3 *Grassland management decision making*

3.1 Introduction

The aim of this chapter is to set out a structured way of making decisions about grassland management.

The method outlined involves gaining an understanding of how much of the site's ecological character is dependent upon management, gathering information to identify possible management options, and then evaluating these to find the one which is most appropriate in terms of meeting conservation objectives. The primary role of monitoring is to ensure these decisions were correct and if not, to identify how management should be adjusted.

Grassland management can be seen as a problem which has a series of possible solutions at a given site. All the solutions will need to be evaluated before the most acceptable management regime can be identified. The stages included in such an approach are shown in Figure 3.1.

3.2 Defining management objectives

A frequent mistake is to begin to make decisions about grassland management before the objectives for management have been defined. In addition, it is sensible to review these objectives from time to time to take account of new knowledge of the site and the changing status of grassland types and species elsewhere.

Management objectives will vary from site to site, and within one site different goals may be set for different areas. For example, the maintenance of a species-rich flush, or an area of bare soil important for bees and wasps, may be important individual goals for parts of a larger site.

To aim to conserve all species present on the site may be unrealistic, as some species may have such small populations their survival cannot be guaranteed. It is sensible to expect a few species will be lost over time, just as other species are likely to colonise.

Conversely, setting very narrow targets may be inappropriate. For example, at some sites particular attention is paid to the population sizes of individual attractive and scarce species, such as green-winged orchid *Orchis morio*. The populations of these species fluctuate due to climate and other uncontrollable natural factors. To set the goal of maintaining the same population each year is likely to result in a drastic fluctuation in management, as each year's change in numbers is followed by an adjustment to the management regime, putting the rest of the site's interest at risk, and perhaps even damaging the target species.

