

Norfolk Flora Group News - Winter Newsletter 2023-24

Welcome to the NFG Winter Newsletter !

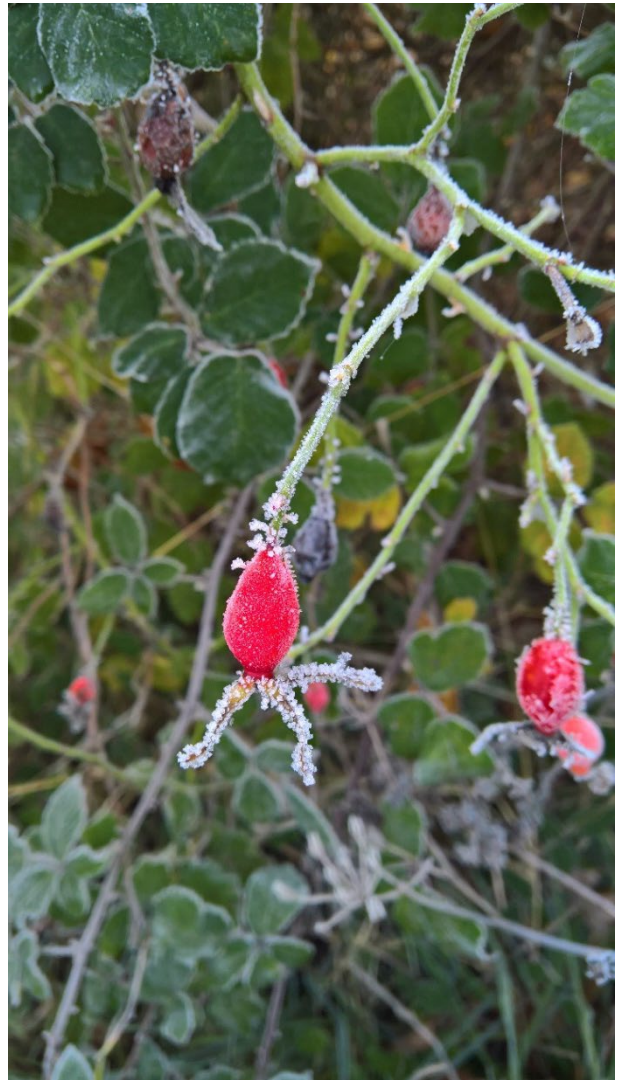
Issue 9 ... Apologies for a very late winter newsletter (spring newsletter?) this year - I was waiting for one final article.....

This will in fact be my final time as Editor: essentially I have taken on a couple of extra duties for the BSBI plus additional family commitments and there are simply not enough hours in the day. I hope that someone else will take on the role!

We ran a full suite of meetings in 2023 - over 40 in total, including some great workshops on *Taraxacum*, *Populus*, *Rubus*, *Salicornia*, *Limonium* and Elms. Thanks are again due to Alex Prendergast, who heroically led the majority of the workshops, and also to Mike Crewe (Poplars) and Fred Rumsey (*Salicornia*).

With the regular winter meetings, the number of events in 2023 was around 75, although I have to admit I lost count after a while.

Contributors to this edition are Bob Leaney (who has excelled himself with a 12pg epic this time), Alex Prendergast, Suki Pryce, Steve Clarkson, Ian Senior, Bob Ellis, Janet Higgins; our special guest author double-billing of Owen Mountford & Jonathan Graham; and our formidable feathery crossword-setter, the Sedge Warbler.



Cryobotany: *Rosa rubiginosa* agg. Jo Parmenter

Jo Parmenter

The views and opinions expressed in this Newsletter are those of the individual authors, and not of the Norfolk Flora Group, nor its membership in general.



CHANGES IN THE NORFOLK ROADSIDE VERGE FLORA SINCE SYSTEMATIC RECORDING BEGAN WITH THE FIRST ATLAS

I have made several attempts at writing on this subject over the last few years, but have been prompted to make another effort by last year's publication of the Plant Atlas 2020, by the Norfolk Wildlife Trust's request for the Norfolk Flora Group to help find Roadside Nature Reserves and, of course, by Jo's request for a winter newsletter article. I agreed readily because I thought I had a previous account in one of my piles which I could just embroider and update a little, but of course I can't find it at the moment - no doubt it will turn up just as I am finishing this version.

This account derives mainly from observations since I moved to Norfolk a decade or so after the publication of the first Atlas in 1962, observations involving not only floristic changes but also management changes and other anthropogenic factors that could be responsible for those changes.

In interpreting the relationship between the floristic changes and possible change factors, I have also taken into account my experiences with the NWT's Churchyard Conservation Scheme, Narborough chalk grassland SSSI reserve and the NWT/Norfolk County Council RNR scheme. Discussions with Shane Plant on the cutting regimes used on RNR's have been particularly helpful, and have supported my view that road verges are now suffering largely from too infrequent cutting from midsummer until early autumn. Management of road verges in general, and RNR's in particular, is discussed at the end of the article; another useful source on this subject has been *Grassland Plants of Britain and Ireland - ecology, threats and management* (Peter Stroh, Kevin Walker *et al*).

Large scale changes - findings of the Plant Atlas 2020

These are very nicely summarised in the simultaneously published "Britain's Changing Flora", which contains numerous graphs of distribution changes since 1950: against native/alien status; habitat association; Ellensberg indicator values (light, moisture, pH and fertility); and latitudinal/altitudinal distribution (major biomes). Graphs are also given for distribution changes in individual "winner" or "loser" species.

Findings of course were for all plant associations, but those which could relate to roadside verge grassland communities were as follows:

- A 20% increase in neophytes, but a 40% decrease in archaeophytes and a 10% decrease in natives
- A 10% decrease in neutral grassland species but a 30% decrease in acid grassland species and a 20% decrease in calcareous grassland species.
- A 20% decrease in light dependent species, but virtually no decrease in species of shady habitats; a 25% loss of calcicoles but only about a 10% loss of plants of neutral or acid soils; a 25% loss of plants of infertile habitats, but much less loss of plants with high or medium nutrient requirements.



Perhaps the most striking finding was that, of all the major biomes, the only one showing an increase was the Mediterranean biome, which includes species like *Poa infirma* and *Crassula tillaea*.

It is important to realise, of course, that hectad "presence or absence" recording primarily concerns distribution rather than population. It can only detect large scale changes in distribution and will not detect any increases or decreases in population even of large scale, if distribution at the hectad level remains stable (See "Measuring change between surveys" in the Summary, p. 11). Nevertheless it is interesting to note that, with the exception of the Mediterranean biome, virtually all categories of plant have declined somewhat, but light dependent species, calcicoles, and plants of infertile habitats have declined the most.

These findings certainly mirror what we have seen in Norfolk on road verges, but the loss of light dependent species due to rank grasses (especially 'False-oat'), scrub or bramble is in fact mainly due to cessation of cutting rather than eutrophication alone. Conversely, reinstating cutting 2-3 times a year from midsummer to early autumn should to some extent offset the effects of eutrophication by allowing light dependent species to germinate or spread vegetatively the next spring in a short sward. Moreover, loss of plants with high or low pH requirements might be related, not to pH, but to the fact that these two types of plant are both dependent on nutrient poor soils and are therefore particularly vulnerable to eutrophication. As regards status, the enormous changes in our road verge flora largely involves increases in archaeophytes and natives rather than neophytes - the other way round from the Atlas "all habitat" figures; increasing roadside neophytes are much more a feature of pavements, car parks and other such urban habitats.

Many native plants are now increasing on road verges as contaminants of grass seed used to establish new road verges or from "wildflower mixtures" sown on nearby arable or amenity sites. But many native species have recently spread from their historical habitats to new ecological niches because of increased vehicular seed transport and salt deposition (the halophytes), or because the recent enormous increase in vehicular seed transport is now allowing them to reach suitable sites never accessed before. *Geranium rotundifolium* is a particularly striking example of the latter "behaviour change": 50 years ago it was a local plant of steep, sunlit, thinly grassed banks; in the last decade or two it has spread and enormously increased its population, colonising disturbed road verges and even urban traffic islands, road kerbs and waste ground.

The role of vehicular seed transport is also relevant to the last Summary finding of an increase in the Mediterranean biome. As will be discussed later, global warming is unlikely to be the only factor involved in the spectacular northern spread of *Erigeron sumatrensis*, a Mediterranean biome species native to Peru or Western Chile which has spread in little more than two decades from London to Edinburgh and even further north. This spread seems too fast to be accounted for by global warming alone and it seems likely that increased vehicular seed transport has transported seeds to urban thermophile habitats where it could have established long ago if only seeds could have got there.



As regards "winners", in the Summary analysis, Norfolk seems typical in having seen great increases in road verge populations of Bee Orchid, Early Meadow Grass, Lesser Sea-spurry, Pendulous Sedge and Mossy Stonecrop - although the last species is much more a feature of gravelly forestry car parks and tracks than of road verges. Garden Lady's Mantle, which tops the Summary list of species with the greatest range expansion this century, has also increased a little in Norfolk, but remains, for some reason, an infrequent find.

The only species of road verges listed as a "loser" in the Summary is Harebell, a notoriously poor competitor of open grassland and heathland on infertile dry soils with either low or high pH. On roadsides Harebell in Norfolk has always been scarce and confined to a few steep droughted banks; its loss seems more connected with eutrophication and increased root competition rather than cessation of cutting, for its disappearance is not associated with invasion by False-oat or other tall grasses.

The post World War 2 road verge flora before BSBI recording began

The semi natural flora of roadside verges in Norfolk still present after the last world war can be conveniently be categorised into three broad types: that of the Breckland in the SE; that of the "sheepwalk" area of the NW; and that on neutral grassland verges in most of the rest of the county. One needs to ask what the flora of these three types of verge was like before BSBI recording began, and why, if one is to understand changes since.

With the exception of Breckland where hedges have always been largely absent, it must have been the presence or absence of hedges that had the most effect in selecting out the flora of any particular verge present by the middle of the last century. In the "ancient countryside" of Rackham, largely south of Norwich, hedges would have been present since early medieval times; in the rest of the county enclosure occurred mainly in the Parliamentary Enclosure Period around 200 - 250 years ago. Either way, once enclosed the verges would have been scythed for hay in late June or July and the aftermath grazed, mainly with sheep in all probability, until grass growth ceased around late October.

