

Sward enhancement: selection of suitable sites

Sward enhancement refers to management techniques which aim to increase the botanical diversity (mainly the wildflower component) of species-poor grassland. Such work can be funded under Environmental Stewardship, in particular the Higher Level Stewardship Scheme. This note outlines how to select the most suitable sites for sward enhancement. Other notes provide guidance on various methods of sward enhancement, for further details see below.

Key points

Sward enhancement can be difficult. There have been many failed attempts. There is most chance of success on sites with:

- Low soil phosphorus (index 0 or 1).
- Few competitive species in the sward.
- No pernicious weed problem.

With the exception of highly stressed sites (eg very droughty or waterlogged sites) soil analysis will be essential.

Sward enhancement is much easier and has more chance of success if livestock, especially cattle, are available.

Introduction

Since the 1930s, the extent of species-rich grassland in England and Wales has declined by more than 97% in the lowlands, with similar losses in many upland areas. It may be impossible to recreate the complex plant and animal communities where they have been lost.

The species-rich grassland that remains is an irreplaceable and highly valued national resource, which must be protected and sensitively managed.

In addition many areas of degraded, species-poor grassland have the potential to be enhanced through appropriate management. UK Biodiversity Action Plans have set targets both

for maintaining existing species-rich grassland, and for restoring the wildlife interest of degraded grassland.



Flower rich hay meadow, Lower Derwent Valley

Site selection

Sward enhancement can be a very difficult process. There have been many failed attempts and there is no guarantee of success. It can be expensive and the first step to success is to only try and enhance the sward on sites with the right characteristics.

The key to help assess a site's potential for enhancement can be seen below. Enhancement methods often involve disturbance to the sward and some sites may not be suitable, because this disturbance could damage an

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historical or bird interest, or it could increase the risk of soil erosion.

Soil nutrient status

Residual soil fertility is the main obstacle to successful sward enhancement, and this is the most important factor to consider.

The soil nutrient status of species-rich semi-natural grassland is typically low. The most important nutrient which is thought to influence sward diversity is the available phosphorus (P), although other nutrients, especially potassium (K), may also have a role.

Grassland selected for sward enhancement should usually have a low soil P status (index 0 or 1). The exceptions are:

- On sites which are regularly cut for hay, where a relatively rapid reduction in P is expected, a moderate P status (index 2) may be acceptable.
- Where the soil or slope imposes high stress on plants by drought (indicated by very shallow soil or extreme stoniness) or water-logging, as some level of botanical diversity may be attained even if the P status is high.

The management history of a site can give a good indication of the likely soil P status. Sites which are likely to be high in P are those that:

- Have a long history of regular, moderate to high fertiliser and manure applications.
- Have historically received high applications of basic slag and/or super phosphate, for example in the 1950s and 1960s when this was a common practice.
- Are on heavy soils, with a high potential nutrient pool.

It is not always possible to judge the soil nutrient status of a site from the composition of the sward, as species may have been lost as a result of re-seeding or the use of broad-spectrum herbicide for weed control, rather than the application of fertiliser. In most cases soil analysis will be required.

The standard soil sampling methods outlined in Technical Information Note TIN035 – *Soil*

sampling for habitat recreation and restoration in agri-environment schemes, should be followed.

Guidance on interpreting the results of soil analysis is given in Technical Information Note TIN036 – *Soils and agri-environment schemes: interpretation of soil analysis*.

In addition to determining soil nutrient status, soil analysis can provide useful information on other soil properties, including soil type and pH. This information can help to identify target vegetation for the site and, if necessary, suitable species to introduce.

Competitive species

The presence of significant amounts of highly competitive species such as Yorkshire fog *Holcus lanatus*, soft brome *Bromus hordeaceus* and creeping buttercup *Ranunculus repens* in the existing sward will make it difficult for introduced wildflowers and finer grasses to survive.

White clover *Trifolium repens* is also very competitive and thrives in soil conditions of low nitrogen but high P. It often becomes extremely abundant when nitrogen fertiliser inputs cease.

Where competitive species dominate it may be possible to control them by establishing yellow rattle *Rhinanthus minor* before trying to introduce any other wildflower species. Yellow rattle parasitizes a wide range of species but performs particularly well on grasses and legumes. Consequently, it has the potential to reduce the vigour of its hosts and hence overall grassland sward productivity. For further information see Technical Information Note TIN060 - *The use of yellow rattle to facilitate grassland diversification*.

Alternatively where competitive species dominate and there is no existing botanical interest, it may be more effective to remove the sward by herbicide application and/or cultivation, before introducing desirable wildflowers and grasses. However, this option would not be appropriate where other interests on the site may be adversely affected, or there is a risk of soil erosion.

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Pernicious weeds

Pernicious weeds such as creeping thistle *Cirsium arvense* and broad-leaved dock *Rumex obtusifolius* must be controlled before the sward can be enhanced. Where the sward is being retained, any application of herbicide should avoid damaging non-target species (eg apply herbicides to target species by spot treating or weed wiping).

Management options

Sward enhancement has more chance of being successful if livestock form part of the management. Livestock, in particular cattle, play an important role by creating patches of bare ground (which provide regeneration gaps for seed) and by trampling in the seed. This not only helps increase the botanical diversity of grassland, but also helps maintain that diversity.

Most enhancement efforts to date have focused on meadows rather than pastures. However, research has shown that enhancement of pastures is also possible if the right methods are used.

Grassland managed by mechanical means alone is more difficult to enhance and is likely to lose its species diversity over time.

