A Framework for the Management of the Rothiemurchus Pinewoods

Introduction

Biodiversity conservation, based on the sustainable management of the estate, is a primary objective of Rothiemurchus Estate (RE) and the native woodlands are a focus for all the estate activities. This Framework represents stage two of a three stage planning process, which will replace the Long Term working Plan of 1998. The first stage was the drafting of the Woodland Biodiversity Action Plan in 1998. The second is the presentation of this Framework based on fieldwork and analysis that began in September 1999 and was completed in July 2001. The third phase will be an operational plan to be agreed between the estate and FC.

A Woodland Biodiversity Action Plan (WBAP) has been drafted, which has provided a foundation for a co-ordinated approach, supported by Scottish Natural Heritage (SNH), which will encompass the conservation management of all of the woodland habitats and species, including the non-woodland elements of the forest zone (<700 metres elevation). The WBAP incorporated the concept of a Forest Habitat Network (FHN) that will link into a wider habitat network for the Cairngorms.

People have probably played an important role in the ecology of the Rothiemurchus woodlands since the climatic optimum of Scots pine coincided with the colonisation by Mesolithic people about 5000BC (Smout, 1993). The impact of people on woodland structure and composition became more significant after 1650 when Smout (1999) describes the 'continuous trafficking by local people buying from the laird or more probably and commonly, operating under licence and selling on down river.' This exploitation was sustainable but is likely to have had a substantial effect on the structure and character of the wood (Smout, 1999). In the nineteenth and twentieth centuries spasmodic heavy exploitation caused some damage and high levels of grazing coupled with occasional forest fires exacerbated the decline of forest cover, which reached its lowest level in 1960.

The close interaction of people with nature is considered to be an important part of the heritage of the forest. Human interference by the creation of clearings plays an important role in maintaining the structure of the forest for a range of species by removing shade, providing disturbed soil which facilitates regeneration of tree seedlings, ensuring continuity of a variety of forest habitat types, and maintaining amenity. The application of the FHN concept will permit continuity of minimal intervention, low intervention and disturbed sites within some woodland areas as well as conserving the important non-woodland wetlands, riparian areas and upper tree lines.

A series of Activity Plans for habitats, mammals and birds in Rothiemurchus have been drafted. A Forestry Commission (FC) Woodland Grant Scheme (WGS) Management Grant is in place and this requires an Operational Plan detailing the work to be carried out, the justification and the associated costs. Funding of Long Term Working Plans is to be made available by the Forestry Commission. The proposals described here will be put forward for this scheme. Activity plan no 4 covers Biodiversity and Conservation Management (Appendix 1).

Objectives of this Framework

This paper constitutes an important next step from the WBAP in proposing a woodland management framework that builds on the recommendations of the WBAP and begins to identify the Old Growth Core Areas (OGCA) and Extended Rotation Areas (ERA). An important inventory of the native pinewood resource has been conducted by Basil Dunlop, and provides the basis for the present work.

Background to this Framework

In addressing the requirements of a management strategy the Cairngorms Working Party suggested three altitudinal zones of which one is described as the forest and moorland zone and covers the middle elevations of semi-natural and planted woodlands, moorlands and bogs between the mountain and plateau zone and the valley zone. Woodlands are mainly confined below the 600-metre contour.

Caledonian Forest (native pine) is listed as a priority habitat in the Habitats Directive. This designation is based on the view that this habitat is in danger of disappearing in the European Community and requires special and urgent protection measures to ensure its survival and subsequent enhancement.

Native Pine Woodlands have been targeted within the UK Biodiversity Action Plan as an important ecosystem, a Habitat Action Plan has been drafted, and Species Action Plans have been drafted for some of the important pinewood species

The forests of the Cairngorms are particularly significant, representing the most extensive example of boreal forest in Britain. Much of the forest is relatively unmanaged, or managed on an extensive basis and contains high biological diversity. However, much of the forest is severely degraded in ecological terms. Most importantly, the continuity between different forest types, and between different structural types within forests, has to some extent been lost. Woodlands cover about 61,400ha (11.8%) of the area.

The Woodland Biodiversity Action Plan

The WBAP describes a strategy that will safeguard the important natural heritage characteristics of the forest, and methods for assessing, maintaining and increasing biodiversity in native pinewoods, which are applicable to the forest of Rothiemurchus.

Appendix 4 is a draft document that begins to develop prescriptions for the application of sensitive silvicultural practices that will safeguard the important natural heritage characteristics of the forest.

The proposed increases in biodiversity should be carefully managed within the natural, chemical and physical constraints of the sites, and be consistent with the ecology of all of the woodlands, including non-native species and those managed for commercial objectives. The plan is an important component in the complementary hierarchy of managing for biodiversity from national to local level. WBAP's can

provide a valuable framework within which to address woodland conservation requirements at a local scale. A summary of the proposed actions is provided in Appendix 2.

A vision for the Cairngorms

The following statement by the Cairngorms Working Party creates a vision for the future landscape of the Cairngorms, which encompasses all current land uses.

