Action for juniper

What we are doing

Juniper (*Juniperus communis*) is one of the key woodland species identified for action under the Scottish Forestry Strategy 2006. This note summarises the action being carried out by Forestry Commission Scotland, either ourselves or in partnership with others, to help conserve and expand juniper populations. There are links to more detailed information. This note covers the period 2008/09 to 2010/2011 in depth and in outline to 2015.

Current status and distribution

Juniper is a UK Biodiversity Action Plan priority species. Juniper scrub on heaths and calcareous grassland is a habitat type of European Community interest. Two of the three sub-species of juniper found in the UK grow in Scotland: the upright type which is a shrub or small tree (*Juniperus communis ssp. communis*), and the prostrate or dwarf type (*Juniperus communis ssp. nana*). Both have separate male and female bushes. Pollen is wind-borne and berries are dispersed mainly by birds. Juniper supports a range of specialist insects, fungi and lichens, provides shelter and food for larger animals, and older bushes often protect tree saplings from browsing.

Juniper grows in a wide range of habitats, including moorland and maritime heaths, woodland and montane environments from sea level to 1000 m altitude. Juniper has been declining throughout the UK both in terms of range and abundance, and Scotland now supports approximately 80% of the UK population.

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Action for juniper

A national picture of distribution and status has emerged from surveys in 2003 for Scottish Natural Heritage and in 2007 for **Plantlife**.

- Upright juniper is locally abundant in the central Highlands. In the islands and down the western side of Scotland and as far south as Dumfriesshire, juniper populations are generally small and scattered both within woodland and open habitats. In eastern and southern regions many juniper populations are very small, but some larger stands occur, particularly on open ground.
- Prostrate juniper rarely occurs in woodlands; it is found in exposed coastal and montane heaths, blanket bogs and rock ledges, mainly in the northwest mainland and the Northern and Western Isles. It can be locally common but many populations are very small.
- Juniper overall had disappeared from 23% of sites where it was formerly present.
- Over the remaining range, juniper is under threat in the short to medium term at 45% of sites, and a further 23% of populations are not secure and may need intervention to promote regeneration.
- Only a third of remaining sites have strong and secure juniper populations.

Figure 1a & 1b - Distribution of sub-species of juniper (based on records held by the National Biodiversity Network)

Fig 1a - Distribution of upright form of juniper *(Juniperus communis ssp communis)*

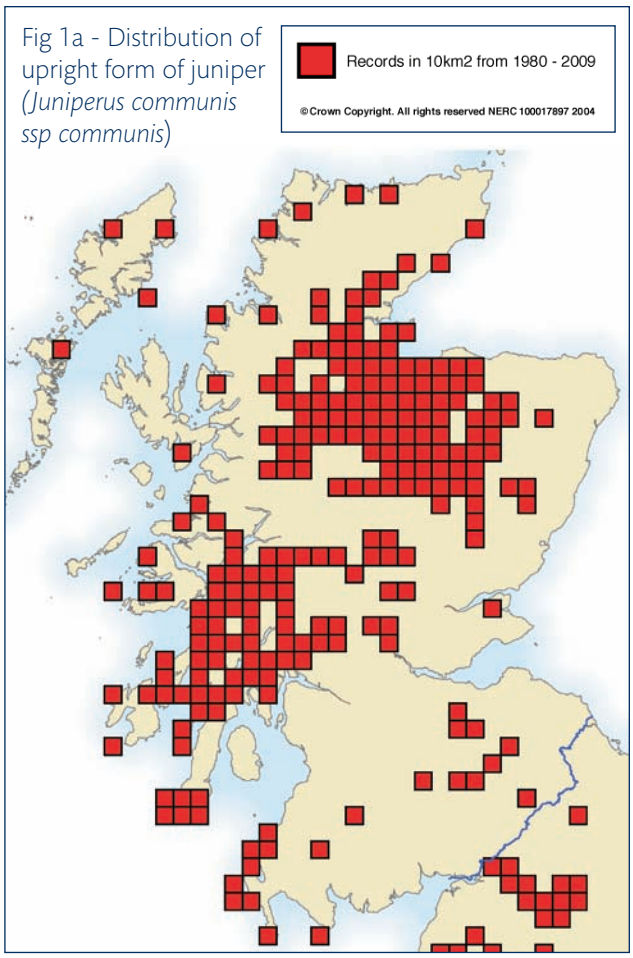
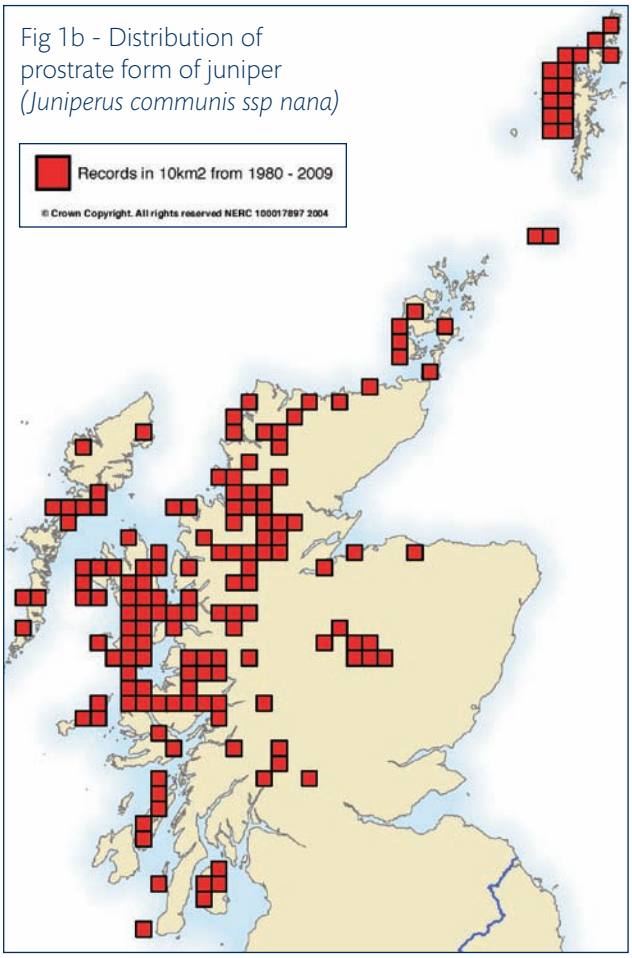


