Forestry in Caithness and Sutherland

A Context Analysis

Consultant: Rob Mc Morran and Jeremy Milne, Centre for Mountain Studies, UHI-Perth College

Table of Contents

1. Introduction

The Scottish Forestry Strategy 2006 (SFS) sets out to define the role of forestry in the sustainable development of Scotland's economy. Forestry now operates in a very wide context and by its nature as a multi-purpose land use has the potential to form links between several major Government strategies including those related to sustainable development, renewable energy, biodiversity, health and education. The cross-cutting nature of forestry is reflected in the organisation of the SFS into seven key themes: climate change; timber; business development; community development; access and health; environmental quality; and biodiversity.

Forestry in Caithness and Sutherland is often associated with the negative environmental impacts of the establishment of coniferous forests in the Flow Country. However, while this is clearly an issue of considerable importance, forestry in the region also has a much wider range of positive interactions as a land use and as a community resource.

This report is based on a review of relevant literature, web resources, and consultation with people involved with forestry and related activities in the area (see Appendix 1). A number of case studies of relevant local initiatives were carried out as part of the work and summaries of a selection of these are presented throughout this report. The key objectives of this report are:

1) To briefly clarify the policy and environmental contexts for forestry in Caithness and Sutherland.

2) To identify the existing contributions of forestry in Caithness and Sutherland and the key opportunities for the development of this land use in the future in terms of delivering the SFS across the counties

3) To act as a base for informing any update of the Highland Forest and Woodland Strategy and the development of the new Highland Local Development Plan.

1.1 The wider policy context for forestry in Caithness and Sutherland

The Scottish Government Strategic Objectives, National Outcomes and National Indicators include a range of relevant goals for forestry, including:

- Reducing the nations 'ecological footprint'
- Increasing to 95% the amount of designated sites in favourable condition
- Increasing the number of adults who visit the outdoors regularly
- Generating 50% of electricity from renewables by 2020 (interim target of 31% by 2011)
- Increasing the rate of new house building and the sustainability of house building (which can be partly achieved through the use of Scottish timber in housing)

Scotland's Sustainable Development Strategy sets out a set of five key principles, all of which are relevant to forestry: the promotion of good governance; living within environmental limits; achieving a sustainable economy; ensuring a strong healthy and just society; and using sound science. A review of progress of this strategy in 2007 highlighted key points to be improved upon, including the greater integration of economic development within the wider aims of sustainable development and reducing greenhouse gas emissions.

Recent Scottish agricultural policy (A Forward Strategy for Scottish Agriculture, 2001 and Next Steps 2006) has emphasized the importance of agricultural diversification, contributing to rural development and protecting and enhancing biodiversity and the environment. These aims are reflected in the Scottish Rural Development Programme, which focuses on developing sustainable land use systems and addressing market failures through farm business development and diversification. The Committee of Inquiry into the Future of Scotland's Hills and Islands (Royal Society of Edinburgh 2008), recently highlighted widespread declines in the numbers of livestock being farmed in rural areas, with approximately 197,000 ewes being removed from grazing in the Highland and Islands Conservancy alone - equivalent at minimum stocking densities, to the release of 23,600ha of land from grazing. These reductions represent the result of changes in the EU Common Agricultural Policy[1] (CAP), which allow farmers to reduce stocking densities while continuing to receive the Single farm payment (SFP). From a forestry perspective, such reductions in grazing, combined with the policy emphasis on farm diversification, present clear potential for woodland expansion, the regeneration of native woodland and the integration of forestry with agriculture. Reductions in domestic grazing stock may result in a corresponding increase in deer browsing pressure, with associated increased requirements for protection of woodlands through deer management and/or fencing.

The over-arching vision and key objectives for forestry in Scotland are set out in the Scottish Forestry Strategy (2006). The SFS outlines a key vision for forestry in Scotland:

By the second half of this century, people are benefiting widely from Scotland's trees, woodlands and forests, actively engaging with and looking after them for the use and enjoyment of generations to come. The forestry resource has become a central part of our culture, economy and environment.

The strategy is underpinned by the key principle of sustainable forest management, reflecting international and European forestry policy. The three key outcomes of the strategy are envisaged as: improved health and well-being of people and their communities; competitive and innovative businesses contributing to economic growth; and high quality, robust and adaptable environments. The SFS also includes a key aspirational target of expanding the current woodland area in Scotland from an existing 17% to 25% by the second half of the 21st Century.

Three further areas of policy of specific relevance to forestry in Caithness and Sutherland are the Highland Forest and Woodland Strategy (HFWS), the Scottish Government's rationale for woodland expansion and the Caithness and Sutherland Peatlands Management Strategy. The HFWS is centred on developing a multifunctional and sustainable forestry sector and is based on six key principles:

• *increasing the community benefit from forestry and woodlands;*
• *identifying opportunities for forest and woodland expansion compatible with other interests;*
• *improving existing forests and woodlands to enhance forestry's contribution to the economy and environment of Highland;*
• *working with partners to address economic and infrastructure issues;*
• *retaining and enhancing the level of funding for forestry in Highland*

The specific themes which are highlighted within the strategy as being most suitable for targeted funding reflect these principles and outlined in Table 1 below.

[1] It is also possible that some of this apparent decline may be linked with the fact that decoupling has removed the incentive to over-report stock numbers.

Table 1 Key themes advocated by the Highland Forest and Woodland Strategy as being suitable for targeted funding

1. Measures to increase community benefits from forests. There is increasing recognition of the important role that local communities/partnerships offer through the management of the forest and woodland resource in securing both local and wider socioeconomic and environmental gains, expansion and development of woodlands around Settlements and crofter forestry.
2. Enhancement of the region's attractiveness for tourism and recreation through woodland development – including enhancement of tourist routes, archaeological sites, and paths; forest design improvements and establishment of woodland interpretive centres.
3. Expansion of native woodland, particularly in areas of higher natural heritage value or important areas for recreation – via development of forest habitat networks and implementation of LBAP's, area initiatives such as Sunart Oakwoods, and schemes to reinstate and expand riparian, tree-line, and coastal woodland.
4. Expansion of productive forest – both in terms of establishing new woodlands geared to timber production in the less-constrained areas of the region and improvement of the species range and timber quality of specific species in certain broad locations.
5. Improvement of the infrastructure for forestry and local processing – identification of priority road and bridge improvements, opportunities for increased rail and ship usage for timber transport, and development of local processing capacity and woodfuel supply chains.

The Environmental Impact Assessment (forestry) (Scotland) Regulations 1999 apply to afforestation proposals of any significant size[2]. These include that potential afforestation proposals be assessed in terms of their cumulative impacts (i.e impacts of proposals in a wider (regional/national) context which relate to issues such as (for example) the wider landscape and potential affects on movement of deer populations). The HFWS (which is currently due for revision) and **any future indicative forestry strategy for the region represents a framework within which potential cumulative impacts of proposals can be assessed, as well as facilitating the identification of key opportunities for forestry at the strategic level** (e.g. forestry proposals which complement and enlarge habitat networks within the region). The regulations also apply to woodland removal.

The Caithness and Sutherland Peatland strategy is centred on promoting land management which benefits the region's valuable extensive peatland habitats, as well as creating greater awareness around these habitats and encouraging community and economic development which is compatible with safeguarding the region's peatlands. Objective 2 of the strategy is specifically concerned with sustainable woodland management and achieving an appropriate balance between woodlands and peatlands across Caithness and Sutherland. Specifically the strategy recognises that restructuring of existing forests, along with appropriate enhancement and extension of native woodland areas, has the potential to contribute significantly to the environmental, economic and social value of the region's peatlands. Specific actions within the strategy which are seen as required to address objective 2 include (among others):

- Providing clear guidance on the location and type of woodland that might be appropriate in and around the peatlands.
- Developing guidelines on appropriate forestry restructuring and clearance, and developing incentives and mechanisms to enable these to be implemented.
- Developing modelling to identify areas where creation of new woodland would have maximum natural heritage benefits.
- Promoting the development of wood fuel and other local timber markets.

[2] An EIA determination is made by FCS for afforestation proposals of 5ha or above. In the case of the proposal being in an AONB, National Park or NSA this threshold is reduced to 2ha. For details of EIA requirements for forestry projects see: http://www.forestry.gov.uk/pdf/EIAGeneral09.pdf/$FILE/EIAGeneral09.pdf

A further area of policy of relevance to forestry in Caithness and Sutherland is the Scottish Biodiversity Strategy (2004), which has the key aim of: 'conserving biodiversity for the health, enjoyment and wellbeing of the people of Scotland'. Specific measures include halting biodiversity loss, reversing previous losses and increasing awareness, enjoyment and understanding of biodiversity. The Nature Conservation (Scotland) Act (2004) also places a statutory duty on all public bodies to further the conservation of biodiversity. Caithness and Sutherland is also a relatively heavily designated region, with almost half of the total land area designated as SSSI (see Appendix 2), with many of these designations relating to the presence of blanket bog habitats. The 1992 EU Habitats and Species Directive also recognised both active raised bog and blanket bogs as habitats of EU interest requiring priority conservation measures, resulting in many of these areas also being designated as Special Areas of Conservation (SACs). Furthermore, under the UK Biodiversity Action Plan (which defines blanket bogs (and various other peat dominated habitats) as priority habitats for conservation regardless of designation) the Blanket Bog Habitat Action Plan seeks to restore 75% of blanket bog which is currently degraded, with the aim of this 75% being in or approaching favourable condition by 2015 (requiring the restoration of both designated and undesignated blanket bog habitats). In relation to designated sites across Scotland the Scottish Government's performance indicators also include a target of increasing the proportion of designated sites in favourable condition to 95% by end 2010 (a target which is likely to be extended).

The climate change mitigation agenda has also become increasingly dominant in recent years, with the Climate Change (Scotland) Bill currently under development. A key target for Scotland, is the reduction of Scottish greenhouse gas emissions by 80% by 2050, with the further development of renewable energy envisioned as playing a major role in this. The forthcoming Renewable Heat Strategy also has an indicative target of 11% of heat coming from renewables by 2020, with the bulk of this anticipated as being generated from biomass. To support renewable heat the implementation of this strategy will also involve either a Renewable Heat Obligation Certificate or a Renewable Heat Incentive scheme. Forestry is recognised within the SFS as having a significant role to play in mitigating climate change through achieving reductions in atmospheric CO_2. This can be achieved through both the absorption and storage of atmospheric CO_2 by living trees (carbon sequestration) and by providing a carbon-neutral alternative to existing fossil fuels (woodfuel). The role of forestry in delivering the Scottish Government's climate change mitigation agenda is clarified in Forestry Commission Scotland's Climate Change Action Plan (2009-2011)[3] and in the 2009 review report 'Combating climate change – A role for UK forests'[4]. This climate change action plan emphasizes the potential for forestry and forest expansion to contribute to tackling climate change and provides a basis for acting on a number of measures, including:

- Protecting and managing existing forests through sustainable forest management, conserving carbon stocks, and minimising woodland removal;
- Creating new woodland to capture carbon, produce wood and help adaptation;
- Adapting to climate change by planning and managing forests in a way that minimises future risks from climate change, for example through the creation of forest habitat networks, and using different timber species, including hardwoods, or silvicultural systems;
- Promoting the use of sustainably produced wood for energy and construction;
- Reducing the forestry sector's carbon footprint – particularly through the minimisation of roundwood road miles and the promotion of localised timber processing and use;

[3] See: see: http://www.forestry.gov.uk/ccapscotland and for
[4] See: see: http://www.forestry.gov.uk/forestry/INFD-7Y4GN9

While clear opportunities exist for further forest and woodland expansion in Caithness and Sutherland, the conservation importance and carbon sink values of the region's extensive peatland habitats necessitate a strategic approach (see sections 3.1 and 3.2). Specifically, current Scottish Government[5] and FCS guidance suggests woodland establishment is best focused away from areas of deeper peat (>50cms) and that woodland establishment proposals on sites of shallower peat should be carefully considered with respect to the overall size of the peatland area in question and the possible hydrological connectivity of the site to other areas of deeper peat[6].

