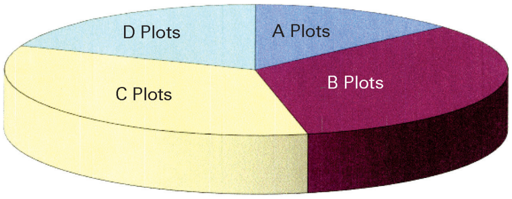

Fig. 3 The overall distribution of cock's-foot in the grass plots during summer, 1969–2001

tussocks had replenished their food stores and were so large that it was impossible to mow the 'B' plots as closely as the 'A's.

Conventional lawn grasses have their growing points at, or just below, the ground surface so that mower blades do not damage them but instead slice through the lamina of the leaves. The growing point in a Cock's-foot tussock is well above the ground surface and is removed or damaged by lawn mowing. No tussocks survived for long in the 'A' plots in those early years. Note the very low cover in 1971 (Fig. 4). I suspect that the subsequent increase in its cover of the 'A' plots reflects a change in management practice.

When the Field Centre opened we inherited a large (and extremely heavy) cylinder lawn mower from the previous tenant. It cut through grass tussocks with ease. When that mower died, it was replaced by a series of Flymo rotary mowers that floated over the ground on the hovercraft principle. They were much less laborious to use but they did not cut as close to the ground as their predecessor – as is revealed by the rise of Cock's-foot in the 'A' plots during the late 1970s. Eventually we realised that it was a false economy to use equipment designed for domestic gardens at Nettlecombe Court and we turned to wheeled rotary mowers; their arrival saw Cock's-foot cover drop down again.

The 'B' plots were cut with a mechanical scythe (when it could be persuaded to work), by a traditional scythe or with shears. In all cases most of the tussocks survived unscathed.

But the main impression conveyed by Figs 5-7 is of a plant diminishing in abundance and this is confirmed by Fig. 8. One possible explanation is

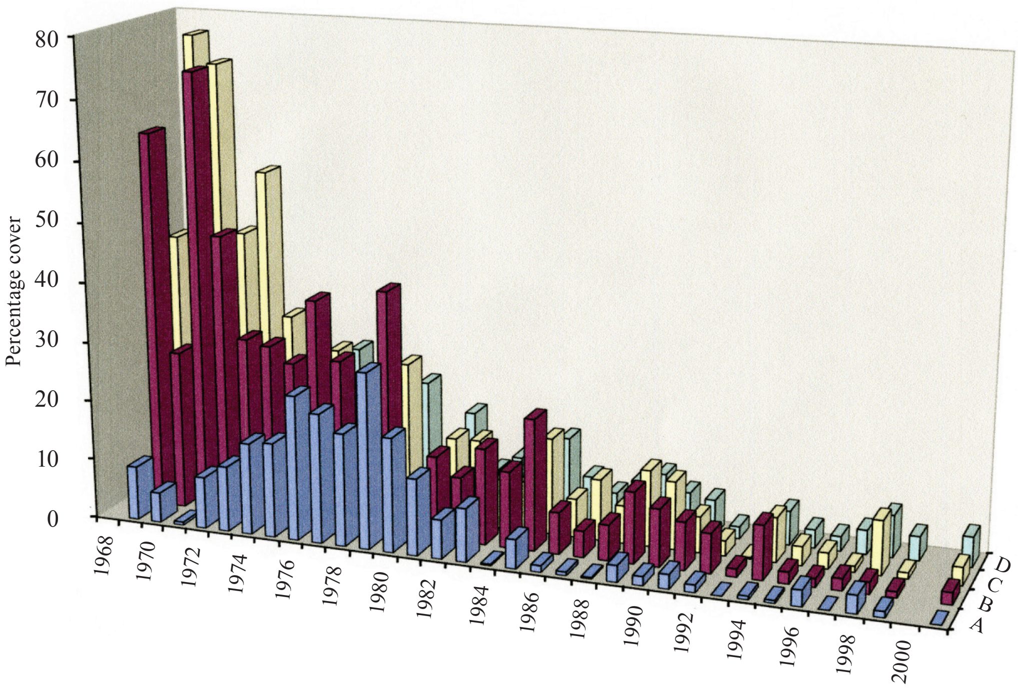

Fig. 4 Fluctuations in the abundance of cock's-foot (Dactylis glomerata) *under the four treatments, over time. 'A' plot data are in the foreground, with 'B' and 'C' plots behind them leaving 'D' plots in the background. The bars represent annual averages of the data collected in summer (May–July).*

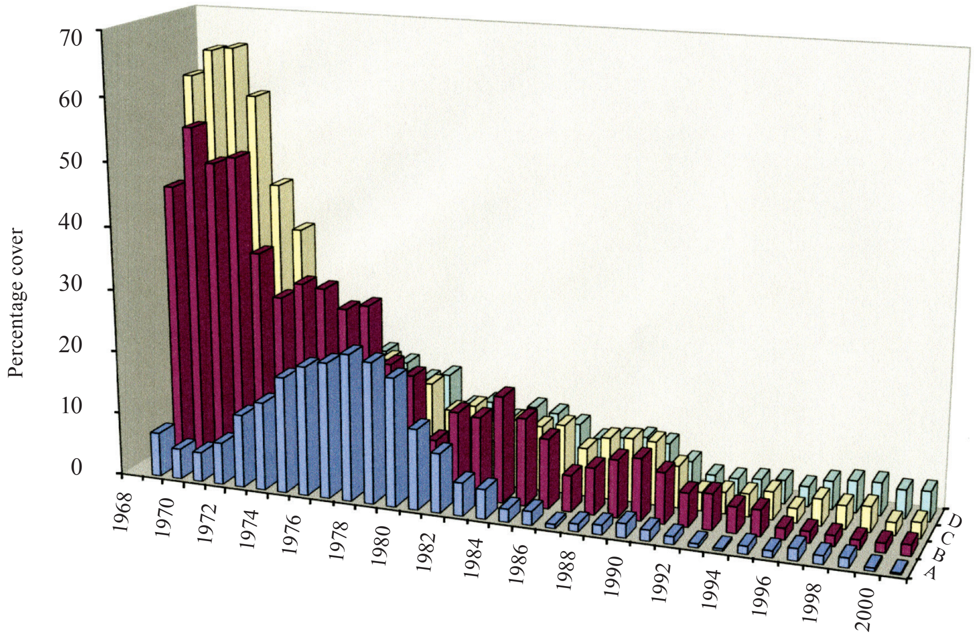

Fig. 5 Fluctuations in the abundance of cock's-foot (Dactylis glomerata) *under the four treatments, over time. 'A' plot data are in the foreground, with 'B' and 'C' plots behind them leaving 'D' plots in the background. ('D' is not visible before 1977.) The bars represent smoothed averages of the data collected in summer (May–July).*

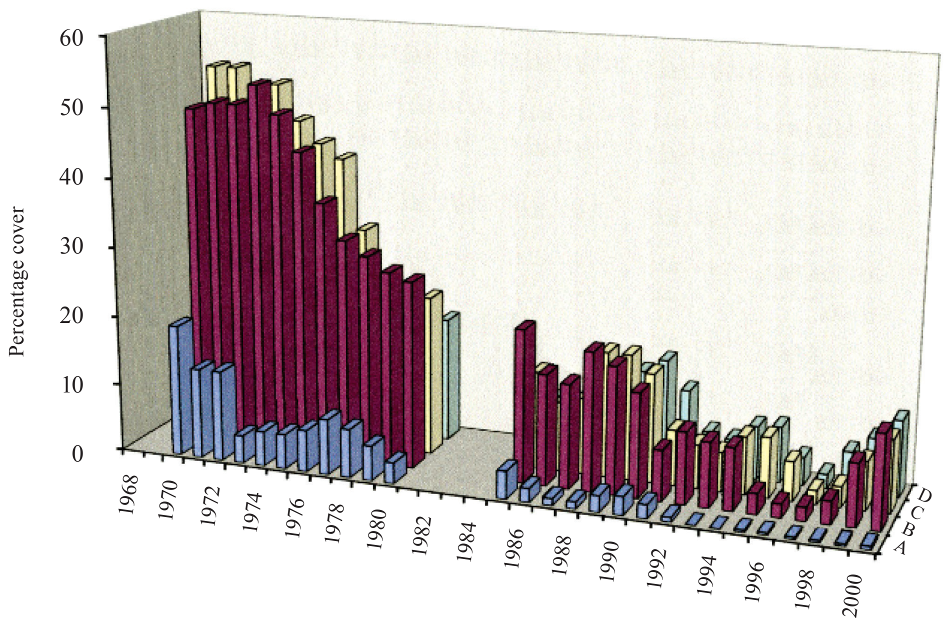

Fig. 6 The comparable plot of the available spring (February–April) data

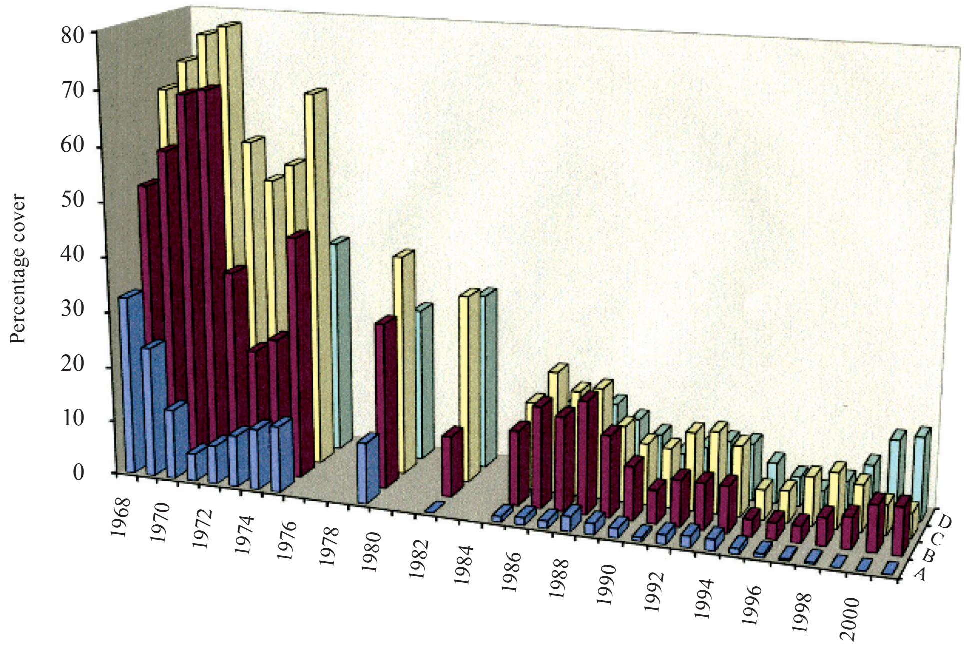

Fig. 7 The comparable plot of the available autumn (August–October) data.

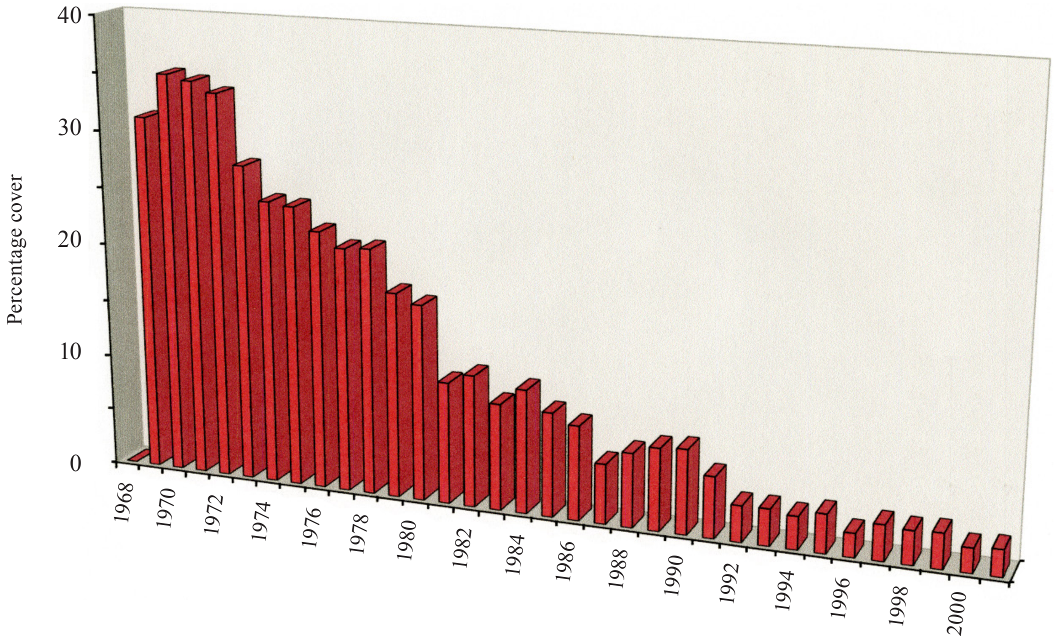

Fig. 8 Overall mean fluctuations in the abundance of cock's-foot (Dactylis glomerata) *in summer, 1969–2001*

given by Moore (1966) who stresses the importance of controlling the rampant summer growth which could be damaged by frost. In the 1970s, farmers were recommended to plough and re-seed grass leys containing Cock's-foot every ten years (W. W. Ker *pers. comm.*) and to fertilise regularly. It will be noted that the peak abundance of Cock's-foot in Figs 4-8 occurred in 1969 or 1970, ten years after sowing. No fertiliser was applied to the plots after 1967.

Cock's-foot flowered regularly in the 'C' plots but did not colonise freely from seed (some commercial strains are known to be infertile). The 'D' plots colonised very slowly, vegetatively, from the margin. Overall, we see the fate of an introduced species, deprived of the added fertiliser that it requires in order to thrive, steadily diminishing over time.

Yorkshire Fog (*Holcus lanatus*)

This grass had proved to be an invasive species in the Preston Montford plots (C. A. Sinker *pers. comm.*), coming to dominate in his equivalent of the 'B' plots. The other reason for selecting it for study was its ease of identification – the only 'hairy' grass present and with pink 'pyjama stripes' on its white leaf-bases. It would not have been included in the original seed mixture because it is unpalatable to farm stock except when very young.

Yorkshire Fog produces copious quantities of seed and is a rapid coloniser of disturbed ground; by the autumn of 1969, it was actually the most abundant species in the 'D' plots although Fig. 9 shows that overall it has performed best in the 'C' plots.