Fig 1b - Distribution of prostrate form of juniper *(Juniperus communis ssp nana)*



Threats

There are a range of factors contributing to the decline of juniper in Scotland, mainly by restricting natural regeneration or threatening mature bushes.

Fragmented populations

- Many juniper populations across Scotland occur in populations of less than 10 plants, with few populations exceeding 1000 bushes: populations should exceed 50 plants to be viable;
- Juniper has separate male and female bushes, which can make pollination of isolated bushes difficult.

Damage and lack of regeneration

- Widespread browsing from deer, sheep and rabbits;
- Excessive grazing prevents seedlings from becoming established, including voles eating seedlings;
- Undermining by moles is also significant locally;
- Insufficient grazing at some sites prevents seedling establishment or causes the loss of mature plants from overshading;
- Low production of viable seed linked to age, health and senility: more than 50% of plants recorded in surveys have been mature, old or dead;
- Browning damage and dieback in many populations, the causes of which are likely to vary from site to site.

Land management

- Direct clearance of juniper stands;
- Land use changes including afforestation, more intensive agriculture or moorland management and development;
- Excessive or uncontrolled muirburn.

Climate change

- Drier spring weather in the east may restrict seedling establishment and growth;
- In the west of Scotland protracted waterlogging in autumn and winter, coupled with milder winters, will cause water-table fluctuation and more unsuitable growing conditions, stress and disease;
- More frequent mild winters in which temperatures rarely drop below 4°C may reduce germination rates in some areas, because juniper seeds need cold weather to break dormancy;
- Increased variability of annual weather may reduce pollen dispersal in wet summers and reduce berry production on more isolated bushes.

Habitat requirements

Juniper grows in a wide range of plant communities on well-drained nutrient-poor soils.

In woodlands juniper is limited by shade: it is most frequent in open pine and birch woods and it is also a minor component of upland oakwoods.

Upright juniper grows in almost pure juniper stands which are classified as a native woodland type in the National Vegetation Classification (*Juniperus communis – Oxalis acetosella* woodland: W19). Juniper scrub can persist indefinitely, or it can be a successional stage in the development of native woodlands, usually birchwoods.

Prostrate juniper grows in exposed habitats from sea level to tree line communities notably in *Calluna vulgaris – Juniperus communis ssp. nana* heathland (National Vegetation Classification type H15).

Current juniper populations are almost entirely self-sown and so the conservation of juniper should be based on promoting natural regeneration where possible. But planting will be needed in areas where this is not achievable, e.g. in small, moribund populations of old bushes, or to restore juniper to areas of its former range.