The key economic drivers for forestry development more widely include the current global economic crisis and recent peaks in food and energy prices. Within Scotland these pressures have resulted in a slow down in house building and knock on effects for the construction industry, as well as increased unemployment more widely, higher fuel bills and increasing fuel poverty. Due to the links between the construction industry and forestry and the global nature of timber markets, these factors are likely to result in a depressed market for some timber products in the short to medium term. However, global recession has also led to a lowering of the relative value of sterling as a global currency, resulting in the wider use of home grown timber, with this factor also increasing the relative attractiveness of timber produced in the UK to overseas markets. Overall, despite significant constraints, timber prices are presently increasing gradually, with small roundwood prices particularly benefitting from expansion of the subsidized woodfuel sector. Furthermore, despite a decline in property (housing) markets, forest property values have increased significantly in recent years as investors increasingly view land and forestry as a comparatively secure investment.

From a societal perspective, increased unemployment and the increased difficulties in acquiring mortgages are likely to result in growing pressures being placed on available social housing and rented accommodation. Forestry and forest-linked industries offer considerable opportunities to combat such pressures, with the increased demand for timber in construction and cost-effective and environmentally friendly energy in particular, representing a source of market demand for an emerging woodfuel industry. Furthermore, developments such as the National Forest Land Scheme (which has made forested land more widely available for purchase by Scottish communities) represent key opportunities for communities to take innovative approaches to supplying low cost housing needs.

1.2 The environmental context for forestry in Caithness and Sutherland

Climatic and soil related factors represent fundamental key influences on the nature of forestry across Caithness and Sutherland. Highly productive brown earth soils are rare, with the southern parts of the region characterised by a complex pattern of low fertility podsols and ironpans on the mid-slopes and hill tops, low fertility peats in hollows and on flatter ground in the uplands and very fertile gleys beside watercourses and in flushes. To the north, extensive areas of unflushed peat support internationally important blanket bog habitats which are unsuitable for forestry development due to their conservation importance, while areas of very low soil fertility are likely to be unsuitable for timber crops. Areas of shallow peat and mineral soils are generally those best suited to forestry where timber production is a primary objective, with the kyles and straths representing the most fertile and productive parts of the region. As semi-natural native and/or amenity woodlands are generally less dependant on soil productivity, the opportunities for the establishment of these woodland types are significant throughout many parts of the region.

[5] See: The Scottish Government's Rationale for Woodland Expansion at: http://www.forestry.gov.uk/pdf/ForestExpansion.pdf/$FILE/ForestExpansion.pdf

[6] As outlined in the FCS Guideline Note: *Forests and Peatland Habitats.* July 2000: http://www.forestry.gov.uk/pdf/fcgn1.pdf/$FILE/fcgn1.pdf

The region has a generally warm and wet maritime climate affected by strong west and south-westerly winds and a short growing season. Western and northern parts of the region are particularly windy, due to their exposure to the atlantic and closeness to the passage of areas of low pressure. Annual rainfall varies from 700 mm in the east to more than 2000 mm in the west. The combination of poor soils and a wet and windy climate, constrains the potential for forestry development, with the distribution of and approach to management of the regions forests heavily influenced by these factors. Specifically, conventional forestry planting in the region has predominantly consisted of self-thinning mixtures, which in the past have generally consisted of Sitka spruce and lodgepole pine, with the spruce eventually shading out the initially faster growing pine.

Current climate change predictions[7] suggest the region is likely to experience modest increases in annual mean daily temperature and winter precipitation and modest decreases in summer precipitation and mean wind speed (Broadmeadow 2000, See Appendix 3 for temperature and moisture deficit map). The lengthening of the growing season, coupled with the fertilisation effect associated with the projected rise in concentration of atmospheric CO_2, should contribute to increased levels of productivity in the region. Climate change is also likely to result in drier soils in parts of Caithness and Sutherland, which can lead to improved soil fertility, increased productivity and increased windfirmness. However, the opportunities for forestry may be counterbalanced by an increased incidence of extreme wind (storm) events, particularly in winter months, and possible increases in disease and pest incidence (Broadmeadow 2008, Ray 2005 and 2008). An increase in winter precipitation and increased likelihood of heavy rainfall (flood) events could also result in increasing soil instability which could increase the windthrow risk further.

Predicted climate change scenarios should facilitate growth of a broader range of broadleaved and more sensitive tree species. Downy birch is likely to remain the dominant broadleaved species in the east, although sycamore may replace some of the birch in the west over the next 50 years (Broadmeadow, Ray 2005). Productivity of Sitka spruce is also predicted to increase in the east. However, a combination of increased soil moisture deficits and heavier winter rainfall is likely to exacerbate water stress issues and increase drought cracking, potentially significantly reducing the value of spruce crops. Furthermore, more rapid growth of spruce crops may result in a decrease in timber strength thereby further restricting the marketability of timber crops. Conversely, growing conditions for Scots pine are likely to become generally more favourable, particularly in the northeast of the region.

To develop forest resources in the region in the future which have the capacity to adapt to climate change, the use of a wider range of species (and a wider range of genetic material within a species) can be used to increase stand and forest resilience to climate change and, where feasible, long-term low-impact silvicultural systems (LISS) are likely to offer significant opportunities (Ray 2008).

1.3 The forest resource of Caithness and Sutherland

In Caithness and Sutherland, the vast majority of forest planting which occurred in the 1960's, 70's and 80's was in the form of non-native conifer forests, which now dominate the region's forest resource. The overall amount of new planting in the region has declined since 1990, with the proportion of non-native conifers within the total planting having also declined

[7] For current Scottish-wide climate change trends and predictions see: *A handbook of climate change trends across Scotland* (SNIFFER) at http://climatetrendshandbook.sccip.org.uk/; The UK Climate Impacts programme *UKCIP02 Scientific Report* (climate change scenarios report) http://www.ukcip.org.uk/index.php?option=com_content&task=view&id=353&Itemid=408; (note that Revised climate change projections (UKCP09) will soon be published); and the Forestry Commisson's 2005 Information Note: *Climate Change and British Woodlands* at: http://www.forestry.gov.uk/pdf/fcin069.pdf/$FILE/fcin069.pdf

steadily since 1992, from 96% of total planting in the 1988-1992 period, to 27% in 1993 (the remainder being 33% Scots pine and 40% native broadleaves) and from 2001 onwards the vast majority of new planting has been of native trees (including Scots pine). Since 1989 a total of 10178 ha of native broadleaves and 3393 ha of Scots pine have been planted in the region. As a result of these changing priorities and regional variability in environmental conditions, the existing forest resource in Caithness and Sutherland is varied geographically. South west Sutherland is by far the most diverse, with mixed coniferous woodland and a number of important Native Pinewoods supplemented by new pinewoods and other native woodlands planted using trees of suitably local origin. Woodlands in Caithness and central Sutherland are predominantly coniferous and the west coast is dominated by scattered birchwoods set in rugged landscapes. A number of large native woodland schemes have been established in the west, particularly on common grazings.

Forestry Commission Scotland (FCS) currently manage a total of 33,325 hectares of stocked forest in Caithness and Sutherland, of which 97% is conifer forest. Private forests cover a further 39,524 hectares, of which 83% is conifer forest, the majority of which is at a younger growth stage than the state owned forestry in the region. Much of the forest cover in the region was planted with timber production as an objective; however, due to the distance from market of many of these forests, the future viability of timber production from these resources will be significantly influenced by the development of local/regional markets for timber/wood products. Forests and woodlands in the region also provide a range of functions other than timber production, including acting as a recreational resource. The overall proportion of semi-natural woodland in the region is low, although in recent years riparian broadleaved woodland has expanded in a modest way and almost 3,000 hectares of productive forests have been permanently removed as part of a restructuring process in the peatlands. Recent high rates of grant for new planting (associated with carbon sequestration objectives) have also resulted in continuing private sector afforestation across the region more widely. Appendix 4 shows a map of forest and woodland cover and ownership for Caithness and Sutherland.

2. Key opportunities for forestry in Caithness and Sutherland

2.1 Timber production

The two most critical factors influencing the current and future economic viability of timber production in Caithness and Sutherland are the distance to market and the final price per tonne received for timber products. Currently, many areas of the national forest estate in Caithness and Sutherland are in the productive stage, while the majority of private sector forests, due to differences in the timing of planting, have either not yet reached the productive stage or they are only beginning to enter it[8]. The timber output from the region is therefore predicted to increase considerably within the next 5-10 years. Timber flow predictions for the Highland and Islands conservancy show a continual increase in timber outputs from 1,180,924 tonnes a year for the 2007-2011 period, to over 1.4 million from 2012 and reaching 1.8 million during the 2022-2026 period (See Appendix 5). Specific predictions for the flow country show an annual output increase from 40,000 tonnes in 2009 to over 90,000 tonnes for the 2010-2016 period (see Appendix 5). Importantly, these figures are based on the FCS 2007 production forecasts (under revision for 2011) and the private data used within them can be considered as incomplete[9].

[8] Private sector crops are estimated to lag behind FCS crops somewhat in terms of their overall maturity, but by no more than 5-10 years in most cases.

[9] Previous work by the HTTG has shown that surveys of private forest owners generally only reveal a proportion of what the private sector may (or may not) be supplying at present. Private sector forecasts are therefore generally more difficult to achieve and delivery against developed forecasts is also less certain than for public sector forests.

As a result of the timing gap between private and state sector planting, the development of downstream forestry industries have, thus far, been predominantly developed as a result of state forestry activities. The primary markets for timber products produced in the region are currently to the south or overseas, with sawmills in and around Inverness of prime importance. No large-scale markets for either sawlogs or lower grade timber products, currently exist within the region., Further opportunities exist for localised sawing and processing of timber, particularly at small to medium scales (see section 2.3). Given the increasing role of the private sector in relation to timber production in the region in future years, the development of accurate production forecasts for private sector forests represents a major opportunity to support and influence future industry investment decisions.

Allowing for sufficient market development therefore, timber production remains an economically viable and sustainable option in the region. Considerable opportunities exist for the development of the sector. Opportunities continue to exist for increasing the viability of timber production by planting and replanting of high productivity species, such as improved Sitka spruce, on suitable sites. Such approaches offer potential for ensuring efficient usage of the limited area of land available, as well as contributing to climate change mitigation (through both carbon sequestration and the potential for substitution of fossil fuels and energy intensive materials with wood products) over a relatively short timescale. The greatest benefit from all forms of market development and positioning is likely to be achieved where this occurs in conjunction with long-term decisions on restocking, forest expansion and forest restructuring across the region.

