

The Native Woodland Resource in the Scottish Lowlands

Neil A. MacKenzie and Robin F. Callander



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A Review of Current Statistics

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Front cover: Carstramon Wood, Stewartry. This is part of a series of ancient oakwood remnants in the Fleet Valley. Most of the sessile oaks are over 120 years old and some are over 200 years. The understorey is mainly hazel with ash, alder, birch and wych elm also present. Some sycamore and beech were planted early in the last century. The wood has had many hundreds of years of productive use, having been coppiced for the production of charcoal for the smelting of iron, brass and copper between 1830 and the early 1900s. Subsequently, the wood supplied a bobbin mill and small wood products business in Gatehouse of Fleet until about 1931. (51365)

Back cover: The natural distribution of Scotland's main native forest types prior to the major effects of human intervention. (Adapted from D. N. McVean and D. A. Ratcliffe, *Plant communities of the Scottish Highlands*, HMSO, London, 1962, with modifications by Walker and Kirby, 1989.)

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Summary

This report provides a summary account of the present extent, distribution, composition and condition of the native woodlands in the Scottish Lowlands. The results are based on a review of all available survey information and show that the native woodland resource in the Lowlands is substantially greater than has been previously recognised. The report also highlights the significant differences between the proportions of native woodland in the Highlands and the Lowlands.

The overall area of native woodland is 28 881 hectares. This consists of both natural and planted origin native woodland. There is a minimum of 16 681 hectares of natural origin native woodland. This is a 150% increase on the area recorded by the only previous review in 1987 and there are clear indications that the full extent of these native woodlands is still significantly under-recorded.

There are 12 200 hectares of planted origin native woodland. Most of this is likely to consist of oak, ash and elm within policy woods, mixed origin woods and managed broadleaved plantations.

The most common native tree species are birch and oak and, although the native woodlands are relatively evenly distributed throughout the Lowlands, there are notable concentrations within the central belt. Lowland native woodlands are not in such poor condition as those in the Highlands but, nevertheless, many are threatened by a lack of regeneration or by structural change due to non-native introductions.

The overall native woodland resource in the Lowlands represents just 10% of the total woodland area in the region. This follows a progressive decline in the proportion of native woodlands since at least the Second World War, when the percentage of native species was almost four times the present amount.

Analysis of recent trends shows that a quarter of all new planting consists of native species. However, while there has been a significant increase in the use of native species in the Lowlands over the past few years, this increase has been modest compared to the rest of Scotland.

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Chapter 1

Definition of the resource

Introduction

This report reviews all the main surveys dealing with native woodlands in the Scottish Lowlands and provides an account of the present extent, distribution, composition and condition of these woodlands. The report was commissioned by the Forestry Commission in order to complement the results of *The native woodland resource in the Scottish Highlands* (MacKenzie and Callander, 1995) and to permit an estimate of the area of the native woodland resource for Scotland as a whole. It incorporates all known survey data up to March 1994 when the report was completed.

The review updates and expands on the only previous review of existing information on

native woodlands in the Lowlands (MacKenzie, 1987). This 1987 report highlighted the scarcity of native woodlands in the Lowlands compared to the scale and extent of the resource in the Highlands. This report confirms the differences in the proportion of native woodland in the Lowlands although new survey data since 1987 have established that the native woodland resource is more extensive than had been previously recognised.

The Lowlands

The Lowlands are that part of Scotland to the south of the Highland Boundary Fault and to the east of the eastern edge of the Grampian Mountains. The main part of this region is covered by 25 local authority districts (Figure 1.1). Lowland areas are also contained within

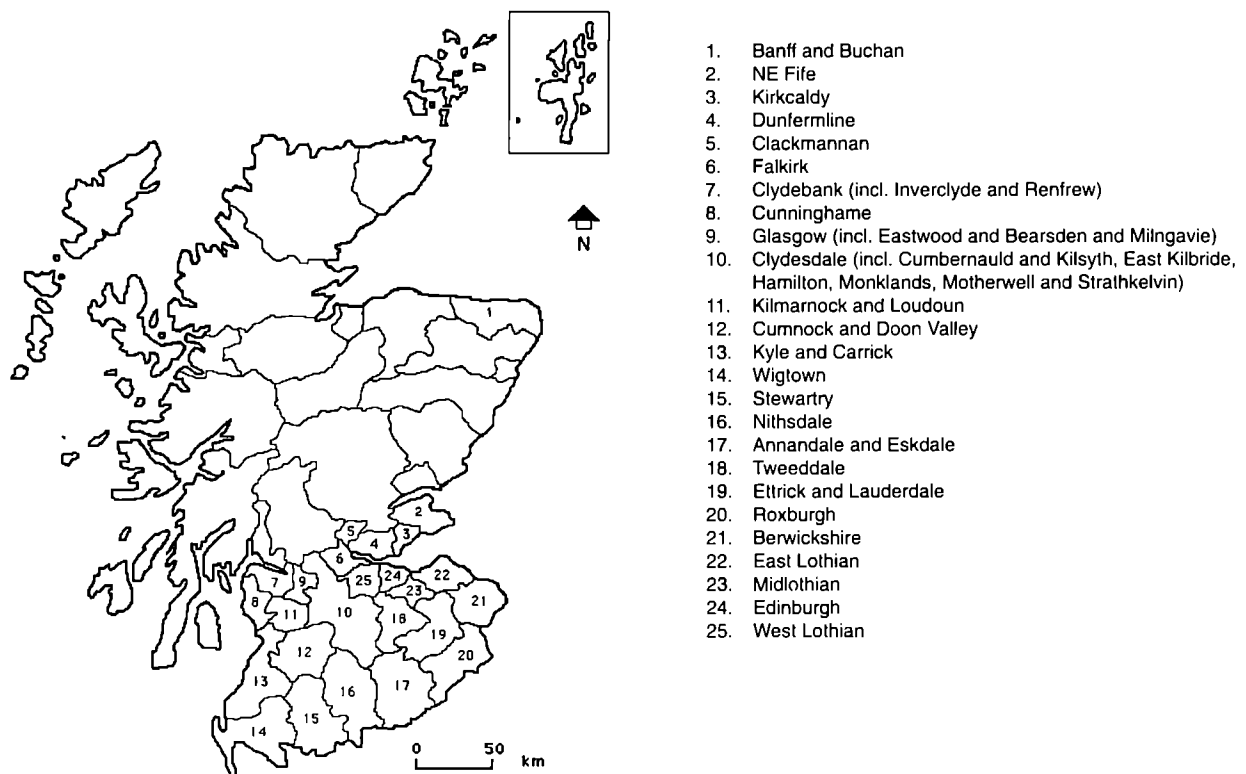


Figure 1.1 Local authority districts in the Lowlands. (Data for Aberdeen and Dundee districts are included in MacKenzie and Callander, 1995)

several of the Highland districts (MacKenzie and Callander, 1995) but, because most native woodland statistics are available at the level of local authority districts and could not be readily broken down further, the 25 districts are taken to equate with the Lowlands for the purposes of presenting data in this report. These 25 districts cover 2 239 800 ha or 31% of the area of mainland Scotland and the Inner Hebrides, and 10% of the land area of Great Britain.

Native woodlands

The native woodlands in the Lowlands are those woodlands which consist wholly or largely of tree species native to the region. These native species are listed in Table 1.1 and are the tree species that became established in the Lowlands by natural means following the end of the last Ice Age.

The native woodlands in the Lowlands are of two main types:

- *Natural origin native woodlands:* woodlands composed of trees which have had a continuous history of natural regeneration throughout the post-glacial period.
- *Planted origin native woodlands:* woodlands composed of native tree species where either the current or a previous generation of the trees has been planted.

Natural origin native woodlands are often referred to as genuinely native woodlands because they are the direct descendants of the region’s original natural forest cover. These woodlands, while they are naturally occurring woodlands, are also classified as semi-natural because their habitat character is considered in all instances to have been modified by the activities of Man.

Natural and planted origin native woodlands are usually relatively easily distinguished in the field. However, there are some areas composed of oak, ash and elm where research into historical documents only allows the origins of the woodland to be determined ‘on the balance of probability’.

Table 1.1 Trees and shrubs native to the Scottish Lowlands

Alder	<i>Alnus glutinosa</i>
Ash	<i>Fraxinus excelsior</i>
Aspen	<i>Populus tremula</i>
Birch, downy	<i>Betula pubescens</i>
Birch, silver	<i>Betula pendula</i>
Blackthorn	<i>Prunus spinosa</i>
Cherry, bird	<i>Prunus padus</i>
Cherry, wild (gean)	<i>Prunus avium</i>
Elder	<i>Sambucus nigra</i>
Elm, wych	<i>Ulmus glabra</i>
Hawthorn	<i>Crataegus monogyna</i>
Hazel	<i>Corylus avellana</i>
Holly	<i>Ilex aquifolium</i>
Juniper	<i>Juniperus communis</i>
Oak, pedunculate	<i>Quercus robur</i>
Oak, sessile	<i>Quercus petraea</i>
Rose, dog	<i>Rosa canina</i>
Rose, guelder	<i>Viburnum opulus</i>
Rowan	<i>Sorbus aucuparia</i>
Whitebeam	<i>Sorbus rupicola</i>
Willow, goat	<i>Salix caprea</i>
Willow, grey	<i>Salix cinerea</i>
Willow, eared	<i>Salix aurita</i>
Yew	<i>Taxus baccata</i>

Note Some of these species are rare or have a restricted natural distribution in the Lowlands (e.g. yew, elder, guelder rose and the rock whitebeam, *Sorbus rupicola*). Other small shrubs like gorse, broom, dwarf birch and additional willow species and their hybrids could also have been included in this list. (See Beckett and Beckett (1979) or Peterken (1981) for further information on the distribution of native species.)

