



**Our AGM will be held at Hunworth Village Hall on Saturday the 15th June.**

**The programme is:**

**2pm - 2.15pm: The AGM**

**2.15pm to 3.15pm: A Presentation by Dr Jonah Tosney, Norfolk Rivers Trust. The Beaver and Re-Wilding of Rivers.**

**3.15pm - 3.30pm. Refreshments**

**3.30pm - 4pm. A visit to the river at nearby Hunworth meadow.**

Jonah is an ecologist by background with much practical experience of river restoration. He has an interest in the role that beavers could play in that context, and has made study visits to the Tamar to which the Devon Wildlife Trust introduced the beaver some three years ago. He has also been to see them at Ham Fen, where the Kent Wildlife Trust introduced the beaver 17 years ago. The beaver produces a structure that acts as a leaky dam. In the right place they can reduce silt

problems, and improve shading and biodiversity. However there are potential downsides, which makes the reintroduction a controversial issue. We welcome discussion by all, after the talk lasting 45 minutes.

It is ten years since the cutting edge river restoration on the Hunworth meadow was completed. By kind permission of the Stody Estate we will visit the site, and see how the work was carried out by a multi-disciplinary project team. Sections of new channel were sculpted by a digger, created by a design which brought sections of sinuosity and narrowing, and shallow riffle areas and deep pools. These were then 'stitched' into parts of the existing river; and the 'redundant' existing parts were back-filled from the top, but stopped short to leave backwaters in the channel. This was a pioneering project, and a springboard for the 1.2 km of new river at Bayfield in 2014.

This Newsletter links back to the article in Autumn 2018 on Spout Hills Past, and the role as the source of the water supply for Holt. We now follow with the further article Spout Hills Present and the interest as a wildlife site. We also have an authoritative article by Simon Harrap on Holt Lowes. The complex and unique wetland area of the Lowes makes it a Special Area of Conservation, and is of international importance for the flora. The different sources of groundwater make this a unique site.

Across the range of articles we have sought to illustrate in one edition the importance of water resource, both in quantity and quality; and that in Norfolk and East Anglia we are in a precarious situation. The pressures arising from growth in population and climate change will make for a more difficult future situation; and our concerns for the Glaven are reflected in most of the articles.

# Holt Spout Hills: the Present

In the previous Newsletter we traced the past history of Spout Hills as the source of the water supply for Holt as it would have been from the Domesday Book, with a pond created by damming the stream from the powerful spring. The pond remains in the same position today, but its use for supplying the town was discontinued after 1885 with the drilling of a borehole and the building of a Pump Station; and that continued until the early 1950s. Twenty years ago local historian Keith Entwistle carried out many interviews with individuals on their childhood recollections of the Hills going back to the 1920s. They had many fond memories of the freedom to explore and play on the Hills. This was particularly so around the stream running across the site, and sometimes making a dam on the stream.

In this they were following a long tradition. In 1898 the Parish of Holt erected a sign to set out the byelaws for what was the local name for the area: "The expression the Pleasure Ground means the pleasure ground known as Spout Hills". Spout Hills still provides much pleasure today. Children play there, albeit the young ones only with a parent. Adults walk or jog for exercise and fresh air, many walk their dog. But for some much the greatest pleasure is the wetland meadow of wild flowers in the grassland around the stream, and the valley in which it lies. Wetland meadows with a rich and diverse plant life have suffered a catastrophic decline in the past fifty years. The much quoted national loss is 97%; and the Norfolk naturalist Mark Cocker in his 2018 book, "Our Place: Can we save Britain's wildlife before it is too late?", puts the loss at 99%. So those local people and visitors who come to Spout Hills in spring and summer will in the main not realise that Spout Hills is such a special and precious place.

Pre-1960s the Hills were still being grazed by sheep. In the 1960s road

**Top: Looking up to the pond, through which the 'Spout' flows: 24 June 2018**

**Bottom: The stream does a right-angle bend. View downstream towards the bridge**





widening required the removal of fencing, and with that all grazing stopped. Scrub and rank vegetation encroached over much of the area, which summer grazing had prevented. This is how flower rich meadows evolved, but also through a late summer cut for hay and winter feed for stock also had the same beneficial effect. With Spout Hill though there was the opportunity, as part of the management of the site, to progressively bring back the flora by first clearing the rough vegetation followed by introducing a regime of a summer machine cut, and raking and removing the cut vegetation.

In 1974 the management of the site became the responsibility of Holt Town Council, and this offered an opportunity for local volunteers to become involved. One of the first activities was to attend to the pond. This had a retaining wall for the pond to be fed by the spring. The pond was open at the top (east) end of the slope on which it sits – this had allowed a horse and cart to back into the pond and fill containers with water for the town. In the early 1980s the retaining wall was leaking badly and on the way to collapse. It was repaired by pupils from Gresham's School, under the supervision of Tony Leech. In 2014 the Town Council re-modelled and formalised this to cut off and separate, and close the open east end, and make a concrete base; but leave the top part of the pond 'natural' as it was as a reminder of the original function.