2.2 Woodfuel

Woodfuel is a renewable energy source that has the potential to deliver many economic, social and environmental benefits. Woodfuel can be obtained in three main forms; logs; wood chips derived from residues of forest operations, forest thinnings, other low-grade roundwood and new agricultural crops such as short rotation willow coppice; and wood pellets, which are made by compressing sawdust and wood shreds produced in sawmilling or manufacturing. The main environmental benefits of woodfuel arise from the fact that energy derived from burning wood is broadly carbon neutral and it often substitues for fossil fuels. The amount of CO_2 released into the atmosphere when wood is burned is approximately equivalent to the amount of CO_2 that was absorbed as the tree grew. By replanting trees to replace those that are burned, the net amount of CO_2 added to the atmosphere is reduced to a minimum. Woodfuel therefore offers significant potential to contribute to climate change mitigation.

The development of a woodfuel industry also has the potential to improve the economics of woodland management by adding value to lower grade timber by converting it to forms available for burning for energy.

The benefits of woodfuel are likely to be greatest in remote areas where a significant proportion of the population lives in settlements that are not connected to the national gas supply. This results in fuel for heating needing to be transported into these areas in solid or liquid forms at significant extra cost. As Appendix 6 shows, existing heat demand in Caithness in Sutherland is high and concentrated around key population centres. This high demand for heat energy in northerly areas like Caithness and Sutherland, coupled with the extra cost, can lead to financial difficulties for many people, or ‘fuel poverty’. Potential increases to the price of oil in the future are likely to exacerbate this situation if no alternative fuel sources are developed.

Major potential demand is likely to exist for woodfuel across Caithness and Sutherland, due to the high heat demand and requirements for environmentally friendly energy. Futhermore, this area of market and industry development **potentially represents a considerable opportunity for supporting the long term sustainability of forestry in the region**. A growing interest in woodfuel is apparent among domestic users and owners of larger public and community buildings. For example, woodfuel boilers have been installed at the shared

FCS, SNH abd SGRPID offices at Golspie. The use of pellet boilers and stoves is also on the increase throughout the highlands[10].

Despite the apparent opportunities, significant constraints also exist for any emergent woodfuel industry in the region. In particular, the cost base for the raw material (woodfuel) is rising as demand increases for woodfuel (from both new and existing users) and the involvement of large international companies (such as BALCAS. Furthermore, certain limitations on supply do exist and any future developments within the woodfuel sector will be required to carefully assess their long term requirements in terms of the availability of raw material. A key factor in strengthening the viability (and profitability) of emerging woodfuel businesses is likely to be their ability to acquire raw product as close to source as possible and using trees other than spruce (such as lodgepole pine). In order to minimise costs and the overall carbon footprint of woodfuel, the most efficient model for building a woodfuel industry is to establish a network of suppliers that are close to both their timber source and markets.

Existing woodfuel suppliers located in the region include Almac Chipping Ltd at Wick, Dunrobin Sawmill at Golspie and EcoHeat at Lyth. Wood pellets are also produced by the new Balcas CHP plant at Invergordon (Case Study 1), which has increased confidence in longer-term supply. The increased availability of mobile sawmilling equipment has also opened up considerable opportunities for cost-effective fuel log production.

Case Study 1 - Balcas CHP and wood pellet manufacturing plant: The Northern Ireland based company Balcas which is already the UK's largest supplier of wood pellets, has recently developed a new facility at Invergordon. This £31 million biomass development includes a CHP plant generating an estimated 5 Mw per annum that will be sold to the national grid and also a wood pellet manufacturing unit producing 100,000 tons of pellets per year. The plant is expected to utilise 320-350,000 tons of wood per year, half from sawmill residues and half from small roundwood. Roundwood will be sourced from within a 50-60 mile radius of the plant though there is potential to extend this radius if the cost of timber make it viable to do so. It is expected that this new facility will provide a substantial market for low grade timber and small roundwood from Caithness and Sutherland.

The technology for small-scale energy generation from wood is developing fast; however, there is currently a shortage of accredited technicians to install and maintain this equipment (no accredited biomass technicians are listed on the Scottish Governments list of accredited installers within Caithness and Sutherland). As biomass installations must be carried out by accredited installers to be eligible for grant support, a crucial element of the development of the woodfuel sector is the provision of further training[11] to generate the required expertise and number of accredited woodfuel technicians.

2.3 Added Value and Niche Markets

A major constraint for forestry in Caithness and Sutherland is the lack of local timber processing facilities, with timber generally transported south to processing facilities in and around Inverness. As unprocessed timber is a low value product, the costs associated with such transport often result in economic viability being difficult to achieve. However, significant further capacity for local use of timber exists, with localised processing and timber engineering potentially representing a major opportunity to add value to the product, with associated benefits in terms of transport and carbon emissions, jobs and local economies. Due to environmental constraints limiting the consistent production of high quality sawlogs in

[10] While larger public buildings are well suited to automated hopper-fed wood chip boilers, the domestic market is more suited to the use of pellets that can be easily packaged for household use. For existing houses the simplest way to convert to woodfuel is often through the installation of high efficiency log burning stoves.

[11] Training courses have been run in Caithness and Sutherland in the past with support from the Scottish Biomass Support Scheme. 'Ignite Wood Fuel Training' is the first and only accredited woodfuel training scheme in the UK and offers an intensive three day course. These course have previously been run in Ullapool and Lairg in 2007 and are ongoing, being run at different locations across the UK.

the region, the development of a local modern, industrial scale sawmill is unlikely. Opportunities for such a development may exist further south, such as at Invergordon; however, opportunities for adding value by processing locally do exist at other scales.

Specifically, development of wood chip supply chains for the wood fuel industry can be supported by the co-development of additional markets for wood chip, such as wood chip cattle corrals footpaths and equestrian facilities (with wood ships already being marketed within the region for these purposes). **There are also opportunities for smaller scale sawmills, producing products predominantly to supply agricultural markets (e.g. pallets, fence posts and cladding) to develop in the area.** Particularly, where these are linked to community groups there are significant sources of funding available to start-up new businesses. Modern portable/mobile sawmills (which can be relatively large scale) can also allow woodfuel to be cut on site, allowing for considerable cost savings and viable woodfuel production at relatively small scales. The acquisition of forest resources or working in partnership with existing forest owners is likely to provide significant advantage to such initiatives in terms of acquiring a low-cost consistent supply of raw material.

The **promotion of the use of home-grown timber in the construction industry is a further potential regional growth market for forestry products with significant associated environmental benefits.** The use of local timber to develop timber flooring and cladding (utilising spruce as well as larch) also offer potential for development, particularly as the timber specifications for such products are less stringent than for general construction. Particular opportunities are also presented by the development of new engineering solutions in timber processing and construction methods, which allow for the use of lower grade timber in construction.

2.4 Farm, community and crofter forestry

2.4.1 Farm and crofter forestry

Considerable scope exists for further expansion and integration of woodland on more marginal farmland in suitable areas in Caithness and Sutherland, in line with changes to the CAP and a current move away from sheep grazing in Northern Scotland. The forest types with most potential for establishment on farms and crofts and with available grant support are biomass plantings (particularly short rotation forestry) and native woodlands, with some scope for productive conifer crops. Tree planting or regeneration is unlikely to occur on better quality land as this is a regionally limited resource and of greater value when used for other purposes. Certain areas of marginal land are also likely to be unsuitable for biomass planting for natural heritage reasons or due to the continued presence of low densities of grazing stock. Tree planting also represents an important opportunity to improve wider farm management, with the development of shelter belts in particular potentially improving conditions for livestock.

Case Study 3 Sandy Murray, Crofter: Sandy Murray took over his father's croft in 1976, which now totals 300 hectares, 90ha of which is planted with trees; 25 ha of conifer forest, 20 ha planted for Christmas trees and the remainder planted with native woodlands. The Christmas trees are the single most important commercial aspect of Sandy's crofting business, comprising some 10-15% of turnover. Sandy expects the conifer forests to be an important source of income to the croft in the future, in conjunction with the development of the new sawmill nearby at Forsinain. Woodland on his croft also benefits biodiversity as well as sheltering his livestock, which improves the returns on sheep farming since sheltered animals require less supplementary feed. Sandy is considering how he might be able to develop recreational facilities in some of the forestry to enhance the appeal of a new 14 bed backpackers hostel he has built on his croft by restoring an old millhouse.

Much of the recent planting in the region has been established under crofter forestry schemes since the Crofter Forestry (Scotland) Act 1991 conferred ownership of trees planted on crofts to the crofters. The majority of these new plantings have consisted of native woodlands, due to the higher grant payments. Crofters have been encouraged to include objectives for timber and/or woodfuel production in their planting plans; however, many of these woodlands have received minimal management input since planting as their potential benefits, beyond conferring grant money, are often not perceived. One opportunity in this regard, is the linking of farm-level plantings with further development of the woodfuel sector, to ensure provision of a viable market for wood products relatively close to new woodlands, thereby allowing farmers and crofters an effective means of diversification. The development of the woodfuel market would allow for an end-use to be built into such woodland establishment, thereby encouraging active woodland management on the part of the farmer or crofter.

A key issue facing the expansion of farm and croft woodlands is the difficulty in achieving economies of scale and being competitive in a market place dominated by large-scale suppliers. One area which offers potential to overcome this issue is **the development of farm/croft woodland cooperatives**. In Caithness, a model being brought forward through the PelleTime project, is for short rotation forestry to be grown on parcels of more marginal farmland which is let by farmers to a co-operative company that co-ordinates all of the preparation, planting, management, harvesting and restocking. Such a model has the potential to allow for greater flexibility, in that individual farmers can commit as much or as little of their land as they wish, provided it is in demand by the co-operative.

2.4.2 Community woodlands

A key generic issue for forestry and development generally in Caithness and Sutherland is the remoteness of the region and the correspondingly scattered nature of the population. In 2005 the population of the 780,000 hectares of Caithness and Sutherland was 38,262, which represents a decrease of 0.4% since 2001, compared with increases of 1.7% and 0.6% across the Highlands and Scotland for the same period (HIE 2007). This equates to a population density of five people per km2, one of the lowest in Europe. The unemployment rate in Caithness and Sutherland (3.3% in 2007) is also higher than the national average (2.4% in 2007) (HIE 2007). The regions population is also an ageing one, which can affect economic activity and the sustainability of services, with 48.7% of the population 45 or over in 2005, compared with 46.5% in the Highlands and Islands and 42.2% in Scotland.

From a forestry perspective the low population density implies a dispersed market for timber products and a lack of available skilled employees for forestry initiatives. However, despite these figures, a strong base of existing community activity relating to a variety of activities is evident in the region. Forestry is no exception, with Caithness and Sutherland having been at the forefront of the development of community woodlands and community involvement with forestry over the last 10–15 years, with a range of community woodland initiatives evident in the region (see Case Studies 5, 6 and 7 and Appendix 7).

Despite widespread community engagement, centralising drivers remain the dominant force in forestry, and no substantial relocalisation of forestry has occurred in Scotland as yet, although the rise of woodfuel markets, and increasing concerns about the costs (economic & environmental) of timber transport may provide drivers for localisation. However, there is a much wider recognition of the importance of delivering local benefits, and of forestry being seen to contribute to the development of sustainable local communities, and this is reflected in significant policy developments and initiatives to support community woodlands and community engagement with forestry, such as the National Forest Land Scheme (NFLS)[12]. Two communities in Caithness & Sutherland have used the NFLS to date, whilst a further two applications are in development.

