

CONIFER PLANTATIONS

Priority Action (CP1)

Identify conifer plantations that could be converted to broadleaves as part of a forest habitat network.

Target: Complete forest habitat network study for Dumfries & Galloway by 2012.

Lead: Forestry Commission Scotland.

Priority Action (CP2)

Expand areas of long-term retention within conifer plantations.

Target: 100ha of new long-term retention by 2015.

Lead: Forestry Commission Scotland.

1. Habitat Description

1.1 Physical Characteristics

The primary purpose of most conifer plantations is timber production, though a few in the lowlands may also have landscape and game functions. They are composed wholly or mainly of coniferous trees, often dominated by stands of single species, typically non-native larches, Sitka Spruce or Norway Spruce. At the forest



Forest trail in Dalbeattie Forest. August 2006. (Peter Norman)

scale, species composition may be more mixed, with a variety of native trees and shrubs on the **forest edge**, or more rarely scattered throughout. Most plantations are on ground that has been drained by a network of **ditches** and deep ploughed prior to tree planting, although more recent plantations may have used alternative establishment techniques.

The early years of forest growth, sometimes described as the **pre-thicket stage** (when the trees are approximately 0-12 years old), is perhaps the richest for biodiversity, especially in first rotation plantations where remnants of the previous habitat are present. During the **thicket stage** (10-30 years old) the trees form a dense canopy preventing most light from reaching the forest floor, resulting in an almost total absence of ground flora and understorey. Some plantations are thinned at this stage. The **high forest stage** (30-70 years old) results in a higher, sometimes more open **canopy** (especially in deciduous larch plantations), allowing more light to reach the forest floor and some re-establishment of ground flora. This is most marked at the forest edge. Most trees are harvested at 40-70 years old, before

reaching maturity. Harvesting is frequently carried out using **clearfell** methods, though continuous cover forestry is increasingly being used. The site is then restocked for a second and subsequent rotation of trees. **Long-term retention** of mature conifers beyond this age is now being practised for biodiversity and landscape purposes in some locations.

1.2 National and International Context

Approximately 1,516,000ha (7%) of Britain is covered by conifer plantations, with 993,000ha in Scotland. Along with improved grasslands, conifer plantations are the most widespread and abundant of habitats in Dumfries & Galloway, with approximately 145,000ha (23% of the region) planted with conifers, almost 10% of all UK planting. Given the extent of conifer plantations in the region, their existing and potential value for biodiversity is of high importance.

2. Dumfries & Galloway Status

2.1 Recent Trends

In the last 20 years increasing attention has been given to the biodiversity of conifer plantations. This has prompted many second rotation forests to be planned to take account of nature conservation needs through the creation of a greater diversity of tree species and ages, management of rides and glades, retention of old stands with dead and dying trees, more sensitive treatment of watercourses and encouragement of understorey vegetation. In some instances, conifer plantations have been removed to recreate former habitats, especially raised bogs.

2.2 Current Distribution

Conifer plantations are widespread, especially in the uplands. All of Dumfries & Galloway's conifers, except for a tiny number of Junipers, are of plantation origin. Only in the Scottish Highlands do semi-natural woods of native Scot's Pines occur.



2.3 Site Examples

Extensive examples of conifer plantations are found at **Eskdalemuir**, **Forest of Ae**, **Mabie Forest**, **Dalbeattie Forest** and in **Galloway Forest Park**.

2.4 Associated Habitats

A number of habitats occur in close association and/or overlap with conifer plantations, and the following action plans may also contain relevant information: River Headwaters, Exposed River Shingle, Native Woods, Broadleaved and Mixed Plantations, Forest Roads and Rides, Forest Ponds.



The region's conifer forests may offer a last refuge for Red Squirrels. Loch Ken 2007. (Gordon McCall)

3. Importance for Associated Species

3.1 Mammals (very high importance)

The natural habitat of Red Squirrels *Sciurus vulgaris* in Dumfries & Galloway is native broadleaved woodland, but they also occur in low densities in conifer plantations from the **thicket stage** onwards. However, introduced Grey Squirrels are better able to compete for food and will eventually replace them in native woods. Large conifer plantations with few large-seeded broadleaves might provide the only long-term prospect for the survival of Red Squirrels in Dumfries & Galloway, although even here changes to species composition and age structure will be required.

Insect food for bats is usually plentiful in conifer plantations, but the harvesting of the trees prior to maturity limits the availability of holes, even in the high forest stage. Special provision has to be made for them, usually with boxes. More **long-term retention** of conifers, including retention of standing dead-wood, would increase their prospects.