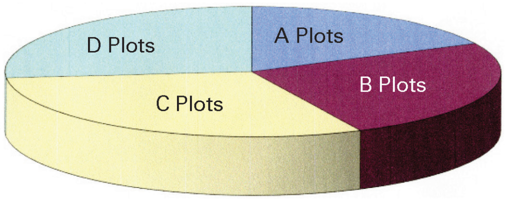

Fig. 9 The overall distribution of Yorkshire fog in the grass plots during summer, 1969–2001

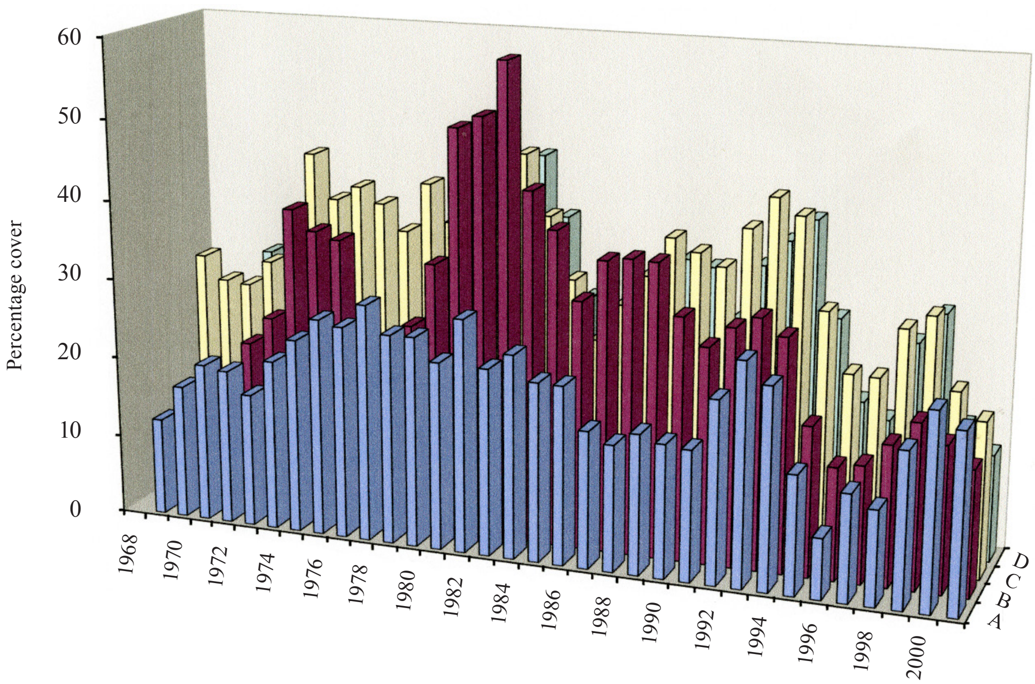

Fig. 10 Fluctuations in the abundance of Yorkshire Fog (Holcus lanatus) *under the four treatments, over time. 'A' plot data are in the foreground, with 'B' and 'C' plots behind them leaving 'D' plots in the background. The bars represent smoothed averages of the data collected in summer (May–July).*

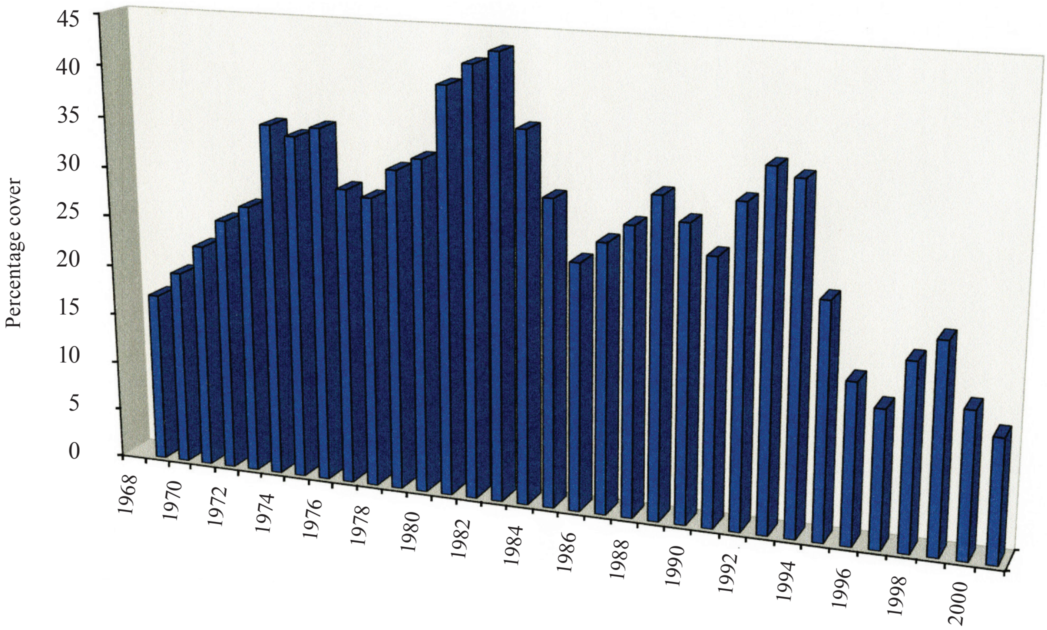

Fig. 11 Overall mean fluctuations in the abundance of Yorkshire Fog (Holcus lanatus) *in summer, 1969–2001*

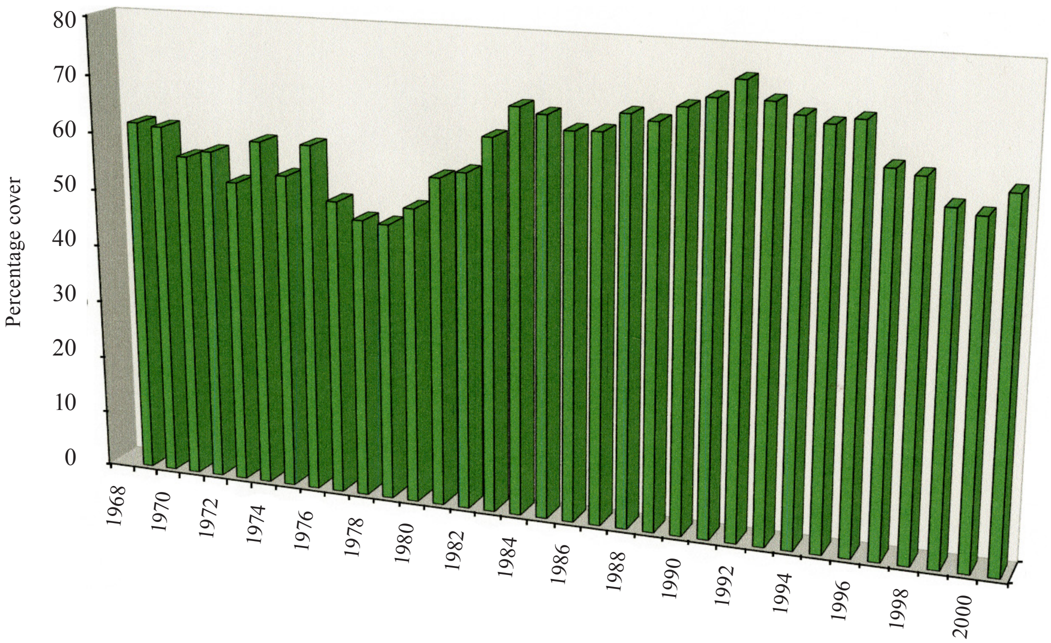

Fig. 12. Overall mean fluctuations in the abundance of other grasses in summer, 1969–2001.

Neither Fig. 10 nor Fig. 11 suggests that theFexperimental treatments were the controlling factor operating on the performance of this grass. Up until 1983, the plot shows a progressive increase in percentage cover, to be replaced by an overall decline, complicated by a pattern of cyclical fluctuations. This pattern was initially interpreted (Crothers 1991) to be a response to the decline in Cock's-foot (Fig. 12). That may, indeed, have been a factor, but the subsequent overall decline requires a different explanation.

'Other grasses'

It is difficult to draw many conclusions about a 'dustbin category' such as this because there are so many unknowns. The pie chart (not included) is so nearly perfectly divided into quarters as to suggest that, between them, these 'other grasses' successfully exploited the entire available habitat.

When compared with Fig. 8 (Cock's-foot peaked in 1970) and Fig. 11 (Yorkshire Fog peaked in 1983) the 'other grasses' peak (Fig. 12) was delayed until 1992. Unable to dominate either of the large perennial species (let alone both of them together) they only came into their own when the others were both in decline. (Which does not explain why they, too, were in decline after 1996.)

The student data can tell us no more, but there were other surveys of the plot flora. On 19 March 1969, Charles Sinker examined the 'D' plots one year after the start of the experiment. By far the most successful colonist, covering more than 25% of each plot, was Creeping Bent (*Agrostis stolonifera*). Yorkshire Fog was the next commonest grass, well-established but less than 12.5% cover. Scattered individuals of Common Bent (*Agrostis capillaris*), Sweet Vernal-grass (*Anthoxanthum odoratum*), Meadow Foxtail (*Alopecurus pratensis*), Cock's-foot, and Perennial Rye-grass (*Lolium perenne*) were also noted.

The plant list for all plots compiled by Dr D. H. (Kery) Dalby in July 1978 confirmed the continued presence of *A. odoratum* and *L. perenne* and added Soft Brome (*Bromus hordeaceus*), Crested Dog's-tail (*Cynosurus cristatus*), Red Fescue (*Festuca*

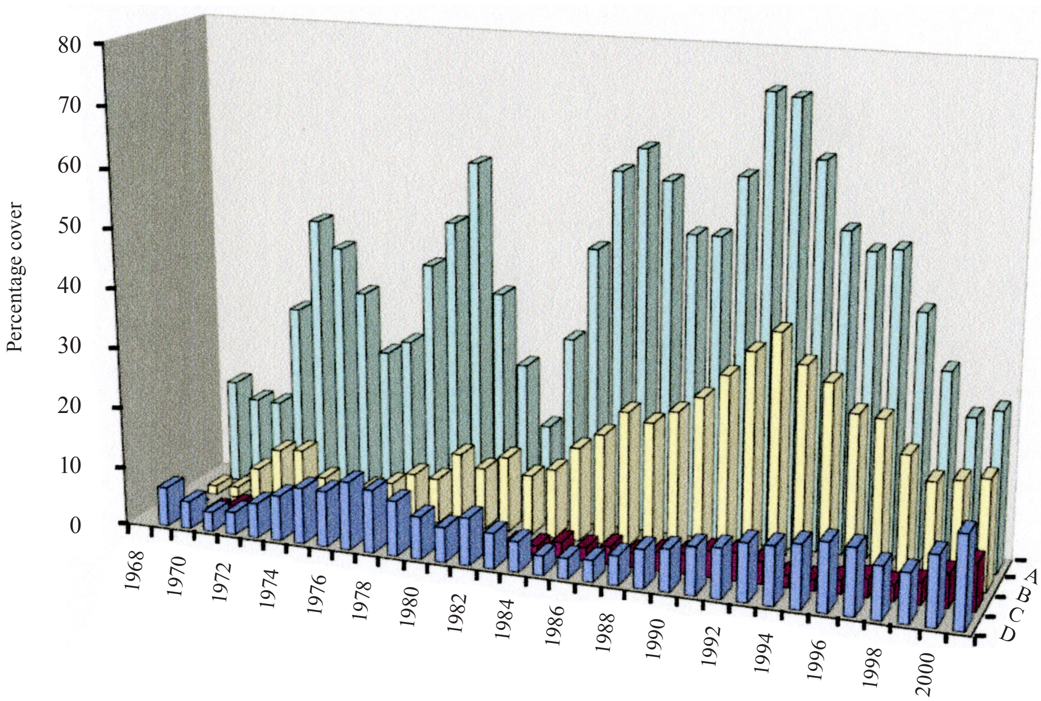

Fig. 13 Fluctuations in the abundance of moss (Rhytidiadelphus squarrosus) *under the four treatments, over time. 'D' plot data are in the foreground, with 'C' and 'B' plots behind them leaving 'A' plots in the background. The bars represent smoothed averages of the data collected in summer (May–July)*

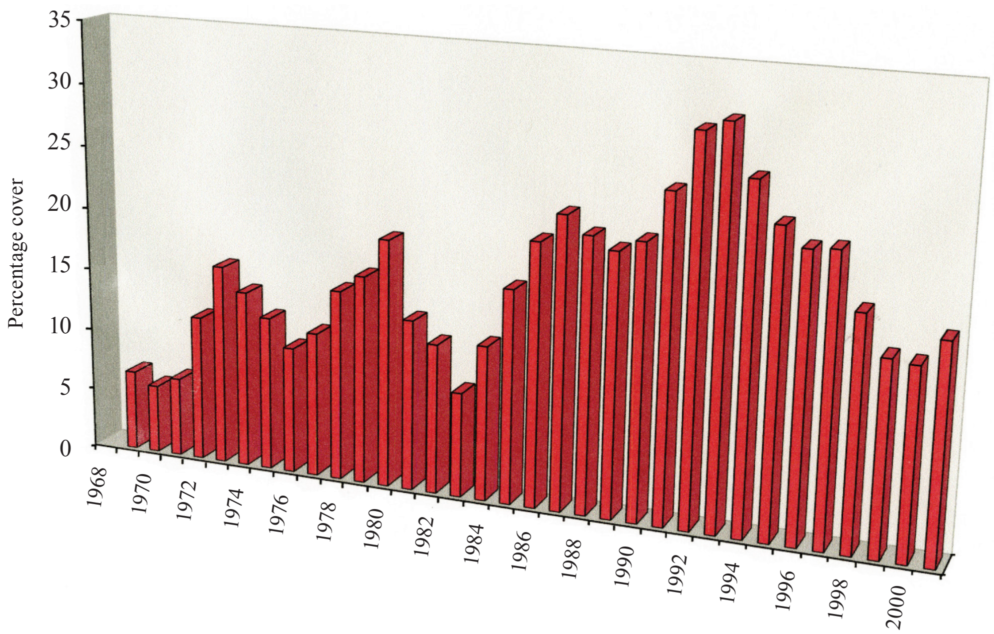

Fig. 14 Overall mean fluctuation in the abundance of moss (Rhytidiadelphus squarrosus) *in summer, 1969–2001*

rubra), Small Sweet-grass (*Glyceria declinata*) and Annual Meadow-grass (*Poa annua*).

Several lists drawn up between 1988 and 1990 confirmed the continued presence of *A. capillaris, A. odoratum, A. stolonifera*, and *F. rubra* whilst adding Wavy Hair-grass (*Deschampsia flexuosa*) and Timothy (*Phleum pratense*).

In July 1997, Dr Charles Turner found *A. odoratum* to be the most widespread 'other grass', it being present in all 16 plots whilst *F. rubra* was present in all 'B', 'C' and 'D' plots. The only other species recorded was Smooth Meadow-grass (*Poa pratensis*).

Nobody would ever claim to have found all the species present in a non-destructive sample taken on a single day, so nobody should attempt to read too much into the last few paragraphs. But the overall appreciation would appear to be that the most successful coloniser of the bare ground in the 'D' plots had given way to a predominance of Sweet Vernal-grass and Red Fescue, the picture being complicated by the occasional appearance of various other species.

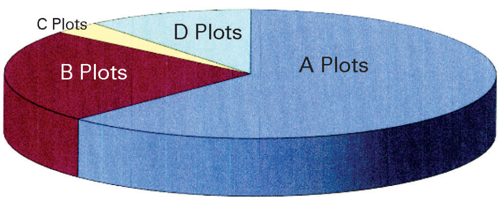

Fig. 15 The overall distribution of moss in the grass plots during summer, 1969–2001

Moss

As would be expected, moss performed much better in the mown than in the unmown plots (Figs 13 and 15) because its low growth-form is easily shaded out by taller vegetation; although it performed much better in the 'D' plots than in the 'C', having been given that opportunity to colonise bare ground in March 1968. (Note that the plot order in Fig. 13 has been reversed so that the 'A' plots are at the back to allow the other data to be seen.)

I don't think anybody, in 1968, would have expected the data to show episodic fluctuations of abundance in the 'A' plots but not, to the same extent, in the others. The overall long-term fluctuation is best appreciated in Fig. 14 which uses the (summer) data from all of the plots.