Location on the farm

In terms of location, the best fields to select are those which are adjacent to existing species-rich grassland, or which link other important habitats on the farm. Isolated sites surrounded by arable land or improved grassland are unlikely to be colonised naturally by other plants, or to be used by a wide range of associated invertebrates and mammals.

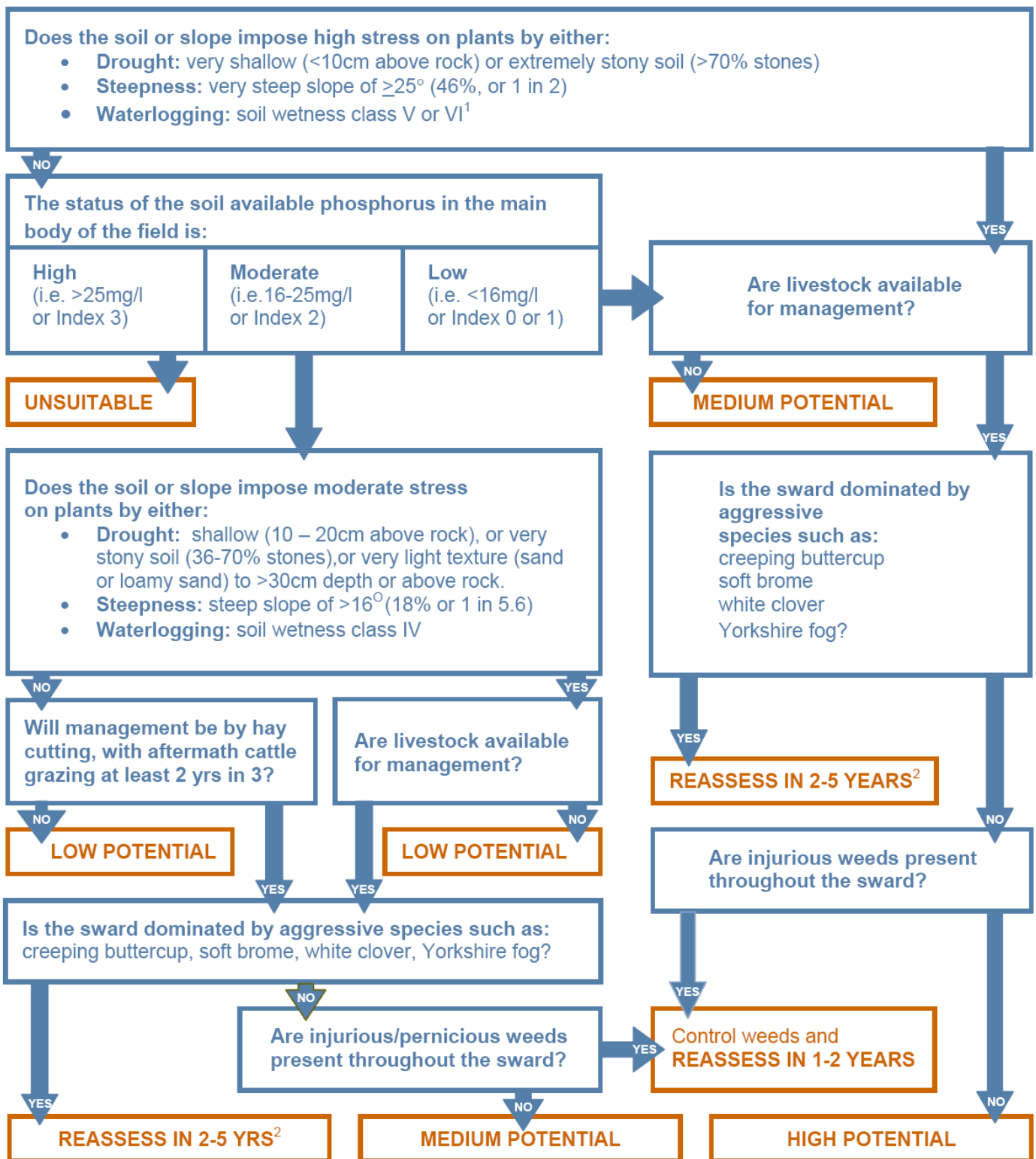
- Technical Information Note TIN035: *Soil sampling for habitat recreation and restoration in agri-environment schemes*
- Technical Information Note TIN036: *Soils and agri-environment schemes: interpretation of soil analysis*
- Technical Information Note TIN038: *Seed sources for grassland restoration and re-creation in Environmental Stewardship*
- Technical Information Note TIN060: *The use of yellow rattle to facilitate grassland diversification*
- Technical Information Note TIN062: *Sward enhancement: choice of methods*
- Technical Information Note TIN063: *Sward enhancement: diversifying grassland by spreading species-rich green hay*
- Technical Information Note TIN064: *Sward enhancement: diversifying grassland by oversowing and slot seeding*
- Technical Information Note TIN065: *Sward enhancement: diversifying grassland using pot-grown wildflowers or seedling plugs*

This Note does not supersede prescriptions in agri-environment scheme agreements. If there is any conflict between the information in this note and your agreement please contact your local adviser.

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KEY TO THE *BOTANICAL ENHANCEMENT POTENTIAL* OF SPECIES POOR GRASSLAND



¹ Soils with wetness classes V and VI are wet for long periods into the growing season, or permanently waterlogged near the surface. Soils with wetness class IV are waterlogged for long periods in winter

² Where these species dominate and there is no existing botanical interest, it may be more effective to remove the sward (taking into account historical, bird and other interests on the site and the risk of soil erosion).