



GREEN CONNECTIONS POWYS

RARE PLANTS REINTRODUCTION PILOT STUDY

END OF PROJECT REPORT

DECEMBER 2022



This project has received funding through the Welsh Government Rural Communities - Rural Development Programme 2014-2020, which is funded by the European Agricultural Fund for Rural Development and the Welsh Government.

The Rare British Plants Nursery
PO Box 96
Builth Wells
LD2 9AP

www.rarebritishplants.com

1. Beacons Hawkweed *Hieracium breconicola*

- 1.1. Prior to the start of this project the only Beacons Hawkweed plant in existence was a single individual growing on an exposed rocky ledge at Fan Nedd in the Brecon Beacons National Park. With just a pinch of seed held at Kew's Millennium Seed Bank and no living plants held in botanical collections, the future for this critically endangered Welsh endemic was looking extremely bleak.
- 1.2. Seeds supplied by Kew's Millennium Seed Bank have allowed us to establish a back-up population at our plant nursery and we have also returned thousands of fresh seeds to the Millennium Seed Bank for long term storage.
- 1.3. Since the start of the project, we have returned thirty Beacons Hawkweed plants to Fan Nedd. Twenty-seven of these plants were still present in November 2022. The three 'missing' plants appear to have been lost as a result of rock falls and grazing by slugs.
- 1.4. More than half of the introduced plants flowered in 2022.
- 1.5. Although the Green Connections project is now at an end, we will be continuing our work on Beacons Hawkweed. More of our cultivated plants will be returned to Fan Nedd in 2023. We will continue to monitor the fortunes of this exceptionally rare Welsh endemic.
- 1.6. We have written an article for Natur Cymru magazine highlighting our work on Brecknock's endemic Hawkweeds. It will be published in the next edition of the magazine (April 2023). It is hoped that our article will shine a light on the plight of rare endemic Hawkweeds.



An introduced Beacons Hawkweed plant. Flourishing over twelve months after introduction to Fan Nedd. Photographed in July 2022.



Two introduced Beacons Hawkweed plants at Fan Nedd. Carefully planted into a fissure of rock. Photographed in September 2021 immediately after planting.



The same two plants the following summer. The plant on the right is in bud. Photographed in July 2022.

2. Hepste Hawkweed *Hieracium apheles*

- 2.1. Hepste Hawkweed is endemic to the Hepste Glen in the Brecon Beacons National Park. Prior to the start of this project the only plants surviving in the wild comprised five individuals growing on a rocky ledge next to a small waterfall.
- 2.2. Sixty plants were introduced to Hepste Glen in 2021. Update surveys in 2022 found that at least twenty-five of these plants had survived the winter floods and the summer drought and are evidently now well established.
- 2.3. We will be restocking Kew's Millennium Seed Bank with thousands of fresh seeds in 2023 and will continue to monitor the introduced plants.



Sitting on a rock ledge in the Hepste Glen, next to the last remaining wild Hepste Hawkweed plants.



Hepste Hawkweed introduction site located on riverside rocks opposite the existing wild population. Arrows show the location of some of the introduced plants. All these plants were still present over one year after being introduced and had survived a number of floods & droughts.

3. Wood Bitter-vetch *Vicia orobus*

- 3.1. Fifteen cultivated plants were introduced to one of the hay meadows at Gilfach Nature Reserve in Spring 2021. They were watered a number of times in the summer of 2021 but received no supplementary care in 2022.
- 3.2. All fifteen introduced plants were alive and well in late summer 2022 and the majority were flowering. They are now well established.
- 3.3. Gilfach is owned and managed by the Radnorshire Wildlife Trust. The management requirements for the Wood Bitter-vetch have been discussed with the site manager and it is anticipated that with continued favourable management the Wood Bitter-vetch will continue to flourish.



Wood Bitter-vetch immediately after planting.



Wood Bitter-vetch flowering over one year after being introduced to Gilfach's hay meadow.

4. Sunny Haven Caravan Park, Howey (Wood Bitter-vetch & Northern Marsh Orchid)

- 4.1. In the summer of 2022, we advised the site managers of Sunny Haven Caravan Park on the creation of a small wildflower hay meadow.
- 4.2. The proposed hay meadow is located on the edge of the caravan park and had become overgrown with rank grasses. Following discussion with the site manager, two plots were cleared and these were seeded with a mix of hay meadow species that were sourced from our own hay meadow located on the outskirts of Builth Wells. Seeds included within the mix comprise: Eyebright, Rough Hawkbit, Common Cat's-tail, Black Knapweed, Common spotted Orchid, Yellow Rattle and the nationally rare Greater Yellow Rattle. We also introduced mature plants of Wood Bitter-vetch that we cultivated from seeds originally collected at Gilfach Nature Reserve. A small number of full-grown Northern Marsh Orchids were also introduced to the meadow. These orchids were rescued from a development site that was subsequently cleared of all vegetation.
- 4.3. Following our advice, the site managers will be implementing an annual management regime that will allow the meadow to establish over time. We will continue to visit the site to see how the meadow develops and we will be 'on call' to offer advice as and when it is required.
- 4.4. This particular project has created much interest within the caravan park community and it is hoped that it will kickstart other biodiversity projects in the area.



