FORESTRY COMMISSION

GUIDANCE NOTE FOR STAFF IN SCOTTISH CONSERVANCIES
GUIDANCE NOTE 11 (REVISED MARCH 2001)

DEER AND FENCING

Purpose and target audience

1. The purpose of this Guidance Note is primarily to help Forestry Commission staff consider forestry proposals where deer and fencing are major issues. Other government departments, land owners, agents and managers, environmental NGOs and deer management groups may find it helpful. Copies should be made available upon request to applicants and consultees.

Structure

2. The original Guidance Note on this subject was issued in 1997. Following calls to update it, a number of revised drafts were circulated for external consultation during 2000. It became clear, however, that it would not be possible to produce a Guidance Note that enjoyed widespread consensual support; this was largely because of differences in view about the weight to be given to the threat to woodland grouse, ie capercaillie and black grouse.

3. Current policy, including a framework for assessing risk to capercaillie and other woodland grouse, is set out in the **main part of this Guidance Note**. It should be noted that this may need further revision as circumstances change and more information becomes available.

4. A **technical annex** summarises much of the background information contained in the original version of this Guidance Note. It also includes references and sources of further information.

5. There are also a number of more detailed **appendices**, covering assessment of seedling density and effective deer density; our agreement with the Deer Commission; and the preparation of Deer Management Plans.

Context

6. The policy context includes:-

- the Scottish Forestry Strategy, which states that the impact of deer, which thrive in woodland conditions, can be a serious threat in some places. It explains that deer fencing is an option where necessary culls cannot be achieved, but is expensive and can have undesirable side-effects, such as killing capercaillie and other woodland grouse that fly into the fences. The Strategy highlights the need to increase awareness of problems caused by high deer numbers; to develop and implement effective Deer Management Plans; to develop guidance on

deer fencing to minimise risk to woodland grouse; and to develop improved low impact fencing.

- the Deer Commission's long term vision "Wild Deer in Scotland", which looks forward 15-20 years to a situation where deer populations are managed locally so that their management is fully integrated with all local land uses and land use objectives.

- concerns over declining black grouse and capercaillie populations, and especially the latter, whose numbers have decreased by more than half over during the 1990s, leaving only about 1,000 birds in Scotland. The capercaillie is listed on Annex I of the EU Birds Directive which requires special conservation measures to be taken throughout its range, both inside and outside protected areas. Both capercaillie and black grouse are the subject of Species Action Plans under the UK Biodiversity Action Plan. These set conservation objectives and targets, and identify actions for lead Government bodies. (More detail on their statutory protection is given in the technical annex to this Guidance Note.)

Policy on deer and fencing

7. It is our general policy to support the use of deer fencing only when no reasonable alternative is appropriate. Thus, the preferred approach is to encourage the action needed to secure deer densities that are compatible with the woodland management objectives; more information on this (and the practical difficulties that may arise) is contained in the technical annex. Where fences are unavoidable, their adverse impact should be minimised through careful siting, design (including appropriate marking) and later removal when they are no longer necessary; (the commitment to encouraging redundant fence removal applies both to new fences and to older fences). Where unacceptable levels of fence strike by capercaillie or black grouse arise, steps should be taken to remove the particular fence involved. Where existing fences are due to be replaced, they should be reviewed as if they were new fences. Further information is contained in the annex, which emphasises that effective deer management is necessary, even where deer fences are used.

8. Due to current concern over the threat to Scotland's capercaillie population, a more rigorous approach is needed where fences could pose a threat to these birds. This should be based on a risk assessment approach, described below. It is recognised that, unfortunately, this may impose constraints on woodland managers that make it impossible to secure successful establishment or regeneration, unless or until deer numbers can be reduced in areas of high deer density.

Risk assessment

9. In order to minimise the risk of killing capercaillie, a view needs to be taken as to the level of risk:-

- the risk is deemed to be **very high** within 1 km of known capercaillie lek sites;

- the risk is deemed to be **high** in areas nearby to or adjoining very high risk areas, or where there are known populations of capercaillie;

- the risk is deemed to be **medium** elsewhere in the core capercaillie zones identified on the maps we have produced;

- the risk is deemed to be **low** elsewhere.

This classification is intended to be a guide. For example, capercaillie may occur outwith core zones meaning that here is clearly a risk; and where capercaillie are absent, the presence of black grouse can affect the level of risk. More detailed consideration of individual sites both for capercaillie and black grouse may well be necessary, drawing upon available local information and expertise, including advice from SNH, the Game Conservancy and the Capercaillie Project Officer.