Communities can of course engage with forests management under a variety of arrangements. A number of communities manage woodlands in partnership with FCS, which allows them to influence forest management while retaining FCS as the active land manager. However, a key issue for some groups is the lack of rights to forest products, which makes it difficult for such groups to establish an income stream from the woodland. The development of community-private landowner partnerships also represents a future opportunity, which could allow for access to grant initiatives which would otherwise be inaccessible to private landowners, potentially resulting in benefits for both sides. A major opportunity which is likely to emerge from the current round of legislative changes is the option for communities to lease land under the NFLS, giving them control of the forest on a long-term lease without the increasing challenges of land purchase.

[12] The NFLS gives communities the opportunity to attempt to buy or lease[12] National Forest Land whether or not it has been identified as "surplus" and placed on the market. The National Forestry Act does not allow FCS to lease forested land for woodland management reasons, although the leasing of open ground by FCS is permitted. There is some scope for this to be changed under the upcoming Public Sector Reform Act, to allow for community groups or other interested parties to lease forest land and potentially gain an income from the marketing of forest products.

Case Study 4 - North Sutherland Community Forestry Trust (NSCFT)– Borgie Forest: In May 2005, NSCFT signed a 25-year joint management agreement with FCS for a cluster of national forests comprising forest areas at Borgie, Dyke, Forsinain, Rimsdale, Rosal and Syre amounting to 10,000 hectares of publicly owned forests. Borgie Forest, the largest, is managed as a multipurpose forest, with significant timber production and extensive recreation provision. NSCFT have built a log cabin that will be used as NSCFT office space and leased out for functions. They have also been involved with the Scottish Agricultural College in trials of berry cultivation and are currently looking into the possibility of building holiday cottages. The NSCFT are currently exploring options to purchase a portion of, or all of Borgie forest under the NFLS to access timber to supply the NSCFT run Forsinain sawmill.

Case Study 5 - Culag Community Wood: The Culag Wood, near Lochinver, is leased from the Assynt Estate and Highland Council for a nominal fee and managed by the Culag Community Wood Trust. The 36 hectare wood is currently dominated by mature non-native conifers with patches of broadleaves. The wood is managed for multiple objectives, including sustainable timber production; biodiversity conservation; access for recreation and education – trails and interpretation and various wooden shelters have been established as well as picnic tables and sculptures and an 'orien-tree-ing' trail; skills and employment – the Trust is keen that the wood be used as a resource that might stimulate the establishment of small forestry related businesses in the community.

In general, future community woodland acquisitions and developments are likely to be more tightly linked with socio-economic objectives, in addition to the more traditional objectives for such groups of developing access and conservation. In Caithness and Sutherland, two key potential areas for socio-economic development for such groups are the development of community-level woodfuel heating schemes and woodland crofts (Case Study 6).

Case Study 6 – Embo Woodland Crofts: One option currently available to communities under the NFLS allows eligible community groups to apply to purchase FCS land for the development of woodland crofts. Such initiatives offer opportunities for people living in fragile rural areas to acquire land to help sustain their livelihood, thereby promoting community viability and encouraging younger people to remain in the locality and stimulating local economies with local timber processing activities. The development of what may turn out to be Scotland's first woodland crofts is currently underway at Embo, which will potentially utilise the FCS Fourpenny Plantation on the East Sutherland coast. A formal Community Body (The Embo Trust) has been established, with the aim of purchasing land from FCS and creating 10 new crofts of 10 acres each. The crofts will be owned by the community company and leased to tenants who will be required to waive their right-to-buy to ensure that they remain as community assets. Each croft will have timber-build, cabin-style dwellings built using local timber where possible. It is hoped that, given an area of land with a forest resource on it, the new crofters will use their own entrepreneurial skills to come up with income-generating initiatives, with the development of biofuels and the linking of crofts with community energy initiatives one key possibility.

2.5 Native and riparian woodlands

Whether it be by crofters or larger-scale private landowners, **the continued enhancement and expansion of native woodlands in the region offers major opportunities to deliver biodiversity benefits, contribute to carbon sequestration, enhance the regions landscapes, provide shelter, as well as potentially stimulating agricultural diversification and local economic development.** Specific opportunities exist for improving the condition of existing semi-natural woodland. A number of such sites would benefit from more active management, with opportunities to bring plantations on woodland sites (PAWS) under management which facilitates protection or enhancement of native woodland attributes. Positive native woodland management also offers the potential to assist in delivering the Scottish Government's objective of increasing the percentage of designated sites which are in favourable condition.

A number of key opportunities for further native woodland establishment also exist around core native woodland sites and ancient woodland sites; however, given the general paucity of native woodland (see Appendix 8 for a map of existing native woodlands), the most extensive opportunities will be to create new native woodlands by planting. The expansion of the network of forest and woodland habitats within the region must take account of other open ground habitat types of conservation importance.

Much of the recent broadleaf planting has targeted riparian areas and **the establishment of woodlands in riparian areas and across catchments more widely represents a further major opportunity for expansion of native woodlands in the future**. Riparian woodlands also present the most significant opportunities for creating connected woodland habitat by utilising the natural connectivity of watercourse networks. Riparian woodlands can also help to improve water quality of watercourses and headwaters of Northern river systems, which helps to maintain their fishing interest. Furthermore, woodland which follows river systems does not encroach on surrounding farmland or open ground habitats or form landscape 'barriers'.

2.6 Recreation, health and welfare

The forests and woodlands of Caithness and Sutherland play a critical role in providing sheltered and attractive locations for people to engage in outdoor pursuits. Numerous forest trails exist in the region and forest areas are particularly popular with dog owners as they allow for varied, long and sheltered dog walking. Forest areas also provide the backdrop for mountain biking, a rapidly growing sport in Scotland, which has significant potential to stimulate rural economies (Case Study 7). In global terms, Scotland is a very well recognised mountain biking destination (with the UCI Mountain Bike and Trials World Championships was held at Fort William in 2007) at the forefront of developing mountain biking facilities and FCS is one of the key players in this. Key opportunities for the future lie in further development and connection of clusters of mountain biking facilities.

Case Study 7 - Highland Wildcat Trails, Golspie: This world class Mountain Biking facility features the longest purpose built bike track descent in the UK and the longest technical singletrack climb. The facility is operated by Highland Wildcat, a community company established in 2005 to promote leisure and recreation in Sutherland for the benefit of public health and the rural economy. Having secured a long-term lease from Sutherland Estates which owns the forest and £500,000 of funding through the Scottish Forestry Grant Scheme and other sources, the Trails opened in November 2006. The biking trails now attract in people outside of the main tourist season, providing welcome additional income to local accommodation and service providers. Caithness and Sutherland mountain bike enthusiasts have also set up the Monumental Mountain Bike Club and the local school has been successful in obtaining funding from Sports Scotland to buy bikes for the school.

Forests and woodlands have an important role to play in improving both the physical and mental health of both individuals and communities, and are often particularly effective in reducing inequalities and delivering health benefits to deprived and marginalised populations. Two specific initiatives which link forestry and health and offer potential for Caithness and Sutherland in the future are:

- **Step it Up Highlands**: This initiative has 30 (600+ people) groups across the Highlands which provide a framework for people to improve their health through engaging in group walking. Caithness and Sutherland represent a priority expansion

- **Hospital grounds initiative**: FCS and the Registrar for Public Health are currently exploring how hospital grounds can be improved for health across the Highlands. A pilot project has been proposed, in which the grounds of Lawson Memorial Hospital at Golspie will be landscaped (to include tree planting) to improve available shelter and wildlife areas and create landscapes which are supportive and humane.

Case Study 8 - Fitness Trail, Camore Wood: In the Camore Woods just outside Dornoch, FCS have developed a fitness trail consisting of a number of exercise stations connected by a woodchip track that winds among the trees. At each station there is a sign indicating how to safely use each exercise object. The inclusion of fitness trails in community woodlands sited near towns and villages across the region would bring health benefits to local communities.

Community health and well-being is also linked to the quality of the educational resources available to community members. Forest resources can also be used as a direct educational resource, through school visits to woodlands for both educational and recreational reasons. Lochinver primary School, for example, make considerable use of Culag Community Woodland, in conjunction with the Countryside Ranger Service, as an educational resource and for physical activities more generally. The FCS Rural Skills Programme also currently facilitates young people working on conservation and recreation projects as well as core operations. Considerable further potential exists in the region to incorporate woodland visits and ranger led educational trips within the school curriculum. Appendix 9 lists further initiatives occurring in the region, which utilise or rely on forest environments and deliver a range of health and recreation-related benefits.

2.7 Tourism and forestry

Landscape and the natural environment represent key draws for the majority of visitors to Caithness and Sutherland and while visitor numbers to the region are lower than in many other areas of the Highlands (225,405 visitors in 2003), tourism is nevertheless an important regional industry. Forests and woodlands represent an important part of the region's landscapes and environment and while the west coast lacks the extensive coniferous forests of the Southern and North Eastern parts of the region, valued areas of attractive native woodland are present to a limited extent – with considerable potential for restoration and expansion. The 'wildness' of the terrain and distinct wildlife are key attractions and visitors typically spend a week or more at a time. The provision of native woodlands and forest recreational facilities adds to the mix of activities that enhance an outdoor holiday and can enhance the overall appeal of a location by providing an attractive backdrop. Communities that can offer a diversity of outdoor experiences are likely to be most successful at attracting visitors and there are some good examples of creative schemes that help achieve this, such as the All-Abilities Path on Little Assynt Estate (Case Study 9). Currently woodland park concepts have been explored in East Sutherland and at Sibster (see Appendix 10). Woodland parks incorporate high quality interpretation, recreation facilities and low key tourism developments and could offer the potential to successfully integrate forestry with tourism in the region. This could potentially lead to increased visitor numbers as well as providing further justification for the re-structuring of many forest areas.

Case Study 9 - Leitir Easaidh All-Abilities Path, Little Assynt Estate: In 2000, the Culag Community Woodland Trust bought the Little Assynt estate on behalf of the community and have constructed a 1.5 km all abilities through 2000 hectares of newly planted native woodland. The path includes two jetties with shelters and compost toilets and a specially adapted boat for disabled anglers and won the Working Together for Tourism Award in 2006.

The development of in-forest archaeological trails and interpretation may also represent an opportunity in certain areas (with over 500 scheduled monuments evident in the region), particularly where suitable locations exist close to population centres or within existing community woodlands. Perhaps of greater potential importance is the future development of the setting of many archaeological sites in the region, in terms of establishing native woodlands and enhancing the surrounding landscape. Wildlife is also an important component that draws people to the area and increasing the amount of native woodlands should increase the wildlife potential. The development of wildlife tourism has proved highly successful in other regions of Scotland, such as in Strathspey in the Cairngorms and in conjunction with cetaceans and sea eagles on Mull.