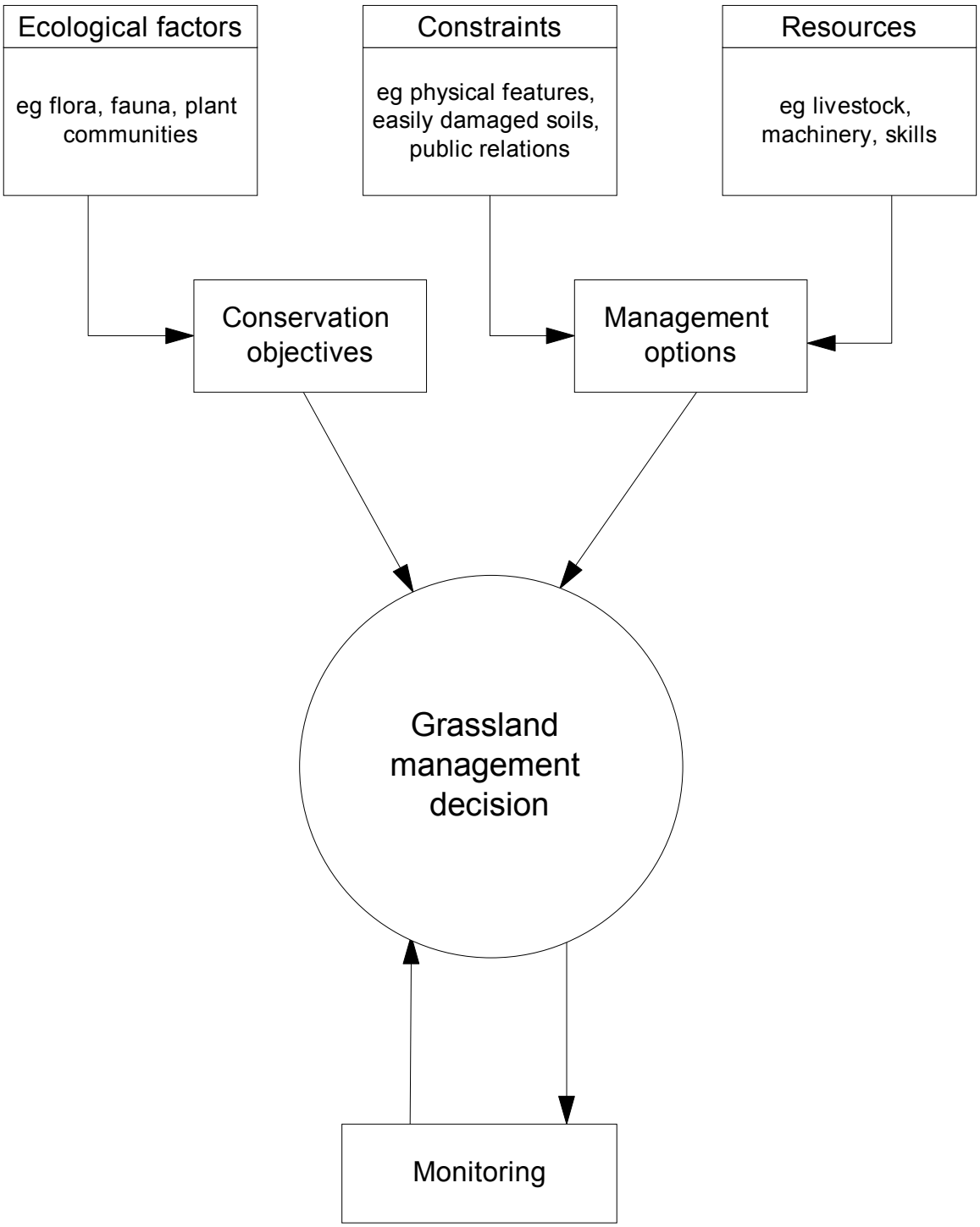

Figure 3.1 Simple model of grassland management decision making

A balanced approach is to see the primary goal as maintenance of the main plant communities of the site, along with the main features of importance to animals, such as areas of bare soil, scattered bushes and scrub margins (see Kirby 1992). This will not necessarily conserve all plant and animal species of importance, so it is important to identify nationally and regionally rare or local plant and animal species, and see their conservation as a complementary goal. At some sites very rare species may achieve an overriding importance. Finally, and as a much lower priority, attention should be paid to species which are rare locally, say at county level. It is often highly inappropriate to aim for conservation of common species which are rare in the particular site, because one would expect every site to hold a few site rarities, and for some extinctions and invasions to occur.

3.3 Acquiring information about the site

When preparing management plans there is a risk of gathering large amounts of unfocussed information which confuses rather than assists decisions. A more limited amount of information can be useful in guiding conservation decisions. Generally three broad types of information are valuable, although the level of detail available will vary from site to site.

3.3.1 Plant communities and plant and animal assemblages

This information is required to establish the conservation objectives at a site and to interpret the ecological conditions which management should create, or maintain, in order to sustain/increase key individuals/communities. Simple species lists are of very limited value as an information tool, because they give no indication of the relative abundance of species or where sensitive species occur. Ideally, a map of the site showing distribution of National Vegetation Classification Units is desirable, as this provides a standard baseline against which to weigh judgements on management.

In addition, information about the abundance and distribution of rare and local plants species should be collected, preferably on maps.

Similar quantitive zoological data is highly desirable, but in practice is seldom available.

3.3.2 Site characteristics

It is important to record the following information to enable management decisions to be made:

- Slope and aspect, which will indicate the microclimate features of the site, as well as identify problems for machinery use caused by steep slopes.

- Sward structure, which allows one to judge if existing management is suitable for the range of species for which the site is important. Estimates of mean sward height, percentage leaf litter cover and percentage of bare ground, provide a valuable record for making decisions and a simple monitoring baseline.