"we recommend that over time all existing native woodland should be conserved, improved and extended to provide long term environmental recreational and timber benefits. This strategy will create a mosaic of native woodland interspersed with heather moorland, grassland, peatland and wetland and, on the lower ground in particular, agricultural land and productive forest of native and non-native species. Heather moors will still be extensive in some parts and used for grouse shooting and open hill deer stalking The proposed forest expansion should take place over a very long time-scale of more than 100 years with perhaps half occurring in the first 50 years. The natural heritage, employment, tourism, sport, wildlife and the owners of the land should all benefit greatly from the major changes proposed"
Cairngorms Working Party, 1992

The Cairngorms Partnership draft strategy for Badenoch and Strathspey (Cairngorms Partnership, 1996) identifies two time spans, 20-25 years and 100-200 years.

"In the former we envisage achieving the consolidation and regeneration of existing native woodlands to guarantee their future. This will include the restructuring of plantations to create a more diverse age structure and range of native species. In the longer term we envisage that a substantial amount of new regenerated native woodland will have matured and new woodlands will be established where parent frees are no longer present, thus linking and expanding those woodlands that already exist This will create extensive areas of interconnected woodland which will provide the base for a thriving sustainable forestry industry, recreation and tourism, as well as extensive areas of natural forest ecosystems."

In terms of multi-objectivity, the draft strategy highlighted the following aspects of forest management in order to achieve their vision,

1 native species predominating
2 a sustainable source of timber
3 a presumption in favour of natural means
4 increased biodiversity
5 increased opportunities for outdoor recreation
6 forestry techniques that are sensitive to the wildlife importance of woodlands, as well as the quality and quantity of fresh water
7 consideration of the impact of woodland siting and management on the landscape and views.

However, it is important that the predominance of native species referred to in 1 above should refer to the area in general, but only native species regenerating by natural processes should be permitted in the areas of ancient woodlands defined in the Caledonian Pinewood Inventory (Forestry Commission, 1998).

That our future management should be sustainable (in the widest sense; i.e. including biodiversity, soil quality, timber production, economics, etc.) is the only major constraint that we should work to. A vision for the future of Rothiemurchus forest, based on this principle was described by Ratcliffe (1999) and builds on the guidance offered above for the Cairngorms as a whole. This vision was presented to the people living within, and adjacent to the forest during 1999.

Many of the objectives of Sustainable Forestry Management are targeted to meet the needs of society as a whole, and their delivery can result in costs to the estate. It is entirely reasonable that these costs should be met by society through public funding.

Woodland fragmentation and decline

Fragmentation of habitats is one of the principal causes of losses in biodiversity and one of the major benefits of restoring woodlands in the Cairngorms is that woodland contiguity can be restored relatively easily (see Ratcliffe, Peterken and Hampson, 1998). The current distribution and size of woodland patches provides an excellent opportunity to link these to provide larger areas of contiguous woodland, which will benefit a wide range of species. In the absence of sufficient area of suitable woodland habitat the provision of corridors connecting isolated fragments is considered to be valuable. Such linkages do not need to involve direct contact of the canopy but should avoid gaps sufficiently large to inhibit the movement of the important species of animals and plants (see later analysis).

Within woodland patches, species with specialised requirements may require particular types of habitat networks to allow them to survive and disperse. An example of this is the need for a network of old growth patches containing standing and lying dead and decaying wood to support saproxylic invertebrates.

The degree to which woodland types will influence the presence and dispersion of organisms within them is highly dependent upon the size of patch relative to the ranging and dispersion distances of the particular species. For example, small patches may provide all of the requirements of immobile, 'old-growth' invertebrates, while simply representing 'edge' to wide ranging mobile species. The need for large patches of contiguous habitat is likely to be far more important to large, wide ranging woodland specialist, than to small immobile ones.

Woodland Types

Native pinewoods (Pine-Birch-Juniper woodlands) is the most extensive woodland type in the Cairngorms area, forming the main forest matrix throughout the Spey catchment, Glen Avon, Highland Deeside and the Don valley

However, several other woodland types are present which form transitional and edge habitats. The following discrete woodland types occur in Rothiemurchus and these are described more fully in the Woodland Biodiversity Action Plan.

Riparian woods
Mesic broadleaved woodland
Acid oak and birch woods
Pine, birch, juniper woodlands
Bog woodland
Unstocked woodland
Sub-montane scrub
Coniferous plantation
Policy woodlands

Structural types

Most of the preceding woodland types can be represented by different age and growth stages. In terms of supporting different species of organisms, these 'structural types' are often of more significance than the particular species composition of the woodland, though clearly these two factors interact. The main structural types are listed below and are fully described in the WBAP. However, the 'maturing' and 'old-growth' types are of most importance in relation to managing the mature woodlands and descriptions are therefore provided in full.

Establishment) These structural types all include patches of variable growth
Pre-thicket) and open spaces where trees are not regenerating.
Thicket)

Maturing

The trees are close to their ultimate height. The canopy remains relatively 'closed', though increasing light reaches the ground, allowing an increase in ground vegetation. Limited regeneration of shade-bearers occurs in shaded patches. Open patches will occur and light-demanders will regenerate into these gaps if they are big enough (c. >0.5 ha). Many trees will be producing seed, which will support increasing numbers of seed-eating animals, and their predators and parasites. In managed stands of trees, some thinning will be occurring in this stage, and some clearings will be made, making way for the beginning of a further Establishment stage. Some natural mortality occurs due to differential growth rates and shading leading to natural thinning. Many of these areas will currently represent the Extended Rotation Areas (ERA's) where sensitive felling and removal will provide open well-lit glades with disturbed ground to facilitate further regeneration, modify woodland structure to the benefit of some species and contribute to the sustainable management of the forest.