Chapter 2

Existing sources of information

Extent and distribution

There is no site-related or sample woodland survey which is sufficiently comprehensive to provide an accurate assessment of either the overall extent of native woodlands in the Lowlands or the distribution of this resource between local authority districts in the region. Therefore all attempts to provide an overall account of the resource involve the integration of different surveys.

These surveys often employ different methodologies and have different aims and objectives. There are four key variables which are considered important when using such survey data as a basis for calculating the extent of the native woodland resource.

1. *Time scale.* The data from the different surveys may have been collected at significantly separate times; for example, surveys analysed for this report were made between 1 and 15 years ago. Surveys which were known to be out of date were not included.

2. *Minimum size.* The minimum size of the woodland usually differs between the surveys used. For example: the Forestry Commission (FC) Census (1983) excludes woods under 0.25 ha; the Ancient Woodland Inventory excludes woods under 2 ha and most Scottish Natural Heritage (SNH) field surveys exclude woods under 5 ha. The data used in this report will therefore exclude all woods under 0.25 ha in the woodland area totals and all woods under 2 ha in the genuinely native woodland area totals.

3. *Site or sample survey.* Surveys were either site related – with all woods assessed within a specified set of criteria for site definition; or they were based on samples of the main types of woodland which was extrapolated to

provide an estimate of the total woodland in a given area. Most SNH surveys relate to individual sites while the last FC census (1983) was a sample survey. Both types of survey were used to compile the area data in this report.

4. *Degree of coverage.* The FC Census, the Ancient Woodland Inventory, other SNH surveys and the Ordnance Survey all contain limitations on the detail, type and quality of their respective surveys of woodland. This report, therefore, will also reflect these differences.

All four variables affect the comprehensiveness of each and every survey to a greater or lesser degree and, consequently, the area totals given in this report are all minimum figures.

The FC Census (1983) does not separate the planted or natural origin woods or identify the non-native component in such woods. Most SNH surveys of natural origin woodland omit underplanted woods or woods with a significant component of non-native species. Some woods were also omitted in numerous NCC/SNH surveys due to lack of time or a refusal of permission to visit them. The main objective of many SNH regional surveys was to assess woodland for their suitability as Sites of Special Scientific Interest (SSSI) and, although most semi-natural woods were surveyed, existing SSSIs were sometimes excluded, so there are inconsistencies in the level of coverage available for some districts.

Further information on SSSIs is only available in the citation files located at SNH regional offices or centrally from Coredata. Coredata is part of an SNH computer database which records information on SSSIs within each local authority district. Thus, it was possible to extract the total area of woodland (classified to semi-natural broadleaves, conifers, mixed and scrub) in each SSSI. However, not every SSSI has been habitat

mapped to Phase 1 standard, or included on the database, and the extent of Coredata coverage varies for each district. In addition, woodland surveyed for the SNH Uplands database is recorded separately and not on Coredata. This review used Coredata to supplement field survey coverage where other information was scarce.

Many field surveys use current Ordnance Survey (OS) maps as a basis for initial selection of woodlands and this can itself lead to woodlands being excluded. OS maps omit woodlands. The revision period for the OS may be at intervals of 20 years or more and some maps can be significantly out of date. MacKenzie (1988) estimated that 6% of the area of genuinely native woodland in a survey of 1877 ha had been omitted from the OS 1 : 25 000 pathfinder edition (surveyed between 1966 and 1977). The FC Census (1983) recorded 1890 ha of unmapped woodland in South Scotland Conservancy. This woodland was not included in the census totals because there was insufficient information about the species composition, but much of this total is likely to have been native woodland. The FC Census may therefore have under-represented the native species component by about 0.5%.

The main source of information for total woodland and for planted origin woodland is the FC Census (1983) but, as the data were collected between 12 and 15 years ago, subsequent regeneration and planting are not taken into account in the FC's regional statistics. The main source for data on the extent of natural origin woodland is the Ancient Woodland Inventory (SNH Inventory database and district reports). These main data sources are not directly comparable because of the differences associated with the key variables but it is assumed that the FC Census will have included most of the natural origin woodland.

The assessment of the natural origin woodland is further complicated by the limitations of the Ancient Woodland Inventory (AWI). This was a desk study based on the OS 1 : 25 000 maps supplemented by field survey reports, aerial photographs and other sources to qualify map data where appropriate. Site assessments based solely on the appearance of woods on the OS maps may include some woods which are of planted origin. The Inventory may also have included woods not on the OS map if identified by field survey as important for nature conservation. However, some woods may have

been omitted, particularly recent regeneration, if they were not considered important for nature conservation.

The Inventory was not intended to be a comprehensive survey of all genuinely native or semi-natural woodland over 2 ha (Walker and Kirby, 1989) and cannot therefore be relied upon as a realistic assessment of the resource. Some recent studies suggest that significant areas of genuinely native woodland may have been omitted. For example:

- In a Phase 1 woodland survey of Eastwood district 86% of the area of semi-natural woodland was excluded from the Inventory (NCC, 1991a).
- In a Phase 1 woodland survey of East Kilbride district 42% of the area of semi-natural woodland was excluded from the Inventory (NCC, 1991b).
- A Phase 1 woodland survey of Strathkelvin district recorded almost five times the area of semi-natural broadleaved woodland listed in the Inventory (SWT, 1990-92a).

Roberts *et al.* (1993) attempted to ascertain the area of woodland over 2 ha which had not been included in the Inventory. They calculated that the Inventory had under-represented the area of genuinely native or semi-natural woodland in Scotland by 23%. Therefore, for some districts, in order to improve the coverage of the AWI, alternative and more comprehensive survey data, where available, were used to replace the AWI total for semi-natural woodland.

Species composition

There is no site-related survey which is sufficiently comprehensive to provide an accurate assessment of the species composition or types of native woodland in the Lowlands. The FC census (1983) is the main source for the distribution of the native woodland resource into species for each Lowland district. The census is, however, a sample survey and area totals for each species are not related to a site or to a woodland type. The native component in mixed broadleaves was not identified and the census did not differentiate between natural origin and planted origin woodland.

The only sources of information on the composition of genuinely native woodland are those

field surveys which classified the woodland or which provided a Phase 1 type site description.

One of the main difficulties in providing district totals for the main woodland types in the Lowlands based on field survey material is the variety of classification systems used in each survey. These vary from the detailed floristic surveys of the National Vegetation Classification (Rodwell, 1991) and the stand type surveys of the Peterken system (Peterken, 1981) to canopy cover and Phase 1 surveys which employ a variety of site descriptions ranging from a % estimate of the main species (e.g. FC 1947-49 Census; Bunce *et al.*, 1979) to a broader classification of semi-natural conifers, broadleaves or dominant species (e.g. Scottish Wildlife Trust Habitat Surveys; Grampian Regional Council, 1987).

Many of these classifications are incompatible with other systems unless an arbitrary analysis or simplification is carried out which involves altering the classifications to the lowest common denominator. However, analysis of this nature was beyond the scope of this report and therefore the list of areas given in Appendix 1 is, firstly, to provide an indication of what proportion of the AWI totals have been validated by field survey and, secondly, to use more comprehensive area data to replace some district AWI totals.

Structure and condition

There are no district field surveys which aim specifically to assess the age structure and condition of the native woodland resource. There are also no sample survey reports although Scottish Native Woods (Perkins, personal communication, 1994) have carried out some site surveys of native woodland in Dunfermline and Clackmannan districts and the Tayside Native Woodland Initiative may have surveyed some woods in the lowland parts of Perth and Kinross and Angus districts. The FC Census provides a detailed age class analysis of individual species, but only for high forest trees. However, in the Lowlands these account for 70% of the area of the native broadleaved resource.

The district field surveys carried out by SNH using the National Vegetation Classification may have assessed age structure and regeneration in semi-quantitative terms but, as no analyses of the survey record cards have yet been completed, the information is not readily accessible. The Phase 1 Habitat Surveys currently in progress by Scottish Wildlife Trust/SNH do not generally include any assessment of woodland condition, although some information may be available in target notes.

Chapter 3

The native woodland resource

Extent

The FC Census (1983) records that 28 881 ha or 10% of the total woodland area in the Lowlands consists of native species. This overall native woodland resource therefore occupies just over 1% of the Lowland land area, compared to over 13% occupied by all the woodland in the region. Analysis of other surveys suggests that this overall native woodland resource consists of a minimum of 16 681 ha natural origin native woodland and 12 200 ha planted origin native

woodland. These two main types of native woodland therefore account for 58% and 42% respectively of the native woodland resource (Figure 3.1).