Neutral grassland road verges

The absence of cutting in April, May and June associated with this "haymaking regime" would have favoured the early flowering plants that are nearly always the major component of neutral grasslands, allowing them to flower and at least occasionally set seed during these months. However, the early flora would also have been selected out in several other ways: firstly, the sheep would have been taken off the verge at night, often on to arable fields, where they would defaecate, thus reducing nutrient levels; secondly, grazing until late October or so provided a warm short sward the next spring for early growth of the wildflowers; thirdly, frequent cropping from July to October would have suppressed *Arrhenatherum elatius*, *Dactylis glomerata* and *Holcus lanatus* that would otherwise have invaded and choked out the wildflowers by root competition.

It is important to realise that the haymaking regime only produces a rich flora if the hay cut is followed by intense grazing (or in churchyards frequent low cutting), until grass growth ceases. The usual early flowering species of neutral road verges have a dormant



period after flowering during which the grass can be grazed or cut without ill effect - they can be said to be "quite happy underground" during this period. On the other hand the False-oat and other tussocky grasses are still putting on strong growth between July and late October. Removal of culms and tillers at this time will deprive them of nutrients that would otherwise be transposed down to the roots in the late autumn for survival overwinter. In contrast most of the early flora species are winter green, with most growth and nutrient production occurring in late winter and early spring.

Breckland road verges

On the very poor soils of Breckland the semi natural flora of road verges in the mid 20th century would have been very different, not just because of the special species favouring these soils, but also because the verges would have been subject to grazing throughout the spring, summer and early autumn along with the adjacent unhedged pasture - supplemented, of course, by intensive rabbit grazing in many areas. The very poor soils and heavy grazing would have produced a sparse, eroded grass sward mainly composed of *Agrostis capillaris*, *Festuca rubra* or *Festuca ovina* agg., and the frequent cropping also meant that only wildflowers able to put on rapid vegetative growth, flower, and at least occasionally set seed, were able to survive. Another important factor in the survival of the Breckland flora was that many species have very long flowering periods from late spring until early autumn, and the ability to "come again" after being grazed off throughout this period.

The Breckland soils are of two main types: nearly all calcareous to the west; and the mainly acidic to the east, though intimately interspersed with many areas of calcareous soil as well. There is no reason to believe that road verges in the mid 20th Century would not have supported much the same rich flora of classical Breckland specialities as are now to be found on a few areas of heathland, pasture or on forest rides or gravelly track sides: species like *Briza media*, *Avenula pratensis*, *Linum catharticum*, *Thymus pulegioides* and *Polytrichum*, *Astragalus danicus*, *Filipendula vulgaris*, *Helianthemum nummularium*, *Sanguisorba minor* on calcareous soils; or on acidic soils, *Galium saxatile*, *Potentilla erecta*, *Teucrium scorodonia*, *Rumex acetosella*, *Erodium cicutarium* or, occasionally, *Teesdalia nudicaulis*.

These scarce Breckland plants are nowadays almost completely absent from road verges, apart from a few ubiquitous acid loving plants like *Rumex acetosella*, *Galium saxatile*, *Erodium cicutarium* and *Potentilla erecta*, or occasional populations of calcicoles like *Briza media*, *Linum catharticum* or *Thymus pulegioides*. This must have been due to two factors: firstly, cessation of grazing associated first with myxomatosis and then with widespread conversion to arable farming enabled by crop irrigation; and secondly, eutrophication. Both the calcareous and acid floras of Breckland are dependent on very low soil nutrient levels and so are peculiarly susceptible to eutrophication.

Road verges of the NW sheepwalk area

This region has also been labelled the "Goodsands" (see Gillian Beckett in *A Flora of Norfolk*, 1999), because of its light sandy or loamy soils. Before the parliamentary



enclosures it was managed almost entirely as sheep pasture, with centuries of grazing rather than open field agriculture. The main part, meeting the central plateau of slightly acid North Sea Drift Till just east of Fakenham, has a deep, well drained loamy drift deposit soil of neutral reaction, beneath which is a thick marly layer over the chalk, which for the most part is well below the soil surface. With enclosure and conversion to arable a lot of marl was spread on to the fields to improve soil texture and nutrients, but little of this would have got onto road verges. For this reason any calcicole flora to be found in this area was probably in chalk or marl pits, or on the steep sides of deeply dissected river valleys, as is the case still now.

The area of the Goodsands where a calcicole flora has (at least in the past) been rich on surface calcareous deposits, lies in a very narrow strip only a few miles wide, to the north and parallel to the north coast, stretching west from Cockthorpe, through Warham and the Burnhams, to Ringstead, and then a slightly wider strip south through Hillington, Grimston, East Walton and Narborough (see soil map in W.M Corbett, Beckett and Bull, 1999). The soil in this strip is shallow, calcareous, well drained and sandy or loamy in texture, very similar to the soils in the western part of Breckland, which is regarded by convention as beginning south of the River Nar.

After enclosure the Goodsands verges of both types would presumably have been cut for hay around July, with grazing of the aftermath. Cessation of grazing alone would have resulted in much deterioration in the calcicole flora of the calcareous Goodsands area to the north and west, and this flora would also have been particularly affected by eutrophication, as in the Breckland. The very wide verges of this calcareous region are usually kept well cut, but not frequently enough to suppress tussocky grasses, and it is for this reason that it is mainly the taller and more competitive calcicoles that we find here now - species like *Origanum vulgare*, *Centaureum scabiosa*, more occasionally *Scabiosa columbaria*, or *Filipendula vulgaris*. Less competitive calcicoles such as *Briza media* or *Helianthemum nummularium* are found only occasionally, the latter usually on steep well drained road banks.

Most of the chalk flora of NW Norfolk is now found not on road verges but confined to a few grazed area of "downland" type at Ringstead Downs, Cockthorpe and Warham Camp, to chalk or marl quarries, or to frequently cut farm tracks through the odd surviving patch of improved pasture. Only about 12 of the 60 or so sites for the CG2 *Festuca/Avenula* chalk grassland community in Norfolk at the end of the last century were in the NW Goodsands area, the vast majority, especially of rich sites being on calcareous drift soils in Breckland (Peter Lambley, in Beckett and Bull, 1999).

Changes in the Norfolk road verge flora observed since 1974

My arrival in Norfolk 50 years ago coincided with the end of the hedge removal period in the arable lowlands, maximal in the late 1950's and 1960's. Hedges were still being cut down to ground level and then repeatedly recut to prevent regrowth; rows of hedge trees in neglected hedges were often hauled out by the roots.



Hedge removal had several observable effects on the road verge flora at the time, some of which have continued since: to begin with, thick layers of cuttings physically suppressed much of the verge flora and resulted in an immediate increase in nutrients, with long rooted "weed" species like docks and thistles taking over; hedge removal also exposed the verges to inorganic fertiliser drift from the neighbouring fields and more recently to drift of ammonia or dried manure from intensive chicken farms; lastly the cut down hedge was often replaced by bramble, later to become a major invader of verges when cutting became less frequent or ceased altogether.

During the 1970's and early 1980's the main worry conservationists had about road verges was the frequency of cutting and especially the first cut in May, which was felt to be destroying the spring and early summer flora. Some early flowering plants were probably lost at this time but by far the greatest loss, involving both early and late flowering species, undoubtedly occurred from the mid 1980's when early and frequent cutting gave way to a minimal cutting regime: narrow verges were often not cut at all except at road junctions; broader verges had only one swathe cut on the road edge. This resulted, on dry soils, in verges being taken over by *Arrhenatherum elatius*, *Dactylis glomerata* or *Holcus lanatus*, together with such species as *Heracleum sphondylium*, *Centaurea debeauxii*, *Achillea millefolia*, *Artemisia vulgaris*, *Cirsium arvense*, *Cirsium vulgare* and *Conium maculatum*; on moister soils, *Epilobium hirsutum* is frequent and sometimes locally dominant in this rank vegetation. Less frequently, on poor heathy soils, *Pteridium aquilinum* took over, or where nutrient levels were particularly high, *Urtica dioica*. The end result of this process, which we are still now seeing, is progress through this "rank herbage" stage to invasion by bramble, Blackthorn sucker thicket or scrub.

The first plants lost at this time were those flowering between April and June, poorly competitive species such as *Primula vulgaris*, *Saxifraga granulata*, *Stellaria holostea*, *Rumex acetosa* and *Veronica chamaedrys*. Meadow saxifrage almost completely disappeared from road verges at this time apart from on steep road banks, around half a dozen populations within a few miles of Coltishall being taken over by longer, denser grass growth. Another notable casualty mainly in the west was *Clinopodium acinos*, which disappeared from many steep dry road banks, in contrast to *C. ascendens* which has noticeably spread on verges of late.

Later in the process mid-late summer flowering species like *Galium verum*, *Cruciata laevipes*, *Knautia arvensis*, *Agrimonia eupatoria* and *Pimpinella saxifraga* were also widely lost, succumbing to competition from rank herbage. *Leucanthemum vulgare* survived better but most of its prominence as a road verge plant this century was the result of it being sown over vast stretches of new dual carriageways and spread from thence.

On the chalky boulder clay S and SE of Norwich, *Primula veris*, *Ajuga reptans* and *Trifolium ochroleucon* were frequent losses. The Sulphur Clover is often nowadays found as isolated plants in tussocky grass due to infrequent cutting and raking.



This enormous loss of wildflowers during the last two decades or so of the last century was largely due to cessation of cutting but was certainly due also to eutrophication. The effect of eutrophication is most evident on unhedged road banks next to arable land subject to fertiliser drift. These verges usually support little except an extraordinarily rank sward of False-oat, much like the narrow, steep, fertiliser exposed field banks between the neighbouring fields.

Two comparatively new arrivals that seem well able to cope with eutrophication and tussocky grass, are the crucifers *Rapistrum rugosum* and *Hirschfeldia incana*; both these species have been spreading along major roads in Norfolk much as they have around the M25 motorway north of London, especially since the turn of the century. *Rapistrum* was initially largely confined to the Great Yarmouth area but has now spread to many new sites, mainly in the east of the county. *Hirschfeldia* has behaved similarly, but here the initial stronghold was Norwich, where it was for long a feature of building sites, especially around the UEA.

Another crucifer that has spread markedly over the same period is *Raphanus raphanistrum* ssp *maritimum*, which has slowly progressed along the A149 from the northern end of Breydon Water over the last two decades or so; It has now reached as far as Potter Heigham. The enormous overwintering rosettes that Sea Radish produces are unmistakable but can't be differentiated from the hybrid with Wild Radish (ssp *raphanistrum*), unless found in fruit, so many of these finds could be the hybrid.

Another tall competitive plant that has spread enormously despite eutrophication is *Lactuca virosa*, which is now found throughout the county along even the smallest roads. The much smaller *Lactuca serriola* has not increased in the same way.