Juniper is a long-lived species, often reaching well over 100 years, and although it needs good deer management it is not as sensitive to browsing as some broadleaved trees or shrubs. There is great potential to introduce juniper into upland planted forests, in order to diversify internal edges, glades, old growth stands and upper margins.

Juniper for planting can be grown from seed or cuttings. There is a need to promote a greater plant supply from sources across the range of juniper in Scotland to meet increasing demand.

Table 1 - Key conditions required for maintaining juniper populations

Aim	Required conditions
Bush survival and growth	• Full light to slight shade: can persist as an understorey in open canopied woodland, glades, open edges and treelines; • Plants can stand grazing/browsing but growth can be retarded; • Well drained soils: waterlogging and fluctuating water tables can lead to stress and disease.
Natural regeneration	Parent population: • Varied age structure - young bushes produce fertile seed more reliably; • Good mix of male and female bushes; • Minimum of 50 bushes in same stand or in scattered stands less than 500m apart. Seedling growth: • Browsing levels low, so fruiting and flowering shoots remain; • Open / bare well-drained ground, but no long dry periods in spring and summer; • Seedlings can appear after severe grazing, but will only persist when subsequent grazing pressure is low or where dwarf shrub cover protects them.
Establishment by planting	Site conditions: • Well drained, nutrient-poor soils, either acidic or alkaline; • Protected from grazing and rodent damage; • Absence of drought. Planting material: • Suitable sources adapted to the planting site – see guidance in **'Seed Sources for native trees and shrubs in Scotland'**; • Mix of male and female bushes; • At least 50 bushes planted together in same stand or in scattered stands less than 500m apart.

Juniper conservation action to date

The juniper species action plan

The UK Species Action Plan for juniper is led by Plantlife and has 3 current targets relevant to Scotland:

- Maintain the current range of juniper in the UK;
- Restore representative tree-line juniper populations where relict juniper persists at 5 sites in Scotland by 2015;
- Restore H15 Juniperus ssp. nana communities in 3 areas of Scotland by 2015.

A range of measures and projects have helped juniper conservation in recent years:

- Species surveys were carried out in 2003 and 2007 (see Current status section);
- A strategy for juniper conservation in Scotland has been developed by Plantlife and Forest Research (see below);
- Juniper in and around native woodlands is included in the Native Woodland Survey of Scotland;
- Limited amounts of juniper planting have occurred on the national forest estate;
- Previous grant schemes supported some planting of juniper as a shrub species in new native woodlands;

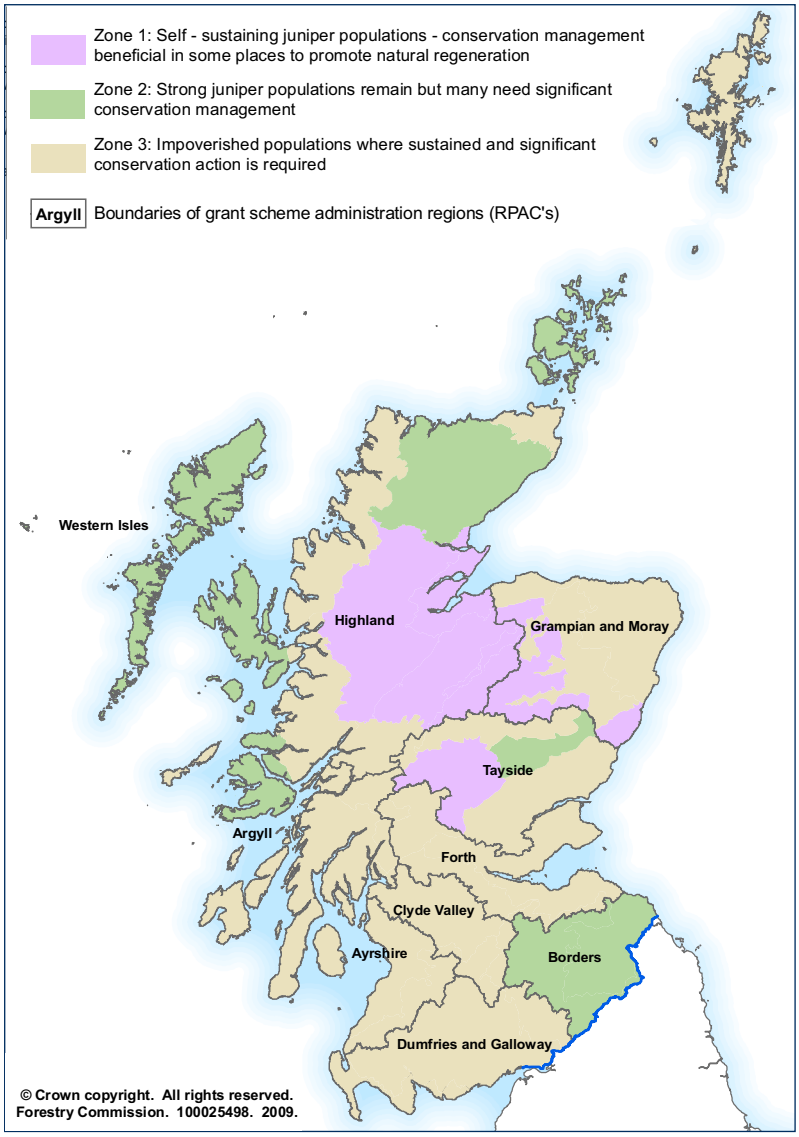
- Grant support options have been made available for scrub and woodland juniper under the Scottish Rural Development Programme;
- Management trials to encourage regeneration have been started by Forest Research and Plantlife;
- Research is being carried out by Forest Research for Scottish Natural Heritage into causes of extensive die-back at Glenartney juniper wood, a Special Area of Conservation for juniper.