- Soils and detailed information about soil structure, chemistry, organic content and so on, may be available but it is difficult for the non-specialist to interpret. Soil depth is significant, as shallow soils and rock outcrops will provide areas of naturally short turf and bare soil which

may be of importance for key species and communities. Other features such as soil acidity, structure type (eg whether sandy, clay or loam) will allow one to interpret how soils affect the ecological character of the site, and highlight potential problems such as the susceptibility to compaction of clay soils by poaching.

" Drainage features, such as occurrence of natural springs and flushes, artificial features such as ditches, under-drainage and pumping equipment. This information will not only allow an interpretation of the ecological features of the site, but also highlight potential management problems.

3.3.3 Recent and current management

Information about past management can help explain the development of the site and the reasons for its current (or lack of) nature conservation interest. It also helps to determine whether current management is maintaining or increasing the nature conservation interest of the site. If it is not, changes in the existing regime are more usual than the introduction of a radically new regime.

It is important to ask the following questions:

" Has the site been grazed, mown or otherwise managed (eg by burning) in recent years?

" If it was grazed, what were the species, number, breed, age and sex of the stock?

" Approximately how long were the livestock on the site each year and between which periods?

" Has there been supplementary feeding of livestock or use of natural or artificial fertilisers and herbicides?

" If the site has been mown has this been annual, biennial or less frequent, for how long was the meadow closed and on what date was it mown?

This information may be gained either by written accounts or interviews with the site manager, neither of which may be particularly accurate.

" It is important to visit the site to ensure that the information gathered is compatible with the appearance of the site and ensure key aspects have not been overlooked.

Points to note during such a visit:

" Whether the site is managed or not and if so if it is meadow or pasture at the time of the visit.

" Species number, breed, sex and age of any livestock on site.

" Evidence of the degree to which livestock actually affect the site, such as clearly eaten-down areas of vegetation, opening up of the turf by hooves and frequency of dung.

- Successional change in vegetation indicative of undergrazing.

- The presence of weed species such as ragwort *Senecio jacobaea*, thistle *Cirsium* spp. and dock *Rumex* spp., and other indicator species of nutrient enrichment such as rye -grass *Lolium perenne* and white clover *Trifolium repens*.

- The condition of fencelines and watering points for livestock, including recent improvements, which nearly always indicate an intensification of management.

- Evidence of recreational and/or other use of the site.

3.4 Controllable factors

- **Standing crop/vegetation structure**

  This is mainly controlled by grazing and cutting. The plant communities and individual plant or animal species at a site often have requirements for specific structural features. There are many short-lived higher plants, mosses, lichens, invertebrates and birds which require short turf with many gaps of bare soil for their survival. Other tall herbs, invertebrates and birds of meadow land and scrub margins require tall grassland (either during the summer months, as in meadow, or all year round, as in the case of scrub margin). Some animals require both short and tall vegetation to be present on the site. Defining the structural features to which the communities and species of a site are adapted is therefore an important first stage in making management decisions.

- **Nutrient status**

  During the present century there has been a massive increase in the nutrient levels in the soils of UK grasslands due to use of artificial fertiliser. This means that over most of the lowland area of the UK, and in the more intensively managed grassland of the uplands, species-poor rye-grass *Lolium perenne* MG7 communities have replaced the rich assemblage of grassland types of nature conservation interest.

  For the most part conservation management involves restricting the supply of nutrients to a grassland site, and particularly preventing the use of artificial fertilisers and inputs of nutrients in supplementary feeds.

- **Hydrology**

  In the past, man has created highly modified hydrological systems within which plant and animal communities of high nature conservation value have developed. In these situations there is a requirement to make conscious decisions about site hydrology, because drainage is an active process. Presently, there is only a limited amount of scientific information about how grassland floristics relate to hydrology. The situation can be complicated by changes in hydrology which occur naturally. These may simply result in replacement of one community of nature conservation interest with a second community of similar conservation value. Generally, over

the past century, there has been an increased drying out of sites; management should favour maintenance or an increase in wetness, particularly where there is evidence of decreasing wader populations or other species groups of wet habitats.