3 Cross-cutting themes/opportunities

3.1 Carbon sequestration and renewable energy

Forestry offers considerable potential to mitigate the impact of the continued use of fossil fuels on climate change, by absorbing and storing atmospheric carbon. In essence this will help to 'buy time' while the UK moves towards a low carbon economy (Broadmeadow, Ray 2005). This **short-term carbon storage benefit will be complemented by increased use of renewable energy sources such as woodfuel and the use of timber as a sustainable building material, which locks up carbon in buildings and offers an alternative to the use of materials that have high carbon footprints associated with their production**. For Caithness and Sutherland to continue their contribution to carbon sequestration and the requirements of the SFS more generally, the projected shrinkage of the forest resource in some areas over the next 25 years, through planned restructuring, windfarm establishment or for other reasons, must be at least balanced, if not exceeded, by woodland expansion in other areas. While native woodland expansion and low intensity forestry offer opportunities in this regard in the longer term, short rotation forestry and the planting of 'productive' conifer species such as Sitka spruce on suitable sites, also offer considerable opportunities to maximise carbon sequestration in the shorter term.

The expansion of a wide range of forest and woodland types offers considerable potential to support the objectives of the Climate Change Action Plan (Section 1.1). However, the mitigation of climate change through woodland expansion is subject to ensuring expansion occurs on suitable soil types. Tree establishment on soils with high carbon content (such as peat soils) results in an initial release of carbon due to the associated cultivation and aeration. While initial carbon losses can be compensated for by subsequent carbon sequestration by the growing trees, evidence also exists which suggests that afforestation can alter the functionality of deep peat from that of a carbon sink to a carbon source. To maximise the associated carbon sequestration benefits woodland expansion should therefore be focused away from areas of deeper peat soils (see Section 1.1).

Furthermore, **the quantification of the carbon budget of key activities in Caithness and Sutherland, such as road haulage of small roundwood and sawlogs for specific distances, will allow future decision makers to incorporate carbon costs within decision making processes.** The requirements for carbon sequestration are likely to grow in future years, which may place pressures on the forestry sector to limit haulage distances and utilise more timber locally; however, the carbon agenda is also likely to increase opportunities for carbon offsetting and the creation of new woodlands and the replacing of marginal agricultural activities with managed native woodlands. In this regard, clear potential exists for the development of a carbon credits scheme, where land managers are rewarded according to their respective carbon footprints and carbon offsetting activities.

3.2 Forest restructuring

A major opportunity to expand and enhance native woodland and forest species and structural diversity more widely in Caithness and Sutherland, is represented by the coming of age of much of the existing conifer forests in the region. Multiple factors will determine the best options for a second rotation including owners objectives, timber markets, site characteristics, the matching of species to site, environmental considerations, the implications of climate change and the overarching aim of long term sustainability. The future situation regarding markets for wood products within the region is also key. The re-structuring of the regions forests to allow for ease of access to markets and the potential development of new markets will provide very significant opportunities to improve the long-term sustainability of forest management. Due to the wider importance of peatland habitats for conservation and carbon storage and the limited availability of lower carbon agricultural soils in the region, future woodland expansion is likely to be focused on lower quality, marginal agricultural land. This is likely to offer a significant net carbon sequestration potential from woodland.

Restructuring also offers a key opportunity to restore priority areas of deep peat. Priority for further peatland restoration should be given to areas of peatland where previous forest planting has affected the interests of adjacent Natura designated sites (see appendix 11 for map of priority areas for further woodland removal). In addition, opportunities exist to clear forest cover from other areas to meet national targets for blanket bog recovery in the UK Biodiversity Action Plan. Significant efforts have already been made to accelerate woodland removal from such priority sites as part of the wider peatland restoration strategy for Caithness and Sutherland, with almost 3000 hectares of conifer forest having been removed from peatland sites in recent years. Removal is subject to the forestry EIA regulations.

To allow for the delivery of the maximum range of benefits, **the single most important opportunity for forestry in Caithness and Sutherland in the future, is the development of a more multifunctional approach**, with forestry practices potentially incorporating a wider mix of tree species in planting and re-stocking schemes and delivering on a wider range of forest management objectives. **The diversification of tree and woodland types represents a key opportunity to develop a forest resource which is more resilient to climate change, and which offers forest managers greater flexibility to respond to emerging local markets for wood products**. Native woodlands/species represent significant opportunities for new planting, given their current restricted distribution. **To ensure the highest degree of multifunctionality and potential resilience to climate change, the maintenance of significant elements of non-native tree species will be of considerable importance., This includes Sitka spruce and wider use of larches in re-stocking and in new planting, where sites are suitable.**

The conversion of existing forests to low impact silvicultural systems (LISS) including continuous cover forestry, is often viewed as impractical in the region, due to environmental factors. However, opportunities for the application of LISS approaches do exist outwith peatland sites, particularly in the Dornoch area and in the region's Kyles and Straths where soil quality is higher and there is more shelter, giving more silvicultural choice of species and structures. Environmental constraints are also likely to constrain tree species choice to a greater extent in the north and north-western parts of the region, with a greater capacity for the use of a wider range of species in the southern and south-eastern parts.

3.3 Timber Transport

A major issue for the forestry sector in Caithness and Sutherland is the capacity of the transport infrastructure and the high costs of transporting timber to distant markets. As timber output levels increase, the existing road network (see Appendix 12 for a map of agreed timber transport routes) will also be put under increasing pressure from timber traffic and increasing traffic congestion. Opportunities exist for upgrading of the road network although current reductions in road maintenance budgets may result in upgrading being restricted. Any potential improvements to the road network will need to take into account the potential location of any second rotation and the long term economic and environmental (carbon footprint) costs of continued road haulage (particularly given the objectives of Forestry Commission Scotland's Climate Change Action Plan relating to timber transport – see section 1.1). The use of low-impact vehicles such as tractors with trailers on some of the smaller routes or sophisticated lorries with Central Tyre Inflation (CTI), offer significant potential, in association with novel road maintenance techniques. The linking up and structural improvement of forests using internal forest roads also offers potential for cost-effective transport of timber closer to market before public roads need to be utilised. Funds are available from the Scottish Government to support developments which aim to minimise the amount of timber transportation on fragile public roads via the Strategic Timber Transport Fund (STTF). In 2008 the A897 Partnership Project was established with funding from the STTF (£400,000) and co-financing from Highland Council and Forest Enterprise (£100,000). This scheme will facilitate increased timber extraction on the 30km B897 section between Kinbrace and Helmsdale through co-operative management, monitoring and development of the use of CTI, or low ground pressure vehicles on the public road as well as minor structural improvements. Consideration should to be given to whether the STTF could be directed further towards modest upgrades of sections of public roads to facilitate timber extraction in the future.

Despite significant constraints, there is also considerable support and potential for modal shift i.e. transporting more timber by rail and sea, not least due to the potential benefits in terms of emission reductions relative to timber haulage by road. Two fundamental ingredients to the future successful development of rail as a viable way to transport timber are: the development of rail-connected end markets to minimise steps in the transport process and associated transhipment costs; and, the construction/upgrading of railway sidings at key points to facilitate loading of trains off the live line to allow more loading time and more efficient locomotive and line usage. Potential also exists for more timber (particularly chipwood) to be transported by sea out of Scrabster and Wick harbours.

Forthcoming decisions relating to market development and the economic viability of the regions forest resources are likely to be a key influence on any future long term timber transport strategy. Furthermore, decisions regarding the location of future areas to be re-stocked or newly planted should be integrated with decisions on timber transport developments. It is therefore of major importance that a strategic approach be taken to timber transport planning in Caithness and Sutherland.

3.4 Deer management

Across most of Caithness and Sutherland establishment of new woodlands usually requires that deer numbers are reduced by culling and that deer are excluded from newly established woodland areas by fencing. Agreed deer management plans are an important component of woodland expansion proposals. It is also generally necessary to pro-actively manage deer outside of woodland enclosures, to avoid increasing the pressure on woodland fragments outside of fenced areas. Predictive management of deer is generally required where trees are being restocked. This is of particular importance in the case of native woodlands, where natural regeneration is the preferred restocking method where seed sources are present. This may be less costly and is more environmentally sustainable. Requirements to cull deer for woodland management reasons are often seen as reducing the economic returns achievable from open range sport shooting. Woodland establishment provides natural shelter and facilitates expansion of deer populations over the long term. Deer present in established woods enjoy warmer conditions and higher nutrition, are consequently heavier, healthier and have higher fecundity levels than non-woodland deer.

New joint-working practices between DCS, SNH, FCS and the Scottish Government are focused on bringing designated sites into favourable condition. A number of priority sites for joint working on deer management have been identified in Caithness and Sutherland. These are predominantly upland sites, although most have at least minor elements of woodland. Potential future developments which have the capacity to affect how deer are controlled in Caithness and Sutherland include objectives to make deer management groups (DMGs) more autonomous over time, together with the 'open season' on red deer in Scotland becoming more flexible. These measures should allow for a more adaptable and prescriptive approach to be taken to deer management across Caithness and Sutherland.

Future opportunities also exist for wider deer control in conjunction with attempts to establish native woodlands without rotational fencing[13] – particularly in locations where the establishment of fencing has the potential to adversly impact on natural heritage and/or landscape and wild land[14] values. However, it is important to ensure that the management of deer does not negatively impact on the objectives for sustainable land use in the wider countryside.

4. Key conclusions

1. Clearly, forestry delivers a wide range of benefits in Caithness and Sutherland and offers a number of opportunities which can be further developed in the future. To ensure the delivery of a diversity of benefits and the long term sustainability of forestry in the region the **development of a more multifunctional approach to forestry management across the entire region** is critical. Specifically, **the diversification of both forest species and woodland types and forest structure,** including the increased application of LISS where feasible, offers considerable potential for developing forests which are resilient to both climate change and market fluctuations and clearly beneficial in both economic and environmental terms. The integration of objectives for timber and/or wood production within forest management plans including in the case of native woodlands, also offers opportunities for tenants and landowners to engage with future wood product markets, thereby maintaining a degree of active management of these woodlands.

2. There are significant opportunities in Caithness and Sutherland to assist the Scottish Government's woodland expansion targets, contributing to a reduction of the impact of climate change, the local economy and the health and wellbeing of local people. (see “the Scottish Governments Rationale for Woodland Expansion”). The opportunities of greatest significance include:

- The extension and restoration of native woodlands, in particular riparian woodlands and woodlands in headwaters of major rivers and on ancient and semi-natural woodland sites;
- The development of short rotation forestry for biomass production;
- The expansion of woodland cover for carbon sequestration with a focus on productive conifers.

3. The haulage of high quality sawlogs south is envisioned as continuing, particularly in the short to mediiu term. In the longer term, **an opportunity exists to process (saw and engineer) timber locally**, which offers potential to contribute to both rural development and to climate change mitigation through the sequestering of carbon in buildings. T**he continued use (in terms of both restocking and expansion) of non-native species on suitable sites will remain of considerable importance, for sustaining timber production and the associated carbon sequestration value of high productivity species such as Sitka spruce. Opportunities for species diversification should also**

---

[13] In line with the requirements outlined by the joint agency statement on fencing which states that: Consideration must be given to the full range of options for achieving appropriate deer densities before deciding on whether or not to approve or financially support the use of deer fences.
See: http://www.dcs.gov.uk/_downloads/final%20fencing%20policy.pdf

[14] See Scottish Natural Heritages's Policy Statement on Wildness in Scotland's Countryside: http://www.snh.gov.uk/docs/A150654.pdf . Search areas for wild land which been identified for wild land (see: http://www.snh.gov.uk/docs/A150658.pdf) include very significant areas within Caithness and Sutherland.

be taken where appropriate. The **development of in-forest timber transport** represents a key opportunity in the future, particularly if in conjunction with the development of a rail connected end market. It is of key importance that the potential development of timber transport follows a strategic approach, which takes account of the future restructuring of the regions forest resource and the need for timber transport to be efficient, both economically and in terms of carbon footprinting. . **The further establishment of native woodlands and short rotation forestry on crofting land also offers the potential to allow for diversification**, specifically where such woodlands are actively managed in the longer term.