10. Where the risk is deemed to be **very high**, the erection of new, conventional deer fences cannot be supported through grant aid, EIA consent or plan approval. Exceptionally, it may be possible to agree a non-conventional deer fencing solution, but this will need to be agreed locally and will depend upon the particular situation and the available fencing techniques. Areas of **very high** risk should also be given the highest priority for fence modification, and preferably removal.

11. **High** risk areas are likely to have to be treated in the same way as **very high** risk areas, but there may be more scope to develop an acceptable solution using non-conventional deer fencing (see Technical Annex for further details).

12. Grant aid (or, where appropriate, EIA consent) will not normally be given for conventional deer fencing associated with woodland expansion projects in **medium risk** areas; exceptions may be made with the agreement of SNH. The removal of fences that pose a threat to woodland grouse and of redundant deer fences should be encouraged. In areas deemed to be **medium risk**, deer fencing proposals should be considered very carefully, with every effort being made to minimise the use of traditional deer fences. If, however, there is no practical alternative, then carefully sited and designed deer fences may be used to protect restocking or regeneration within existing woodland areas. This reflects the importance of achieving sustainable management of the woodland habitat.

13. Where the risk is deemed to be **low**, the policy set out in paragraph 7 will apply.

14. Within SPAs designated for capercaillie (listed in paragraph 3.2 of the Technical Annex), the risk will be **very high, high** or **medium**. It is likely that an "appropriate assessment" will be required for proposals likely to have a significant effect on the conservation interest of capercaillie, SPAs (and pSPAs). This may include proposals inside or outwith the boundary of an SPA (or pSPA).

Links with WGS contracts

15. Where appropriate, WGS contracts should include Deer Management Plans, which should take account of advice from statutory consultees including, in particular DCS and SNH. Any deer fencing proposals (including plans for removal) should also be set out in the WGS contract or associated Deer Management Plan.

GUIDANCE NOTE 11

DEER AND FENCING – TECHNICAL ANNEX

Contents

Introduction

The purpose of this technical annex is to support the main body of the Guidance Note. It is **not** intended as a mini-text book on deer management and fencing; but sources of further information and references are given at the end. Grateful acknowledgement is given to Dr Philip Ratcliffe who was instrumental in pulling together much of this material, and to others who have provided helpful comments.

1. Background: woodland deer

1.1 Ecological role

The four species of wild deer in Scotland are red deer (population estimate 350,000), roe deer (population estimate 300,000), sika deer (no population estimate – but widespread hybridisation with red deer) and fallow deer (population estimate 8,000). All are naturally associated with woodlands, although many red deer live on open hill land.

Deer are an important component of woodland ecosystems and have an important role in creating a diverse structure that favours woodland biodiversity. This is especially valuable where it is intended to establish or restore native woodland. While a total absence of grazing can lead to the (undesirable) development of dense thickets, many important species benefit from limited grazing by deer: these include pinewood specialists such as wood ants, crested tits and capercaillie; and oakwood specialists such as redstart, wood warbler, pied flycatcher and tree pipit. Some of these are UK Priority species.

Problems arise when there are too many deer, leading to seedling loss, reduction in height growth, or damage to trees, loss of woodland grouse habitat and less wildlife diversity (see Gill, 2000, on this last point). Vulnerability to damage varies between different tree species and depends upon many factors, including palatability, and alternative food sources. Willow, sessile oak, rowan, holly, aspen, ash, hazel and Norway spruce are usually highly vulnerable to deer browsing and bark-stripping. Overgrazing can also have a significant effect on food sources for capercaillie through its adverse impact on blueberry and associated invertebrates. Planted stock is generally more susceptible to grazing than natural regeneration.

1.2 Population dynamics

Many woodland red deer populations reproduce at a rate of about 50-70 calves per 100 hinds. Sometimes 30-90% of yearlings can be pregnant although the norm is considerably less. Natural mortality in sheltered woodland environments is usually low (Ratcliffe, 1984). This can result in many woodland populations requiring a cull of 30% simply to maintain numbers at the same level. Since Sika deer can exhibit high yearling pregnancy (80%+) even in areas of high density (25+/km²) the required cull for Sika will therefore need to exceed 35% just to maintain the population level. Given the concealing cover afforded by forests, it is not surprising that such control is often difficult to achieve.

Woodland red deer populations are generally regulated through density-dependent mechanisms. This means that as the population density is reduced, the population responds through improvements in reproductive performance and reductions in mortality. Thus, a strong and consistent control effort must be sustained to maintain low population densities, especially since better habitat cover may also make shooting more difficult.