The hay meadow at Sunny Haven Caravan Park. Photographed in December 2022, a few weeks after the removal of rank vegetation.

5. Arlais Community Garden, Llandrindod Wells (Deptford Pink)

- 5.1. Deptford Pink *Dianthus armeria* is a critically endangered plant associated with disturbed ground and summer droughted turf. There are only a handful of localities for this plant left in Wales. The 'Incredible Edible' Llandrindod Wells community group who manage the Arlais Community Garden are very keen to establish some Welsh rarities in their gardens.
- 5.2. A large number of Deptford Pink seeds were introduced to the Arlais Community Garden in September 2022. The open ground around the garden appears ideal habitat for Deptford Pink. It is anticipated that Deptford Pink should establish as a 'weedy' species around the edges of paths and lawns. We have advised the community group on management requirements to ensure that the Deptford Pink survives and spreads.
- 5.3. Our Deptford Pink originates from one of its last remaining Welsh sites at Bryndias Farm in Carmarthenshire and was sourced from the National Botanic Garden of Wales.
- 5.4. The community group has recently created a small wildflower meadow and we have provided advice on hay meadow management. We have provided seeds from our own hay meadow and have also introduced some mature plants of Wood Bitter-vetch.
- 5.5. The community group also plans to create an arable weed area that will benefit wildlife as well as educate visitors. We will be providing rare 'weeds' for this aspect of the project in 2023. To kick start the rare weeds collection, we introduced Annual Knawel to parts of the garden in December 2022 (more details under the Annual Knawel section below).
- 5.6. My visit to the community garden was reported in the Brecon & Radnor Express (Wednesday 7th September 2022).



Arlais Community Garden. Marginal areas where the tarmac is being colonised by mosses and small annual plants were seeded with Deptford Pink and Annual Knawel.

6. Spreading Bellflower *Campanula patula*

- 6.1. Six of the plants introduced to a roadside verge at Gwarallt Wood in 2021 flowered in 2022. An additional five plants were looking healthy but did not flower in 2022. A number of small seedlings were found in autumn 2022, these originate from seeds introduced to the site the previous year. Nineteen of the plants that were originally introduced in 2021 were not re-found in 2022. A number of these missing plants may still be present as non-flowering plants are difficult to locate amongst the bankside vegetation.



A flowering Spreading Bellflower. Photographed late summer 2022, over one year after being introduced to Gwarallt Wood.

7. Heath Cudweed *Omalotheca sylvatica*

- 7.1. Thirty Heath Cudweed plants were planted out at Gwarallt Wood August 2021. All of these plants flowered shortly after introduction and all were still present and alive four months later. Fourteen plants flowered in 2022 and a number of seedlings were also observed around some of the introduced plants.
- 7.2. Recent forestry operations have opened up much of the surrounding habitat and it is hoped that the Heath Cudweed will be able to spread into these newly created areas.



Heath Cudweed flowering for a second year running at the Gwarallt Wood introduction site. Photographed late summer 2022.

8. Brecon Dandelion *Taraxacum breconense*

- 8.1. Brecon Dandelion is the only Welsh endemic species of dandelion. Historically it was known from at least eight separate locations but it now appears to be restricted to just two. Only small numbers of plants remain and at one of the sites the Brecon Dandelion is down to single figures. No back-up population is held in cultivation and the Millennium Seed Bank only holds a tiny number of seeds.
- 8.2. In March 2022 Kew's Millennium Seed Bank supplied us with a small number of seeds. We successfully germinated these and we spent the summer nurturing these seedlings into large plants. We now have a healthy back-up population in cultivation.
- 8.3. Although not expected to flower until spring 2023, we managed to coax a number of plants into flower in December 2022 (using artificial light). These flowering plants will generate lots of seed that will allow the production of many new plants for introduction to new locations.
- 8.4. We have identified a site suitable for the establishment of a new wild population that is close to an existing historical site. The owner of the site (Cilrheol, Ffrwdgrech, Brecon) has given us permission to introduce the Brecon Dandelion and we have discussed management requirements that will allow the Dandelion to flourish.
- 8.5. Although the Green Connections project has ended, we will be continuing our work on this rare species and are currently looking at other sites that have potential to support introduced populations.
- 8.6. We will also be restocking the Millennium Seed Bank with a large number of Brecon Dandelion seeds in spring 2023.



