RBAPS
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Species-rich Floodplain Meadows

Best Practice Guidelines for farming for conservation on the Shannon Callows







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Background

This document has been prepared as a guide to the delivery of species-rich floodplain meadows which are widely recognised as being of high conservation value. The benefit of producing such meadows is not solely in the production of public goods, including biodiversity, pollinator services and carbon sequestration, but also in optimising delivery to a market which financially rewards those public goods. Agri-environmental schemes have existed for many years, and more are being developed whereby the payments to farmers depend on the ecological quality of farmed habitat. In some of these schemes the ecological quality is measured through carefully selected result indicators and payments are made on the basis of these indicators. This document provides best practice guidelines to allow farmers to optimise delivery of biodiversity on species-rich floodplain meadows.

Management of floodplain meadows

The farming practices that have been in place on the meadows for centuries produced wonderful flower-rich meadows that support a range of other wildlife too. However, modern farming often has little consideration for maintaining species-rich floodplain meadows, which requires appropriate and adaptive management. If the management is not right, the quality of the meadow will suffer.

WHY MOWING MATTERS

Central to the management of any meadow is the annual mowing and saving of hay. Mowing and removing the crop of hay removes nutrients from the meadows, much of which has been deposited by the winter floods. It is not simply the annual mowing which is important; the timing of the cut is also critical to maintaining the botanical diversity.

When perennial plants (those plants that live for a number of years) set seed they then die back. When they die back they draw nutrients down in to their roots and store it there to fuel the next year's growth. The later in the year that mowing takes place the more nutrients that are stored in the plant roots and the less nutrients that are taken away in the hay crop.

Optimum mowing date relates to the hydrology and nutrient level of a site. Thus, the decision of when to cut hay depends on both the plant community and soil fertility and the farmer must also consider factors such as the condition of the sward, soil moisture and weather conditions in a given year. In a wet year for example, it may be necessary to delay mowing until the ground conditions are right and the weather and sward is dry enough.

Where the condition of the meadow is poor, with problem species becoming dominant, it may require an early cut (perhaps mid- or late June*), or perhaps two cuts in the year (one in June* or July and again in September) if soil, growth, and weather conditions are right.

When rare ground-nesting birds (such as whinchat or curlew) are present it is preferable to delay mowing until at least mid-July to allow the chicks to fledge. However, delaying mowing past the optimal time for the meadow is not recommended as a regular practice, particularly where problematic species or nutrient management are an issue.

*see page 7: Mowing before the 30th of June



If I mow too early will it prevent flowers from setting seed?

Most flood meadow plant species are long-lived perennials that don't need to set seed every year. Mowing earlier than usual one year in three, or five, or ten, will not adversely affect the seed bank. Repeatedly mowing early in the summer however will reduce floral diversity as the seed bank is not replenished by the plants setting seed.



The timing of mowing on the meadows is often best decided by basing it on the fodder quality for livestock, as was the traditional practice for generations. This practice has maintained diverse plant communities in the past. If a meadow was traditionally mown in late July then that is probably the best time for that meadow, while if it was traditionally mown in August - then that is probably the best time for that meadow. When all physical factors allow, this is often the best approach to take in terms of when to mow.

Hay turning

Traditional hay-making is a slow process which involves mowing the hay and turning it on the meadow, possibly two, or even three times, before baling it and removing it from the site. As well as drying the grass for winter storage, turning the hay on site scatters the flower seeds, a process which is essential to maintaining the seed bank of the soil.

The making of silage is a much quicker process, with mowing, baling and removal of the crop from large areas of meadow often taking place in just a few hours. It might not be possible every year, but turning the cut grass, allowing it to dry and the seeds to scatter, will benefit the floristic diversity.