A plant survey of the site was carried out in 1985-86, and the botanical interest was such that the County Council arranged a Countryside Stewardship agreement in 1994, which brought not just recognition but funding support. In the period 1995-2008 the valley area was mowed annually by machine and the cut material was allowed to dry and shed seed before removal. At 2004 the ten year Coun-

**Top; View from the bend looking up the wet valley; small springs add to the 'Spout' flow.**

**Centre: These four photographs show the main species in flower on the first visit, 24 June 2018. Earlier part of the season, so ragged robin, buttercups, some orchids. Top pair much ragged robin, in a block soon to be cut. Lower pair show an orchid by the bridge; and orchids in meadow in upper part of wet meadow.**

**Bottom: Photograph at 1 July after further cutting and raking.**

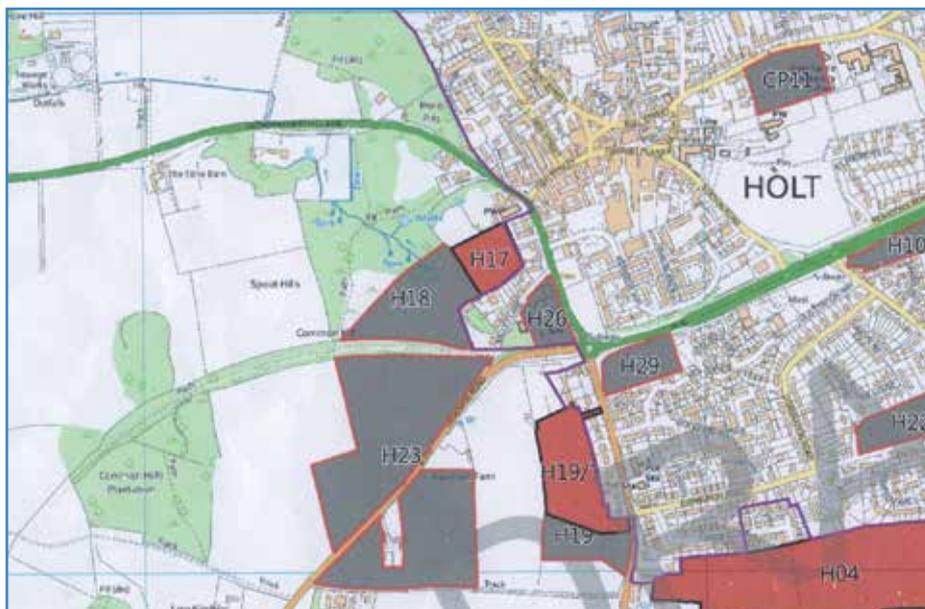
tryside grant was renewed until 2014 and the national closure of the scheme. But now there was a plant-rich site and in addition to the public access, there was no fear of being chased by a family herd of cattle fearing that their calves were under threat.

With the 2005 designation of Spout Hills as a County Wildlife Site, Holt Town Council established a sub-committee to advise on the management of the site, including of course the wildlife interest. Restoration to the full potential of a neglected site takes time and perseverance, but this has been very successful. The wetland meadow areas have all the flowers of a traditional meadow appearing in succession over the summer months. So we find Lady's Smock, Ragged Robin, Common Spotted Orchid, Yellow Rattle, Meadow Sweet, Fleabane, Water Mint and Purple Loosestrife in abundance. Their value in supporting pollinating insects should not be under-estimated; their decline is of concern as they have a key role in the production of food. The variety of different grasses are both interesting to look at as well as being the backcloth for the flowers.

Over two hundred plant species have been recorded from Spout Hills between 1987 and 2018. Species in the Wet Valley which are uncommon in Norfolk include Bogbean, Eyebright, Marsh Helleborine and Common Twayblade. On the Streamside a recent arrival has been the statuesque Hemlock Water-dropwort, widespread in the Broads but very rarely found elsewhere in Norfolk. On the Grassy Heath Harebells occur in several patches when mowing activities allow.

Last year I went to the site on the 24th June and saw the wet valley meadow area early on a bright and sunny day. Some narrow paths had been cut, making a reasonable balance between plants cut down and access to walk through in most of the area, and have a close-up view of flowers and grasses. I was dismayed on a return visit on the 1st July to see the paths both greatly widened and extended into new areas. This cutting was done before any plants would have a chance to seed; and half of the plants in the cut areas even to flower. So we hope the Council will review mowing regimes and not repeat this situation in the future; and at a wider level resist any changes which would damage the site beyond repair.

So what might be the future for Spout Hills and other wetland sites. Holt is a growth town in the Local Plan now being progressed by the District Council. The first concern is



with an increase in people and increased demands on water resource that puts more pressure on our natural environment. The second concern is the specific location of selected housing sites. The allocation of new sites will be consulted upon shortly. The whole town is ringed with potential sites; those coloured red are those preferred by the Council. A larger number of other areas are marked grey. While not in the first rank of being a candidate for house building, it may be that a grey site joins the red sites at later stages of the Plan, which runs to 2036. Site 17 lies behind the neo Georgian houses which face across the A148 to Budgen is a red site. Adjacent to H17, and bounded as far as Common Hill along the old railway line, is H18, a grey site. The northern corner of H18 runs across the head of Spout Hills wet valley. We urge you to engage with the consultation.