The total here of 16 681 ha for genuinely native woodland is less than the estimate in Roberts *et al.* (1993), which was also based on the FC Census and the AWI although the analyses were different. Their estimates for semi-natural woodland based on the FC Census and the AWI/FC Census were 27 422 ha and 23 106 ha

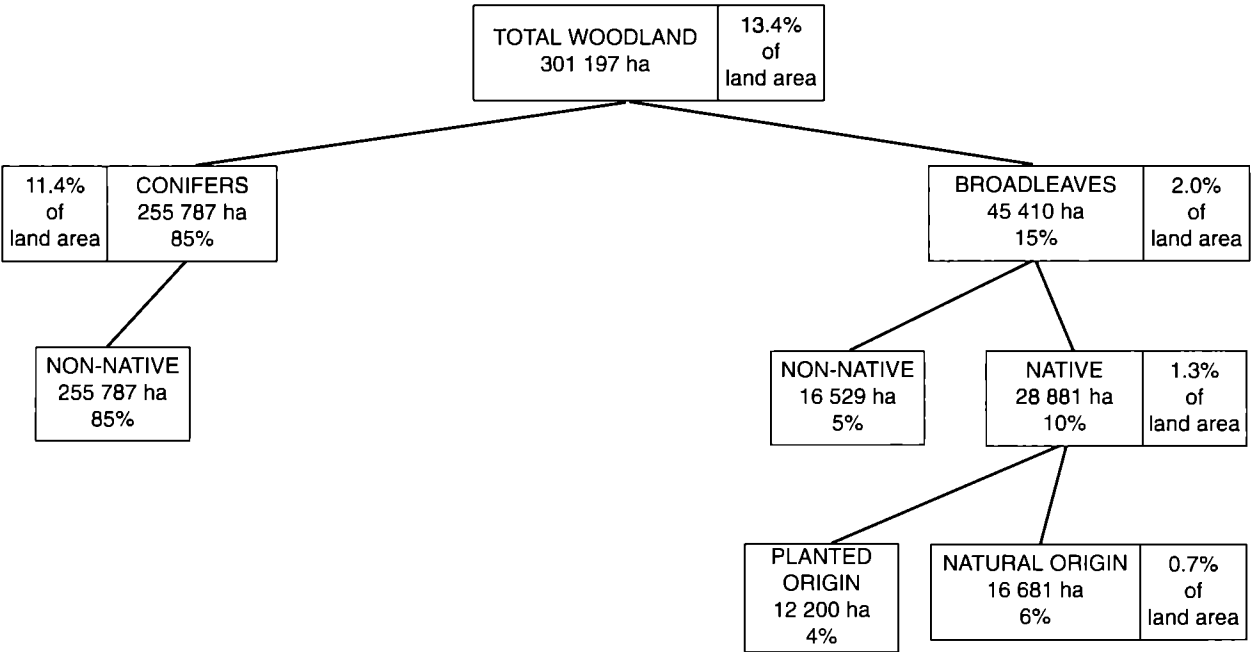


Figure 3.1 Extent of native woodlands in the Lowlands. Sources: FC Census (1984); Ancient Woodland Inventory

- Notes
- 1. All planted totals exclude new planting after 1982.
 - 2. Woodland % expressed as % of total woodland.
 - 3. Mixed broadleaves have not been included as the FC Census did not record the species composition. This category is mainly planted policy woods which may contain some native species but the proportions are unknown.

respectively for the four main regions in the Lowlands (Lothian, Borders, Fife, and Dumfries and Galloway). The figures of Roberts *et al.* are probably larger because of the inclusion of an estimate for unmapped woodland (6630 ha) and because of the inclusion of woods between 0.25 ha and 2 ha (4316 ha) in the former figure. If

these totals are excluded then the area estimates are broadly comparable.

The total for genuinely native woodland is a minimum total because, as described in Chapter 2, the full extent of these woodlands is still clearly significantly under-recorded. At present, 40% of this estimated minimum total has been confirmed by field survey, as identified in Appendices 1 and 2.

The extent of native woodlands in the Lowlands is set in a Scottish and GB context in Tables 3.1 and 3.2. Table 3.1 illustrates the limited amount of Scotland's native woodland resource contained within the Lowlands compared to the Highlands. In a GB context (Table 3.2), the native woodland resource in the Lowlands represents just over 1% of Britain's total woodland area and accounts for 4% and 3% respectively of Britain's woodland area

Table 3.1 The lowland native woodland resource in the Scottish context. Sources: Ancient Woodland Inventory; FC Caledonian Pinewood Inventory (1994); FC Census, 1979-82 (District and Conservancy totals); Scottish Office (1991); other field surveys as listed in Appendix 1

	Highlands	Lowlands	Scotland
Total land area (ha)	5 081 700	2 239 800	7 321 500
% of Scotland's land area	69	31	100
Total woodland area (ha)	602 142	301 197	903 339
% of Scotland's woodland area	67	33	100
Total area of native species (ha)	210 754	28 881	239 635
Native species as % of total woodland	35	10	27
% of Scotland's native species area	88	12	100
Total area of natural origin woodland (ha)	104 876	16 681	121 557
Natural origin as % of total woodland	17	6	13
% of Scotland's natural origin area	86	14	100
Natural origin as % of total native species area	50	58	51
Planted origin as % of total native species area	50	42	49

Table 3.2 The lowland native woodland resource in the Great Britain context. Sources: Ancient Woodland Inventory; FC Census, 1979-82 (Conservancy and District totals); Kirby, personal communication (1994); Locke (1987)

	England	Wales	Scotland	GB
Total land area (ha)	13 043 927	2 076 402	7 321 500	22 441 829
% of GB land area	58	9	33	100
Total woodland area (ha)	929 027	237 432	903 339	2 069 798
% of GB woodland area	45	11	44	100
Total area of broadleaves (ha)	545 106	69 467	145 597	760 770
% of total woodland area	59	29	16	37
Total area of conifers (ha)	383 321	167 965	757 742	1 309 028
% of total woodland area	41	71	84	63
Total area of native species (ha)	399 774	53 635	239 635	693 044
% of total woodland area	43	23	27	33
% of GB native species area	58	8	34	100
Total area of natural origin woodland (ha)	415 679	60 808	121 557	598 044
% of total woodland area	45	26	13	29
% of GB natural origin area	70	10	20	100

composed of native species and of genuinely native woodland.

Composition

Native broadleaved woodland represents 64% of the total area of broadleaved woodland in the Lowlands. Birch and oak are the most common native tree species in the Lowlands, and form the major canopy species in 36% and 26% respectively of the native woodland resource and together account for 39% of all broadleaved woodland in the region (Figure 3.2).

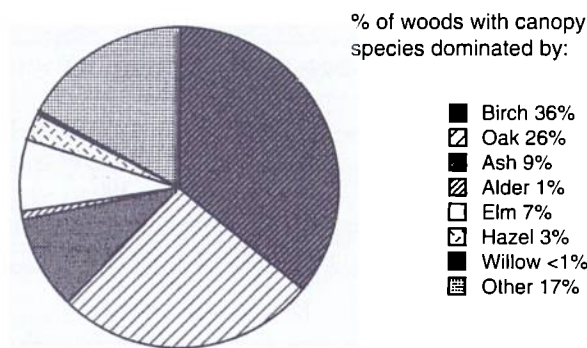


Figure 3.2 Species composition of native woodlands in the Lowlands. Other: refers to undefined areas of species which were not listed in the principal species categories and includes alder, willow, hazel, hawthorn, cherry and non-native lime, horse chestnut and hornbeam. Source: FC Census (1983)

(Although there are no genuinely native pine in the Lowlands the species is planted commercially, albeit in low numbers. Out of a total conifer area of 255 787 ha in the Lowlands only 8% consists of Scots pine. See also Appendix 3.)

Differences in methodologies between the main woodland surveys mean that it is difficult to ascertain accurately the proportions of native broadleaves that are of natural and planted origin. The main difficulty lies in determining how much of, in particular, the oak, ash and elm are of planted origin. Most birch and the other broadleaved species are likely to be of natural origin but oak, ash and elm have been planted in the Lowlands for many centuries, and probably also on sites which formerly contained natural origin woodland of the appropriate

species. Although there will be some oak, for example, in the natural origin mixed deciduous woods as well as in the gorge and river valley woods, the absence of scrub oak, ash and elm in the FC Census for South Scotland Conservancy (1983), suggests that a significant proportion is also within managed high forest of planted, natural or mixed origin.

Distribution

The distribution of the overall native woodland resource in the Lowlands is shown by local authority district in Figures 3.3 and 3.4, which are based on the statistical information given in Appendices 3 and 4.

The extent of native woodland in each district ranges from less than 1% to just over 4% of total land area, with several of the smaller districts in the central belt, for example Clackmannan, having the highest density (Figure 3.3). The proportion of all woodland in each district that consists of native species ranges from 3% to 60% and, again, it is the central belt districts, such as the Glasgow area and mainland Cunninghame, which have the highest percentage (Figure 3.4).

