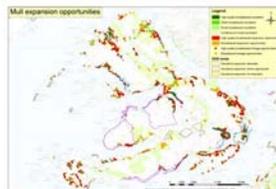


# FOREST HABITAT NETWORKS IN THE ARGYLL ISLANDS

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## Glossary

**Generalist:** species associated with all types of woodland.

**Specialist:** species closely associated with particular woodland types.

**Network:** a configuration of habitat which allows species to move and disperse through a landscape.

**Connectivity:** being connected.

**Functional connectivity:** habitat patches being connected in such a way that they allow species to move and disperse even though some patches may not be physically connected

**Broadleaved woodland networks:** woodland networks for species specifically associated with broadleaved woodland but which may be found in mixed woodland to a lesser degree and occasionally in conifer. The species have a rather reduced dispersal and a more exacting habitat requirement than “generalists”.

**High quality broadleaved woodland networks:** a woodland network for species associated mainly with woodland of particularly high ecological quality and (usually) long site occupancy.

**Woodland generalist network:** a woodland network for species associated with *all types* of woodland or which may require woodland for a part of their life cycle, or for which woodland forms part of their range

**Landcover:** the habitat or land use of an area.

<b>SSNWI;</b>	<b>Scottish Semi-natural Woodland inventory</b>
<b>NIWT:</b>	<b>National Inventory of Woodland and Trees</b>
<b>ASNWI:</b>	<b>Ancient semi-natural woodland</b>
<b>WGS:</b>	<b>Woodland Grant Scheme</b>
<b>SFGS:</b>	<b>Scottish Forestry Grant Scheme</b>
<b>SSSI:</b>	<b>Site of Special Scientific Interest</b>
<b>SAC:</b>	<b>Special Area of Conservation</b>
<b>SPA:</b>	<b>Special Protection Area</b>

## Summary

This study provides information on native woodland expansion and restoration opportunities to increase the connectivity of native woodlands without jeopardising non-wooded habitats and land uses; and which target land most suitable for woodland establishment. Outputs are intended to be used by Forestry Commission Scotland (FCS), and Scottish Natural Heritage (SNH) and others to develop plans for supporting woodland expansion on the Argyll Islands as part of a rural development initiative.

Maps were produced using a range of existing databases showing: a) woodland distribution; b) open ground habitats/ land uses; c) existing woodland networks; d) opportunities for expanding networks by restoration and conversion of woodland; and e) opportunities for expanding networks by establishing new woodlands on open ground. The maps have been divided into 5 separate areas: 1) Mull, 2) Islay and Gigha, 3) Jura and Colonsay, 4) Tiree and Coll, and 5) the small islands from Lismore to Scarba. The forest habitat network maps were produced using a Forest Research (FR) spatial model called “BEETLE” (Biological and Environmental Evaluation Tools for Landscape Ecology). The following network types were generated: a) high conservation quality broadleaved woodland networks; b) “other” (lower quality) broadleaved woodland networks and c) woodland generalist networks (for conifer and mixed woodland). Networks comprise woodland habitat patches, plus a zone around them into which woodland species are assumed to be able to disperse.

The project was limited by the need to rely primarily on the Land Cover Scotland 1988 (LCS88) database to generate maps of non-woodland land cover. LCS88 gives a general idea of land cover types and is not sufficiently detailed to make judgments on the appropriateness of woodland expansion in specific locations. Identifying areas where there is potential conflict with conservation interests was achieved by considering the appropriateness of woodland expansion in designated areas. Three SSSI classes were defined describing the appropriateness of woodland expansion based on the SSSI citations and plans, and are depicted as colour coded SSSI boundaries on maps. Land which is physically unsuitable for new woodland has been identified (bog and areas of high exposure where tree growth is not possible); and these areas were eliminated from potential expansion opportunities.

### Networks (see maps 2a-e)

The total area of *existing broadleaved woodland* is a little over 10k ha. The area of existing broadleaved woodland *network* is 16k, of which high quality broadleaved woodland network totals 9k ha. The total areas of woodland network (including woodland generalist/conifer woodland) is 37k ha. In many areas the “quality broadleaved networks” are nested within the “other broadleaved networks”, which in turn are linked by “woodland generalist networks” to give very substantial network distribution. The vast majority of the broadleaved woodland networks occur on Mull, with about 60% of the broadleaved network area, followed by Islay with 25% and Jura with 8%. The remaining islands total only 7% between them, and some islands have no

woodland networks, *i.e.* Coll and Tiree. Among the small islands Shuna (Loch Melfort) is indicated as having a considerable area of broadleaved woodland network.

### **Restoration opportunities (see maps 3a-d)**

These represent opportunities for expanding *quality broadleaved networks* by restoring intervening areas of “other” broadleaved woodland to higher conservation status; and linking areas of quality broadleaved woodland to form larger networks. The total area of this type of woodland restoration opportunity (see maps) is 2110 ha, the vast majority (1915 ha) being on Mull; with other islands providing only small opportunities due to their smaller and more fragmented woodland resources (Islay 80 ha, Jura 23 ha and Shuna 20 ha). Restoration opportunities represent 35% of the existing woodland area on Mull but smaller proportions on the other islands (0-20%).

### **Conversion opportunities (see maps 3a-d)**

These represent opportunities for expanding *broadleaved networks* by converting conifer woodland to native broadleaved woodland, thereby linking areas of broadleaved woodland to form larger networks. The total area of woodland offering conversion opportunities (see maps) is about 1316 hectares, the vast majority of which are on Mull (803 ha), Islay (358 ha) and Jura (109 ha) (see table 3). There are few opportunities on the smaller islands due to the scarcity of conifer woodland. Conversion opportunities represent 12-15% of the existing woodland area on the larger islands.

### **Expansion opportunities (see maps 4a-d)**

Expansion opportunities comprise: a) expansion opportunities *at the edge of existing woodlands* within a zone of up to 500 m around existing woodland; and b) *linking opportunities*: locations where existing networks come within 2 km of each other and where new woodland placed in between would effectively form a link. The total area of buffer expansion opportunities (see maps) amounts to 4894 ha: the vast majority of which are on Mull (2735 ha), Islay (1371 ha) and Jura (429 ha), because these have the largest broadleaved woodland areas. Expansion opportunities at the edge of existing woods equate to 47 % of the total broadleaved woodland area of the Argyll Islands as a whole; having a woodland expansion potential of 45-50% on the larger islands, and 0-60% on the smaller islands (depending on the extent of existing woodland cover). 190 linking opportunities were identified, mainly on Mull and Islay. It must be remembered that all expansion zones will inevitably include a considerable proportion of land which is unsuitable for woodland expansion (*i.e.* farming, open ground of conservation value, poor access etc.); and that these values are therefore only indicative upper limits. The expansion potential of smaller linear woodlands has been assessed somewhat conservatively in this study by prioritising larger woods for expansion. There is clear potential for woodland expansion in a way which benefits forest habitat networks without disadvantaging open habitat. However there are several practical management constraints, which differ from island to island.