Acknowledgement: Tony Leech sourced the historic photographs of Spout Hills in Part 1, and provided for this Part 2 the timeline on conservation activities. Many thanks to Tony and others who have long taken an active interest in the management of nature conservation at Spout Hills.

*Ian Shepherd*

**Top: The NNDC proposals for new housing that impinge on Spout Hills. Red is a preferred option, grey other options.**

**Lower: Another 1 July 2018 view after the further cutting.**

**Opposite page: Drought conditions at 24 June of last year find these cattle in harvested field adjacent to Spout Hills**

# Another Dry Summer?



In the last Newsletter we wrote on the adverse impact on wildlife in rivers and ponds caused by hot and dry weather last summer. We also mentioned the constraints imposed on farmers on water for spray irrigation; their request to 'forward borrow' against their 2019 allowance was refused. In addition a lack of grass forced farmers to bring forward animal feed in store for the coming winter; hence the presence of cattle in a field adjacent to Spout Hills on 24 June last year.

The signs at late March are that we might be heading for near drought conditions again this year. The stresses of a drought highlight the precarious balance between the needs of water resource for the public water supply, farm spray irrigation, and to sustain our wildlife; and the public water supply has an uplift in the holiday season. These demands all peak in summer, when aquifer levels are at their lowest and wildlife most vulnerable. Unless there is an increase in average rainfall in the next few months, there will again be problems in the summer.

At the end of January Anglian Water stated that Groundwater and River Levels were significantly below average, and 12% below what they were in 2018. The EDP reported that East Anglia in January had only half the expected rainfall. Prior to this (26th January) the EDP's Chris Hill had reported on a National Drought Group meeting. The Government and its agencies stressed their determination to work with the water industry, farming and

environmental groups to mitigate the potential challenges of a cold winter and dry summer. While most water companies are confident about maintaining water supplies as long as rainfall stays above 60% of the Long Term Average for the next few months, the forecast for agriculture and the environment is gloomier. Paul Hammett, the National Farming Union's water specialist, said at the meeting that soil moisture deficits are increasing at the time of year when they should be decreasing, and fears are growing that some rivers will be noticeably low by the end of May.

The 'competition' for water is reflected in a case in the Broads. A CPRE colleague attended the AGM of the Broadland Agricultural Water Abstractors Group on the 22 February. Some members of BAWAG feel they are facing a real crisis as the Environment Agency are cutting, and in some cases revoking, their abstraction licence. This arose from concerns on water levels and quality around the Broads, Catfield in particular. Further that while they are caught in this situation, the Internal Drainage Boards continue to pump water away only a few feet from farm boreholes.

Coinciding with this Chris Hill, in the 23 February EDP, reported on a national meeting where the Secretary of State for the Environment Michael Gove spoke and responded to questions at the annual conference of the National Farmer Union. The Norfolk NFU chairman referred to the BAWAG issue and asked the minister why

farmers at risk of losing their resource were being treated unfairly compared to Anglian Water. He said that there are proposals to revoke 21 abstraction licences within the next few weeks. "This will destroy some farming businesses, the local economy, and severely impact on national food processors. Does the minister think it is fair that the local water company is being given some years to adjust to the change, but farmers are being told they will lose their water this year, with no time to find new sources of water". Michael Gove agreed to raise the question with the Chief Executive of the Environment Agency and respond in the near future. "I was not aware there was an inequity in the treatment of the Water Company and farmers". "Particularly in an environmentally sensitive area like the Broads, we do need to be thoughtful".

Water quality problems were also discussed at the BAWAG meeting. The Environment Agency Diffuse Pollution Officer gave a presentation on phosphate pollution and that there are some worrying increases in phosphate levels on the rivers Ant and Bure, and in particular Barton Broad. The officer planned to look into the catchments of these areas, as there will be a number of sewage treatment works discharging into the catchment, and if the receiving works are going to be receiving increased flows due to urban growth. There is a need to ensure that phosphate levels are taken into account for any planned expansions. In our view this also applies to Holt Sewage Treatment Works.

# Holt Lowes: History and Natural History

**H**olt Lowes lies just to the south of Holt, between Holt Country Park and the River Glaven. It is important from the outset to clear up a common confusion. Holt Lowes and Holt Country Park are not the same. Holt Country Park is essentially a conifer plantation and is owned and managed by North Norfolk District Council. Holt Lowes is an area of heathland, deciduous woodland, bog and fen that is under the control of the Trustees of Holt Lowes, who manage the area for conservation in close collaboration with the Norfolk Wildlife Trust.

The Lowes is a relic of the once very extensive tract of heathland that was found in North Norfolk between Cromer and Holt, extending south all the way to Norwich. These heaths had been formed on the deposits of sands and gravels that had been dumped by the ice sheets of various Ice Ages. But the heathlands themselves were not the natural vegetation of the area, rather they were the result of man's activities since the Bronze Age, and had been formed and maintained by grazing, burning and periodic cultivation. In the 19th and 20th centuries improving agricultural techniques allowed much of these once-extensive heathlands to be ploughed-up and reclaimed for agriculture, and a lot of the remainder has been planted with conifers. The small areas that remain are mostly commons or 'poors' allotments that were protected from 'improvement' by the reluctance of their trustees to allow anyone to do anything new or different.

