



Founded 1905

Knettishall Heath Nature Reserve: Ten years of conservation to create a more natural landscape, and how the journey has reflected the changes in the wider world.

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Knettishall Heath nature reserve is a Breckland site that is a remnant of the former extensive heaths of this area, characterised by very limited tree cover, poor soils and a rich historical timeline. It is a very interesting region where the land itself displays a tapestry of clues to its past which are tightly woven within the unique biodiversity found here. In more recent years it has also become reflective of modern issues such as climate, so here my aim is to offer an insight into the challenges faced in shaping a new nature reserve in the last 10 years and certainly many of the lessons learnt. The trust took over land management here in 2012 and during that time there have been new approaches to traditional conservation methods adopted in general, and most certainly a change to how the reserve has been used by visitors.

To give some background, the area started life as a network of post-glacial inland sand dunes, the scars of the glacial period often remain at the surface, and at Knettishall the periglacial stripes of alternating acid and calcareous soils are one of the best examples in the county. With such complex soils in close proximity and constant disturbance, the resultant ecosystem became reliant on open sandy ground with little competition from more invasive vegetation. With such poor soils the primary industry of the region was rabbit farming, and this continuation of ground disturbance combined with heavy grazing solidified the requirements of the local species. The plants and invertebrates of the Brecks are widely reliant on a short sward and little ground cover. Later ownership of the Knettishall Heath area by the Riddlesworth estate brought about varied land use including excavation for chalk and marl pits as well as a brick kiln, and later still it provided a training area for the home guard and military. To this day the reserve is pock-marked by training trenches, pits, parish boundaries and medieval plough lines, yet more disturbance which has over time provided a variety of niches for wildlife. The 1945 aerial photograph Figure: 1 shows the extent of the open Breck heath landscape at the time, although it is difficult to know whether this was purely through rabbit grazing or through human intervention as well.

The loss of rabbits due to myxomatosis, change in local industry and other changes in local land use instigated yet more change, primarily the loss of the open Breckland heath, and by 2007 woodland was dominating the area as in seen in Figure: 2.



Fig 1: 1945 aerial photo of Knettishall Heath



Fig 2: 2007 aerial photo of Knettishall Heath

10 years of restoration – aiming for a mess

Today the site designations include: Site of Special Scientific interest (SSSI), County Wildlife Site (CWS), County Geodiversity Site (CGS), Special Landscape Area (SLA), Open Access Land, Scheduled Ancient Monument and various

rights of way. When the Trust took over the reserve in 2012, the reserve had been managed as a popular country park for many years, the visitor infrastructure was well maintained, and we wanted to carry on the efforts that had been started to prevent the loss of Breckland heath.

In 2010 the Breckland Biodiversity Audit provided an evidence-based framework which was influential in assessing the priority species in the Brecks, many of which are nationally rare or scarce, and their requirements to inform the next stage of the journey for Knettishall. The key habitats comprised acid heath, calcareous heath, river and river valley grassland, mixed scrub, rides, conifer plantation, wet woodland and mixed woodland. The reserve was put into a Higher-Level Stewardship scheme, whilst a 10-year management plan and a 5-year heathland restoration plan were put together to restore a lot of the lost areas of Breckland and lowland heath, and critically to create a more permeable open landscape to support species that had become isolated.