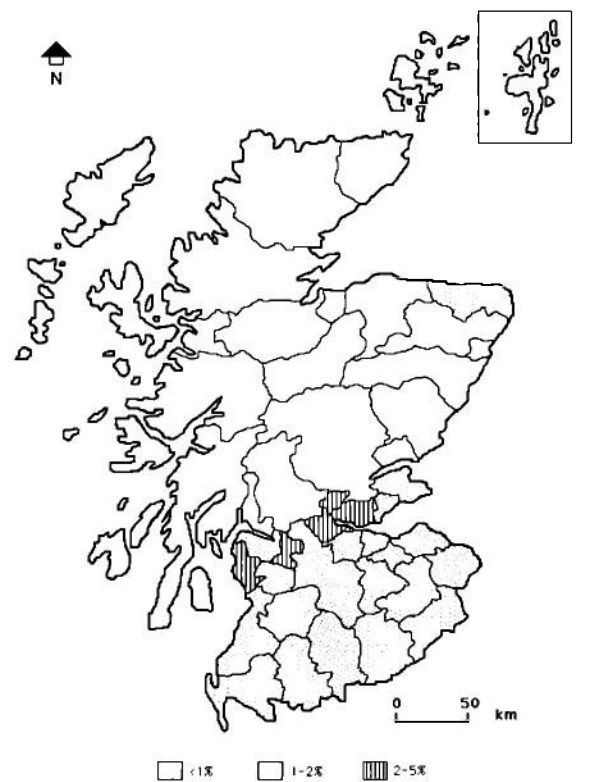


Figure 3.3 Area of native species as % of land area in each Lowland district

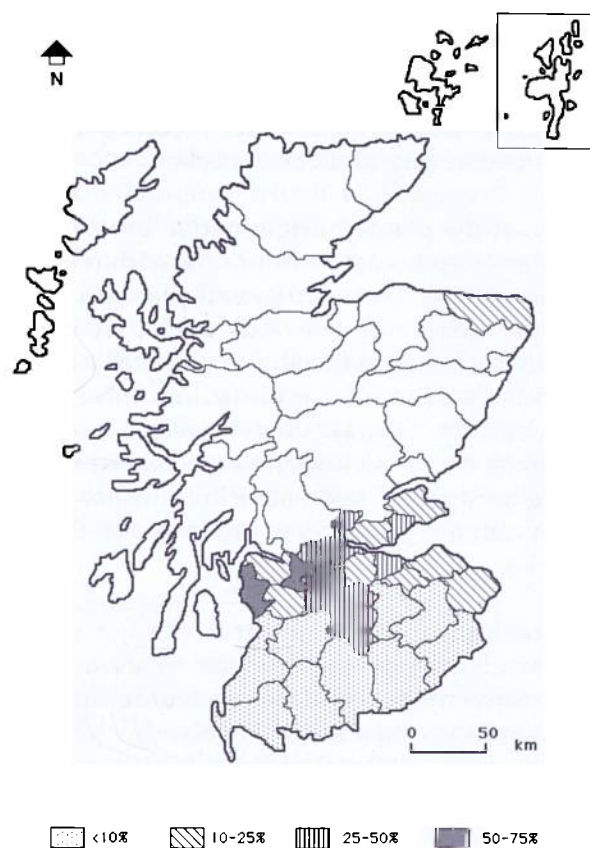


Figure 3.4 Area of native species as % of woodland area in each Lowland district

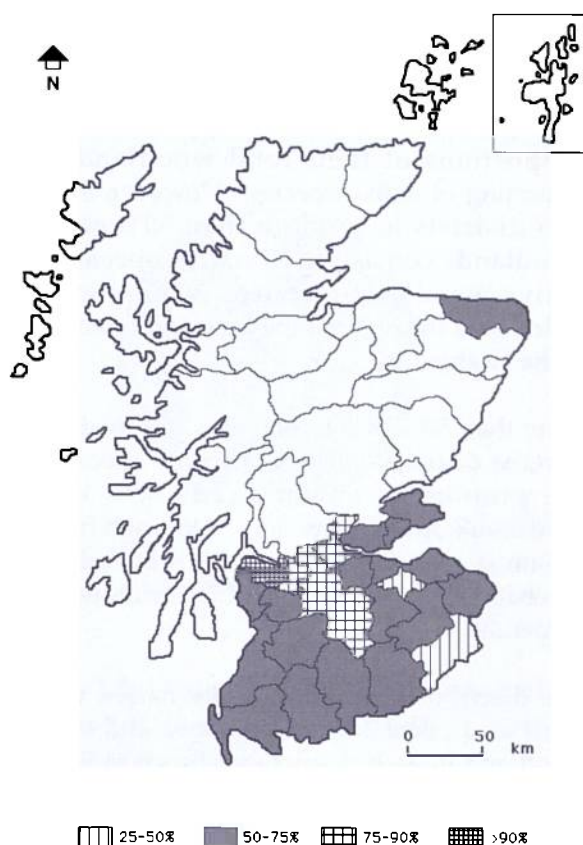


Figure 3.5 Area of native broadleaves as % of broadleaved area in each Lowland district

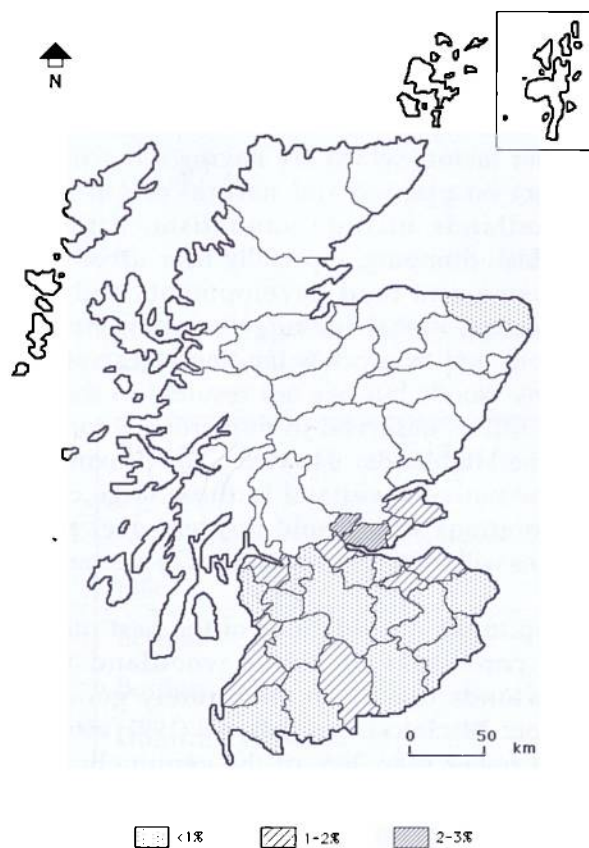


Figure 3.6 Area of genuinely native woodland as % of land area in each Lowland district

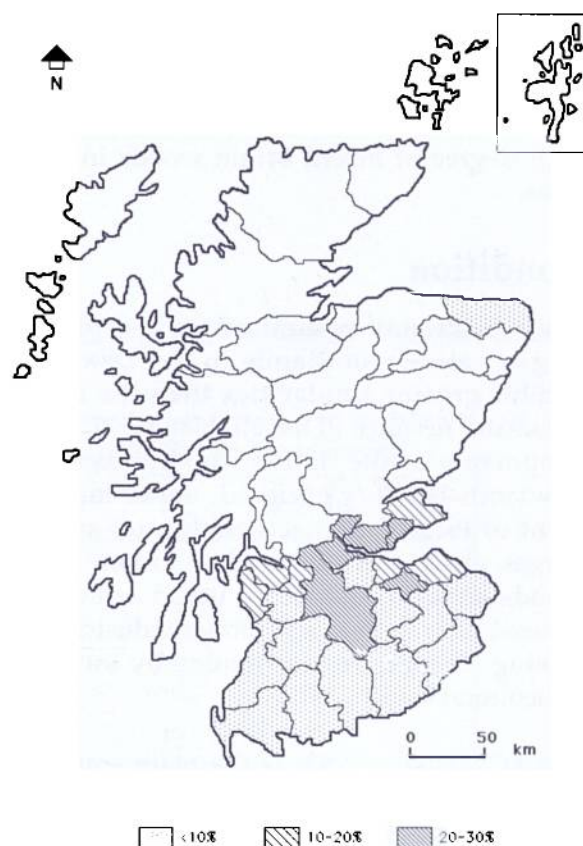


Figure 3.7 Area of genuinely native woodland as % of woodland area in each Lowland district

The central belt districts, for example the Glasgow and Clydesdale areas, contain the highest densities of native woodland and also tend to be the districts with the highest proportions of their total woodland area consisting of native species. However, as only two districts have more than 50% of their woodlands consisting of native species, the native woodland resource is more evenly distributed throughout the Lowlands compared to the Highlands.

More than 50% of the total area of broadleaves in most districts consists of native species but the proportion only exceeds 90% in the Clydebank area (Figure 3.5). Although birch is the most common native species overall, it is exceeded by oak in 14 of the 25 districts listed in Appendix 4.

The distributions of genuinely native woodlands as a percentage of land area and of total woodland in each district are shown in Figures 3.6 and 3.7 respectively. These reflect a pattern similar to that of native species where there is a moderate concentration in the central belt but the total resource has a wider distribution.

There are no readily accessible data available on the distribution of planted origin native woodlands in the Lowlands. The matter is further complicated by the difficulty in determining the origins of some native species without extensive historical research and by the high degree of mixed origin woods in some areas.