To elaborate, Holt Lowes is a 'Poors' Allotment' of 49.3 hectares set aside by the Holt and Letheringsett Enclosure Act in 1807. The enclosure acts, which were private acts of parliament, were an early wave of privatisation whereby land passed into private hands and the bulk of the population were stripped of historic rights. Each act appointed enclosure commissioners to 'divi up' the parish and by way of compensation they might set aside the very worst (in terms of their potential for agriculture) areas for the poor. Thus Holt Lowes was described in the Act as an allotment for houses of the parish not exceeding £10 per annum (i.e. annual rent), to be used by the owners and occupiers of such ancient



**Above. Keeled Skimmer**  
**Until recently the Lowes was the only site in East Anglia for this dragonfly. Effective management has created lots of habitat and the expanding population has now spread to other sites, such as Beeston Common and Buxton Heath.**

houses for supplying each of them with common pasture for one head of 'neat' (meat stock), or for one gelding or mare, and for taking flag, ling, brakes and furze for domestic firing. These activities were to be subject to the control of the trustees, namely the Rector, churchwardens, and overseers of the poor. In 1807 there were around 140 qualifying 'poor' in the parish of Holt.

## Topography and Habitats

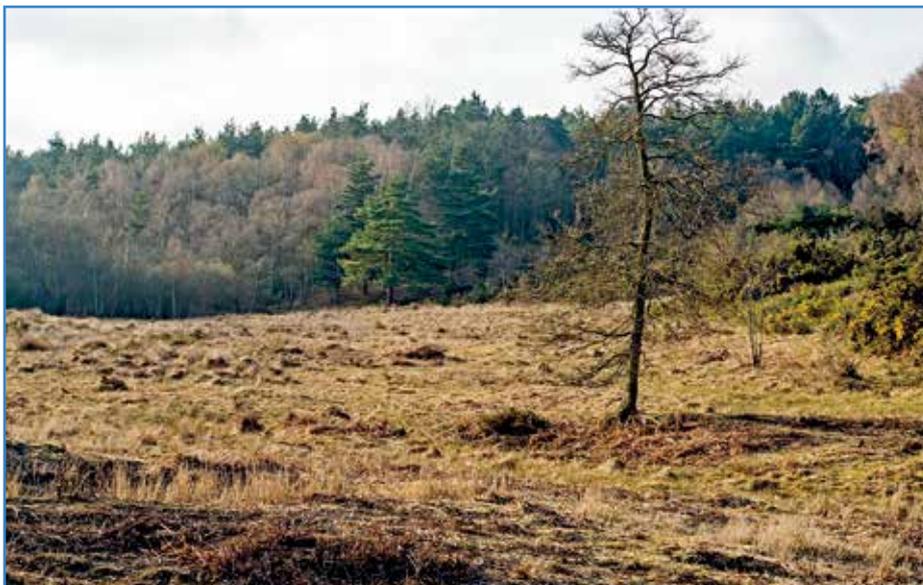
The Lowes is essentially a plateau of sands, gravels and flints covered in heathland, acid grassland and woodland. This plateau is cut by two small tributaries of the River Glaven; the 'Northern Valley' is partially wooded, while the southern 'Mixed Mire' is much more open, with woodland mostly at the southern end, to the south of Soldiers Pond. The River Glaven forms the long south-eastern boundary of the Lowes. Both the tributary valleys and the Glaven Valley have an extraordinarily complex mosaic of spring fed fens and mires, re-

lated to the very complex geology and hydrology.

## Geology and Hydrology

Holt Lowes lies near the western end of the Holt-Cromer Ridge. This comprises sands and gravels of glacial origin. Its age is uncertain, but it may date from the Anglian Glaciation, c.350,000 years BP. The sands and gravels have minor inter-beds of silt and clay, and are commonly chalk and flint-rich. The glacial sands and gravels overlie a deposit of Lowestoft Till (the so-called 'boulder clay' but not necessarily clay, rather a mixture of silt, gravels, clays and decomposed chalk, the last of which is clayey). These drift deposits overlie a deposit of Norwich Crag and then Upper Chalk. Locally, the glacial sands range from 10m to 30m in depth and thin out, presumably as the result of erosion, towards the River Glaven and in the southern tributary valley (the Mixed Mire). The Lowestoft Till is 15-40m deep and the Crag c.10m deep. The Upper Chalk occurs at 30-40m below ground level and is around a thousand feet thick!

The main regional aquifer lies in the Upper Chalk (and the Crag), which are sealed off below the Lowestoft Till; this is the aquifer that provides the drinking water for most of Norfolk's inhabitants. Perched on top of the Lowestoft Till is a sand aquifer which appears to be hydraulically detached from the water in the chalk.