Old-growth

The ultimate height of trees is achieved, though trees may continue to grow slowly, increasing in girth. Some large trees will have blown down, or died in-situ and fallen branch-wood will be considerable, heralding a substantial increase in amounts of dead

and decaying wood. There will be significant gaps in the canopy, adding to the complexity of the mosaic. There will be a well-developed, multi-layered understorey. The availability of a wide range of ecological niches, especially those associated with dead and decaying wood, will support a wide range of specialist species. Although old-growth is clearly a dynamic state, changes are considerably slower than in other structural types, and for the purpose of this plan it can be considered to be a semi-permanent state. Importantly, sufficient old growth needs to be maintained at any one time to provide continuity of suitable conditions for the important species dependent upon it. This requires minimal management with new seedlings becoming established in gaps created by the demise of older trees. Invasive non-native species and high deer numbers may require management.

Old Growth Core Areas

Old Growth Core Areas (OGCA) are the best examples of old growth which are selected from the available patches, and which will be managed on a minimum intervention regime. This will ensure that concentrations of senescing, dead and decaying wood remain and that natural processes are the main factors driving ecological changes.

Extended Rotation Areas

ERA's provide extended, transitional habitats for many species, including those that have been safeguarded by the provision of OGCA's. They permit dispersal to and from adjacent OGCA's. They provide the open glades and disturbed conditions required by species that have developed a degree of interdependence with the historic use of the forest by people. The concept of maintaining the 'normal' forest, which is always represented by a relatively equal distribution of age-classes of trees through time, is important in maintaining these conditions. The management of ERA's will involve the use of low impact silvicultural systems such as continuous cover methods, and small-scale group fellings.

Biodiversity conservation: mimicking nature

There are few, if any, ecosystems where the full range of biodiversity is documented. Commonly in Europe, there is a high level of knowledge of the vertebrates (usually the charismatic megafauna), but invertebrates are often only partially recorded and their requirements poorly understood. For this reason it is proposed that the principle of mimicking natural ecological processes and providing the structural components found in natural forests (Ratcliffe, 1993; Ratcliffe & Peterken, 1995) should provide the basis to any strategy aimed at biodiversity conservation. This approach is perhaps the only way to address the needs of the large array of species whose presence is perhaps unknown or whose habitat requirements are poorly understood by providing a range of appropriate conditions that are continuously available.

Biodiversity conservation: catering for species

Building on this concept of mimicking natural processes and providing a full range of ecological components in the woodlands, the next stage is to address the requirements of important local species. Recent work on the development of a Forest Habitat Network for the Cairngorms (Ratcliffe, Peterken & Hampson, 1998) provides a useful approach that has been adopted here. This stage is especially important for the conservation of rare and sensitive species and analyses information on habitat requirements, minimum patch sizes and dispersal capabilities of individual species.

The provisional list of species used here is based on those species that occur on the UK Biodiversity Action Plan lists and are known to be present at Rothiemurchus. This selection includes those species that occur on Annexes I of the Bird and Habitat Directives (Natura 2000), and the approach used is considered to cater for the needs of a much wider range of species that are locally important in the Cairngorms.

Table 1. Summary of key data for important pinewood species

Species	Dispersal distance	Minimum patch size	Habitat	Grazing req.
Ants				
Scottish wood ant	100m	5-l0 ha	open pine	some
narrow-headed ant	2km	5 ha	glades	some
northern wood ant	2 km	5 ha	open pine	some
Hoverflies				
Blera fallax	?	? 1 tree	pine rot hole (OGCA)	-
Callicera rufa.	5 km	? 1 tree	pine rot hole (OGCA)	-
Bees & wasps				
O. uncinata	more than 5 km? -		-	-
C. hirsuta	more than 5 km? -		-	-
Spiders				
Clubonia subsultans	less than 1 km	? 5 ha	open pine	some
Dipoena torva	?	? 5 ha	open pine	some
Pelecopsis elongata	?	? 5ha	open pine	some
Flies				
Xylophagus cinctus	5-10 km	l0 ha	pine bark	-
Medetera exellens	5-10 km	2.5 ha	pine bark	-
Birds				
Scottish crossbill	v. high ?	c.25 ha	pinewoods with high, structural diversity	some
crested tit	2 km	25 ha	open pine, tall heather, snags	some grazing beneficial
capercaillie	20 km	500 ha	open pine old trees, diverse shrub layer	some
Mammals				
red squirrel	1-2km	100/2000 ha	mixed conifers	-
beaver	5-12km	500 ha	riparian broadleaved woods	

Pinewood plants

The plants at most risk from human disturbance have limited powers of dispersion and spread mainly vegetatively. They are all dependent on heavy shade and cannot cope with early growth stages of forest.

Goodyera repens (creeping lady's tresses)
Linnaea borealis (twinflower)
Moneses uniflora (one flowered wintergreen)
Pyrola media (intermediate wintergreen)
Orthilia secunda (toothed wintergreen)
Ptilium crista-castrensis (a moss)

Pinewood biodiversity

A summary of the ecological requirements of a range of sensitive or rare pinewood species is given in Table 1. Many of the species are strongly associated with old growth, but may not depend upon it. They do however, require habitats with open conditions and big old trees, which are provided by old growth, but equally can be provided by careful management of the ERA's. Felling will provide temporal continuity of open glades and disturbed areas, which in turn provide the requirements of other species.