Brecon Dandelions grown from seeds supplied by the Millennium Seed Bank. Photographed December 2022.

9. Crass-leaved Hawkweed *Hieracium inspissatum*

- 9.1. Crass-leaved Hawkweed is historically known from a number of sites in the Brecon Beacons but is now restricted to a single location at Pwll Byffre. Its existence at Pwll Byffre looks extremely bleak. The population has crashed in recent times from one hundred and fifty plants in 2010 to just ten individuals in 2016 (when last surveyed in detail). The catastrophic decline is attributable to overgrazing by sheep.
- 9.2. Kew's Millennium Seed Bank supplied us with 30 seeds in March 2022. We successfully germinated the seeds and these grew into large flowering plants. We have recently replenished the Millennium Seed Bank with thousands of seeds and are now in the process of growing on plants for a recovery project.
- 9.3. Re-introduction to Pwll Byffre is pretty pointless given the ongoing grazing pressures. However, Crass-leaved Hawkweed once grew at Fan Nedd (same location as Beacons Hawkweed). We have gained permission from BBNPA to introduce Crass-leaved Hawkweed to Fan Nedd in 2023 (when our recently germinated seedlings will be large enough to plant out in the wild).



Pwll Byffre, the last remaining site for Crass-leaved Hawkweed. Its future here is uncertain, overgrazing by sheep has reduced the population to just ten plants.



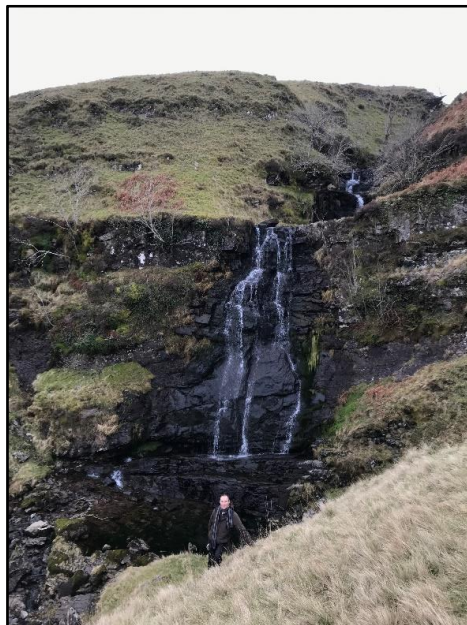
Crass-leaved Hawkweed in cultivation at The Rare British Plants Nursery.

10. Black Mountain Hawkweed *Hieracium tavense*

- 10.1. The entire world population of Black Mountain Hawkweed comprises thirteen plants that grow on inaccessible rock ledges next to a waterfall at Nant-y-llyn, Black Mountain in the western area of the Brecon Beacons.
- 10.2. BBNPA (owner) have given us permission to establish a new Black Mountain Hawkweed population on rock ledges next to a water fall located just downstream of the current population.
- 10.3. We acquired Black Mountain Hawkweed seeds in late summer 2022 and following successful germination, we now have a good number of small seedlings in cultivation. These will have grown on sufficiently to be planted out in early summer 2023.



Black Mountain Hawkweed currently only grows on rocky ledges next to a waterfall in the Upper Tawe Valley.



Proposed introduction site for Black Mountain Hawkweed. Rocky ledges next to the waterfall located downstream from the existing wild population.

11. Annual Knawel *Scleranthus annuus*

- 11.1. Annual Knawel is a rare species in Brecon and Radnorshire and has only been seen recently at a couple of locations. It is also in steep decline nationally.
- 11.2. We have attempted to founder three new populations. Future monitoring will be undertaken to establish how these populations fare.
- 11.3. Population No. 1 - Seeds were introduced to a steep summer droughted bank at Lower Llaithddu Farm, Llaithddu, in September 2022. Following discussions with the site owner, a light grazing regime has been instigated that should benefit the plant.
- 11.4. Population No. 2 – Seeds were introduced onto the central portion of a very long hardcore track at Derwendoppa, Trawscoed. Discussion with the site owners have resulted in a change of management from herbicide application to annual cutting/mowing that should benefit the Annual Knawel as well as many other weedy species.
- 11.5. Population No. 3 – Seeds were introduced to the Arlais Community Garden, Llandrindod Wells in December 2022. The open ground around the garden appears ideal habitat for small drought tolerant annual species like Annual Knawel.



Annual Knawel in cultivation at the Rare British Plants Nursery.