In order to discover some of the species that had been lost or declined at Knettishall, the Trust had to gather a lot of local knowledge which was crucial in enabling us to shape an informed and educated goal. There has never been any doubt that this goal was most certainly not a fixed habitat that would remain unchanged. I have certainly come to understand that a successful nature reserve, or indeed a wild place of any kind, is one that is flexible and constantly evolving, often within perimeters, but these perimeters are much wider than one might or should anticipate. A resilient nature reserve is one that can be a haven for scarce wildlife specific to its habitats (in particular if this is scarce habitat such as Breckland heath or Alder Carr woodland, (both found at Knettishall) but also at the same time offer a haven for a broad spectrum of biodiversity. Therefore, the aim of the project was to return what had become a compartmentalised space with hard borders between woodland and heathland, to a more fluid fragmented landscape with structural complexity. But what does this look like? The short answer is a wonderfully messy mixture of all stages of succession. For example, at Knettishall an area of grassland or heathland should be interspersed with bare patches, dwarf shrubs and pockets of trees, whilst the most crucial element of scrub of varying ages providing that soft transition into woodland. The crux here is that by creating as much of a mess of habitats as possible, you massively increase the amount of edge habitat and microhabitats closer together. The culmination of resources in close proximity are then far more accessible to the variable life cycles and demands of as many different species as possible. For example, reptiles require open sandy soil to bask upon, as well as good ground vegetation cover to hide and hunt in. Ground burrowing invertebrates are so reliant upon heathland due to their need for the sunny open banks to burrow egg laying holes such as the Bee Wolf *Philanthus triangulum* or Heather Bee *Colletes succinctus*, but at the same time needing access to flowering heathland plants such as heather and bedstraw. Ground nesting birds such as Woodlark *Lullula arborea* and Nightjar *Caprimulgus europaeus* often require scrubby or shrubby areas to nest in cover, whilst having access to open areas for territorial song flights or to feed within the seed bank on the ground.



Figs 3 and 4: area of mature woodland after thinning (top) and the same area of woodland three years on.

In order to achieve this the main part of the project encompassed turning back the successional clock with a programme of tree removal – not hugely popular on any site let alone a nature reserve. We estimated over 50% of what was scarce Breckland heath had become woodland since 1945, mainly secondary woodland and conifer plantation that had reached the end of its ‘crop life’. Clear felling and thinning were followed up by stump mulching and the stripping of the subsequent organic matter such as pine needles, thus exposing the floral seed bank underneath. The immediate impact was not hugely slightly as demonstrated in Figures: 3 and 4, however over the following two years these areas were being quickly colonised by heath, grassland and woodland plants, grazing animals and sun loving species such as Foxgloves *Digitalis purpurea*, butterflies and hunting dragonflies. Throughout the project we have witnessed some of the scarcer indicators of success such as Heath Bedstraw *Gallium saxatile*, Tormentil *Potentilla erecta*, Dropwort *Filipendula vulgaris*, bryophytes,

and lichens quickly move into these areas. The areas of mature woodland have been retained as fantastic habitats in their own right, with well-known woodland practices of glade and ride enhancement utilised to create space around veteran and mature trees.

The other significant change was introducing grazing across a 250-acre area which included the three individually isolated areas of Breckland heath as well as grassland, wood pasture creation areas and mature woodlands. The grazing pressure here is needed to maintain the constant disturbance and fluidity of successional stages in the vegetation. Native ponies such as Exmoor's were chosen to support native rare breeds wherever possible, and ponies were best suited and most resilient to a busy site with lots of visitors encompassing a range of demographics including dog walkers. They also do a great job of grazing with variety, closely cropping turf in some favoured grazing spots, as well as leaving long 'tussocky' grasses in dunging areas, browsing on scrub in the winter and creating bare patches where they dust bathe.

This two-pronged approach to the restoration with both tree removal and grazing introduction has, now 10 years on, resulted in a wonderfully mixed mosaic of habitats as demonstrated in Figs: 5, 6 and 7.