Landscape pattern and woodland structure: the requirements of species

There is a notable lack of information available on the requirements of these important species. However, certain important common factors emerge from a consideration of the species accounts.

Some species require large areas of diverse woodland and are capable of achieving a variety of dispersal distances. Others seem unable to disperse across non-woodland gaps greater than about 1-2 km and, it seems sensible therefore, to plan forests of a size equivalent to the needs of the species with the largest minimum patch size and to reduce gaps to less than about 1.5km. It is likely that some species will find movement easier in some sub-optimal habitats than others. For example, the relative shelter and humidity provided by non-native plantations, or even long heather, may provide suitable conditions for the movement of some species, interspersed with transitional pauses, whereas heavily grazed moorland might not. In the absence of detailed information on individual species requirements, it seems appropriate to apply maximum gaps of 1.5 km in open conditions, while this distance might be extended in woodland and scrubby habitats.

Red squirrel and capercaillie require native woodland habitat larger than 500 ha, although red squirrels may be able to cope better than capercaillie with areas as little as 100 ha as long as patches of sufficient suitable habitat occur within 2 km. Both species seem to benefit when maximum distances between patches are less than about 2 km. These large patches of pinewood should ideally reflect the wide range of structure and tree density found in natural woodlands, and includes a wide range of tree and shrub species. Scottish crossbills, crested tits and Scottish wood ants also appear to benefit from this pattern. In other areas patches can be smaller, but virtually all pinewood species appear to benefit from woodland patches greater than 5 ha.

Many species are relatively immobile, requiring special habitats such as shade or decaying wood, but do not need large patch sizes. In particular some of the characteristic pinewood plants (Table 1) require shade and reproduce largely by vegetative methods, thus limiting their ability to move around. Their ability to survive during the early seral stages of forests when the amount of light reaching the forest floor is considerably increased is poorly understood. For these species it seems appropriate to identify areas where continuity of shade conditions can be provided and disturbance and timber extraction are limited or prevented.

Species that require pinewoods with an open structure and a diverse herb layer (see Table 1) should be maintained by suitable management aimed at providing these conditions. Felling and removal, coupled with low levels of grazing can help to do this. Large numbers of species require dead wood, and it seems important to maintain continuity (in time) and contiguity (in space) of this habitat.

An appropriate spatial pattern of OGCA's and ERA's that provide the patterns described above is considered to provide the conditions required by many of the vast number of species associated with mature woodlands. Sensitive management of the ERA'S can provide many of the requirements, but management activities may limit the periods of suitability and reduce the availability of some important components such as dead wood. Conversely, OGCA's will provide the vital continuity, although even with OGCA's their suitability for particular species will change through time.

In particular Rothiemurchus Forest extends to 3,000 hectares as displayed on the charts below. It is unique in Scotland in that it includes an almost unbroken section of continuous naturally regenerated native woodland from 220 to 600 metres above sea level, with some trees growing at 700 metres. The forest is well known for having been managed primarily by natural regeneration continuously for over 200 years. Through out this period grazing animals have been controlled to levels at which natural regeneration was successfully achieved.

Forest management proposals: the way forward

Following an initiative by The Forestry Commission in September 1998, a meeting of representatives of RE and SNH was held on 25 January 1999 to agree an approach to considering the potential for harvesting timber from native pinewoods in the context of the wider biodiversity conservation objectives. Duncan Stone and Alan Hampson (Scottish Natural Heritage) and Basil Dunlop and Philip Ratcliffe (Rothiemurchus Estate) attended. There was agreement on the following;

- The identification of OGCA's and ERA's at Rothiemurchus as proposed in the WBAP should be pursued.

- The Basil Dunlop Inventory should be used to help locate OGCA's and to identify the ERA's which might be available for management.

- Outside the OGCA's a wide range of silvicultural systems should be considered, from single tree selection, through various scales of group selection to small scale clear-cutting. Consideration should be given to mimicking natural disturbances.

- Harvesting timber from native woodlands is perfectly acceptable when other agreed objectives are being met.

- The maintenance and increase of biodiversity should be a major consideration in the selection of silvicultural systems. This should especially reflect the specific requirements of the animals and plants that are characteristic of native pinewoods (Table 1 above).

- Consideration must be given to the management of bog forest, riparian forest, sub-montane scrub and non-forest habitats below the tree line.

- SNH agreed to investigate the availability of soil maps to aid the process of identifying areas.

A rationale

Management should try to maintain a 'normal' forest structure. OGCA's aimed at providing connectivity, along the lines indicated earlier (see map), should be identified and managed on a minimum intervention regime. In wet areas (see map) the ground surface is sensitive and crossing by machines should be avoided if possible. In ERA's, a management mix of continuous cover silviculture, incorporating silvicultural thinning, and the creation of open space by small-scale felling can be used to mimic natural disturbance regimes. These methods should be used to complement each other in achieving an even spread of age classes and the balanced woodland structure required to support a variety of species. The FC and CP should try to encourage the development of markets for big logs, especially locally.