3.5 Uncontrollable factors

It is important to realise that not all factors can be controlled and hence management is not such a precisely targeted activity as one might wish it to be.

" **Climate**

There are marked variations from year to year in both rainfall and temperature at all grassland sites. This will influence the abundance of individual species and extreme conditions. A series of unfavourable seasons may even make certain species extinct.

Climate will also influence the productivity of the grassland, such that in a cold, dry spring there will be much less grass than in a warm, wet spring. Applying the same intensity of management each year will mean that in some years the management results in a short sward and perhaps damage by grazing, while in another year it will result in a tall sward. This will have marked implications for some species although, as this is a natural pattern of variation, the effect may only be dramatic in ecological terms when there are extreme events such as prolonged summer drought. It is important to have a degree of flexibility in order to tailor the intensity of management to each year's weather conditions, or at least to make provisions for extreme events, for example by taking grazing animals off the site during drought.

" **Natural population dynamics**

One of the reasons for conserving grassland ecosystems is the complexity of their natural dynamics, despite the fact they are managed systems. From year to year complex events related to climate, the innate properties of individual species, interactions with other species, disease and chance events cause populations to change in a way which is unrelated to management. A dramatic illustration of this is provided by the rabbit *Oryctolagus cuniculus* which can build up to very large numbers causing extensive damage. This can be followed by an attack of myxomatosis which causes the population to crash and introduces a new set of problems.

It is often unwise to place too much emphasis upon a single species when making management decisions, as its variation may be in part unrelated to management. By looking at plant communities or species assemblages a more complete understanding of the impact of management can be gained.

" **Adjacent land use**

Land use practices on land surrounding unimproved semi-natural grasslands can have a big impact on the nature conservation interest of a particular site. These are not always controllable (depending on the relationship with the landowners). Such impacts include:

- an influx of nutrient-rich groundwater or run-off;
- fertiliser drift from surrounding farmland;
- low water levels due to over-abstraction from rivers or ground water.

" **Atmospheric deposition**

Deposition of sulphur and nitrogen resulting from air pollution can have a significant impact on species and habitats of nature conservation interest, including semi-natural grasslands (Woodin & Farmer 1993). Mitigation of such impacts can only really be achieved by changes in policy and legislation.

3.6 Management context

Most lowland grassland sites are influenced by or are a product of surrounding land use, and many exist within farmed landscapes. The main reason for considering what is happening on land surrounding a site is to identify the possible options for management. Most management will be carried out by people with livestock and machinery close to the site. Options such as using "flying flocks" (flocks of sheep kept simply for the purpose of conservation management and moved around conservation sites) are expensive and can only be used on a small number of sites in any season. (See Chapter 5.)

Where a site forms part of a farm it is valuable to determine what types of livestock and machinery are owned by the farmer. Where the site is outside a farm , then examination of farming in the vicinity will identify possible ways in which cooperation with a local grazier or contractor may allow the site to be managed. Sites which occur in arable landscapes or on the urban fringes will be most problematic, as grazing livestock may not be available.

The type of livestock farming practised locally is important. Dairy farmers will be loathe to graze their livestock on grasslands of nature conservation importance; dairy cattle are valuable and the relatively low feed value of grasslands of nature conservation interest means that milk production would be reduced to an unacceptable level. Similarly, if local farmers are seeking to fatten cattle rapidly for slaughter they too will be loathe to graze animals on sites of nature conservation importance. The animals most suited to grazing lowland semi-natural grasslands are suckler cows and breeding ewes or beef cattle being raised on an 18 month or longer system of production (Hopkins 1992).

Examination of the local landscape will also allow one to understand other problems of management which may arise due to recreational use by visitors, sporting interests on the land and matters relating to water management and pollution.

3.7 Taking decisions about management

The preceding text has been concerned with preparing information and ideas about a site which will allow sensible management decisions to be taken. This information will help to answer the following questions, leading to the most appropriate management regime being adopted at a given site:

" What are the ecological requirements of the communities and species of importance?

