Hay Time
Saving our precious meadows

Hay Time Rescue

Final report of the

Hay Time Rescue project

September 2018 – November 2019

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YORKSHIRE DALES MILLENNIUM TRUST
Patron HRH The Prince of Wales

LANCASHIRE ENVIRONMENTAL FUND

FOREST OF BOWLAND
Area of Outstanding Natural Beauty

Contents

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FOREST OF BOWLAND

Area of Outstanding Natural Beauty

1. Summary

Hay Time Rescue was a project funded jointly by Lancashire Environmental Fund, Yorkshire Dales Millennium Trust and Forest of Bowland AONB.
Continuing the hay meadow restoration work in the Forest of Bowland, the project aim was to bolster the population of some of the scarcer plant species in the Forest of Bowland, by extending and managing the areas where they are currently found, with the support of farmers, land owners and volunteers. Working closely with Lancashire Environmental Records Network (LERN), historic and current records were used to give an indication of suitable seed collection and re-introduction sites.
The work focused mainly in the species rich hay meadows and pastures in the area, but also included some special verges. The project ran from the end of September 2018 to the end of November 2019. Engaging volunteers, landowners, community groups and Kew Millennium Seed Bank to grow local, sustainably sourced seed into plug plants, the project has successfully re-introduced 1100 plug plants of three scarce plant species at eight different sites across the AONB.
The field scale hay meadow restoration work carried out through the Hay Time project continued, with 13 ha of meadows having restoration or enhancement work over the summer and autumn of 2019.
The project has worked successfully with land owners, community groups and with schools. Over the course of the project our public events attracted over 80 people, sharing seed collection and propagation knowledge with landowners, both within and outside Forest of Bowland AONB, and educating local school children on the importance of wild flowers.

2. Introduction

A species rich hay meadow, Forest of Bowland, 2012

YDMT and Forest of Bowland AONB have reintroduced wildflowers to over 700 hectares of degraded meadows across the region since 2006, making important strides in helping to safeguard meadows and the hundreds of species of native wildlife that they are home to. Unfortunately, wildflower meadows are still one of the most threatened habitats in Britain, with 97% of traditional species-rich meadows having been lost since the 1940's. With much more still to be done, the project is building on the success of Bowland Hay Time between 2012 and 2015, and following on from Networks for Nectar, and Wildflowers for the Meadows 2014 – 2017. All of these projects have been made possible with funding by the Lancashire Environmental Fund. The Hay Time Rescue project aim was to bolster the population of some of the scarcer plant species in the Forest of Bowland, by extending their populations through plug planting in suitable sites across the AONB.

Globe flower near Gisburn Forest, 2018, C. Edmondson.

Delivered by Yorkshire Dales Millennium Trust in partnership with Forest of Bowland AONB, this 14-month project engaged local volunteers and Kew Millennium Seed Bank to propagate and "foster" sustainably collected seed into plug plants.

The four key species were bird's-eye primrose *Primula farinosa*, globe flower *Trolllius europaeus,* melancholy thistle *Cirsium heterophyllum* and saw-wort *Serratula tinctoria*.

These species were once widespread in our meadows, road verges or stream and river banks, but have now declined into scattered, isolated populations around the area. In particular bird's eye primrose is listed as a nationally scarce species, is a Lancashire BAP target species and in 2012 cited as decreasing globally on the IUCN Red List.

Using data provided by the Lancashire Environmental Records Network (LERN) team, surveying and soil testing potential sites, suitable locations for seed collection and re-establishing populations were found.

Kew Millennium Seed Bank at Wakehurst Place in Sussex was commissioned to produce approximately 1000 plug plants from locally sourced seed of the four key species for the project.

Saw-wort at Hole House, 2018, C. Edmondson.

Melancholy thistle, Slaidburn AONB 2013,.

Bird's-eye primrose, L.Kriko, 2005

3. Suitable Site locations

The site locations for the plug plants were chosen carefully with many aspects to be taken into consideration.

Historic and recent records for each species were supplied by the team at LERN, and used to build up a picture of the distribution of each species. Interactive pdf's were provided and are an invaluable tool for examining each record e.g date of records, details on the location and the numbers recorded.

The Flora of West Lancashire (Wheldon & Wilson, 1907) and Flora of North Lancashire (Greenwood, 2010) were also consulted to develop an understanding of historic and present distributions, in addition to research on the environmental preferences of each species.

Soil samples were taken at donor and potential receptor sites for comparison, and to ensure the suitability of receptor sites.

Sites were investigated for their current management, soil type and pH. The existing flora at a location can indicate if the site is suitable, should the species list match that of an existing site for the species in question. Therefore botanical surveys were undertaken at existing and potential sites to assess their compatibility.