Pine Martens *Martes martes* were reintroduced to Dumfries & Galloway in the 1980s. Since then, the extensive conifer plantations of the region have enabled their population to expand and increase, although they are rarely seen. A variety of other mammals have successfully adapted to conifer plantations. These include Badgers *Meles meles*, Roe Deer *Capreolus capreolus* and Red Deer *Cervus elaphus*.

3.2 Fungi and Lichens (high importance)

Conifer forests, even fairly recent ones, provide good habitats for larger fungi. If the total number of species is lower than native woods, then this is almost certainly due to the fact that plantations tend to be monocultures.

Species such as the Saffron Milk-cap *Lactarius deliciosus* are even able to survive in the dense **thicket stage**, though rarer fungi tend to be associated with more mature trees. For example, the nationally rare *Fayodis bisphaeriga* and *Rhodocybe gemina*



Herald of Winter Hygrophorus hypothejus is restricted to pinewoods. Torrs Warren, November 2007. (Peter Norman)

have been found in association with pine and other conifers in Kirkcudbrightshire, and *Galerina stylifera* in the Forest of Ae. Some species, such as *Pholiota flammans* recorded at Kirroughtree, are more usually found in Caledonian Pine Woods, whilst *Melanotus proteus*, an uncommon fungus of pine stumps, is from a predominantly a tropical/sub-tropical genus. A number of species, such as the Larch Bolete *Suillus grevillei*, have been introduced into Britain as a result of the creation of conifer plantations.

Microfungi, including mycorrhizal species that are essential for the growth of most British plants, are less common in conifer plantations, often lost through soil disturbance during initial ploughing or subsequent use of heavy machinery.



The poor qualities of conifer bark, the lack of deadwood and old trees, excessive shade, and a lack of ecological continuity due to the clearfelling system make most conifer plantations poor in lichen diversity.

3.3 Birds (high importance)

Several birds, including Short-eared Owls *Asio flammeus* and Grasshopper Warblers *Locustella naevia* favour the **pre-thicket** stage of the conifer plantations. Second rotation forests have not so far provided the same benefits for these species as the original plantings.

Conifer plantations, especially in the **high forest** stage, are the favoured habitat for a number of species, including Song Thrushes *Turdus philomelos*, Coal Tits *Periparus ater*, Willow Warblers *Phylloscopus trochilus*, Goldcrests *Regulus regulus*, Siskins *Carduelis spinus* and Common Crossbills *Loxia curvirostra*. Only the latter species is restricted to conifers, the others also occurring in a range of other habitats. Chaffinches *Fringilla coelebs* are very common in conifer plantations and given the extent of this habitat in Dumfries & Galloway, regional numbers may well be significant in a UK context. A number of birds of prey also nest in plantations at this stage, and even more so in areas of **long-term retention**. These include Buzzards *Buteo buteo*, Sparrowhawks *Accipiter nisus*, Goshawks *A. gentilis* and Long-eared Owls *Asio otus*.

Dumfries & Galloway has many **forest edge** habitats which should offer potential for the foraging of Black Grouse *Tetrao tetrix*. Merlins *Falco columbarius* will also nest on the forest edge, so long as there is suitable adjacent open ground for hunting. Practical conservation measures within conifer forests have resulted in dramatic improvements in the number of Barn Owls *Tyto alba*.



Barn Owl,
(Paul McLaughlin)

Dumfries & Galloway supports almost the entire Scottish population of Nightjars *Caprimulgus europaeus*, which nest and feed in forest clearings, including areas of **clearfell**. Forest restructuring may be able to provide suitable habitat continuity for these birds.

3.4 Invertebrates (medium importance)

Large, dense stands of conifers of uniform age are not of great interest for invertebrates. Those that do occur are either recent arrivals to Britain or common generalists that have spread from native plants. However, given their extent in Dumfries & Galloway, their overall total contribution to invertebrate biodiversity in the region is not insignificant. A few nationally scarce species, such a ground beetle *Trechus rubens*, also occur.

A number of new invertebrate species have been attracted to the **canopy** of conifer plantations, including several hoverflies. For example, *Eupeodes lundbecki*, although common in Europe, was recorded at one of its first locations in the UK at Tynron in 1984. Other recent



The caterpillars of Red-necked Footman moths feed on lichens growing on conifers. Glenwhan, July 2005. (Richard Mearns)

colonists include *Eriozona erratica*, *E. syrphoides*, *Melangyna compositarum*, *Parasyrphus lineola*, and *P. malinellus*. The latter was new to science when discovered in 1952. Although most are predators of aphids and other canopy species, they also require the presence of flowers at ground level.