*It should be noted that the maps are only capable of providing useful information at strategic scale and because of inadequacies in the underlying data, cannot be used for individual woods or properties.*

## 1. Aim of Project

This project provides information about native woodland expansion and restoration opportunities to:

- improve the connectivity of native woodlands
- avoid damaging non-wooded habitats and land uses
- target land most suitable for woodland establishment.

The project outputs are intended to be used by Forestry Commission Scotland (FCS), Scottish Natural Heritage (SNH) and other organisations, to help develop plans which support woodland expansion as a part of rural development initiatives.

## 2. Method

A sequence of maps have been produced to show a) woodland distribution; b) open ground habitats; c) existing woodland networks and d) opportunities for expanding networks by restoration and conversion of woodland and establishment of new woodlands on open ground. The maps were divided into 5 separate areas *i.e.*: 1) Mull, 2) Islay and Gigha, 3) Jura and Colonsay, 4) Tiree and Coll and 5) the small islands from Lismore to Scarba.

**2.1 Woodland distribution maps:** Maps were produced describing the distribution of native woodland and other forest based on SSNWI, NIWT, ASNWI, WGS and SFGS datasets (see maps 1a-1e) (see Glossary for definitions). The woodlands were categorised into:

1. Ancient woodland
2. Other broadleaved woodland and scrub
3. New native woodland
4. Mixed broadleaved / conifer woodland (including policy woodlands)
5. Mainly conifer woodland

**2.2 Open ground habitat maps:** Maps were produced of open ground habitats and land uses adjacent to woodlands, based on LCS88 and SSSI datasets (see appendix 1 for example map)<sup>1</sup>. The maps were intended to provide an idea of the suitability of land adjacent to the woodlands for woodland expansion. The open ground was categorised into:

1. bog
2. wet heath
3. bracken
4. farmland
5. dry heather moor
6. *Nardus/Molinia* grassland

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<sup>1</sup> Landcover maps for the other islands are available from Forestry Commission Scotland Conservancy Office

These maps are not particularly satisfactory as the categories in LCS88 are very general and contain many different habitat types; and therefore do not allow differentiation between higher and lower conservation-value open ground in anything other than the crudest terms (see section 5).

**2.3 Forest Habitat Network Maps:** Maps were produced describing the forest habitat network characteristics of the current woodland cover (see maps 2a-e) using a Forest Research (FR) spatial model from a suite of tools called “BEETLE” (Biological and Environmental Evaluation Tools for Landscape Ecology). The BEETLE model is used to assess the:

- distribution of patches of woodland that are habitat for woodland species;
- characteristics of the open ground between the patches of woodland - which determine the likelihood of the species dispersing from patch to patch.

Where the woodland patches are sufficiently close to allow dispersal, they are assumed to form a network. Where they are too far apart, a break in the network is assumed to occur. The model uses different scenarios to cover the range of habitat requirements and dispersal abilities encountered in different woodland species.

Networks comprise the woodland habitat patches, plus a zone of non-woodland landcover around them into which woodland species are assumed to be able to disperse. In this study the maximum dispersal distance from woodland habitat was set as 1000 m, representing moderately mobile species. This dispersal distance was reduced through the surrounding open habitat matrix (non-optimal habitats *e.g.* improved land, water, etc). The more modified the habitat type the greater the difficulty of dispersal assumed in the model. The actual values of dispersal ability used are not linked directly to any one species, but are set at values representing a range (or class) of species (called Focal Species<sup>2</sup>).

### Network types

In this study the following network types were generated:

1. **high quality broadleaved woodland networks:** for species associated mainly with woodland of particularly high ecological quality and (usually) long site occupancy. Species in this category might be less mobile than broadleaved specialists and include *e.g.*: ancient woodland indicator species, particularly certain assemblages of lower plants
2. **broadleaved woodland networks:** for species specifically associated with broadleaved woodland, but which may be found in mixed woodland to a lesser degree and occasionally in conifer. The species have a rather reduced dispersal and a more exacting habitat requirement than “generalists” (see below).
3. **woodland generalist networks:** for species associated with all types of woodland or which may require woodland for a part of their life cycle, or for which

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<sup>2</sup> Focal species are considered to represent the wider elements of the woodland community and key ecological processes. In a forest habitat network analysis, the focal species can be a real or ‘virtual’ species or a range of species that use the woodland habitat

woodland forms part of their range. Examples include: fox, badger, green woodpecker, spotted flycatcher, great woodrush, bracken.

For this study, the distinction between “high quality” and “other” broadleaved woodland was made in order to get a better understanding of the likelihood of particular native woodlands acting as habitat patches for “broadleaved woodland specialist species” ; and therefore as sources for these species to colonise adjacent areas of woodland. Higher quality woodlands were assumed to contain more potential habitat.

In order to generate the 3 types of network outlined above, the broadleaved native woodlands on the islands (but not the mainland) were split into 2 categories according to the following quality criteria:

### ***High Quality Broadleaved Woodland***

*This is woodland of high conservation value comprising*

- Woodland SACs and SSSIs
- Ancient woodland (unless heavily modified);
- Other native woodlands that show diversity of composition and structure, with a varied complement of later successional tree and shrub species, containing well-developed authentic woodland ground flora, (usually ash and ash-alder woodlands, some oak woodlands and a few birch woodlands). Associated open ground likely to be of high conservation value.
- Coastal hazel scrub

### ***Other Broadleaved Woodland***

*This is woodland of medium and low conservation value comprising*

- Other mainly mature native woodland: typically less diverse and of more recent origin.
- Native woodland, some of which is of high conservation value, but with a significant admixture of non native trees (inc. policy woods on ancient woodland sites)
- Young birch woodland – typically with low species and structural diversity and with associated open ground likely to be of lower conservation value
- Recent broadleaved planting and new native regeneration
- Other mixed woodland, including broadleaved woodland with an element of planted conifers

### ***Edge effects and very small woods***

The edges of woods are known to be of lower habitat value for true woodland species. For this reason, a 20 m strip was removed from the edge of woods prior to the 500 and 1000 m dispersal distance being applied to create the networks (*i.e.* the maximum dispersal distance is effectively reduced by 20 m for each habitat patch becomes 480 m). This has the effect of eliminating woods smaller than 50 m across as habitat patches<sup>3</sup>; and

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<sup>3</sup> The 50 m comprises a 20 m internal buffer at each edge, plus 10 m which is the resolution of the GIS system. Although eliminated as habitat patches, the removed buffer is included as non-habitat woodland in the analysis.

therefore they do not feature as source habitat within a network. A value of 20 m was chosen because the standard value of 50 m used elsewhere in Scotland did not account for the steep sides of small gully woodlands, known to be of high conservation value (*e.g.* for Atlantic bryophytes), and the width of many woodlands were underrepresented. Also the standard calculation of the edge (equal to a distance of 2 tree heights from the woodland edge) was more realistically applied to the wind attenuated Atlantic woodlands, by assuming a mean stand height of 10m. Using a 20 m buffer allowed more of these small woodlands to be included in the analysis.