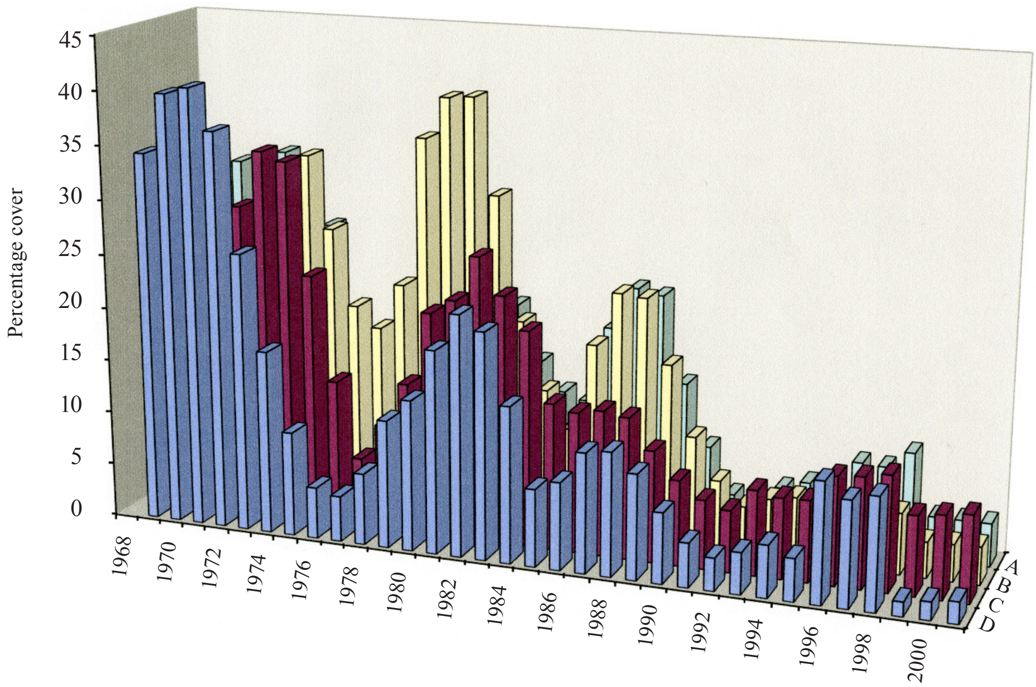

Fig. 16 Fluctuations in the abundance of Creeping Buttercup (Ranunculus repens) *under the four treatments, over time. 'A' plot data are in the foreground, with 'B' and 'C' plots behind them leaving 'D' plots in the background. The bars represent smoothed averages of the data collected in summer (May–July)*

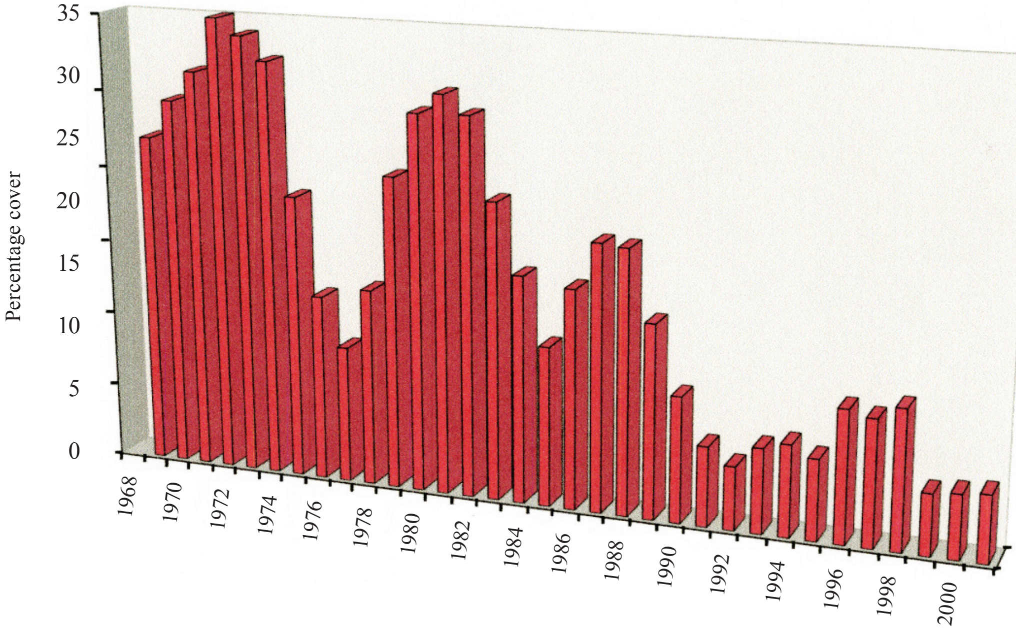

Fig. 17 Overall mean fluctuations in the abundance of Creeping Buttercup in summer, 1969–2001

Springy Turf-moss (*Rhytidiadelphus squarrosus*) was, seemingly, the predominant species although a Haircap (*Polytrichum* sp.) and Neat Feather-moss (*Pseudoscleropodium purum*) were recorded on two occasions, and Rough-stalked Feather-moss (*Brachythecium rutabulum*), Pointed Spear-moss (*Calliergonella cuspidata*) and Taper-leaved Earth-moss (*Pleuridium acuminatum*) were recorded once only.

Creeping Buttercup (*Ranunculus repens*)

This, seemingly the only species of *Ranunculus* to be present in the plots in 1968, was originally chosen as one of the study taxa because its distinctively-shaped leaves rendered it easy to identify. A common agricultural weed, it would not have been (intentionally) included in the seed mixture sown in Court Field when it was reclaimed for agriculture in 1960. It was well-established by 1969 (Figs 16 and 17) and, according to Charles Sinker, was the third most abundant coloniser of the 'D' plots in March that year (after *Agrostis stolonifera* and *Holcus lanatus*).

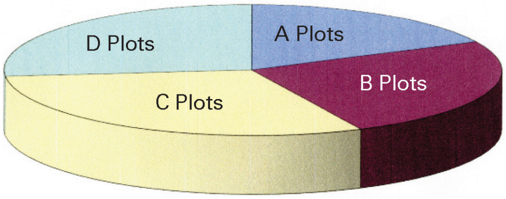

Fig. 18. The overall distribution of Creeping Buttercup (Ranunculus repens) *in the grass plots during summer, 1969–2001*

Figure 18 reflects its ability to prosper under most grassland conditions; a vegetative reproduction strategy, based on runners very close to the ground surface, facilitates colonisation of bare surfaces and survival of mowing whilst an ability to grow tall when supported by the surrounding vegetation ensures its survival in the long-grass 'C' and 'D' plots. I was interested to see that it fared least well in the, intermediate, 'B' plots – yet, at the beginning of this century, it was most abundant there.

However, the commanding impression from Fig. 17 is of the cyclical nature of the fluctuations in abundance of this plant down the years. Fig. 16 is, arguably, the most complicated of the equivalent graphs presented here because peak abundances shifted from 'A' plots via 'D' plots to 'C' plots and, ultimately, to 'B'. In short, the experimental 'treatment' was almost entirely coincidental to the performance of this plant at this site – a conclusion that I had not envisaged in 1968!

A brief comparison of Fig. 17 with the equivalent plot for moss (Fig. 14) shows a quasi-reciprocal relationship: one declining whilst the other increases, yet both peaking at much the same time.

White Clover (*Trifolium repens*)

Figures 19 and 20 demonstrate very clearly that this is a plant of short grassland, much better suited to a lawn than a pasture. The stem of this clover grows across the ground very close to the surface, rooting from the nodes and the height of the leaf surface is a function of petiole length alone. In short, this is a plant very well adapted to survive sheep or rabbit grazing (and therefore lawn-mowing) but as a consequence depends on such activities for it to receive adequate illumination.

It might appear surprising, therefore, to find it growing in a sward dominated by a large grass (Cock's-foot) but both had been sown together when the land was reclaimed for agriculture. "It is usual to include one or more of the clovers in association with grasses. Being leguminous, clovers utilise the nitrogen of the atmosphere and when the root residues are mixed with the soil, nitrogen is subsequently released for the use of other plants" (Moore 1966). Moreover, the clover helps to knit the sward together and, being richer in protein over a longer period of the growing season than are grasses, they improve the feeding value of the herbage. Moore goes on to say that wild White Clover was considered an essential ingredient of all seed mixtures intended for three-year or longer leys.

There is no doubt that this species performs best in the 'A' plots, where the regular mowing prevents the development of tall vegetation that would have

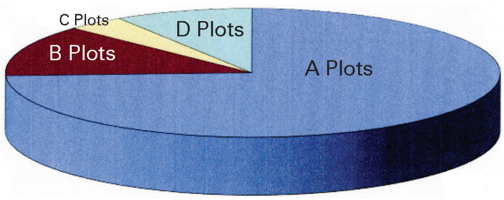

Fig. 19 The overall distribution of White Clover (Trifolium repens) *in the grass plots during summer, 1969–2001*

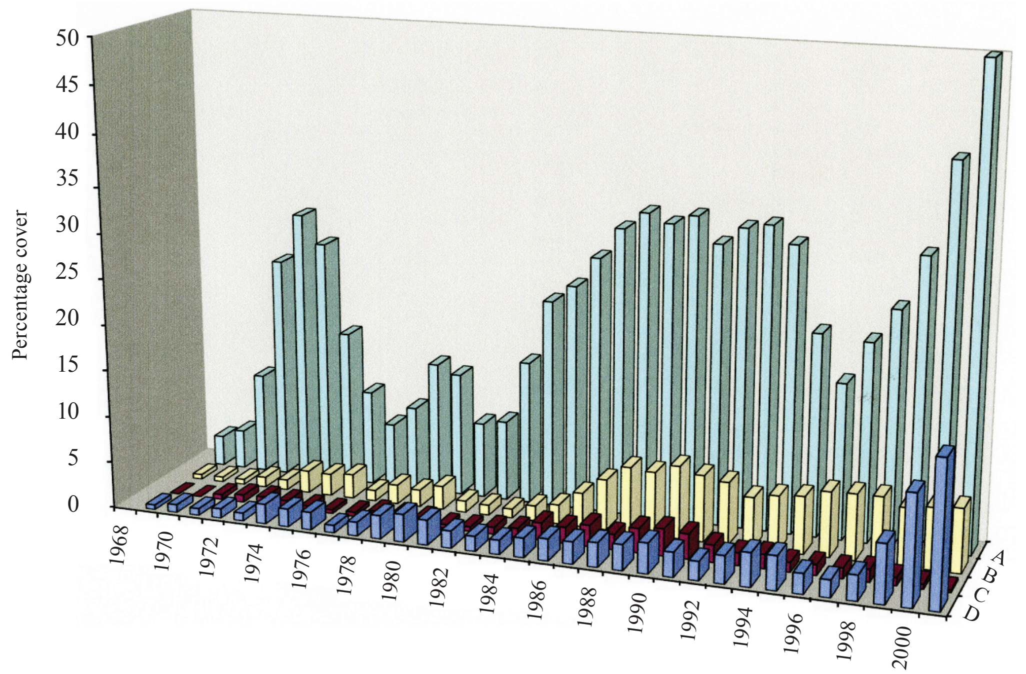

Fig. 20 Fluctuations in the abundance of White Clover (Trifolium repens) *under the four treatments, over time.'D' plot data are in the foreground, with 'C' and 'B' plots behind them leaving 'A' plots at the back*

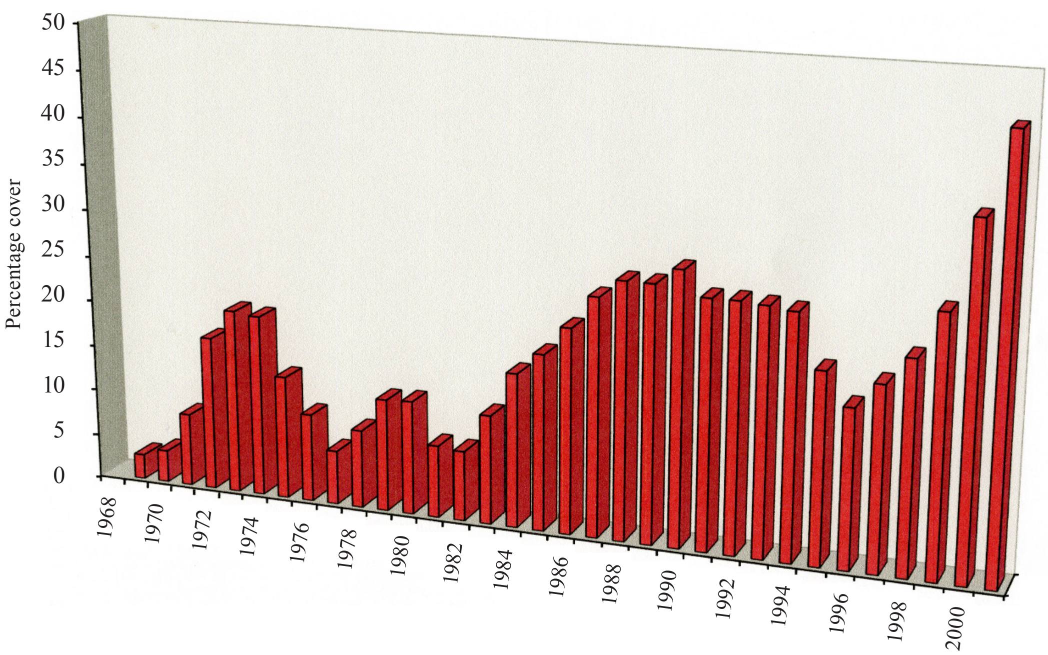

Fig. 21 Overall mean fluctuations in the abundance of White Clover in summer, 1969–2001

cut out the light. The low clover values in the early years must reflect the under-grazing of the sward in Court Field in 1960-1967.

Obviously, the overall impression to be gained from Figs 20 and 21 is of a plant increasing in abundance, showing something of the cyclical pattern displayed by other taxa but maintaining a strange 'stand' from 1987 to 1994. (Note that, as for moss, 'D' plots are displayed in the foreground of Fig. 20 and 'A' at the back.)

A secondary feature seen in Fig. 21 is the rise, in the 'B' plots', from ca 1% to ca 5% cover between 1984 and 1989 and its subsequent continuation at about that level. 1984 was the last year in which the smoothed mean percentage cover of Cock's-foot exceeded 10% (Fig. 8).

More surprising is the rise of this plant in the 'D' plots after 1997. I notice that the equivalent graph for moss (Fig. 13) also shows an increase in the 'D' plots at this time and so there may have been more light available at ground level in those years.

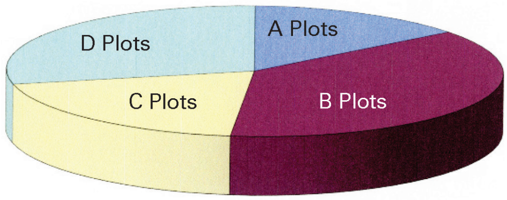

Fig. 22 The overall distribution of Yarrow (Achillea millefolium) *in the grass plots during summer, 1969–2001*

Yarrow (*Achillea millefolium*)

I chose this plant for study because of the ease with which it could be distinguished from everything else growing in the plots in March 1968 by the shape of its leaves. The specific epithet '*millefolium*' translates as 'thousands of leaves' which is not literally true but each leaf is so finely divided that it might give that impression.

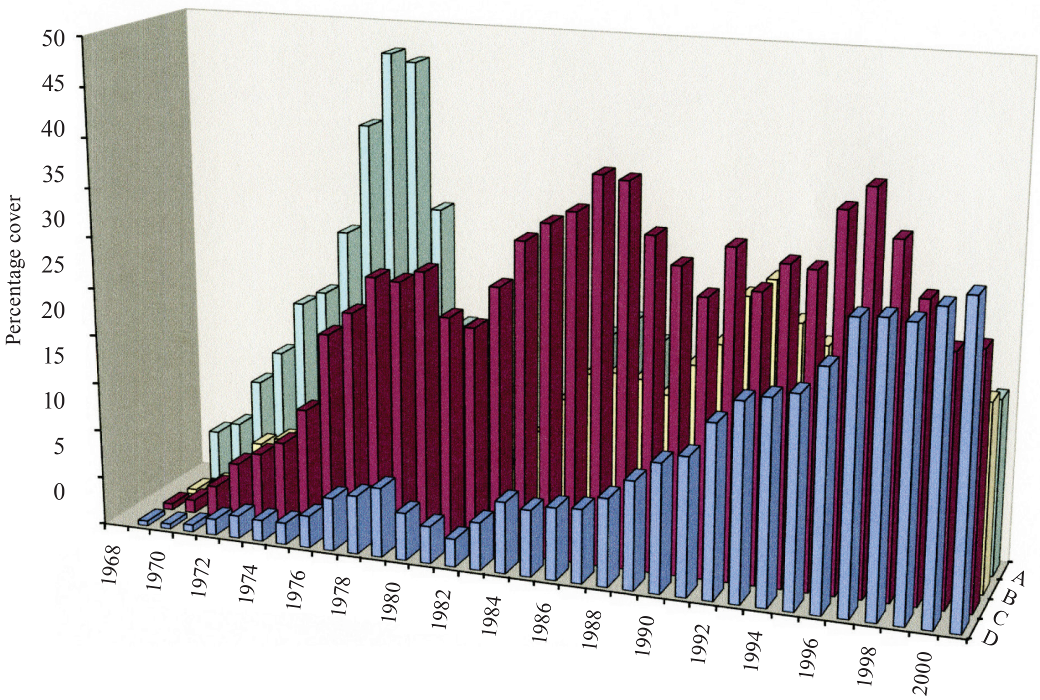

Fig. 23 Fluctuations in the abundance of Yarrow (Achillea millefolium) *under the four treatments, over time. 'A' plot data are in the foreground, with 'B' and 'C' plots behind them leaving 'D' plots at the back*

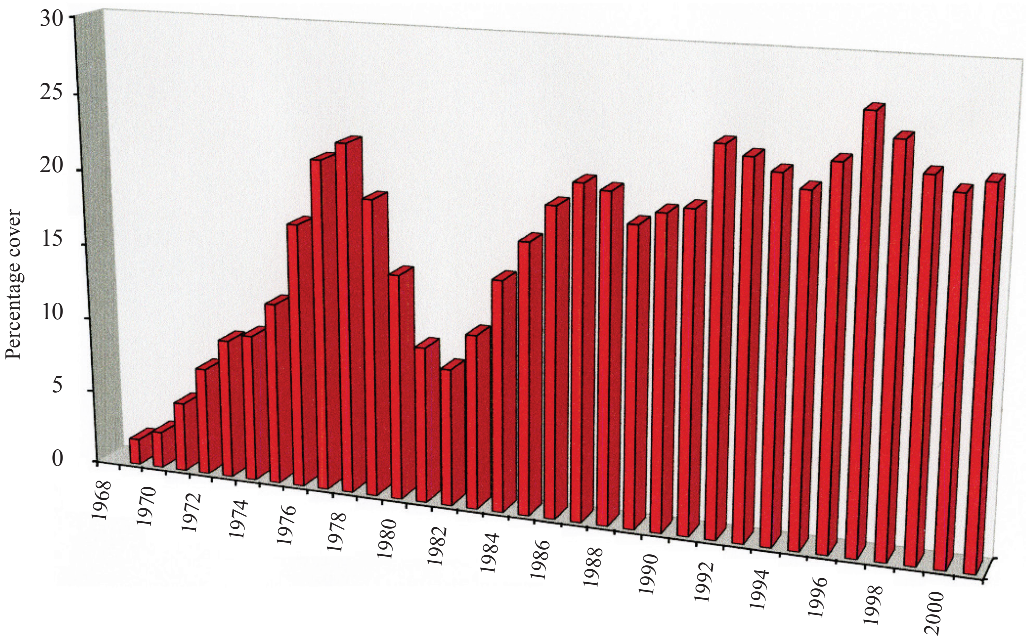

Fig. 24 Overall mean fluctuations in the abundance of Yarrow in summer, 1969–2001

Overall, Yarrow achieved the highest percentage cover in the 'B' plots (Fig. 22) but that was not always the case (Fig. 23).