Old-growth and extended rotations

The important range of key invertebrates and plants that are dependent upon old growth will clearly require continuity of habitats, but if they are to expand well beyond the minimum viable population size linkages of old growth will be necessary. OGCA's should be established with a minimal intervention regime (i.e. no removal of timber), which should be surrounded by ERA's, where a proportion of trees are removed at a range of ages beyond normally accepted rotations. This management will provide benefits to biodiversity conservation in terms of providing connectivity, allowing populations to disperse from the OGCA's, as well as providing a suitable mosaic of habitats.

Within OGCA's individual patches will continue to mature until sufficient dead wood and old growth is present to maintain the specialised fauna and flora dependent upon the shade and decay stages of dead wood. As some trees blow over, or die, seedlings will regenerate in the open spaces created and dynamic changes to the OGCA will occur. However, the important features of old growth should remain. In addition, it may be necessary to identify new areas, within existing ERA, destined to become OGCA, in order to create and maintain the appropriate connectivity of OGCA's (i.e. addressing the species requirements of minimum patch sizes and dispersal distances). This will require the identification of these areas within the younger age-classes of woodland so that they can be managed appropriately (opportunities are present in the area to the north of the Mineral Well).

ERA's should be planned and managed to prevent non-woodland gaps of more than 1 km between adjacent patches of woodland. Within woodlands a variety of canopy structures will occur ranging from dense canopies, with branches of adjacent trees in close contact, to open canopies where the canopy edges may be separated by gaps of

up to about 50-100 metres. This is as important for riparian woodlands as it is for native pinewoods.

Coarse woody debris

A large range of species require Coarse Woody Debris (CWD) (dying, dead and decaying wood that is present standing or lying and in a variety of decay stages) in one form or another. Rot holes in tree stumps, humid and dry bark and dead wood in a variety of microclimates provide habitats for a wide range of common and rare species. Snags (standing dead trees with no top), more than 22 cm diameter and between 0.5 - 4.0 metres tall are required as nesting sites for crested tits.

Rothiemurchus has been managed for centuries for extraction of timber, and standards of woodland tidiness, in which all windblown or dead wood was removed, were maintained until 1985. A recent survey therefore revealed very low levels of CWD relative to what could be available in managed woodlands of these types. This may be restricting the viability of some species, and requires urgent attention. Consideration should be given to the following methods of increasing the amounts of dead wood;

a) by killing some trees to provide standing dead wood and future snags.
b) by felling some trees, (a proportion larger than 22cm diameter), from high stumps (c. >1.5 metres) to provide snags and logs.
c) The provision of bird and bat boxes as a short-term measure is recommended.

Removal of dead and fallen trees should be prevented throughout the forest. CWD should be encouraged throughout the entire forest area. Some modelling is necessary in order to try to cater for future requirements of CWD as the forest structure and spatial patterns change.

Developing a management approach

Field visits by a survey team comprising, Keith Duncan (Scottish Natural Heritage), Graham MacBryer (The Forestry Commission), Alph MacGregor (Rothiemurchus Estate), Basil Dunlop (Rothiemurchus Estate) and Philip Ratcliffe (Rothiemurchus Estate) has resulted in the identification of areas of OGCA and opportunities for harvesting within the proposed ERA's. The field survey made full use of the Basil Dunlop Inventory and the WBAP to aid its work.

Output from the field surveys

A map overlay to the Basil Dunlop Inventory is provided at Appendix 3. This shows areas selected as potential Old Growth Core Areas. The following target notes indicate proposals for the main areas of 'maturing' and 'old-growth' structural types. During the field survey it became clear that the area previously referred to as Forest Matrix does not exist here. Having identified the main areas of Old Growth Core, the remaining harvestable areas of the forest fall into the category of Extended Rotation

Area, which includes opportunities for clear-cutting and continuous cover silviculture.

Moormore

East Moormore is ideally situated on the North Eastern edge of Rothiemurchus, as an Old Growth Core Area. There are many large old trees interspersed with bog forest and open areas. It links well with Glenmore Forest (FE) and the area is highly fragmented with strips of glacial moraine in close proximity to important and fragile wetlands. The density of harvestable pine trees is low and tree form, from a harvesting perspective, is generally poor. In a few places dry moraines provide some ground stability and a limited amount of harvesting may be possible here. In summary, harvesting opportunities are limited to some localised thinning and the occasional removal of large well-formed individual trees. Great care is required in extraction. Costs will be very high. It is recommended that most of this area away from the principle extraction routes be managed under a minimal intervention regime.

Piccadilly Mineral Well

This is a large variable area, with wet boggy patches, especially to the east and with denser areas of mature pine to the west of the main access route. It is proposed to favour broadleaves along the AlIt Druidhe and Am Beanaidh rivers. The OGCA connections following the eastern bank of the Allt Druidhe and the northern section of the Am Beanaidh should extend into the Piccadilly/ Mineral Well area becoming larger toward the eastern end.

There are good opportunities for timber harvesting in the western section, and careful route management will be necessary to avoid ground damage during extraction toward the eastern access via the Loch Morlich woods.

Carn Eilrig Triangle

For walkers this is one of the most inaccessible parts of the forest and contains important lek sites for capercaillie. There are excellent areas of old growth throughout the area and the riparian zones are especially interesting. While the Capercaillie population remains at risk it is recommended that felling is limited to within 100 metres or so of existing forwarder tracks within the ERA, and takes place outwith the breeding season.