Condition

The condition of natural origin and planted origin native woodlands in the Lowlands exhibit greater similarities than the native woodland resource in the Highlands. A higher proportion of the native woodlands in the Lowlands is either enclosed, under management or located in inaccessible sites such as gorges, cleughs or river valleys. Many of the woods are also adjacent to urban settlement, disused railway lines and former industrial and mining sites or are surrounded by intensive agricultural land.

The FC Census (1983) is the main source of information on the structure of native woodlands but does not distinguish the planted origin from the natural origin resource. According to the FC Census 80% of the oak, almost 60% of the elm and 30% of the ash were

established in the last century. There is a wider spread of age class among the birch, but 64% are over 40 years old and, because this species may not be as long lived as other broadleaves, the present diversity could be in decline.

Most of the planted origin native broadleaves are likely to be oak, ash or elm within estate policy woods or broadleaved plantations or within mixed origin woods which are either planted trees introduced into genuinely native woods or planted woods which have been invaded by naturally regenerating trees. A common feature of lowland broadleaved woods is the incidence of non-native introductions such as sycamore, beech, lime and various conifer species.

Disturbance and structural change to the genuinely native woods by the colonisation of non-native trees and shrubs is more evident in the Lowlands than in the Highlands. Many of the largest and finest of the mixed deciduous woods along the Rivers Ayr, Clyde, Calder, Avon, for example, were partly cleared and replanted with conifers in the past or contain exotic species introduced in the 18th and 19th centuries. The Wood of Cree, the largest oak-wood in south Scotland, had been partly underplanted with conifers and, although most of these woods are now SSSIs, the existing non-native colonisers will continue to have an effect on the natural woodland ecosystem.

Other factors which are having a detrimental effect on planted and natural origin native woodlands include vandalism, litter and rubbish dumping, especially near urban areas, housing and road developments and some casual or illegal felling. Browsing by deer, rabbits and livestock is limiting regeneration in many woods but has not resulted in the poor conditions observed in numerous woodlands in the Highlands. However, the proximity of some native woodland to those large conifer plantations which hold resident deer populations will continue to be a threat to regeneration.

Despite the depredations of the past many of the core areas of native woodland in the Lowlands remain in moderately good condition. MacIntosh and Tidswell (1991) estimated that fewer than 30% of the genuinely native woodlands in Dumfries and Galloway and in the Clyde Valley could be considered endangered. Colonisation by birch and willow is common on former industrial land and there has been an increase in the planting of broadleaves in the

central belt by the district councils and the Central Scotland Countryside Trust.

There are also a number of management operations in several of the best of the natural origin woodlands which will improve their diversity and ensure a more secure future. The RSPB have removed much of the underplanting in the Wood of Cree; the Scottish Wildlife Trust have erected stock fences in the Ayr Gorge woodlands, in the Clyde Valley woodlands and at Woodhall Dean; the phased removal of sycamore and beech is taking place in some oak and mixed deciduous woods; while Strathclyde Regional Council's River Valley Strategy includes a number of woodland restoration projects.

Ownership

Of the native woodland area in the Lowlands 94% is in private ownership and 6% is owned by the Forestry Commission (Forestry Commission, 1983; Figure 3.8). Within the 'private' total, a small proportion (probably less than 10%) is owned by public bodies such as SNH, SOAEFD, British Coal and various district councils while conservation organisations, like SWT, RSPB and the Woodland Trust, also own a number of native broadleaved woodlands.

A significant proportion of the native woodland resource may also be within agricultural tenancies but there are no data on the scale of this.

The pattern of ownership is broadly similar across all the main local authority regions in the

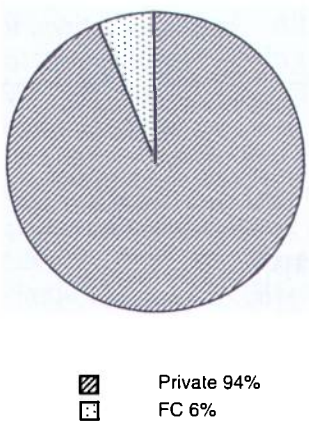


Figure 3.8 Ownership of the native woodland resource in the Lowlands. Source: Forestry Commission (1983)

Lowlands (Table 3.3). The FC own a slightly higher proportion in Dumfries and Galloway region but this has probably been significantly reduced after the purchase of the Wood of Cree by the RSPB in 1984. In the Lowlands a higher proportion of the native broadleaved resource is owned by the private sector; compared to the ownership of all broadleaved woodland in Scotland, 86% of broadleaves are in private ownership (Forestry Commission, 1983).

Table 3.3 Ownership of the native woodland resource in four local authority regions. Source: Forestry Commission (1983)

Region	Area (ha)	% Native broadleaves	
		FC	Private
Fife	2593	3	97
Lothian	3156	<1	99
Borders	4620	2	98
Dumfries and Galloway	5594	13	87

Chapter 4

Recent trends in the resource

Background

Until the end of the last century the majority of woodlands in the Lowlands were probably dominated by native broadleaved species, although beech, sycamore and other non-native broadleaves and conifers had been planted extensively in policy woods and in some natural woods during the 18th and 19th centuries (Walker and Kirby, 1989). The loss of mature woodlands during the First and Second World Wars and the subsequent afforestation programme by the Forestry Commission altered the scale and proportion of native species. By the end of the Second World War native species accounted for less than 40% of the woodland area in the Lowlands (Forestry Commission, 1952) and by the early 1980s the proportion was down to 10% (Forestry Commission, 1983). As post-war agriculture developed, many native woods were cleared for livestock and subsequent regeneration or woodland expansion was often prevented by overgrazing or by the adjacent cultivation or other intensive land use.

The major part of this change has been due to the massive expansion in conifer afforestation based largely on the planting of Sitka spruce. The total woodland area in the Lowlands increased from 84 000 ha in 1947 to over 300 000 ha in the 1980s (Forestry Commission, 1952, 1983). During the same period, however, some native woodlands were cleared or underplanted with conifers and there was an increase in the area of sycamore, ash and birch, partly at the expense of oak which had decreased in area by over 3000 ha since 1947 (Forestry Commission, 1983).

There is now general agreement that about 30-50% of the natural origin native woodlands in the Lowlands had disappeared between the beginning of the century and the 1980s, with the greatest extent of the losses having occurred

since the Second World War (Parr, 1981; Walker and Kirby, 1989).

Current period

The decline in the native woodland resource in the Lowlands has started to be reversed since the mid-1980s. This change is a result of many factors, but two developments might be seen as particularly significant:

- The introduction by the FC in 1985 of their Broadleaved Woodland Policy and associated grant scheme.
- The changes in forestry incentives that resulted from the 1988 Budget.

The loss of genuinely native woodlands due to forestry has largely stopped since 1985 (FC Broadleaves Policy, 1991). In addition, a start has been made to restore the remnants of some genuinely native oak and mixed deciduous woodlands which had been partly destroyed by the creation of non-native plantations or altered by exotic introductions. Much of this work is being carried out by the conservation organisations (SNH, RSPB, SWT, Woodland Trust) or by the regional or district councils.

Other factors, however, are continuing to have an impact on the condition of genuinely native woodlands and survey reports indicate that most broadleaved woods consist of trees which are mature. Overgrazing by deer, rabbits and livestock remains a barrier to regeneration in many areas while self-seeding from non-native introductions is affecting the structure and ecology of numerous woods. In Lanarkshire, for example, although oak is the most common broadleaved species, less than 1% consists of trees under 100 years old while the youngest trees are birch, sycamore and beech. The future development of this succession will inevitably result in changes to the ecology and character of

these woods (Ross and MacKay Consultants, 1994). The pressures of urban development, vandalism and rubbish tipping and the loss of elm trees to Dutch elm disease all have a localised but detrimental impact to the overall woodland resource.

Apart from data from individual sites there is no information at the district level of the extent to which native woodlands have started to be regenerated or expanded. The statistics from the FC's Woodland Grant Scheme (WGS) for Lothian and Borders and Dumfries and Galloway Conservancies show a steady increase over recent years in the planting of native broadleaves.

Tables 4.1 and 4.2 show the increase in broadleaves from 6% of new planting and restocking in 1986 to 26% in 1991/92, although

the proportional increase has only been significant in the previous 3 years. During the 7 years to 1992 broadleaves accounted for 10% (3878 ha) of all planting (36 937 ha) in South Scotland Conservancy, and this proportion rises to 21% in the 3-year period 1989-92, when new planting of conifers declined. All data refer to new planting and restocking as natural regeneration has involved less than 15 ha in any one year in South Scotland.