#### **2.4 Native woodland restoration and expansion opportunity maps**

Maps were produced showing areas where additional or restored native woodland would provide the greatest benefits in terms of increasing the extent and connectivity of native woodlands. The following opportunities were identified from the FHN maps:

1. **Restoration opportunities (maps 3a-d):** These describe restoration of existing broadleaved woodland to a better conservation status so as to form larger networks of *high quality woodland*. They are located on sites where patches of high quality broadleaved woodland are separated by lower quality “other” broadleaved woodland. Restoration of this intervening woodland to high quality effectively joins the woodland patches of high quality to form a single larger network. Restoration opportunities were identified where *quality broadleaved networks overlay existing (lower quality) broadleaved woodland*.
2. **Conversion opportunities (maps 3a-d):** These describe the opportunity to convert existing conifer woods to native woodland, and are located on sites where patches of broadleaved woodland are separated by conifers. Conversion would effectively join patches of broadleaved woodland to form a single larger network. Conversion opportunities were identified where *broadleaved networks overlay existing conifer woodland*.
3. **Expansion opportunities (maps 4a-d).** These describe expansion of existing broadleaved woodland onto open ground so as to increase the extent of networks and join neighbouring networks together. Two types of expansion opportunity were identified:
  - Expansion at the edge of existing woodlands: a zone extending up to 500 m from the edge of broadleaved woodland representing the area where new woodlands could be established by regeneration (the first 50-100 m) and planting (beyond 50-100m).
  - Joining neighbouring networks: locations where existing networks come within 2 km of each other and where new woodland planted between, would effectively form a link.

#### **Suitability of open ground for new woodland**

In the expansion opportunities outlined above, the suitability or otherwise of open ground for woodland expansion was assessed to take some account of physical conditions and conservation concerns.

**Physical conditions:** land considered unsuitable and excluded from the expansion opportunities was:

- land with such high wind exposure that it was unsuitable for tree growth, defined by a DAMS score > 20<sup>4</sup>
- peat bogs.

**Conservation status:** the only information available is for designated sites such as SSSI, SCAs and SPAs. These were categorised based on the SSSI citations and other information supplied by SNH into:

1. SSSIs primarily designated for a woodland interest and where woodland expansion is desirable.
2. SSSIs where there is some woodland interest in the designation and where some woodland expansion would be desirable, although other habitats are designated within the SSSI, implying that expansion would require a site survey to decide where woodland expansion would be appropriate.
3. SSSIs designated for non-woodland habitats where woodland would not be desirable. These are mostly wetland, geological or aquatic sites.

### **3 Current distribution of woodland on the Argyll islands**

#### **3.1 Overview**

The distribution of woodland is shown in maps 1a-1e; with woodland divided broadly into

- Native broadleaved woodland
- New native woodland
- Mixed (broadleaved/conifer) woodland
- Conifer woodland

Native woodland is located in loosely defined networks or isolated woods mainly:

- along the coastal zone and in gullies leading inland from coasts.
- at low elevations on hill slopes.

Conifer forests often occur as large, angular blocks on lower and mid-slopes. Some of these form quite large networks, aligned along the lower and mid hill-slopes. In other areas conifer woods occur as isolated blocks. Mixed woodland occurs locally, usually as policy woodlands on favoured sites at low elevations around large houses.

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<sup>4</sup> DAMS is “Detailed Aspect Measurement Score” developed by Forest Research for windthrow hazard assessment and essentially provides a measure of site windiness taking account of location in the country, elevation, topographic shelter and aspect

The oceanic climate and the wide range of soil types result in a great diversity of native woodland types and often in rich assemblages of oceanic woodland ferns and lower plants.

Native woodland distribution is restricted to low ground and relatively sheltered locations by exposure; with the Atlantic seaboard and exposed knolls experiencing some of the highest windspeeds in the world for their elevation. Exposure generally restricts woodland to land below 250m, or lower in extreme situations, and can result locally in woodland with an unusual but very characteristic form. Ravines are important for providing sheltered conditions which allow woodland to flourish despite the climate.

Woodland is also restricted by the presence of mires and other wet soils which, combined with the wet and windy climate, effectively preclude tree growth. Exposure, poor soils and sometimes past management practices combine on some islands to give extensive areas without trees. On some islands agricultural activity is widespread and tree cover is restricted because of this.

### **3.1 Mull**

The Isle of Mull has the most extensive areas of native woodland in the Argyll islands, with some well-defined, though fragmented, networks already in existence (see map 1a).

Native woodland is located in loosely defined networks mainly:

- along the coastal zone and in gullies leading inland from the coast
- at low elevations on hill slopes on eastern Mull.

#### **The coastal zone woodlands**

Linear (“comb-like”) networks occur where the gully woods are linked at their *lower* ends by strips of woodland along a raised beach, cliff, or other low-lying ground. Good examples of this include: the south shore of Loch Spelvie, the north side of Loch Tuath (Torloisk) and the southern shore of Loch Scridain. Typically they form narrow woodland corridors, and usually occur between an elevation of 10 and 100 m., with a few examples extending up gulleys to a height of about 150 m. Included within this category are the distinctive scrub woodlands of the Ross of Mull.

The woodland is usually of ‘high quality’, and often ‘very high quality’. On the variable soils between Salen and Lochbuie, woods are usually of birch or oak/birch. On the granites of the Ross of Mull, hyper-oceanic woodland fragments of birch, hazel, willow and stunted oak occur. The remainder of the Mull coast is dominated by basaltic lavas that support ash/hazel and birch/hazel woodland with wych elm locally frequent.

These woodlands are of the highest conservation value, being ‘ancient’, some of them perhaps ‘very ancient’, and having very high botanical diversity. On an international scale they are very rare and probably more notable than the Caledonian pinewoods.

