

New tools for new times -

delivering a Nature Recovery Network in the White Peak: one year in



PEAK
DISTRICT
NATIONAL
PARK



White Peak Land Management Trials



The White Peak plateau

Natural England and the Peak District National Park Authority (PDNPA), working in partnership with National Trust and six White Peak farmers, have established a series of small-scale practical field trials to investigate a range of potential management interventions and techniques across a suite of typical White Peak farms. The principle aim is to investigate new ways farmers and land managers can deliver for the environment, in particular how to link fragmented wildlife habitats across the agriculturally productive White Peak plateau.

Agreements are funded by the PDNPA for a period of five years, and began in summer 2019.

Defra's Environmental Land Management scheme (ELMs) White Peak Test

Natural England and the PDNPA worked with a wide range of partners, farmers and land managers through the Peak District Land Managers' Forum and the White Peak Partnership to develop ideas for ELM. In 2019, the White Peak Test was successful in becoming one of Defra's Phase one ELM Tests & Trials. The Test has focussed on the White Peak for the first year, and is now extending into two other National Character Areas for a further year, running until October 2021.

The findings of these practical trials will form part of the results from the White Peak Test that will be fed back to Defra, and it is hoped that learnings can be integrated into the development of ELM as the main tool for delivering Defra's 25 Year Plan for the Environment in the White Peak.

Where might the trials lead? A vision for the future...

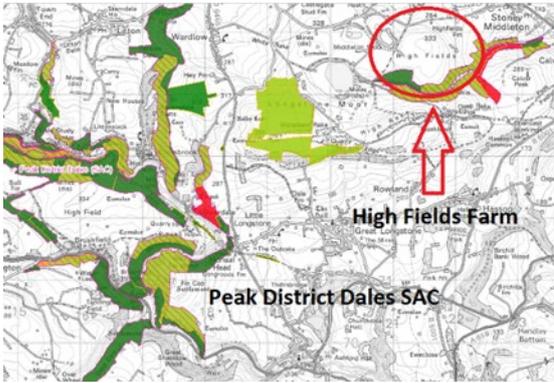
The ambition of the trials is for learning to be fed into the design of ELM, with the aim of securing the tools necessary for landscape scale delivery within the White Peak and throughout England. Simple, practical management interventions coupled with informed targeting, empowered farmers and land managers, collaboration, technological innovation, accessible advice and appropriate incentivised payment rates are likely to be key ingredients to success.



Hay meadow seeded in 2011

This report draws out some of the initial findings and lessons learned from the first full year of the trials.

Better - structural diversity within Priority Habitat



Location of land at High Fields and the Peak District Dales Special Area of Conservation (SAC)

In 2018, National Trust purchased 80ha at High Fields Farm on the White Peak plateau. The land is important both for its existing special interest and potential to fulfil a key role in the future delivery of a Nature Recovery Network.

In partnership with Natural England and the PDNPA, a Higher Tier Countryside Stewardship agreement was developed, with the aim of pioneering management techniques to enhance the structural diversity of existing Priority Habitats without detracting from their quality or extent. A range of methods are being explored to introduce scrub and dwarf shrub species, together with extensive year-round grazing of native breed cattle.



Establishment techniques at High Fields

An extensive grazing system has now been introduced centred around a herd of hardy breed cattle, which range across the entire block of land and remain on site all year round. The aim is to mimic a naturalistic grazing regime with cattle creating variation in sward characteristics across the site through their natural patterns of behaviour. Stock numbers are designed to achieve very light grazing during the summer season, whilst allowing for self-sufficiency through the winter. The approach has got off to a good start, with cattle settled and a lightly grazed, tussocky flower-rich sward observed throughout the summer.

A range of active interventions were to commence during the summer of 2020, but due to the Coronavirus pandemic it has not been possible to draw on volunteer labour needed for many of the tasks, including collection of heather brash, wildflower and scrub seed. However, contractors were able to begin the process of introducing more wildflower species to certain parts of the site through creation of bare ground and spreading species-rich green hay across 30 acres of former silage fields.



Preparation of bare ground for green hay spreading, High Fields
1 September 2020

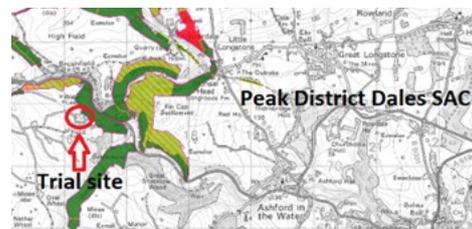


Green hay spreading, High Fields
7 September 2020

The vision - to expand high value sites onto adjacent productive soils.