The full details of the composition of these broadleaves are not available, but it appears the overwhelming majority are native species. For example, Table 4.3 gives details of the broad-leaved species for approved applications for the whole of Scotland since June 1991, when such data started to be entered into the FC's database. Non-native species and the 'other broadleaves' category only accounted for 6% of the total, with

Table 4.1 Grant-aided restocking and new planting in FC South Scotland Conservancy, 1986-1992

Year to 31 Mar	Broadleaves (ha)			Conifers (ha)			Overall total (ha)
	Restock	New planting	Total	Restock	New planting	Total	
1985/86	102	109	211	535	2 698	3 233	3 444
1986/87	116	191	307	475	3 113	3 588	3 895
1987/88	130	393	523	407	7 602	8 009	8 532
1988/89	208	533	741	490	9 702	10 192	10 933
1989/90	193	413	606	411	2 660	3 077	3 683
1990/91	184	502	686	511	2 179	2 690	3 376
1991/92	288	516	804	639	1 631	2 270	3 074

Table 4.2 Broadleaves as a % of grant-aided new planting and restocking in FC South Scotland Conservancy, 1986-1992

Year to 31 Mar	Total restock (ha)	Broadleaves as % of restock	Total new planting (ha)	Broadleaves as % of new planting	Overall total (ha)	Broadleaves as % of total
1985/86	637	16	2 807	4	3 444	6
1986/87	591	20	3 304	6	3 895	8
1987/88	537	24	7 995	5	8 532	6
1988/89	698	30	10 235	5	10 933	7
1989/90	604	32	3 073	13	3 683	16
1990/91	695	26	2 681	19	3 376	20
1991/92	927	31	2 147	24	3 074	26

Natural regeneration is excluded because totals are less than 15 ha in any year.

native species explicitly 63% and ‘mixed broadleaves’ (considered very largely native) another 31%. Thus, more than 90% of the broadleaves total may well consist of native species.

The proportion of new planting of broadleaves on Forest Enterprise land is at a similar level to the private schemes but there is no significant increase until 1993 when the proportion rises to 13% (Tables 4.4 and 4.5). The composition of

the main category, ‘mixed broadleaves’, is unknown although native species are probably a sizeable element in most schemes.

For the year ending 31 March 1994, the statistics for Lothian and Borders and Dumfries and Galloway Conservancies show that native species accounted for less than 28% of the total area (2323 ha or 14% of the Scotland total) upon which first instalment establishment grant was paid (Tables 4.6 and 4.7). This is in contrast to

Table 4.3 Areas of broadleaved species approved for new planting under The Woodland Grant Scheme in Scotland, June 1991-December 1993

	Planting (ha)	Natural regeneration (ha)	Total (ha)
Birch	1 278	1 543	2 821
Oak	783	45	828
Alder	583	8	591
Ash	491	11	502
Rowan	351	58	409
Cherry	322	0	322
Woody shrubs	274	26	300
Willow	263	34	297
Aspen	64	0	64
Hazel	53	4	57
Native broadleaves	629	1 194	1 823
Total	5 091	2 923	8 014
Mixed broadleaves	2 535	1 388	3 923
Other broadleaves	115	37	152
Non-native broadleaves	583	16	599
Grand total	8 324	4 364	12 688

Table 4.4 Restocking and new planting on Forest Enterprise land in the Lowlands, 1987-1993

Year to 31 Mar	Broadleaves (ha)			Conifers (ha)			Overall total (ha)
	Restock	New planting and natural regeneration	Total	Restock	New planting and natural regeneration	Total	
1987	78	72	150	846	1397	2243	2393
1988	124	58	182	885	1063	1948	2130
1989	89	53	142	995	682	1677	1819
1990	54	112	166	886	1335	2221	2387
1991	46	88	134	1185	786	1971	2105
1992	80	63	143	1125	636	1761	1904
1993	101	91	192	934	318	1252	1444

Table 4.5 Broadleaves as a % of new planting and restocking on Forest Enterprise land in the Lowlands, 1987-1993

Year to 31 Mar	Total restock (ha)	Broadleaves as % of restock	Total new planting (ha)	Broadleaves as % of new planting	Overall total (ha)	Broadleaves as % of total
1987	924	16	1469	5	2393	6
1988	1009	18	1121	5	2130	9
1989	1084	13	735	7	1819	8
1990	940	18	1447	8	2387	7
1991	1231	11	874	10	2105	6
1992	1205	12	699	9	1904	8
1993	1035	19	409	22	1444	13

The Lowlands includes all local authority districts listed in Appendices 3 and 4.

Table 4.6 Woodland Grant Scheme statistics (grant paid) for Scotland and for Lothian and Borders and Dumfries and Galloway Conservancies, 1993-1994 (to 31 March 1994)

	Restocking (ha)		New planting (ha)		Natural regeneration (ha)		Totals (ha)	
	Conifers	Broadleaves	Conifers	Broadleaves	Conifers	Broadleaves	Conifers	Broadleaves
Scotland Total areas	2535	1726	4608	4568	593	2885	7736	9179
Lothian and Borders	168	116	565	270	0	5	733	391
Dumfries and Galloway	323	82	625	164	1	4	949	250

Table 4.7 Total area of new planting, restocking and natural regeneration (grant paid) under Woodland Grant Scheme for Scotland and for Lothian and Borders and Dumfries and Galloway Conservancies, 1993-1994 (to 31 March 1994)

	Broadleaves		Conifers		Total
	Total (ha)	%	Total (ha)	%	All species (ha)
Scotland	9179	54	7736	46	16 915
Lothian and Borders	391	35	733	65	1 124
Dumfries and Galloway	250	21	949	79	1 199

the all Scotland statistics for the same period; these show that native broadleaves accounted for around half of the total area of new planting and restocking (Table 4.7).

There are no data available on the genetic origins of the stock used for the area of native species planted in the Lowlands over the past year. If the 632 ha planted in Lothian and Borders and Dumfries and Galloway Conservancies were mainly of native species and the planting was at the minimum density then required by the FA for full grant (1100

stems ha⁻¹), over half a million native trees will have been used.

Robinson and Ryder (1988) recorded that in 1987, 92% of the stock in Scottish nurseries was of non-Scottish origin. Although there is no clear presumption that native broad-leaved species need be of local origin stock, except perhaps on some ancient sites and for certain species (Forestry Authority, 1994), there is now at least one major nursery in the Lowlands which specialises in Scottish origin trees.

Chapter 5

Conclusions

The compilation of the statistics for this summary account of the native woodland resource in the Lowlands has involved the same range of difficulties as the last review (MacKenzie, 1987). These include having to use a wide range of survey sources, often with widely separate survey years and different methodologies.

However, since MacKenzie (1987), an important amount of new survey data has become available, particularly through additional SNH district field surveys, SNH and SWT habitat surveys and the completion of the provisional Ancient Woodland Inventory.

Analysis of all the data now available shows that the native woodland resource in the Lowlands is greater than previously recognised. The results in this report increase the estimated minimum area of genuinely native woodlands in the Lowlands to 16 681 ha – a 150% increase on the 1987 total of 6652 ha – and with clear indications that these natural origin woodlands may still be under-recorded in the Lowlands.

Although the loss of genuinely native woodlands appears to have been largely stopped since the late 1980s, many remain threatened by other factors or require management to improve diversity or promote regeneration. While there has been a significant increase in

the planting of native woodlands in the Lowlands over the past 5 years, this increase has been modest compared to the rest of Scotland. Native species have accounted for about 25% of all planting under the FC grants in the Lowland Conservancies compared to over 75% in Highland Conservancy in the year to 31 March 1993 (MacKenzie and Callander, 1995).

This report has incorporated, in comparison to MacKenzie (1987), data on the planted origin as well as natural origin native woodlands. Planted origin native woodlands account for 12 200 ha or 43% of the overall native woodland resource and currently consist mainly of oak, ash and elm.

The inclusion of planted origin as well as the genuinely native or semi-natural native woodlands in this report, reflects the greater recognition of the existing and potential value of some types of planted origin native woodlands. In particular, the landscape, amenity and historical importance of many old broadleaved plantations, often on ancient sites, is of significantly greater import in the Lowlands than in most other parts of Scotland. The development of an integrated perspective on the management of the overall native woodland resource safeguards and enhances the genuinely native woodlands while promoting the environmental and other values of all native woodlands.

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Appendix 1 Main areas of semi-natural woodland confirmed by field survey or site description

District	Total broadleaves (ha)	Woodland classification	Survey reference	Remarks
Banff and Buchan	398	Phase 1, NVC, Peterken Stand Type, Site description	Grampian Regional Council (1987); Hepburn (1991); Smith (1980-83); Coredata; SSSI citations	GRC habitat survey is the most comprehensive; Hepburn surveyed 5 woods (206 ha) using NVC; Smith surveyed 6 woods (136 ha) using Peterken Stand Type. SSSIs included.
Dunfermline	257	Phase 1, Site description	Perkins (1994); SWT (1992)	Perkins has information on 257 ha of semi-natural woodland; SWT have mapped most of the ancient woods (up to 112 ha).
Kirkcaldy	49	Phase 1	SWT (1992)	SWT have mapped most of the ancient woods (up to 49 ha).
NE Fife	126	Phase 1, Site description	SWT (1992); Coredata	SWT have mapped most of the ancient woods (up to 126 ha); 70 ha of semi-natural broadleaved woodland are recorded on Coredata; an SWT habitat survey is in progress.
Clackmannan	73	Phase 1, Site description	Perkins (1994); Coredata	Perkins has information on 70 ha; Coredata records 73 ha of semi-natural broadleaved woodland.
Falkirk	41	Phase 1	Coredata	No district survey; Coredata records 41 ha of semi-natural broadleaved woodland.
East Lothian	89	Phase 1	Coredata	No district survey; Coredata records 89 ha of semi-natural broadleaved woodland.
Edinburgh	10	Phase 1	Coredata	No district survey; Coredata records 10 ha of semi-natural broadleaved woodland.
Midlothian	86	Phase 1	Coredata	No district survey; Coredata records 86 ha of semi-natural broadleaved woodland.