Managing for ground-nesting birds and other wildlife

Along with a diversity of wild flowers, species-rich floodplain meadows support an array of other wildlife including many insects, ground-nesting birds and small mammals. Generally having a range of mowing dates across the meadows will benefit the wider biodiversity, while mowing from the inside of the meadow out towards the edges will give the meadow animals an opportunity to escape the mower blades. Leaving some uncut margins also provides important refuges for birds, insects and small mammals.

EXAMPLE: WHINCHAT

Whinchat, with a national population of possibly less than 250 breeding pairs, is one of our rarest birds in Ireland. About half of its population nests on the Shannon Callows. The delayed mowing for corncrake on the callows since the 1990s no doubt favoured this small ground-nesting bird. When whinchat has been identified as nesting on a meadow, delaying mowing on the meadow until late- July will greatly benefit the bird.





TIMING IS EVERYTHING

- Mow too early and you risk losing plant species, especially if the meadow is mown too early in a number of consecutive years, as this depletes the seed bank.
- Mow too late and you risk nutrient enrichment with competitive and aggressive species becoming dominant. The more often the meadow is mown too late the more of an issue this becomes.

Left: Devil's bit scabious, a late-flowering meadow plant that will benefit from the occasional later cut

Aftermath grazing

Using livestock to graze the meadows after they have been mown may benefit the wild flowers and insects on the meadows. Although a rare practice now, where aftermath grazing has traditionally taken place, it may continue provided the hay crop has been saved at the appropriate time.

Mowing meadows before the 30th of June within a designated Special Area of Conservation (SAC)

Mowing meadows within a designated site, such as the River Shannon Callows SAC, before the 30th of June, is an Action Requiring Consent (formerly Notifiable Action) from the National Parks and Wildlife Service. This process involves an ecological evaluation of the site to assess if it is beneficial to the ecology of the species-rich floodplain meadow to mow before the 30th of June.

Floods and weather

In getting the management right, a number of factors need to be considered. On the callows, both the timing and duration of floods vary from year to year, meaning that for each meadow there is some variability in when both the condition of the sward and the condition of the soil will be ready for the mowers from one year to the next. Combined with these factors, the local weather conditions are changeable and unpredictable within the year and getting hay saved can be a challenge.

The key to appropriate management is giving flexibility to the farmer to apply an adaptive approach to management, allowing each farmer to deal with varying flood, sward, soil and weather conditions in each meadow in each year

Common problems on the meadows

Nutrient balance

Every year the vast Shannon floods bring plenty of nutrients to the callows. Hay-making and the removal of the crop of hay or silage is essential for maintaining the nutrient balance of the flood meadows. When nutrients are allowed to accumulate problems may arise with weeds and aggressive (highly competitive) species. The addition of fertiliser to the meadows has a detrimental effect on the plant diversity. By giving the competitive plants an advantage, they grow taller faster, while other less competitive plants get out-competed for nutrients in the soil and light from above.





Addition of fertiliser (evident from tram lines on this meadow in May) can lead to an increase in competitive species including creeping buttercup and meadowsweet (right).

Competitive plants such as meadowsweet, creeping buttercup and strong grasses will become dominant over time with the application of fertilisers (or from not mowing the meadow). In order to promote a diversity of meadow plants it is best to avoid fertiliser application completely. Where fertilisers have been applied in the past and the condition of the meadow has been affected, taking a crop twice a year for a number of years will help lower nutrient levels and promote species-richness and will reduce the cover of meadowsweet.

Removing the cuttings from the meadow is essential! Leaving them to decompose on the meadow leads to nutrient enrichment, a thatch of litter forming and rank growth the following year.

Mowing in spring? A rare possibility

If a year of mowing is missed and last year's crop still stands on the meadow the following spring it may be possible to mow and clear off the cutting before April* after floods recede and before plants begin to grow and ground-nesting birds build their nests. Mowing in spring depends on flood and ground conditions being right, and will not be possible in most years. The floods need to have receded and the ground dried sufficiently to allow entry of machinery. It would only be advisable early in spring, and not in April, May or June, as these are sensitive times for plants and birds. It is a very narrow window that may appear in a rare year (*See page 7 **Mowing before the 30th of June** for more information on mowing in spring).