The importance of dead and decaying wood is usually associated with broad-leaved trees, but it is also of importance in **long-term retention** conifers. The longhorn beetles *Rhagium bifaciatum* favours dead and decaying pine, though it also occurs on other trees.

The Hairy Wood Ant *Formica lugubris* is regularly recorded in conifer plantations in the Highlands. There is a pre-1970 record from the Machars. Although it is now probably extinct, there is an outside possibility that a population may still exist in local forests.



3.5 Non-flowering Plants (low importance)

Although numbers of species and quantity of plants can be high, conifer plantations support a poor quality moss and liverwort flora, composed almost entirely of common species. Important species occur only where plantations contain remnants of former habitats, such as native woods or bogs, or sometimes on decaying large stumps or logs. One species of interest, Ostrich-plume Feather-moss *Ptilium crista-castrensis* is perhaps most typically a plant of northern Scottish pinewoods, where its growth can be quite luxuriant, but it has also been found, rarely, in pine plantations in Dumfriesshire.

3.6 Reptiles and Amphibians (low importance)

Conifer plantations in Dumfries & Galloway support virtually all of the region's reptile and amphibian species, but most occur at very low density within the trees. The most important areas tend to be localised open spaces, such as forest ponds or forest roads, or transient habitats such as **clearfell** areas.

3.7 Flowering Plants (low importance)

Rare plants associated with Caledonian pinewoods have been recorded in conifer plantations outside of the Highlands, including the Borders and Cumbria, but few, if any, are known from Dumfries & Galloway. As a result, the flora of conifer plantations generally consists of common and widespread flowering plants.

Following clearfelling there can be rapid recolonisation of flowering plants from adjacent or buried seed sources. However species tend to be opportunists, with little, if any recolonisation of pre-plantation flora.

3.8 Fishes (low importance)

No species of fish are strongly associated with conifer plantations. Indeed, poorly planned forests can exacerbate acidification of adjacent watercourses, severely depleting fish populations.

4. Environmental, Economic & Social Importance of Biodiversity

- Though conifer plantations are rarely economically profitable without state aid, they continue to provide economic and employment benefits to Dumfries & Galloway.
- The softwood timber produced in the plantations is generally of low quality but does supply a number of markets, typically for pulpwood.
- Given the extent of conifer plantations in Dumfries & Galloway, they make an important contribution to carbon sequestration. However this is rather limited in comparison to the totals for peatlands, semi-natural habitats and seas.
- Conifer plantations are well suited to outdoor recreation activities such as mountain-biking and paint-balling that may cause damage to less robust habitats.

5. Factors affecting the Habitat

- **Uniform age and species composition** of forests has not benefited biodiversity.
- There is the prospect of **shorter rotations** as timber processing becomes more efficient and timber markets change, which may impact on species associated with more mature trees.
- **Removal of stumps** for use in biomass power stations is likely to reduce fungal and bryophyte diversity of planted conifer plantations.
- **Wind and fire damage** can open up clearings in forests and encourage biodiversity associated with the catastrophic events that occur in natural ecosystems.



6. Strategic Actions

6.1 Recent and current activity

- The management and expansion of conifer plantations in the UK is regulated by the government through the **Forestry Commission**. Grants are paid where the management or creation of plantations is in accordance with UK forestry policy. This is set out in a series of publications: The UK Forestry Standard defines and applies government commitments to sustainability and biodiversity and this is augmented by a series of guidelines on biodiversity, landscape, water, archaeology and recreation.
- UK forestry policy addresses problems of uniform species cover, stipulating inclusion of a minimum proportion of minor conifer species together with open space and broadleaves. These elements are likely to comprise 20-30% of new and second rotation forests. The policy also provide guidance on continuous cover silvicultural systems and the identification of long term retentions to produce old trees.
- Local forest strategies, termed Forest Frameworks, have been developed by **Forestry Commission Scotland, Scottish Natural Heritage** and **Dumfries & Galloway Council** for Galloway and Lockerbie-Langholm to guide the location of new forests.