It is proposed that all of this area be managed with Old Growth patches throughout the ERA, in addition to the large OGCA marked on Map 1. Should felling and removal of timber from the ERA be necessary, care must be exercised, especially if Old Growth areas cannot be avoided during timber removal. The management proposed here will support biodiversity conservation objectives especially for capercaillie and red squirrel populations. Although this particular area is only about 180 hectares there is good connectivity to other large OGCA's.

Cadha Mor,

Much of this area is steep and naturally well drained with a semi-natural tree line that exceeds 500 metres in places. There are good examples of sub-montane forest, which

complement the adjacent Creag Fhiaclach, considered to be the best example of a natural tree line in the UK at over 600 metres. The high elevation and situation to the southern edge of the pinewoods make the southern part of this area an important OGCA.

There is some good quality timber here and there are some reasonable extraction routes to the north. It is recommended that portions in the south of the area be identified as OGCA's, while the northern part should be an ERA allowing continuous cover silviculture.

Within Coire Buidhe, there is an excellent example of high elevation woodlands. There are some large trees at high elevation (>450 metres). This area is adjacent to Cadah Mor and is of similar value.

Although there are large timber trees of good form, the area is inaccessible and felling and timber removal would almost certainly cause ground damage and would impact upon landscape considerations. It is recommended that this area be managed under non-intervention as an OGCA

Loch an Eilein - Badan an Droma

An area that was previously felled and has regenerated naturally, this stand contains a variety of stem forms including some large spreading trees. There are large numbers of ant's nests here. Its situation between Loch an Eilein and the Am Beanaidh offers a valuable site for an OGCA to allow dispersal of organisms.

There are very good stands of usable timber here and removal would be reasonably straightforward. A combination of single tree selection and small group felling should be used effectively here to create further diversity. The recommendation here therefore is to identify small OGCA's, while devoting most of the area as an ERA.

Red deer have been encouraged to winter here so the local deer density in this area does not seem to have been reduced as much as elsewhere and there are less signs of regeneration on the edges of the stands. Once regeneration of woodland has been achieved elsewhere, the reduction of local deer densities here could effectively encourage a spread of woodland onto the surrounding dry heath.

Loch an Eilein - Compartment 18 and Pike bay

This area has been thinned in the past. The last thinning was in 1985 and the stand is now due for a further thinning. There is virtually no understorey here due to the rather dense shade from the canopy. The stand has a managed appearance with large areas of uniform good-quality timber trees. The proposal here is to thin the stand again as soon as possible followed by a 'seeding felling' in about 10 years time. Patches of natural regeneration should be enlarged by periodically felling peripheral trees. Regeneration should become widely established following the final group felling.

Cattle grazing within the stand, prior to the final thinning, will help create suitable seedbeds for regeneration, but cattle should only be removed at the time of a dense pulse of natural regeneration.

Lower Tullochgrue

There are a number of small stands of aspen on either side of the approach road to Lower Tullochgrue, which are worthy of management, particularly to extend the area occupied. These areas need to be more accurately defined and a management regime developed that particularly targets the temporal provision of dead and decaying wood and provides for an inventory of associated species. Annual Management Grant (WGS) is available for this purpose.

Polchar - Lochan Mor - Blackpark

There are areas of regenerating Scots pine with a high proportion of broadleaves present in this area. There are also mature areas identified on the Basil Dunlop Inventory, which may be appropriate for both harvesting and for Old Growth. These areas require further attention.

Coylumbridge wood and Blackpark

The main pinewood area is relatively sparse with many open areas. The river corridor forms an important potential OGCA with many old broadleaved trees. Part was fenced to aid regeneration but cattle (c. 20 km-2) currently seasonally graze the remainder rather heavily, and it may be opportune to reduce the density of cattle to allow regeneration to coincide with a prolific seed year in the future.

The area is of mixed origin and, in addition to many self-sown pines, there are occasional larch and spruce trees. The pines are generally of poor form, but there are occasional good timber trees. The recommendation here is in time to reduce cattle grazing as described above so as to stimulate regeneration along. Heavy thinning in some areas will encourage regeneration, retain the variety of tree forms and provide timber. Extraction routes should be planned to avoid the important moist patches.

A Recommended Working Rationale

Building on the information provided in this framework document, ongoing discussions with RE, FC and SNH have revealed much synergy and agreement in the objectives of conserving biodiversity while facilitating the wise use of the forest's timber resources. The integrated and sustainable management of the forest must deliver the objectives contained within the Natura 2000 Programme.

Important areas are defined on Map 1, which shows important wetlands, riparian areas OGCA's and ERA's. Wetlands and OGCA's are important habitats and are potentially fragile and so any activities must avoid damage to these areas. The following management rationale is proposed to deal with the future management of these areas.

Area 1 (OGCA). Minimal intervention as described in this framework document.

Area 2 (ERA with blanket consent). These areas are agreed by RE, FC and SNH as suitable for the creation of clearings by the felling and removal of timber. RE will manage these under the accepted ERA regime described in this framework document and in accordance with recognised codes of good practice. It is proposed that SNH provide a blanket consent to the 'Operations Likely to Damage the Features of Special Interest' (otherwise referred to as Potentially Damaging Operations or PDO's) in these areas. Specifically, PDO's No 10,11, 12, 13b, 21, 23 and 26 address woodland management issues. This consent should recognise the estates' commitment to following recognised good practice through the application of the principles embodied in the FC's Forestry Practice Guides on The Management of Semi-Natural Woodlands (especially No 7 on Native Pinewoods), the UK Forestry Standard and the FC 'Guidelines' series. This will involve the careful management of sensitive micro sites, including areas potentially sensitive to disturbance adjacent to ant nest, capercaillie leks, ancient pinewood plants (referred to earlier), etc.