12. Tubular Water Dropwort *Oenanthe fistulosa*

- 12.1. This county rare species was introduced to a pond at Derwendoppa, Trawscoed in spring 2022. The pond was originally created as part of the Millennium Ponds Project.
- 12.2. The introduced plants were historically sourced from the Begwns, one of only a handful of remaining sites in Brecknock and Radnor.
- 12.3. Monitoring in December 2022 found that the introduced plants have flourished and have spread substantially (via runners) from their introduction sites. The ponds are fenced off from the surrounding fields. Following consultation with the site owner, occasional grazing will be undertaken in order to prevent the establishment of scrub and rank vegetation that could, over time, threaten the marginal pond vegetation that includes the Tubular Water Dropwort.



Ponds at Derwendoppa. Tubular Water Dropwort was introduced to the pond on the right-hand side of the photograph. The water level in this pond fluctuates through the year but the pond never dries out completely. The pond on the left dries out completely in dry summers.



Tubular Water Dropwort growing as an aquatic along the winter flooded pond margins. Photographed in December 2022.

13. Pennyroyal *Mentha pulegium*

- 13.1. As a native species Pennyroyal is only known from a single site in Wales. This being Brechfa Pool where the plant survives in the closely grazed and poached ground around the pool margins.
- 13.2. Cultivated plants were introduced to the margins of an ephemeral pond at Derwendoppa, Trawscoed and to a poached seasonal wetland area close by.
- 13.3. The introduced plants were historically sourced from Brechfa Pool which is located a few miles to the east.
- 13.4. The ponds are fenced off from the surrounding fields. Following consultation with the site owner, occasional grazing will be undertaken in order to maintain open conditions that the Pennyroyal requires.



Pennyroyal was planted in marginal areas around the pond where there is short open vegetation.

14. Maiden Pink *Dianthus deltoides*

- 14.1. Maiden Pink is a nationally scarce plant that requires short summer droughted turf that is not grazed too intensively, especially during its summer flowering period. It has been lost from many sites through overgrazing as well as under grazing.
- 14.2. Twenty-five Maiden Pink plants were introduced to rocky outcrops and summer droughted grassland at Penrhiw, Newbridge-on-Wye in September 2021. In addition, a large quantity of seed was also scattered over the site.
- 14.3. All twenty-five plants were looking healthy three months later and most of these plants could also be relocated in winter 2022 having survived a spring and summer drought.
- 14.4. Following our advice, the site owner has instigated a favourable management regime of light grazing that includes removing grazing animals during the Maiden Pink's flowering period. It is anticipated that this new grazing regime will have benefits for many other species present at the site.



One of the Maiden Pink introduction sites at Penrhiw.

15. Globeflower *Trollius europaeus*

- 15.1. Over the last two years we have been cultivating Globeflowers that originated as seed from the last remaining plant at Gilfach Nature Reserve. This last plant has now died and there are no Globeflowers left at Gilfach. Our cultivated Gilfach Globeflowers are now large flowering plants that are ready for planting out in the wild. We will be planting them out at Gilfach along the banks of the River Marteg in February 2023. We have surveyed the entire river bank and have identified a number of suitable locations for reintroduction.
- 15.2. We are also cultivating Globeflowers that originate from the Radnorshire Wildlife Trust's Llanbwchllyn Lake Reserve. The Globeflowers here are down to single figures and our cultivated plants will be used to bolster the wild population.



Llanbwchllyn Lake Globeflower in cultivation at The Rare British Plants Nursery.



Gilfach Globeflowers in cultivation at The Rare British Plants Nursery. Photographed in December 2022. It's winter but many of our cultivated Globeflowers are in full flower!

16. Conclusions

- 16.1. The Rare Plants Reintroduction Pilot Study has been extremely successful.
- 16.2. The pilot study has demonstrated that with thoughtful planning and with modest funds, some incredibly rare species can be successfully returned to the wild in a relatively short space of time.
- 16.3. In an intensively farmed and ecologically fragmented countryside, the pilot study has highlighted the important role that rare plant reintroduction projects can play in conserving biodiversity.
- 16.4. The study has also highlighted the generosity and enthusiasm of private landowners who are prepared to offer their land as rare plant receptor sites. Not only do these private landowners provide sites for rare plant introductions but they are, more often than not, happy to be guided on how to manage their land for the benefit of rare species. Without the enthusiasm, support and assistance of private land owners and community groups the rare plants pilot study could never have been successful.
- 16.5. And finally; this pilot study has played a very significant role in kickstarting targeted species conservation efforts for a number of locally, nationally and globally rare plant species. The Green Connections Powys project is over but the rare plant recovery projects that it has initiated will continue. It is hoped that these projects will inspire similar projects in the future.



Rare plants in cultivation at the Rare British Plants Nursery.

Back left to right: Spreading Bellflower, Wood Bitter-vetch, Beacons Hawweed.

Front left to right: Maiden Pink, Heath Cudweed, Hepste Hawkweed.

Andrew Shaw BSc(Hons) MSc
The Rare British Plants Nursery

06.12.2022