4. The **development of regional woodfuel markets at different scales, offers a significant opportunity to support the long term economic viability of forestry in Caithness and Sutherland.** This area of market development also offers the potential to meet a significant proportion of the energy demands of the region, as well as contributing to the mitigation of climate change, generating economic growth and achieving rural development. Furthermore, the existing strong base of community woodland activity can utilise smaller-scale woodfuel initiatives to create further markets for lower grade timber at local scales as well as potentially generating an income, thereby ensuring the future sustainability of these initiatives.

5. Within this wider context of a shift towards multifunctional forestry and regional and local market development, it is **suggested that future woodlands be established on areas of shallow peat and mineral soil across the region**. However, it is also suggested that **the area of forest cover within the core Flow Country should decline overall**, with continued restoration of priority sites to blanket bog (see appendix 11).

6. The priorities for woodland removal will be further influenced by the of the joint agency Science Group who are assessing the impacts of woodland edge on adjacent SAC/SPA.

4.1 A proposed set of principles for future forest expansion and management in Caithness and Sutherland

The following represent a draft set of key principles to support the decision making process regarding **future woodland expansion and management of existing forests and woodlands within Caithness and Sutherland.** These are not designed as a set of forest management objectives for forestry within the region but rather a tentative set of guidelines to guide the process of forest restructuring in the region. They are divided into general principles, specific principles to guide future forest expansion and specific principles to guide restructuring of existing forests.

General principles for woodland expansion and management

- Multi-objective sustainable forest management should represent a key aim for forestry throughout the region.
- Forest types and tree species should be carefully matched to site and fit for purpose at both a strategic and local level within a regional context of multifunctional forestry and species diversification.
- Natural regeneration should be the preferred future method of expansion in and around existing native woodlands. On very degraded sites, opportunities for expansion by natural regeneration will be curtailed by the current limited extent of existing parent material. New planting is likely to be the dominant method for initiating and establishing native woodlands in the short to medium term.
- The use of rotational fencing continues to represent a clear opportunity to limit the impacts of deer on regenerating and newly planted woodlands. Alternatives to fencing should also be considered where feasible.
- Forest planning should, where feasible, aim to develop networks of forests which are connected by forest roads and have good access to markets to increase economic efficiency and viability.
- There should be no new planting on extensive areas of deep peat (blanket bog).

Opportunities for future woodland expansion

- Widespread opportunities exist for increasing woodland cover throughout the region, with the greatest focus on timber production in the productive kyles and straths and a greater emphasis on native woodlands across the region more widely. Particularly strong opportunities exist for establishing native woodlands in riparian zones and river catchments more widely across the entire region. The expansion of native woodlands should be strongly encouraged in the central part of the region where they have been most seriously depleted.
- Considerable opportunities exist for the establishment of short rotation forestry, particularly on marginal agricultural land, with a key objective of biomass production. There is also scope on marginal land for other forms of productive conifer and broadleaved woodlands.
- A strategic approach should be taken to the locating of new woodlands, so that the benefits to the regions wider network of habitats are maximised.

- The consideration of how wood products will be extracted in planting proposals represents a clear opportunity for new woodlands which aim to include the production of wood products as a management objective and should be encouraged.

- Some agricultural land may provide opportunities for establishing new woodlands, with the primary aim of establishing an integrated mosaic of forestry and farming.

Opportunities for restructuring of existing forests

Significant further opportunities exist to restructure the existing forest resources of the region to meet the requirements of the UK Forestry Standard and SFS. Forest restructuring represent an opportunity to provide a consistent flow of timber, deliver rural development benefits for local people and to help meet the government's climates targets and enhance the environmental and social benefits provided by the forests and surrounding habitats. The specific principles developed to guide the process of forest restructuring in the region are outlined below:

- Considerable opportunities exist to incorporate a higher proportion of native species and larches in future re-stocking programs and to manage forests for a more diverse structure in the longer term. Specifically, opportunities exist for greater incorporation of species such as larch, Scots pine, ash and oak in future re-stocking programs.

- Seek to maintain a level of timber production which will support the existing timber markets and the emerging woodfuel markets

- Continued development of timber transport infrastructure particularly investment in road improvements.

- The use of LISS should be encouraged where site conditions make such approaches feasible and this may be in conjunction with supplying woodfuel markets.

- Restocking should balance the owners economic objectives with opportunities for environmental benefit.

- The economic viability of native woodlands and the use of such woodlands for woodfuel production at small scales should be encouraged and improved upon.

Appendix 1 List of Consultees

Consultees for the first round (2006/2007)

Alex Scott	Scottish Natural Heritage
Alistair Sinclair	Farmer
Andrew Anderson	Community Land Unit, Highlands and Islands Enterprise
Andy Summers	The Highland Council
Anne Coombs	Historic Scotland
Bill Ritchie	Assynt Foundation
Bob Dunsmore	Forestry Commission Scotland
Bob Stubbs	Highlands and Islands Enterprise
Bruce Taylor	Scottish Woodlands
Catriona Macdonald	Lochinver Primary School
Chris Whealing	Sutherland Estates
Claire Belshaw	Assynt Foundation
Cliff Beck	Highland Birchwoods
Colin Mackenzie	Highland Timber Transport Group
Duncan Stone	Scottish Natural Hertiage
Elizabeth Marshall	The Highland Council
Frank Roach	Highland Rail Partnership
Ian Ross	Highland Councillor
Jean Balfour	Scourie Estate
Jim McGillivray	Highland Councillor
Jolyon Amos	Fountains Forestry
Jon Hollingdale	Dunnet Forest Trust
Jon Priddy	Caithness and Sutherland Enterprise
Malcolm Wield	Forestry Commission Scotland
Robbie Kernahan	Deer Commission Scotland
Sandy Murray	North Sutherland Community Forest Trust
Scott Armstrong	Visit Scotland
Sir Michael Wigan	Borrobol Estate
Steve Robertson	North Highland Forest Trust
Sue Agnew	Scottish Natural Heritage
Tim Cockerill	Forestry Commission Scotland
Tom Sayles	National Farmers Union
Willie Beattie	Forestry Commission Scotland

Second round consultees (2009)

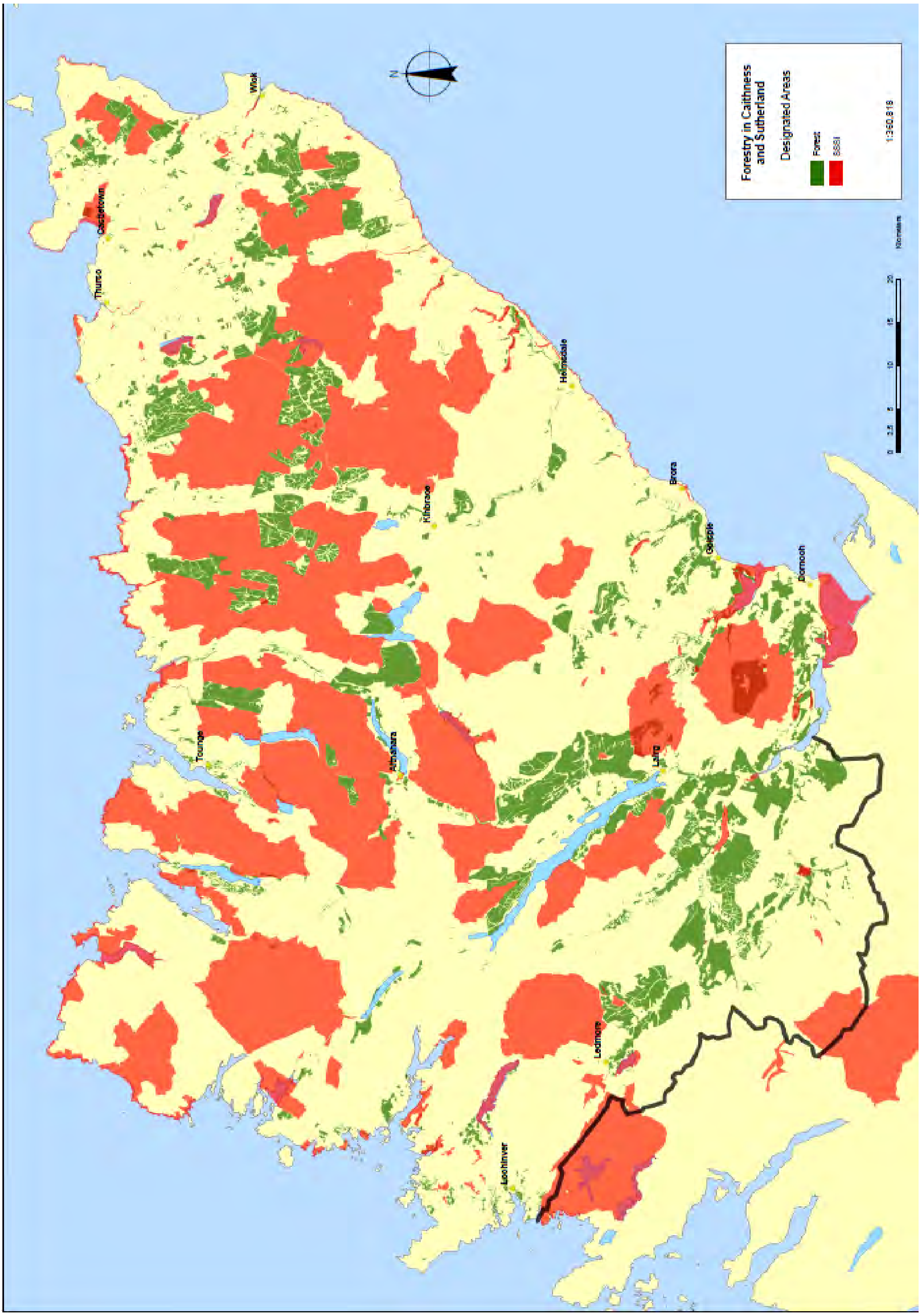
Andrew Cooper	Scottish Natural Heritage
Bob Dunsmore	Forestry Commission Scotland
Bob Frost	Forestry Commission Scotland
Bob Stubbs	Scottish Forestry Trust
Brendan Friel	Balcas
Bruce Taylor	Scottish Woodlands
Colin Mackenzie	Highland Timber Transport Group
Jolyon Amos	Fountain Forestry
Jon Hollingdale	Community Woodlands Association
Julian Fryer	Forestry Commission Scotland
Kenny Graham	RSPB
Lesley Cranna	Scottish Natural Heritage
Malcolm Wield	Forestry Commission Scotland
Matt Richie	Forestry Commission Scotland
Robert Patton	The Highland Council

Sandy Murray	North Sutherland Community Forest Trust
Scott Armstrong	Visit Scotland
Sinclair Coghill	Deer Commission Scotland
Tim Cockerill	Forestry Commission Scotland
Willie Beattie	Forestry Commission Scotland

Third round consultees (2010)