Problematic Species

MEADOWSWEET

Meadowsweet (*Filipendula ulmaria*) is a healthy component of most wet meadows and the most species-rich meadows will have a good cover of it. It is however a vigorous plant which, when conditions allow, can grow quickly and dominate a meadow to the detriment of other meadow plants and the fodder quality.



The white flowers and red stem of meadowsweet can be seen here (right) in a wonderfully diverse meadow in the Shannon Callows.





On some meadows, with wet summers, and no mowing or consecutive years of late mowing, the meadowsweet becomes very tall and strong and shades out other meadow plants as shown above.

When meadowsweet becomes a problem the meadow will need two cuts per year for a number of years to physically control the meadowsweet and to remove excess nutrients. Consider mowing in late June* or early July and aim to mow again in September, if possible. *See page 7: Mowing before the 30th of June for more details.



Mowing at the appropriate time each year is key to good management and keeping problematic species under control

DOCKS ON THE MEADOWS

Broad-leaved and/or curled dock often occur in patches along or near the riverbank, or on slight rises within the meadows. Much of the silt from the floods is deposited immediately next to the channel, where it accumulates as slightly higher areas of ground. These slightly higher areas are often more nutrient-rich than other areas of the meadow, thus favouring the growth of docks.

The presence of docks indicates high nutrients levels in the soil

A high cover of docks may therefore be a natural feature of the meadows and not related to sub-optimal management by the farmer. Docks also appear in high numbers in some years and die out again afterwards. The presence of docks does indicate high nutrients and the best management, particularly if they persist and/or cover much of the meadow, is to mow the meadow twice in the year for a number of years and remove the crop each time. Leaving the crop means leaving both the seeds and the nutrients in the crop and this will worsen the problem.

Rule No. 1: Do no harm. Don't risk damaging the meadow!

Any advice provided here are general guidelines for farmers to consider and all management is dependent on suitable conditions on the ground. Mowing again late in the summer although it may have been recommended in June might not be possible in September or October. Ground conditions need to be right. Don't risk damage to the meadow.

Herbicide use

The application of broad spectrum herbicide is hugely detrimental to the plant species-richness, targeting all flowering meadow plants indiscriminately. Studies have also shown that herbicides have a knock on negative effect on insect communities, which in turn will impact species further up the food chain, such as small mammals and birds. Applying herbicide, to control meadowsweet for example, has more impact on the less competitive plants, and it may actually exacerbate problems with aggressive species such as meadowsweet in future years. For example the less competitive species don't recover and meadowsweet is then free to grow unchecked by competition from the other flowering plants.

Herbicide should not be applied on floodplain meadows

Water quality

Water quality continues to decline in Ireland with agriculture contributing significantly to the problem. Pollutants such as inorganic nitrate and phosphate, farmyard manure and herbicide all have detrimental effects on both water quality and the associated biodiversity. Floodplains are particularly sensitive areas because of the vulnerable species they support and their proximity to rivers. By reducing, or eliminating, the application of fertilisers and other chemicals, you are improving water quality and helping to support wildlife.