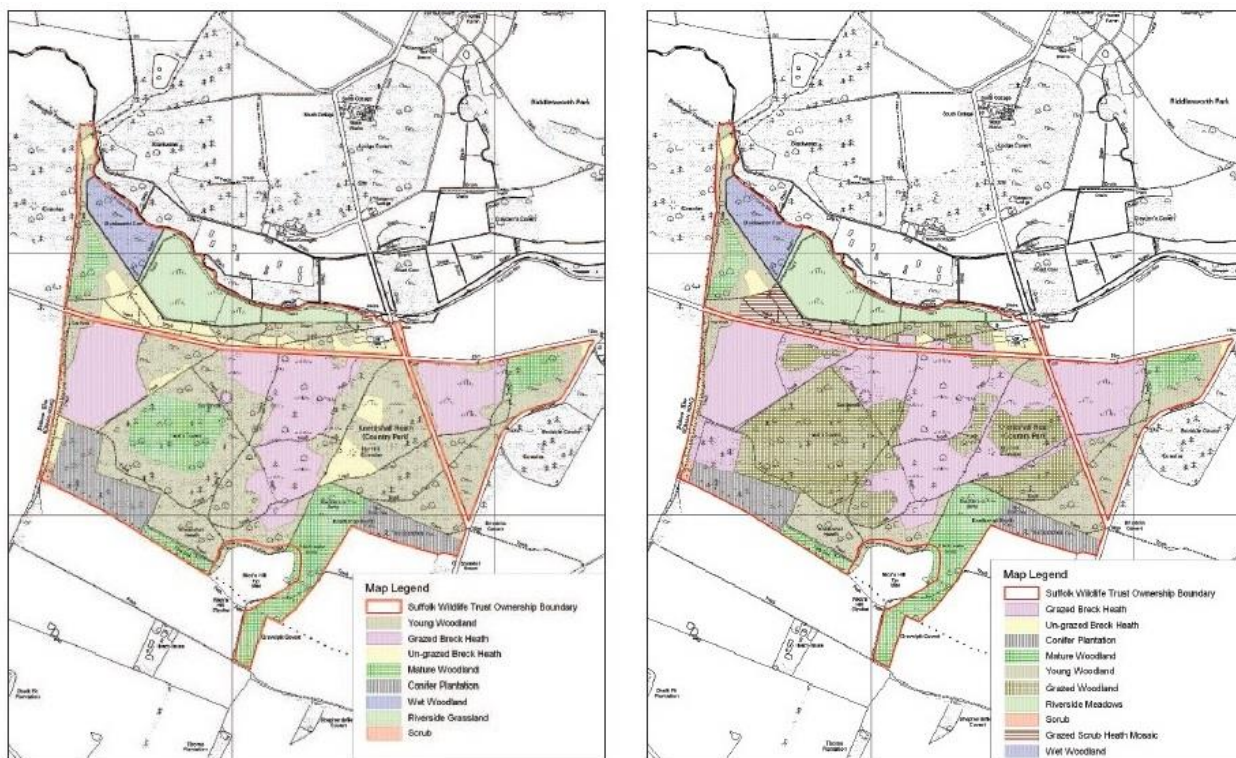


Fig 5: targeted habitat changes over 5-10 years Credit: SWT



Fig 6 & 7: aerial drone photos before and after restoration works Photos: J. Lord

Follow up challenges and achievements:

The most significant challenge in removing woodland to restore heathland is undoubtedly the follow up emergence of scrub, specifically silver birch and Scots Pine *Pinus sylvestris*, Bracken *Pteridium aquilinum* and in some cases Common

Ragwort *Senecio jacobaea*. All these more invasive plants and trees are critical parts of the ecosystem, but if left in what is now such a man managed environment will simply dominate. In some conservation scenarios, such as wilding of a much larger area this is not a problem, but where such rare habitat at the early successional stage is being protected, some control does need to be undertaken but not at the undervalue of scrub itself. The aim is to control enough of these more invasive plants to allow these rarer habitats to thrive, whilst allowing pockets and swathes of scrub and Bracken to also be maintained – as ever a balance. At Knettishall Heath we have adopted an annual winter cycle of scrub removal, very similar to coppicing in a woodland, leaving pockets of scrub of varying age ranges whilst preventing it from dominating. We are lucky enough to have a fantastic volunteer team to help us remove the scrub by hand, although some chemical treatment in the form of weed wiping is sometimes used. In a bid to move away from chemical use, we have also started the process of Bracken bruising as opposed to what is widely viewed as the more successful method of chemical spraying to control Bracken. We are in the early years of this trial, but 4 years along areas of bracken that are being repeatedly bruised are certainly becoming less prevalent.