### **Hill-slope woodland of eastern Mull**

Substantial areas of native woodland occur on the relatively sheltered lower slopes of eastern Mull, for example at Scallastle, Ardura and around Loch Ba. These tend to be larger than the strictly coastal woodlands and may extend up to 200-250 m in elevation. They are oak and birch-dominant, often with a component of ash and hazel along the watercourses. The oak-dominated woodlands are similar to managed coppice-oak woodlands on the mainland. Ravines and wooded outcrops may be very rich in lower plant assemblages.

Most of the existing woodland networks occur in a matrix of semi-natural open ground habitats which may have high nature conservation value in their own right (see section 5 below). Some are under management for woodland regeneration, *e.g.* Ardura and around Loch Ba, some are still grazed, *e.g.* much of the Ross of Mull woodland and at Loch Tuath, and some have been incorporated into conifer forests.

### **New native woodland**

New native woodlands tend to occur in similar locations and in proximity to existing native woodland; their locations constrained by soils, climate and access. The large isolated new native planting schemes, which are common on the mainland, are rare on Mull. New native woodland regeneration schemes have led to a modest expansion of some small broadleaved woodland networks – for example along the southern shore of Loch Scridain. These schemes have, however, not been designed with larger strategic networks in mind. There are a few larger native woodland planting schemes in their early stages, *e.g.* above Torloisk and Dervaig.

### **Conifer woodland**

Conifer woodlands occur as large, rectilinear blocks and consist primarily of Sitka spruce. Some form quite large networks, often elongated along the lower and mid hill-slopes. Older plantations are mostly at lower elevations, usually between sea level and 250 m; and are often adjacent to, or contain within them an element of native woodland. Most of these older blocks were planted by the Forestry Commission, and some have been sold to private owners or community groups. Those remaining in FCS ownership are being restructured and the native woodland and open ground components are being significantly expanded. Restructuring should make a substantial improvement to the native woodland networks on Mull.

Younger plantations tend to be on higher, more exposed ground, up to 350m in places, with little or no native woodland component and with limited potential for native woodland network expansion.

### **Mixed and policy woodland**

Mixed woodland occurs locally, usually as policy woodlands on favoured sites at low elevations around the sites of large houses (*e.g.* Torosay, Lochbuie, Carsaig, Aros Park). Policy woodland usually contains a native woodland component, comprising mature planted trees, and remnants/descendants of a pre-existing native woodland, together with

introduced broadleaves, typically sycamore and beech. Conifers occur as specimen trees or in small stands.

Policy woodlands usually contain well-grown trees and are useful components of woodland networks, linking into adjoining native and conifer woodlands.

### **3.3 Islay**

Islay is comparable in size to Mull but has far less native woodland (see map 1b). Many of the woods have been heavily modified by past planting. There are two main areas of woodland:

- the central belt from Bridgend to Port Askaig,
- South-east Islay.

#### **The central belt from Bridgend to Port Askaig**

This is low-lying and relatively sheltered land, generally below 100m, with a fragmented network of broadleaved trees interspersed with improved agricultural land, rough grazing and wetland. The native woodland type is ash and hazel with oak, but sycamore has been widely planted and is abundant throughout, including woodlands that are recorded as 'ancient'. Sycamore becomes the dominant canopy species around Bridgend.

Woodland extends along the coast north of Port Askaig as far as Bunnahabhain. This is primarily semi-natural birch woodland, actively spreading by natural regeneration.

#### **South-east Islay**

This area has a very high conservation value and contains by far the most extensive native woodland on Islay, and one of the most significant woodland complexes of the Argyll islands.

South-east Islay is a mosaic of native woodland, policy woodland, small blocks of conifers and open ground habitats, stretching in a broad band along the southeast coast of the island. South-west of Ardilistry, mixed woodland predominates, especially in the vicinity of the public road, with oak, ash, hazel, sycamore, beech and conifers. There is a greater degree of naturalness inland from the public road, and north-east of Ardilistry, where the main woodland type is oak/birch/hazel woodland with alder and willows in wetter hollows.

As well as these two areas, there are fragments of broadleaved woodland scattered around the island, often with sycamore present in the canopy. Small areas of high conservation value native woodland occur, *e.g.* at Coill a' Chorra Ghoirtein near Gruinart, important for its lichen assemblage; and the dense thickets of eared willow with hazel on the Rhinns (a SSSI, designated for its hyper-oceanic vegetation communities and bird populations). The latter is likely to be a highly natural scrubby woodland type, reminiscent of similar woodland on the Ross of Mull, though nowhere near as extensive and with more eared willow and less hazel.

There is potential for strengthening the existing woodland networks in both south-east Islay and the central belt.

### **Conifer woodland**

There are no extensive conifer forests on Islay but several small to medium-sized plantations, privately-owned and mostly of Sitka spruce. Where these blocks are adjacent to small areas of native woodland (*e.g.* south-east Islay and the Laggan catchment south of Bowmore) or contain native woodland fragments within them (*e.g.* north of Port Askaig), there is the potential for expansion of broadleaved woodland networks by restructuring and converting the plantations.

## **3.4 Jura**

Woodland is almost entirely restricted to the eastern coastal fringe of Jura (see map 1c), which is relatively sheltered and has intermittently better soils than other parts of the island. Exceptions occur as small isolated birchwoods near the northern tip of the island and woodland fragments along parts of the Sound of Islay.

High quality native woodlands occur on the island, mostly linear woods associated with the old sea cliffs and adjacent ravines and gullies. The woods at the northern end of the island are predominantly of birch with some alder and stunted oak. From Ardlussa southwards, oak/birch and ash/hazel woodlands occur. Communities of Atlantic bryophytes, lichens and field layer species make some of these woods important conservation sites.

Conifer woodland occurs mainly in small blocks, with the exception of medium-sized plantations south of Craighouse at the south-eastern end of the island. Policy woodland occurs around settlements and large estate houses, notably Ardlussa and Jura House and contains elements of native woodland. This policy woodland generally grades into native woodland away from the centre.

All the main types of woodland (native, conifer, policy) occupy the same eastern coastal fringe, with the result that all three woodland types occur in close proximity and are often contiguous. These areas of woodland are interrupted by high ground extending across the island as far as the east coast which is generally unsuited or too exposed for woodland.

Recent new planting and natural regeneration is limited in extent, as is the amount of land suitable for native woodland network expansion. The conifer plantations south of Craighouse and around Lagg are in the process of being restructured and provide an opportunity for broadleaved woodland expansion in these areas.

## **3.5 Colonsay**

There are two excellent native woodlands on the east coast of Colonsay, close to each other but separated by a short section of heath (see map 1c). Both are high in conservation value and contain a mix of oak and birch.