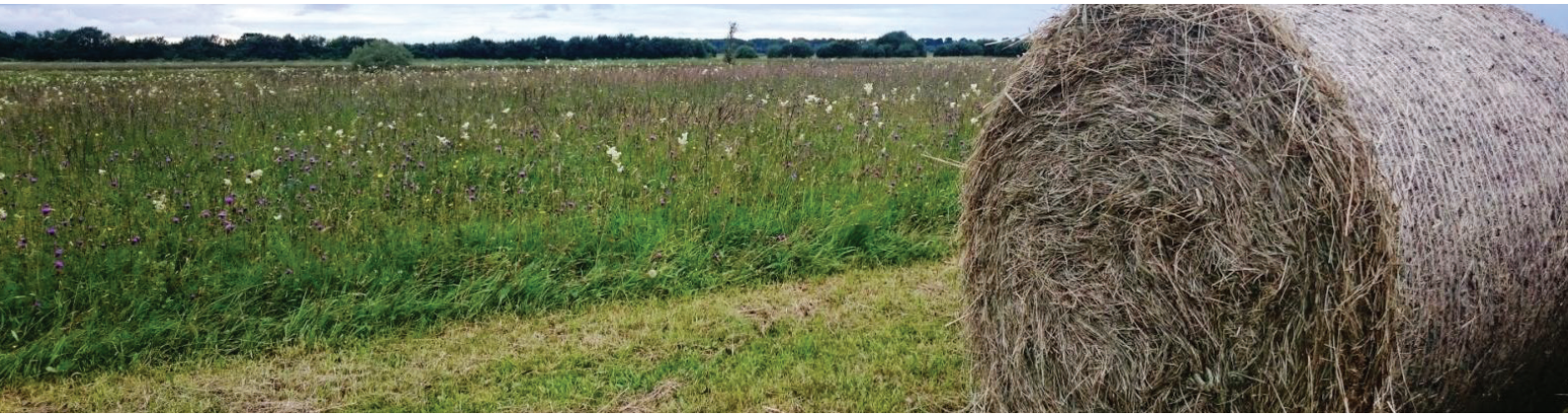
Maintenance of drains

Existing drains need to be maintained to ensure water leaves the meadows and the soil is allowed to dry as quickly as possible when floods recede. With the flood and weather constraints on the flood meadows, adequately maintained drains are essential to facilitate land management. Clear drains to ensure ground is ready for machinery following a flood or wet weather. It is very important to clear existing drains carefully, not to deepen or widen beyond their original dimensions. Clearing of drains within the River Shannon Callows SAC is an Action Requiring Consent (formerly Notifiable Action) from the National Parks and Wildlife Service.

Soil structure and machinery on the callows

A healthy soil with good structure has channels (spaces) running through the soil made by earthworms and the roots of plants. Each year when the plant roots die and decay small channels are left through the soil. These channels play an important role in allowing water to drain from the meadow after the floods recede. Soil compaction is where these spaces and channels have been closed, most likely under the weight of machinery on wet, soft soils. It is important to make sure the ground is sufficiently dry before accessing meadows. The shift to larger farm machinery in recent decades has implications for the callows. Restoring soils once compacted is a very slow, if not impossible, task. On most floodplain meadows it is best to use only lighter tractors and mowers to avoid cutting up or compacting the soils.

A range of mowing dates across a meadow is good for wildlife as it means there are parts of meadow left uncut later in the summer to provide important habitat for meadow plants, insects and birds



Mowing at the appropriate time each year is key to keeping meadowsweet and other competitive plants under control

Improving the diversity of species-rich meadows

The best way to manage meadows is by annual mowing at the appropriate time. The appropriate timing may mean mowing once in July or August of each year, or if excessive nutrients are an issue, mowing earlier in occasional years will benefit the site. On other meadows it may be beneficial to carry out two cuts in occasional years.

The plants we see on the meadows now are there because of past management and in some cases previous management was detrimental to the species-richness. Fertiliser application promotes vigorous grasses which out-compete slower growing species (including smaller less competitive grasses and flowering plants). Over time, those flowers that don't have the opportunity to grow up and set seed will be lost from the meadow. Historical fertiliser application may have long-lasting results if the seed bank is depleted; this is likely where fertiliser application was high for a number of consecutive years. If the addition of nutrients occurred in recent years, whether through fertilizer application or changes in the flood regime, then increasing the frequency of mowing is necessary to lower the nutrients in the soils.