Andrew Anderson	Community Land Unit, Highlands and Islands Enterprise
Andrew Coupar	Scottish Natural Heritage
Becky Shaw	Consultant
Bill Taylor	Consultant
Bob Frost	Forestry Commission Scotland
Bob Stubbs	Consultant
Brendan Friel	Balcas
Bruce Taylor	Scottish Woodlands
Cliff Beck	Highland Birchwoods
Colin Mackenzie	Highland Timber Transport Group
Dave Bruce	Forestry Commission Scotland
David Jardine	Forestry Commission Scotland
Diane MacPherson	Comhairle nan Eilean Siar
Eleanor Garty	Woodland Trust Scotland
Graeme Findlay	Forestry Commission Scotland
Ian Ross	Highland Councillor
John Henderson	Farmer
John McGlade	Consultant
Jolyon Amos	Consultant
Jon Hollingdale	Community Woodland Association
Julian Fryer	Forestry Commission Scotland
Kenny.Graham	RSPB
Kevin Peace	Forestry Commission Scotland
Lesley Cranna	Scottish Natural Heritage
Margaret Davidson	Highland Councillor
Matt Ritchie	Forestry Commission Scotland
Neil Sutherland	Neil Sutherland Architects
Pete Mayhew	RSPB
Robert Patton	The Highland Council
Sandy Murray	North Sutherland Community Forest Trust
Sinclair Coghill	Deer Commission Scotland
Stuart Benn	RSPB
Tim Cockerill	Forestry Commission Scotland

Appendix 2 Map of SSSI designations in Caithness and Sutherland



Appendix 3 Baseline figures and 2050 and 2080 temperature and moisture deficit projections for Scotland (Ray 2008)

Accumulated temperature distribution of Scotland's climate: a) baseline climate, 1961–1990; b) projection for 2050; c) projection for 2080.

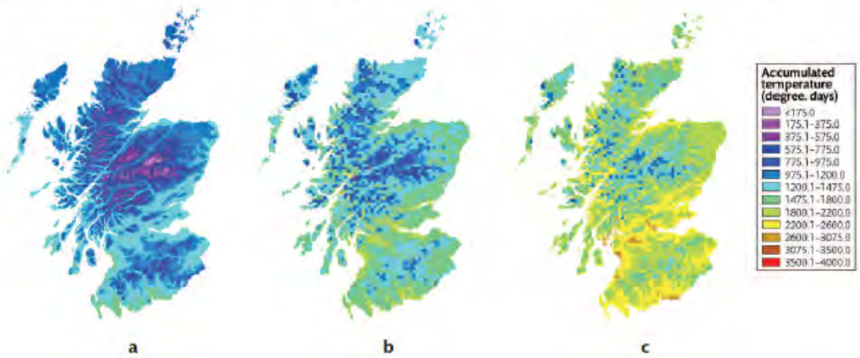
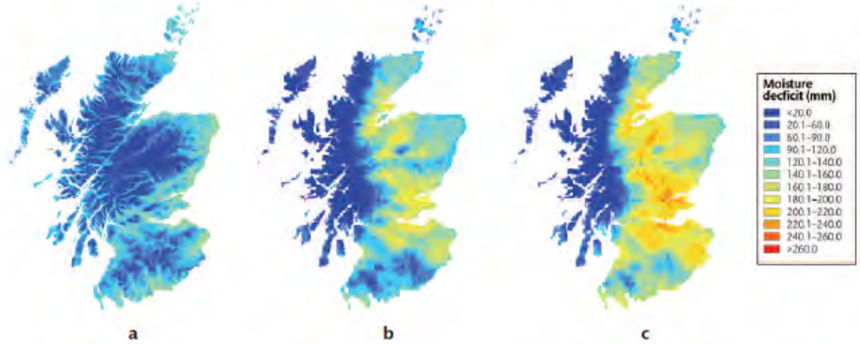
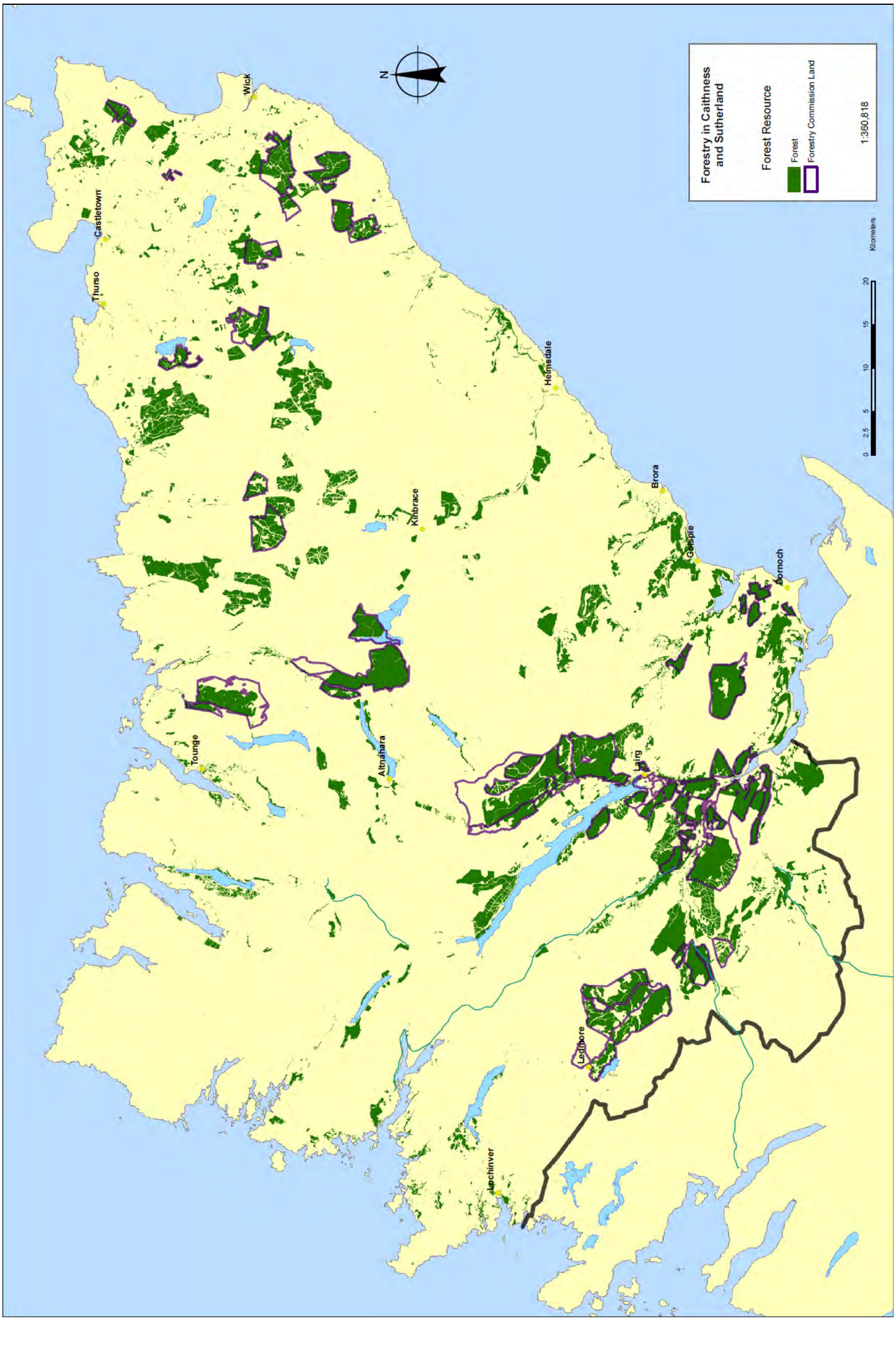


Figure 2
Moisture deficit distribution of Scotland's climate: a) baseline climate, 1961–1990; b) projection for 2050; c) projection for 2080.

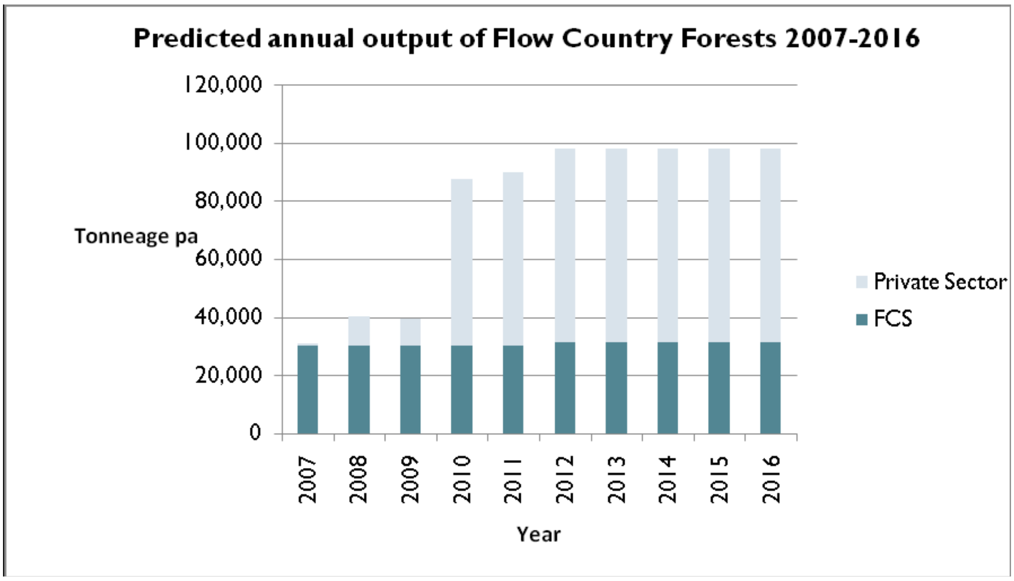


Note: Figures 1 and 2 show average climatic conditions simulated for a 30-year period. Climate projections suggest a significant change in summer rainfall and evaporation in central, eastern and southern Scotland, leading to drier summer conditions and more frequent summer drought. In the northwest of Scotland, the level of summer rainfall is expected to be maintained or to increase. Both Figures are based on projections from the UKCIP High-emissions scenario.