The rate at which roe deer populations can increase is fairly similar to that of red deer, but in dry springs can exceed 30%. (Although roe deer frequently produce twins, kid mortality can be high, especially in wet springs.) Mortality in roe deer is influenced by such extrinsic factors as the weather. Roe and Sika populations tend to respond more quickly than red deer following a reduction in their density.

2. Regulating deer densities

2.1 Target densities

The desired population density will depend upon management objectives. Generally speaking, densities of less than about 7 deer per square kilometre are required if tree regeneration is to occur, aiming at a target level of, say, 4-7 deer per square kilometre. In some cases, however, lower densities may be necessary; for example, deer may adversely affect aspen at densities as low as 2-4 per square kilometre. Densities greater than 10 deer per square kilometre can markedly reduce bio-diversity; however, the 'right' level of grazing and browsing can mimic natural conditions and provide a wide range of ecological niches.

While it is not necessary to maintain deer densities at 4-7 deer per square kilometre throughout the later successional stages of the woodland to achieve tree regeneration, it is important for wider bio-diversity

benefits. In any case, it is important that the density is not allowed to exceed 10-15 deer per square kilometre. This is because it can take considerable resources of time and effort to bring such high densities down to levels where conditions suitable for regeneration are again achieved.

Regulating deer in woodlands by shooting thus requires continuous commitment, with considerable investment in the management, training and equipping of skilled stalkers. As explained below, there also needs to be a coordinated effort over large areas (often at least 5 square kilometres) to achieve effective control. Fencing can also play an important part in the overall deer management strategy (for example by protecting particularly vulnerable areas or separating units with different management objectives; this topic is also dealt with in more detail below.

2.2 Assessing densities

An assessment of current deer densities is clearly needed to assess the scale of the task (and timescale) needed to bring the population down to the target level. On the open hill, or in "open" woodlands, direct counts and thermal imaging provide helpful information about deer densities, but dung counts are often used in more closed woodlands to give information about average deer occupancy over previous months (the dung decay period). In addition, some simple population modelling is useful for deciding cull targets; this requires information on the population performance and especially reproduction, mortality and immigration. (Ratcliffe (1984) and Ratcliffe and Mayle, (1992) provide a detailed methodology for such assessments.) The most recent source of advice for density estimation is FC Field Book 18 (Mayle, Peace and Gill, 1999).

2.3 Deer mobility

Red deer occupying open-range are often subject to large-scale movements influenced by weather, and there is often good local knowledge about such movements. (Woodland deer are much less influenced in this way due to the availability of shelter.) Consequently, planting and regeneration schemes adjacent to high-density open-range populations are vulnerable to large-scale and often unpredictable incursions during inclement weather.

Traditionally, fences have provided a mechanism for allowing neighbouring estates to pursue different land use objectives, separating high density populations on sporting estates from low density populations in woodlands (or areas where nature conservation is important). In the future, as deer management becomes more sophisticated, and if deer managers are prepared to co-operate over large areas of deer range, it should be possible to move towards a situation where different objectives can be achieved without fencing. For the present, however, tensions can arise where, for example, new woodlands occupy the traditional wintering range of deer from neighbouring estates and heavy culling is seen as adversely affecting the sporting potential of those neighbouring estates. (This is, however, a matter for debate: see arguments about the so-called 'vacuum effect' in Ramsay, 1996 and Evans, et al, 1994).

In areas of multiple land ownership, with multiple objectives within and between ownerships, agreeing and achieving acceptable red and sika deer densities for different parts of the range without the use of fencing can be difficult. Ideally, agreement should be reached – for example through Deer Management Groups – about acceptable deer densities and cull targets for different locations. Judicious use of fencing may also provide part of the solution, especially where there remains a risk of large-scale incursion.

Artificial feeding can be used to divert deer away from vulnerable woodland areas; however, this is not likely to succeed when overall densities of deer exceed those that are compatible with tree regeneration. Using supplementary feeding to maintain red deer at densities higher than the carrying capacity of their range is not recommended in woodland management

2.4 Monitoring results

The culling of large numbers of deer does not necessarily mean that effective control is being achieved and so some objective means of assessment is necessary. Thus, the results of control programmes must be carefully monitored. In natural regeneration schemes, the response of vegetation (seedling density and performance) should be the primary indicator of success in woodland regeneration schemes; but deer density should also be measured, both to assess deer control requirements and success in reducing deer numbers. A method for doing this is outlined in Appendix 1 and fuller details are given in Forestry Commission Field Book 18 (Mayle et al 1999). An initial assessment should also be carried out while proposals are being developed to provide baseline data and assess the likelihood of successful regeneration.