Summary of year one findings

First year monitoring surveys suggest little obvious difference in the establishment of sown grass and herb species between areas treated with glyphosate and surface power harrowed, and those ploughed and power harrowed (whether treated with glyphosate or not). Species establishment was notably worse in areas surface power harrowed without glyphosate pre-treatment. At this early stage, this indicates that glyphosate treatment followed by surface cultivation may be the best way to establish wildflowers whilst minimising soil carbon loss.



Location of scrub pasture trial site and the Peak District Dales SAC

Cutting and removal of the sward to encourage rooting, tiller grasses and remove annual weeds worked well, with good regrowth of sown grasses and herbs. The cut also stimulated the herbs to flower.

Cattle were introduced for one month between mid September and mid October, quickly settling on the flower-rich sward and helping to create a tussocky and variable structure for winter. This is an encouraging start, suggesting there is potential to introduce botanical and structural diversity to fertile and productive soils. Going forward, the trials will assess whether introduced species persist and how easily light, scattered scrub and small tree species establish under different grazing regimes.

Beech Farm, Taddington

The creation of structurally diverse grassland with a scatter of wildflowers and occasional tree or scrub species is being trialled. It is envisaged that this could provide optimum conditions for wildlife to expand out from protected sites and move throughout the landscape.

Two fields of productive perennial ryegrass sward used for silage production immediately adjacent to the Wye Valley SSSI offered the opportunity to buffer and extend the SSSI.

Soils are free-draining sandy silt loam over limestone, with a pH of 6.4 and Phosphate (P) and Potassium (K) indices of 2.

On 6 September 2019, a variety of seedbed preparation techniques were used - traditional ploughed and cultivated or surface-only cultivation. Both methods included pre-treatment with and without glyphosate. The aim was to assess the relative costs and benefits of species establishment and soil carbon release. Both fields were sown with a diverse seed mix containing a wide range of UK native grasses and herbs, including a range of robust herb species which are more likely to persist within a fertile soil. Seed was applied using a power harrow mounted air-seeder.



Layout of sward establishment techniques, Beech Farm



Ryegrass dominated silage field, Beech Farm 16 July 2019



Power harrowing & seeding direct into sprayed sward, Beech Farm 6 September 2019

The sown species were generally slow to establish and within surface power harrowed areas that hadn't been treated with glyphosate, the ryegrass was quick to return. Chickweed generally took advantage to form a carpet over areas treated with glyphosate. There was also some concern about erosion and surface capping of bare soil, particularly within ploughed areas.



Power harrowed only, Beech Farm
30 September 2020

By April, within ploughed and glyphosate/ surface power harrowed areas, the fine-leaved grasses were beginning to get going, still with a substantial cover of bittercress and chickweed. There was generally plenty of opportunity for sown herb species due to the amount of bare ground, with many seedlings in evidence, including ribwort plantain, oxeye daisy, red campion and knapweed.

By 30 June there was good establishment and ground cover across all treatment areas in both fields. Within the areas power harrowed without glyphosate pre-treatment, a thick ryegrass sward prevailed, with only a thin scatter of herbs such as red clover, hay rattle and oxeye daisy beneath. Within the areas pre-treated with glyphosate and then power harrowed, there was significantly higher herb cover. The ploughed areas, both with and without prior glyphosate treatment, also contained a high proportion of herbs, with crested dog's-tail forming the dominant grass species.

The sward was removed from all areas on 1 July to encourage rooting, tiller grasses and remove annual weeds. This worked well, with good regrowth of sown grass and herb species. The cut also stimulated the herbs to flower.



Glyphosate & power harrowed sward
Beech Farm 16 March 2020

Glyphosate & power harrowed sward
Beech Farm 30 June 2020

Glyphosate & power harrowed sward
Beech Farm 30 September 2020

In order to remove the bulk of herbage, place the sward in a good position for regrowth the following spring and create tussocky conditions suitable for invertebrates and small mammals during the winter, 15 young cattle were grazed from 7 September to 10 October 2020. Having just come from a grass dominated sward, the cattle were a little unsure what to make of this herb-rich pasture at first, but quickly settled and could be observed eating a wide variety of herb species.