Team of volunteers who work on the Heath.
Photo: P. Rutherford

Ragwort has always been a challenge for land managers, and I shall not go into much detail here on how controversial it is. Simply put, it is a very important nectar rich food source for a range of invertebrates, and the only plant to support the life cycle of the cinnabar moth. As many people know however it can be poisonous to horses, but critically this is only in its dried form, such as in hay, and this simple fact means some conservationists are keen to leave the live ragwort plants where possible. Where land borders neighbours with equines or meadows that take a hay cut to feed equines Ragwort control is still a necessity. There is growing discussion around the possibility of the annual cut or removal of a Ragwort plant actually putting extra stresses on the local plant population, causing more and more booms of its growth similar to coppicing. There is therefore an increasing view that by leaving the plant to go through its cycle, it may naturally become outcompeted by other plants.

An unforeseen challenge was the Covid-19 pandemic which has undoubtedly had various impacts on many of our nature reserves and local green spaces. Many sites including Knettishall Heath saw a reduction in visitors during the first Spring lockdown, allowing ground nesting birds to thrive, followed by a massive influx of visitors as the limitations on outdoor mixing were more flexible than indoors. Unfortunately, like many reserves we saw an increase in problems such as overcrowding, fly tipping and increased rubbish. However, at the same time we experienced more positive changes of new visitors discovering the joy of their local spot for the first time and wanting to support it through volunteering, donations and becoming members.

Our most recent challenge facing most land managers now is the threat of drought and wildfire. On a heathland site this is merely exacerbating a concern that is always present, and so much of our work this year has been to inform visitors about the risks of disposable BBQs, glass bottles and cigarette butts. The concern now is how regular these prolonged periods of heatwaves and drought stress could become.

The project accomplishments and challenges are very reflective of wider conservation and societal ebbs and flows, so I would like to end on some of our success stories. At the start of the project there was a comprehensive list of over 1300 species recorded over time at the heath, but many of these after initial surveys in 2012 were proven to have been lost. The restoration and maintenance of Breckland heath, species rich semi-natural grassland, the improvement in soft woodland edges and a mosaic of habitats has seen some fantastic wildlife returns in recent years. Some of our positive floral indicators now include Purple Milk-vetch *Astragalus danicus*, Maiden Pink *Dianthus deltoides*, Common Rock-rose *Helianthemum nummularium*, Sheep's Sorrel *Rumex acetosella*, Harebell *Campanula rotundifolia*, Mouse-ear Hawkweed *Pilosella officinarum* and several cushion forming mosses. Heather Bee populations have recovered and over seven species of bat including Barbastelle *Barbastella barbastellus* thrive here amongst the new invertebrate rich glades and rides. We have seen Woodlark, Stonechat *Saxicola rubicola* and Woodcock *Scolopax rusticola* return to breed after long absences, and we hope to attract breeding Nightjar back again someday. Hand in hand with the practical work and crucial to the project has been welcoming our local visitors. Guided walks and events through the project, especially in the tree removal stage have been key in helping visitors understand why we went through that process. In the time the Trust has been at Knettishall Heath, the conservation and the visiting world has changed around it rapidly. Re wilding has become the buzz word now with many diverse interpretations, but perhaps in the least it has raised an awareness for the need for wild places, and amongst land managers to adopt a more flexible approach opening our minds to management techniques, or lack of, that support natural processes more.

Finally, I would like to offer a huge thank you to Steve and Pauline Rutherford from the BNA for their unwavering support and continued species lists after each visit – let's hope we can keep adding to them!

Samantha Norris has worked for Suffolk Wildlife Trust since 2012 and is the Warden of Knettishall Heath Nature Reserve.
Photos: S. Norris unless indicated.

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