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Managing arable farmland for biodiversity

Farm Advisory Service

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Summary

A range of options are available through the Ecological Focus Area (EFA) requirements of enhanced greening or through the Agri-Environment Climate Scheme (AECS) to deliver benefits for biodiversity alongside productive arable farming. These are:

- **Establish a network of grass margins and beetle banks throughout the farm (aim for at least 1-2% of the land)**
- **Provide wild bird seed mixes over the winter (aim for at least 1% of the land)**
- **Provide pollinator habitat during the summer (aim for at least 1-3% of the land)**
- **If possible, retain winter stubbles on at least 10% of the farm**
- **Protect and enhance existing habitats on the farm and create connectivity between them**
- **Combine habitat creation and management with Integrated Crop Management to maximise biodiversity benefits**

Introduction

Arable farming productivity in Scotland increased dramatically in the decades following the second world war, driven by technological advancements, new farming practices and policy changes. While the total arable land area has decreased, much higher yields have led to higher output from the land that remains in cultivation. Only around 10% of Scotland's agricultural land is used to grow crops, but this contributes about one third of Scotland's total agricultural output by value.

However, this improvement in productivity has come at the cost of reduced biodiversity, which has manifested most visibly in significant declines in the populations and range of many farmland birds, insects and plants. This matters because biodiversity underpins the natural processes essential for healthy and productive agriculture, as well as contributing to our mental well-being. Biodiversity loss leads to reduced soil fertility, increased pest and disease vulnerability and reduced pollination of crops.

Efforts to find solutions to biodiversity loss in arable farmland started during the 1980s and gained traction through the 1990s with the introduction of the first agri-environment schemes. There is now a wide range of options that farmers can use to promote biodiversity in arable farming systems as well as delivering benefits to water quality and carbon sequestration.

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How Arable Intensification has Impacted Biodiversity

The mechanisms by which arable intensification has reduced biodiversity can largely be explained by the following inter-related factors:

- Simplification and specialisation of farm systems
- Increased pesticide and fertiliser use
- Increase in autumn-sown crops
- Habitat loss and fragmentation
- Increased mechanisation

The following section goes into more detail about the impacts of each.

Simplification and Specialisation of Farming Systems

Prior to the mid-20th century mixed farming predominated in most low-lying areas of Scotland, with cereal and root crops grown in rotation with grass, providing a high diversity of habitats within a small area. However, economic pressures have seen farming systems specialise and simplify in different parts of the country. Arable cropping has disappeared or significantly declined both in northern and western areas and in the upland margins, where grass-based livestock rearing predominates, and also in the south-west, where intensive, grass-based dairy farming is dominant. In these areas, species associated with arable farmland, such as the Corn Bunting, have almost entirely disappeared.

In the drier east of the country, arable cropping is now less likely to form part of a mixed farming system and instead is often continuous arable cultivation with less semi-permanent habitats such as grassland.

Increased Pesticide and Fertiliser Use

Much of the improvement in arable productivity has been due to the development and widespread adoption of artificial fertilisers and plant protection products (herbicides, fungicides and insecticides). However, these have detrimental effects on biodiversity. Fertilisers promote the growth of a few dominant plant species at the expense of more diverse vegetation and can alter microbial communities, resulting in degraded soil health, while herbicides and insecticides directly reduce the amount of plant and invertebrate biodiversity.

Increase in Autumn-Sown Crops

The introduction of autumn-sown crops means that there has been a reduction in the amount of winter stubble fields, which can be an important feeding area for seed-eating birds, while the crops become too dense for some ground-nesting birds such as Lapwings and Oystercatchers, in the spring.

However, autumn-sown crops do provide nesting opportunities for other species of birds such as Reed Buntings and Whitethroats and having a variety of spring and autumn sown crops can go some way towards maintaining a diversity of different habitats on the farm. However, where economies of scale on larger farms encourage block cropping with a single crop over large areas, this simplifies the farm environment and reduces biodiversity.

Habitat Loss and Fragmentation

With the post-war push for agricultural production, many areas of semi-natural habitat such as wetlands and unimproved grassland were converted to arable land. Those areas that were too difficult to cultivate or drain are often no longer grazed due to the specialisation of farming systems and consequently have become overgrown and lost botanical diversity. The use of larger, more efficient machinery has also resulted in fields becoming larger, and the loss of boundary habitats such as hedges and dykes, which are refuges for biodiversity on the farm.