Monitoring should cover the following:-

Primary (essential) parameters	**Secondary parameters (culled animals)**
Seedling density	Species, Sex, Age
Seedling performance	Reproductive status of females
Bird strikes on fences	Body weight
Deer densities	Where shot

3. Deer fencing

3.1 The role of fences

Fences can be used to exclude deer from woodlands for long enough to secure successful establishment or regeneration. They can also allow different deer densities to be maintained on adjacent properties.

Traditionally, deer fences were associated with afforestation in the north, north-east and central Highlands, where the new forests were often adjacent to sporting estates. There was much less use of deer fences in mid and south Argyll, the Loch Lomond area and Galloway; they were considered unnecessary because of relatively low deer densities. But deer were present in the south and west and - as woodland cover increased - relatively high-density populations became established in these woodlands. (Ratcliffe, 1984). Today, the impacts of red deer are visible in woodlands throughout the range.

Excluding deer by fencing is an effective method of protecting young trees from damage. But over large areas (of more than about 3 square kilometres) fencing alone is only a short-term solution, unless fences can be maintained and incursions dealt with effectively over long time periods. If this is not achievable, then the benefits of fences are likely to be temporary, not influencing the presence and ultimate densities of deer beyond about 15 years. In general, the smaller the exclosure, the easier it is to maintain deer numbers at the desired levels; thus temporary fenced exclosures can be effective in 'kick-starting' seedling establishment by protecting vulnerable young seedlings. Small-scale enclosures may also serve a useful monitoring purpose. Fences can also be used to protect important seed sources in woodland patches that are isolated within open moorland; such areas are often in decline and in urgent need of protection from grazing if they are to continue regenerating into adjoining areas. Where temporary use is to be made of deer fences it is sensible to ensure that such fences are reusable.

Where fencing is used as part of a deer management strategy, it is important to remember that it is just that – *part* of the strategy: effective deer control is also necessary.

3.2 The impact on woodland grouse

Both black grouse and capercaillie populations are declining significantly in many parts of their European range. Capercaillie populations in Scotland are now estimated at less than 1000 individuals. They have disappeared from some parts of their former range within the past ten years. In the UK Black grouse numbers only around 6,500 males (Hancock et.al 1999). The reason for the decline is that productivity has been low, and insufficient to redress the balance resulting from mortality, which itself has been aggravated by deaths through collisions against fences. (Low productivity is related to high June rainfall, which kills chicks; predation on nests and chicks; and poor spring weather, which reduces the ability of hens to achieve optimum breeding condition.)

The importance of these species is reflected in domestic and European legislation. Capercaillie are listed on Annex I of the Birds Directive which highlights the need to conserve protected species at the edge of their range; capercaillie is one such species. The Birds Directive requires the adoption of 'special conservation measures concerning their habitat in order to ensure their survival and reproduction in their area of distribution', including identification of special protection areas (SPAs). There are currently six SPAs for capercaillie: Abernethy Forest, Ballochbuie, Cairngorms, Glen Tanar, Kinveachy Forest and Loch Lomond. Within these SPAs, "appropriate assessment" may be required: see Scottish Executive Revised Guidance, dated June 2000, updating Scottish Office Circular 6/1995.

Black grouse are listed in Annex II/2 of the Birds Directive. In addition, both species are the subject of Species Action Plans within the UK Biodiversity Action Plan process. The Scottish Executive is proposing to increase the protection afforded in Scotland to the capercaillie, by listing the species on Schedule 1 of the Wildlife and Countryside Act and by making it an offence to intentionally or recklessly disturb the display site or 'lek' which is essential to the breeding success of the species.

Deer fences are a proven hazard to birds, and many deaths have been reported - see Baines and Summers (1997) and Petty (2000) . Where young woodlands are adjacent to open moorland, red grouse are the most frequent casualty. Black grouse collisions appear to be most frequent in pre-thicket

plantations, but also occur in all ages of woodlands and on open moorland (Baines and Summers (1997). Capercaillie mortality is most frequent where fences pass through mature woodlands. This mortality is particularly serious due to the low population size and declining status of capercaillie, and because fence collisions appear to be responsible for a large proportion of mortality, particularly in first year birds (c. 50%). This mortality happens mainly during the dispersal phase in the autumn. Black grouse mortality due to deer fences is thought to be around 30%.

Petty (2000) undertook a review of research needs in relation to capercaillie. On fencing, he concluded that:-

> "Fence collisions are an important cause of mortality in adults* (and black grouse too), and appear to be implicated in lower survival rates. Therefore there should be less dependence on fencing and more on limiting deer numbers by culling".
>
> *(ie fully-grown birds)

He advocated no new fencing in "key sites" other than in exceptional circumstances, and in "core areas" only with the full agreement of consulted bodies and capercaillie experts. He also suggested that any use of non-conventional fencing should be agreed with the Commission in consultation with SNH and DCS.