*Eyed Ladybird, a conifer specialist. Kirkconnel, August 2007.
(Greg Baillie)*

6.2 Other recommended actions

- Direct any **new conifer plantations towards areas of low conservation value**, such as derelict industrial, low grade arable, and improved pasture, which will result in a net gain for biodiversity. Avoid semi-natural open habitats and native woods of a high conservation importance.
- Where feasible, **restore high biodiversity habitats** damaged by conifer planting.
- Identify locally, as well as nationally and internationally important habitats and species within and around conifer plantations and ensure actions for them are included in **forest plans**.
- Develop systems to **monitor the biodiversity** value of conifer plantations, for example by assessing critical habitat features and selecting key or indicator species.

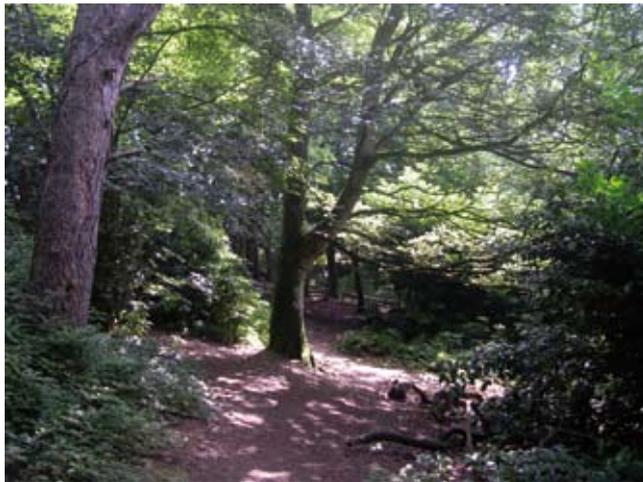
BROADLEAVED & MIXED PLANTATIONS

Priority Action (BMP1)

Identify suitable locations for new broadleaved plantations as part of a forest habitat network.

Target: Complete forest habitat network study for Dumfries & Galloway by 2012.

Lead: Forestry Commission Scotland.



A mixed plantation, created entirely for recreation at Powfoot Lakes. July 2006. (Peter Norman)

1. Habitat Description

1.1 Physical Characteristics

Broadleaved and mixed plantations have been created for a number of purposes, most commonly game cover, timber, landscape and amenity, and wildlife conservation. Most have been planted on open ground or in some cases by under-planting of semi-natural woods. They are composed both of native and non-native broadleaved trees, often mixed with conifers, and occur primarily on more fertile ground in the lowlands.

Plantations of native trees should not be confused with semi-natural and/or ancient woods. As plantations mature, they take on many of the characteristics of such woods and can become more difficult to distinguish from them, but it is likely that none have yet acquired the complicated ecological inter-relationships of semi-natural ancient woods, and may not do so for many hundreds of years. Those with the best chance of doing so are those with a woodland type soil that has been least disturbed and modified during the period that the wood was absent. Plantations on highly improved agricultural soils may grow trees, but may never acquire a full woodland ecosystem.

1.2 National and International Context

The majority of Britain's broadleaved trees are of plantation origin. In Scotland, there was around 3000km² of broadleaved and mixed woodland in 1998, the majority of which was of plantation origin. This area will have subsequently increased.

2. Dumfries & Galloway Status

2.1 Recent Trends

The number and area of broadleaved plantations has been increasing in the last 20 years, encouraged by state grant programmes. Few have any significant timber value, but have been created for amenity, wildlife and game purposes. Short-rotation coppice is a very new form of plantation.

2.2 Current Distribution

Most woods in Dumfries & Galloway, even those composed of native species, are of planted origin. Larger plantations tend to be associated with private estates, houses or castles, but smaller woods of native oaks, birches, elms and Ash, often with non-native Beech, Sycamore and conifers, are also widespread. They often comprise a sinuous patchwork on agricultural land, and their historical origins are usually not obvious.

2.3 Site Examples

Cotland Plantation (SSSI) at Bladnoch is an old plantation, predominantly of oaks and Ash. It supports an interesting flora. Nearby, **Kilsture Forest** is the largest woodland in the Machars. **Cally Woods** at Gatehouse of Fleet was planted on top of a designed landscape in the 1930s, with oaks, Sycamore, Ash, Beech, Scot's Pine and Sitka



Beech plantation with characteristic sparse ground flora. Drumlanrig, September 2006. (Peter Norman)



and Norway Spruce the main trees. It supports good bird, bat, lepidoptera and fungi populations. Other important policy woodlands include those at **Drumlanrig, Kelhead** and parts of **Mabie Forest**.