Area 3 (ERA requiring consultation between the Forestry Commission and Scottish Natural Heritage). This area is composed of small patches of OGCA (often too small to be easily mapped) within a matrix of ERA. In these areas limited harvesting of timber is possible, but after initial identification of potential sites by RE, this will be approached by a case by case consideration involving RE, FC and SNH. Mitigating actions and PDO consents will need to be discussed followed by harvesting agreements when appropriate. The important Am Beanaidh/ Allt Druidh corridor will require particularly sensitive management to maintain connectivity.

While some trees that fall into rivers and burns may require to be removed, and recognising the need to fell dangerous trees adjacent to footpaths, it is proposed that broadleaves should not be felled within 20 metres of the mid point of the river. In this way riparian zones will effectively become OGCA.

Area 4 Riparian areas. Important areas within the influence of adjacent water courses. These require sensitive and possibly specific treatment and will be the subject of consultation with RE, FC and SNH.

Area 5 Wetlands. Fragile wetland ecosystems with minimum intervention management.

Additional Recommendations

1 Extend the recent deadwood survey to assess the number of snags and downed logs of all decay classes shown in Figure 1.

2 Within some of the ERA's selected for thinning/felling, impose a thinning methodology (e.g. Compt 18, adjacent to Pike bay and at Coylumbridge/Black Park) aimed at removing utilisable timber, but at the same time creating future Coarse Woody Debris by the means suggested above. The objective should be to create at least 5 cu metre/ ha of snags greater than 15 cm breast diameter; A longer-term objective should be to maintain some examples of all decay stages (Figure 1).

3 Plan for the removal of any redundant deer fences eg Badan an Droma

4 Use existing map data, including the RE data on wetlands and potential routes for timber removal, to identify the priority locations for the establishment of new native woodland connections and attempt to restrict most gaps to less than 1 km. Such connections should be established through new planting and natural regeneration where appropriate. In particular, the following should be targeted;

a) riparian woodlands

Consider the establishment of a 'patchy ribbon' of native woodland following the riparian zones to permit contiguity. With care this will increase biodiversity and complement fishing interests. This need not prevent some timber harvesting on the drier moraines of the riparian areas.
b) sub montane scrub at the upper tree line

5 Work on minor species should focus on aspen of Strathspey origin and opportunities for other species such as hazel and holly should be pursued. The aim will be to establish additional areas of minor species. The following approaches are suggested,

a) identify and quantify the existing distribution of aspen, hazel and holly.
b) identify and quantify suitable stands for expansion and translocation.
c) identify potential seed supply or mechanisms for collecting rooting materials.
d) consider application for WGS to provide Aspen management at Lower Tullochgrue

6 The establishment of some small fenced exclosures aimed at the establishment of aspen, hazel and holly, where appropriate, is necessary, given the relatively high palatability to deer of these species. Clearly, the disadvantages of deer fences would be carefully considered, but the principle of achieving 'net conservation benefit' should be recognised. Stock fences may be sufficient to deter deer from entering small exclosures.

7 Continuing efforts should be made to maintain local deer densities of 4-6 deer km-2,

8 Review the requirement for bird and bat boxes with SNH.

9 Initiate a survey to establish the position of all capercaillie leks to further inform the management especially in relation to timber harvesting.

10 Initiate a survey to establish the locations of the 'key' pinewood plants (see Table 1).

11 Forwarder routes and stacking areas should be planned and guidelines for their use drafted.

12 Interpretation signs should be designed for informing visitors to the forest about forest management. The wording of such signs should be agreed with FC and SNH.

13 Consider the establishment of a small tree nursery to produce broadleaved tree seedlings of local origin.

14 In time reduce cattle density at Coylumbridge/ Black Park and consider the future use of cattle in the forest to achieve biodiversity aims through seasonal grazing.

15 Monitoring programmes should be established aimed at measuring the rate and direction of response to management actions. The costs of monitoring should not be overlooked when planning and budgeting.

16 The identification of demonstration sites that could be used to demonstrate 'Best-Practice' to other owners and managers might be considered to be valuable by The Forestry Commission and Scottish Natural Heritage.

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Bidwells
5 July 2001

Appendix 1

Rothiemurchus - ACTIVITY PLAN SUMMARY SHEET (Draft 2: 9.1.98)

Title Biodiversity management

Group

Description Develop a plan to enhance levels of biodiversity throughout the estate, focusing in particular on the non-woodland elements, especially the montane, sub-montane and moorlands within the 'forest' altitudinal zone. This will build on the existing Woodland Biodiversity Action Plan (WBAP), which uses a landscape-scale approach to satisfying the needs of a wide range of forest animals and plants, and the Natural Heritage Audit (NHA). The autecological information collected from these will go some way to providing the information required for the 'audit' stage of developing a Local Biodiversity Action Plan, hence the proposed links with the Cairngorms Partnership. The proposed woodland management and spatial pattern resulting from the previous work is a sub-set of a more extensive approach to developing a Forest Habitat Network (FHN) for the Cairngorms (SNH, In press). The NHA will identify the important non-woodland species, hopefully following a similar approach to that used in developing the FHN and the WBAP. Importantly, this approach avoids an inefficient and unwieldy species-centered approach to the lower organisms, concentrating instead on a habitat approach based on similarities in requirements. This Activity will identify relevant ecological data such as minimum patch size, mean and maximum dispersal capabilities, habitat structure and reasons for scarcity or sensitivity and provide plans for future management

Location Throughout the estate

Links to other activities
This activity provides an important basis for many others, in
particular, Wildlife Management (including key wildlife sites, birds and large wide-ranging species), Cattle Grazing, Forest Long-Term Working Plan, Glen Einich/ Lairig Ghru Woodland, Remodelling young plantations, Deer Management, Juniper Management, Heather
Management and Research. The NHA will provide a collation of existing information.