Increased Mechanisation

Larger, faster and more efficient machinery can also have more direct impacts on biodiversity. While field operations can be completed much more quickly, this makes it less easy to avoid ground-nesting birds such as Lapwings which nest in spring-sown crops.

Reversing the Declines

While it might be desirable to support a return to diverse mixed farming in some areas such as the upland margins, and there is also potential to re-integrate livestock into some productive arable areas, reversing biodiversity declines does not have to be a case of turning the clock back. Instead, several simple measures to set aside areas of land and manage them less intensively have been developed over the years. Where these are employed alongside an integrated crop management approach to agronomy, biodiversity recovery can go hand in hand with productive arable farming.

The management measures that have been developed typically deliver one or more of the following biodiversity benefits:

- **Biodiversity refuges** – areas of permanent or semi-permanent vegetation that are less disturbed than cultivated land can provide a safe environment for ground-nesting birds, perennial plants, invertebrates and small mammals, both during the spring and summer and as overwintering sites.
- **Pollinator resources** – flowering plants tend to be scarce in intensively managed arable crops, but management that encourages a wide diversity of flowering plants, whether annual plants in disturbed habitats or perennial species in more permanent vegetation will support a healthy insect population, which in turn will also support insect-eating wildlife such as birds and bats.
- **Seed-rich habitat** – many of the farmland bird species that have seen significant population declines are seed-eating species, so it is beneficial to provide high quality seed-rich habitats to take the place of the less-intensively managed crops that provided this resource in the past.

Setting aside areas to deliver these biodiversity benefits can also deliver other benefits, including biological control of pests, crop pollination services, protection of watercourses from diffuse pollution and carbon sequestration.

Financial Support

The main financial mechanisms to support the management of arable land for biodiversity are the Agri-environment Climate Scheme (AECS) and the Ecological Focus Area (EFA) enhanced greening requirement of the Basic Payment Scheme (BPS).

The greening payment currently equates to 30% of the full BPS payment and includes a requirement to set aside the equivalent of 5% of the farm's arable area into one of the EFA options. Greening is available to all BPS claimants and is therefore the most widely accessible support mechanism for biodiversity enhancement.

By contrast, AECS is a competitive scheme but offers area-based payments for managing specific areas under management prescriptions. It can therefore be used to support management over and above the minimum standards of greening.

Table 1 shows the main biodiversity enhancement measures for arable farmland, the biodiversity benefits that they deliver and the schemes that are available to support their creation. Providing a mix of options that will provide all three benefits between them will deliver the greatest biodiversity benefits.

Table 1: The main options for biodiversity enhancement in arable farmland showing the benefits each option provides (+++ delivers maximum benefit, ++ delivers moderate benefit, + can deliver benefit) and the support available for the option through AECS and EFA.

	Grass field margins	Beetlebanks	Species-rich grassland	Annual pollinator mix	Green manure	Retention of winter stubble	Wild bird seed	Unharvested crop
Benefits Provided								
Biodiversity refuges	+++	+++	++		*		+	+
Pollinator resources	++	+	+++	+++	++		+	
Seed-rich habitat						++	+++	+++
Funding Support								
AECS Grass Strips	✓							
AECS Beetle Banks		✓						
AECS Wild Bird Seed							✓	
AECS Stubbles followed by green manure					✓	✓		
AECS Retention of winter stubbles						✓		
AECS species-rich grassland			✓					
AECS Unharvested conservation headlands								✓
EFA Fallow			✓	✓	✓		✓	
EFA Margins	✓	✓					✓	
EFA Green Cover			(✓)		✓			
EFA Nitrogen-fixing crops			(✓)					
EFA Unharvested Crop								✓

Management Options

Grass field margins

Grass field margin with flowering plants

Grass margins provide a habitat for small mammals and invertebrates, including beneficial insects such as predators of crop pests and pollinators. These in turn provide food for farmland birds such as grey partridge, finches, buntings, barn owls and kestrels, while grey partridges and bumblebees may use grass strips for nesting.