Forestry Commission Scotland action for juniper

FCS action will focus mainly on woodland juniper populations and substantial areas of juniper scrub adjacent to woodland. We will target our efforts to help deliver the strategic approach to juniper conservation in Scotland developed in the **2007 Plantlife report** which identified three conservation action zones.

Figure 2 shows Scotland mapped into these zones, and also shows grant administration regions (Regional Proposal Assessment Committee regions: RPACs). The conservation priorities for each zone are summarised below. This broad strategic approach needs to be adjusted for individual sites, based on knowledge of the condition of juniper populations and local circumstances.

Figure 2 - Juniper conservation action zones for Scotland



Zone 1: Self- sustaining juniper populations - conservation management beneficial in some places to promote natural regeneration.

Management is either already suitable for juniper conservation or could readily be made suitable, mainly through control of grazing regimes. Planting will rarely be required.

Zone 2: Strong juniper populations remain but many need significant conservation management.

Woodland juniper has suffered some decline, but there is some potential for regeneration, with help from measures like fencing, deer control, conservation

grazing and selective tree felling to reduce shade. Some planting may be required for small or moribund populations. Management of moorland sites could be improved by controlling the timing and intensity of grazing, protecting bushes from muirburn and removing encroaching vegetation.

Zone 3: Impoverished populations where sustained and significant conservation action is required. Juniper is scattered and typically in small and/or overmature populations with little regeneration. Action should concentrate on reducing grazing impact and bulking up populations quickly, focusing especially on populations that would help maintain the species range.

In woodlands, fencing, deer control, selective felling and conservation grazing may all help to secure regeneration. But planting will often be needed to secure minimum breeding populations of 50-100 plants before the current old bushes die out. Planting should also be used to help restore juniper's range as part of wider efforts to increase the biodiversity of planted forests.

Action on the national forest estate

Aims

We aim to make a significant contribution to the strategy for juniper conservation shown in Figure 2 by:

- safeguarding and enhancing existing juniper stands on and adjoining the national forest estate;
- increasing the use of juniper in restocking and new planting.

We already manage a number of important sites for juniper in several forest districts:

- Inverness, Ross & Skye
- North Highland
- Cowal & Trossachs
- Moray & Aberdeenshire
- Galloway
- Dumfries & Borders.

Work to date has included survey to identify location and abundance in areas such as Glenmore in Strathspey and the Merrick Kells in Galloway. New planting of native woodlands have included juniper in sites such as the Darroch Wids project in Moray and Aberdeenshire Forest District. In Cowal & Trossachs 1,500 bushes were planted between 1997 and 2005 in groups around remnant populations.

However there is still work to do on identifying the status of juniper in parts of Tayside, the West Highlands and Argyll and there is scope for greater use of juniper in relevant planting programmes.

Our efforts for the period of this programme will include seven key actions, mainly focused in areas where juniper is declining, has recently become scarce or is abundant but restricted by adjoining plantation forest. There will be less emphasis on areas where juniper has always been rare or where there are robust naturally regenerating populations with room for expansion.