The policy woodlands around Colonsay House are a mix of ancient woodland and mixed conifer/broadleaved woodland. Elsewhere, there are a few areas of regenerating birch woodland though most of the island is a mix of improved farmland and heath.

There is potential to link some of the woodland fragments on this island.

### **3.6 Gigha**

This island is a mix of improved farmland and semi-natural habitats, with widespread pioneer scrub woodland, especially at the northern end of the island (see map 1b). The woodland is a mosaic of regenerating willow and birch woodland with open ground habitats including bracken, heath, rush pasture and exposed rock.

Achamore House woodland is a mature mixed woodland in the centre of the island, designated as a designed landscape and historic garden. It is primarily broadleaved woodland with much sycamore and a shelterbelt of Sitka spruce. Elsewhere on the island, there are a several small blocks of maturing Sitka spruce shelterbelt.

The woodland areas are currently fragmented and there is considerable scope for linking these into a network on land not prioritised for agriculture.

### **3.7 Tiree**

There are some patches of scrub willow (eared willow plus hybrids) on Tiree, especially on the moorland at the southern end (Ben Hynish). However there is little potential for developing a woodland network due to the exposed conditions, the absence of true woodland and the demands of agriculture (see map 1d).

### **3.8 Coll**

There are trees around some residential properties and there are small areas of young, mostly native, broadleaved woodland north of Arinagour. This is the only area where the development of a network might be an option.

Native woodland exists in small isolated fragments elsewhere and consists mainly of birch, eared willow, rowan and aspen. It occurs in sheltered pockets along the south-eastern coast and in very small pockets inaccessible to grazing in the rough land north-east of Arinagour. This land is designated an SSSI/Ramsar site and is not suitable for network development.

### **3.9 The small islands (see map 1e)**

#### **Scarba**

Scarba has some areas of high quality native woodland on its sheltered eastern side. Though recorded as native or broadleaved woodland, there is a significant component of policy woodland below the island house, with conifers planted through the more favoured areas. Native woodland consists of oak, hazel and birch with alder on the wetter ground. Away from the east coast, the island is mountainous and essentially treeless.

### **Lunga and the Garvallaachs**

Lunga has a small amount of native woodland on its eastern side. The Garvallaachs are made up of four main islands, one of which, Garbh Eileach, has some good native woodland of a highly oceanic nature, containing oak, ash, hazel, alder and willow. Woodland has been spreading in recent years. The islands are SSSI, and there is little scope for network development on any of these islands.

### **Luing**

Luing is often referred to as treeless but actually has good quality native woodland on the raised beach sea-cliffs. This is mainly oak, ash, birch and hazel woodland, highly natural in character. There are fragments of young woodland elsewhere on the island, mostly of birch and willow, with a substantial area of scrub woodland developing in the centre of the island.

In the short term, there is limited scope for network extension as much of the open ground is intensively farmed.

### **Shuna (Loch Melfort)**

Shuna is already very well-wooded. Oak, birch and alder woodland occupies at least 40% of the island, with substantial areas of regenerating woodland. There are no conifer plantations. The potential for woodland expansion onto open ground is limited (by the need to retain some open ground), but there is potential to enhance the quality of recently established broadleaved woodland.

### **Seil**

Seil has one significant woodland, Ballachuan hazelwood, which is internationally important for lichens and is an outstanding example of what is probably a highly natural woodland type characteristic of the Atlantic seaboard. The dominance of hazel characterises numerous other woodland fragments on the island, many of which are too small to record on the map but some of which have a rich field layer and epiphytic flora.

There is scope for linking some of these small woodland fragments to extend the network.

### **Kerrera**

Woodland is largely concentrated on the sheltered east coast, with some good oak, ash and hazel woodland and some small areas of mixed broadleaves. There is only limited scope for extending this woodland on the east coast. Much of the rest of the island lacks trees and so has poor potential for woodland network extension.

### **Lismore**

Native woodland on Lismore features strips of native woodland along raised beach cliffs with some fragments on steep ground away from the coast. A few small conifer blocks occur and one small area of policy woodland. Some of the cliff woodlands are over 1 km long, but as on Luing and Kerrera the steepness of the terrain makes them appear less substantial on a map than they are in reality.

Being a limestone island, the native woodland is species rich, with rock whitebeam present in places. Also as on Luing, agriculture is an important activity and in the short term the presence of significant areas of improved farmland may limit the potential for woodland expansion.

### **Shuna (Loch Linnhe)**

This is a small island that is primarily open ground with a strip of native woodland above both eastern and western shores. Elsewhere there are scattered small blocks of maturing conifer plantation and planted broadleaves. There is scope for conversion of conifer stands to broadleaved woodland to improve the linkage between existing broadleaved woodland fragments.

## **4. Strengths and weaknesses of current woodland distribution**

### **4.1 Strengths of current woodland distribution**

1. Widely distributed areas of native woodland occur on several of the islands, mainly in the form of small linear woods along raised beach cliffs and other steep low-lying ground.
2. Some of the areas of raised beach and associated woodlands occur as incipient woodland networks, which could be strengthened.
3. Many of the woodlands, whilst small, are of high conservation value, being diverse and natural with specialised woodland flora and invertebrate fauna. Many are of national or international significance for their highly oceanic character.
4. Mixed woodlands (with a policy structure) occur sporadically and can be useful elements in future networks.
5. In more rugged terrain, a proportion of conifer and mixed woodland occurs in similar topographic positions to native woodland (lower and mid-slopes) and can potentially become part of networks.
6. There are opportunities for extending broadleaved woodland networks by converting conifer woodland (including PAWS sites) to native woodland especially on Mull.
7. Adjacent open ground habitats are frequently semi-natural (except where more intensive farming occurs) and good quality mosaics of woodland and open space occur which can be incorporated into networks.
8. In many places the nature and quality of the land around native woodlands is such that woodland expansion is feasible.

### **4.2 Weaknesses of current woodland distribution**

1. Woods tend to be small in extent and are frequently linear. Current networks are generally far less substantial than their counterpart in many parts of the Highland mainland.

2. Two of the islands, Coll and Tiree, have virtually no native woodland that could be used as the core of a future network.
3. Away from the coastal zone, nearly all native woodlands are very small and relatively isolated.
4. Some native woodlands have been modified by interplanting with conifers and sycamore. In many places this planting has been substantial enough to reduce their conservation value. This effect varies widely from island to island and from estate to estate.
5. Many conifer woodlands are isolated from each other and from native woodland, especially on flatter topography – though there are exceptions to this on parts of Mull and Jura.
6. Large and medium sized conifer woodlands are invariably dominated by Sitka spruce with only limited admixture of more light demanding conifers (pine and larch).
7. Some areas of native woodland are adjacent to open ground habitats that are important conservation sites (especially for invertebrates and birds) and this may inhibit opportunities for future woodland expansion in these areas.
8. Some islands are relatively intensively farmed (*e.g.* Tiree, Luing, Lismore), with valuable grazing land adjacent to native woodlands. In the short term, this may limit the scope for woodland expansion on these islands.
9. On most islands, exposure, soil conditions and other physical constraints greatly reduce the area of land suitable for woodland expansion and may inhibit the possibility of neighbouring woodland areas from linking up.