The flora of amenity roadside grasslands

There are lots of roadside grassland areas which would not be seen as suitable for RNR's because they support dynamic plant associations with many alien taxa rather than stable, semi-natural plant communities. Nevertheless these areas have an interesting and increasingly significant flora.

Most such areas could be called "amenity grasslands", being found mainly in urban and suburban districts or in the larger villages, at road intersections, between the main road and service roads, or as broad amenity verges in old suburban estates, the latter often backed by planted shrubs and small trees. Narrower strips of verge occur for miles along roads in old suburban residential estates between the footpath and the road kerb. Similar verges have recently been created in the numerous rural housing developments springing up, on roads serving industrial and retail parks, around new municipal buildings and offices, and on Park and Ride car parks.

All these amenity verges share two vital change factors; firstly they are subject to very frequent and short cutting, usually every few weeks often with disturbance of the soil surface and sparsely grassed patches due to droughting; secondly, they now receive much higher levels of propagules due to vehicular or cutting machine transport.



On poorer sandy or light loam soils especially, amenity verges can support a very rich flora, including scores of species like *Hypochaeris radicata*, *Schorzoneroides autumnalis*, *Crepis capillaris*, *Crepis vesicaria*, *Achillea millefolium*, Crane's-bills, Dead nettles (especially *Galium amplexicaule*) and *Erodium cicutarium* - all these species seem to have increased. Scarcer plants like *Cerastium semidecandrum*, *Stellaria pallida* and *Montia fontana* are increasing on droughted and thinly grassed patches. On richer, moister areas *Ophrys apifera* is becoming a regular find, though only at the rosette stage - this might not therefore indicate a real increase in population. *Erodium moschatum* has shown an extraordinary increase on these types of verges, as has *Torilis nodosa*, *Medicago arabica*, and more occasional *M. polymorpha*.

A special habitat on these thinly grassed amenity verges is the splash zone next to the road, where the grass is suppressed by salt deposition but obligate halophytes are not necessarily present. *Plantago coronopus* and *Erodium cicutarium* are especially frequent in this zone, and may be the only plants present; since they occur on other sparsely grassed but not salt affected areas they would seem to be salt tolerant rather than salt dependent species.

On more moisture retaining, clayey soils the grasses have more of a competitive advantage and the amenity verge flora is much poorer. This is especially the case in heavily trafficked urban areas due to nutrient rich mud splash and airborne nitrogenous pollution. Consolidation, where delivery vans visit or cars are parked, results in an even poorer flora often confined to lawn grasses like *Agrostis tenuis* ("Brown top") and *Lolium perenne*, often with *Poa annua*.

The amenity roadside grasslands in towns and villages and the semi natural rural road verges now share so many species and are so interconnected by long distance vehicular or cutting machine propagule transport that they have to be considered together to properly understand the changes in our roadside flora over the last 50 years. Vehicular seed transport may be airborne in the slipstream of cars or lorries but is probably much more in mud transported on tyres. It is interesting in this connection that one of the most widely distributed members of the Asteraceae, *Lapsana communis*, has no pappus. Furthermore, the spread of *Erigeron sumatrensis* along roads is likely to be in mud, when the fruits are washed off the plant during rain, rather than by pappus in dry weather. Wet weather dispersed seeds will be very much more likely to be transported in mud on to road verges than dry weather seeds randomly dispersed by pappus.

As regards transport of propagules on cutting machinery it was just before recording for the first Atlas began in the early 1950's that mechanical road verge cutting by councils started, mowing over much longer stretches of road than before when cutting was done by scythe. At first cutting involved some sort of cutter bar in rural areas, but recently of course flail mowers have become universal. These machines have several characteristics that make them much more likely to transport propagules: firstly, they cut very close to, or even just below, the soil surface, so are more likely to take up fragments of basal stem, stolon or root that can act as vegetative propagules; secondly, they become clogged with a



mulch of matted grass, mixed up with seeds or vegetative propagules, that will only become gradually detached; lastly, they not only spread seed or vegetative propagules over much larger distances than before but at the same time produce the short, disturbed grass sward that provides a tilth for these propagules to establish. This tilth will also be supplemented by mud spray from the adjacent road.

The mud that in recent years has become such a feature on our rural roads must partly be washed off the verges after low flail cutting and surface disturbance; but it clearly also comes off arable land on the wheels of tractors, or is washed out of field entrances during rain storms. In this way climate change associated rain storms would appear to be having much more effect on our road verge flora than global warming *per se*. Furthermore, movement of propagules is two way, both onto and off the verge. The very short disturbed grass in the splash zone will produce more plants, especially annuals, and the seeds or propagules of these will then wash down onto the road and be transported further along the verge. On level, less trafficked roads, propagules may also establish themselves in a warm thin silt deposit on the road edge itself - *Poa infirma* is especially liable to do this, sometimes producing tens of thousands of plants over hundreds of metres of road edge.

Mud brought on the wheels of tractors also has the potential to spread arable weeds not only far along rural road verges, but also into suburban or urban areas. This is probably how *Mercurialis annua* has spread into towns where it has become a prolific weed in neglected front gardens in recent years; *Veronica polita* and *V. agrestis* are also becoming frequent finds along roads in villages and suburbs, and we have recently found a large population of *Spergula arvensis* on a highly disturbed urban traffic island that presumably arrived in this way.

Vehicular dispersal in mud is also appearing in the opposite direction, from urban to suburban, village or rural sites. *Geranium lucidum* has this century has shown a remarkable trend of this sort producing large colonies on moist bare soil along suburban or village roads, with some plants even on semi natural rural verges as well.

Halophytes

It was over the last two decades of the last century that the halophytes began to appear on our verges. On thinly grassed level verges, *Cochlearia danica* was by far the commonest invader, forming confluent sheets a few feet in width over hundreds of yards of road edge, first on major roads but recently, with increased traffic and wetter roads, on smaller and smaller roads and further and further away from the road edge. Other frequent halophytes on these level verges have been *Puccinellia distans* and *Spergula marina*, much less frequently *S. media*.

Probably the second most common halophyte, *Atriplex littoralis*, has established itself mainly on the eroded edge of steep road banks, often with the salt tolerant *Atriplex prostrata*, a plant frequently found on the upper shore, and, less often, *A. patula*; *Atriplex glabriuscula* is only a very occasional find, but is a rare plant even on the coast. More surprisingly, *Elymus athericus* is also very infrequent on inland road verges, probably because of its very large propagules (caryopses).



Over the last 10 years a "second wave" of halophytes has for some reason appeared on similar sparsely grassed, level verges to those favoured by the *Cochlearia*. The most frequent of these is *Catapodium marinum* but *Sagina marinum* and *Parapholis strigosa* have also occurred at a few sites. Most of these finds have been in the NE of the county which might be an observer effect, but heavier traffic in this area might also be involved.

It should not be assumed that all salt affected verges will have these halophyte species. There are many verges, especially of the frequently cut urban/suburban "amenity" type, where there is an area a foot or two wide bare of grass at the road edge, and with only a very few plants present, typically *Erodium cicutarium* and *Plantago coronopus*. These must be salt tolerant species able to cope also with consolidation of the substrate. It is very noticeable that where the classic halophytes occur the soil is light and friable; this is plainly essential to halophyte establishment for it occurs not only on the level halophyte verges, where it is derived from mud spray, but also on the steep banks favoured by *Atriplex littoralis*, where it is the result of erosion.

The flora of new major roads

The construction of the Southern By-pass and the Northern Distributor Road have had very interesting and contrasting effects on our roadside flora.

The most significant effect for our native flora has been the enormous spread of *Verbascum pulverulentum* along the Southern By-pass. This Norfolk speciality, with something like $\frac{3}{4}$ of its UK population in the county, was probably originally a plant of shingle banks on the Wash coast, but seems to have spread along railways in the 19th century, first down to Norwich and thence elsewhere along the rail system, finding more semi natural habitats on steep, heavily grazed and thinly grassed pasture, where it was favoured by being unpalatable to sheep or cattle. When it found its way on to the newly constructed by-pass it was similarly favoured by heavy rabbit grazing, so much so that there are now many thousands of plants along the 5 miles or so of by-pass, mainly on the wider and steeper N bank.

Other significant additions to our flora on the Southern By-pass are *Dittrichia graveolens* or Stinking Fleabane, 'an alien' which has established itself over the last few years at the eastern end of the by-pass, and large populations of several plants introduced in seed mixtures used on the road banks, mainly *Primulas veris* and *Leucanthemum vulgare*, but also *Malva moschata*. The latter is a native plant in the Breckland but elsewhere it seems nearly always to be a "wildflower seed" introduction.

On the Northern Distributor Road, constructed 5-6 years ago, the most striking feature has been the vast numbers of *Erigeron sumatrensis* and *Erigeron floribunda* present for a few years before the grass thickened up on the road banks: the *E. sumatrensis* population present over many miles must have amounted to hundreds of thousands of plants; the largest population of *E. floribunda* ever found in the county, just NW of the NDR Wroxham Road roundabout, involved several hundred plants. It seems that these populations could only have come in with topsoil needed to construct the high banks on which the fleabanes occurred.



Many other interesting species were initially found on the NDR banks and just behind them. The most unusual record was *Epilobium brachycarpum*, a very scarce alien that is increasing in the S of England and which we have very recently been finding on car parks, waste ground and old tarmac tracks. On the NDR just N of Norwich airport there were at first many hundreds of plants on or behind the new road banks; now it seems to be persisting on a particular sort of dark grey tarmac on a few traffic islands at roundabout exits, with no associated species. We have noticed elsewhere that this plant is especially able to colonise cracked or eroded tarmac; presumably it is tolerant of some toxin or other, giving it a competitive advantage.

Invasive species

By far the greatest floristic loss due to invasive species came as a result of cessation of cutting or grazing and invasion by native False-oat, scrub, brambles, nettles or Bracken. The only significant invasive otherwise is *Smyrmium olustratum*, which has completely taken over hundreds of metres of verge more and more inland this century. Experience in churchyards show that Alexanders can be eradicated by monthly strimming off, four times from February until May, if it invades a RNR or other conservation verge.

Seed Mixtures

Species derived from seed mixtures, either from the intended crop or as a crop contaminant, don't that often get on to road verges and seldom establish; we mainly find odd plants of *Onobrychis viciifolia*, *Phacelia tanacetifolia*, *Amaranthus bonchonii* or *A. hybridum*, *Panicum miliaceum* or *Setaria pumila* from agricultural sources. "Wildflower" mixtures sown by local authorities or amenity groups are usually of old arable weeds, so seldom invade grassy road verges - the usual constituents, *Centaurea cyanea*, *Agrostemma githago* and *Glebionis segetum*, are usually more to be found on nearby "pavement" sites than on grass verges.