Outline Plan

1 Expand the Forest Biodiversity Action Plan to take account of existing information on non-forest ecosystems.
2 Identify requirements to benefit rare and sensitive species.
3 Identify gaps in knowledge to progress 2 above and inform Research Activity
4 Identify action points to achieve enhancement of biodiversity.

Timescale Draft whole estate Biodiversity Management Plan using existing data March 1999.

Outputs and measures
Biodiversity Management Plan acceptable to estate and SNH and endorsed by CP and FA.

Benefits This plan will underpin many of the activities on the estate, and it is difficult to envisage a planned approach to other estate outputs (eg wildlife (including deer) management, cattle grazing, visitor management) without it. It will also develop further the concept of linkages and corridors to benefit as many species as possible as well as safeguarding desirable land-use interests and minimising conflicts, which has become established with the FHN approach.

Appendix 2

Biodiversity Action Plan: Summary of proposed Actions : July 1998

1 Use existing map data to identity the priority locations for the establishment of new native woodland connections and attempt to restrict most gaps to less than 1 km. Such connections should be established through new planting and natural regeneration where appropriate. In particular, the following should be targeted;

a) riparian woodlands
b) the upper tree line
c) aspen clumps
d) wetlands and muskegs

2 Consider establishing small patches of woodlands in suitable remote locations to act as future seed sources for natural regeneration.

3 Outside the lowland areas of Riparian, Mesic Broadleaves and Add Oak and Birch woods, avoid the use of large-seeded broadleaves to reduce the opportunities of grey squirrels colonising the predominantly coniferous red squirrel strongholds.

4 Plan for the extension linking of high altitude scrub treelines with lower ground at such places as Inschriach, Gleinn Einich and the Lairig Ghru.

5 Consider the establishment of a 'patchy ribbon' of native woodland following the riverbank running south from the B970 road, to where it lies adjacent to the B970 due west of Ord Ban. With care this will increase biodiversity and complement fishing interests.

6 Particular attention should be given to the temporal scale of forest expansion with due consideration being given to both the 20-25 year and the 100-200 year time frames (see Section 2). It is important in the context of native woodland regeneration not to attempt to achieve large increases in woodland cover over too short a time period. Management should continue with the objective of trying to maintain a 'normal' forest structure. A management mix of continuous cover silviculture and small scale clear-cutting will mimic natural disturbance regimes, and these methods should be used to complement each other in achieving an appropriate balance of age classes and woodland structure.

7 Old Growth Core Areas (OGCA's), with a minimal intervention regime (i.e. no removal of timber), should be planned and established. Extended Rotation Areas (ERA's) should connect these, where proportions of trees are removed at a range of ages beyond normally accepted rotations. Such ERA connectivity should be planned to prevent gaps of more than 1 km. Within the LTWP, provision should be incorporated to for OGCA's and ERA's within both the Managed Intervention and Minimal Intervention Zones.

8 The FC and CP should try to encourage the development of markets for big logs.

9 The Deadwood Survey (Hackett, 1995) identified inadequate amounts of dead wood in some categories (eg. Decay classes 3-7 in the pole stage). It is proposed that further work be initiated on modelling the temporal sequence of differing volumes of dead wood through a rotation, in relation to the specific requirements of some of the key saproxylic species. Such work will provide predictions of the future requirements of these species and provide a framework for early planning to provide them. More immediately, consideration should be given to increasing the amounts of dead wood, especially in the Managed Intervention Zone (see Hackett, 1955);

a) by killing some trees by ring barking to provide standing dead wood and future snags.
b) by felling some trees, (a proportion larger than 22cm diameter), from high stumps (c. >1.5 metres) to provide snags and logs.

10 Continuing efforts should be made to maintain local deer densities of 4-6 deer km-2. The need to regulate the local and seasonal impact of deer may however, require the use of temporary, small-scale fencing from time to time.

11 The FC, SNH and CP should try to encourage, and possibly direct carefully focused research to expand our understanding of the habitat requirements, mobility and dispersal capabilities, and population dynamics of some of the important species, especially the poorly known invertebrates and lower plants.

12 The FC should encourage continuing research into avoiding and reducing mortality of woodland grouse Thorn deer fences. Deer fences should be used in accordance with established FA guidance

13 Monitoring programmes should be established aimed at measuring the rate and direction of response to management actions. The costs of monitoring should not be overlooked when planning and budgeting.

14 In view of the area of land at Rothiemurchus, which is designated as NNR and SSSI, and the commitment of government to the conservation of native pinewoods and the wider countryside, agreement to the proposals presented here should be sought with SNH and the CP.

Appendix 3

Map 1