## 5. Open ground habitats and land uses

Appendix 1 shows an example of the non-woodland land cover maps produced using the Land Cover Scotland 1988 (LCS88) database. The maps only give a general idea of land cover types and are not sufficiently detailed to make judgments on the appropriateness of woodland expansion in specific locations. At best, they are useful only as broad indicators of where woodland expansion might or might not be appropriate. An ecological site classification (ESC) can be undertaken to guide decision-making. Additional very detailed habitat information is available for some areas, notably the whole of Mull and the Rhinns of Islay, but this level of detail is only patchily available for the remaining islands and hence it was not possible to use it in this study.

The areas shown on the maps as ‘farming’ range from improved and semi-improved grassland on inbye land, to patchworks of bracken, heath and acid grassland on agriculturally marginal land. Woodland expansion may not be appropriate on improved and semi-improved grassland for agricultural reasons. Semi-natural habitats labelled as “bracken”, ‘bog’ and ‘heathland’ are often actually mosaics of several types of habitat and woodland expansion may be appropriate in some places and not in others.

*Molinia* is widespread on some islands, Mull in particular. Most of the *Molinia* is shown as “heathland” because it is species-poor *Molinia*-dominant wet heath. The rest appears

as ‘Undifferentiated *Nardus/Molinia*’ comprising *Nardus* grassland at higher altitudes and *Molinia* grassland at mid to low altitudes. Both *Molinia*-dominant wet heath and *Molinia* grassland are potential habitats for native woodland expansion.

The maps can be used to identify areas of bog where planting is not appropriate. Mires were identified from the LCS database and from a detailed SNH database showing the distribution of peatland<sup>5</sup>. These areas were excluded from the expansion zones shown on the expansion maps (maps 3a-e). However the landcover maps are not sufficiently detailed to be able to pick out other areas of species rich semi-natural habitat where woodland expansion is also not appropriate and this can only be done by site survey for individual woodland expansion proposals.

The general difficulties with the open ground/landuse maps mean that the areas highlighted for expansion *will include a proportion of habitats / landuses where woodland expansion is not appropriate; so they need to be handled with this in mind.*

## 5.1 Designated areas

Identifying areas where there is potential conflict with conservation interests was tackled by considering the appropriateness of woodland expansion in designated areas, based on the SSSI citations and other information supplied by SNH (see section 2.4.1). This allowed SSSIs to be categorised into 3 classes according to the appropriateness of woodland expansion depicted as colour coded SSSI boundaries (see maps 4a-d). This highlighted:

- a number of major locations with considerable existing woodland, where targeted woodland expansion would be appropriate
- many of the areas where woodland is not appropriate have little existing woodland *cover* and therefore fewer expansion opportunities.

## 6. Network characteristics of current woodland distribution

Maps 2a-e show the current distribution of forest habitat networks *i.e.* the woodlands plus a zone around them into which woodland species are assumed to be able to disperse. The networks are divided into:

- high quality broadleaved woodland networks
- other broadleaved woodland networks
- woodland generalist networks, which includes mixed and conifer woodlands.

The maps highlight a number of significant networks and details of these are given in tables 1 and 2. The total area of *existing broadleaved woodland* is a little over 10k ha (see table 1 for breakdown by island). The total area of existing woodland *network* is 37k ha (see table 2), of which:

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<sup>5</sup> Following comparison of the SHN and The LCS88 databases, the latter was used in the maps for defining areas of bog.

- high quality broadleaved woodland network totals 9k ha or 26%
- all broadleaved woodland network is 16k ha or 44 %.

In many areas the “quality broadleaved networks” are nested within the “other broadleaved networks”, which in turn are linked by “woodland generalist networks” to give very substantial networks. The vast majority of the *broadleaved* woodland networks are on Mull (about 60% of the broadleaved network area), followed by Islay with 25% and Jura with 8% (see table 1). The remaining islands contain only 7% between them, with some being devoid of woodland network, *i.e.* Coll and Tiree. Among the small islands Shuna shows up with a considerable area of broadleaved woodland network. The key areas of broadleaved woodland network are outlined below:

- Mull: Lagganulva to Torloisk; around Dervaig; Aros Park; near Craignure; around Loch Spelvie and on the western end of the Ross of Mull (see map 2a)
- Islay: SE Islay near Ardbeg; north of Port Askaig; with a scattered “other” broadleaved woodland network in the central belt between Bridgend and Port Askaig (see map 3b)

Table 1 Area of broadleaved woodland networks on each island.

	<b>Total existing broadleaved woodland</b>	<b>High quality broadleaved woodland network</b>		<b>All broadleaved woodland network</b>	
	Area (ha)	Area (ha)	% of total	Area (ha)	% of total
<b>Mull</b>	5503	5901	62	9285	57
<b>Islay</b>	3053	1980	21	4406	27
<b>Jura</b>	877	791	8	1267	8
<b>Colonsay</b>	188	119	1	289	2
<b>Gigha</b>	52	0	0	77	0
<b>Tiree</b>	0	0	0	0	0
<b>Coll</b>	0	0	0	0	0
<b>Scarba</b>	59	12	0	80	0
<b>Lunga /Garvell's</b>	19	28	0	31	0
<b>Luing/ Torsa</b>	70	49	1	128	1
<b>Shuna</b>	311	315	3	356	2
<b>Seil</b>	165	114	1	157	1
<b>Kerrara</b>	24	30	0	35	0
<b>Lismore</b>	149	119	1	170	1
<b>Shuna (L. Linnhe)</b>	18	0	0	20	0
<b>Total</b>	<b>10489</b>	<b>9459</b>	<b>100</b>	<b>16301</b>	<b>100</b>