Example map of historic record locations for globe flower in the Forest of Bowland, as supplied by LERN.

Some species such as globe flower are susceptible to competition from more vigorous flowers and grasses, with some species preferring a certain aspect or gradient on the site.

Site choice for melancholy thistle plugs at Gathering Fields, near Scorton. Damp stream banks are often favoured by this species.

Current management practices can be the reason for a particular species no longer being present; such as grazing regime and intensity, fertiliser addition, or complete absence of management leading to the site being overgrown with scrub and vigorous grasses.

All of the above factors were taken into account when choosing the sites for re-introduction. A map of all the sites where plug plants were planted out is included at Appendix 1.

4. Seed Collection and Propagation

Saw-wort, seed heads ready for collection at Hole House Lane Meadow, Slaidburn. 2019, C.E.

Globe flower seedlings germinated at New Laithe, Newton-in-Bowland. 2018, C.E.

The seed for the project was collected in late August and September 2018 from various sustainable and long standing populations in the area. No more than 25% of the available seed was collected at any site, to ensure that the population would not be affected. The grid reference for each site was collected by GPS to enable the creation of a GIS map layer at the end of the project showing all the donor sites and receptor sites, with positions accurate to <10m (*Appendix 1*).

The seed was collected on dry days, and put into paper bags, rather than plastic, to keep the moisture levels to a minimum. Each collection was split, with 50% going to Kew Millennium Seed Bank, and the remainder distributed among the five volunteer growers, and a small amount retained in the collection at the AONB. The seed was sown into trays by the volunteers as soon as possible following collection to maximise the viability, as they can start to deteriorate once picked if not in the right conditions (Appendix 2: Kew MSB Seed Collection Notes). Peat free compost was used as the medium, and most were left out to "stratify", that is to experience a frost to stimulate germination. Some were moved under cover in spring, and then potted on when large enough.

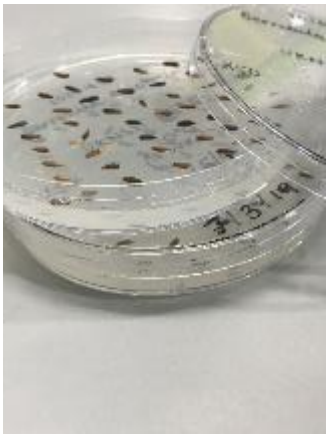
Overall the success rate of germinated seed to plug plants was very high (average 80%), with over 600 globe flower plugs being produced by one volunteer.

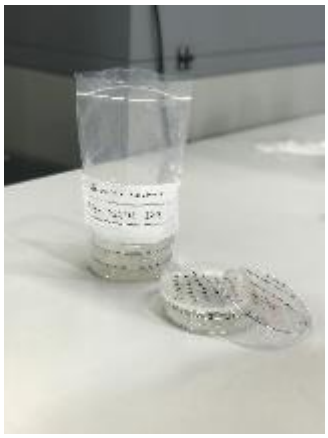
Melancholy thistle *Cirsium heterophyllum* was also grown from root cuttings. These were taken when the host plant was dormant (between November & December), cut into 2" pieces and potted into peat free compost. Although they grew on earlier than the seed, the plug plants were of a similar size by August. Some were so vigorous they were planted out at Stephen Park meadow, Gisburn Forest in August 2019 as they were outgrowing their pots by then.

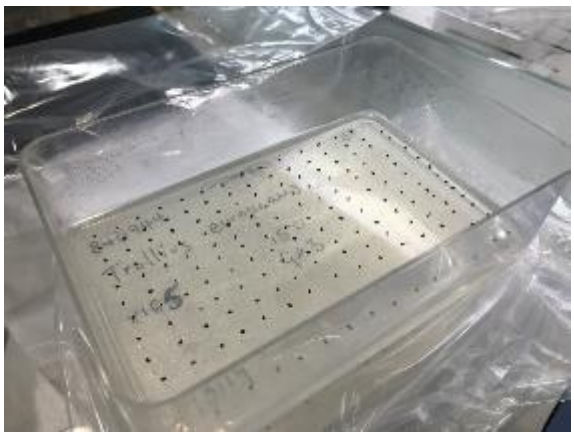
A further seed collection was made in the autumn of 2019 of saw-wort and another scarce and declining hay meadow species; dyer's greenweed, *Genista tinctoria.* Both species were sent to Kew Millennium Seed Bank for future use.

5. Kew Millennium Seed Bank

Building on our previous visits to Kew Millennium Seed Bank at Wakehurst in Sussex, they were commissioned to grow plugs of all four key species for the project. Seed collected from suitable Bowland populations of globe flower, saw-wort and melancholy thistle were sent to Kew, and bird's-eye primrose from a population just over the border in the Yorkshire Dales were used from the seed banks resources.