2.4 Associated Habitats

A number of habitats occur in close association and/or overlap with broadleaved and mixed plantations, and the following action plans may also contain relevant information: Native Wet Woods, Native Ash Woods Native Oak Woods, Native Birch Woods, Scrub Woods, Veteran Trees, Conifer Plantations, Forest Roads and Rides, Forest Ponds, Wood Pastures and Parklands.

3. Importance for Associated Species

3.1 Fungi and Lichens (high importance)

A number of non-native trees are important for fungi and lichens. In particular Beech is crucial for a whole array of fungi, and Sycamore is important for lichens. The nationally rare Golden Bootleg Fungus *Phaeolepiota aurea* was recorded in a mixed open plantation in Kirkcudbrightshire and from Mabie Forest, both in 1993.



The spiny underside of the edible Hedgehog Fungus. St. Ann's, September 2006. (Peter Norman)



Chaffinch. (Paul McLaughlin)

3.2 Birds (high importance)

A wide range of birds is found in well-managed plantations, including various thrushes, tits and finches. Though very rare in Dumfries & Galloway,

Hawfinches *Coccothraustes coccothraustes* may occasionally be found in plantations that contain Beech, Cherry and Hornbeam.

3.3 Mammals (high importance)

The mammal fauna of broadleaved plantations is little different to semi-natural native woods - management practices are of more importance than tree species composition. Bats in particular require the retention of mature and semi-mature trees with plenty of holes for roost sites.

3.4 Invertebrates (medium importance)

As a result of the poor colonising ability of woodland invertebrates, broad-leaved plantations lack the characteristic species of semi-natural ancient woods. Unless the plantation adjoins ancient woodland, the invertebrates will generally be common species that occur in a range of habitats. Nevertheless they can occur in high numbers. A few species of more restricted national distribution are known from mixed plantations, including the larvae of the hoverfly *Cheilosia longula* that feeds only within fungi growing under broadleaved and coniferous trees.

3.5 Reptiles and Amphibians (medium importance)

Reptiles and amphibians are more influenced by plantation structure than its age or species composition. Populations in open plantations can therefore be just as high as in native woods.

3.6 Non-flowering Plants (low importance)

Plants generally take much longer to colonise plantations than animals, especially if the plantations are isolated from existing ancient woods. As a result, most plantations lack the typical species diversity associated with ancient woods, though long-established plantations may have acquired at least some of them.

3.7 Flowering Plants (low importance)

As with non-flowering plants, the best plantations for flowering plants tend to be the oldest ones that have been least disturbed.



Common Figwort tolerates shaded habitats in plantations. Dalry, July 2007. (Maggi Kaye)

4. Environmental, Economic & Social Importance of Biodiversity

- Nature conservation is rarely the main reason for the establishment or management of broadleaved and mixed plantations. Most fulfil a variety of other roles including landscape, timber production, amenity, recreation, shelter and game cover.
- A survey by the Forestry Commission in 2003 found that 18% of the Scottish population had collected non-timber forest products in the preceding 12 months, mostly from mixed woods. 173 species were collected, mostly to eat or for medicinal or craft uses. Most products were for personal use and the collecting was considered to be of social and cultural importance, but some collecting also resulted in a modest economic income.

5. Factors affecting the Habitat

- Management work, including **felling and thinning**, can be damaging to bird and bat populations and ground flora, if carried out at sensitive times of the year.
- Creation of a dense shrub layer for pheasants in woods managed for game has sometimes been achieved by the **planting of potentially invasive shrub species** such as Rhododendron, Laurel and Snowberry.

- The **siting of pheasant release pens**, especially if intensively stocked can lead to soil enrichment and loss of ground flora.
- **Climate change** may affect tree species distribution throughout Britain. For example it has been suggested that conditions may become unsuitable for Beech in much of the south of England. Although not native to Scotland, in the future this tree may be more suited to environmental conditions in Dumfries & Galloway.

6. Strategic Actions

6.1 Recent and current activity

- New mixed plantations have been created at a number of locations including **Barfill Farm**, near Crockeford.

6.2 Other recommended actions

- Implement the same management techniques for broadleaved and mixed plantations as for native woods, wherever this does not conflict with other uses. Encouragement of **a diverse species and age structure, creation of open space, retention of wet areas and decaying wood**, can all usually be incorporated into management whilst retaining the primary purpose of the plantation.
- **Consider planting Beech woods** on ground of low biodiversity value. Do not plant Beech in existing semi-natural native woods.