Where historical management has depleted the species-diversity and the seed bank then mowing alone may not improve the meadow diversity. One possibility is to scatter seeds from a top quality meadow with high species-richness. Some farmers traditionally gathered the hay seeds left on the barn floor or in the bottom of the hay trough over the winter months to scatter on bare ground in the spring. Similarly, scattering seeds collected from a nearby top quality floodplain meadow over the winter and scattering them on the meadow in spring would benefit less species-rich meadows.

It is essential that if seeds are scattered at a site, that these seeds are sourced locally from a good quality meadow. Buying hay from a top-quality species-rich meadow and collecting the seeds from the hay trough may be an option (be sure to use a clean trough to ensure only the right seeds are collected, so as not to add any weeds or other non-meadow plants).

Green hay strewing

Another possibility, one that has been carried out with great success on floodplain meadows in the UK, is the strewing of green-hay cut and collected from a top quality species-rich meadow. As always with meadows, the timing of this is hugely important, as the donor site (the species-rich meadow) needs to be ripe and ready to soon drop the seeds when turned out on the recipient site (the species-poor meadow receiving the new hay seeds). It is termed green hay, as it is cut and collected immediately, not turned or allowed to dry where it was cut. This ensures all seeds are kept in the hay. This species-rich green hay must be transported as quickly as possible to ensure the viability of the seeds.

The recipient site will also need to be suitably prepared before the species-rich green hay can be spread on it; this involves restoring the nutrient balance of the site (e.g. mowing early in the year and repeating mowing in preparation for the species-rich green-hay.) The recipient site will also need to be gently harrowed (using a light chain harrow or similar) to create approximately 40% bare ground in preparation for the new seeds. Seek specialist advice if this is being considered. Green hay strewing will require collaboration with expert ecologists and consultation with National Parks and Wildlife Service. Green hay strewing would only be carried out on a site of very poor ecological quality with few or no flowering plants (positive indicator plants).

Green hay strewing within a designated Special Area of Conservation (SAC)

Both mowing of meadows before the 30th of June and harrowing of ground within a designated site, such as the River Shannon Callows SAC, are Activities Requiring Consent (previously Notifiable Actions) from the National Parks and Wildlife Service. This process will involve ecological evaluating the site to assess if it is beneficial to the ecology of the meadow to carry out the restoration work and to ensure no damaging activities are carried out.

Steps for the restoration of the plant community using green hay strewing:

1. **The target area is mown in early summer and all cuttings removed from the site.**

2. **A second cut is carried out with all cuttings removed, when an approved species-rich donor site is ready to be mown (typically mid-August, but this is growth and weather dependent). Mowing twice and removing cuttings reduces nutrient levels and will help to promote the target floral species.**

3. **The site is lightly harrowed creating approximately 40% bare soil, preparing the ground for the new seeds.**

4. **A number of bales of species-rich green hay are brought to the site from a species-rich meadow within the Shannon Callows which is of high quality. The species-rich green hay (it is termed green hay as it will be taken freshly cut and not turned or dried on the donor site) will be spread across the site, and turned a number of times to disperse the seeds over the bare soil. The strewn hay will be removed from the site after a number of days (depending on the weather) to again avoid nutrient enrichment of the soil.**

A note on species diversity:

Every species has its own niche, a niche is the unique conditions that a species lives under, these conditions include food availability, temperature, light intensity and water availability. Floodplain meadow plants have their niches along the floodplain, with each plant tolerating different levels of flooding, nutrients and soil conditions. This is one of the reasons why floodplain meadows are so rich in wild plants.

Note on donor sites:

The higher the species-richness at the donor site, then the higher the possibility of suitable seed-to-soil conditions being met at the recipient site. Suitable donor sites include those with high plant species-richness and supporting plant communities of European importance (Annex I habitats), including Lowland Hay Meadow [6510], *Molinia* Meadow [6410] and Hydrophilous tall herb [6430], which often occur in a mosaic across the meadows.

See also a separate document on RBAPS Species-rich Flood Meadow scores and recommended management.

Please visit our project website **www.rbaps.eu** for more details.



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