Hay Time Rescue seed set in agar for germination, 2018, Kew Millennium Seed Bank.

The seed was first tested for viability before being sown out in agar trays, and kept in incubators at the appropriate temperature for each species' germination. The globe flower and saw-wort seed were also scarified (i.e. abrasion of the surface) to encourage germination before sowing.

All species germinated well with the exception of the bird's-eye primrose, which had a very low seed to plug plant success ratio, with only 36 plants produced from 750 seeds sown. The saw-wort produced 232 plants from 300 seeds, globe flower 390 plants from 500 seed and melancholy thistle 157 plants from 260 seeds.

Full propagation notes are available to view at Appendix 3. The plants were collected at the end of September 2019, by which time they were all vigorous and ready to be planted out. I was given a tour of the wonderful facilities at the seed bank, which helped to understand the seed collection process from when they receive the seed, through sorting and testing and the sub-zero (-20^{o}C) storage facilities for the worlds' seed collection.

More details of the seed bank and the whole process can be found here: https://www.kew.org/science/collections-and-resources/research-facilities/millennium-seed-bank

Unfortunately, some of the globe flower and bird's-eye primrose plants had been contaminated with some non-native seed, and therefore had to remain at Kew until spring 2020, to ensure any further stray seed has germinated.

Hay Time Rescue plug plants out in cold frames at Kew Millennium Seed Bank June

The drying room and sorting rooms at the Millennium Seed Bank 2019, C.E.

Inside one of the incubators and the sub-zero storage chambers at the Millennium Seed Bank 2019, C.E.

6. Plug planting

The end of September to Mid- October is the ideal time of year to plant plug plants out in the field, as this gives them the maximum growth period in their pots, plus gives the roots time to acclimatise in their planted location before they begin to die back for winter.

Children from St James' Primary School in Clitheroe came out and helped to plant over 30 melancholy thistle and 50 saw-wort plug plants at Stephen Park meadow, Gisburn Forest. They worked really well as a team and were keen to learn about why wildflower and pollinator conservation is important.

Pupils from St James' School enjoying their plug planting experience, Gisburn Forest 2019, C.E

Bell Sykes farm in Slaidburn, the site of the Coronation Meadows and donor for much of the green hay in our restoration work, was both a donor of the melancholy thistle seed, and a receptor for globe flower, saw-wort and melancholy thistle plug plants in separate areas of the farm. Six globe flower plugs from 2016 seed were planted in the spring of 2019, with mesh guards to protect from grazing animals. One group of three did really well, producing a flower head and seed, but the remaining three were devoured by slugs. They may, however come through again in 2020.

The site for the globe flower is a north-west facing slope of rough pasture infrequently grazed by low numbers of sheep. With the help of two volunteers, a further 100 plugs were added in the same two areas in October 2019, with the additional protection of sheep fleece to guard against slugs.

Plug plants in situ at Bell Sykes Farm, Slaidburn, October 2019, C.E.

In addition, 23 melancholy thistle plants and 69 saw-wort were planted in the corner of a higher meadow to the north, which has had previous restoration work done by green hay transfer. The site was chosen for its soil type and pH, and the fact that it is an area not cut when the hay crop is taken, as this removes the flower heads before the seed is set in late flowering species. The meadow is extensively grazed by sheep over winter.

Plug plants in situ at Bell Sykes Farm, Slaidburn, October 2019, C.E.

Swainshead Hall Farm near Scorton was another of the project sites. The landowner engaged volunteers from Lancaster University to help with seed propagation and plug plant "fostering", growing saw-wort and globe flower seeds. These were transplanted on "Landscapes for Life" day, 21st September 2019, with further melancholy thistle plugs from Kew being added in October.

Plug plants going in at Swainshead Hall Farm, September 2019, C.E.

Huge success with globe flower seed propagation was achieved by another of our volunteer growers in Newton, with over 600 plugs produced, along with over 30 saw-wort plants. These were distributed across the receptor sites of the project including the site at Newton, which is also a site of previous Hay Time restoration works.

Globe flower seedlings, April and May 2019, M. Breaks.

In total 1066 plugs of the three key species were planted in eight sites around the Forest of Bowland AONB. The table below (in addition to the map at Appendix 1) shows the distribution of the species, where the seed was sourced, and the grower.