To be eligible for AECS (grass strips in arable fields) or EFA (EFA Margin - Longer term Diverse Grass Sward), grass margins must be between 3 and 20 metres in width and must contain a mix of pollen bearing flowering plants when being newly established (at least four species for AECS). Suitable mixes will typically contain low productivity, tussock forming grasses such as cocksfoot, timothy and fescues, alongside tall, robust perennial flowering species such as knapweed, yarrow, red clover and oxeye daisy. Wider margins provide better hunting habitat for barn owls or kestrels and more effective buffer strips for watercourses (AECS margins alongside watercourses >1.2m wide must be at least 6 metres in width).

EFA margins should not be grazed or cut between 1 January and 15 July, while AECS margins should not be grazed or cut between 1 April and 15 August. Cutting after those dates can help maintain botanical diversity in the sward but can also reduce the structural diversity of the vegetation (tussocks) which are important shelter for many invertebrates and small mammals. Cutting margins on a rotational basis every 2-3 years could be a good compromise.

The greatest benefits will accrue when a network of margins is established throughout the farm, connecting with each other and other habitats to create wildlife corridors. Margins will have a particular benefit when established next to existing boundary features such as hedges, dykes or watercourses. A good rule of thumb, based on research on the habitat requirements of grey partridge and barn owl, would be to try to establish 4 - 7km of grass margins per 100ha and for these to occupy at least 1-2% of the arable area of the farm.

Beetle Banks

Where arable fields are larger than 16-20ha, it is difficult to achieve more than 4 km of field margins per 100ha and much of the field will be a long way from the refuge of the margins. In these situations, creating beetle banks, which are effectively grass margins across the middle of large fields, will be beneficial. These should be used to divide large fields into blocks of no more than 10ha, but gaps wide enough for machinery (up to 25 metres) can be left at each end to allow the whole field to continue to be easily worked as one unit.

EFA margins can be used to support this type of management, and there is also an AECS Beetle bank option which differs from the grass strips option by having a minimum width of 2 metres and a minimum requirement for only one flowering species (although more would be beneficial).

Species-rich grasslands

Species-rich grassland with native wildflowers

Wildflower-rich habitats do not have to be restricted to field margins but can also be established in blocks or patches across the farm. These provide a feeding resource for pollinators and a low-disturbance refuge for ground-nesting birds and overwintering invertebrates.

For sites where this management is intended to be maintained for the long term (5 years+), a wildflower mix using native species and approximating to a semi-natural grassland will be the best option. Fine-leaved grasses such as red fescue, along with wildflowers such as birdsfoot trefoil, red clover, knapweed, oxeye daisy, ribwort plantain, lady's bedstraw and sorrel will achieve this. This will generally work best on sites where soil fertility is relatively low (e.g. lighter soils) as these species can't compete well with vigorous grass growth.

For sites that are likely to be returned to arable cultivation within five years, a mix that uses agricultural cultivars of clovers and other legumes might be more appropriate and these will often work better on more fertile soils. In all cases, however, it is important to use a mix of species that flower at different times, so that a nectar resource for insects extends across as much of the summer as possible.

Species-rich grassland can be established and managed as EFA Fallow, which must not be grazed or cut between 15 January and 15 July. There is also an AECS option for management of species-rich grassland that is suitable for native wildflower mixes, which also can't be cut before 15 July and which requires cuttings to be removed to reduce fertility and vigorous grass growth. Cutting or grazing is important to maintain the diversity of species-rich swards. Delaying the cutting of species-rich grassland until August or September can help late nesting species such as Corn Buntings in the areas where they occur.

There is not currently any specific payment available to cover the initial cost of establishing species-rich grasslands.

Annual Pollinator Mix

Annual pollinator mix

Annual pollinator mixes can be used to provide a short-term feeding habitat for insects. The benefit of these is that they can be rotated around the farm and the annual plants that are sown tend to grow more quickly and flower more profusely than the perennial species used in species-rich grasslands. However, they do not tend to persist for more than one year at a time and need to be resown annually, either on the same site, or a new site each year. It is best to avoid single species mixes and instead use a mix of species that flower at different times and provide a nectar resource throughout as much of the summer as possible. Annual pollinator mixes can include native annuals such as cornflower, corn cockle, corn marigold and poppies, as well as agricultural species such as crimson clover, vetch and Phacelia.