Mixed broadleaved plantation. Cally Woods, Gatehouse of Fleet, July 2007. (Peter Norman)

Priority Action (FRR1)

Raise awareness of forest managers of the importance of forest roads and rides for biodiversity, and how best to manage them.

Target: Arrange training course by 2012.

Lead: Dumfries & Galloway Biodiversity Partnership/Butterfly Conservation/RSPB.



Forest road with grassland and scrubby edge. Potterland Hill, July 2007. (Peter Norman)

1. Habitat Description

1.1 Physical Characteristics

Roads and rides have been constructed in both coniferous and broadleaved plantations for the purposes of forest management. **Roads** are access routes with metalled surfaces designed to support use by heavy timber transport vehicles. They are created by the removal of soil and re-profiling of the ground surface, and usually have associated drainage ditches. Passing/turning places and timber stacking/loading areas may also be present. **Rides** are unsurfaced and designed for infrequent use only by specialist off-road forestry vehicles. Wayleaves cut under power lines provide a very similar habitat to forest rides. Both roads and rides may also serve as firebreaks.

Both roads and rides provide a mosaic of open ground and vegetated habitats that is often more diverse than the surrounding plantation. Broadleaved shrubs and trees frequently occur, even in predominantly coniferous forests. Grassland, bare ground and wetland (ditch) habitats can also occur.

The greatest physical asset of roads and rides for biodiversity, in comparison to the interior of the forest, is the abundance of light. However, the presence of

trees also provides shelter from wind, and there are often long intervals between bouts of disturbance.

2. Dumfries & Galloway Status

2.1 Recent Trends

Maintenance of roads and rides in the recent decades has, just like forest management, become increasingly mechanised and the tractor-drawn swipe or flail is the principal tool.

2.3 Current Distribution

Forest roads and rides are widely distributed through all of the region's larger forests.

2.4 Associated Habitats

A number of habitats occur in close association and/or overlap with forest roads and rides, and the following action plans may also contain relevant information: Conifer Plantations, Broadleaved and Mixed Plantations, Forest Ponds, Quarries and Mineral Workings.

3. Importance for Associated Species

3.1 Invertebrates (high importance)

The invertebrate fauna of forest roads and rides is generally of greater interest than that in the plantation, especially where plantations are composed of even-aged single species conifers. A number of species of butterfly have been retained



Painted Lady, one of many butterflies that use open sunny roads and rides. Dunskey, August 2003. (Maggi Kaye)

following afforestation through the creation and management of suitable forest roads. These include the Pearl-bordered Fritillary *Boloria euphrosyne* at Mabie, the Grayling *Hipparchia semele* at Sandyhills and the Dingy Skipper *Erynnis tages* at Dalbeattie.



Moths are less dependent than butterflies on sunlight, but the abundance of broadleaved shrubs, particularly willows and birches, on forest roads and rides provides important foodplants. Other invertebrates have been little studied, but sun-loving groups such as bugs, bees, wasps and hoverflies are likely to be more common here than in the shade of the forest. Predatory insects of other habitats, such as dragonflies from forest ponds, are often attracted to hunt in the sheltered conditions provided by roads and rides.

3.2 Fungi and Lichens (high importance)

Roads and tracks through woods and plantations provide an important microhabitat for fungi including rare tooth fungi. These species appear to have a preference for fruiting in bare mineral soils and forest tracks often offer a perfect habitat. Many other fungi also fruit along forest roads, though it is not clear exactly why this is the case. Common forest road species include Orange-peel *Aleuria aurantia* and Shaggy Ink-cap *Coprinus comatus*.



Conical waxcap *Hygrocybe conica* on forest road. Mabie, August 2007. (Peter Norman)

3.3 Flowering Plants (medium importance)

The flora of roads and rides can be completely different to the forests through which they pass. A greater diversity of flowering plants is found on lowland forest roads and rides than in the uplands. Bird's-foot Trefoil *Lotus corniculatus*, Common Dog Violet *Viola riviniana* and Black Knapweed *Centaurea nigra* are typical species, all of which are important for butterflies. Bird's-foot *Ornithopus perpusillus*, a tiny localised plant of open grassland, has been found thriving on the disturbance created along some forest roads in the region.

In upland areas, several species have benefited from the reduced grazing pressure in forests, compared to adjacent sheep pastures. Bog Asphodel *Narthecium ossifragum* often flowers profusely and Heather *Calluna vulgaris* and Bog Myrtle *Myrica gale* grows tall along forest rides. Heath Cudweed *Gnaphalium sylvaticum*, one of the few native vascular plant species to benefit from the extensive afforestation programmes of the 20th century, grows on open woodland and forestry rides in areas of former heathland, though now appears to be in national decline and is locally rare.