Local authority grass/wildflower or grass mixtures used to sow new road verges often contain *Poterium sanguisorba* spp. *balearicum* and *Lotus corniculatus* var. *sativus* - these two species are the main new additions to our road verge flora as both persist or even spread. *Festuca brevipila* has also been increasingly sown on new urban and suburban verges this century and is quite easily spotted when not mown as it flowers about two months before the other Festucas. Other notable species that probably arrived as grass seed contaminants are *Erodium moschatum* and *Torilis nodosa*

Conservation headland seed mixtures often have *Leucanthemum vulgare* as their main constituent, often with *Lotus corniculatus* var. *sativus*; they are the most likely source of *Onobrychis viciifolia*, *Trifolium hybridus* and *Trifolium pratense* var. *Sativus* on rural verges.

New roadside grassland seeded by housing developers usually also contains *Leucanthemum vulgare* and *Lotus corniculatus* var. *sativus*, but often with *Galium album* and *Malva moschata*.

Nectar crops - very large fields are now often sown with *Phacelia tanacetifolia*, a frequent find on nearby verges; *Trifolium incarnatum* is much less frequent as a crop and a road verge find.

Game/wildbird crops of Maize, Quinoa or Millets, *Sinapis alba* etc. often have *Amaranthus* spp. and *Setaria* spp. as seed contaminants - these, *Sinapis alba* and the Millets (usually *Panicum miliaceum*) are the usual escapees.



Mid 20th century bungalow estate verges are sometimes extraordinarily rich in scarce or rare annual clovers, especially in the NE, probably because of the well drained light loamy soils of the region; the bungalow development at the eastern end of Cromer, on the coast road, is the prime example. Although such clover populations may be the result of persistence of species from previous pasture, it seems more likely they are due to grass seed contaminants in the particular mixtures used to seed the verges at the time. Over recent decades newly sown lawns in gardens, doctors' surgeries and other such places have been rich sites for clovers in my area, usually *Trifolium striatum*, but also *T. subterraneum*, *T. glomeratum* and *T. scabrum*, and the same species are sometimes found on the verges of local bungalow estates.

Management of road verges and RNR's

As regards management of semi-natural, rural, non RNR road verges on neutral soils, if it ever becomes feasible, it would benefit the flora to reinstate cutting at least twice a year, in July and late October ideally, with earlier cutting at road intersections etc. for safety reasons. At the tussocky grass or rank herbage stage, if any of the early flowering scarcer species survive, there is potential for bringing them back in this way.

Once an uncut verge has reached the bramble, Blackthorn thicket or scrub stage there are not going to be any surviving wildflowers present and reinstating cutting is pointless. However such vegetation, or indeed nettles or bracken, can be prevented from spreading into an RNR by cutting a swathe into the vegetation about six times a year from May to October.

As regards management of RNR's, Shane Plant was involved in a RNR study in which three stretches of a verge were cut and raked in three different ways: once a year in July; once a year in September/October; or twice a year at both these times. The last twice a year cutting regime improved the flora the most, but, if cutting and raking was only once a year, a July cut and rake was the best option - no doubt because to some extent it inhibited the growth of tussocky grasses, which a Sept/Oct cut alone would not do.

Experience in churchyards with the NWT Churchyard Conservation Scheme has shown the same thing. Churchyards on neutral soils have much the same MG1 mesotrophic grass community as neutral road verges and the usual advice is to cut and rake twice a year in July and late October.

The usual RNR cutting regime at present is to cut and rake only once a year in September, which is often resulting in the verge being taken over by rank herbage or even scrub or Blackthorn. A verge that I designated about 30 years ago at Tunstead, which had *Euphorbia amygdaloides*, *Viola riviniana*, *Hieracium sabaudum* and *Anemone nemorosa* has gradually been invaded by bracken with loss of most of the less competitive wildflowers. A cut and rake in July of the bracken and areas of grass where the violet and Wood Anemone have finished flowering, but leaving the Wood Spurge and Hawkweed areas until a cut and rake of the whole area in October, would have maintained the flora much better.

It is the timing and extent of the midsummer cut which is most crucial. This means that the original survey on which the cutting regime is based must be in June or July when any invasive tussocky grasses or rank herbage will be fully evident.

Bob Leaney



EGMERE FARM POND: NOMINATED FOR THE ODDEST POND VEGETATION AWARD

As we often say in the NFG: "You never know what you'll find!"

In late July '23, four of us (Marilyn Abdulla, Tim Doncaster, Mary Ghullam, Suki Pryce) set out on an informal recording session while Jo Parmenter was on holiday. Jo had suggested that we tackle the under-recorded tetrad centring on Egmere TF93D in west Norfolk, where limited public rights-of-way mainly comprise inhospitably busy roads; and we expected little from this very intensively-farmed arable area. However, silver-tongued Tim managed to negotiate additional access to private parts of the Walsingham and Holkham Estates for us, and it was in the latter that we came upon a quite unexpectedly intriguing pond (TF902378). Set in what seemed to be a rather ordinary, weedy, reversion field, with Ragwort, Broad-leaved Dock etc, this circular pond - currently dry - caught us completely by surprise. What attracted our attention initially was the encircling band half way down of what proved to be massed *Rumex maritimus* Golden Dock - not a common plant in our area by any means. Above it, in the transition zone from the field, *Sagina procumbens* grew in strangely extensive carpets beneath *Holcus lanatus*, and this zone was peppered with what we initially took to be the seed heads of Yellow Rattle (Tim) or some large Pennycress (Suki). These were, however, in fact the profuse dead inflorescences of *Erythranthe guttata* Monkeyflower, which was still growing and flowering among the Golden Docks. Scattered in this zone was also a metre-plus diameter patch of *Gnaphalium uliginosum* Marsh Cudweed ("never seen the like" says Tim), with *Rorippa palustris* Marsh Yellow-cress, *Bidens cernua* Nodding Bur-marigold, and *Plantago major* subsp. *intermedia*. Below it, a slender form of *Persicaria maculata* Redshank dominated the rest of the pond - interestingly, as *Crassula helmsii* New Zealand Pigmyweed was also present but seemed quite subdued by the vigorous Redshank.

At the end of a long day's recording, we stood in wonder for some time, exclaiming over the unexpectedness of this assemblage of unlikely species and peculiar bedfellows in a farm pond in west Norfolk. "You couldn't make it up!" seemed to best sum up our feelings.

Suki Pryce



Egmere Pond with Tim



Marilyn Abdulla *Mimulus guttatus*

Marilyn Abdulla

'MISSING MONADS' - UNDER RECORDED MONADS

In preparation for the updating of the Norfolk Flora, it is important to ensure even recording coverage at the monad level as well as the tetrad level as we propose to use both scales, depending on the species. We devised a method of assessing coverage at the monad level by selecting around 450 "qualifying species". The average number of qualifying species recorded since 2000 per monad is 61, with Beeston Bog (TG1642) being an outlier with 352 species.

We organised 7 meetings in 2023 in areas where there were clusters of monads with low numbers of qualifying species, the 'Missing Monads' meetings. Overall, we recorded in 35 monads and made 5489 records, an average of 164 per monad and a total number of qualifying species of 417. A summary of the increase in the numbers of qualifying species recorded in each monad is shown in Figure 1. All the monads had linear habitats (roadside verges and banks and at least some hedgerows) and most, apart from the urban ones, had arable margins.

Missing Monads 1 - Booton area

On 29th April, nine recorders split into three groups and surveyed four monads (TG1024, TG1222, TG1226 and TG1322). In addition to the usual habitats, TG1226 provided some woodland edges with quite abundant *Stellaria neglecta* Greater Chickweed together with well-naturalised *Symphytum tuberosum* Tuberous Comfrey. The group also came across a small woodland with displays of *Adoxa moschatellina* Moschatel, *Anemone nemorosa*, Wood Anemone, *Melica uniflora* Wood Melick and *Oxalis acetosella* Wood-sorrel. In TG1222, the churchyard surrounding the magnificently quirky St Michael and All Angels church held a mix of habitats and yielded records for *Conopodium majus* Pignut, *Eranthis hyemalis* Winter Aconite and *Galanthus nivalis* Snowdrop as well as a lovely display of *Cardamine pratense* Cuckooflower in the long grass. This monad also hosted *Stellaria neglecta* on a roadside bank. In the adjacent monad, TG1322, an encounter with a group of friendly fishermen enabled the recorders to access some fishing pools and these added records for wetland species and aquatics species including *Carex otrubae* False Fox-sedge, *Hypericum tetrapterum* Square-stalked St John's-wort, *Potamogeton crispus* Curled Pondweed, *Ceratophyllum demersum* Rigid Hornwort, *Nymphaea alba* White Water-lily and *Stratiotes aloides* Water Soldier, the last two of which were likely to have been introduced. TG1024 turned up the most unusual find - *Muehlenbeckia complexa* Wireplant growing in a wall. The average number of records per monad was 157 and overall they increased the number of qualifying species by 74%.

Missing Monads 2 - Ludham area

On 3rd June, seven recorders split into three groups and surveyed six monads (TG3819, TG3919, TG3920, TG3921, TG3924 and TG4019). TG3819 had the highest number of qualifying species outside Norwich, including species of arable and wetland habitats (mainly in a small sliver of How Hill NNR) as well as a number of garden escapes. Highlights included *Athyrium filix-femina* Lady-fern and *Stachys arvensis* Field Woundwort. TG3921 also had a good number of species, again including wetland habitats (at the edge of Catfield Common), which yielded amongst others, *Calamagrostis canescens* Purple Small-reed, *Hottonia palustris* Water-violet and *Potamogeton trichoides* Hair-like Pondweed. The remaining monads were rather dull, brightened



just slightly by a large colony of *Rapistrum rugosum* Bastard Cabbage that spanned TG3919 and TG4019. The average number of records per monad was 152 and overall they increased the number of qualifying species by 78%.