Site	Species	Number of plugs	Source	Grower
Bell Sykes	Globe flower	6	Stocks	M. Breaks
Bell Sykes	Globe flower	100	Stocks	M. Breaks
Bell Sykes	Melancholy thistle	23	Bell Sykes	Kew
Bell Sykes	Saw-wort	69	Hole House	Kew
Crook 'O Lune	Globe flower	15	Stocks	M. Breaks
Haggfield	Globe flower	180	Stocks	M. Breaks
Haggfield	Saw-wort	51	Hole house	Kew
Haggfield	Melancholy thistle	10	Root cuttings	C.E.
New Laithe	Globe flower	245	Stocks	M. Breaks
New Laithe	Melancholy thistle	36	Bell Sykes	Kew
New Laithe	Saw-wort	20	Hole House	Kew
New Laithe	Saw-wort	30	Hole House	M. Breaks
Skelshaw meadows	Melancholy thistle	24	Bell Sykes	Kew
Skelshaw meadows	Saw-wort	24	Hole House	Kew
Stephen Park	Melancholy thistle	32	Bell Sykes	Kew
Stephen Park	Melancholy thistle	12	Ribchester	C.E
Stephen Park	Saw-wort	50	Hole House	Kew
Swainshead Hall Farm	Globe flower	21	Stocks	H. Leece
Swainshead Hall Farm	Melancholy thistle	24	Bell Sykes	Kew
Swainshead Hall Farm	Saw-wort	11	Hole House	H. Leece
Wolfen Hall	Globe flower	21	Stocks	M. Breaks
Wolfen Hall	Melancholy thistle	10	Root cuttings	C.E
Wolfen Hall	Melancholy thistle	18	Bell Sykes	Kew
Wolfen Hall	Saw-wort	34	Hole house	Kew

Methodology

- Each area was first cleared of vegetation either with a scythe or more drastically by digger, to remove some of the top soil in addition to the vegetation.
- For each plug plant, a hole slightly larger than the pot was created either using a trowel, bulb planter or spade.
- The soil at the base of the hole and the plant roots were loosened, to enable the roots to spread more easily.
- The plants were then "firmed in" to ensure good root to soil contact, and avoid water logging.
- For the globe flower plugs, sheep wool was added for slug protection, and will be renewed in spring.
- In sites where grazing occurs, an enclosure was created to protect from animals. This also helps to keep rabbits out, as they like to pull the plants out and dig in the loosened soil. Replacing the vegetation around the plants can also help disguise the new planting.

7. Field-scale meadow restoration work 2019

Field-scale meadow restoration, i.e. 'Hay Time', within the Forest of Bowland AONB has continued, funded through the Hay Time Rescue project.

The green hay donor site during 2019 was Bell Sykes, Slaidburn. Details of this donor site can be found in the final report of the Bowland Hay Time project, produced in 2014. The same methodology was used as previously in terms of site selection and donor matching.

The majority of restoration work was within a small geographical area, enabling the green hay method. Despite periods of settled dry sunshine at the beginning of the summer, by mid-July the weather in 2019 was really wet, with no two dry days together, and very wet ground conditions making the use of heavy machinery very difficult. Eventually by the beginning of August the weather settled for a few days and the contractor was able to cut the green hay crop at Bell Sykes and take it to the 9ha receptor site at Wellbrook Meadows, near to Abbeystead.

Barn sweepings and some hand collected seed were used at three sites to enhance the wild flower populations. Some seed was bought from Cumbria Wild Flowers, added to the mix and cast by hand.

Cutting and collecting green hay at Bell Sykes, followed by spreading at Wellbrook, August 2019.

In total over the project, 9ha of meadows had green hay restoration and 4ha of meadows were enhanced using seed application. The table here provides a summary of the schemes undertaken in 2019.

Receptor	Donor	Restoration (ha)	Enhancement (ha)	Funding source	Method
2019					
Wellbrook, Abbeystead	Bell Sykes	9		HTRP	green hay
Swainshead Hall Farm	Bell Sykes		1.85	HTRP	Barn sweepings & seed addition
Tenement Farm	n/a		.3	HTRP	Seed addition
Thornley-with-Wheatley	n/a		1.85	HTRP	Seed addition
TOTALS		9	4		
TOTAL AREA FOR PROJECT		13 ha			

The location of all of these sites can be found on the map in Appendix 1..

8. Events and Promotion

The project delivered two "Seed collection and propagation" events in mid-August at Bell Sykes Farm Slaidburn, promoted through the Festival Bowland and Flowers of the Dales programs of events, also the AONB Facebook page. Initially only one event was planned, but proved so popular on both sides of the border that we ran a second event a couple of weeks later. With the help and expertise of Mr Peter Foley, a local experienced horticulturist, our participants leaned about the importance of timing your collection, the best growing mediums and nurturing your seedlings. Peter Blackwell, the farmer at Bell Sykes, was also on hand to answer practical questions on wild flower hay meadow management.