Table 2 Network areas by island

ISLAND	High quality broadleaved woodland networks				All broadleaved woodland networks (“high quality” plus “other”)				Woodland generalist networks (all woodland broadleaved, mixed and conifer)			
	Total number	Total area (ha)	Mean area (ha)	Largest (ha)	Total number	Total area (ha)	Mean area (ha)	Largest (ha)	Total number	Total area (ha)	Mean area (ha)	Largest (ha)
<b>Mull</b>	174	5901	34	463	231	9285	40	708	398	24204	61	3427
<b>Islay</b>	49	1980	40	674	123	4406	36	709	214	7414	35	902
<b>Jura</b>	30	791	26	160	41	1267	31	314	62	2863	46	408
<b>Colonsay</b>	3	119	40	45	9	289	32	72	9	366	41	146
<b>Gigha</b>	0	0	0	0	6	77	13	48	12	196	16	76
<b>Tiree</b>	0	0	0	0	0	0	0	0	0	0	0	0
<b>Coll</b>	0	0	0	0	0	0	0	0	12	171	14	50
<b>Scarba</b>	2	12	6	6	3	80	27	62	7	92	13	66
<b>Lunga /Garvella chs</b>	3	28	9	11	3	31	10	12	4	35	9	13
<b>Luing/ Torsa</b>	4	49	12	19	5	128	26	62	17	230	14	70
<b>Shuna</b>	1	315	315	315		356	20	352	1	369	369	369
<b>Seil</b>	4	114	29	41	8	157	20	46	25	309	12	80
<b>Kerrara</b>	4	30	8	11	5	35	7	11	9	60	7	17
<b>Lismore</b>	17	119	7	39	21	170	8	42	45	319	7	76
<b>Shuna (L. Linnhe)</b>	0	0	0	0	2	20	10	16	4	67	17	28
<b>Total</b>	<b>291</b>	<b>9459</b>	<b>33</b>	<b>674</b>	<b>457</b>	<b>16301</b>	<b>36</b>	<b>709</b>	<b>819</b>	<b>36695</b>	<b>45</b>	<b>3427</b>

- Jura: small patches on the east side mainly in the northern half of the island (see map 3c)
- Colonsay: a number of patches in the northern half of the island (see map 3c)
- Shuna: more than half the island comprises broadleaved network (see map 3e)
- Lismore: as a few very narrow strips (see map 3e).

## 7. Expansion of networks

Networks can be improved both by restoring the network characteristics of existing woodland and by creating new woodland. The general priorities are as follows:

1. Protect and manage existing native woodland resource - especially quality broadleaved woodlands such as ancient woodland and designated woodland sites.
2. Restore degraded native woodland to a 'favourable condition'; the priority here is to identify areas of "other broadleaved woodland" which link quality broadleaved sites. This will increase the connectivity and extent of quality broadleaved woodland networks.
3. Convert conifer woodland to native broadleaves, so as to link broadleaved woodlands which are separated by unfavourable conifer woodland.
4. Create new native woodlands by expanding existing native woods or planting new ones in critical gaps in the network.

In addition, there are opportunities to improve the condition of semi-natural open ground habitats adjoining native woodland through positive conservation approaches (*e.g.* by reducing grazing pressure from deer and stock or by controlling bracken and rhododendron).

### 7.1 Expanding native woodland networks by restoring/converting existing woodland

The opportunities for expanding networks by restoring broadleaved woodland and converting conifers to broadleaves are shown in maps 3a-d; and area details are given in table 3. *It should be noted that the maps are only capable of providing useful information at strategic scale and because of inadequacies in the underlying data, cannot be used for individual woods or properties.*

**Restoration opportunities:** These show the best areas for expanding *quality broadleaved networks* by restoring adjoining areas of "other" broadleaved woodland to higher conservation status; and hence linking areas of quality broadleaved woodland to form larger networks. The total area of woodland restoration opportunities highlighted by the maps is 998 ha, the vast majority (803 ha) being on Mull; with other islands only providing much smaller opportunities due to their smaller and more fragmented woodland resources (Islay 80 ha, Jura 23 ha and Shuna 20 ha) (see table 3). These restoration opportunities represent 35% of the existing woodland area on Mull but smaller proportions on the other islands (0-20%); Shuna stands out because such a large proportion of the island has broadleaved tree cover. Some of the key areas are outlined below:

- Mull: Several significant areas: Aros Park, Lagganulva; near Craignure and Carsaig (see map 3a).
- Islay: restricted to areas near Ardbeg plus Bridgend and other woodland where sycamore is abundant (see map 3b)
- Jura: one small area on the east coast near Lealt (see map 3c)
- Colonsay: small areas near Colonsay House (see map 3c)
- Shuna (Loch Melfort): a substantial area in the centre of the island (see map 3d)
- Lismore: one small area near Kilcheran Loch (see map 3d)

There are no restoration opportunities on Col and Tiree because of the lack of woodland cover.

**Conversion opportunities:** These show the best areas for expanding *broadleaved networks* by converting conifer woodland to native broadleaved woodland; and hence linking areas of broadleaved woodland to form larger networks. The total area of woodland conversion opportunities highlighted by the maps is about 2402 hectares, the vast majority of which are on Mull (1915 ha), Islay (358 ha) and Jura (109 ha) (see table 3). There are little or no conversion opportunities on the smaller islands due to the absence of conifer woodland *but see below*. These conversion opportunities represent 12-15% of the existing woodland area on the larger islands.

Table 3 Summary of restoration and conversion opportunities

Island	Restoration Opportunities		Conversion Opportunities	
	Total area (ha)	% of broadleaved woodland area on island	Total area (ha)	% of broadleaved woodland area on island
<b>Mull</b>	803	14.6	1915	34.8
<b>Islay</b>	80	3	358	11.7
<b>Jura</b>	23	3	109	12.4
<b>Colonsay</b>	18	10	18	9.6
<b>Gigha</b>	0	0	0	0
<b>Tiree</b>	0	0	0	0
<b>Coll</b>	0	0	0	0
<b>Scarba</b>	0	0	0	0
<b>Lunga /Garvell's</b>	0	0	0	0
<b>Luing/Torsay</b>	0	0	0	0
<b>Shuna</b>	62	20	0	0
<b>Seil</b>	5	3	0	0
<b>Kerrara</b>	0	0	0	0
<b>Lismore</b>	7	5	<0.1	<0.1
<b>Shuna (L. Linnhe)</b>	0	0	2	11.1
<b>TOTAL</b>	<b>998</b>	<b>-</b>	<b>2402</b>	<b>-</b>

Some of the key conversion opportunities are outlined below.

- Mull: Several significant areas: Aros Park; South of *Dervaig*; around Loch Scridain; near Craignure (see map 3a).
- Islay: north of Port Askaig and a scatter of sites in the River Laggan catchment (see map 3b).
- Jura: several small areas along the east coast (see map 3c).
- Colonsay: small areas near Colonsay House (see map 3c)

There are no conversion opportunities on Col and Tiree because of the lack of woodland cover. There are also small blocks of conifer on some of the smaller islands, including Luing, Gigha, Lismore and Shuna (Loch Linnhe) which present good conversion opportunities, although these may not figure as part of a network.