**Above left. The Mixed Mire**  
*Seen in mid April, the mires hide their riches well, but by mid summer there are often good numbers of showy species such as Common Spotted Orchid. This is one of the most botanically fascinating valleys in Britain, unique and irreplaceable.*



**Left. Dartmoor Ponies**  
*The Lowes is home to a small herd of ponies which cope well with the rough grazing and are popular with visitors. They add a 'wildness' to the site but have proved to be of limited value in controlling scrub.*

**Right. Common Wintergreen Pyrola minor.**  
*The Lowes is the only site in East Anglia for this dainty plant. Wintergreens, although herbaceous, are members of the Ericaceae, the heather family, and are strongly associated with boreal habitats. The Lowes is the only remaining site for the species in East Anglia.*

In summary, the following hydrological units may be recognised beneath Holt Lowes:

- \* A shallow, sand aquifer
- \* A Lowestoft Till (boulder clay) aquiclude
- \* A confined Chalk/Crag main aquifer

The details of the hydrology of the the Lowes remains poorly understood, however, despite a lot of research. The sand aquifer is of limited extent and is dependent on recharge from rainfall, and some of the fen areas are vulnerable to periods of drought and dry up during a hot dry summer, but other areas seem immune from this - even in summer 2018, some of the fen remained very definitely wet. What does seem certain is that the fens receive no water from the River Glaven, which is lower and in a deepened and canalised bed.

### Water Catchment

The surface water catchment of Holt Lowes lies mainly to the north-west and is c. 1.76 km<sup>2</sup> in area. The groundwater catchment may cover a similar area to the surface water catchment (on the assumption that the sand aquifer extends throughout the surface water catchment), in the area of glacial sands to the west and north of the Lowes.

### Conservation

Holt Lowes had long been recognised as a special place for plants and animals, with the first records of notable species dating from the end of the 18th century - including records by William Jackson Hooker (see caption). In 1915 the Lowes was included in a list of 284 British wildlife sites 'worthy of preservation' by Charles Rothschild - founder of the Society for the Promotion of Nature Reserves and in 1954

was declared an SSSI ('Site of Special Scientific Interest'). The Lowes also forms part of the 'Norfolk Valley Fens' Special Area of Conservation, an important designation that theoretically gives additional protection to the site.

Declaring an area as an SSSI is, however, not enough to maintain the wildlife interest of the site. Following the Enclosure Act the use of Holt Lowes by the poor of the parish steadily declined. Indeed, the Lowes is thought to have been largely used for recreation by the end of the 19th century. Gradually, as grazing and wood cutting dwindled away, the trees that covered the heath in prehistoric times began to return. In the 20th century periodic large fires and Rabbits kept them at bay for a while, but by the 1960s much of the heath was succumbing to invasion by trees. The first modest attempts at management began in the 1960s with masters and

boys from Gresham's School in Holt. In the 1980s a portion of the Lowes was leased for a time to the Norfolk Wildlife Trust (NWT), and although Holt Lowes is no longer strictly a NWT reserve, the Trust remains central to the management. With significant funding under Countryside Stewardship and then Higher Level Stewardship, management has involved removing many of the trees and the associated leaf-litter and the reintroduction of grazing.

Why bother to maintain the open heath and mires? The heathland vegetation of heather, gorse and various grasses although not 'natural' is old and has been relatively stable - it may well have been in existence for up to 5,000 years. This long period of stability has allowed the heath and associated wetlands to be colonised by a rich variety of plants and animals, and the vegetation is termed 'semi-natural'. In contrast, if it were to return to woodland, it would most probably be a species-poor 'secondary woodland' (i.e. trees growing on a site where woodland has been absent for a significant period of time). It would take many generations for such 'secondary woodland' to acquire the richness and diversity of the existing heath, and indeed, it may never do so as there may not be suitable source populations for animals and plants to recolonise.

Effective management of Holt Lowes and similar sites is not easy and inevitably involves compromises. The special plant communities have evolved to live in environments with low levels of nutrients, but in common with most of the wider countryside, eutrophication is an ongoing problem (see below). The labour-intense traditional management is no longer possible, and machinery and volunteers can only do so much. Every so often we are offered a 'silver bullet' that will solve many of the management issues. Twenty years ago it was grazing, and I clearly remember staff from English Nature and the Norfolk Wildlife Trust working hard to persuade the trustees to introduce cattle to the Lowes to control the scrub. This was done, and the cattle were followed by Dartmoor ponies, but while they have helped in some ways, they have caused problems in others and have done little to control the invasion of the heath and mire by Scots Pine, birches and willows!

## Flora

The Lowes has several habitats of particular interest: dry heath, wet heath, fen/ mire and wet woodland. Dry heath is found on the plateau and as well as stands of Common Gorse has a community that is a mosaic of Heather



**Upper. Glow-worm**  
***It is the females of this beetle that glow - for a couple of weeks in mid summer. Very variable numbers can be found on the Lowes, mostly on the margins of the wetter area. The larvae feed on slugs and snails.***

**Lower. The moss *Hookeria lucens* was described (under a different generic name) in 1801. It was found on 'Holt Heath' (i.e. Holt Lowes) in around 1807 by William Jackson Hooker, then in his early twenties. When Sir James E. Smith needed a name for a new genus of mosses in 1808 he took inspiration from his friend's discovery and named the genus *Hookeria*. Hooker was born in Norwich and devoted his life to the study of botany. In 1820 he was appointed Regius Professor of Botany at the University of Glasgow and in 1841 was appointed Kew Gardens' first official Director.**