Participants in the "seed collection and propagation" event August 2019.

In July, an information stand at Forest of Bowland Meadow Open Day was used to promote the Hay Time projects, giving information on the work we have undertaken over the last few years and the current Hay Time Rescue project. There was a good number of attendees (approx. 200), and plenty of interest in this project and future restoration projects. This is a great opportunity to chat to a larger audience of interested participants and to pass on messages about the importance of wildflower habitats, and the work done through our projects to enhance and conserve them.

9. Chiastocheta

The Hay Time Rescue project also assisted in research into a rare fly species *Chiastocheta*, which rely on globe flower for the adult portion of their life cycle. Rob Zloch from North Lancashire Wildlife Group and researcher of these species, came to the Forest of Bowland in June 2019 and together we surveyed all the known globe flower populations in the area. To avoid damage the flowers he mostly used a technique of dropping a net over a flower head or several flower heads while holding the end up in the air. This meant that the flowers were barely touched and that flies could fly upwards and be trapped.

Sampling for *Chiastocheta* in Gisburn Forest, June 2019.

At one site he recorded three *Chiastocheta inermella*. According to NBN Atlas there have only been 5 records ever for this species. The *Anthomyiidae* Recording Scheme, which holds many more records than are on NBN Atlas, also only has these same 5 records, and all are from at least 60 years ago:

- 1 in 1960, Speybridge, Scotland
- 1 in 1934, Langdon Beck, Teesdale
- 1 in 1934, Malham, Yorkshire
- 1 in 1934, Ribblehead, Yorkshire
- 1 on 06.06.1934, Ribblehead, Yorkshire

So a rare find, making the increase in globe flower populations all the more important in this area.

10. Conclusions

The Hay Time Rescue project has been very successful in producing plug plants from locally sourced seed across the Forest of Bowland AONB, and using them to bolster the population and distribution of these scarce species. The numbers of plants grown and receptor sites have been more numerous than expected within the timescale of the project. The project has also continued to facilitate and fund field-scale meadow restoration, with a further 13ha of meadows restored or enhanced over the 14 months of the project, with much interest for future projects.

We have worked with individuals, community groups, schools and local businesses, and have adapted to meet these different needs, offering advice and practical help where needed. Our events have engaged land owners and managers, and increased awareness of the importance of meadow restoration work, and conservation of these scarce meadow plants.

Through the data supplied by LERN we now have a good understanding of the historic distribution and population of five of scarce and important Lancashire floral species. This research has also enabled us to locate potential sites for future restoration projects.

Our partnership with Kew Millennium Seed Bank at Wakehurst in Sussex has progressed successfully, with an increase in the quantity of seed and species from the Forest of Bowland now stored in the seed bank, prolonging our ability to enhance our meadows with these species, and helping to mitigate against future population losses and climate change. The remaining plug plants for the project will be delivered by Kew in the spring of 2020, for planting out in additional suitable locations. Investigations are ongoing into the current suitability of further historic sites for the bird's-eye primrose.