Missing Monads 3 – Burston area

On 17th June, eight recorders split into two groups and surveyed five monads (TM1081, TM1182, TM1281, TM1282 and TM1283). This was a good meeting for roses, TM1081 being the most diverse with six species. *Rosa arvensis* Field-rose was recorded in all five monads. *Rosa canina sens. str.* Dog-rose, *Rosa rubiginosa* Sweet-briar, *Rosa squarrosa* Glandular Dog-rose, *Rosa tomentella* Round-leaved Dog-rose and *Rosa tomentosa* Harsh Downy-rose were recorded in two monads of the five monads. *Rosa corymbifera* Hairy Dog-rose was recorded just in TM1081, which also yielded the clayland specialists *Ononis spinosa* Spiny Rest-harrow and *Trifolium ochroleucon* Sulphur Clover. Arable species recorded included *Roemeria argemone* Prickly Poppy, *Sherardia arvensis* Field Madder, *Bromus secalinus* Rye Brome and *Anthemis cotula* Stinking Chamomile. *Ophrys apifera* Bee Orchid was recorded in two monads (TG1081, TG1182). The average number of records per monad was 132 and overall they increased the number of qualifying species by 97%.

Missing Monads 4 – Buxton area

On 8th July, seven recorders split into two groups and surveyed four monads (TG2222, TG2226, TG2320 and TG2425). TG2222 and TG2425 both yielded good numbers of qualifying species and had a nice show of *Clinopodium ascendens* Common Calamint, on the roadside banks. TG2425 had a good selection of arable weeds including *Amsinckia micrantha* Common Fiddleneck, *Chenopodium ficifolium* Fig-leaved Goosefoot and *Spergula arvensis* Corn Spurrey. In contrast, TG2222 was better for plants which are more often associated with human habitation such as *Campanula poscharskyana* Trailing Bellflower and *Erigeron karvinskianus* Mexican Fleabane, which are usually garden escapees, and *Galinsoga quadriradiata* Shaggy Soldier and *Polypogon viridis* Water Bent, which seem to get around with unintentional human assistance. This monad also had a good range of habitats; records included the wetland species *Glyceria fluitans* Floating Sweet-grass and *Glyceria notata* Plicate Sweet-grass as well as the woodland species *Moehringia trinervia* Three-nerved Sandwort and *Carex sylvatica* Wood Sedge. An unusual find was *Nothofagus obliqua* Roble which was growing just outside a fence and although probably planted there, it might have been self-sown from a more mature tree within the boundary. TG2320 yielded a number of roadside 'salt aliens' including *Atriplex littoralis* Grass-leaved Orache, *Puccinellia distans* Reflexed Saltmarsh-grass and *Spergularia marina* Lesser Sea-spurrey. The average number of records per monad was 152 and overall they increased the number of qualifying species by 82%.

Missing monads 5 – Stockton area

On 10th August, nine recorders split into two groups and surveyed four monads (TM3893, TM3894, TM3993 and TM4093). The arable margins were very fruitful in all four monads, for example: *Amaranthus retroflexus* Common Amaranth, *Euphorbia exigua* Dwarf Spurge and *Kickxia elatine* Sharp-leaved Fluellen in TM3893; *Descurainia sophia* Flixweed in TM4093; *Polygonum rurivagum* Cornfield Knotgrass in TM3993; *Sherardia arvensis* Field Madder in both



TM3993 and TM4093 and *Bromus secalinus* Rye Brome in all four monads. Species typical of the South Norfolk claylands included *Clematis vitalba* Traveller's-joy in all four monads, *Hypericum hirsutum* Hairy St John's-wort in TM3893, *Rosa tomentosa* Harsh Downy-rose in TM3983 and *Sison amomum* Stone Parsley in TM3894. Perhaps the most interesting finds were *Chenopodium hybridum* Maple-leaved Goosefoot in some quantity in TM4093 and *Picris hieracioides* Hawkweed Oxtongue in TM3893. The average number of records per monad was 161 and overall they increased the number of qualifying species by 85%.

Missing monads 6 - Hockering area

On 19th August, thirteen recorders split into three groups and surveyed seven monads (TG0611, TG0716, TG0813, TG0816, TG0916, TG1014, TG1114). These were a fairly unremarkable group of seven monads spanning the A47, however they did turn up a few notable species: *Setaria pumila* Yellow Bristle-grass in TG0813 and TG1114, *Pimpinella saxifraga* Burnet-saxifrage in TG0716 and *Odontites vernus* Red Bartsia in TG0611, TG0716, TG0916 and TG1114. There were some interesting sown arable margins, but the recordable arable species were *Solanum nitidibaccatum* Green Nightshade and *Spergula arvensis* Corn Spurrey in TG1114 and *Lepidium campestre* Field Pepperwort in TG0916. Perhaps more associated with waste and disturbed places were *Barbarea intermedia* Medium-flowered Winter-cress in TG0816 and *Hirschfeldia incana* Hoary Mustard in TG 1114. The average number of records per monad was 144 and overall they increased the number of qualifying species by 81%.

Missing monads 7 - Norwich

Urban monads usually have a good degree of public access making them more time-consuming to cover, so a second meeting was arranged to allow more recording time. On 16th September, eight recorders split into two groups and surveyed three monads (TG2213, TG2313 and TG2509) and on 18th November eight recorders split into two groups and surveyed two monads (TG2011, TG2111).

TG2011 includes the Asda/Holiday Inn car park, parts of industrial estates, residential areas including a new development (both occupied and under construction) and some residual semi-natural habitat. Species of note included *Amaranthus bouchonii* Indehiscent Amaranth in the car park, *Lepidium ruderae* Narrow-leaved Pepperwort by the Ring Road and *Laphangium luteoalbum* Jersey Cudweed and *Ornithopus perpusillus* Bird's-foot in the new development.

TG2111 is mainly residential but there are some industrial/commercial areas and green spaces. Species of note included *Potentilla argentea* Hoary cinquefoil and *Clinopodium vulgare* Wild Basil which is somewhat unusual in an urban context.

TG2213 is largely within Norwich Airport and thus out-of-bounds, but it was possible to access about 15 to 20 hectares of industrial estate and a recently built residential area, some of which was still under construction. Species of note included *Senecio inaequidens* Narrow-leaved Ragwort and *Trifolium arvense* Hare's-foot Clover.

TG2313 is on the fringes of Norwich and includes both residential areas and arable fields. Species of note included *Papaver dubium* Long-headed Poppy and *Veronica polita* Grey Field-speedwell.



TG2509 is almost entirely residential but it includes a thin sliver of Mousehold Heath and some allotments. Species of note included *Catapodium rigidum* subsp. *majus* Fern-grass (this subspecies seems to be quite widespread around Norwich now), around 30 spikes of *Orobancha minor* Common Broomrape on *Brachyglottis x jubar* Shrub Ragwort (which was almost certainly subsp. *minor* var. *heliophila* Thorogood & Rumsey in British and Irish Botany 2:230 (2020) which is host-specific and has been named Brachyglottis Broomrape) and bizarrely, a sapling of *Paulownia tomentosa* Foxglove-tree was growing in a shopping centre pavement crack between some railings and a pallet.

To give a flavour of the territory, the following "qualifying species" were present in four or more of the five monads: *Acer platanoides* Norway Maple; *Buddleja davidii* Butterfly-bush; *Chelidonium majus* Greater Celandine; *Erigeron floribundus* Bilbao's Fleabane; *Erigeron sumatrensis* Guernsey Fleabane; *Filago germanica* Common Cudweed; *Geranium rotundifolium* Round-leaved Crane's-bill; *Lactuca serriola* Prickly Lettuce; *Lamium amplexicaule* Henbit Dead-nettle; *Linaria purpurea* Purple Toadflax; *Malva moschata* Musk-mallow; *Medicago arabica* Spotted Medick; *Mercurialis annua* Annual Mercury; *Oxalis corniculata* Procumbent Yellow-sorrel; *Plantago coronopus* Buck's-horn Plantain; *Polypogon viridis* Water Bent and *Viola odorata* Sweet Violet.

The average number of records per monad was 206 and overall they increased the number of qualifying species by 93%.

Analysis of average percentages of natives, archaeophytes and neophytes

To illustrate the difference between the number of alien species in urban monads compared to ones in the wider countryside, the proportion of native, archaeophyte and neophyte species in the lists for each monad were analysed. The average percentages of natives, archaeophytes and neophytes in the countryside monads were 72%, 17% and 10% respectively. In the Norwich urban monads, the percentage of natives decreased to 59%, there was a marginal decrease in the percentage of archaeophytes to 15% and the percentage of neophytes increased to 24%.

What can you do to help?

Come along to the 'missing monads' meetings in 2024.

Here are a list of monads that need further work:

TG0235, TG0437, TG0507, TG0625, TG0730, TG0734, TG0737, TG0806, TG0907, TG1232, TG1327, TG1608, TG1609, TG1705, TG1814, TG2302, TG2315, TG2411, TG2505, TG2519, TG2618, TG2718, TG2912, TG3102, TG3123, TG3228, TG3806, TG4115, TG4327, TG4411, TG4416, TG4511, TG4617, TG4721, TG4818, TG4912, TM0391, TM0493, TM0586, TM0785, TM0983, TM1092, TM1186, TM1288, TM1490, TM1584, TM1784, TM1883, TM1990, TM2390, TM2391, TM2792, TM2793, TM2891, TM2898, TM4296.