Appendix 1 (continued)

Main areas of semi-natural woodland confirmed by field survey or site description

District	Total broadleaves (ha)	Woodland classification	Survey reference	Remarks
West Lothian	272	Phase 1	SWT (1993)	SWT have completed a survey with maps at 1 : 10 000 scale plus target notes and record 272 ha of semi-natural broadleaved woodland and 405 ha of dense and continuous scrub which includes birch regeneration.
Berwickshire	266	Phase 1	NCC (1976); Coredata	There is no recent district survey; Coredata records 266 ha of semi-natural broadleaved woodland; the 1976 NCC Phase 1 survey recorded 215 ha of semi-natural broadleaved woodland over 1 ha.
Ettrick and Lauderdale	238	Phase 1	NCC (1976); Coredata	There is no recent district survey; an SWT Phase 1 habitat mapping project is in progress; Coredata records 85 ha of semi-natural broadleaved woodland; the 1976 NCC Phase 1 survey recorded 238 ha of semi-natural woodland and scrub.
Roxburgh	239	Phase 1	NCC (1976); Coredata	There is no recent district survey; Coredata records 55 ha of semi-natural broadleaved woodland; the 1976 NCC Phase 1 survey recorded 239 ha of semi-natural woodland and scrub.
Tweeddale	42	Phase 1	NCC (1976); Coredata	There is no recent district survey; Coredata records 26 ha of semi-natural broadleaved woodland; the 1976 NCC Phase 1 survey recorded 42 ha of semi-natural woodland and scrub.
Clydebank	–	Phase 1	Clydebank District Council (1983); NCC (undated)	Kilpatrick's Project and the district council have some Phase 1 habitat survey information but no area data.

Appendix 1 (continued)
Main areas of semi-natural woodland confirmed by field survey or site description

District	Total broadleaves (ha)	Woodland classification	Survey reference	Remarks
Inverclyde	55	Phase 1	NCC (1992)	Inverclyde district habitat survey recorded 55 ha of semi-natural broadleaved woodland.
Renfrew	37	Phase 1	Coredata; NCC (1991c, 1991d)	12 woods surveyed in the Carts Project and a further 8 woods surveyed in the Mid Clyde project; no area data available. Coredata records 37 ha of semi-natural broadleaved woodland.
Clydesdale	540	NVC, Phase 1	NCC (1989b, 1990)	The Clyde Valley survey recorded 540 ha using NVC (record cards but no report); the Clyde-Calders habitat survey mapped some woods to Phase 1 (155 ha of semi-natural woods); an SWT habitat survey is in progress.
Cumbernauld and Kilsyth	87	Phase 1	NCC (1989/90)	The district habitat survey recorded 87 ha of semi-natural woodland; scrub (e.g. hawthorn and birch) also recorded but no area data available.
East Kilbride	161	Phase 1	NCC (1991b)	The East Kilbride habitat survey recorded 161 ha of semi-natural broadleaved woodland; 78 ha of scrub, which may include tree regeneration, were also recorded.
Hamilton	200	NVC, Phase 1	NCC (1990 and undated); Coredata	The Clyde Valley woodland survey recorded 162 ha using NVC (record cards but no report); the Clyde and Avon Project habitat survey recorded 722 ha of semi-natural broadleaved woodland, some of which will be in Hamilton district; 104 ha of scrub were also recorded; Coredata recorded 200 ha of semi-natural broadleaved woodland; an SWT habitat survey is in progress.

Appendix 1 (continued)
Main areas of semi-natural woodland confirmed by field survey or site description

District	Total broadleaves (ha)	Woodland classification	Survey reference	Remarks
Monklands	168	Phase 1	NCC (1989c)	The Monklands habitat survey recorded 168 ha of semi-natural broadleaved woodland.
Motherwell	80	NVC, Phase 1	NCC (1990); Forbes <i>et al.</i> (1983)	The Clyde Valley woodland survey recorded about 80 ha using NVC (record cards but no report); the district council survey recorded about 242 ha of semi-natural woodland in 1983 and there has been no change since then.
Strathkelvin	500	Phase 1	SWT (1990-92a)	The Strathkelvin district habitat survey records 500 ha of semi-natural broadleaved woodland plus 141 ha of dense scrub (excludes Campsie Fells).
Cumnock and Doon Valley	50	Phase 1	Coredata	Maps and target notes for the SNH Cumnock and Doon Valley habitat survey but no report. Coredata recorded 50 ha of semi-natural broadleaved woodland.
Cunninghame (excl. Arran)	55	Phase 1	Coredata	Coredata recorded 55 ha of semi-natural broadleaved woodland.
Glasgow	42	Phase 1	Coredata; NCC (1991e)	Coredata recorded 42 ha of semi-natural broadleaved woodland; NCC recorded woodland and scrub in the district habitat survey but no area data are available.
Bearsden and Milngavie	-	Phase 1	NCC (undated)	Some semi-natural woodland information is available in the Kilpatrick's Project habitat survey but no area data are available.

Appendix 1 (continued)
Main areas of semi-natural woodland confirmed by field survey or site description

District	Total broadleaves (ha)	Woodland classification	Survey reference	Remarks
Eastwood	104	Phase 1	NCC (1991a)	The Eastwood habitat survey recorded 104 ha of semi-natural woodland; a further 74 ha of scrub were also recorded.
Kilmarnock and Loudoun	–	Phase 1	SWT (1990-92b)	There is a Phase 1 habitat survey of the district but no area data are available.
Kyle and Carrick	314	Phase 1	Coredata, SWT	Coredata recorded 314 ha of semi-natural broadleaved woodland; maps and target notes by SWT are available for the northern half of the district, but no report or statistics completed.
Annandale and Eskdale	221	NVC	NCC (1989b)	12 woods (221 ha) were surveyed to NVC; record cards and maps but no report.
Nithsdale	427	NVC	NCC (1989b)	19 woods (427 ha) were surveyed to NVC; record cards and maps but no report.
Stewartry	643	NVC	NCC (1989b)	21 woods (643 ha) were surveyed to NVC; record cards and maps but no report.
Wigtown	662	NVC	NCC (1989b)	19 woods (662 ha) were surveyed to NVC; record cards and maps but no report.

Appendix 2 The main woodland classifications used in district field surveys

District	Area (ha)			
	NVC	Peterken Stand Type	Other	Phase 1
Banff and Buchan	206	b	–	192
Dunfermline	–	–	257	^a
Kirkcaldy	–	–	–	49
NE Fife	–	–	–	126
Clackmannan	–	–	70	3
Falkirk	–	–	–	41
East Lothian	–	–	–	89
Edinburgh	–	–	–	10
Midlothian	–	–	–	86
West Lothian	–	–	–	272
Berwickshire	–	–	–	266
Ettrick and Lauderdale	–	–	–	238
Roxburgh	–	–	–	239
Tweeddale	–	–	–	42
Clydebank	–	–	–	^a
Inverclyde	–	–	–	55
Renfrew	–	–	–	37
Clydesdale	540	–	–	^a
Cumbernauld and Kilsyth	–	–	–	87
East Kilbride	–	–	–	161
Hamilton	162	–	–	38
Monklands	–	–	–	168
Motherwell	80	–	–	162
Strathkelvin	–	–	–	500
Cumnock and Doon Valley	–	–	–	50
Cunninghame (excl. Arran)	–	–	–	55
Glasgow	–	–	–	42
Bearsden and Milngavie	–	–	–	^a
Eastwood	–	–	–	104
Kilmarnock	–	–	–	^a
Kyle and Carrick	–	–	–	314
Annandale and Eskdale	221	–	–	-
Nithsdale	427	–	–	-
Stewartry	643	–	–	-
Wigtown	662	–	–	-
Total	2941	b	327	3426
%	44	–	5	51

Other = structure and condition surveys.

^a Phase 1 surveys have been completed but data are not available.

^b Some woods also surveyed using Peterken system (Peterken, 1981).

Area data show a minimum figure as there are several surveys in progress or where survey material still requires analysis.