I had always assumed this to be regarded as a weed in agricultural grassland and was surprised to read that it is sometimes included in seed mixtures (Moore 1966). There is, however, no suggestion that it was sown in Nettlecombe and the percentage cover was low under all treatments in 1968 (Tables 2 and 3). Thereafter it was initially most successful in the unmown 'D' plots but, from the early 1980s it scored most highly in the 'B' plots, although it later became increasingly abundant in the 'A' plots. All in all, the data confirm that this is a plant well suited to the grassland habitat, being able to thrive under a range of conditions (Fig. 24).

Other plants

This 'dustbin' category includes every plant that was not one of the other seven target taxa. It is thus the category most prone to error as any group of students that failed to recognise one of those seven will have included the 'hit' in this category. Thus the group that sampled the plot 'B2' on 13 July 2001 (Table 4) seems to have been reluctant to positively identify more than a few individuals of the named plants in this recently-mown sward – recording 'other grasses' as 72% cover, 'other plants' as 81% and nothing else more than 5%.

None of these 'other plant' species were included in the original seed mix, so it is not surprising that their cover values were low when the experiment started. And, as no attempt was made to discourage their colonisation (no herbicides were applied), it was to be expected that they would increase both in numbers of species and in total cover.

When Charles Sinker made his list (in March 1969) of species that had colonised the 'D' plots in their first year there were ten species of 'other plants'. That number had risen to 37 when Dr D. H. Dalby compiled a flora for all the plots in July 1978.

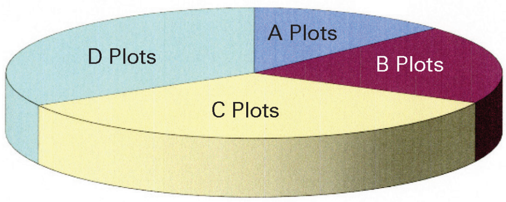

Fig. 25 The overall distribution of 'other plants' in the grass plots during summer, 1969–2001

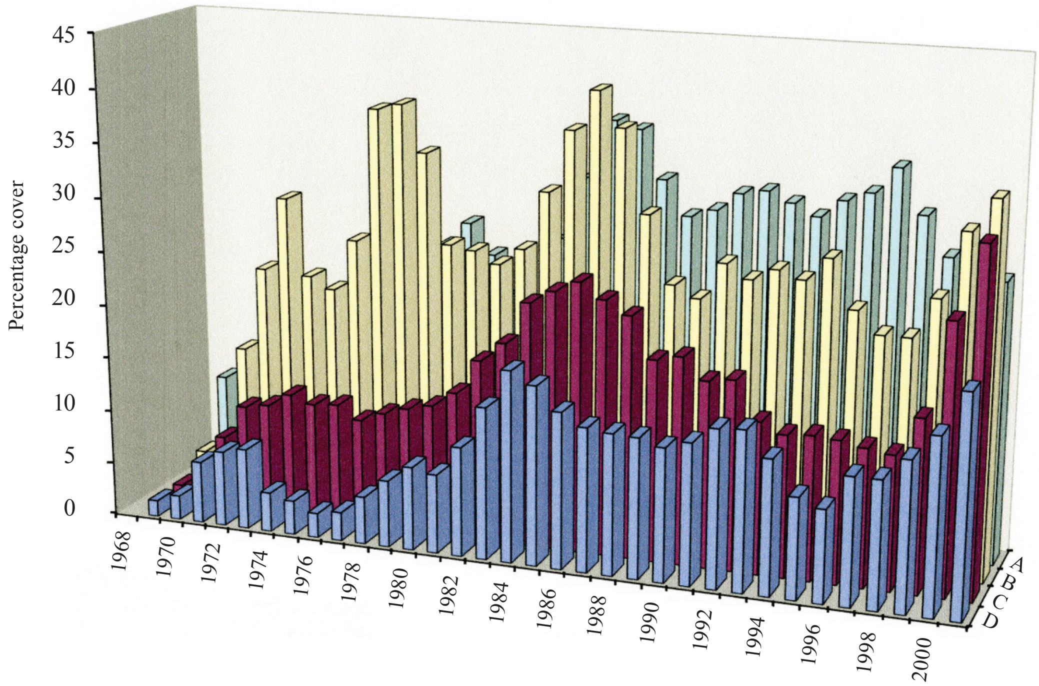

Fig. 26 Fluctuations in the abundance of the 'other plants' under the four treatments, over time. 'A' plot data are in the foreground, with 'B' and 'C' plots behind them leaving 'D' plots in the background. The bars represent smoothed averages of the data collected in summer (May–July)

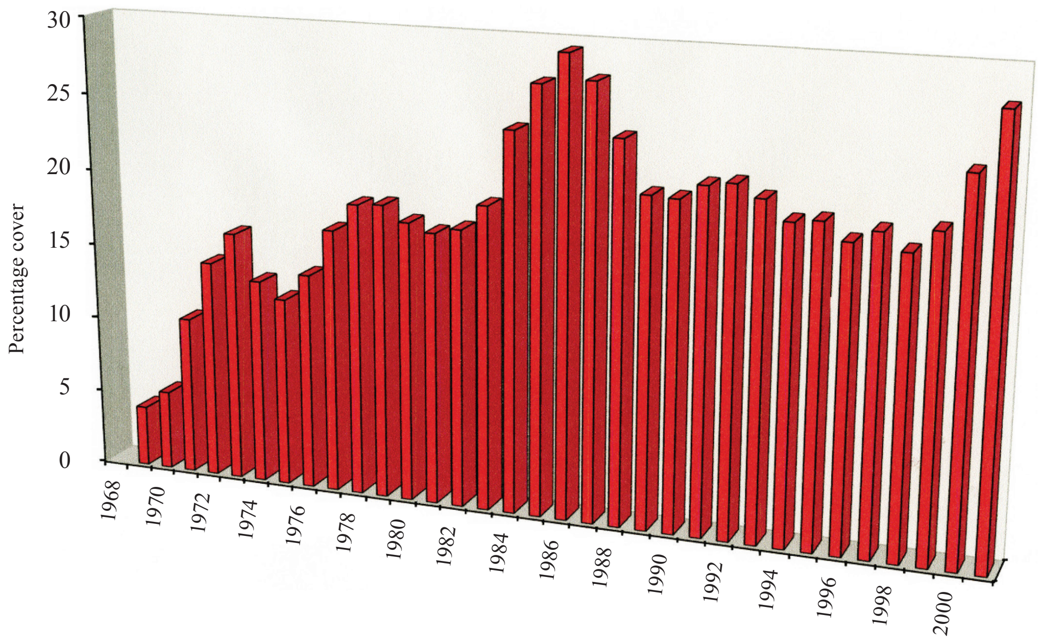

Fig. 27 Overall mean fluctuations in the abundance of the 'other plants' in summer, 1969–2001

And the number remained at that level in 1988 and again in 1998 but they were not exactly the same species.

The summary pie-chart (Fig. 25) shows that these plants are discouraged by mowing (the 'C' and 'D' slices are almost exactly equal). Species richness tells much the same story; the 1998 survey identified 15 'other plants' in the 'A' plots, 18 in 'B', 19 in 'C' and 23 in 'D'. Figure 26 shows that percentage cover was initially highest in 'C' plots with 'D' and 'B' catching up to peak in the mid-1980s. Then after a ten-year period of apparent stasis there was another spike in abundance (see the right-hand end of the graph in Fig. 26). This may be an artefact. I retired at the end of 1999 and the plots were sampled much less frequently thereafter. In other words, there was less human disturbance.

In the other half of Court Field, exclusion of grazing livestock in 1972 had resulted in the development of secondary woodland in the valley floor by 2000 (Crothers 2015). Nothing remotely comparable occurred in the Experimental Plot, despite a regular delivery of acorns. Fifty-two tree seedlings were identified within the Experimental Plot in July 1991, 17 of which were growing in the plots, mostly within 25mm of the plot margin and in plots furthest from the house (Crothers 1991). Rooks and Jackdaws, that harvest acorns from the trees on the slope above the plots, carry their trophies down to the flat valley-floor to feed on them. The close-mown paths between the plots were obviously suitable sites and the acorns that survived to germinate were presumably ones that had shot off sideways into the vegetation when stabbed by a beak.

Few of the oak seedlings survived to their second summer and only one grew to about a metre high. Growing conditions are extreme. The soil is very thin (c. 50 mm) over the levelled Old Red Sandstone 'shillet' and dries out quickly during hot summers. It can also be cold at times; frost having been recorded in every month of the year (Ratsey 1973) and a grass-minimum of -14°C was recorded on one occasion.

DISCUSSION

Compared with the other end of Court Field, which was well on its way to woodland in less time, the grass plots changed very little. Unlike the earlier paper (Crothers 2015) this one is not illustrated with many photographs because they show very little change once the 'D' plots had recolonised, although the paths got narrower. But whilst the vegetation remained grassland, and all of the chosen study species remained present, nobody seeing the data presented in this paper could imagine a stable state over the thirty years.

The underlying transition has been from a

Fig. 28 Students collecting data on the grass plots, 2 May 1985. The weather station occupies the right-hand corner of the Experimental Plot. The drums in the foreground contained North Sea crude destined for an oil-pollution experiment on the Exmoor coast (it had to be stored n metres away from an inhabited building.) The other 'boxes' are snail cages for research on Cepaea *species*

sown pasture, boosted by (moderate) applications of artificial fertiliser, to a much less productive regime. Fertility levels must have been dropping throughout, especially in the mown plots from which the clippings were removed. Plants with high nutrient requirements, including an agriculturally-improved weakly- or in-fertile strain of Cock's-foot, introduced in the seed mix, declined over time. I presume that this is why Creeping Buttercup similarly declined.

Reduced soil fertility allowed wild White Clover to increase thanks to its ability to 'fix' atmospheric Nitrogen. But the overall increase in Yarrow was most probably due to a decrease in competition.

The peaks and troughs, so evident in the various graphs, whilst not obviously related to any of the recorded meteorological data, must reflect the outcomes of intense competition active within this grassland community. I suspect that each was triggered by some external stimulus (meteorological or otherwise), which then affected all the other species.

Tailpiece

It could perhaps, be argued that this paper has no place in these Proceedings as it is not concerned with natural history – based, as it is, on human management of an essentially artificial environment for an educational purpose. Others may argue that a paper based on student data (with all its inherent inaccuracies) has no place in a serious publication. I ask both groups of people to widen their horizons and to think outside the box.

I contend that the changes highlighted here are unlikely to have been confined to these plots. I suggest that most plant communities probably show comparable fluctuations over time – with obvious consequences for the animal, fungal and other communities that depend upon them. The 'Balance of Nature' is far from stable, even in apparently stable communities.

The importance of the history of a site cannot be exaggerated. In this case, knowing that the land had been ploughed and reclaimed for agriculture in 1960 was invaluable. Forty years later, several components of that seed mix still thrived; others, unsuited to this site, have effectively gone. And that single act, on one afternoon in March 1968, when I removed the turf from the 'D' plots remains the reason for the differences still visible between them and the 'C' plots.

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NATURAL HISTORY REPORTS

VASCULAR PLANT REPORT 2015

In 2015 two monumental botanical works were published: an addition to The New Naturalist Library, *Alien Plants* by Clive Stace and Mick Crawley, and the *Hybrid Flora of the British Isles* by Clive Stace, Chris Preston and David Pearman. The importance of both aliens and hybrids within the British and Irish flora cannot be over-stated. Indeed, all taxa recorded new for Somerset in 2015 were either aliens or hybrids.

Changes in agriculture, trade, industry and horticultural fashions have resulted in ongoing changes to our alien flora, so that the total number of known alien plants (neophytes) recorded in Britain and Ireland continues to increase. Stace and Crawley (2015) list 1,809 neophytes recorded in Britain and Ireland since 1987 (the start of recording for the *New Atlas of the British & Irish Flora* (2002)), although this figure is likely to have changed since publication of their book. The number of recorded hybrids in our flora is also increasing: 626 were recognised by Stace (1975), but there are now 909 known hybrids in Britain and Ireland (as of 2014). These include 605 hybrids between native taxa (by definition natives); 141 hybrids between native and alien taxa and hybrids which have arisen spontaneously here between different alien taxa (termed 'neonatives' by Stace and Crawley (2015)); and 152 (mostly horticultural) taxa which have been introduced to our flora as hybrids (thus regarded as neophytes), with a few more of uncertain parentage.

Hybridisation in vascular plants is a frequent event: it is believed that about half of the world's plant species have evolved through mechanisms involving hybridisation (Stace and Crawley 2015). Many plant hybrids are fully fertile, some of these backcrossing with their parents, a process known as introgression, to form fertile swarms, blurring the traditional concept of species. Some such hybrids are of immense ecological significance, for example the hybrid between our native Bluebell (*Hyacinthoides non-scripta*) and the introduced Spanish Bluebell (*H. hispanica*) is now more common than either parent in urban and suburban areas. This hybrid (*H.* x *massartiana*) is fully fertile and can cross with either parent, leading to widespread concern that the native Bluebell may be threatened by introgression. Even sterile hybrids may be of evolutionary significance as doubling of their chromosomes (the result of a failure during the processes of cell division, which may be caused by, for example, an environmental event) can result in creation of a fully fertile amphidiploid taxon. This process has been responsible for the evolution of several ecologically significant new species, for example Common Cord-grass (*Spartina anglica*), distributed along the coast of Somerset (and elsewhere), evolved as an amphidiploid from Townsend's Cord-grass (*S.* x *townsendii*), which is itself a sterile hybrid between the rare native Small Cord-grass (*S. maritima*) and Smooth Cord-grass (*S. alterniflora*), an introduction from America. The influence of *Spartina anglica* on the species composition of our saltmarshes has been considerable.

In the following list, three native hybrids are reported as new for Somerset: a hybrid Helleborine, *Epipactis* x *schulzei* (*E. purpurata* x *helleborine*), an hybrid Eyebright, *Euphrasia* x *difformis* (*E. arctica* x *micrantha*) and a Willow, *Salix* x *mollissima* nothovar. *undulata* (*Salix triandra* x *viminalis*). Whilst *Euphrasia* and *Salix* are both regarded as difficult genera, with few botanists attempting to identify species, let alone hybrids, the helleborines are amongst our most beautiful native orchids and are generally well recorded. Yet recognition of the hybrid between *E. purpurata* (Violet Helleborine) and *E. helleborine* (Broad-leaved Helleborine) is made difficult because the differences between the two species are mainly quantitative and the hybrid itself is said to be fertile, and thus capable of introgression with both parents (Richards 2015), resulting in confusing hybrid swarms. *E. purpurata* is a rare species in Somerset, currently known only at the site of the hybrid, with *E. helleborine* found nearby, within the distance a pollinator might fly. *Euphrasia micrantha* has also always been a rare species in Somerset and there are no recent records; this parent was not found with the hybrid, which is fertile and can persist long after one or both parents are lost from a site.