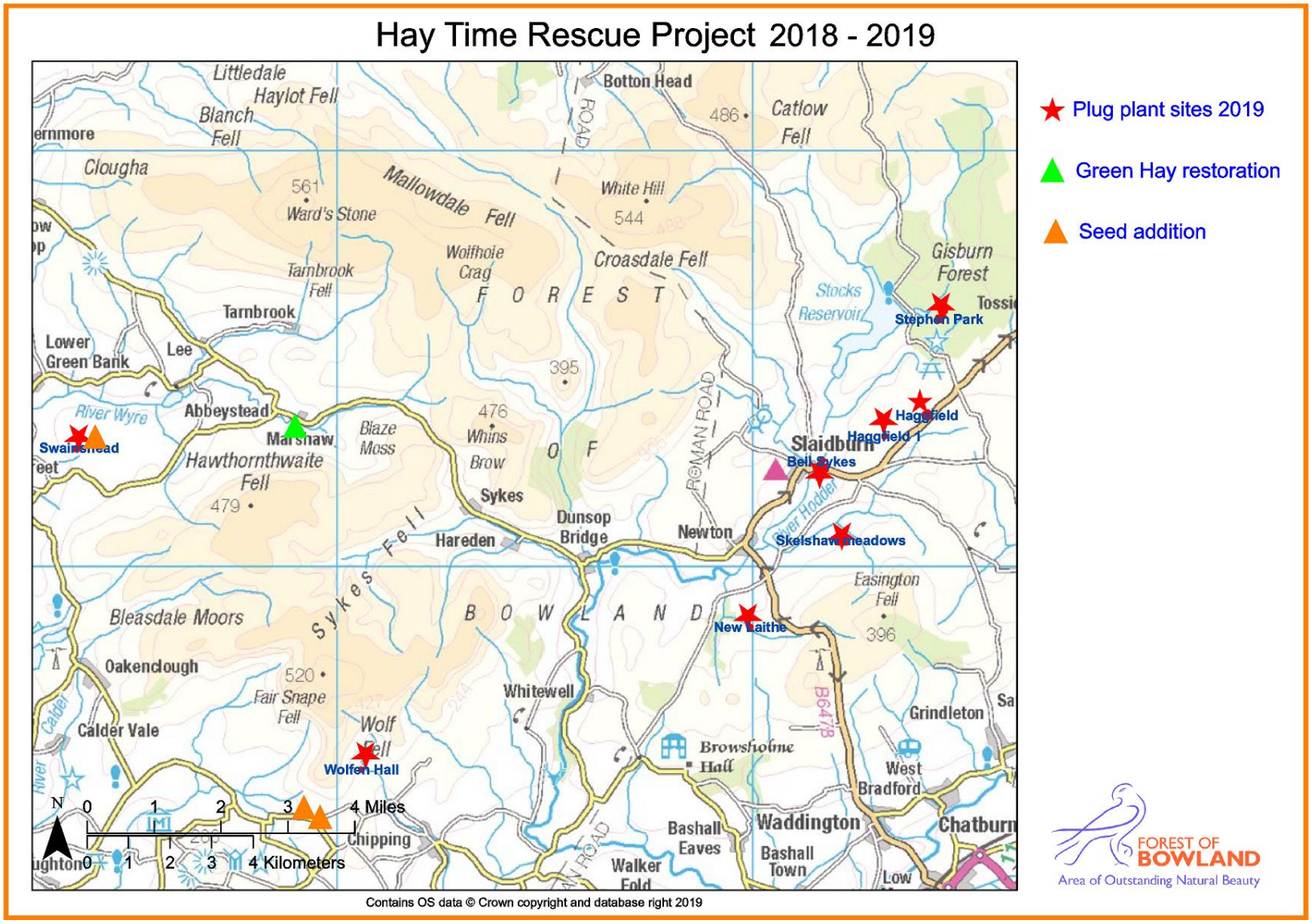
The project performance indicators can be found at Appendix 4.

Melancholy thistle down and seed, AONB 2016

Globeflower heads and seed, AONB 2016

Dyer's greenweed seed pods ripening, AONB 2019

Appendix 1: Map of plug plant reintroduction sites



Appendix 2: Kew MSB seed collection protocol

UK FLORA SEED COLLECTING

ON BEHALF OF THE

MILLENNIUM SEED BANK PARTNERSHIP,

ROYAL BOTANIC GARDENS, KEW

PROTOCOL FOR SEED COLLECTION

This Protocol has been compiled to provide information and advice for botanists proposing to participate in the Millennium Seed Bank Partnership UK collecting, including collections made for the UK Native Seed Hub at RBG Kew.

1. AIM OF SEED COLLECTING

The aim is to conserve verified and well documented wild species seed collections, each of which comprises a significant representation of the genetic variation within a sampled population. The collections are a basis for off-site conservation and, where appropriate, for introduction or recovery programmes. Material will also be available for research into seed biology, germination behaviour and other aspects of biological study and more generally used to further RBG Kew's charitable and statutory purposes.

By working with partners and volunteer collectors across the UK, RBG Kew intends to collect and maintain viable seed samples from at least one population of each UK native plant species that regularly sets storable seed. RBG Kew also aims to store samples from across the natural UK range of our native species to support a wider range of future uses. These include restoration of native plant communities through the work of the UK Native Seed Hub (UKNSH), described in Annex 3.

2. AUTHORISATION AND TRANSFER OF MATERIAL TO KEW

- **You must ensure that you have prior permission of the landowner or occupier to access and collect seed from their land.** It is important that landowners are aware of and agree with the potential use of seed so please ensure that they are supplied with a copy of the Landowner Consent & Information sheet (Annex 3), that consent is given and that you or the landowner complete the relevant boxes and sign the field data sheet (Annex 1).
- Collection from species included in Schedule 8 of the Wildlife and Countryside Act, 1981[2] (listed at Annex 2) requires a licence from the relevant statutory conservation agencies. Please contact RBG Kew for advice[3]
- Collecting within Sites of Special Scientific Interest (England, Scotland, Wales) or Areas of Special Scientific Interest (Northern Ireland) require approval from the statutory conservation agencies. RBG Kew has general consent with conditions for England, Wales and Scotland. **Landowner permission and liaison with agency manager(s) remains a requirement.** Please contact RBG Kew for advice and a copy of relevant Assent Letter[3]

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[2] For Northern Ireland: Schedule 8 of the Wildlife (Northern Ireland) Order, 1985

[3] See end of document for RBG Kew contact details

Version 10 Mar 2016

TARGETING POPULATIONS FOR COLLECTION

A preliminary visit to the site will usually be required to assess the population(s), to confirm the identification whilst the plants are in flower, and to estimate the likely harvesting date and potential seed production.