The main observations during establishment have included the ability of the sward to establish despite disadvantageous conditions such as heavy winter rainfall, drought and surface capping.



Young cattle grazing wildlife pasture
Beech Farm 24 September 2020

There was little obvious difference in the establishment of sown grass and herb species between treatment with glyphosate and surface power harrowing, and ploughing with power harrowing with or without glyphosate. Surface power harrowing without glyphosate pre-treatment was the least successful approach in terms of herb cover, which was mainly restricted to patches of red clover. This suggests that treatment with glyphosate followed by surface cultivation may be the best way to establish the mix whilst minimising soil carbon loss and stimulation of weeds in the seedbank.

The cattle had no problem in taking the herb-rich sward and appeared to actively target certain species.

Year two will determine the most effective method(s) of introducing scattered scrub and tree species to create more structural diversity. Seed from local scrub and tree species was collected by hand during autumn 2019 and subjected to a number of treatments - cold, stratification and growing on into whips. Some of the chitted seed was planted during spring 2020, with young seedlings due to be planted out over the coming winter. During 2021 the two fields will be grazed at different stocking densities and times to trial the most successful approaches to controlling coarse grasses whilst allowing wildflowers and scrub to thrive.

The vision - a scatter of herbal leys across the plateau, with some being allowed to flower at any given time.

Herbal leys have so far failed to gain much traction in the Peak District, most likely due to the intensity of grassland management and the rules associated with the current Countryside Stewardship herbal ley option (GS4), which are unfavourable to all-grass systems. However, through the practical field trials and White Peak Test, there has been significant interest in the concept of herbal leys and if these issues can be overcome, herbal leys could be used across the White Peak plateau.

A suite of herbal leys have been sown across five different farms within fields recorded as PG01 Permanent Grassland for Basic Payment Scheme purposes, the sward having first been surveyed and verified as improved (G01) grassland using Natural England BEHTA criteria. Different techniques and timings have been used to establish the leys, which will now be managed in a variety of ways to determine whether season-wide flowering can be achieved at a landscape-scale under a mass uptake scenario. The first year has largely concentrated on establishment, with management variations to be fully implemented from year two onwards.

Summary of year one findings

Early indications are that establishment of the herbal ley by over-seeding, preceded either by surface power harrowing or tine cultivating into a sward treated with glyphosate appears to be just as effective as the preparation of a conventional seedbed - at least for spring sowing. Over-seeding without prior application of glyphosate resulted in a poor take of legume and herb species, and significant competition from the old sward.

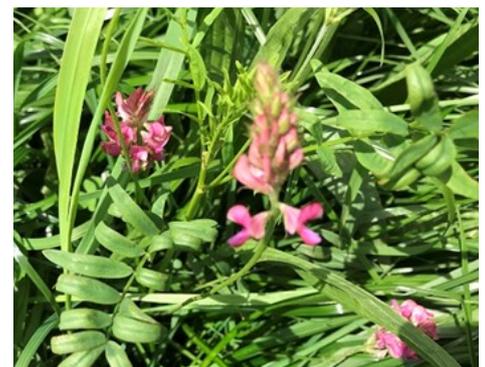
Weed control has proved to be critical when ploughing or deeper cultivations are used, even if the old sward appears weed free. This adds to the case for using shallow cultivation as an establishment technique. Early grazing five to six weeks after germination also appears to be helpful in encouraging the species to tiller and root, in addition to consolidating the soil.



Herbal ley in full flower, Standhill Farm
19 July 2020

Considering that most soils were of similar character overlying the limestone, there were notable differences in the suite of species established at each site. However, the diverse seed mixes still resulted in a sufficiently varied sward to provide a flowering resource throughout the season, with nectar and pollen being available for invertebrates from June right through to the autumn. Early English vetch was typically prominent in the early part of the season, with red clover being of greater significance later on. This suggests that setting prescriptive targets for the number or percentage of flowering species present in the sward may not be particularly useful provided that a diverse seed mix is used.

Perhaps the most important finding lies in how pleased participants have been with their herbal leys, with several aiming to establish additional areas without financial support. All reported grazing cattle to be very settled and actively choosing to graze the leys in preference to ryegrass when given the choice. The findings from year two will show if this is reflected by the experience of feeding conserved forage over the winter period. Such positive feedback tends to support the view that a change in eligibility criteria permitting the use of supported herbal ley options on land classified as PG01 Permanent Grassland, coupled with a simplified approach to management requirements, could potentially result in a large increase in the flowering resource for pollinators across the White Peak plateau.