All of the new species recorded in Somerset in 2015 have escaped from cultivation, with the exception of Austrian Chamomile (*Anthemis austriaca*). This species is being sown unwittingly in patches of cornfield flowers used to prettify road verges and public spaces, being included in seed mixes as 'Corn Chamomile'. *A. austriaca* is a relatively recent arrival in Britain and Ireland: it was not even mentioned in Preston *et al*. (2002), but since 2000 it has been found at sites across England, Wales and southern Ireland, whilst a few older records for Corn Chamomile (*Anthemis arvensis*) have been re-determined as this species. It closely resembles the true *A. arvensis*, but that species, which is an archaeophyte (a species thought to have arrived through man's activities before 1500), has declined substantially in recent decades due to susceptibility to herbicides.

In a well botanised county like Somerset, it is unusual to find a new native species, but a significant record for South Somerset (VC5) in 2015 was the discovery of a single plant of Sea-kale (*Crambe maritima*). This usually long-lived perennial maritime species has only ever made sporadic appearances in Somerset, having been found in North Somerset (VC6) twice on the coast and once on a tip. Its appearance on the beach at Bossington may only be transient, but demonstrates that there are always exciting records to be made.

Around 80,000 records of vascular plants were made in Somerset in 2015, which is a phenomenal achievement. All records below are for 2015 unless otherwise stated and fall into one of the following categories:

- A taxon recorded for the first time in the wild in Somerset (Watsonian vice-counties 5 (South Somerset) and 6 (North Somerset)), ie *a new county record*
- A taxon recorded for the first time in the wild in one of the vice-counties, either VC5 or VC6, ie *a new vice-county record*
- Other records of particular interest, for example second or third vice-county records, species re-found after a long absence, or newly discovered populations of nationally rare or threatened species.

Within each category, records are listed alphabetically by 'taxon', which may be a species, microspecies, subspecies, variety or cultivar. Both native and introduced species are included, with more recently introduced taxa (neophytes) being distinguished by an asterisk before the name. Nomenclature follows Stace (2010) for all taxa included in that work. The vice-county is given for each record; the boundary between VC5 and VC6 follows the River Parrett/River Yeo/A303.

Recorders and referees whose names appear more than once have been abbreviated as follows: Bristol Naturalists' Society (BNS); Somerset Archaeological and Natural History Society (SANHS); Somerset Rare Plants Group (SRPG); Tom Cope (TAC); Helena Crouch (HJC); Ro FitzGerald (RFitzG); Dave Green (DEG); Ian Green (IPG); Paul Green (PRG); Graham Lavender (GL); Simon Leach (SJL); Clive Lovatt (CML); Liz McDonnell (EJMcD); Chris Metherell (CM); Stephen Parker (SJP); John Poingdestre (JP); Fred Rumsey (FJR); Jeanne Webb (JW); Margaret Webster (MAW).

Where mentioned in the following list, the most recent Somerset Floras are abbreviated as *FBR* (*The Flora of the Bristol Region*) and *AFS* (*The Atlas Flora of Somerset*); see References for full details of these publications.

New county records

Agrostis scabra (Rough Bent) – Winford (ST54086478), 1 Aug, one plant growing as a weed in a large planted tub in front garden, MAW (det. HJC, conf. TAC), VC6.

Anthemis austriaca (Austrian Chamomile) – Steart Marshes (ST252442), 3 Oct 2014, originated from seed mix around car park, now widely established, RFitzG & EJMcD, VC5. Still present in 2015.

****Beta vulgaris*** subsp. ***cicla*** var. ***cicla*** (Spinach Beet) – Bath (ST74876436), 16 Apr, one plant in car park against wall of flats in Lower Bristol Road, HJC, VC6.

****Bupleurum fruticosum*** (Shrubby Hare's-ear) – Maperton Ridge (ST66762693), 28 May, one shrub on N verge of road parallel to A303, maybe discarded or self-sown, HJC & FJR, VC6.

Cardamine heptaphylla (Pinnate Coralroot) – Penselwood (ST76753135), 6 Mar, small clump in flower on verge of Coombe Street opposite cottage, HJC & FJR, VC6.

Clematis cirrhosa (Early Virgin's-bower) – Tintinhull (ST50241973), 23 Jan, one self-sown on roadside wall of Tintinhull House, parent plant in nearby garden, PRG, VC5.

Euphrasia* x *difformis (*E. arctica* x *micrantha*) – Withypool Common (SS83243447, SS83333455), 29 Jun, several plants on roadside, N side of road, HJC, CM & FJR (det. CM), VC5.

Epipactis* x *schulzei (*E. purpurata* x *helleborine*) – Hunstrete (ST644622), Aug, four confirmed hybrids (and possibly more) amongst colony of *E. purpurata* under trees beside fishing lake, Richard Mielcarek, (conf. John Richards), VC6. Unusual plants have been seen and photographed by RM at this site since 2006 but it was only in 2015 that their identity was confirmed.

***Juncus polycephalus** (Manyhead Rush) – Steart Marshes (ST25264419), 3 Oct 2014, one plant at edge of a newly dug pool, probably planted in error during wetland creation by WWT, RFitzG & EJMcD (det. TAC), VC5.

***Nonea lutea** (Yellow Nonea) – Alhampton (ST62693488), 7 Jun, one plant on pavement at base of stone wall, HJC & Jim Crouch, VC6.

***Oxalis dillenii** (Sussex Yellow-sorrel) – Sandford Batch (ST417584), 28 Jun, at edge of cemetery allotments, RFitzG, Pam Millman & Christine Loudon, VC6.

***Polystichum polyblepharum** (Japanese Tassel-fern) (Fig. 1) – Horrington Hill (ST58044782), 22 May, one glossy plant on bank by old track along S edge of wood, HJC & FJR, VC6.

Fig. 1 Polystichum polyblepharum (Japanese Tassel-fern) at Horrington Hill (Photo: HJC)

***Spiraea douglasii** subsp. **menziesii** (Steeplebush) – Enmore, SE of (ST24153461), 5 Sept, naturalised in a hedge near Tireland's Farm, EJMcD & RFitzG, VC5.

Salix x **mollissima** nothovar. **undulata** (*Salix triandra* x *viminalis*) – Westhay Moor (ST46374373), 15 Jul 2014, N side of Westhay Moor Drove between Dag's Lane and Lewis's Drove, JW, VC6.

New vice-county records

***Anthemis austriaca** (Austrian Chamomile) – Bath (ST74926435), 29 Oct, few plants on disturbed verge growing with *Centaurea cyanus* so probably originating from a seed mix, HJC, VC6.

Crambe maritima (Sea Kale) – Bossington Beach (SS8848), 8 Jul, one plant on stable shingle, GL (conf. Tim Rich), VC5.

Epilobium x **interjectum** (*E. montanum* x *ciliatum*) – Westhay Moor Drove (ST462436), 2 Aug, single short well-branched plant on waste site, EJMcD & CML, VC6.

***Houttuynia cordata** (Fish-plant) – Freshford (ST79126023), 18 Sep, two plants growing through tarmac of road to station (cultivar 'Chameleon'), HJC & DEG, VC6.

***Ilex** x **altaclerensis** (*I. aquifolium x perado*) – Hunstrete (ST64446224), 1 Aug 2014, one shrub beside path alongside fishing lake, HJC & FJR (det. FJR), VC6.

***Weigela florida** (Weigelia) – Thorney, E of (ST43202266), 22 Apr, large bush E side of disused rail track, JP, VC5.

Other interesting records

***Acanthus mollis** (Bear's-breech) – Backwell (ST49526858), three clumps in field hedgerow opposite houses, HJC & MAW; Somerton (ST48772850), large patch on bank by footpath alongside railway line, HJC & PRG, VC6. Fourth and fifth records for VC6 and first since *AFS* and *FBR*.

***Agrostis castellana** (Highland Bent) – Chilcompton (ST648506), 1 Aug, on coal mining spoil near summit of New Rock Batch, HJC & EJMcD (det. TAC), VC6. Second record for VC6 and Somerset.

Alopecurus aequalis (Orange Foxtail) – Chew Valley Lake (ST55726027), 23 Sep, at a few places in Villice Bay, Rupert Higgins, VC6. Third record for VC6.

***Amsinckia micrantha** (Common Fiddleneck) – Nailsea (ST47517089), 27 Jul, one plant on bank at corner of car park, at junction of Stockway North and Link Road, Terry Smith, VC6. Second record for VC6.

Anagallis arvensis subsp. **foemina** (Blue Pimpernel) – Barton St David (ST53753230), 20 Sep, one plant in flower, JP, VC6. F irst record for this GB Scarce species in this hectad since 1915.

Apium inundatum (Lesser Marshwort) – Shapwick Heath (ST42344082), one patch in late successional ditch between fields E of Station Road, Colin Leppard & SJP, VC6. First record for Shapwick area since 1957.

Atriplex littoralis (Grass-leaved Orache) – Bath (ST73916222), 17 Jan, one plant on triangular verge in middle of A367 on W side of Red Lion roundabout, HJC & Jennifer Crouch, VC6. First inland record for VC6. Subsequently found by JP at four more inland sites in Somerset, along the A303.

****Avena barbata*** (Slender Oat) – Rode, SE of (ST81055353), 21 Jul, few plants at E edge of maize field, HJC & DEG, VC6. Second record for VC6 and Somerset.

****Avena sterilis*** subsp. ***ludoviciana*** (Winter Wild-oat) – Old Cleeve (ST0441), 20 May 2009; Golsoncott (ST0238), 3 Sep, JW, VC5. First records for VC5 since 1986.

Bromus interruptus (Interrupted Brome) (Fig. 2) – Burnham-on-Sea (ST30864758, ST30874758, ST30884758), 15 Oct, 110 plants at S edge of area of Apex Leisure Park which is cultivated and sown with arable plants, HJC & FJR, VC6. Deliberately introduced here as a contribution to the long-term conservation of this English endemic, which is listed by Cheffings and Farrell (2005) and Stroh *et al.* (2014) as 'Extinct in the Wild'. First record for VC6 since 1915.

Fig. 2 Bromus interruptus (Interrupted Brome) *at Apex Leisure Park, Burnham-on-Sea (Photo: HJC)*

Catapodium marinum (Sea Fern-grass) – Ilchester (ST522223), 7 Jun, lots around margin of centre of roundabout and along edge of the B3151 leading from roundabout, PRG, VC5. First inland record for VC5. Also found at Axbridge by EJMcD & CML and at Glastonbury by IPG & PRG, the first inland records for VC6 since *AFS*.

Catapodium rigidum subsp. ***majus*** (Fern-grass) – Kingston, Yeovil (ST554164), 16 Aug, IPG & PRG, VC5. Second site for VC5.

****Conyza floribunda*** (Bilbao's Fleabane) – Yeovil (ST5316, ST5415), 30 Oct, rough ground, PRG, VC5. Fourth and fifth records for VC5.

****Crepis setosa*** (Bristly Hawk's-beard) – Steart Marshes (ST25214419), 3 Oct 2014, one plant in disturbed area at newly constructed car park, EJMcD & RFitzG; Otterhampton Marshes (ST24944365), 30 Jul, in re-seeded grassland of Steart Marshes, EJMcD & RFitzG; Knighton, Stogursey (ST19124460), 5 Sep, from seed mix at Bullen Farm, top of ridge, RFitzG, VC5. Third, fourth and fifth records for VC5.

****Cuscuta campestris*** (Yellow Dodder) – Knighton, Stogursey (ST19124460), 26 Aug, in seed mix strip at Bullen Farm, RFitzG, VC5. Third record for VC5.

Dryopteris x ***deweveri*** (*D. carthusiana* x *dilatata*) – Penselwood (ST755308), 6 Mar, one large plant at top of rushy field below Underhill, HJC & FJR, VC6. Third record for Somerset and VC6.

****Echinochloa colona*** (Shama Millet) – Dyche, Stringston (ST16824133), 30 Aug, one plant in corner of maize crop, RFitzG, VC5. Fourth record for VC5.

Epilobium x ***interjectum*** (*E. montanum* x *ciliatum*) – Freshford (ST79055972), 9 Sep, one plant beside a minor road, Tony Mundell, VC6. Second record for VC6.

Euphrasia arctica subsp. ***borealis*** (Arctic Eyebright) – Oare (SS80084706), 5 Jun 2011, frequent in hay meadow S of church, HJC & FJR (det. FJR); Withypool Common (SS83243447, SS83333455), 29 Jun, two plants on roadside, N side of road, HJC, CM & FJR (det. CM); Portford Bridge, Withypool (SS83173444), several plants on roadside, E side of road, just N of bridge, HJC, CM & FJR (det. CM), VC5. First records for VC5 since 1935.

Euphrasia confusa (Confused Eyebright) – Elsworthy Hill (SS81134088), 12 Aug, in moderately species-rich acid grassland, EJMcD & SRPG (det. CM), VC5. First record for VC5 since *AFS*.

Euphrasia officinalis subsp. ***anglica*** x ***micrantha*** – Withypool Common (SS83643493), 29 Jun, on roadside bank, HJC, CM & FJR (det. CM), VC5. First record for VC5 and Somerset since 1952.

Euphrasia pseudokerneri (Chalk Eyebright) – Banner Down (ST78956827), 19 Aug, many plants in species-rich turf at SW end of Banner Down, HJC & DEG (det. CM), VC6. Fifth record for VC6 and Somerset and first since 1964.

Euphrasia tetraquetra x ***confusa*** – Cross (ST414549), 18 Aug, several plants with both parents on floor of disused quarry, HJC & FJR (conf. CM), VC6. First record for VC6 since 1988.

****Festuca brevipila*** (Hard Fescue) – Taunton (ST23502507), 19 Jul, several plants in recently sown new road verge on dual carriageway outside retail park; Taunton (ST207255), 17 Oct, grass verge, N side of entrance to Silk Mills park-and-ride car park, SJL, VC5. Third and fourth records for VC5.

****Galinsoga parviflora*** (Gallant-soldier) – Wellington (ST1321), 20 Aug 2014, one plant as street weed in Waterloo Road, SJP, VC5. First record for VC5 since *AFS*.

Galium parisiense (Wall Bedstraw) – Taunton (ST20812542), 17 Oct, 39 plants in brick paving and kerbside in Silk Mills park-and-ride car park, SJL, VC5. Second site for VC5.

****Geranium nodosum*** (Knotted Crane's-bill) – Chilcompton (ST64865090), 1 Aug, two plants at edge of Abbey Road, HJC & EJMcD; Freshford (ST78886021), 18 Sep, many plants along edges of footpath past mill, clearly escaped from adjacent garden, but spreading quite considerably, HJC & DEG, VC6. Fourth and fifth records for VC6.

****Helianthus tuberosus*** (Jerusalem Artichoke) – Butleigh (ST51303363), 24 Sep, several stems temporarily naturalised along verge near layby, JP, VC6. Third record for VC6 and first record for VC6 and Somerset since *AFS*.

****Ilex*** x ***altaclerensis*** (*I. aquifolium x perado*) – Leigh Woods (ST56117374), 27 Sep, one sapling by main path above Quarry 5, near corner of fence, HJC & BNS (conf. FJR); Bathwick Wood (ST76556510, ST76586508), 21 Oct, two saplings in wood, probably bird sown, HJC & FJR, VC6. Second and third records for VC6.

Juncus maritimus (Sea Rush) – Steart Marshes (ST25414409), 11 Jul, one plant at edge of wide ditch, SJP, SJL, SRPG & SANHS, VC5. Fourth record for VC5.

****Lotus corniculatus*** var. ***sativus*** (Common Bird's-foot-trefoil) – Cannington (ST24574153), 20 Aug, in Beere Manor area, probably part of an arable margin seed mix, EJMcD & RFitzG, VC5. Third record for VC5.

****Narcissus*** 'Telamonius Plenus' – Kilve Pill (ST144443), 4 Mar, clump NW of Limekiln, long naturalised, RFitzG, VC5. Fourth record for VC5.

****Nassella tenuissima*** (Argentine Needle-grass) – Batheaston (ST77486724), 18 Jul 2014, a few small plants self-sown into pavement cracks in High Street, Sharon Pilkington; Portbury Wharf (ST47357680), 31 Dec 2014, one plant at edge of pavement in Newfoundland Way, HJC; Glastonbury (ST50493831), 26 Dec, one plant in gutter of Chalice Way, self-sown from a nearby garden, HJC, VC6. Third, fourth and fifth records for VC6.

****Paeonia mascula*** (Peony) – Maperton Ridge (ST66652694, ST66672693), 28 May, three small plants on S verge of A303, HJC & FJR, VC6. Fourth site for VC6 and Somerset.