and Western Gorse. In National Vegetation Classification (NVC) terms this is 'H8 species poor sub-community', which rightfully suggests that botanically speaking it is rather dull, although it looks great when the heather and gorse are in flower together in the late summer. Due to the steep gradients of the valley sides, the area of wet heath (indicated on the ground by the dusty pink flowers of Cross-leaved Heath) is very limited. The valley bottoms are the site of the varied fen and more communities (with some 'perched' on the valley sides due to the emergence of springs there). These are arguably the jewel in the crown of Holt Lowes, especially the 'Mixed Mire' in the south-western tributary valley. The complex water chemistry and the range of pH (pH 3.4-pH 7.9 according to my measurements in 2001) have produced, in a relatively small area, an amazingly diverse habitat, with sundews, Common Butterwort and at least seventeen species of sedges. It is not so much that the individual species are very rare, however, rather



that the combination of plant communities is very special. But, in terms of rarities, it is the wet woodland on the Lowes that holds the iconic species: Mezereon, Wood Horsetail, Common Wintergreen, Lesser Skullcap, and the moss *Hookeria lucens*. The last four are essential western species in Britain, favouring areas of higher rainfall, and are testament to the long-running stability in the Norfolk valley mires in general and Holt Lowes in particular – put simply, they do not dry out.

#### **Fauna**

The Lowes supports an important population of Adders, which depend upon the open conditions, while Grass Snake is as recent colonist that seems to be spreading in the Glaven Valley. The heath holds breeding Nightjars and Woodlarks and a thriving colony of Greyling butterflies. Other invertebrates of note include lots of Minotaur beetles on the open heath and Bog Bush Cricket and Glow-worm around the mires.

#### **Upper: Wood Horsetail *Equisetum sylvaticum***

***Horsetails are every gardeners enemy, but this distinctive species is finely branched and very delicate in appearance; it is not found anywhere else in East Anglia.***

#### **Lower: Great Sundew *Drosera angelica***

***Sundews are insectivorous and their sticky hairs will trap any creature not strong enough to pull away. This is the rarest and most localised British species, with the bulk of the population in NW Scotland.***

#### **Threats**

The most insidious threat to the Lowes comes from the deposition of atmospheric nitrogen in the form of nitric acid (nitrate) derived from nitrogen oxides generated by the burning of fossil fuels. Ammonia

is another compound of nitrogen present in the atmosphere which stimulates plant growth. It arises mainly from the volatilisation of fertilizer and the decomposition of livestock dung. The prevailing wind is from the south-west, picking up these diffuse pollutants from the whole of southern Britain and bringing them to Norfolk. The deposition of dog mess from the ever-increasing number of dogs has a similar effect, but concentrated along the side of paths. Fortunately, it is not possible to park on the Lowes, so the Country Park bears the brunt of fouling as the dogs are 'emptied' before they get to the Lowes! Dogs are also a threat to ground nesting birds, such as Nightjar and Woodlark, and to Adders. Unfortunately, there is little that can be done about atmospheric pollution, and dog owners too seem largely oblivious to the threat posed by their pets and their excrement and are extremely reluctant (or unable) to keep them under close control. As the local human population increases and housing creeps ever-nearer, so does the issue of dogs.

De-watering is a major threat that looms ever larger. As Holt expands the local hydrology could be impacted, with house, roads and hard standings either diverting surface water away from the Lowes or adding oil, pesticides and other pollutants to the aquifer. Despite years of study, the hydrology is still contentious and abstractions for drinking water and irrigation could also impact on the fens and mires.

As a final thought, I see the increasingly prevalent concepts of 'mitigation' and 'habitat creation' as insidious threats to sites such as Holt Lowes. Government, developers and increasingly too the ecological consultancy industry that they support are promoting the view that habitats can be picked up and moved to somewhere more convenient, or even re-created. This concept has taken on a life of its own and is becoming mainstream as more and more biologists grow up with it. While birds, butterflies or perhaps beetles can be moved around at will, sites such as Holt Lowes cannot. The complex combination of geology and hydrology is unique and cannot be re-created, neither can the plant communities that depend on it.

*Simon Harrap,  
Hon Secretary,  
Trustees of Holt Lowes*

# Essex & Suffolk Water: The interaction with Farmers



I attended a meeting at Itteringham in February organised by Catchment Sensitive Farming, delivered by Natural England, the Environment Agency and Defra. This gives advice and practical support on good practice and funding for some projects. They are not alone in this effort, and water companies also have a major presence. There is also involvement by the Norfolk Rivers Trust in delivering water sensitive farming, with partners in the Broadland Catchment (Alison Smyth) and Cambridge and Ely-Ouse Catchment (Ed Braham Jones). The main aim of the day was to provide advice and detailed information for farmers on procedures and equipment on pesticide handling.

My main interest was the introductory presentation from Ian Skinner, the Catchment Advisor for Essex and Suffolk Water. This gave a very good insight to the operation of the company, the monitoring of 'raw' water from the rivers from which they abstract, the routes by which pesticides can enter

***The River Bure at Itteringham. "This is the first point of sampling to monitor the quality of the 'raw water' before abstraction at Belaugh"***

rivers, and how this helps towards ensuring that the treated water they supply to their customers meets drinking water standards. It was good to hear a clear and authoritative talk on a subject that gets relatively little informed discussion on the challenges that face both farmers and water companies.