Petty also recommended an inventory of deer fences in key sites, ranking fences according to their perceived danger to capercaillie. Efforts should then be made to secure removal of almost all internal fences in key sites, and most internal fences in core areas; remaining internal fences should be marked in key sites or within "hot spots" elsewhere.

A map is available to Conservancies showing the 1990 distribution of capercaillie and the boundaries for capercaillie core zones and expansion (or extension) zones. The core zones reflect the actual Scottish distribution in 1990, whilst the expansion zones reflect suitable habitat which the birds could recolonise if the decline reversed. Within the core areas, 'key sites' (that is, sites containing the most viable populations) are currently being identified by the Capercaillie Project Officer.

The Commission's policy on deer fencing is set out in the main part of this Guidance Note. Further background and practical information is contained in "Management of Forests for Capercaillie in Scotland" (Moss and Picozzi, 1994) and "Woodland management … and saving the capercaillie" (Scottish Biodiversity Group, 1998).

3.3 Other impacts

For a variety of reasons deer fences can impair recreational and visual experiences in the countryside. In areas of high scenic value with high visitor appeal the avoidance of fencing, especially roadside fencing, is to be recommended. Where a sense of wildness can be experienced especially in remote locations with few human artefacts, it is particularly important to avoid fencing unless a clear 'net gain' can be identified. Where fences are essential, they should be located so as to have minimal landscape impact by relating to closely to local landforms and existing landscape features. Fence lines that run close to and parallel with recreational routes should be avoided where possible.

Where deer fences cross regularly used access routes, gates should normally be provided, with arrows being used to direct walkers to the gate. In such circumstances, interpretation should be considered to explain why deer fences are necessary and to indicate when they might be removed.

Contrasts between different adjacent grazing regimes, or grazed versus ungrazed patches can create obtrusive patterns in the landscape. While this may be unavoidable at the boundary of different land ownerships and land uses, the Forestry Commission's Forest Landscape Design Guidelines (FC, 1994) offers guidance to reducing these effects. Managing without fences is very much a preferred option in such circumstances.

Many archaeological and cultural artefacts are located in areas that were cleared of trees in the past. Continued grazing over long time scales has prevented the encroachment of vegetation that would frequently obliterate these sites. Thus grazing provides a valuable means of managing these sites and should be continued where possible. Deer fencing may have negative impacts on archaeological sites

due to a reduction in grazing pressure, dividing sites with fences and direct damage through fencing operations. Fences should never be allowed to cross an archaeological site.

Historic Scotland must be consulted on any proposal likely to affect a scheduled ancient monument. The FC Guidelines on Archaeology should be used to inform the management of other important archaeological sites. Advice may also be sought from the FC's archaeologist, the local authority archaeologist or from an archaeological consultant.

The use of fencing can also have an impact on other nature conservation interests, in addition to woodland grouse. A non-fencing approach is often likely to result in a more diverse range of species and habitats, where deer are effectively managed.

3.4 Location, siting and management of fences

Fencing should only be done after a complete appraisal of their possible adverse impacts and, where they are used, the latest knowledge on limiting these impacts should be applied. Paragraphs 9-14 in the main body of this Guidance Note set out the approach to risk assessment. In areas of woodland grouse habitat, specialist advice may be necessary. In general, fences should never be constructed through or directly adjacent to existing mature capercaillie habitat because they cannot be easily seen against the wooded background. Instead they should be kept back at least 25 metres from woodland edges; but this may increase the risk of collisions to black grouse – this highlights the importance of seeking specialist advice relevant to a particular site. Critical areas for woodland grouse include knolls with blaeberry, harestail and cotton-grass, the break of slopes, and close against young plantations. As described earlier, landscape, recreational and archaeological impacts, should also be taken into account in the planning and siting of fence lines.

Deer fences should be removed when they are no longer needed. This may be after a fairly short period in areas where tree growth is rapid but is of course likely to be longer in areas of slow growth, such as at high elevations. Once trees have achieved a height of about 1.5 metre, deer browsing is unlikely to prevent further growth within the crop as a whole, though if the trees are important commercially the risks from height reduction and stem deformation may require a further period of exclusion. Fence removal is a high priority in woodland grouse habitats; elsewhere, it may be worth maintaining deer fences into the early thicket stage. Regeneration involving a wide range of age classes of trees over large areas may require locally targeted fencing (covering the regeneration phase) rather than the enclosure of large areas.