Please consider the following points before harvesting takes place:

1. Collectors should ensure that the population is of wild origin, and neither planted nor cultivated.

2. Small populations (less than 50 individuals) or those that will yield less than 1000 viable seeds should only be targeted when larger, more productive populations are not easily available. An 'ideal' collection will be from a large number of individuals and will contain between 10,000 and 20,000 seeds. Depending on the species, these quantities can be achieved in less than two 'collector-hours'. However, this is only a guide and it may not be possible to harvest these numbers, especially from threatened or scarce species.

3. It is recommended that seed maturation is monitored if possible. Seeds should be harvested as close to natural dispersal as possible to achieve maximum longevity in storage. Levels of insect or other damage within the seeds can be checked prior to collection. A cut test is the best way to assess this (see 5. Seed Collecting Methodology).

4. IDENTIFICATION

Please identify to infra-specific level where appropriate. When there is any doubt about the field identification please supply the following:

- • A close-up (and ideally scaled) photograph illustrating clearly the key identification features e.g. number of stamens, leaf venation, stipule shape, etc.
- • Comprehensive identification notes, entered on the field data form, with information about the presence of closely related species.
- • A representative herbarium specimen (NB. not for threatened/Schedule 8 species). Ideally including flower, fruiting structure and vegetative parts. This specimen will be accessioned into the collection at RBG Kew's Herbarium. Please contact us if you need advice.

Quality photographs illustrating the plant and its habitat will be welcomed by RBG Kew as valuable reference material. Copyright is retained by the photographer (or the photographer's employer) and material will not be used in publications without permission. Please indicate whether permission is granted if photographs are sent.

Confirmation of the field identification will usually be carried out by either RBG Kew or the BSBI Referee, and nomenclature will follow the New Flora of the British Isles Third Edition (Stace 2010). All material should be sent to RBG Kew in the first instance.

5. SEED COLLECTING **METHODOLOGY**	**RATIONALE**
1. If there are >1000 seeds available for collection, and seeds are large enough in size, carefully cut test a small sample (5-20) of randomly selected seeds by examining a cross section of each seed using small clippers & a hand-lens. (The small clippers on Swiss Army knives are good).	To estimate the frequency of empty or damaged seeds, and confirm that the majority of seeds are fully formed and mature.
2. Estimate the seed production per fruit or capsule, per individual, and per population.	To record additional information about the plant's seed biology,to better assess the seed numbers available and the influence of the collecting operation on the population.
3. Collect **mature, dry** seeds into either cloth or brown paper bags (the latter well secured with tape). Large collections can be made using plastic buckets and then transferred to bags.	To allow moisture to escape from the bag as seeds dry. This will ensure the highest possible post-harvest quality and will maximise the potential storage life of the collection in the seed bank.
4. Collect entire seed heads of awned or similar species into paper bags. Seed cleaning should be left to Seed Bank staff.	To enable easy removal from bag. To make maximum use of available field time and allow cleaning & preparation of material in controlled laboratory conditions.
5. Fleshy fruits should be collected directly into plastic bags and allowed to aerate. Contact RBG Kew as soon as possible for specific advice.	Fleshy fruits can decompose rapidly and delayed dispatch to the seed bank can exacerbate this problem.
6. **Sample equally and randomly** from as many plants as possible across the extent of the population, noting the number of individuals sampled (>50 individuals if available; ideally 200+).	To capture the widest possible genetic diversity from the plant population sampled.
7. **Collect no more than 20%** of the viable seed available on the day of collection for populations of >20 seeding individuals. **Reduce sampling to less than 10%** for populations of less than 20 seeding individuals (threatened taxa)	To ensure that the sampled population is not damaged by the seed collecting.

6. FIELD DOCUMENTATION

Record information for each collection using the field data form at Annex 1. The data fields in bold text are the priority for completion, and further data make the collection more valuable for conservation and subsequent use. Please assign collection numbers, using your initials and a number (consecutive for separate collections) and label your collection, herbarium specimen and any associated material with this number.

Please sketch the location of particularly elusive populations and attach to the field data form. This will assist in locating the populations in the future.