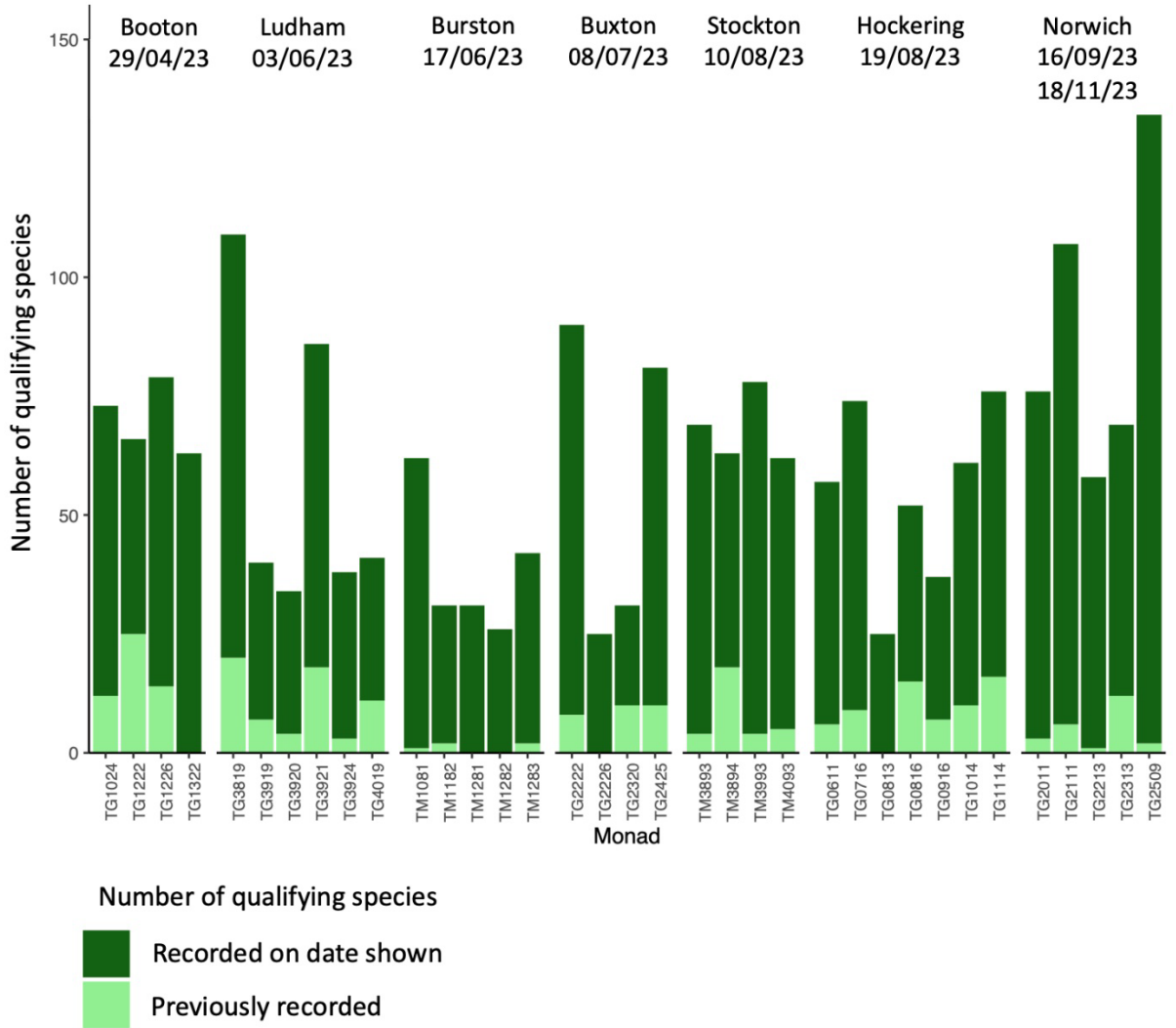
Thank you to the following recorders:

Marilyn Abdulla, Enid Barrie, Dorothy Casey, Tim Doncaster, Mary Ghullam, Bob Leaney, Jo Parmenter, Meg Miller, Sarah Morrison, Libby Pool, Suki Pryce, Ian Senior and Ian Woodward.



Figure 1. Increase in the number of qualifying species per monad

Each bar shows the total number of qualifying species recorded in each monad since 2000.



Janet Higgins & Bob Ellis



SALICORNIA TASTING NOTES (AND IDENTIFICATION)

On 1st October 2023 a large group (with eminent contingent from outside the county) met at Morston Quay for a workshop on Glassworts. Fred Rumsey led us into the marsh and guided us through the complexities of *Salicornia*. It turns out that (as with many critical groups) with a bit of guidance they are really quite friendly despite the few morphological taxonomic features being somewhat obscure. The autumn colours appear to be a helpful guide to the species allowing 'something different' to be spotted at distance and we (JP, KN, AP), having depleted conventional snacks, may have stumbled upon a further character to supplement the morphology - taste. The following list presents the salient ID and ecological features as well as taste characteristics to assist determination when looking at this tricky group - in any case it might help someone select the appropriate accompaniment to a pan-fried Sea Bass (probably not *Sarcocornia*). If you find *Salicornia europea s.s.* or *Salicornia obscura* do have a nibble (not too much of the *obscura*, it is RRR) and report back.

Taxon (per Stage 4)	Morphology	Colour (in Autumn)	Habitat (as observed at Morston + Stage)	Taste (in order of preference, fresh state)
<i>Salicornia fragilis</i> Yellow Glasswort	Flowers similarly sized in groups of 3. Fertile segments with straight to convex sides. Terminal spike 6-15 fertile segments.	Bright yellow	Associated with salt pans, mid marsh lower marsh and channels	Crunchy, tasty (also large enough for a substantial vegetable)
<i>Salicornia ramosissima</i> Purple Glasswort	Flowers in groups of 3, the central flower larger . Fertile segments with convex sides. 0.1-0.2mm wide scarious border on upper edges of segments.	Shiny red-purple	Edges of tracks and muddy patches throughout saltmarsh	Fresh, juicy, flavourful (but a bit small)
<i>Salicornia dolichostachya</i> Long-spiked Glasswort	Flowers similarly sized in groups of 3. Fertile segments with straight to convex sides. Long terminal spike (12-30 fertile segments)	Dull green-yellow	Edges of larger creeks, hollows in mid marsh, lower marsh	A bit watery, reasonable flavour (large)
<i>Salicornia emerici</i> Shiny Glasswort	Flowers similarly sized in groups of 3. Fertile segments with straight to convex sides. Stem remains fleshy several nodes from the top. Lower fertile segment 3.5mm at narrowest point. Slender for a tetraploid.	fiery orange-pink in Norfolk, dirty-brownish elsewhere	Hollows in upper and mid saltmarsh	A bit fibrous, reasonable flavour
<i>Salicornia</i> × <i>marshalii</i> (<i>ramosissima</i> × <i>disarticulata</i>)	Flowers in groups of 1-3 . Variably intermediate (depending on female parent?). Often more robust than <i>disarticulata</i> but not always.	Glaucous green to yellow-green with purple flowers and edges of segments	With the two (diploid) parent species	Fibrous, OK-taste, dry



<i>Salicornia disarticulata</i> One-flowered Glasswort	Flowers singular . Breaks apart readily	yellow-green with red flowers. Becoming yellow-orange later	Widespread in drier parts of saltmarsh	Dry, tasteless
<i>Sarcocornia perennis</i> Perennial Glasswort	chunky fertile shoots & thin sterile shoots, perennial with woody base. Sprawling -bushy.	dark green	edges of creeks & mid marsh	Unpleasant, foetid, fishy, wet, fibrous
<i>Salicornia obscura</i> Glaucous Glasswort	Flowers in groups of 3, the central flower larger . Fertile segments with convex sides. Scarios border <0.1mm	Glaucous , not reddening	Not seen. Bare mud, salt pans & channels	Not tasted
<i>Salicornia europaea s.s.</i> Common Glasswort	Flowers in groups of 3, the central flower larger . Fertile segments with convex sides. Scarios border <0.1mm. Upswept branches. Longer terminal spoke than ramosissima.	Mid-dark green	Not seen (a few likely-looking plants were left at <i>europaea</i> agg). All levels in saltmarsh	Not tasted

Thank you to Fred for making the long journey to Norfolk and for sharing your knowledge with us; similarly to Martin Rand and others who shared their experience of the group. And thanks to Jo and Mary for organising the visit.

Alex Prendergast



S ramosissima

Alex Prendergast





S x marshallii family portrait

Alex Prendergast



S emerici

Alex Prendergast



S disarticulata

Alex Prendergast





S. dolichostachya

Alex Prendergast





S fragilis

Alex Prendergast



NEW PLANT FINDS IN EARLHAM CEMETERY

During 2023 I continued my regular lunch break wandering around the Earlam cemetery. It's a great way to get some exercise and clear your head before getting back down to work in the afternoon. In late April, I set out to find *Poa angustifolia* having been introduced to the species the previous Saturday on one of our Flora Group recording sessions. Jo had suggested that it was under recorded as it was an early flowered species that soon got lost from view as other grasses grew and flowered around it. She suggested that it might occur in Earlam cemetery so was worth looking for. Challenge accepted!

So, at my first lunchtime opportunity I went over to the site to look for it. On the way into the cemetery, there is a steep sided grassy bank that is regularly mown. At this point it had been left alone and various grasses had started to flower. I spotted one that looked very much like my target species so collected a sample, took a few pictures and carried on. As I wandered around the site, I started to see a few more similar looking grasses coming into flower too. Again, taking a sample or two for later checking.

Once I had finished work, I checked the collected plants and felt fairly certain that this was indeed *Poa angustifolia*. I needed to get it checked to be certain so sent a few pictures of my plants to Jo. She quickly confirmed that I had indeed found *Poa angustifolia*! It was also new for the cemetery site too!

Over the next couple of weeks, I covered as much of the site as I could to see if more plants could be found and in what sections. The result was that the plant was found all over the grassy sections of the site. So wasn't a rare species in there at all, just one that had been missed in past surveys. Still a nice find though!

The next couple of plant finds were discovered on the same day in September within a few feet of each other. There is a yard area which has recently been used as a dump for tree chippings. Before this, the area was a mix of open, compacted grassland and bare soil that was regularly churned up by the tractors, trailers and other machinery that are used on site. The area this summer became covered in orange foxtail grass, which is pretty invasive so had covered a large part of the wood chips. While photographing this grass, I noticed a yellow brassica species growing nearby, which I assumed to be *Diplotaxis muralis* or Annual Wall Rocket, which is common in the area. However, when I went to look at the plants close up I was amazed to discover it was actually *Rapistrum rugosum* or Bastard cabbage! Not a plant I had expected to discover in Earlam cemetery. In fact, I have only ever seen it once before at a site on a main road outside of Norwich. So how has this plant arrived in the cemetery? Maybe some of the wood chippings had the seed as a contaminant or maybe some of the machinery used had recently been on land where the cabbage has been growing and brought the seed in via compacted soil on wheels or bodywork? We will never know of course.

The second plant found within feet of the cabbage, was Narrow-leaved Ragwort, *Senecio inaequidens*. This has been spreading around the country for a number of years and has finally arrived in the cemetery. That was a plant I thought might arrive and it duly has. Only one plant was found but was flowering profusely.



Both plants had reached fruiting and presumably seed has been deposited in the general area. Shortly after I discovered both plants, they were killed off by a mix of strimming of the vegetation and renewed vehicle movements churning up the wood chip and soil again. It will be interesting to see if either plant shows itself again in 2024.