Self Heal, often abundant on forest roads. Mark Hill, Colvend, July 2007. (Peter Norman)

In forests planted on bogs, once the canopy closes the only remnants of the original bog vegetation is usually to be found along rides, including Cranberry *Vaccinium oxycoccus*. Such plants provide a reservoir of seeds that can recolonise adjacent areas following harvesting, and are therefore valuable in any bog restoration projects. However, experience at Longbridge Muir and Moss of Cree suggests that this may be a very slow process.

3.4 Reptiles and Amphibians (medium importance)

Wide roads and rides are a good habitat for Common Lizards *Zootoca vivipara*. Common Frogs *Rana temporaria* may also breed in ditches.

3.5 Birds (medium importance)

Birds of forest roads and rides are more typical of the early stages of forests, rather than the more mature high forest stage. Species include Garden Warblers *Sylvia borin*, Chiffchaffs *Phylloscopus collybita* and Tree Pipits *Anthus trivialis*. Forests roads and rides may also be important for hunting Sparrowhawks *Accipiter nisus* and owls, and for the 'roding' display flights of Woodcocks *Scolopax rusticola*.



3.6 Mammals (medium importance)

In mature forests with sufficient bat breeding sites (caves, tree holes or bat boxes) for bats, linear features such as streams, roads and rides provide essential opportunities for feeding and movement of most species, especially if they link areas of semi-natural habitat. Indeed, forest roads and rides are the best places to locate bat boxes. They are also extensively used by feeding deer, and are ideal locations for deer control where required.

3.7 Non-flowering Plants (medium importance)

Stag's-horn Clubmoss *Lycopodium clavatum* and Alpine Clubmoss *Diphasiastrum alpinum* occur sufficiently frequently on the forest roads and rides to be an important part of the flora at almost all altitudes. Neither species is common in Dumfries & Galloway. Roadside ditches support a broad range of mosses and algae.



Green Tiger Beetles *Cicindela campestris* benefit from open sunny rides. Balloch Wood, August 2006. (Peter Norman)

4. Environmental, Economic & Social Importance of Biodiversity

- Roads and rides are the most publicly accessible part of forests, frequently used by walkers and cyclists. High biodiversity adds to the interest and enjoyment of such forest users.
- Game management can be compatible with management for biodiversity.

5. Factors affecting the Habitat

- Blanket application of herbicides as a way of managing forest roads is detrimental to biodiversity, especially flora and invertebrates.

6. Strategic Actions

6.1 Recent and current activity

- The forest roads around Lochaber Loch in Mabie Forest have been monitored for butterflies on a weekly basis by **Forestry Commission Scotland** during the summer for more than ten years, and management adjusted accordingly.



FOREST PONDS



Priority Action (FP1)

Assess the distribution and ecological importance of forest ponds in Dumfries & Galloway, by mapping their location and carrying out sample surveys.

Target: Map 100 and survey 25 forest ponds by 2015.

Lead: Forestry Commission Scotland/Dumfries & Galloway Environmental Resources Centre.

1. Habitat Description

1.1 Physical Characteristics

As with any other pond, the biodiversity value of forest ponds depends on a range of factors, including size, depth, bank profile, water quality, degree of shading and quantity of marginal and aquatic plants. All of these are influenced by the geological and environmental conditions of the surrounding landscape, but all can also be affected by the historic and current management regime.



*Forest pond at Scree. August 2004.
(Peter Norman)*

2. Dumfries & Galloway Status

2.1 Recent Trends

The increased mechanisation of forestry means that excavation of new forest ponds has been much easier than in the past. As a result a number of ponds have been constructed in recent years, primarily for conservation and amenity purposes. These ponds have tended to have more natural contours and features than early forest ponds.

2.2 Current Distribution

Forest ponds are widespread within forests in Dumfries & Galloway. Although most forests are in the uplands, it is likely that the greatest density of forest ponds is located within forests at lower elevations.



Dalshinnie Loch in Mabie Forest. July 2004. (Peter Norman)

2.3 Site Examples

Some ponds that are known to have high biodiversity interest include **Penninghame Pond** and **Knockman Wood Pond** near Newton Stewart, **Borgan Pond** near Glentool, **Dalshinnie Loch** (LWS) in Mabie Forest and **Earshaig Ponds** near Beattock.