Action for juniper

Action 1: Survey in areas where the status of juniper is uncertain.

We are surveying open land on the national forest estate to assess the location and condition of priority habitats covered by the UKBAP. Surveyors will also be asked to record the location of juniper. In addition specific juniper surveys will be undertaken in three districts.

In strategy zones 2 and 3, where juniper is generally in decline, medium to large populations of juniper (50+ bushes) will be assessed to determine their potential for natural regeneration. Where populations are considered viable but young age classes are absent, management for regeneration will be planned; i.e. controlling excessive browsing or managing rank vegetation. Where juniper populations appear moribund, planting will be planned (see Actions 3 and 4 below).

Action 2: Assist in natural regeneration of viable stands where there is over-grazing or competition from other plants.

A range of projects will be undertaken to achieve this action. At Glenmore the Action for Mountain Woods project, supported by the Heritage Lottery Fund, is aiming to promote establishment of advance regeneration and the expansion of montane scrub by reducing deer impacts. Juniper will form an important component of this rare habitat, particularly dwarf juniper.

Elsewhere, small exclosures will be erected around juniper regeneration to protect against deer browsing. Overstorey trees will also be felled or killed standing where juniper occurs as an understorey and is suffering from excessive shade.

Action 3: Bolster moribund populations through planting, particularly where these are remote from sizeable naturally regenerating stands.

We have several projects underway to secure small isolated populations of juniper consisting of moribund bushes that seem incapable of natural regeneration. For example in Galloway and Dumfries and Borders, cuttings will be taken from isolated populations and used to grow juniper plants. These will help to secure the future of several remnant juniper stands.

We will also assess small isolated juniper populations in Wester Ross and the Isle of Skye to see whether planting is appropriate.

Action for juniper

Action 4: Take opportunities to link and expand juniper stands through targeted actions in forest design plans.

In forests that include populations of juniper we will consider restructuring the adjacent plantations to encourage expansion and linkage to other juniper stands (whether on the national forest estate or on neighbouring ground).

In Upper Nithsdale (Dumfries & Borders Forest District), we manage open steep slopes with skeletal soils close to fragmented populations of juniper on neighbouring land. Within the plan period we will grow juniper cuttings for planting on these slopes to link to the existing populations.

In Glenkirk (Inverness, Ross & Skye Forest District) we will cut back forest margins next to juniper stands to encourage future juniper expansion.

Action 5: Plant juniper to diversify Scots pine plantations, the internal and external edges of non-native plantations, and Planted Ancient Woodland Sites which are being restored towards pine, birch or oakwoods.

In North Highland Forest District, we will underplant Scots pine plantations with juniper to improve structure for capercaillie. Juniper plants of local provenance will be sourced for this purpose.

Juniper is one of the species being planted to restore ancient woodland sites in Glen Affric and Glen Moriston. This is carried out in partnership with Trees for Life.

In the Merrick hills (Galloway Forest District), we plan to establish extensive new areas of treeline woodland in currently open land above the forest, of which juniper will be an important component. During the plan period, we will propagate juniper cuttings for this project.

In South Balnoon (Moray & Aberdeenshire Forest District), we will plant 1,000 juniper bushes to diversify species composition in a recently felled area.

Juniper is a potentially important forest edge species for planted forests. Although it is not easy to establish, it can have a long life span and withstands exposure and poor soils. We will train our staff to identify suitable sites and techniques for planting juniper.

Action 6: Increase the use of juniper as a component of new planting on appropriate site types.

Several landscape-scale restoration projects are underway in Scotland. One of the most ambitious is the Great Trossachs Forest project that aims to establish a mosaic of native woodland and open habitats from Glen Finglas to Loch Lomond. We manage the Loch Katrine catchment within the middle of this project area. Juniper will form an important component of native woodland planting and we aim to establish 15,000 juniper plants in total, of which 8,000 will be planted by 2011.

We will also identify opportunities to plant juniper within areas which we acquire for new woodland planting.

Action 7: Increase juniper plant supply by growing them in Forestry Commission nurseries.
The main restriction on wider use of juniper in forest restocking and new planting is the limited availability of plants grown from suitable Scottish source populations. Production from seed is typically erratic. We will work with Forestry Commission nurseries to see if we can reliably produce genetically varied planting stock by collecting seed and sowing to grow 'cutting hedges' for larger scale vegetative propagation. This will allow provenance to be identified to seed zone and sites of origin. We will carry out seed collections in autumn 2009 to establish these cutting hedges.