****Physalis peruviana*** (Cape-gooseberry) – Glastonbury (ST48553838), 23 Aug, two plants in flower/fruit at Sewage Treatment Works, one in a skip and one on a wall by filter beds, SRPG, VC6. Fourth record for VC6.

****Phytolacca acinosa*** (Indian Pokeweed) – Camel Hill (ST58842570), 16 Aug, one mature fruiting plant against wall in horse paddock, outside walled garden, probably bird sown, JP, VC6. Second record for VC6 and first since *AFS*.

Polypodium x ***mantoniae*** (*P. interjectum* x *vulgare*) – Ridge (ST55025615), 18 Nov, large patch on hedge bank on E side of lane, HJC & FJR (det. FJR), VC6. Third record for VC6.

****Populus*** x ***jackii*** (*P. balsamifera* x *deltoides*) – Brinsea (ST44636193), 28 Jun, GL & Ian Salmon, in ditch, suckered (cultivar 'Aurora'), VC6. First record for VC6 since *AFS* and *FBR*.

Rumex x ***callianthemus*** (*R. maritimus* x *obtusifolius*) – Catcott Lows (ST40124186), 11 Aug, one tall plant in fruit amongst tall herb vegetation, with both parents nearby, HJC & SJP (conf. John Akeroyd), VC6. Third record for VC6 and Somerset, and first since *AFS*.

Salix x ***mollissima*** nothovar. ***undulata*** (*Salix triandra* x *viminalis*) – Glastonbury, W of (ST48543922), 23 Aug, small plantation of trees by cycle track, SRPG (det. JW), VC6. Second record for VC6 and Somerset.

****Scilla forbesii*** (Glory-of-the-snow) – Brent Knoll (ST34035092), 20 Mar, one plant of cultivar 'Pink Giant' on top of hill, Catharine Shellswell, VC6. First record for VC6 since *AFS*.

Senecio inaequidens (Narrow-leaved Ragwort) – Batch (ST32425574), 14 Sep 2014, lots in yard, PRG; Ashton Gate (ST568712), 27 Apr, one on roadside, PRG, VC6. Third and fourth sites for VC6.

Trifolium resupinatum (Reversed Clover) – Golsoncott (ST024398), 13 Jul 2014, on grassy bank in front of Escott Farm Buildings, JW; Steart (ST258433), 22 Oct, two good-sized plants, in rough grassland beside footpath between Mendip Hide and River Parrett, SJL, VC5. Third and fourth sites for VC5.

Verbascum densiflorum (Dense-flowered Mullein) – Englishcombe, N of (ST71826328, ST72116327), 27 Oct, several plants along side of track and in yard S of Haycombe Lane, HJC & DEG, VC6. Second record for VC6 and first since *FBR*.

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FIRST FLOWERING DATES 2015

In 2015 I again recorded first flowering dates (FFDs) for 339 vascular plant species, continuing a study begun in 2008 to compare FFDs today with 'average first flowering times' recorded in Somerset by Walter Watson in the first half of the last century (Watson 1949; Leach 2011 *et seq.*). Recording methods were the same as in previous years.

A summary is given here of FFDs recorded, along with the main features of the weather in winter (December-February), spring (March-May) and summer (June-August), based on my own observations and regional (S.W. England and S. Wales) data and analyses available on the Met Office website (http://metoffice.gov.uk/climate/uk/). As usual, records of snowfall, snow lying and air and ground frosts were from my back garden in Taunton.

The weather

In comparison with 2013–14, the winter period was cool, with daily mean temperatures close to the long-term (1961–1990) average in December and February, but 1.1°C above average in January. Sunshine totals were generally above average, particularly so in December, while rainfall for much of the winter (and spring too) was below average – a welcome contrast to the record-breaking wetness of winter 2013–14.

Overall, spring temperatures were close to the long-term average, but April was exceptionally mild, dry and sunny, with daily mean temperatures 1.7°C above average, rainfall 37% of average and sunshine 140% of average. It was the sunniest April since records began, in 1929.

Summer, on the other hand, was unexceptional:

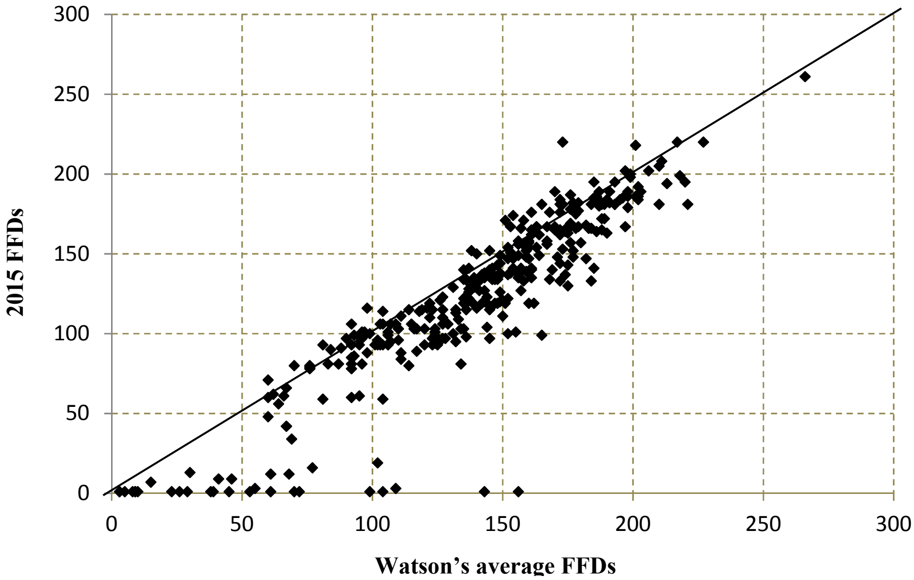

Fig. 1 First flowering dates (FFDs) for 339 species in 2015, plotted against 'average first flowering times' given by Watson. Dates are shown as day numbers (day 1 = 1st January). The diagonal line marks the line along which data-points would lie if 2015 FFDs were identical to those given by Watson; above the line the 2015 date is later than Watson's date, below the line is earlier

temperatures were at or just below the long-term average, while rainfall was 32% above average. Whereas in mid-April we had enjoyed sunny days with temperatures in the low twenties, on 1st June – the first day of meteorological summer – central heating switches were being flipped as an overcast, wet and windy day produced a daytime maximum temperature of just 13°C.

In 2015 sleet or 'wet snow' was observed falling, but not settling, on just two days. Air or ground frosts were recorded on 37 days – 11 in each of December and January, 15 in February, six in March, four in April and one in May.

First flowering dates

FFDs recorded in 2015 are compared with Watson's FFDs in Fig. 1, and with both Watson's dates and those recorded by me between 2008 and 2014 in Table 1. Species making up the monthly groups in Table 1 are determined by Watson's dates; so, for example, the 'April' group comprises 55 species for which Watson's FFDs fell in the month of April, i.e. between days 92 and 122.

Averages of all monthly groups, other than February, were broadly similar in terms of their deviation from Watson's dates, being around two weeks (11-18 days) earlier (Table 1). They were also close to the 2008–15 'running averages', especially in spring and summer, indicating that 2015 was, for the most part, a rather unremarkable year. Taking all species combined, FFDs in 2015 were an average of 14.8 days earlier than those recorded by Watson.

In terms of individual species, there were very few unusually early FFDs. However, Barren Strawberry (*Potentilla sterilis*), noted in a previous annual report (*SANH,* 157: 194-7) for its relatively late FFDs in comparison with Watson's date – and with a 2008-14 average FFD of 2nd March – was found to be already flowering in Thurlbear Wood on 1st January. Amongst woodland species, Spurge Laurel (*Daphne laureola*) was notably early, also in flower on New Year's Day but with an actual FFD of 23rd December, while Dog's Mercury (*Mercurialis perennis*) started flowering on 13th January, its second-earliest FFD in the series. Watson's February group, which includes both Barren Strawberry and Spurge Laurel, was especially early (Table 1), with four of the seven species already in

TABLE 1 – DEVIATION (IN DAYS) BETWEEN MONTHLY AVERAGE FFDs 2008–15 AND THOSE CALCULATED FROM WATSON'S DATES. NEGATIVE VALUES INDICATE EARLIER FLOWERING THAN WATSON'S DATES, POSITIVE VALUES LATER FLOWERING. n = NO. OF SPECIES IN EACH MONTHLY GROUP

Month	2008	2009	2010	2011	2012	2013	2014	2015	2008-15 average	n
Jan	-10.5	+0.1	+7.5	-1.7	-12.5	-12.4	-8.6	-11.6	-6.2	12
Feb	-17.9	-17.6	+1.7	-18.4	-32.3	-35.6	-18.6	-44.7	-22.9	7
Mar	-14.8	-8.0	+14.8	-10.1	-27.2	-12.9	-22.5	-16.0	-12.1	27
Apr	-21.4	-10.8	+3.3	-13.3	-24.5	-8.4	-28.6	-14.5	-14.8	55
May	-11.4	-16.5	-3.7	-28.1	-18.7	-3.3	-29.8	-17.8	-16.2	89
Jun	-9.6	-13.5	-7.0	-23.1	-13.5	-3.6	-22.9	-11.9	-13.1	93
Jul	-6.9	-13.7	-11.2	-20.1	-5.3	-6.6	-18.4	-11.2	-11.7	49
Aug*	-8.0	-10.3	-11.3	-21.9	-6.1	-7.1	-20.4	-16.0	-12.6	7
Overall	-12.2	-12.9	-2.7	-20.3	-16.8	-6.5	-24.2	-14.8	-13.8	339

*The August group includes one species, Ivy (*Hedera helix*), for which the 'Watsonian' FFD lies in September

flower on New Year's Day and even the latest of the group in flower by 9th January.

Overall, 212 species in 2015 had FFDs at least one week earlier than those recorded by Watson, while just 26 species had FFDs at least one week later. The latter included six of the eleven species noted for their delayed FFDs in comparison with Watson's dates (Leach 2015), namely Meadowsweet (*Filipendula ulmaria*), Marsh St John's-wort (*Hypericum tetrapterum*), Wild Parsnip (*Pastinaca sativa*), Hoary Ragwort (*Senecio erucifolius*), Colt's-foot (*Tussilago farfara*) and Tufted Vetch (*Vicia cracca*). For one of these species, Colt's-foot (Fig. 2), there are sufficient data nationally to show a marked shift to later flowering over the second half of the last century (Sparks *et al.* 2015, fig. 3), but reasons for such a trend remain far from clear. Woods (2015) wondered whether timing of onset of winter (first frosts) could be more important than spring temperatures in determining the FFDs of some species – a suggestion that would merit closer investigation. Clearly, more work is needed nationally to establish which species are bucking the general trend towards earlier flowering, and why.

Fig. 2 Colt's-foot, beside the Bridgwater-Taunton Canal at Obridge, Taunton – one of a small number of plant species apparently coming into flower later today than in the mid-20th century

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HOVERFLY NOTES 2015

We were pleased this year to receive records of several rare or scarce hoverflies. These included three real rarities. The first was on 6th May when Tony Parsons found a strange hoverfly dead in his greenhouse in Crewkerne. It turned out to be a specimen of the Red Data Book species *Chalcosyrphus eunotus*, a hoverfly with only three previous records (and possibly just two breeding sites) in Somerset, all in the far north-east of the county. It is thus a first record for South Somerset (VC5). *C. eunotus* has a preference for woodland streams where its larvae are thought to feed in rotting branches submerged below, or just above, the water line. This large hoverfly enjoys sunbathing on fallen or overhanging branches, and it is likely that the urge to keep stream banks and other watercourses tidy is contributing to its extreme rarity.

A second Red Data Book species, *Parhelophilus consimilis*, was found and photographed on 14th June at Walton Heath by Barrie Widden. This hoverfly is the rarest of the three British *Parhelophilus* species, and tends to be associated with pond margins and fen habitats. In Somerset it appears to be very largely restricted to the Somerset Levels and Moors. It looks similar to *P. versicolor*, and usually separating the two would require examination under a microscope. However, its key distinguishing features, such as the pale front tarsi, were readily discernible from Barrie Widden's photograph.

The third rarity of 2015, *Rhingia rostrata*, was found by one of us (DL) on 30th April at Meare Heath, nectaring on a dandelion flower. In our publication *Somerset Hoverflies* (1998) the presence of this species in Somerset was based on a single record from the 1940s; but it appears to have been more frequently recorded in the county in recent years – either it is increasing, or possibly naturalists are becoming more able to distinguish it from its common close relative, *R. campestris*. It tends to be found earlier in the spring than *R. campestris*, and in our view is a much cleaner-looking and shinier insect.

Other records of note in 2015 included the following: *Criorhina floccosa*, a carder-bee mimic, at Windom Hill, Yeovil, on 27th April; *Epistrophe nitidicollis* in our garden in Yeovil on 25th May; *Anasimyia contracta* at Pit Wood, Ham Hill Country Park, on 6th July; and *Arctophila superabiens* at Ham Hill Country Park on 17th September.

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BUTTERFLIES IN SOMERSET 2015

In 2015, members of the Somerset and Bristol Branch of Butterfly Conservation (BC) recorded butterfly abundance on 70 transects, an increase of 9 over 2014. Of course, the total butterfly count increased accordingly, and the more data we have to feed into the national butterfly monitoring programme the better. However, the average number of butterflies per transect fell from 1,854 to 1,744. This may have been due to poor weather conditions, particularly in July and August, which were cooler, wetter and windier than in 2014.

Forty-four species were recorded on transects in 2015 compared with 42 in 2014 and 45 in 2013; there were again no records of Glanville Fritillary

(*Melitaea cinxia*) or Wood White (*Leptidea sinapis*), but Adonis Blue (*Polyommatus bellargus*) re-appeared. Some species coped well with the adverse weather conditions, while others suffered badly. Of the 44 species recorded, 24 showed a decrease in numbers over the previous year and 19 an increase, with one species static. Because the Large Blue (*Maculinea arion*) is such an iconic Somerset butterfly, it should be recorded here that numbers increased fourfold in 2015 over 2014 and it is estimated that there was a similar increase in the number of eggs laid.

While short-term fluctuations are to be expected, it is the longer-term trends that are more important. Where sufficient data are available to calculate a 10-year trend, ten species have increased, with Brimstone (*Gonepteryx rhamni*) and Peacock (*Aglais io*) showing strong increases, while four have shown a moderate decline and the remaining 13 have remained more or less stable overall. There are insufficient data to show a trend for 17 species.

Against this background, and rather than cataloguing how each species fared, the fortunes of five species at Carymoor, near Castle Cary, where around 26 of our 44 species are found, may be of particular interest. Overall, the numbers of butterflies recorded on transect counts at Carymoor in 2015 were down by 35% in comparison with 2014.

Fig. 1 Small Tortoiseshell (Aglais urticae)

The **Small Tortoiseshell** (*Aglais urticae*) (Fig. 1) has had a roller-coaster ride over the last two years. Despite the 10-year trend showing a moderate increase, this multiple-brooded species suffered a 73% decline in numbers in Somerset in 2015. At Carymoor the decline was 76%. Whereas in 2014 there were 973 transect records of Small Tortoiseshell, with 291 on 7th August alone, the equivalent total for the whole of 2015 was just 213 – with only 8 recorded on 8th August. It is difficult to account for this dramatic fall, although the poor weather conditions mentioned above may have been responsible for the very small second brood in August and September.

Fig. 2 Small Skipper (Thymelicus sylvestris)

Numbers of **Small Skippers** (*Thymelicus sylvestris*) (Fig. 2) and **Essex Skippers** (*T. lineola*) – two species generally recorded together as a species-pair as it can be hard to distinguish between them in the field – suffered a similar collapse in numbers (-72%), a more severe decline than across the county as a whole. In 2014 they were the most numerous butterflies of all at Carymoor, with combined records of 1,286 specimens, 439 being recorded on 15th July alone; in 2015 this fell away to 345 in the whole season. It is more difficult to account for this decline since both species are single-brooded, the Small Skipper overwintering as larvae and the Essex Skipper as ova. However, the flight period of both species coincided with poor weather conditions in July and August.

Fig. 3 Holly Blue (Celestrina argeolus)

On a happier note, **Holly Blue** (*Celestrina argiolus*) (Fig. 3) was one of the year's 'winners', reflecting the position throughout Somerset (+111%). In 2014 and 2013 there were only eight and five records respectively at Carymoor; in 2015 this increased to 30 records. The Holly Blue population fluctuates because of its relationship with a parasitic ichneumon wasp, *Listrodomus nycthemerus*, which kills many of its larvae, leading to butterfly numbers declining. This results in there being fewer host larvae of the next generation for the wasps to parasitise, which causes a decline in numbers of the wasp. Fewer wasps mean more Holly Blue larvae surviving through to adulthood, leading to an increase in butterfly numbers, and then a consequent rise in wasp numbers, and so the cycle repeats itself.