Sainfoin within diverse ley, Bent Farm
19 July 2020

Harley Grange, Earl Sterndale



Layout of establishment strips, Harley Grange

A herbal ley cutting mix was sown into 4.19 acres of well-drained, loamy sand over limestone (pH 5.8) on 2 May 2020. Soil P index was 3, whilst K index was 2. The seedbed was prepared using a variety of techniques in strips sited immediately alongside each other for comparison - ploughed and power harrowed, surface power harrowed straight into the sward, or surface tine (comb) harrowed. All techniques were tried with and without the application of glyphosate, with seed sown through an air-seeder.

Initial concerns over dry seedbed conditions were soon allayed with the arrival of rain in May. A light graze with the dairy herd on 13 July helped to knock back patches of chickweed and encourage rooting and thickening of sown species. A patch of creeping thistle within one of the ploughed areas was weed wiped on 29 July following a further graze.

The first silage cut was taken on 12 September, yielding a respectable 22 five foot square bales of 500kg each. The sward was lightly grazed again by the dairy herd on 22 September, with a final graze on 6 October.

Early indications are that the over-seeding technique, preceded by either surface power harrowing or tine harrowing into a sward pre-treated with glyphosate appears to be just as effective as the preparation of a conventional seedbed for spring sowing. Conversely, over-seeding without prior application of glyphosate resulted in poor take of legume and herb species, and significant competition from the original ryegrass sward.

There was generally good representation of sown species including ribwort plantain, red clover, white clover, alsike clover and sweet clover, bird's-foot trefoil and early English vetch. The owners noted that the cows clearly wanted to be in the herbal ley, rather than the adjacent ryegrass fields, and are considering sowing an additional field next spring.



Herbal ley over-sown into a sprayed sward (left) and non-sprayed sward (right), Harley Grange

Bent Farm, Tissington

A herbal ley cutting mix was sown into a 4.5 acre field on well-drained sandy loam soil over limestone, with a P index of 2 and K index of 3 (pH 6.4). The field was prepared by burning off the old sward with glyphosate once during autumn 2019, and then again in early April 2020 to control weed regrowth. The field was disked, power harrowed and then shallow drilled on 19 April 2020. Plans for a longer stale seedbed to control weeds were cut short due to dry spring conditions and concerns over lack of soil moisture.

With the arrival of rain later in May, the ley got off to a very good start, with good establishment of a wide range of the sown species including ribwort plantain, red clover, white clover, alsike clover and sweet clover, bird's-foot trefoil, lucerne, sainfoin and early English vetch. Very little weed cover was apparent.



Good early establishment, Bent Farm, 19 June 2020



Complete ground cover of sown species, Bent Farm, 19 July 2020

A first silage cut was taken on 19 July and again on 6 September after a period of flowering. Unfortunately, quite a bit of soil was found in the crop on both occasions, possibly due to a slightly fluffy seedbed and machinery sinking into the ground, which may in turn be due to the very dry conditions at sowing and perhaps insufficient consolidation. The ley was grazed by dairy heifers in mid-September, with the owner noting how settled they were. Despite soil contamination, initial impressions of the silage were good, with the owner commenting "if you had a clamp full of that, I think you'd be quite happy".

Church Lane Farm, Great Longstone



Flowering red clover, Church Lane Farm
30 August 2020

A herbal ley cutting mix was sown into a small field of just over an acre on a sandy silt loam soil over slowly permeable subsoil (pH6.1). The seedbed was prepared by spraying the old sward with glyphosate, applying farmyard manure (to raise P and K indices from 1 towards 2), ploughing and power harrowing. Seed was sown using an air-seeder on 19 August 2019.

The emerging herbal ley contained a scattering of chickweed, with rabbit damage to some of the ribwort plantain. From 12-15 April 2020, 60 sheep were grazed to remove weeds, encourage rooting and thicken the sward. This was then left as long as possible to allow early flowering before being cut for haylage on 17 July, producing seven round bales. A second cut was

taken in the first half of September, the owners noting a greater amount of flowering clover on the second cut than the first. This could be due to greater presence of clover, or due to stimulation of flowering by the first cut.

Dominant species during the first year were ribwort plantain, red clover, white clover and alsike clover. Early English vetch was prominent before the first cut.

The owners were very pleased with the first year performance and have already sown an additional field with herbal ley mix.



