Floodplain Meadow Restoration Case Study
An Oxford University Meadow, river Thames Oxfordshire

Landownership and site background

The meadow is owned by an Oxford University college and managed by a tenant farmer. In recent times, it has been managed through a hay cut and grazing facilitated by an HLS agreement. The older history is not known.

Restoration activity

The practical restoration activity was undertaken by Long Mead's Thames Valley Wildflower Meadow Restoration Project and funded through a grant from Ecover as part of a wider project on the Thames to restore meadows and understand soil carbon in floodplain meadows.

Two restoration approaches were used. The site was prepared by having a hay cut in mid-July 2020 and then progressively topped to reduce the grass height. Part of the field was then chain harrowed, but also then rotavated as the soil was observed to be compacted and very dry and the chain harrow was ineffective. Some areas of the meadow were not treated in this way as they already had some botanical interest or were very sedgy/rushy. The treated areas were then harrowed to a fine tilth.

At the end of July, green hay was cut from an ancient meadow just outside Oxford, transferred immediately and spread in a muck spreader at a ratio of 2-1 or 3-1 depending on the height of the sward at any particular location.

A week later the field was rolled. December to march saw some significant flooding, and also badger activity after spreading, pulling up clods of earth, which were replaced by volunteers.

The following year, 2021, the field was hay cut in mid-July and grazed by 10 long-horn cattle from September to November.

In November 2022, 1026, 9 cm plug plants were put in the meadow. These were 13 different species and included great burnet, devil's-bit scabious pepper saxifrage, sneezewort and dropwort.

Site information

Size: 6.8 ha
Public access: Not direct to meadow, but high public access around the site
Phosphorus levels: 18.6 mg/l
Soil type and profile:
Flood frequency: Frequent in lower lying area, with bigger floods across whole field every 3-4 years. The field tends to sit under floodwater for 2-3 weeks before slowly draining back through the ground. No obvious path for surface water back to the river currently as the ditch is blocked.
Cost: Funded through a grant from Ecover for green hay spreading and plug planting. Management costs through HLS agreement.
End use of hay: To feed long horn cattle used for aftermath grazing at the site, over winter.

Current management

Hay cut and grazing are carried out by a tenant farmer based nearby, who cuts the hay and manages the cattle (owned by Christ Church since 1970's). the cattle are used to graze the aftermath and are fed on the meadow hay overwinter.

Floodplain Meadows Partnership

Table 1. Summary of the botanical data collected from 6 quadrats*

Ellenberg F (moisture tolerance)	**5.32**
Ellenberg N (fertility)	**5.47**
Ellenberg R (Reaction)	**6.32**
Species/quadrat (mean and range /1 m x 1 m)	**21.2 (17-24)**
NVC (top MAVIS subcommunity)	**MG4b**

Progress by 2023*

A botanical survey of the meadow was carried out by recording plant species and their abundance in six 1 x 1 m quadrats across the site. The elevation range in the field is reflected in the vegetation composition. On higher ground, the dominance of false oat-grass *Arrhenatherum elatius* and the presence of common cowslip *Primula veris,* suggest that the area is well drained and soils are sandy.

At lower elevations brown sedge *Carex disticha* and rough-stalked meadow-grass *Poa trivialis* indicate wetter areas where species with requirement for high soil moisture occur. The Ellenberg indicator values for soil moisture vary from F=4.7 up to F=6.

An even greater range was observed in soil fertility, where the Ellenberg indicator values ranged from N=4.4 at up to N=6.4. The higher level of nutrients in these lower lying quadrats supported high cover of smooth brome *Bromus racemosus*.

Great burnet *Sanguisorba officinalis* has been planted as plugs and has established very well. The presence of this species has enabled the plant community to be recognised as most similar to the Burnet floodplain meadow plant community (MG4 *Sanguisorba officinalis – Alopecurus pratensis* vegetation in the NVC).

Overall, the meadow is developing very well, with the average species richness higher than 20 sp/m^2 reflecting a good level of taxonomical diversity.

* A summary of the data collection and analysis methods used is available here

Functional diversity

In terms of functional diversity (Table 2), there is a good balance between very competitive (C) and stress-tolerant species (S) (slowly establishing but long-lasting species). However, the high cover of yellow rattle *Rhinanthus minor* along with a few other ruderal (R) (easily spread but short lived) species, has resulted in a very poor balance between R and S functional groups. In well developed, ancient meadows, the three functional types are represented more or less equally.

Priority Habitat Inventory

This meadow meets the criteria for inclusion in Natural England's Priority Habitat Inventory as **Good Quality Semi-improved Grassland**. This means that there are some plant species present which indicate good quality, species-rich meadow, but that continued consideration of progress is required.

Table 2. Five categories of meadow restoration progress, measured by indicator scales based on species richness, NVC similarity score and ratios of Grime's plant functional types. Adapted from Rothero, Tatarenko & Gowing, 2020.

	Score of progress (1 = poor progress, 5 = very good progress)				
Measure	1	2	3	4	5
Average scores from five botanical quadrats per field. Calculated in MAVIS					
Species richness (number of species per 1 m²)	<8	8 to 12	13-15	16-20	>20
NVC similarity score	<50%	50-55%	55-60%	>60%	>65%
C:S ratio	1.65	1.39	1.23	1.1	1.09
S:R ratio	0.67	0.79	0.81	0.89	0.93

Management recommendations

The current management appears effective in developing and then maintaining a species rich meadow.

Areas heavily affected by yellow rattle could be managed through an earlier cut once every few years if this species dominates too much. Where this is creating gaps in the sward, additional restoration efforts are recommended through seed spreading or plug planting in these patches.

If the wetter area in the SE corner starts to spread or makes the area unmanageable, suggest looking at the drain to see if remediation works are needed.