Appendix 3

The woodland resource in the Lowlands

Sources: land area (including inland water): Scottish Office (1991); woodland data: FC Census 1979-82 (district totals); semi-natural woodland data: Ancient Woodland Inventory and others (see Appendix 1)

District	Land area (km ²)	Total woodland area (ha)	% Land area	Total native species area (ha)	% Native broadleaves	% Scots pine of all conifers	% Native species of land area	Total semi-natural (ha)	% Semi-natural land area	% Semi-natural of total woodland	% Semi-natural in SSSIs
Banff and Buchan	1 533	9 978	6.5	1 130	68	24	0.7	844	0.6	8.5	16
Dunfermline	307	3 863	12.6	644	69	41	2.1	805	2.6	20.8	1
Kirkcaldy	251	1 702	6.8	484	70	34	1.9	463	1.8	27.2	0
NE Fife	761	7 258	9.5	1 382	62	49	1.8	806	1.1	11.1	13
Clackmannan	161	1 595	9.9	664	79	38	4.1	391	2.4	24.5	2
Falkirk	294	2 037	6.9	729	77	32	2.5	494	1.7	24.3	5
East Lothian	717	5 121	7.1	1 141	54	30	1.6	746	1.0	14.6	18
Edinburgh	264	1 269	4.8	485	55	36	1.8	144	0.5	11.3	9
Midlothian	361	3 212	8.9	618	45	17	1.7	725	2.0	22.6	18
West Lothian	428	4 072	9.5	850	62	14	2.0	290	0.7	7.1	23
Berwickshire	880	5 549	6.3	1 218	59	31	1.4	298	0.3	5.4	39
Ettrick and Lauderdale	1 366	15 372	11.3	1 248	59	6	0.9	225	0.2	1.5	39
Roxburgh	1 548	30 745	19.9	1 136	48	10	0.7	180	0.1	0.6	33
Tweeddale	904	15 289	16.9	1 002	63	10	1.1	35	<0.1	0.2	6
Clydebank ^a	511	2 846	5.6	458	91	5	0.9	503	1.0	17.7	8
Clydesdale ^b	2 364	8 895	3.8	2 740	77	4	1.2	1 874	0.8	21.1	29

Appendix 3 (continued)

The woodland resource in the Lowlands

Sources: land area (including inland water): Scottish Office (1991); woodland data: FC Census 1979-82 (district totals); semi-natural woodland data: Ancient Woodland Inventory and others (see Appendix 1)

District	Land area (km ²)	Total woodland area (ha)	% Land area	Total native species area (ha)	% Native broadleaves	% Scots pine of all conifers	% Native species of land area	total woodland	Total semi-natural (ha)	% Semi-natural land area	Semi-natural of total woodland	% Semi-natural in SSSIs
Cumnock and Doon Valley	805	13 586	16.9	636	62	2	0.8	4.7	690	0.9	5.1	10
Cunninghame ^c	449	1 828	4.1	1 053	75	23	2.3	57.6	237	0.5	13.0	22
Glasgow ^d	356	1 211	3.4	734	79	19	2.1	60.6	211	0.6	17.4	19
Kilmarnock and Loudoun	375	5 432	14.5	554	69	2	1.5	10.2	187	0.5	3.4	0
Kyle and Carrick	1 338	21 973	16.4	1 473	60	3	1.1	6.7	1 606	1.2	7.3	13
Annandale and Eskdale	1 563	33 855	21.7	1 118	56	3	0.7	3.3	668	0.4	2.0	11
Nithsdale	1 441	23 233	16.1	1 457	60	4	1.0	6.3	1 947	1.4	8.4	14
Stewartry	1 691	44 726	26.4	1 632	61	3	1.0	3.6	1 348	0.8	3.0	24
Wigtown	1 730	32 415	18.7	1 363	56	3	0.8	4.2	964	0.6	3.0	8
Total	22 398	297 062	13.4	25 949	56	8	1.2	8.5	16 681	0.7	5.5	16

^a Includes Inverclyde and Renfrew districts. The native species area is an estimate as the FC Census amalgamated these districts with Dumbarton district.

^b Includes Cumbernauld and Kilsyth, East Kilbride, Hamilton, Monklands, Motherwell and Strathkelvin districts.

^c Excludes Arran.

^d Includes Bearsden and Milngavie and Eastwood districts.

All FC totals exclude 'clumped woodland' (4135 ha) which are not available in the district tables of the FC Census.

Appendix 4

The native woodland resource in the Lowlands: species composition (areas in ha)

Source: FC Census 1979-82

District	Birch	Oak	Ash	Alder	Hazel	Willow	Elm	Other broadleaves ^e	Total
Banff and Buchan	722	188	22	26	3	31	31	107	1 130
Dunfermline	377	119	17	17	1	11	16	86	644
Kirkcaldy	291	94	12	13	1	9	12	52	484
NE Fife	772	273	77	36	2	26	50	146	1 382
Clackmannan	329	150	19	9	17	2	26	112	664
Falkirk	349	174	21	10	18	2	31	124	729
East Lothian	237	319	185	3	40	1	159	197	1 141
Edinburgh	111	136	70	1	15	0	71	81	485
Midlothian	143	190	102	2	17	0	72	92	618
West Lothian	196	208	144	3	31	0	103	165	850
Berwickshire	263	352	191	4	43	1	145	219	1 218
Ettrick and Lauderdale	312	313	208	3	41	1	147	223	1 248
Roxburgh	234	320	201	3	40	1	132	205	1 136
Tweeddale	238	248	141	4	49	1	102	219	1 002
Clydebank ^a	1 430	693	79	41	74	9	119	510	2 954
Clydesdale ^b	1 312	649	79	37	66	7	119	471	2 740
Cumnock and Doon Valley	147	174	97	2	20	0	72	124	636
Cunninghame ^c	507	245	31	15	26	3	45	181	1 053
Glasgow ^d	350	175	21	10	18	2	32	126	734

Appendix 4 (continued)

The native woodland resource in the Lowlands: species composition (areas in ha)

Source: FC Census 1979-82

District	Birch	Oak	Ash	Alder	Hazel	Willow	Elm	Other broadleaves ^e	Total
Kilmarnock and Loudoun	271	126	16	8	14	1	22	96	554
Kyle and Carrick	329	409	226	5	60	1	143	300	1 473
Annandale and Eskdale	242	331	120	4	45	1	89	286	1 118
Niithsdale	304	536	162	5	59	1	121	269	1 457
Stewartry	314	636	223	5	57	1	122	274	1 632
Wigtown	364	439	208	3	39	1	107	202	1 363
Total	10 144	7 497	2 672	269	796	112	2 088	4 867	

^a Comprises the districts of Clydebank, Inverclyde, Renfrew and Dumbarton, which have been amalgamated in the FC Census. Totals therefore differ slightly from those in the text and in Appendix 3.

^b Includes Cumbernauld and Kilsyth, East Kilbride, Monklands, Motherwell and Strathkelvin districts.

^c Excludes Arran.

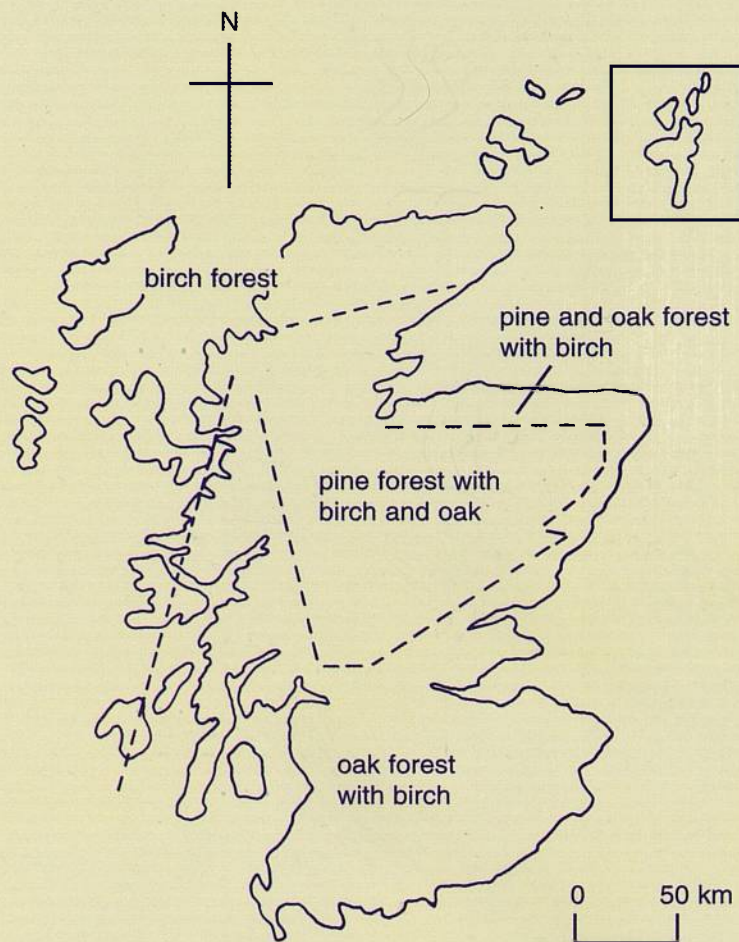
^d Includes Bearsden and Milngavie and Eastwood districts.

^e Other broadleaves: refers to undefined areas of species which were not listed in the principal species categories and includes alder, willow, hazel, hawthorn, cherry and non-native lime, horse chestnut and hornbeam.

Abbreviations used in the text

AWI	Ancient Woodland Inventory
FA	Forestry Authority
FC	Forestry Commission
FE	Forest Enterprise
GRC	Grampian Regional Council
NCC	Nature Conservancy Council
NVC	National Vegetation Classification
OS	Ordnance Survey
RSPB	Royal Society for the Protection of Birds
SNH	Scottish Natural Heritage (formerly NCC)
SOAEFD	Scottish Office Agriculture, Environment and Fisheries Department
SSSI	Site of Special Scientific Interest
SWT	Scottish Wildlife Trust
WGS	Woodland Grant Scheme

The natural distribution of Scotland's main native forest types prior to the major effects of human intervention. The remnants of Scotland's natural woodlands and also planted origin native woodlands reflect a similar pattern today. Scotland's existing native woodlands are important as a unique natural habitat and for the many other environmental, economic and social benefits they provide.



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