In the case of rare, Schedule 8 or nationally scarce species, RBG Kew will ensure that a copy of the form is also made available to the statutory conservation agencies.

7. COLLECTIONS FROM REGENERATED PLANTS

If collections are made from cultivated populations of native species, ie. from an ex-situ collection or garden, please complete the details for the progeny on the reverse of the field data form and provide as much information about the original wild population as you can on the front of the sheet.

8. CARE OF SEED COLLECTIONS AFTER HARVESTING

It is critical to the successful conservation of the seed that it is dispatched to the seed bank within a few days of collection, together with the completed field data forms, using the Freepost address below. Voucher specimens, photos and any other additional information may be sent at the same time or at a later date quoting the collector's name and the number given to the seed collection.

In general, keep the seed collections in a cool, dry place prior to dispatch but please do not refrigerate or freeze them. RBG Kew processing staff will be responsible for cleaning the collections on arrival at the seed bank.

Damp collections should, as soon as possible after harvest, be spread out on newspaper to dry naturally, either outside in the shade or in a well-ventilated room, before dispatch.

Fleshy fruits may require careful handling, partial cleaning and rapid dispatch to the seed bank: contact the MSB as soon as possible for advice.

Seed bags should be clearly labelled with the collection number and species name and then securely packaged for posting to RBG Kew. Please contact the UK Coordinator (details below) for supplies of bags, data sheets, envelopes etc. Some delicate seed collections may need protection by a layer of cardboard or 'bubble plastic' to avoid the possibility of damage in transit.

Appendix 3: Kew MSB Forest of Bowland seed propagation notes

Propagation notes for Forest of Bowland

Serratula tinctoria

Lab: Seeds were Chipped then 4wks @ 10C > 25/10. Synchronous germination. Incubator/Growth Chamber on compost + agar control plate

Transferred to nursery on 4th March. Pricked out into 5cm pots of 2:1 mix of Petersfield Peat Free Supreme compost and standard perlite with 2g/L of Osmocote controlled release fertiliser and placed in closed case in glasshouse with 9C minimum temperature.

Seedlings repotted into larger pots when necessary with 4g/L osmocote added to above mix. Moved to Polytunnel to harden off in late spring then to outside frames for the summer. 300 sown for 232 plants.

Trollius europaeus

Lab: Gibberellic Acid (GA3), 15c. **Incubator on GA3 agar.**

Transferred to nursery on 4th March. Pricked out into 5cm pots of 2:1 mix of Petersfield Peat Free Supreme compost and standard perlite with 2g/L of Osmocote controlled release fertiliser and placed in closed case in glasshouse with 9C minimum temperature.

Seedlings repotted into larger pots when necessary with 4g/L osmocote added to above mix. Moved to Polytunnel to harden off in late spring then to outside frames for the summer. Then placed in a shade tunnel where they did much better than in the full sun of the cold frames. 500 sown for 390 plants.

Primula farinosa

Direct sow on 22nd April into Glasshouse 4 at a minimum of 9C. Sown into mix of 50:50 petersfield and perlite. Once germinated, pricked out into above standard mix with small amount of peat added. Kept in glasshouse over summer now in polytunnel over winter. 750 sown, 36 plants grown. More seed necessary.

Cirsium heterophyllum

Lab: 20/10. Incubator on agar.

Transferred to nursery on 4th March. Pricked out into 5cm pots of 2:1 mix of Petersfield Peat Free Supreme compost and standard perlite with 2g/L of Osmocote controlled release fertiliser and placed in closed case in glasshouse with 9C minimum temperature.

Seedlings repotted into larger pots when necessary with 4g/L osmocote added to above mix. Moved to Polytunnel to harden off in spring then to outside frames for the summer. 260 sown for 157 plants

Appendix 4: Project performance indicators

Indicator	Project performance
Restore 10 hectares of grassland	The field-scale part of the project delivered 13 ha of meadow restoration and enhancement distributed over 4 sites.
To bolster the population of rare plant species in the Forest of Bowland	1100 plug plants distributed across 8 sites in the Forest of Bowland
Engage local community groups and volunteers to grow, foster and plant out the plug plants	The project worked directly with 1 community group and 45 volunteers to produce, nurture and site the plug plants
work with 5 landowners/managers and a local school	The project worked with 11 private landowners, and St James' school, Clitheroe
run 1 events for 20 members of the public	2 public events were run over the course of the project, with 36 people attending, plus a guided walk with 27 participants.
write a project blog to record and inspire activity	The Forest of Bowland AONB twitter feed and Facebook page were used as a news blog for the project. A Hay Time page on the Forest of Bowland AONB website is used as a project update page here.