Finally, the **Brown Hairstreak** (*Thecla betulae*) (Fig. 4) bucked the trend of lower numbers across the rest of the county (-30%). At Carymoor just two male Brown Hairstreaks were recorded together in 2013, and none at all in 2014, but six (only one of which was a male) were recorded on transect in 2015 and there were also other confirmed sightings. Current thinking is that Brown Hairstreak abundance is better assessed by counting eggs rather than sightings of adults, because the butterflies are elusive, especially the males which tend to remain in the tree canopy, although the females do come down to lay their eggs on Blackthorn (*Prunus spinosa*). The butterflies tend to congregate at 'master trees', one of which may have been identified at Carymoor, although this cannot be confirmed until next season. To develop the egg-count approach further, BC runs training days in appropriate areas, including the Polden and Blackdown Hills. These cover both theoretical and practical aspects, and are open to BC members and other interested parties, such as landowners and reserve staff. Hopefully with egg counts being undertaken more widely we will gain a better understanding of the distribution and abundance of this beautiful butterfly.

Fig. 4 Brown Hairstreak (Thecla betulae)

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MOTHS IN SOMERSET 2015

'Macro' moths – residents

In January there were some notably early appearances, including Small Quaker (*Orthosia munda*) and Hebrew Character (*O. gothica*), and a very early Angle-shades (*Phlogophora meticulosa*). Many other species such as the Oak Beauty (*Biston strataria*) also started to appear rather earlier than expected.

During the summer, species of note included Wood Tiger (*Parasemia plantaginis*) – which is only found in the Mendips and a small area of Exmoor – and Lappet (*Gastropacha quercifolia*), a moth that appears to be in decline. In contrast, the Double Line (*Mythimna turca*) seems to be expanding its range eastwards in Somerset.

A Waved Black (*Parascotia fuliginiana*) was noted in Othery in July – the first record of this species in the county. This occurrence was well outside its normal range, so was most likely a migrant, although conceivably it could indicate an overlooked resident population in our area. The larvae feed on fungi on rotting wood.

The Small Ranunculus (*Hecatera dysodea*) became extinct in Britain in 1939 but reappeared in Kent in 1997. Since then, it has advanced westwards and now occurs regularly in the north of the county. The larvae feed on Prickly Lettuce (*Lactuca serriola*), a widespread species that grows abundantly along the M5 and other main roads, so it is likely that, in time, this moth will expand its range in Somerset.

Amongst later-flying species, records of Autumn Green Carpet (*Chloroclysta miata*) from Wells, Weston-super-Mare and Wiveliscombe were especially noteworthy. This is another species that seems to be in decline in Somerset.

'Macro' moths – migrants

A Silver Y (*Autographa gamma*) appeared in Clevedon in January – the only record of this species until April and probably a winter survivor rather than an early migrant. Similarly, a very early Humming-bird Hawkmoth (*Macroglossum stellatarum*), in March, was probably an individual that had overwintered. An early Dark Sword-grass (*Agrotis ipsilon*) was also recorded in March.

Immigration proper got underway in May, with many more of the three species mentioned above, plus several Striped Hawkmoths (*Hyles livornica*), and very large numbers of Bordered Straws (*Heliothis peltigera*) which were commonly seen nectaring on Red Valerian (*Centranthus ruber*) throughout the county. Amongst the rarer migrants, Kent Black Arches (*Meganola albula*) was recorded in Somerset for only the third time; it is now resident in Dorset and appears to be spreading northwards.

Other immigrants included a Bedstraw Hawkmoth (*Hyles gallii*), Pearly Underwing (*Peridroma saucia*), Small Mottled Willow (*Spodoptera exigua*) and Ni Moth (*Trichoplusia ni*), and later, in July, Vestal (*Rhodometra sacraria*), Gem (*Nycterosea obstipata*), Convolvulus Hawkmoth (*Agrius convolvuli*), White-speck (*Mythimna unipuncta*), Delicate (*M. vitellina*), Small Marbled (*Eublemma parva*) and Scarce Bordered Straw (*Helicoverpa armigera*). Also recorded was Four-spotted Footman (*Lithosia quadra*), an occasional migrant in Somerset which is established as a resident breeding species along the south coast (Cornwall, Devon, Dorset).

In the second half of the year some notable migrants appeared. There must have been an earlier – undetected – immigration of Death's Head Hawkmoths (*Acherontia atropos*), as three larvae were found (two in Wiveliscombe and one in Fivehead), as well as two adults. Dewick's Plusia (*Macdunnoughia confusa*) and Golden Twin-spot (*Chrysodeixis chalcites*) were among the large number of Silver Ys recorded. There were also several occurrences of Clifton Nonpareil (*Catocala fraxini*). As a resident, this stunningly beautiful moth became extinct in Britain during the last century. There are signs, however, that it may now be recolonising southern England, although the possibility cannot be ruled out that some recent records may derive from deliberate introductions.

Amongst the migrants there were two firsts for Somerset. In August a Wedgeling (*Galgula partita*) was caught in Merriott by Robin Clatworthy. It is only the second time that this moth has been recorded in Britain; it is a North American species which is also now established in the Azores, Madeira, Canary Islands and southern Spain. In November an Oak Rustic (*Dryobota labecula*) (Fig. 1) turned up in my own moth trap in Langport. This is a recent colonist in Britain, first recorded on the Isle of Wight in 1999 and now probably resident locally in Hampshire, Dorset and Devon.

Fig. 1 Oak Rustic (Dryobota labecula)*, Langport (Photo: John Bebbington)*

The Death's Head Hawkmoth larva found earlier in the year in Fivehead emerged the day before the Somerset Moth Group AGM and was a much-admired exhibit! It was released that evening at the request of the finder.

'Micro' moths – residents

Larval leaf mines of *Ectoedemia heringella*, a species first recorded in Britain in 1996, were found in large numbers on Holm Oak (*Quercus ilex*) at a number of sites around Bath. *Acleris umbrana* – overlooked for 70 years between 1937 and 2007, but now occasionally recorded – was found at Combwich. *Dichrorampha sequana* was taken at Holcombe, the first Somerset record of this species since 1979.

'Micro' moths – migrants

Mecyna flavalis was photographed on Collard Hill in June by Rosie Clegg, only the third Somerset record, and the first for more than 20 years. In September, a specimen of *Metalampra italica* was caught by Elizabeth Allen at High Bannerdown, Bath – a first record for Somerset of a species which was recorded for the first time in Britain as recently as 2003 and which, as its name suggests, originates from Italy.

Spoladea recurvalis (Fig. 2) was taken by Robin Clatworthy at Merriott – another first record for Somerset, and one of a number of records of this species in southern England in November. Also in November, *Tebenna micalis*, a rare vagrant in Somerset, was recorded at Pen Elm, Taunton, while the occasional migrant *Palpita vitrealis* was taken in Wiveliscombe.

The most notable December 'micro' was a specimen of *Syncopacma polychromella* captured in Bath by Robert Kelsh – another first for the county.

Many thanks to everyone, too many to list here, who sent in moth records for 2015. For further details of records mentioned in this note, please refer to the 'Latest Sightings' pages of the Somerset Moth group website (http://www.somersetmothgroup.org.uk). Thanks also to David Agassiz, James McGill, Phil Newman and Paul Wilkins for their help with the identification – often by dissection – of 'difficult' moth species, especially some of the 'micros'.

Fig. 2 Spoladea recurvalis, *Merriott (Photo: John Bebbington)*

Butterfly Conservation aims to publish a national Macro Moth Distribution Atlas in 2018 and this year (2016) is the last year for records to be included in the Atlas. If you have any moth records which have never been submitted (I have recently had valid records from 101 years ago!) and/or if you record any moths this year please do send them to me, preferably by 31st December! Thank you in advance for your help.

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Somerset Moth Group

PLANT GALLS IN SOMERSET 2015

We summarise below records made during 2015 of plant galls that, for the most part, appear to be 'firsts' for VC5 and/or VC6 on the British Plant Gall Society's (BPGS) database. Species are arranged in alphabetical order with brief details of each record's significance, notes on host plants, location, date, recorder, etc. As in previous reports, for those galls featured in Michael Chinery's photographic guide (Chinery 2011) we give page numbers on which they are illustrated.

It is pleasing to once again note an increasing number of observers submitting records. Plant galls, it seems, are starting to gain popularity, particularly amongst field botanists who are able to record them as an 'added extra' when out on botanical excursions. Many records were made during SANHS field meetings organised for other purposes. However one of the highlights of the year was in September when we held a meeting at Barford Park, near Enmore (VC5), at the kind invitation of the owners who were especially keen to find out what plant galls they had on their estate. We investigated roughly half of the parkland trees along with the bordering hedgerows, recording galls of more than 40 species. Several of the oak galls at Barford Park are decidedly scarce in Somerset, including *Andricus malpighii* (a bud gall), *A. quercusramuli* (the striking 'cotton wool' gall) and *Macrodiplosis roboris* (a leaf roll gall). According to the BPGS database, the 'cotton wool' gall may have been recorded only once before in the county, at Pickney (VC5) in 1996. At Barford Park it occurs abundantly on a single large specimen of *Quercus robur*. We are planning another visit in 2016 to complete our recording of this site's rich and varied assemblage of plant galls.

In the list below, records made by us are denoted by initials SJL and/or SJP. Names of other recorders are given in full.

Aceria centaureae (a gall mite on BLACK KNAPWEED, *Centaurea nigra* and GREATER KNAPWEED, *C. scabiosa*) – abundant on *Centaurea scabiosa*, in cliff-top grassland between Kilve and Lilstock (ST1444, 1544 and 1545), 30 Aug, SJL; first record for VC5 and Somerset on BPGS database.

Aceria leioprocta (= ***Phytoptus leioproctus***) (a gall mite on COMMON RAGWORT, *Senecio jacobaea*) – probably this species at Carymoor (ST6131), 15 Aug, SJL & SANHS, but on HOARY RAGWORT, *Senecio erucifolius* rather than *S. jacobaea*; if confirmed, this would be a first record for VC6 and Somerset.

Apion rubens (a beetle causing swollen leaf midribs or petioles on SHEEP'S SORREL, *Rumex acetosella*) (Fig. 1) – Crowcombe Park Gate (ST1437), 19 Jun, SJP, I. Salmon & G. Lavender; in acidic grassland beside track at upper end of Rams Combe (ST1537), 4 Jul, SJL, SJP & Somerset Rare Plants Group; North Down Plantation, Staple Hill (ST2316), 14 Jul, SJL & V. Fairfax-Ross. The first records for VC5 and Somerset on BPGS database, but beetle already recorded from the county, given as "very local" by Duff (1993).

Fig. 1 Swollen midrib on leaf of Sheep's Sorrel (Rumex acetosella)*, caused by the beetle* Apion rubens

Brachycolus cerastii (an aphid gall on *Cerastium* spp) – Cannington Park (ST2440), on COMMON MOUSE-EAR (*Cerastium fontanum*), 10 May, E. J. McDonnell & Somerset Rare Plants Group; possibly first record for VC5 and Somerset. A scarce species in Britain, with a mainly coastal/near-coastal distribution.

Dasineura cardaminis (a gall midge causing swollen flower-buds in *Cardamine* spp) – disused railway S of Aldwick (ST4960), on CUCKOOFLOWER (*Cardamine pratensis*), the galls "looking like chickpeas", 15 May, H. J. Crouch & M. Webster; also Folly Wood (ST6060), again on *C. pratensis*, 3 Jun, H. J. Crouch & M. Webster; possibly first records for VC6 and Somerset.

Dasineura trifolii (a gall midge on WHITE CLOVER, *Trifolium repens*) – Steart Marshes (ST2544), 11 Jul, SJP & SJL; Bathpool (ST2525), 25 Aug, SJL; cliff-top grassland between Kilve and Lilstock (ST1544), 30 Aug, SJL; Henlade Wood (ST2722), 3 Sep, SJL; Barford Park (ST2335), 5 Sep, SJL, SJP & SANHS; evidently widespread but under-recorded in the county, these appear to be the first records for VC5. [Chinery, p. 73.]

Ditylenchus dipsaci (a nematode causing swellings on leaves of RIBWORT PLANTAIN, *Plantago lanceolata*; also on wide range of other hosts including cultivated *Narcissus* spp) – Buckland Wood and The Quants (ST1817), on *Plantago lanceolata*, 18 May, SJL; possibly first record for VC5 and Somerset, undoubtedly overlooked.

Epitrimerus coactus (= ***Leipothrix coacta***) (a gall mite on RIBWORT PLANTAIN, *Plantago lanceolata*) – in lower meadow at Ruggin (ST1817), 3 Jun, SJL; possibly first record for VC5, but easily overlooked.

Eriophyes padi (= ***Phyllocoptes eupadi***) (a gall mite on BIRD CHERRY, *Prunus padus*, presumed to be this or another closely-related species on WILD PLUM, *P. domestica,* and BLACKTHORN, *Prunus spinosa*) – Great Breach Wood (ST5032), on *P. spinosa*, 9 May, SANHS & Somerset Rare Plants Group; Walk Farm (ST7233), again on *P. spinosa*, 6 Jun, SJL; possibly first and second records for VC6. It was a good year for this species in VC5, with 15 new 1-km square records to add to three already on the BPGS database; possibly increasing, or else greatly under-recorded in the past. [Chinery, p. 56.]

Eriosoma ulmi (an aphid causing leaf rolls on ELMS, *Ulmus* spp) – roadside nr Jenny Cridland's Copse, W of Watchet (ST0542), 18 Jul, SJL & Somerset Rare Plants Group; SE edge of Taunton (ST2423), 9 Aug, SJL; possibly first records for VC5 and Somerset. [Chinery, p. 43.]

Gymnetron villosulum (a beetle galling flowers of MARSH- and WATER-SPEEDWELLS, *Veronica* spp) (Fig. 2) – Steart Marshes (ST2544), abundant in ditches on PINK WATER-SPEEDWELL (*Veronica catenata*), the flowers' swollen ovaries having the appearance of "miniature water-melons", 11 Jul, SJP, SJL, SANHS & Somerset Rare Plants Group; in a further five 1-km squares in the Steart area, on *V. catenata*, 4 Aug, E. J. McDonnell & R. Fitzgerald; Wick Moor, Hinkley (ST2145), on *V. catenata*, 20 Aug, SJP & C. Leppard; first and subsequent records for VC5 on BPGS database, although beetle previously recorded in the county (Duff 1993).

Fig. 2 Flower-head galls on Pink Water-speedwell (Veronica catenata)*, caused by the beetle* Gymnetron villosulum

Gymnosporangium fuscum (= ***G. sabinae***) (a gall causing 'barnacle galls' on leaves of PEARS, *Pyrus* sp.) – Farrington Rd, Paulton (ST6456), on garden pear trees, 8 Oct, H. J. Crouch; possibly first record for VC6.

Melampsora caprearum (a gall-causing rust fungus on WILLOWS, *Salix* spp) – Carymoor (ST6130), on GOAT WILLOW (*Salix caprea*), 15 Aug, SJL, SJP & SANHS; first record for VC6 on BPGS database of this certainly overlooked and much under-recorded species.

Melampsora epitea (a gall-causing rust fungus on various ORCHID spp, also on SPINDLE, *Euonymus europeaus*) – on lane-side *Euonymus* bushes, SE of Barrington Hill (ST3016), 29 May, SJL; possibly first record for VC5.

Melampsora euphorbiae (a gall-causing rust fungus on SUN SPURGE, *Euphorbia helioscopia*, and PETTY SPURGE, *E. peplus*) – Sherford, Taunton (ST2223), 4 Oct; Hamilton Park, Taunton (ST2424), 11 Oct; Wiveliscombe (ST0827), 11 Oct; Watchet (ST0743), 28 Oct; all SJL and on *Euphorbia peplus*. Surprisingly, these appear to be the first records for VC5 and Somerset on the BPGS database; clearly a widespread rust fungus but, as a gall-causer, generally overlooked in the county.

Micronematus monogyniae (a sawfly inducing leaf rolls on BLACKTHORN, *Prunus spinosa*) – Ash Meadows and Sherford Bridge Farm (ST2323), 22 May, SJL; possibly first record for VC5 and Somerset.