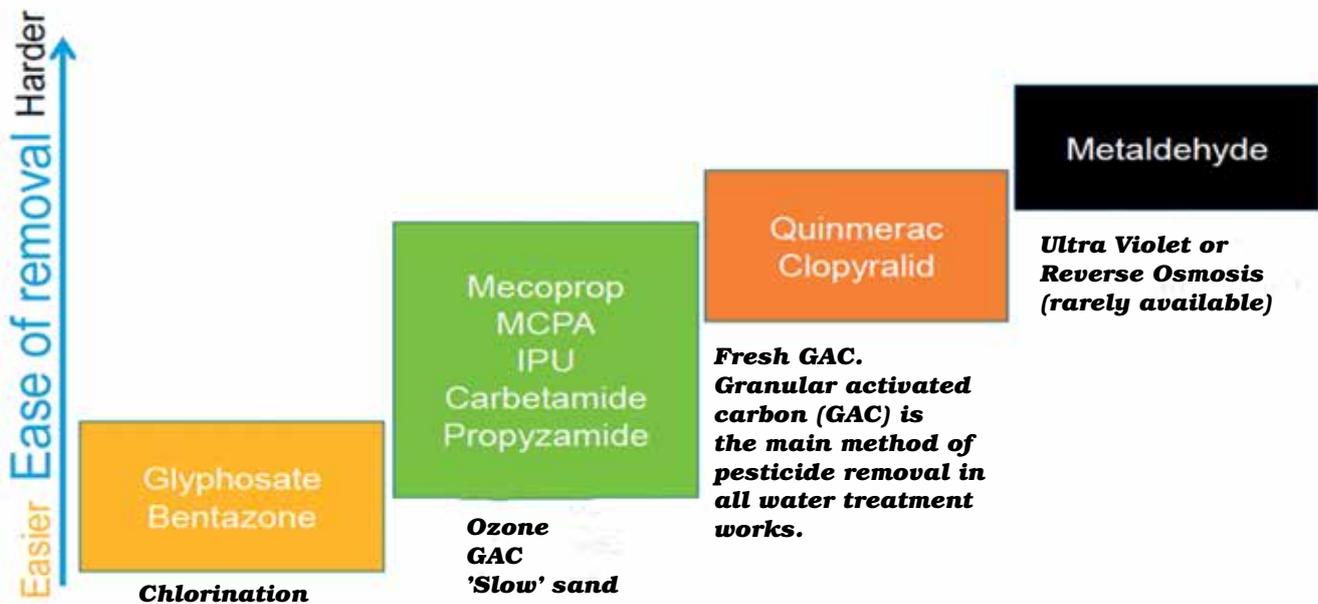
The talk focussed on the northern part of the area the company serves. Water from the Bure, a chalk stream like the Glaven, is abstracted at Belaugh, which is just west of Hoveton and Wroxham. From Belaugh the water is pumped 18 miles to Ormesby Water Treatment Works, and is stored in a reservoir holding 90 million litres – the equivalent of three to four days' supply. The reservoir is blended with water from Ormesby Broad, which

receives surface flows from around Martham and Hemsby, and also from the crag aquifer under the Broad. The usual blend ratio is 60 - 70% from the river and 30 - 40% from the Broads.

An emergency borehole at Jubys Farm at Belaugh can replace some of the river supply if the quality deteriorates for those contaminants that cannot be satisfactorily removed. These include the pesticide metaldehyde, nitrates, and very high turbidity due to sediment in arable and road runoff. Water from the Bure is generally of good quality and occasional issues with pesticides, nitrates and turbidity are usually only short term events following heavy rainfall. The buffer capacity in the reservoir and Broads can compensate for short periods so the borehole is not used very often.

The demands on water supply can vary. Ormesby Water Treatment Works supplies Great Yarmouth and surrounding area which comprises 38,000 households (106,000 people) and one major hospital. Normal pro-

## Not all pesticides are equal



duction of drinking water is 19ML/Day (million litres per day) in December, rising to 24ML/Day in summer when the impact of visitors peaks. The obligations on water companies are to supply 'wholesome' water which meets legal standards. The Water Supply (Water Quality) Regulations 2000 require that after treatment, drinking water must contain less than 0.1µg/l (1 part in 10 billion parts of water) for any individual pesticide and 0.5µg/l for total pesticides. For Nitrates the limit is 50 mg/l (50 parts in 1 million parts of water).

The pesticide Figure illustrates types of treatment available to water companies and the increasing difficulties in removing some chemicals. Metaldehyde, which is used in slug pellets, is virtually impossible to remove and clopyralid (a widely used herbicide) is particularly difficult to remove if present in high concentrations. Monitoring for the presence of metaldehyde at water abstraction points in the East Anglia Region is carried out routinely. Data from August 2012 to November 2016 from drinking water abstraction points on the Wissey, Waveney, Nar, and the Wensum showed that, although the actual levels varied at different abstraction points, all showed spikes at the same time, reflecting the impact that rainfall had on mobilising metaldehyde and causing it to enter rivers in field run-off and land drain flows. Land drains are usually about 1 metre depth at every 18 metres or so,

and often gravel backfilled. The spikes were usually highest in the Waveney which probably reflects the high levels of land drainage in heavier clay soils and increased connectivity between fields and the river in this catchment. Much of the land in the Bure catchment is not land drained, as the soils are lighter and more free draining.