Flowering alsike clover and
early English vetch, Church
Lane Farm 11 July 2020

Standhill Farm, Great Longstone

As the only herbal ley within the trials to be managed solely by grazing, a mix tailored towards grazing was sown into a 6.5 acre field on well-drained sandy silt loam soil over limestone, with P and K indices of 3 (pH6.1). In the absence of any historic weed problem, the decision was made to prepare the ground by shallow ploughing, power harrowing and sowing using an air-seeder on 21 August 2019. The thin soil profile presented some difficulties to ploughing, particularly over the upper slopes of the field.



Rabbit damage to ribwort
plantain, Standhill Farm
18 October 2019

Early establishment was patchy with some severe rabbit grazing, particularly of ribwort plantain. Chickweed was present throughout, together with a scattering of spear thistle seedlings. Rabbit control was organised by the owner.

The sward was lightly grazed by the dairy herd on 4 May 2020 and 1 June to thicken the sward and reduce chickweed. Spear thistles were flail topped after grazing. A further light graze took place on 16 June before a top-up of seed was added over bare patches on the upper slopes of the field. This worked well, with almost complete ground cover achieved by mid July. The sward was grazed again on 28 July prior to weed wiping of spear thistle.

Unfortunately, this was only partially successful due to insufficient height difference between sward and thistles, so thistles were flail topped instead. The ley received its last graze of the season on 19 October, with some key lessons learned for the following season.

Thistle control has been a significant problem to overcome and highlights the risks presented by an unknown seed bank - this

could be an argument for surface-only cultivation. Four variations of grazing cycle will be implemented from year two onwards, with the aim of delivering flowering throughout the season whilst maintaining forage quality. Thistles will be weed wiped following a hard graze within each compartment.

The establishment of this ley presented the greatest number of challenges of the five farms trialling herbal leys, but also resulted in the greatest range of sown species including the full range of clovers, lucerne, sainfoin, bird's-foot trefoil, yarrow, burnet forage herb and sheeps parsley. This may be due to the very thin, calcareous soil.



Dairy herd grazing herbal ley, Standhill Farm 28 July 2020



Spear thistle after graze,
Standhill Farm
28 July 2020

Lower Cumberland Farm, King Sterndale



Early English vetch in first cut silage, Lower Cumberland Farm
16 June 2020

A 4.63 acre silage field was selected as a suitable location for the new herbal ley, soil type being sand silt loam over limestone with a pH of 5.7, P index 2 and K index just below 2.

The ground was prepared by destroying the old sward with glyphosate and applying farmyard manure before ploughing and power harrowing. The herbal ley was sown using an air-seeder on 5 September 2019, using a seed mix tailored to management by cutting, and included early, late and native varieties of red clover.

Whilst relatively slow to take over winter, warmer temperatures in spring resulted in a good, even cover. The ley was then grazed by 40 ewes for one week in early April 2020 to promote rooting, thicken the sward and knock back early establishment weeds such as chickweed and mousear.

The sward was cut for silage on 22 June 2020, yielding a respectable first season cut of 30 bales. The cut was followed by an application of straight phosphate fertiliser to raise the soil index above 2. The first cut yield was equalled by the second cut on 31 August 2020, after a period of around three weeks in full flower. As of October 2020, the ley has regrown again nicely and will be grazed by lambs during autumn. The owners are particularly keen to see how the herbal ley silage feeds alongside ryegrass silage over the winter.



Regrowth of herbal ley, Lower Cumberland Farm, 4 August 2020



Flowering red clover, Lower Cumberland Farm, 17 August 2020

Dominant species during the first year included ribwort plantain, red clover, white clover and alsike clover, with clovers doing particularly well on the second cut. Early English vetch was prominent prior to the first cut.

The vision - a network of structurally and species diverse grass margins.

In August 2019, diverse seed mixes were sown within 3m margins around silage fields on three separate dairy, beef and sheep farms to create tussocky grassland. Once established, the margins were to be managed without inputs and remain uncut but aftermath-grazed with the rest of the field.

Summary of year one findings

The margins were generally easy to prepare and sow, with 3m being both a width the farmers were comfortable with and the road-legal width of a power harrow.

The establishment of wildflower species within the margins was typically scattered with a low cover regardless of technique used. Ryegrass persistence and incursion from the adjacent silage crop also presented an issue where established by surface seeding into an untreated sward. This was less evident where pre-treated with glyphosate.