Support for juniper conservation on privately owned land

Juniper is eligible for grant support from **Rural Development Contracts** under a range of grant options in woodlands, woodland edge and open moorland habitats.

We will work with SNH and the Scottish Government Rural Payments and Inspections Directorate to encourage and support suitable applications to help conserve and enhance juniper in line with the conservation action zones described earlier. See figure 2 on page 6.

We will encourage applications which consider wooded and adjacent open areas together where suitable, as this should better enable the long term conservation of juniper in dynamic populations in mosaics of woodland, scrub and moorland habitats.

Priorities for grant support for juniper are decided by each **Regional Proposal Assessment Committee (RPAC)**. We expect that RPACs will use the information in this Action Note to help them set priorities and assess applications. See figure 2 on page 6.

Potential grant applicants can get further **technical advice** about suitable RDC grant options that can support these actions, and can get advice from an appropriate case officer in the area to help them to develop a suitable plan.

Action for juniper in and around woodlands

Key actions that can be supported by various RDC options include:

- Enhancing juniper populations in and around new and existing native woods by promoting regeneration or by planting (all action zones);
- Adding juniper to diversify non-native and mixed planted woods in new planting or restructuring schemes focused at upper edges, rides, roadsides and riparian areas (mainly zones 2,3);
- Regenerating and expanding small remnant populations to secure them, which will often need planting (mainly zone 3);

- **Stimulating supply of planting material** by registering and managing self-seeded stands of juniper that are suited to seed production (all zones: areas must be over 1ha and 100 mature bushes with a mixture of male and female plants).

Action for juniper in moorland and upland areas

Key actions are:

- **Conserving and regenerating existing juniper scrub areas** e.g. by managing grazing and browsing and protecting from muirburn (all zones);
- **Planting juniper to secure moribund populations or restore juniper scrub to sites where it has recently been eliminated,** especially sites close to other woodland or moorland juniper populations (mainly zone 3).

Other Forestry Commission Scotland action for juniper

Native Woodlands Survey of Scotland

Juniper is being recorded as part of the Native Woodlands Survey of Scotland, which is led by Forestry Commission Scotland. It will provide spatial information on juniper populations, including the size classes present and herbivore impacts, within both native and ancient woodlands. It will also identify open juniper scrub areas near to these woodlands. Reports and maps will be published for individual local authority areas over the period from 2009/10 to 2013/14.

Restoration project for juniper woodland in south Scotland

We are working with the South Scotland Juniper Network, which consists of 14 local partners, to develop a project to secure remnant juniper populations in southern Scotland. All project sites have very impoverished juniper populations, which will be bolstered through planting juniper bushes sourced from ecologically matched sites. One of the aims is to bulk up supplies of planting material. This work should influence the conservation of severely impoverished juniper populations more widely across Scotland.

Research

We are working with Forest Research and Plantlife Scotland at 4 trial sites to test the impact of cattle grazing, exclosures and scarification on regeneration rates.

Juniper seed collections typically have a high proportion of empty seed. Forest Research are testing seedlots in order to advise seed collectors on how to reduce the proportion of berries they collect that contain empty seed.

Volunteer monitoring

We are co-operating with Plantlife Scotland to encourage people to monitor juniper sites close to where they live or visit regularly. If you could like to find out more about this, contact **scotland@plantlife.org.uk**, or telephone 01786 479382.

Reporting and review arrangements

Forestry Commission Scotland will publish an annual summary of our actions for juniper starting in spring 2010. This document will be revised if required and reviewed by early 2012.

Further information

More information can be found at the references and weblinks below:

Distribution and condition

SULLIVAN, G. (2003)
Extent and Condition of Juniper Scrub in Scotland. Report to Scottish Natural Heritage,
Contract No. BAT/AC205/01/02/96.

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Ecology and habitats

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Juniperus communis species dossier for Plantlife:
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Advice on management

BROOME, A. (2003)
Growing juniper: propagation and establishment practices. Forestry Commission Information Note FCIN50.
www.forestry.gov.uk/publications

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Managing uplands for Juniper. Back from the Brink Management Series:
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Contact Forestry Commission Scotland

Forestry Commission Scotland
National Office
Silvan House
231 Corstorphine Road
Edinburgh
EH12 7AT

Tel: 0131 334 0303
Fax: 0131 314 6152
E-mail: fcscotland@forestry.gsi.gov.uk
Web: www.forestry.gov.uk/scotland

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