Not all ecological requirements can be catered for by management, such as a requirement for an acid soil, or the warm microclimatic conditions of a south facing slope. Most, if not all, plant communities of nature conservation interest require a low nutrient status.

Vegetation structure is usually the key managed determinant. The desired vegetation structure will vary from site to site and even from area to area within the site. A range of species may require seasonal variation in vegetation structure, as in hay meadows.

At sites with a managed hydrological regime it is important to identify vegetation communities and species of plant and animals which require either relatively wet or dry conditions.

" Which management techniques can be applied to create the required conditions?

This is often a simple question to answer. The majority of grasslands are grazed or could be grazed. Where a site is already managed as a hay meadow, then continuation of this management regime is necessary to ensure conservation goals are met.

However, there are very many problem sites which lie outside of management and are not easily grazed, such as those on the urban fringe, and small isolated grasslands. Here it is sensible to consider the re-introduction of grazing, but mowing and burning options also need to be considered.

" Is it technically possible to carry out all of the options identified?

This may seem an unnecessary question, but often important problems which cause management to founder are overlooked. This may lead to a waste of resources and possible damage to relationships with landowners.

Examples of problems to be considered are a) steep slopes, which will inhibit machinery use, b) rock outcrops, boulders and other obstacles to mechanical cutting, c) lack of water supply which means cattle and sheep cannot be grazed.

" Do the resources exist to carry out management?

It is important to establish whether there are skilled personnel necessary to carry out the management. This is less problematic in a traditional farming context. However, many sites now belong to "hobby farmers" who may be inexperienced, while many modern farmers may not have the necessary skills to carry out the types of extensive farming which are most suitable

for nature conservation. Certain management techniques, such as herbicide treatment, require a trained and certificated operator.

An important and often overlooked resource is a long-term commitment to the chosen management option. For example, it is not wise to rely entirely on volunteer commitment to manage semi-natural grasslands as numbers often fluctuate. It is important to be able to see a management option through to the end. For example, before introducing a hay cutting regime, one must consider whether it will be possible to dispose of the cut material.

" Which is the most resource efficient management option?

This is an important practical question. For example, on a working farm there are often periods when there are fewer demands upon labour and machinery. At these times it is easiest to carry out conservation management activity, including the supervision of grazing animals, although there should be no sacrificing of nature conservation goals. Similarly, where breeding ewes are the main grazing animal, they can be used most efficiently after the weaned lambs have been separated from their mothers, as at this time their nutritional requirements are lowest. The aim should be to create a long-term sustainable pattern of management. (See Chapter 5.)

" Are there public relations aspects to be considered?

Where grassland conservation involves negotiation with an owner or occupier there may be in-built resistance to the proposed scheme. In part this may be due to unforeseen practical problems and proposals may need to be revised. However, some owners and occupiers have preconceived views of grassland management which run contrary to nature conservation. It may be necessary to provide a clear explanation of why the proposed management regime is appropriate and sell this.

Even more problematic may be public reaction to management. For example in areas where the public have enjoyed de facto public access they may react against fencing and other actions that restrict access. Activities such as grazing, scrub clearance and particularly burning may be seen by the public as damaging to wildlife. A small public relations campaign to explain why the work is required and what it will involve is well worth implementing. Once the local community is persuaded, it is likely to continue to support conservation of the site and its management.

3.8 Monitoring grassland management

For management purposes two types of monitoring information are required:

The first type is biological and ecological information, the second details of how the site has been managed. Guidance about such monitoring is given in Chapter 15.

References and further reading

HOPKINS, J.J. 1992. Management of semi-natural lowland dry grassland. *In*: P.D. GORIUP, L.A. BATTEN & J.A. NORTON, eds. *The conservation of lowland dry grassland birds in Europe*. Peterborough: Joint Nature Conservation Committee, pp. 119-124.

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