Poa angustifolia

Ian Senior



Senecio inaequidens

Ian Senior



Rapistrum rugosum

Ian Senior

Ian Senior



SOME UNUSUAL SOLANACEAE IN NORFOLK, 2023

2023 seems to have been the year of the Solanaceae: we have seen 'new-to-me' recordable *Solanum* species in Norfolk, plus novel field-crop taxa which may start to escape. Another species has been recently spotted in Suffolk, so may soon appear here too. All are worth looking out for in Norfolk, as circumstances seem to be favouring them. *General taxon information is largely courtesy of the new BSBI Online Plant Atlas 2020.*

***Solanum chenopodioides* (*S. sublobatum*)** Tall Nightshade. This species resembles *S. nitidibaccatum* but has narrower leaves. It is a perennial herb native to Argentina, and widely naturalized elsewhere, spreading by seed. In Britain, it is found on pavements, waste ground and in rough grassland, is naturalised in the Channel Islands and the London area, but is a rare casual elsewhere. Holly Percy recently recorded the first *S. chenopodioides* for Suffolk, so it may well be found in Norfolk soon.

***Solanum laciniatum* (*S. aviculare*)** Kangaroo-apple. A native of south-eastern Australia, Tasmania and New Zealand, this is an evergreen frost-tender shrub that was introduced into cultivation in Britain in 1772, and is grown for its attractive foliage and purplish-blue flowers. In the wild, it occurs on rough and waste ground, and on coastal sand. Most populations are casual, but it has been naturalized in the Channel Islands and the Isles of Scilly since 1920, where it often perennates. In Norfolk, a plant was first spotted and photographed by Tony Eadson in July 2022 on the floor of Gotts sand quarry, Trimmingham, TG283383, where it may have been brought in with soil, or on lorry wheels. It was identified by Jo Parmenter as *S. laciniatum* and confirmed by Mike Crewe; and is a new VC27 and County record. I have since found further plants at East Ruston Old Vicarage Gardens (also confirmed by Mike Crewe), in August '23, growing on a small patch of land disturbed by recent tree felling at TG36552881. It also self-seeds in Lionel Ponder's plantsman's garden, North Walsham.

S. linearifolium Mountain Kangaroo Apple. A half-hardy evergreen shrub from SE Australia, inhabiting shady woodlands. It has elegant narrow foliage, bears large, flat, purple flowers for a long period, and has edible yellow fruit. It is available in the horticultural trade. A long-standing population can be found in Great Ryburgh churchyard (Mike Crewe pers. comm.).

***S. scabrum* (*S. melanocerasum*, *S. nigrum* var. *guineense*)** Garden Huckleberry. This is an annual herb of uncertain origin - possibly a native of Africa, but widely cultivated elsewhere for its edible fruit. It was in cultivation in Britain by 1732, and has been found as a casual on refuse tips, sewage farms/fields spread with sewage sludge, and waste ground, where it arises as a garden escape and from food refuse. In early summer '23 I reported an unusual-looking young crop - apparently of a *Solanum* - in a very large field south-east of Sidestrand (east of Top Road, TG2638). By late August Mike Crewe was able to identify the main crop plants as *S. scabrum* - a species new to him - accompanied by a little *S. sisymbriifolium* Red Buffalo-bur (see below). Online research indicates that both species had been trialled in 2020-2021 as taxa that could be used as trap-crops for Potato Cyst Nematode control (eg in South Africa: Priyank Hanuman Mhatre *et al*, 2021; also mentioned in Stace, 2019), and before that since at least 1998 (eg Whitehead 1998).



S. sisymbriifolium Red Buffalo-bur. A native of South America and widely naturalized elsewhere, this is an erect or scrambling annual herb, found on cultivated ground and in waste places. It formerly arose predominantly from wool shoddy, but latterly has been introduced with oil-seed, bird-seed and agricultural seed. It appears to have declined along with the use of wool shoddy as a manure, but may re-emerge as a result of its potential use in killing potato nematodes (see *S. scabrum* above). I saw it as a field crop near Southrepps TG264372 in 2022 - presumably grown for this reason (though it has since been followed by sugar beet, rather than by potatoes, in '23.) It is also used as an ornamental container plant at East Ruston Old Vicarage Gardens - despite its vicious spininess.

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Solanum laciniatum

Tony Eadson



Solanum sisymbriifolium

Suki Pryce





Solanum laciniatum

Suki Pryce



Solanum linearifolium

Jo Parmenter

Suki Pryce

IN MEMORY OF BILL HAWKINS

I joined the Wild Flower Society in 1998 and for a few years everything that I looked at in the plant world was local to me where I lived in Suffolk at that time. I decided to spread my wings and explore other opportunities. Walks are advertised in the Society's magazine and I applied to go on one which was being led by Bill and Carol at Highgrove Wood in North London to see a special plant that grew there called Perfoliate Alexanders, and that was in March 2003.

Thus was the start of a long and beautiful friendship. I learned that Bill was in the Royal Air Force as a fitness instructor after his stint in National Service. He ended up in Grantown-on-Spey where he taught canoeing and survival skills such as digging out snow-holes. It was while he was in Scotland that he started hill walking and mountain climbing. He ultimately conquered all 282 Munros and Carol accompanied him on most of those too. He had an elementary knowledge of the wild flowers that grew there, but Carol, who had a lifelong interest in botany, taught him a lot more.

They lived in Uxbridge for a while and it was in 1987 after the great storm that they became involved in the management and conservation of the Warburg Reserve near Henley-on-Thames in Oxfordshire, which is famed for its population of Military Orchids.



In full retirement they moved to Wymondham in Norfolk in 2003. A lovely property with a brilliant garden developed over the years with added unusual and rare plants from all over the place. Over the next couple of decades, privately and with the Wild Flower Society, we travelled and explored the countryside as well as the towns and villages from the Isles of Scilly to the far north and the Shetland Isles; from the magnificent Burren in the west of Ireland to our home base of East Anglia, but especially Norfolk; and also being involved with the friendly Norfolk Flora Group.

Bill was a very intelligent man and easy to talk to and with, with a range of interests. He had a sharp mind and a wit and extended his botanical knowledge in many fields which included Dandelions and Hawkweeds.

He had us out in the Brecks identifying Dandelions but one of our most memorable days was on the island of Unst in the Shetlands. We were at the side of a loch and its waters were covered in a sheet of blue-green algae. But the edge of the loch was fringed by a vertical wall of slate with a narrow ledge just jutting out above the water level. He saw a Hawkweed growing out of this wall and in moments he was inching his way along this precipitous ledge. Carol couldn't look and ran away! But he crept his way along until he reached the plant. I stood many feet above and read out the key so that we could identify the species from various individual aspects that made it such a special plant to be found nowhere else in the world. He then confidently sidled back and up to the top of the slate and we carried on for the rest of the day.

We had many such instances over the years, but even his 60s and 70s he could still vault over gates, stiles and fences ... which made it all so much harder to see him over the past nine years with a diagnosis of Parkinsons that slowly ate away at him. From a guy that in his younger days ate the equivalent of 6000 calories a day to stay fit, to watch him slowly and inexorably lose so much weight, his posture became more and more difficult for him until he could no longer really do things for himself. The strain on Carol was immense and immeasurable. But he still had a brain that was still so awake, alert and intelligent. He could still crack jokes and make us all laugh. The past few months saw him gradually sliding down that slope until he finally went to Hethersett Hall, a superb nursing care home with excellent staff, close to their home. It also meant that Carol could have some respite time herself. Bill had lost so much weight, had bad bed sores and had some disintegrating spinal bones that were causing him a lot of pain. He started to sleep more frequently and for longer periods when he eventually passed away, with Carol, and a very good friend, Enid, by his side. He was 86 years old. May he rest in peace.

Dr Stephen Clarkson

Another great botanist and lovely friend lost to us.... JP



PROGRESS WITH THE FENLAND FLORA IN 2023

The Fenland Flora is almost finished!

Although the idea goes back to 1970, the *Fenland Flora* project was launched formally in 2005. It is, we believe, unique, focussing on a nature landscape & ecological region, rather than a single county. It covers large parts of West Norfolk (vc 28), as well as substantial areas of vcs 26, 29, 31, 53 and 54, and a smaller portion of vc 32. It is the first synoptic account of the flora of the basin, tracing changing in species distribution from at least 1800, and providing a detailed account of each species for the 21st century. The Fenland has been an under-recorded area by botanists, but in recent decades has become the centre of large-scale habitat restoration in Britain. The Flora will not only be a resource for botanists but also for the Environment Agency, IDBs, numerous NGOs and local authorities.

The area covered by the *Fenland Flora* corresponds closely to that within the Natural England *National Character Area* no. 46 ('The Fens') and thus comprises all the land below the 5 m contour (together with any wholly-included 'islands' inside that area). In Norfolk, it covers the coastal levels from Hunstanton to Lynn, the Nar floodplain as far east as Marham Abbey, the Marshland of The Wash to the borders with Lincolnshire and Cambridgeshire, the levels by and west of the Great Ouse south to Denver and including parts of the Ouse Washes, the Wissey levels and its floodplain upstream to Northwold Common, the fens west of the Cutoff Channel and the Little Ouse floodplain upstream to Santon Downham.

We have produced progress reports each year for the last decade, but this year our report is much shorter, largely because 2023 has been spent writing rather than gathering new data and exploring Fenland in more detail. The present report should be the last before publication. Rather than provide a full description of our activity in the past 18-24 months, we will simply list where we are and what next.

- 1) All species accounts are now complete, covering all vascular plants and *Charophyta*
- 2) As we wrote in our last progress report, the main body of the Fenland Flora Database is now closed, but (of course!) the last two years have seen some new interesting records in Fenland which have been added to the database. Where necessary, species accounts have been amended to take account of important discoveries.
- 3) Introductory and other chapters will be drafted over the winter of 2023-24 *i.e.*
 - Recording of the flora
 - Habitats and landscape
 - Geology and soils
 - Palaeoecology
 - Drainage and its history
 - Social History
 - Agricultural history
 - Urbanisation and transport, including waterways
 - Habitat conservation and restoration
 - Annotated checklist of Bryophyta and other groups



- 4) We have been in discussions with a designer/publisher *i.e.* *Pisces Publications* (part of *NatureBureau* (see <https://www.naturebureau.co.uk/bookshop>) and the publisher not only of recent books on the Great Fen, the Nature of Cambridge, and Cambridgeshire Mosses & Liverworts but also county floras for Sussex, Lanarkshire, Renfrewshire and Derbyshire.
- 5) We have contacted key stakeholders and potential sponsoring organisations and have received funds or promises of funds that will enable publication
- 6) Design, publication and printing during 2024.

Our next progress report should be an announcement of publication!

Owen Mountford and Jonathan Graham

Anyone interested in learning more about the Fenland Flora should contact:

Owen Mountford at om@ceh.ac.uk or fenburdock@icloud.com

Jonathan Graham at jonathan.graham@ntlworld.com

NORFOLK FLORA GROUP PUB OF THE YEAR, 2023

So... which is the NFG Pub of the Year for 2023? We made a great effort to cover as many hostelries as we possibly could and I ended up with scores for around 40 different establishments.