Essex and Suffolk Water monitor the concentration of several pesticides and nitrates and phosphates at various points on the River Bure, starting at Itteringham Bridge, moving downstream to Ingworth Bridge, Oxnead Bridge and at Horstead Mill. They also sample the tributaries including the King's Beck at King's Bridge, Scarrow Beck at Scarrow Bridge, Blackwater Beck at Tuttingham, Hevingham Beck at Buxton and the Mermaid at Buxton Road. The abstraction from the river at Belaugh is also monitored when it arrives at Ormesby.

Pesticides can enter water by three different routes. The types and proportions have been estimated as Drain Flow (60-80%), Handling (30-40%) and Surface Run-off (10-30%). Many pesticides will bind to water but not soil. The greatest risk is when these are applied when drains are flowing or start flowing shortly after application. The topic of the day was handling – losses that occur during handling can be significant. Chemicals are concentrated and yard drains provide an easy pathway to the nearest watercourse. Overland flow can occur during any rainfall

event even in the summer when soil moisture deficit is high. The risk can be increased when fields are worked down the slope and soils are compacted.

Advice was given on what to do in the farmyard and in the field. The latter included: Establish at least 6m buffer strip or 5m no-spray zones next to watercourses; only subsoil if there is a pan; don't overwork soil so it can cap after rain; run tramlines across slopes if possible; spray headlands last to avoid picking up pesticides on tyres from sprayed area; where possible avoid establishing tramlines at drilling; don't spray if land is frozen, waterlogged or cracked; plough a deep headland furrow next to watercourse and don't fill it in when drilling; don't dig a trench to a ditch to get rid of ponding.

Farmers are going through their most difficult and uncertain time in 50 years. It is in the mutual interest of water companies and farmers, consumers and wildlife, to minimise on pesticide use and maximise on good practice, to avoid pesticides entering our water courses and aquifers.

**Acknowledgement:** We acknowledge with many thanks the information drawn from the Essex and Suffolk presentation by Ian Skinner and his further explanation. The Figure on the range of treatments for pesticide in the raw water comes from Thames Water.

*Ian Shepherd*

## Glaven Silt Routes: More Work Needed

Reported in our Spring 2018 Newsletter on the ongoing problems of silt loading to the river. We described the well known causes of silt run-off from either muddy roads, flash run-offs from recently cultivated fields into watercourses, and the chronic insidious seepage into drainage ditches which can carry not only silt but potentially harmful excess nutrients and agrochemicals. The damage this all does to the rivers is well documented and widespread. The evidence of diminished aquatic life, especially invertebrates and fishes, in the Upper River Glaven is a great concern to the Group. The whole ecosystem of the river valley is affected.

Efforts to diminish the loss of nutrients, and silt into watercourses, has been the essence of Catchment Sensitive Farming (CSF) which has been encouraged by DEFRA and Agricultural Advisory Bodies in recent decades. Introducing buffer zones of non tilled ground at run-off sensitive zones, moving machinery access to the top end of fields to avoid run-off down tractor wheel gullies, changing cropping choices, and using cover crops to protect the soil in winter are some of the practices farmers can introduce.

Changes in Countryside Stewardship schemes will influence what environmental benefits are achievable. Other factors are the increased tread width of farm machinery in recent decades, and time pressures to get farm product to market can mean that muddy machinery is often on narrow roads in less than ideal weather. If more extreme weather events are to be expected, it will add to the problems. Despite the efforts of many, run-off events continue to occur with depressing regularity. Continued vigilance is necessary. This winter we had a significant run-off from sugar beet loading and other field work into a road sloping down to the Baconsthorpe stream. As usual it was a combination of circumstances and heavy



**Sloping field exits in the upper valley with easy access for run-off to river.**

rain that triggered events. Steps were quickly taken to halt the run-off, but it is often too late to stop silt getting into the river. Preventative steps must be the answer.

Following on from last years observations and previous studies in the Upper Glaven, a plan to look in detail at potential problem areas was put together, with the aim of involving some members of the local farming group with support and advice if wished.

Head of Farming and Water at the Norfolk Rivers Trust, Ed Bramham-Jones, Charlie Ennals at the local Farmers Wildlife Advisory Group

(FWAG) with Lorraine Marks and myself from RGCG, walked the Baconsthorpe and Bodham tributaries on two cold and contrasting winter days. This was very helpful in identifying vulnerable fields and tracks. The next stage is to continue discussions with interested farmers, who have supported the survey work, and see what measures are possible to reduce silt entry and future run-off risk. The NRT have secured funding from WWF and Coca Cola to support this work. It may be said that Coca Cola have an interest in a sustainable supply of Sugar Beet. The harvesting of Beet is at a high risk time for run-off.

The RGCG is also keeping a close eye on the Ofsted Windfarm deliberations, currently with the Planning Directorate. The proposed cabling routes run through the upper Glaven, and we are pressuring (along with many others) to get the HVDC (high voltage direct current) option chosen, which will minimise the soil disruption in such a vulnerable wildlife area. If this excavation work is not done very carefully, there are real dangers to the river catchment ecology that have been expressed.

*Henry Crawley*

**We aim to work in friendly collaboration with landowners and farmers, conservation organisations and relevant public bodies.**

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