A programme of fence monitoring and time-scale for their removal is an essential component of the deer management plan of an area. A methodology for fence monitoring is set out in Appendix 4.

3.5 Alternatives to traditional fencing

There are a number of alternatives to traditional fencing, such as plastic netting, chestnut paling and certain types of electric fencing. The use of individual tree guards may be practical in relation to small areas of broadleaves.

Many new fence specifications are currently being tested, but only orange barrier netting attached to fences has so far proved to successfully reduce collisions (Andrew and Baines (1997); (Moss and Picozzi, 1994; Petty, 1995; Summers, 1999). Unfortunately this is visually intrusive and is vulnerable to wind and ultra-violet light. However, the RSPB is currently testing a number of other fence designs to improve visibility of the fence and the durability of the material. These include post and rail, chestnut paling and stock fences with a horizontal section attached to the top (the 'L-shaped fence'). There is good reason to believe that chestnut paling in particular can be highly effective; the RSPB and FC Research are currently testing this and a number of other methods to indicate the effectiveness of alternative fences and the durability of the materials.

Electric line wire fences can be effective against red (but not roe) deer and appear to be less damaging to birds, but they require a strong commitment to maintenance to ensure that they remain effective. Much will depend on the site and the ease of daily checking.

Advice be sought from Technical Development Branch (who are working with colleagues in NRS and RSPB) before using any of these specifications. A best practice guidance note (which will include cost data) is currently available in draft form.

4. Comparative costs

Both fencing and deer control are expensive operations.

Deer fencing costs vary from around £5-10/metre, depending upon the terrain and the standard of fence. Due to the short life expectancy of temporary fences it may not be necessary to use heavy-duty materials with pressure-treated woodwork, thus minimising the costs. However, if an effective life of 10-15 years in exposed locations is envisaged, it will be more cost-effective to use a heavy-duty specification. Dismantling fences costs about £0.5-1/metre, but it may be possible to salvage and re-use the materials.

The cost of providing a fully trained and equipped woodland stalker can be about £18-20K per annum, plus overheads. Although these costs can be offset to some extent by the sale of venison, forest protection almost always incurs a net cost. There is also the wider point that employment of stalkers provides a source of long-term, local employment: this is also, of course, true of fences.

It is difficult to make comparisons between deer fencing and deer control due to the different time scales affecting each. In any case, it is probably unhelpful to try to do this since deer control will virtually always be necessary whether or not deer fencing is employed. The main consideration here is that fencing becomes an additional cost (although this may be offset due to culling becoming more effective in fenced areas), and it is therefore important to justify it in the light of the advantages gained.

Sources of further information and References

In addition to the references listed below, further information may be obtained from local DCS, SNH and RSPB field staff; from Kenny Kortland, the Capercaillie Project Officer (01463 715000) and from the Forest Research Agency (contact Helen Armstrong (NRS) on deer ecology; and populations; Robin Gill (Alice Holt) on deer ecology and impacts; and Roger Trout (Alice Holt) on fencing and tree protection.

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APPENDIX 1

NATURAL REGENERATION
ASSESSMENT OF SEEDLING DENSITY AND PERFORMANCE, AND EFFECTIVE DEER DENSITY

This appendix briefly outlines an approach for surveys of seedling density, browsing impact on tree seedlings and average deer density, which will be acceptable to the Forestry Commission for the purpose of funding and monitoring the WGS. Reference should also be made to Forestry Commission Field Book 18 (Mayle et al, 1999).

Background

While proposals for WGS relating to natural regeneration are being developed, assessments should be made of deer density, of the extent of seedling regeneration and of availability of seed sources of the desired tree species. Clearly, if the lack of regeneration is because there are no viable seeds reaching the area, or the vegetation layer is not conducive to germination and survival of seedlings, there is little point in expecting a response from simply regulating deer numbers by fencing or control.

Equally, some measure of the performance of existing seedlings and saplings is required. The most usual requirement for regulating the impact of deer in regeneration areas is when sufficient natural regeneration occurs, but seedlings are being constantly browsed by deer. This impact frequently maintains high densities of seedlings below the level of the surrounding vegetation canopy. It is therefore important not only to measure seedling density, but also growth relative to the height of surrounding vegetation.

Method

1. The area should be stratified into separate known or recognisable units with similar (homogenous) deer usage and impact. Systematic sampling is carried out by laying down temporary plots along a transect line. The detailed methodology for dung counting provided in FC publications should be applied and seedlings assessed at the same time as follows.