Annual pollinator mixes can be used to meet the requirements of EFA Fallow (wildflower mix or soil conditioning crop if appropriate species are sown), EFA margins (short-term diverse sward) and EFA green cover (if appropriate flowering plants are sown and maintained into the following growing season). EFA Nitrogen-fixing crops could also provide a rich

annual pollinator resource if clovers are used.

A general guideline is to aim for at least 1-3% of the land to provide pollinator habitat, although this could include species-rich grassland, green manures and field margins with flowering plants as well as annual mixes.

Green Maure (Soil Conditioning Crop)

Green manure crop containing crimson and red clover

Green manures are primarily intended to help build organic matter and soil fertility. However, they can also deliver wider biodiversity benefits if managed appropriately. By including a mix of flowering species such as clovers, vetches and phacelia, green manure crops can deliver the same benefits as annual pollinator mixes. Recent research has also shown that autumn sown green manures can provide very attractive nesting habitat for corn buntings if they are retained until the end of the following summer.

Spring sown green manures can be supported through the AECS stubble followed by green manure option. They can also be managed as EFA Fallow, through the option for soil conditioning crop (ideally with a mix of species rather than a single stand). The EFA green cover option could also be used to establish green manure in the autumn of the year before, and if this is then managed as EFA Fallow the following year, it would create the ideal habitat for corn buntings.

Retention of Winter Stubble

Winter stubbles were traditionally one of the most important habitats on arable and mixed farms for seed-eating birds due to the presence of spilt grain and weed seeds. However, as intensification led to cleaner crops, less waste and a switch towards winter cropping, seed-rich stubbles are much less common than they once were.

The AECS retention of winter stubble and retention of winter stubble followed by green manure, both provide payments to retain stubble fields over the winter and by prohibiting pre-harvest dessicant sprays and any post-harvest spraying, weed seeds are likely to be more prevalent in these stubbles.

Populations of Skylarks and Yellowhammer have been shown to recover when at least 10% of the arable landscape is left in winter stubble.

Wild Bird Seed

Wild bird seed crop with cereals, linseed and brassicas

Wild Bird Seed mixes are a useful way of providing a concentrated area of seed food for farmland birds during the winter, and particularly in late winter/early spring, when a 'hungry gap' occurs as other seed sources in the landscape are used up. They also provide cover and protection from predators for grey partridge over the winter and during the summer can provide a nesting site for species such as corn bunting, brood cover for partridge chicks and can support invertebrates, including pollinators, particularly if annual pollinator plants are included in the seed mix.

Suitable seed mixes typically include cereals (for buntings and sparrows) and smaller, oil-rich seeds (for finches). Providing a mix of cereals provides a better supply of grain throughout the winter as each species drops their seed at different rates over the winter. Oats drops its grain quickest while triticale retains its grain the longest, and barley is intermediate, so these three cereals make a good combination. Smaller oil-rich seeds can be provided by brassicas such as mustard, rape or kale, but linseed is a better option if there are concerns about clubroot in brassicas. Quinoa can also be a good source of small seeds but does not always establish well in colder or less fertile soils. Annual mixes, sown every year, tend to provide the best feeding habitat as two-year mixes are often less seed-rich in the second year.

A minimum of 1ha of wild bird seed mix per 100ha of farmland is a good rule of thumb to provide sufficient winter food for farmland birds at the landscape scale. In the winter, flocks of smaller farmland birds like to have a safe place of retreat such as a hedge, scattered trees and shrubs or overhead wires, so locating wild bird cover next to these features increases its value.

Support is available through the AECS wild bird seed option and wild bird seed can also be established as EFA Fallow or on EFA Margins for narrower strips. Seed-rich margins can be a good option for grey partridge, but nesting corn buntings prefer larger blocks of at least 1ha that extend further from the field edge.

Unharvested Crops

A simpler alternative to sowing dedicated wild bird seed mixes, is to manage part of the main crop less intensively and leave it unharvested over the winter. Although it may not provide such a high diversity of seeds as a dedicated mix, it is easier to establish as it can just be sown with the rest of the field, but then by restricting spays and fertiliser use on part of the crop and leaving it standing after harvest, a seed-rich habitat is created.