All the margins were cut and removed at least once during the first year to encourage establishment of the sown mix and control growth of productive grasses - this is considered essential.

Weed control, particularly with respect to docks, proved to be an issue where the margin was established by ploughing, potentially due to inversion of the soil and exposure of weed seeds to light.

Where the margins were only cut once, they have already developed a tussocky structure going into winter, demonstrating their potential value for invertebrates, small mammals and their predators.

Bent Farm, Tissington

A network of 3m margins was ploughed, power harrowed and drilled in late August 2019 around a 9ha block of former wheat fields going into grass. A further 4ha field was drilled in early September, the rest of the field going into wheat for whole-crop. The soils are sandy silt loam with P and K indices of 2 (pH6.7). The seed mix comprised a wide range of UK native grasses and herbs, including robust species likely to persist in a high fertility soil.

Heavy rainfall over the winter period resulted in a significant amount of soil erosion and surface capping, which hampered early establishment and resulted in patchy cover of grasses and low cover of herbs. A scatter of dock seedlings was evident throughout the silage fields and the margins.

The margins around the silage fields were cut twice during the summer with the adjacent grass crop to encourage rooting, tiller the grasses and remove annual weeds. Due to the large number of young docks and relatively low herb cover, a pragmatic decision was made to boom spray the margins along with the cropped area, rather than spot spray. The margins around the 4ha wheat field were also mown once after the whole crop had been removed in late July and sprayed for docks late in the summer.



Eroded 3m margin around wheat field, Bent Farm
18 February 2020



3m margin around wheat field, Bent Farm
19 July 2020



Tussocky 3m wildlife margin, Bent Farm
13 October 2020

As of October 2020, weed control appears to have been largely successful with docks now within levels practical to control by spot spraying. Similarly, there are now only a few stretches of margin with low ground cover, which should thicken up naturally without the need for additional seed.

The margin around the 4ha field, cut only once, has already developed a tussocky structure, demonstrating the potential value of these margins for invertebrates, small mammals and their predators. Experience at this site also highlights potential issues arising from intensively managed soils, such as weed burden, especially when soil is inverted by ploughing. Ryegrass incursion from the adjacent silage crop may also prove to be an issue.

Beech Farm, Taddington

3m margins were sown around a 3ha silage field on 12 September 2019. The soil is a well-drained sandy silt loam over limestone, with P and K indices of 2 (pH 6.5). Ground preparation involved direct power harrowing into the surface of a short sward, with seed delivered by a mounted air-seeder. Two margins were sprayed with glyphosate several weeks before sowing, with the other two receiving no glyphosate pre-treatment.

Sheep grazing the adjacent silage aftermath in October were permitted to graze the non-sprayed margin to control regrowth from the old sward, but not the sprayed area.

The sward was slow to establish over the winter and included a patchy cover of bittercress and mousear, but this thickened out following two cuts with the adjacent silage crop. The result was a good cover of grasses and a scatter of herb species including ribwort plantain, autumn hawkbit, oxeye daisy, bird's-foot trefoil, red campion, red clover, knapweed and yarrow. Very little in the way of weeds was noted, potentially due to surface only cultivations without inverting the soil.



Early sward within 3m margin, Beech Farm 16 March 2020



Well established 3m margin after silage cut, Beech Farm 30 June 2020

Lower Cumberland Farm, King Sterndale

A mixture of 3m and 6m margins were sown along a 380m section of the boundary between silage fields and the adjacent SSSI daleside. The soils are a free-draining sandy silt loam over limestone, with a pH between 5.7 and 6.2 and moderately low fertility (P index 1 and K index 2). The existing ryegrass sward was cut and removed for silage on 10 September 2019 before being surface power harrowed and seeded on 13 September. The margins were electric fenced whilst cattle aftermath grazed the silage during the autumn.

Whilst slow to establish over the winter and early spring, the grasses soon thickened out following two cuts with the adjacent silage crop in the summer of 2020. Both weed and herb cover were relatively low, with scattered oxeye daisy, knapweed, bird's-foot trefoil and hay rattle within a grass-dominated sward. This was particularly the case with the 6m margins, most likely due to regrowth and competition from the original grass sward.



3m wildlife margin adjacent to SSSI, Lower Cumberland Farm 6 March 2020



3m wildlife margin adjacent to SSSI, Lower Cumberland Farm 21 July 2020