2. Sampling intensity within each stratum should not be less than eight plots. If the desired levels of accuracy are not achieved up to 12 plots should be sampled.

3. Within each stratum, a transect line is identified in advance on a 1:10,000 map. The starting point of the transect should be chosen as somewhere easily found in the field.

4. Each transect should be divided into eight sections of equal length, and a 7x7 metre laid down at the end of each section.

5. Within each 7x7 metre plot the following should be assessed (a-d by tree species);

   a. number of browsed and unbrowsed shoots;

   b. number of leading shoots above level of surrounding vegetation;

   c. number of leading shoots over 80cm;

   d. number of trees in plot;

   e. number of dung groups (red/sika, roe, sheep).

If, in any specific plot, less than 5 seedlings are encountered, an area outside the plot, but within a 7metre radius of the initial corner peg, should be searched, working from the peg, in order to select up to a further 10 trees. These should be assessed as above. If less than 50 trees are encountered along the

initial transect, further plots should be selected in order to provide this minimum number of trees. Otherwise, the proportion of trees browsed cannot be relied upon as being representative.

Leaders should be recorded as being damaged if either the current leading shoot(s), or the previous winter's shoot(s), have been damaged. These categories of damage are easily recognisable during the growing season. Broadleaved tree seedlings are more likely to be accurately recorded after April when they are in leaf.

Note that an alternative to the use of 7m x 7m plots is to use 1m wide transects ranging in length from 50 to 800m. Use of this method is also detailed in FC Field Book 18.

Analysis & Results

Seedling densities and the proportion of trees surviving to different growth stages can be easily calculated from the collected data. Standard deviations, standard errors and confidence limits should be determined, as explained in relevant FC publications. Results will be appraised against the criteria specified as necessary for WGS funding.

APPENDIX 2

AGREEMENT - DEER COMMISSION FOR SCOTLAND - FORESTRY COMMISSION (SCOTLAND)

The following guidelines have been agreed between the Deer Commission for Scotland and the Forestry Commission (Scotland). These guidelines will be adopted by DCS in determining the advice to FC in relation to deer and their impact on WGS proposals and vice versa. They will also form the basis of advice on deer plans for inclusion by FC in grant conditions. The Forestry Commission will consult DCS on all WGS (including Forest Plans) applications extending to over 50 hectares or more; advice may also be sought in relation to other applications where there are deer issues.

1. DCS to consider the local population of deer over the whole area adjacent to a proposed scheme and assess the impact of the scheme on that population.

2. Using its own count and cull data - together with estate and deer management group count data, DCS to:-

- make an assessment of the numbers of males, females and dependent young to be culled from the immediate area of a scheme;

- calculate the reduction required in the remaining local population to ensure that pressure on fencing, adjoining habitat and the deer themselves is minimised.

3. Where relevant, DCS and FC to agree a programme of reduction of deer numbers prior to and/or after the erection of deer fencing. The FC will seek the applicant's agreement to this reduction programme.

4. DCS to advise the applicant(s) - and the author(s) of environmental statements - to draft an appropriate deer management plan which will identify controllers and set out the agreed control measures and target populations.

5. If requested by FC, DCS will participate at meetings to discuss the progress of a scheme and provide current information to enable FC to be satisfied of the success of establishment and the long-term future of a scheme.

6. DCS will advise on monitoring of deer populations and damage levels.

7. The application of the WGS (including Forest Plans) proposals and the advice from the DCS will necessitate;

a. cooperation with neighbouring occupiers;

b. DCS to support the agreed co-operation and collaboration on deer matters through the hinterland or adjacent catchment.

APPENDIX 3

GUIDANCE NOTES - WOODLAND GRANT SCHEMES, DEER CONTROL AND DEER MANAGEMENT PLANS (Due for revision 2001)

When putting forward proposals for a Woodland Grant Scheme, applicants should include a Deer Management Plan (DMP) if deer are likely to be a problem.

Deer Management Plans for WGS purposes should be concise and include the following:

1. a commitment to control deer to minimise deer related damage. This commitment should apply to colonising deer and existing hefted stocks;

2. named (nominated) and authorised controller(s);

3. monitoring of deer numbers, deer damage impact and deer culls. Setting culls :-

   - through period of contract with the Forestry Commission;

   - throughout rotation, with the Deer Commission for Scotland.

Main Point of Plan

1. The applicant must demonstrate a commitment to pro-active deer control in order to fulfil specific Scheme objectives. In the case of colonising deer on newly planted ground the main objective should be diligent control. Routine monitoring of deer - sightings, tracks and droppings, will confirm attempted colonisation. It is likely that some deer may need to be shot out of season. In some situations night shooting may be necessary.