Mompha bradleyi (a micro-moth causing 'spindle' galls on side-shoots of GREAT WILLOWHERB, *Epilobium hirsutum*) – pond at Shapwick visitors' centre (ST4241), 22 Mar, SJL & SRPG; Carymoor (ST6130, ST6131), 15 Aug, SANHS; possibly first records of gall in VC6, although micro-moth already known to occur in northernmost parts of vice-county (see map on Somerset Moth Group website). Certainly an under-recorded and overlooked gall, and hard to imagine it isn't as widespread in VC6 as it is in VC5, where it appears to be quite frequent and locally abundant (Leach and Parker 2015); found in a further four 1-km squares in VC5 in 2015. [Illustration in *SANH* 158, p. 264.]

Myopites inulaedysentericae (a tiny fruit fly inducing flower-head 'pepper pot' galls on COMMON FLEABANE, *Pulicaria dysenterica*) (Fig. 3) – Carymoor (ST6130, ST6131), 15 Aug, SJP & SANHS; first records for VC6 and Somerset of this nationally uncommon species. The host plant is widely distributed in Somerset but extensive searches in autumn 2015 produced no further records of the gall, so it could be quite a rarity in the county.

Pemphigus bursarius (an aphid causing pouch galls on leaf-petioles of BLACK POPLAR, *Populus nigra* and its hybrids) – Marsh Farm, Steart (ST2544) on the native Black Poplar (*P. nigra* subsp. *betulifolia*), 11 Jul, SANHS and Somerset Rare Plants Group; Obridge, Taunton

Fig. 3 'Pepper pot' gall of Common Fleabane (Pulicaria dysenterica)*, induced by the fruit fly* Myopites inulaedysentericae*. Dried gall of previous year's flower-head on right, showing fly exit holes; and, for comparison, the remains of an ungalled previous year's flower-head on left*

(ST2325), on Lombardy Poplar (*P. nigra* var. *italica*), 15 Jul, SJL; Roughmoor (ST2125), on *P. nigra* var. *italica*, 28 Jul, SJL; Chilton Trinity (ST2939), on *P. nigra* subsp. *betulifolia*, 28 Aug, SJP & SJL; Chantry tearooms, Kilve (ST1444), on *P. nigra* subsp *betulifolia*, 30 Aug, SJL & V. Fairfax-Ross; Barford Park (ST2335), on *P. nigra* var. *italica,* 5 Sep, I. Salmon & SANHS. Surprisingly, these appear to be the first records of this gall for VC5 and Somerset on the BPGS database, although Ian Salmon tells us that he has seen it quite frequently in previous years. A distinctive and easily spotted pouch gall with a side-projection that looks like pouting lips, leading to its local nickname of 'Marilyn Monroe gall'. We suspect 2015 was a particularly good year for it, as it was found as 'new' on trees at Obridge and Roughmoor routinely searched for galls in previous five years. [Chinery, p. 55.]

Pemphigus populi (an aphid causing stalked globular galls on leaf-midrib of BLACK POPLARS, *Populus nigra*) – Marsh Farm, Steart (ST2544), on *P. nigra* subsp. *betulifolia*, 11 Jul, SANHS & Somerset Rare Plants Group; Chilton Trinity (ST3039), on *P. nigra* subsp. *betulifolia*, 28 Aug, SJP, SJL & I. Salmon; possibly first records for VC5 and Somerset.

Pemphigus populinigrae (an aphid causing elongated pouch galls on leaves of BLACK POPLARS, *Populus nigra*) – probably this species, Chilton Trinity (ST2939), 28 Aug, SJP, SJL & I. Salmon; Chantry tearooms, Kilve (ST1444), on *P. nigra* subsp. *betulifolia*, 30 Aug, SJL & V. Fairfax-Ross; possibly first records for VC5 and Somerset. *Pemphigus phenax* and *P. gairi* induce very similar galls, and can only be reliably separated from this species by examination of the aphid nymphs, which are grey in *P. populinigrae*, 'bluish green' in *P. phenax* and 'yellow-green' in *P. gairi* (Redfern *et al.* 2011). We did not check aphid coloration at Chilton Trinity, but the few examined at Kilve seemed to be greyish. [Chinery, p. 55.]

Phragmidium mucronatum (a rust gall on DOG ROSE, *Rosa canina*, and FIELD ROSE, *R. arvensis*) – Barrington Hill (ST2916), 29 May, SJL; old quarry at West Monkton (ST2628), 1 Jun, SJL; beside the mineral railway line, SW of Watchet (ST0542), 18 Jul, Somerset Rare Plants Group; Chilton Trinity (ST2939), 28 Aug, SJL & SJP; all records on *R. canina*; possibly first records for VC5 and Somerset, clearly widespread but poorly recorded.

Phyllocoptes mali (a gall mite on APPLE, *Malvus domestica*) – Obridge, on a single tree in orchard beside R. Tone (ST2325), 15 Jul, SJL. It is surprising, given the number of apple orchards in the county, that this is the first record for VC5 and Somerset on BPGS database.

Puccinia buxi (a gall-causing rust on BOX, *Buxus sempervirens*) – beside bridge at Great Elm (ST748491), 25 Apr, SJP, SJL & SANHS; possibly first record for VC6 and Somerset. Churchyard at Raddington (ST0226), 1 May, SJP, SJL, I. Salmon & G. Lavender; possibly first record for VC5.

Puccinia coronata (a rust gall on BUCKTHORN, *Rhamnus catharticus* and ALDER BUCKTHORN, *Frangula alnus*) – in laneside hedgerow, SE of Donyatt (ST3413), on *R. catharticus*, 25 May, SJL; roadside hedge, between Bickenhall and Broadway (ST3016), on *R. catharticus*, 29 May, SJL; possibly first records for VC5 and Somerset. Carymoor (ST6131), on *R. catharticus*, 15 Aug, SJL, SJP & SANHS; possibly first record for VC6. [Chinery, p. 39.]

Puccinia lagenophorae (a rust gall on GROUNDSEL, *Senecio vulgaris*) – Huntspill (ST2945), 8 Sep, C. Leppard & SJP; apparently the first record for VC6. Following its discovery in Somerset in 2013, there are now (as at end of 2015) records from 25 1-km squares, all but three of these in VC5. A rapidly spreading species in Britain, it is probable that the recent upsurge in records reflects a real increase rather than just better recording. [Chinery, p. 79.]

Puccinia phragmatis (a rust gall on DOCKS, *Rumex* spp) – Burrow Mump (ST3530), on *Rumex pulcher*, 13 Oct, SJL; possibly first record for VC6 and Somerset.

Puccinia punctiformis (a rust gall on CREEPING THISTLE, *Cirsium arvense*) – Coombe Bottom (ST2629), whole plant yellowish and stunted and leaves speckled with orange rust, 19 May, SJL; possibly first record for VC5 and Somerset. Redfern and Shirley (2011) give its status in Britain as "common", so we expect that it may be widespread in the county but until now simply overlooked.

Putoniella pruni (a gall midge on BLACKTHORN, *Prunus spinosa*) – Walk Farm (ST7132, ST7233), 6 Jun, SJL; Carymoor (ST6131), 15 Aug, SJL, SJP & SANHS; first records for VC6. Prior to 2015 the sole Somerset record of this striking gall was Janet Boyd's, from Thurlbear Quarrylands (ST2721) on 15 Aug 2009. Clearly 2015 was a good year for it: not only was it re-found at Thurlbear, but extensive searches turned it up in a further twelve 1-km squares in VC5, mainly to S and SE of Taunton; plus one outlier nr Watchet (ST0542), 18 Jul, SJP, SJL & Somerset Rare Plants Group. This is a highly localized and often rare species in Britain, so its occurrences in Somerset in 2015 are of considerable interest. [Chinery, p. 58.]

Rabdophaga marginemtorquens (= ***Dasineura marginemtorquens***) (a gall midge causing distinctive leaf rolls on OSIER, *Salix viminalis*) – Carymoor (ST6130), 16 Aug, SJL, SJP & SANHS; second record for VC6 and Somerset, the only previous being in 1999 when Janet Boyd recorded it in the far north of the county at Weston Moor (ST4473). [Chinery, p. 64.]

Sphenella marginata (a tiny fruit fly causing swollen flower-heads on RAGWORTS, *Senecio* spp) (Fig. 4) – Carymoor (ST6130 and ST6131), on *S. erucifolius*, 16 Aug, SJP & SANHS; first record of the gall for VC6 and Somerset on BPGS database, although a search on NBN turned up several VC6 records which of course may have been of the fly rather than the gall.

Fig. 4 Swollen and malformed flower-head of Hoary Ragwort (Senecio erucifolius) *caused by the fruit fly* Sphenella marginata

Stenopterapion scutellare (a beetle causing 'spindle' galls on stems of GORSE, *Ulex* spp) – West Hill/Beacon Hill, Quantocks (tetrad ST14F), on *Ulex gallii*, 5 Mar, SJP; first record of the gall for VC5 and Somerset on BPGS database, although beetle previously recorded in the county (Duff 1993).

*Fig. 5 Leaf of a dandelio*n (Taraxacum *sp.*), *deformed by the rust* Synchytrium taraxaci

Synchytrium taraxaci (a rust gall on DANDELIONS, *Taraxacum officinale* agg.) (Fig. 5) – in meadows at Poundisford (ST2219 and ST2220), 17 May, SJL; possibly first record for VC5 and Somerset.

Taphrina deformans (a fungus causing 'peach leaf curl' on CULTIVATED PEACH, *Prunus persica*) – many galls on self-sown *P. persica* in garden of 26 Laburnum Rd, Wellington (ST1420), 4 May, SJP; possibly first record for VC5 and Somerset. [Chinery, p. 57.]

Trioza alacris (an aphid causing waxy leaf-roll and blister galls on BAY, *Laurus nobilis*) – since it was first recorded in Somerset in 2013 (Parker and Leach 2014) it has turned up quite frequently in the Taunton area and may be spreading; Moorlinch (ST3936), 13 Oct, SJL, appears to be the first record for VC6, but with the host being a garden species we suspect that the gall is currently under-reported. [Chinery, p. 34.]

Triphragmium ulmariae (a rust gall on MEADOWSWEET, *Filipendula ulmaria*) – Great Breach Wood (ST5032), 9 May, K. Turvey, SANHS and Somerset Rare Plants Group; King's Sedgemoor (ST4033), 8 Jun, SJP & S. Portch; possibly first records for VC6. [Chinery, p. 81.]

Urocystis ranunculi (fungal gall on BUTTERCUPS, *Ranunculus* spp) – nr Farthing's Farm, Milverton (ST1025), on *R. repens*, 11 Oct, SJL & V. Fairfax-Ross; possibly first record for VC5.

Uromyces dactylidis (a rust gall on LESSER CELANDINE, *Ficaria verna*, and MEADOW BUTTERCUP, *Ranunculus acris*) (Fig. 6) – probably this species on *F. verna* at Raddington (ST0125 and ST0226), 1 May, SJP, SJL, I. Salmon & G. Lavender; Barrington Hill Farm (ST2916), 29 May, SJL. Possibly first records for VC5 and Somerset, although doubtless under-recorded; in neither case did we carry out microscopic examination of the aeciospores to distinguish between this species and *U. rumicis*, another rust known to cause galls on *F. verna*.

Vasates quadripedes (a gall mite on MAPLES, *Acer* spp) – Eastwood Farm Local Nature Reserve, Bristol (ST6371), 3 Sep, H. J. Crouch, L. Pryce & M. Webster; first record for VC6, following its discovery in VC5 in 2013 (Parker and Leach 2014). [Illustrated in *SANH* 157, p. 205.]

Fig. 6 A rust gall on Lesser Celandine (Ficaria verna)*, probably caused by* Uromyces dactylidis

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SOMERSET BIRDS 2014

This was another unexceptional year for records of rare species requiring assessment by the British Birds Rarity Committee (BBRC), although one of these, a juvenile Pallid Harrier (*Circus macrourus*) which roamed widely over both sides of the Parrett Estuary from 22 October until 5 November, was very popular. It was subsequently seen in western France where it spent the rest of the winter. A Black-winged Stilt (*Himantopus himantopus*) was present on Meare Heath in mid-May and a Savi's

Fig. 1 Ring-necked Duck, Wimbleball Reservoir (Photo: Brian Gibbs)

Warbler (*Locustella luscinioides*), a species that almost certainly turns up annually somewhere on the Avalon Marshes, was substantiated by video and sound recordings. Little Bittern (*Ixobrychus minutus*), another species considered by the BBRC, had a disappointing breeding year; although four males were present, no female was seen.

Notable duck species seen in the first winter period included a drake Ring-necked Duck (*Aythya collaris*) (Fig. 1), now almost annual in the county, at Wimbleball Reservoir, seven Scaup (*A. marila*) off Hinkley Point, a long-staying Long-tailed Duck (*Clangula hyemalis*) on Cheddar Reservoir, and two Smew (*Mergellus albellus*), one a rare coastal record. Two Green-winged Teals (*Anas carolinensis*), inevitably drakes, were also recorded.

Bewick's Swans (*Cygnus columbianus*), once such a feature of the Levels in winter, experienced their worst year ever, with only three sightings and no party bigger than five. The reasons for this steep decline are complex and numbers at Slimbridge have also fallen sharply in recent years. In contrast, their close relative the Whooper Swan (*C. cygnus*), is steadily increasing and is now the most regular of the 'wild' swans; up to 15 were present on Tealham Moor in January, and there were widespread records during both winter periods.

The Little Egret (*Egretta garzetta*) continues to increase and can now be encountered on the smallest streams, even in the middle of large urban areas. A flock of 79 seen on Curry Moor in March is no longer considered unusual. Great White Egrets (*Ardea alba*) also bred successfully on the Avalon Marshes for the third year running. Rare herons and close relatives included another likely breeding species, Cattle Egret (*Bubulcus ibis*), plus Night-heron (*Nycticorax nycticorax*), Glossy Ibis (*Plecadis falcinellus*), Spoonbill (*Platalea leucorodia*) and White Stork (*Ciconia ciconia*).

Rare waders included Dotterel (*Charadrius morinellus*), the first since 2010, Grey Phalarope (*Phalaropus fulicarius*), and two Stone Curlews (*Burhinus oedicnemus*). Both the Stone Curlews were on the Steart complex; despite breeding in adjacent Wiltshire in increasing numbers, this species is a significant rarity in Somerset, with only around 20 records. Curlew Sandpipers (*Calidris ferruginea*) had a good autumn passage. Most of these were along the coast but there were several inland records too.

It was an excellent year for rare 'white-winged' northern Gulls. During a national influx of Iceland Gulls (*Larus glaucoides*) in the first winter period as many as 15 were recorded in Somerset, nearly all of these in early evening roosts at Torr Works and Wimbleball reservoirs. Among these, there were three records of juvenile Kumlien's Gull (*L. glaucoides kumlieni*), a race of Iceland Gull which breeds in northern Canada and may be a separate species. These were the first county records.

Puffins (*Fratercula arctica*) are rare in Somerset waters and are usually seen at sea-watching sites such as Hurlstone Point, although never frequently. A storm-driven adult in the Parrett Estuary in February may have been the same bird found

Fig. 2 Dartford Warbler (Photo: Brian Gibbs)

exhausted under a caravan at Brean a few days later and taken into care.

As usual, breeding birds had mixed fortunes. Two pairs of Cranes (*Grus grus*) from the introduced population attempted to breed but were predated. Honey-buzzards (*Pernis apivorus*) may well have bred, and five pairs of Marsh Harriers (*Circus aeruginosus*) did too, one at a new site. Barn Owls (*Tyto alba*) recovered well from the disastrous 2013 breeding season, although Little Owls (*Athene noctua*) continued to decline. Cetti's Warblers (*Cettia cetti*) and Dartford Warblers (*Sylvia undata*) (Fig. 2) also bounced back, and 19 Firecrest (*Regulus ignicapilla*) territories were confirmed in the east of the county.

Remarkably, up to four Richard's Pipits (*Anthus richardi*) (Fig. 3) were observed at Stolford between late November and the end of the year; other good autumn records included Twite (*Linaria flavirostris*) at two coastal sites, together with single Lapland (*Calcarius lapponicus*) and Snow Buntings (*Plectrophenax nivalis*). Encouragingly, up to 50 Tree Sparrows (*Passer montanus*) were regular at a game-feeding station near Witham Friary in December.

Comprehensive analysis of 2014 can be found in the annual report, *Somerset Birds*. Visit www.somersetbirding.co.uk for details or contact the Honorary Recorder, Brian Gibbs, on 01823 274887.

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Fig. 3 Richard's Pipit, Stolford (Photo: Brian Gibbs)