## 7.2 Expansion of networks by creating new native woodland on open ground

Expansion opportunities are shown in maps 4a-d and comprise:

- ***Expansion opportunities at the edge of existing woodlands*** - a 500 m zone of up to 500 m reflecting landcover permeability shown as a coloured border around existing woodland.
- ***Linking opportunities***: Locations where existing networks come within 2 km of each other and where new woodland placed in between would effectively form a link; shown by the circular symbols.

### ***Expansion opportunities at the edge of existing woodlands***

The total area of ‘buffer’ expansion opportunities (from the woodland edge) shown by the maps amounts to 4894 ha; the vast majority of which are on Mull (2735 ha), Islay (1371 ha) and Jura (429 ha), because these have the largest broadleaved woodland areas. Expansion opportunities represent 47 % of the total broadleaved woodland area of the Argyll Islands as a whole; with the increase in woodland area they potentially represent ranging between:

- 45-50% on the larger islands
- 0-60% on the smaller islands depending on the extent of existing woodland cover.

However it must be borne in mind that the all expansion zones will inevitably include a considerable proportion of land which is unsuitable for woodland expansion (*i.e.* farming, open ground of conservation value, poor access, etc.); and that these values are therefore only indicative upper limits.

The main options for expanding existing woodland are outlined below.

Mull (map 4a):

- ***High quality woodland***: Ross of Mull; Laggan peninsula; near Craignure; Loch Ba; on Ulva; with some key ones between Lagganulva and Torloisk
- ***Other broadleaved woodland***: Around Tobermory and Aros Park

Islay (map 4b):

- ***High quality woodland***: There appear to be some opportunities in SE Islay, thought care would need to be taken to avoid open ground habitats of

conservation importance and maintain the intimate mosaics of woodland and open ground. The other main opportunity for expansion is north of Port Askaig..

Table 4 Summary of expansion opportunities

Island	Expansion Opportunities				
	Total area of 500m expansion zone around broadleaved woodlands (ha)	Total area of existing broadleaved woodland	Expansion opportunities as % of existing broadleaved woodland area	Quality woodland	Other BL woodland
<b>Mull</b>	2735	5503	50	63	83
<b>Islay</b>	1371	3053	45	23	10
<b>Jura</b>	429	877	49	3	1
<b>Colonsay</b>	94	188	50	0	3
<b>Gigha</b>	16	52	31	0	1
<b>Tiree</b>	0	0	0	0	0
<b>Coll</b>	0	0	0	0	0
<b>Scarba</b>	25	59	42	0	0
<b>Lunga /Garvell's</b>	13	19	68	0	0
<b>Luing/Torsay</b>	23	70	33	0	0
<b>Shuna</b>	47	311	15	0	0
<b>Seil</b>	58	165	35	0	0
<b>Kerrara</b>	15	24	63	0	0
<b>Lismore</b>	61	149	41	3	0
<b>Shuna (L. Linnhe)</b>	7	18	39	0	0
<b>TOTAL</b>	<b>4894</b>	<b>10489</b>	<b>47</b>	<b>92</b>	<b>98</b>

- **Other broadleaved woodland:** potentially many of the scattered woodlands can be expanded, but in general this will not lead to the formation of larger networks, due to the distances between woodland (*e.g.* around Ballygrant).

Jura (map 4c):

- **High quality woodland:** several small woods in the north half of the island could be expanded.
- **Other broadleaved woodland:** options are limited due to the small number of these woodlands and the fact that many are surrounded by woodland rather than open ground.

Colonsay (map 4c):

- **High quality and other broadleaved woodland:** there are some opportunities in the northern half of the island

Small islands (map 4d):

- **High quality and other broadleaved woodland:** there are small opportunities on several of the islands. Whilst one of the larger potential areas is on Shuna, the high cover of existing woodland means that further woodland is probably not a priority.

### **Linking opportunities**

The main options for linking networks are concentrated are shown on maps 5a-5d and details of numbers are given in table 4. The main opportunities are outlined below.

Mull (map 4a):

- **High quality woodland:** Ross of Mull, Laggan peninsula and Ardura; near Craignure; around Loch Ba; on Ulva; with some key ones between Lagganulva and Torloisk
- **Other broadleaved woodland:** Around Tobermory and Aros Park; Ulva and around Loch Scridain.

Islay (map 4b)

- **High quality woodland:** concentrated in SE Islay around Ardmore
- **Other broadleaved woodland:** a few opportunities in the scattered woodlands around Bridgend.

Jura (map 4c)

- **High quality woodland:** a few opportunities along the east coast

Colonsay (map 4c):

- **Other broadleaved woodland:** there are some opportunities around Colonsay House.

Small islands (map 4d).

- **High quality and Other broadleaved woodland:** a few opportunities on Lismore.

It should be noted that the expansion potential of smaller, especially linear, woodlands has been assessed somewhat conservatively in this study by discounting woods less than 50 m across. Whilst this might not accord with field experience in some cases, the aim is to ensure that expansion effort is directed towards larger woods with the greater opportunity for woodland linkages.

#### **7.2.1 Expansion and linkage along road edges**

Widespread small-scale expansion of woodlands has been happening for a number of years along road edges, where the combination of past disturbance, sustained periods of low grazing, proximity of seed sources, and suitable ground conditions tend to combine. Such expansion is generally too small to appear on the maps generated in this project, but is significant nevertheless and may accelerate with the continued withdrawal of grazing by sheep and increased disturbance from road traffic.

## 8. Implementation issues

There is clearly potential for woodland expansion in a way which benefits forest habitat networks without disadvantaging open habitat. This has been demonstrated by progress in recent years, especially on Mull; and mirrors similar activity elsewhere in west Argyll/Lochaber in areas such as Sunart, Loch Etive and Knapdale. A long-term reduction in grazing intensity raises the possibility of expansion occurring spontaneously, at least in areas where deer populations are not too high.

However there are several constraints. In common with other similar areas there are practical management difficulties in woodland expansion on the islands, which differ from island to island, but include:

- locally severe rhododendron colonisation, with rhododendron extending from the existing woodland onto adjacent open hillsides *e.g.* on parts of Colonsay and Mull.
- the cost of management operations, which are generally higher on islands and are significantly higher on the more inaccessible ones.
- deer numbers, which are very high on some islands, *e.g.* Jura and parts of Mull. This increases the cost of woodland establishment, especially when deer control requires deer fencing and topography dictates linear woodland expansion.
- island land management objectives, which can be highly variable over small areas and not always compatible with woodland expansion.