Usually, this type of management would be applied to a strip at the edge of the crop and can be supported through the AECS unharvested conservation headlands option or the EFA unharvested crop option. Both have a minimum width of 6 metres. The EFA option must be maintained until at least 31 December, while the AECS option must be maintained until 1 March following the year of establishment.

Maximising the Biodiversity Benefits of EFA

The current EFA requirement is to set aside 5% of the arable area of the farm into one or more EFA options, with some options being weighted to contribute more or less than their actual area. As an example of how this could be used to maximise biodiversity benefit, a 100ha arable farm, with an EFA requirement of 5ha, could do the following:

- Create at least 4km of 3-metre-wide EFA margins/beetle banks across the area. This would extend to 1.2ha, and with the 1.5x weighting that is applied to EFA margins, would contribute 1.8ha to the EFA requirement.
- Create at least 1ha of wild bird mix on EFA fallow.
- Create at least 1ha of wild flower mix on EFA fallow.
- Sow at least 1ha of pollinator-rich green cover after harvest, which with the 0.3x multiplier would contribute 0.3ha to the EFA requirement.
- Manage 1ha of the previous year's pollinator-rich green cover as EFA Fallow through the summer.

Together these would meet the 5% EFA requirement while delivering for a wide range of species and even providing the type of autumn-sown green cover crop that is attractive to Corn Buntings

Other Beneficial Practices for Maximum Benefit

Setting aside areas of arable land for biodiversity will deliver the greatest benefits when combined with the following practices:

Integrated crop management

Following good agronomic practices such as varietal resistance, cultural techniques, monitoring and spray thresholds to minimise pesticide use as part of an integrated pest management approach will reduce the impacts of productive crop management on biodiversity. Likewise, fertiliser and manure planning will ensure the most efficient use of nutrient inputs and reduce diffuse pollution impacts on biodiversity.

Protecting and linking other habitats on the farm

Within arable farmland there are often small areas of other habitats, particularly along field boundaries, corners and areas too steep to cultivate. Wetlands are used by a range of arable farmland birds, particularly as foraging areas due to the invertebrates that they support. Waders such as oystercatchers and lapwing benefit from such features being close to spring cereal fields for nesting, while tree sparrows and reed buntings are also known to feed in wetland habitats adjacent to arable farmland. Maintaining existing wetlands and creating new small wet scrapes or ponds on poorly drained areas are likely to add to the biodiversity value of the farm. Support for wetland creation is available through AECS.

Scrub, comprising gorse, hawthorn, blackthorn, elder and hazel provides nesting habitats for species such as tree sparrow, yellowhammer and linnet. Gorse is an important early nectar source for insects before many other plants start flowering and hawthorn, blackthorn and elder provide berries for birds in the autumn. Retaining existing scrub and planting new areas of native shrubs therefore delivers significant benefits. Scrub management (not including gorse) and small-scale planting of native shrubs is supported through AECS.

Hedges provide similar benefits for biodiversity as scrub, particularly where there is a wide or dense hedge base. However, annual cutting reduces flowering and berry production provides less cover for nesting birds. Cutting hedges on a rotation of 2- 3 years and only cutting between December and February maximises the benefit for wildlife. This type of hedge management can be supported by AECS and is also an option for EFA.

Maintaining or planting small areas of native trees and shrubs at field corners or in gullies and steep slopes can increase the overall diversity of habitats and provide nesting habitats for species such as tree sparrows and barn owls. This can be supported through AECS, but care must be taken in areas important for wading birds as they prefer open landscapes and avoid trees.

To avoid having isolated ‘islands’ of biodiversity richness on the farm, it is important to look at ways to connect habitats together using options such as grass margins as wildlife corridors.

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Further Information

For further information on support schemes, refer to the Rural Payments website:

Scottish Government (2025) Ecological Focus Areas URL: https://www.ruralpayments.org/topics/all-schemes/basic-payment-scheme/basic-payment-scheme-full-guidance/greening---bps/greening-guidance-2026/efa-ecological-focus-areas/

Scottish Government (2025) Agri-Environment Climate Scheme URL: https://www.ruralpayments.org/topics/all-schemes/agri-environment-climate-scheme/

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