We again scored pubs on a total of 10 categories, with a maximum score of 5 and a minimum score of 0 available for each. The total was divided by the number of categories which we were able to score for each pub (not everyone was willing to share their toilet experiences, even in the interests of scientific endeavour).

In third place, we have **The Gin Trap, Ringstead**.

In second place, we have **The Dabbling Duck, Gt Massingham**.

In first place, scoring 4.3 out of a possible 5 points, the winner of the NFG Pub of the Year Award for 2023 is ...

******* THE STAG, in West Acre *******

Thank you all for taking part and to the various pubs for making us so welcome and tolerating a degree of strange behaviour which must be unusual, even for Norfolk.

Jo Parmenter

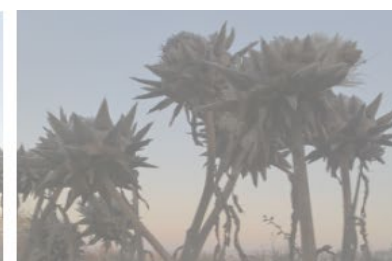


NORFOLK FLORA GROUP CROSSWORD 2024

Another beautifully crafted warble from our feathery friend the Sedge Warbler. I hear from a reliable source that he is once again packing up his little suitcase and stocking up for the long flight north. We shall see (and hear from him) again very soon now. JP

THE CROSSWORD

1		2		3					4	5		6		
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THE CLUES.....

Across

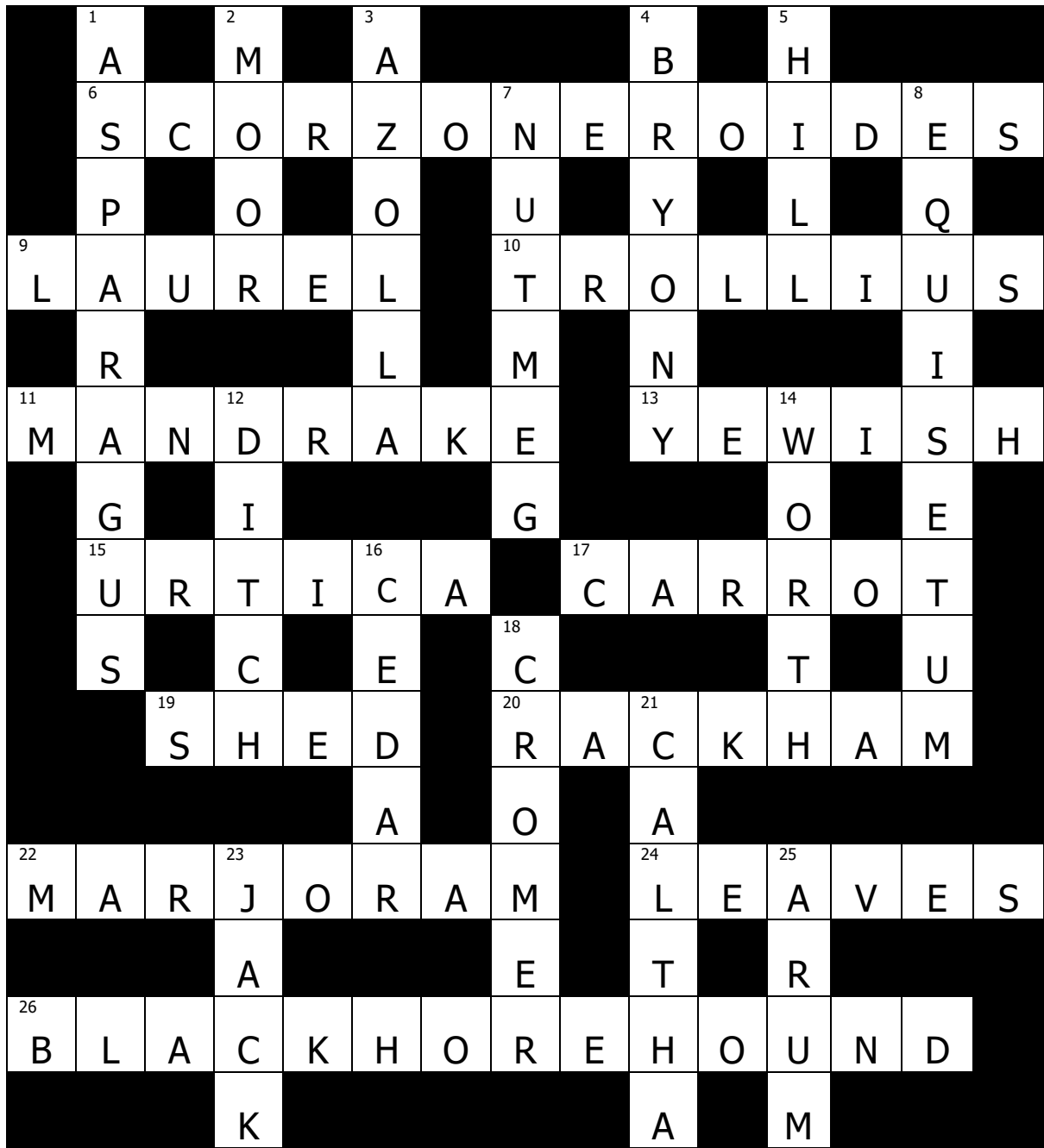
1. Daisy-type flower, one of which hails from 9 across (8)
4. One-seeded nutlet (6)
7. Tree of some age (8)
9. Is Ada able to reach this country? (6)
11. Spiny shrub (4)
12. Small stream bright green holds blue-flowered plant (9)
14. Muddle lilacs lineage to make scarce flycatcher (6, 7)
16. What Jenny likes to do (5)
19. Left, for example, makes this part of the journey (3)
21. Something that might trample yellow spring flowers (9)
23. Must clean up this fungus (4)
25. Top notch not rising after scorching this water plant (8)
27. Peg-legged supporter after time props up architectural plant (6)
28. Scented plant of river banks (and gardens) (8)

Down

1. Big family of grasses, including one belonging to a grazer (6)
2. Every larch matters, initially making a tree (3)
3. Forget-me-not makes me sad (4)
5. Sedimentary rock that is definitely not cheese! (5)
6. Test at home is no good at first! Botanists spend a lot of time on this (9)
8. The headwear that lost its head in town (5)
10. What do you call a man with a spade in his head? (4) (not a cryptic clue!)
13. Footwear with a flop (4)
14. Star-like, looking up the main road to make a family of small plants (9)
15. Scented perennial of dry woods (not of the valley) (4)
16. The scent of the flowers of 11 across (7)
17. When Jack goes to bed, in the Aster family (4)
18. Polite, confused, with poor grade, supporting leaf (7)
20. Essential oils from flowers (6)
22. My favourite plant! (5)
24. A smaller variety of plant, Morris (5)
26. Looking back, this might be one of many often disused on the map, at the end (3)



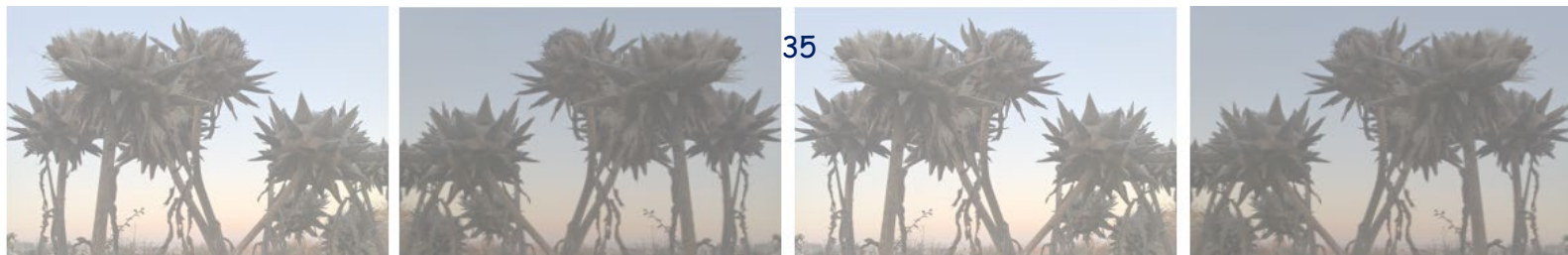
ANSWERS TO THE PREVIOUS NORFOLK FLORA GROUP NEWS CROSSWORD



Sedge Warbler



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..... LOOKING FORWARD TO THE 2024 FIELD SEASON

Just a few of the many highlights!

Blooming Bressingham - We return to Bressingham for a second year.

Brilliant Brambles and extraordinary elms - A two-for-the-price-of-one workshop with Alex, this time at Ringland Hills.

Britons Lane Quarry and Felbeck Trust landholding courtesy of Trevor Williams. Tea & Cake were mentioned....

Buttles Marsh, Ludham - The Broad's Authority's Bittern Reserve also supports interesting fen flora....

Delightful Dandelions - Alex Prendergast proposes a workshop at Holkham this year.

Earsham Estate - we will be visiting twice in 2024 to look at woodlands, grassland and a quarry restoration.

Exhilarating Euphrasia - and if that's not enthralling enough, we will be seeking them out on NWT's Weeting Heath reserve.

Feltwell Fumitories - There will be fumitories. Exciting ones :)

Grimston Warren - Julia Masson and Bill Boyd have kindly arranged to show us around this very special site.

Horsey Estate - we will be visiting the usually inaccessible private landholding to the rear of the dunes

Manor Farm Shropham - I'm really excited about visiting the restored gravel pits - one of my first ecology-led landscape designs

Scintillating Samphire - We will visit salt marshes at Thornham for a workshop on *Salicornia* (with tasting notes and hopefully recipe tips too) with Alex Prendergast.

Shadwell Estate - Chloe at NWT has arranged for us to visit some of the CWS on the Estate.

Watering Farm & Mere Farm pingo project - NWT have agreed for us to visit their restoration project.

West Acre Estate - Another 2 visits are planned to this extraordinary place.

Wild Ken Hill - This year, we will visit the re-flooded marshland and some of the woodland that we were not able to access in 2023.

Wildflowers Revealed - BobL and Richard will be double-billing at Ickburgh, starting out at the Desert Rats Memorial and adventuring in search of interesting Breckland flora. The day will include a learning-focused event for budding botanists in the morning and then those who wish to stay on for recording in the afternoon can do so.

Jo