2.4 Associated Habitats

A number of habitats occur in close association and/or overlap with forest ponds, and the following action plans may also contain relevant information: Conifer Plantations, Forest Roads and Rides, Farm Ponds.

3. Importance for Associated Species

3.1 Invertebrates (high importance)

The sheltered environment of many forest ponds is ideal habitat for dragonflies, and there are numerous ponds that have recorded at least ten species. Usually common species are involved, but several forest ponds support populations of Variable Damselfly *Coenagrion pulchellum*, which has a restricted UK distribution. There have been fewer surveys of other invertebrate groups.



*Common Darter, a typical dragonfly of forest ponds.
Dunskey, August 2003.
(Mike Kaye)*

3.2 Reptiles and Amphibians (high importance)

With the exception of Natterjack Toads *Epidalea calamita*, all native amphibians (Common Toad *Bufo bufo*, Common Frog *Rana temporaria*, Great Crested Newt *Triturus cristatus*, Smooth Newt *Lissotriton vulgaris* and Palmate Newt *Lissotriton helvetica*) breed in forest ponds.

3.3 Flowering Plants (medium importance)

A range of flowering plants is found in, or on the edge of forest ponds: Water Forget-me-not *Myosotis scorpiodes*, Water Mint *Mentha aquatica*, Water Plantain *Alisma plantago-aquatica* and a number



of pondweeds *Potamogeton* spp. Forest ponds, especially in remote parts of the forest, are less frequently visited by botanists than more natural ponds.

3.4 Birds (medium importance)

Though there are no birds directly dependent on, forest ponds, they are visited by many species, including Grey Herons *Ardea cinerea*, Mallards *Anser platyrhynchos*, Moorhens *Gallinula chloropus* and a range of small birds. A number of these may breed.



Moorhens nest on most lowland forest ponds. (Gordon McCall)

3.5 Mammals (medium importance)

Larger forest ponds, especially where they connect to watercourses, are used by aquatic mammals such as Otters *Lutra lutra*, Water Voles *Arvicola terrestris* and Water Shrews *Neomys fodiens*. They are also used by terrestrial mammals for drinking.

3.6 Non-flowering Plants (medium importance)

Aquatic algae form the basis of most pond food chains, but have been little studied in Dumfries & Galloway. A number of aquatic and semi-aquatic mosses and liverworts also grow in ponds, and muddy pond edges tend to be most important for such species.

3.7 Fishes (low importance)

Though many forest ponds support fish populations, and some have been deliberately stocked, few of these are of conservation importance. The introduction of fish may seriously damage amphibian and invertebrate populations.

4. Environmental, Economic & Social Importance of Biodiversity

- Forest ponds contribute to local landscapes and provide a focal point on forest walks.
- Accessible forest ponds have high educational value.
- Correctly designed, located and constructed ponds can assist with the treatment of pollutants from forest quarries or roads.

5. Factors affecting the Habitat

- Damage during forest operations can result from **vehicle use, run-off or large amounts of brash or other debris** falling into the pond. Such damage is now usually avoided through detailed planning of forest operations.
- A **perception that forest ponds need to be regularly 'cleaned'** can result in damage.
- **Introduction of fish** into fishless ponds has occurred in ponds valuable for dragonflies. Such action is now illegal.

6. Strategic Actions

6.1 Recent and current activity

- A pond at Kirroughtree Forest Visitor Centre not only adds to visitor interest, but has been constructed by **Forestry Commission Scotland** and **Cree Valley Community Woodlands Trust** with platforms to enable educational groups to safely sample the aquatic life.
- Eskrigg, within Turnmuir Plantation at Lockerbie, is a former curling pond that is now managed as a nature reserve by the **Lockerbie Wildlife Trust**.
- Garrochar Ponds have been created on the site of a former curling pond within the Forestry Commission's Balloch Wood at Creetown. Though managed by the **Balloch Community Woods** group primarily for amenity purposes, they have quickly become of high biodiversity value.
- Contaminated groundwater (Acid Mine Discharge) issuing from the forest quarry at Craigenbay has been successfully treated by **Forestry Commission Scotland** using a series of four ponds that have a natural appearance and also make a positive contribution to wildlife.
- A number of forest ponds have been surveyed for their dragonfly populations.

6.2 Other recommended actions

- Carry out further **pond surveys to identify ponds of high biodiversity value**. Species groups likely to benefit from additional survey effort include dragonflies, water beetles, aquatic bugs, amphibians and aquatic plants.