2. Named (nominated) and authorised controller(s) should be current firearms certificate holders and be in possession of a rifle(s) capable of meeting the legal requirements in relation to deer control. Authorised controllers should also be fit and competent for the purpose of culling deer.

3. The number of deer utilising the scheme should be monitored. Depending on the topography and vegetation cover of the Scheme area, monitoring can be achieved by direct method of observation, e.g. vantage point counts or indirectly via dung counts. Deer damage should be measured by monitoring the browsing impact on vulnerable trees.

Deer Fenced Enclosures

Where fenced enclosures are created, any deer hefted to the site should be culled before the area is fenced. Where large schemes are associated with known populations of hill deer a cull should be implemented to compensate for the loss of the scheme area to deer range. In the case of deer fenced enclosures applicants should describe the proposed fence specifications and undertake to check them regularly for deer incursions, damage and bird strikes. Monthly checks should be undertaken as a matter of routine. More frequent checks may be necessary during the winter, particularly if drifting snow is foreseen as a problem. Any deer gaining access to enclosures must be culled.

Record Keeping

Good record keeping is fundamental to effective deer management. A record noting the date shot, species, sex, carcass weight and reproductive state of all culled deer must be kept, along with other monitoring information required, such as deer density and (for natural regeneration schemes) seedling density and seedling performance.

Setting culls

In situations where a proposed Woodland Grant Scheme involves the control of resident deer, target culls must be set. Setting precise deer culls for Schemes that involve the shooting of colonising deer is not practical. In these situations the applicant must ensure the culling of any colonising deer during the woodland establishment phase.

Authorisations

Where the woodland manager or occupier has reasonable grounds for believing that serious damage will be caused to woodlands if deer are not killed, controllers must be nominated in writing and authorised by the DCS under the following sections of the Deer (Scotland) Act 1996:-

Section 26 (2) to enclosed woodland (and arable land, improved pasture (other than moorland) and land which has been regenerated so as to be able to make a significant contribution to the productivity of a holding which forms part of that agricultural land).

Section 5 (6) to unenclosed woodland

Section 18 (2) Night shooting of all species of deer must be authorised by the DCS.

> "The Commission (DCS) may authorise an occupier or any person authorised in writing by such an occupier where they are satisfied that the taking or killing is necessary to prevent serious damage to crops, pasture, human or animal foodstuffs, or to woodland and no other means of control which might reasonably be adopted in the circumstances would be adequate".

It will be necessary to comply with the DCS 'Code of Practice for Shooting Deer at Night' and the specification of ammunition and calibres of rifle to shoot roe and all deer at night.

Section 7 Where the DCS are satisfied that, on any land, deer have caused, are causing or are likely to cause damage to woodland the DCS shall draw up an agreement specifying the parties to it and the measures which are to be taken to reduce and control deer.

Copies of application forms for authorisations are available from the DCS at 82, Fairfield Road, Inverness,IV3 5LH.

Relationship with other Deer Management Plans

Where possible the DMP should explain how it fits in with wider DMPs:-

- at the property or estate level;
- at the Deer Management Group level;
- at the corporate level (for large land management organisations).

APPENDIX 4

GUIDELINES FOR MONITORING BIRD COLLISION RATES

In order to obtain an estimate of the collision rate of birds against a fence it is essential that a 'clear-up round' is made to remove all signs of previous collisions (ie feathers and corpses).

Fence-lines should be walked monthly with the observer searching approximately 3 m either side of the fence. Only one side of the fence needs to be walked to achieve this. Under most circumstances a 5 km length of fence should e sufficiently long to obtain a meaningful estimate of collision rates on a a given fence. Bird remains should be removed to prevent double counting on following counts. Collision rates should be expressed as the number of collisions per km per year.

Monthly checks should be carried out for a minimum of one year because there are likely to be seasonal variations in bird collision rates. Black grouse collisions tend to be more frequent in spring, and capercaillie strikes more frequent in autumn.

A 'strike' is defined as a minimum of 4 feathers found at a location, on or beside a fence. If feathers are found it is important to search a wider area (c. 15 metre radius) in case the injured bird has moved away from the fenceline.

The body feathers of grouse can be distinguished from other bird species by the presence of the after-shaft, which is a small secondary feather positioned under the main feather. Where identification of feathers is uncertain specimens should be checked with a reference collection of grouse species.

Grouse feathers may be found in the vicinity of a fence if a raptor has used it as a plucking-post. Raptor pellets and "splash" on the fence post are useful indicators of this. All feathers and corpses arising from raptor activity should be removed.