Appendix 4 Map of main woodland cover types in Caithness and Sutherland (and ownership)



Appendix 5 Graph of predicted timber flow from forests for the Flow Country and timber forecasts for Highlands and islands Conservancy



Highland and Islands Conservancy timber production forecasts

Production Forecast 2005 - Average Annual Volume to 7cm top diameter (cubic metres)

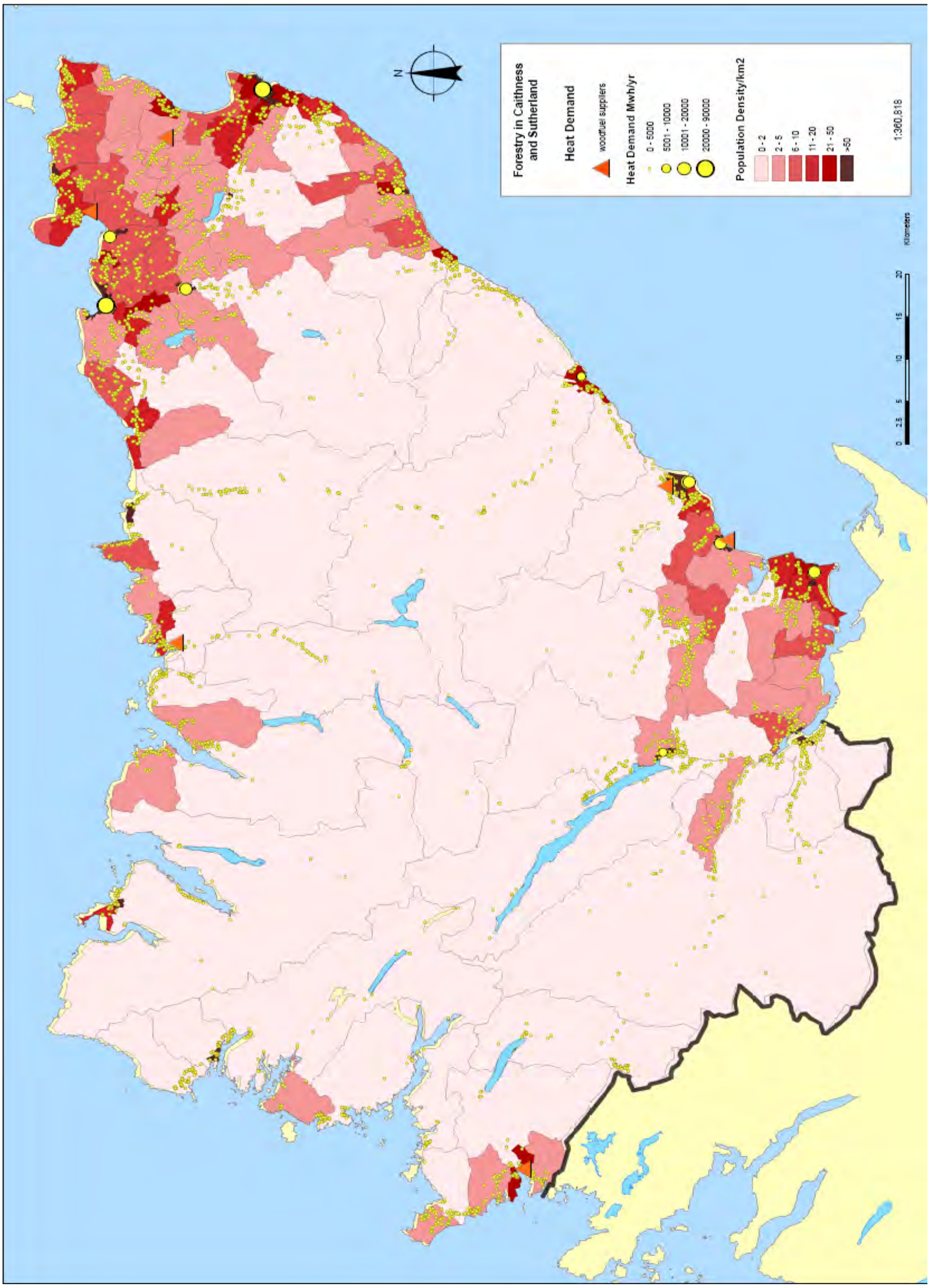
	Private woodlands*	National Forest Estate**	Total Private + NFE
2007-11	**578,592**	**602,331**	**1,180,924**
2012-16	**747,487**	**730,303**	**1,477,791**
2017-21	**905,084**	**823,499**	**1,728,583**
2022-26	**1,003,386**	**815,942**	**1,819,328**
	*Source:IFOS Shona Cameron to MW 4/12/08	** Source IFOS Lesley Halsall to MW 2/12/08	

National Inventory of Woodland and Trees 2001 Area in hectares

	Highland Region	Western Isles	Total
National Forest Estate	**152,623 (44%)**	**709 (29%)**	**153,332 (44%)**
Private	**195,884 (56%)**	**1709 (71%)**	**197,593 (56%)**
Total	**348,507**	**2418**	**350,925**

MW 20th Nov 2009

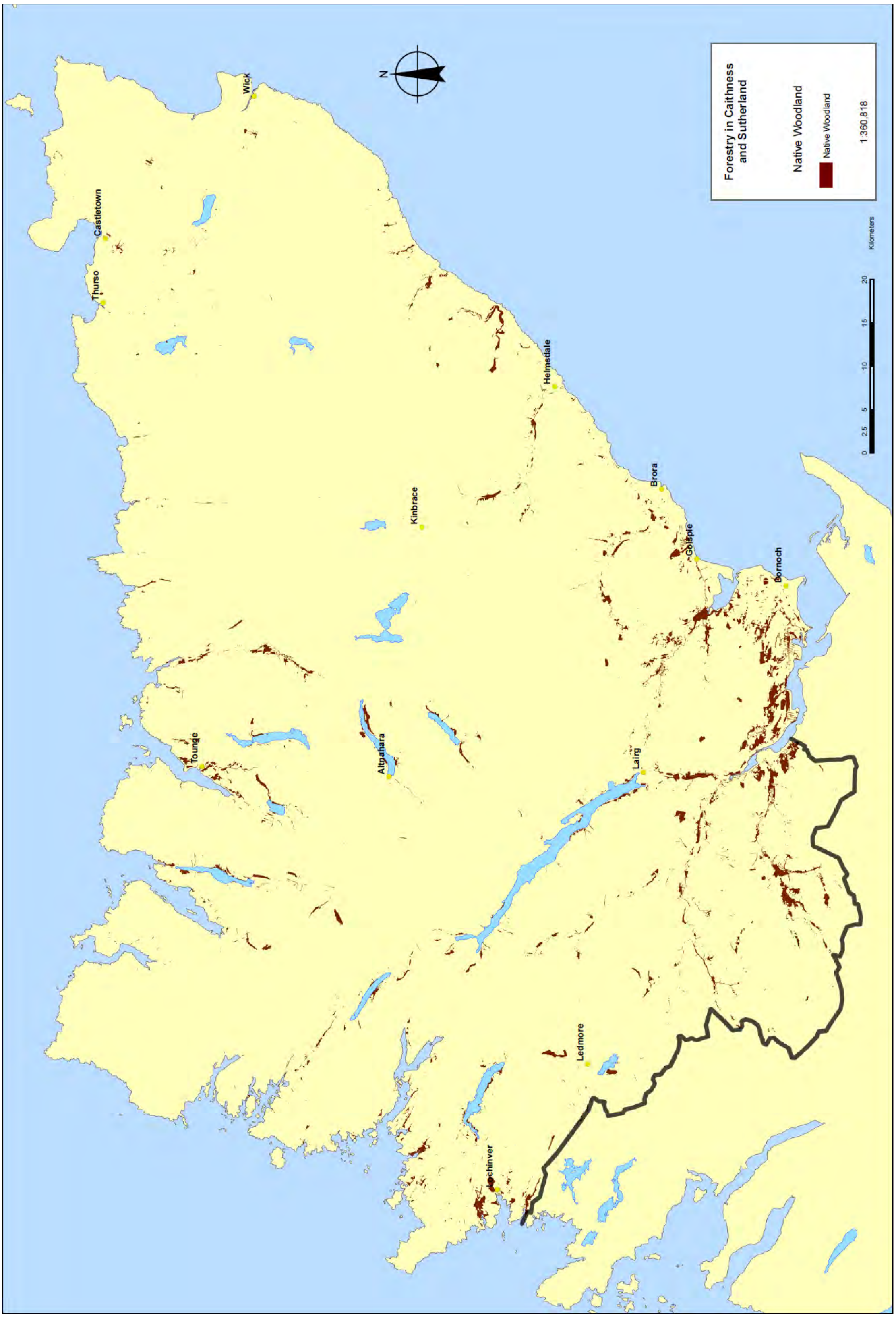
Appendix 6 Map of heat demand in Caithness and Sutherland



Appendix 7 List of Community woodlands (community owned and co-managed) and other major community owned areas in Caithness and Sutherland

MAIN COMMUNITY WOODLANDS/GROUPS
Dunnet Forestry Trust www.dunnetforest.org Dunnet Forest, Caithness ND220700
Culag Community Woodland Trust www.culagwoods.org.uk Culag Woods, Lochinver, Sutherland NC090220
Little Assynt Estate, Sutherland NC175265. Purchased by Culag Community Woodland Trust in 2000
Gearchoille Community Woodland Trust www.gearrchoillecommunitywoodardgay.org.uk Gearchoille Wood, Ardgay NJ600900. A 30 acre semi-natural ancient broadleaved woodland, located on the Dornoch Firth, Sutherland.
RECREATION FACILITIES WITH COMMUNITY INVOLVEMENT ON NATIONAL FOREST ESTATE LAND
North Sutherland Community Forest Trust - Borgie Forest NC670560
Rosehall & District Action Group (RADAG) Rosehall Estate NC480020. Involved development of various faciltities at Rosehall estate (FCS), including a new car park, various trails and interpretive features and a log cabin education centre.
RECREATION FACILITIES WITH COMMUNITY INVOLVEMENT ON OTHER LAND
Highland Wildcat mountain bike trails on Sutherland Estate land. NC830000 www.highlandwildcat.com/
Achvarasdal Wooodland Group NC980650 The Achvarasdal Woodland Management Group was formed in 1999 from the local community and manages 13ha of woodland, in conjunction with Highland Council and the Church of Scotland.
OTHER MAJOR COMMUNITY LAND OWNERSHIP
Assynt Foundation - NC120220 www.assyntfoundation.org Established before the community buyout of Glencanisp and Drumrunie Estates (44,000ha) to manage the land sustainably for the benefit of the community and the wider public.
Assynt Crofters Trust (North Assynt coast). www.assyntcrofters.co.uk Established in response to the proposed sale of the 9,000ha North Lochinver Estate by the landowner. Led to purchase of the estate in 1992 by a collaboration of crofters.
Kylesku Crofters Trust NC230320. Formed by the Kylesku crofters in 2000 and purchased the 800acre Kylesku estate in 2001.
Melness Crofters Trust NC 570640. Trust was set up in 1994 to take over the ownership a 4,360ha section of the Hope and Melness Estate in Sutherland. It aims to manage the estate for the benefit of the community.

Appendix 8 Map of native woodlands in Caithness and Sutherland



Appendix 9 Lists of heath and recreation initiatives related to forestry in Caithness and Sutherland

1. Forestry Commission Scotland led forest biking initiatives in Caithness and Sutherland

Activity	Resource
Kyle of Sutherland Mountain Bike Trails	17km of mtb trails for competent to experienced riders. Trails are divided between the Carbisdale trails on the west side of the Kyle and the Balblair trails on the east side.
Scottish Cycle Training Scheme (SCTS)	Three staff at North Highland Forest District trained as mountain bike leaders and in the delivery of the SCTS. Free resources available, including road signs and cones for playground or forest delivery of SCTS. Scheme has provided a useful 'carrot' to develop links with primary schools and Active Schools co-ordinators. Working with Road Safety and Scottish Cycling to develop an off-road addition on to the scheme.
Forest Cycling open days	Delivered through the trained staff at North Highland Forest District. Open events (2hrs long) aimed at cyclists new to forest and off-road cycling. Aim is to educate communities as to the available resource and encourage use of National Forest Estate. Also using local freelance instructors. Fleet of bikes available.
Forest Cycling taster sessions	Delivered via the local Active Schools co-ordinators, to primary and secondary pupils. Focussed at schools on fringe of Forest District to develop awareness of FCS and the recreation/health opportunities on the National Forest Estate. Fleet of bikes available.

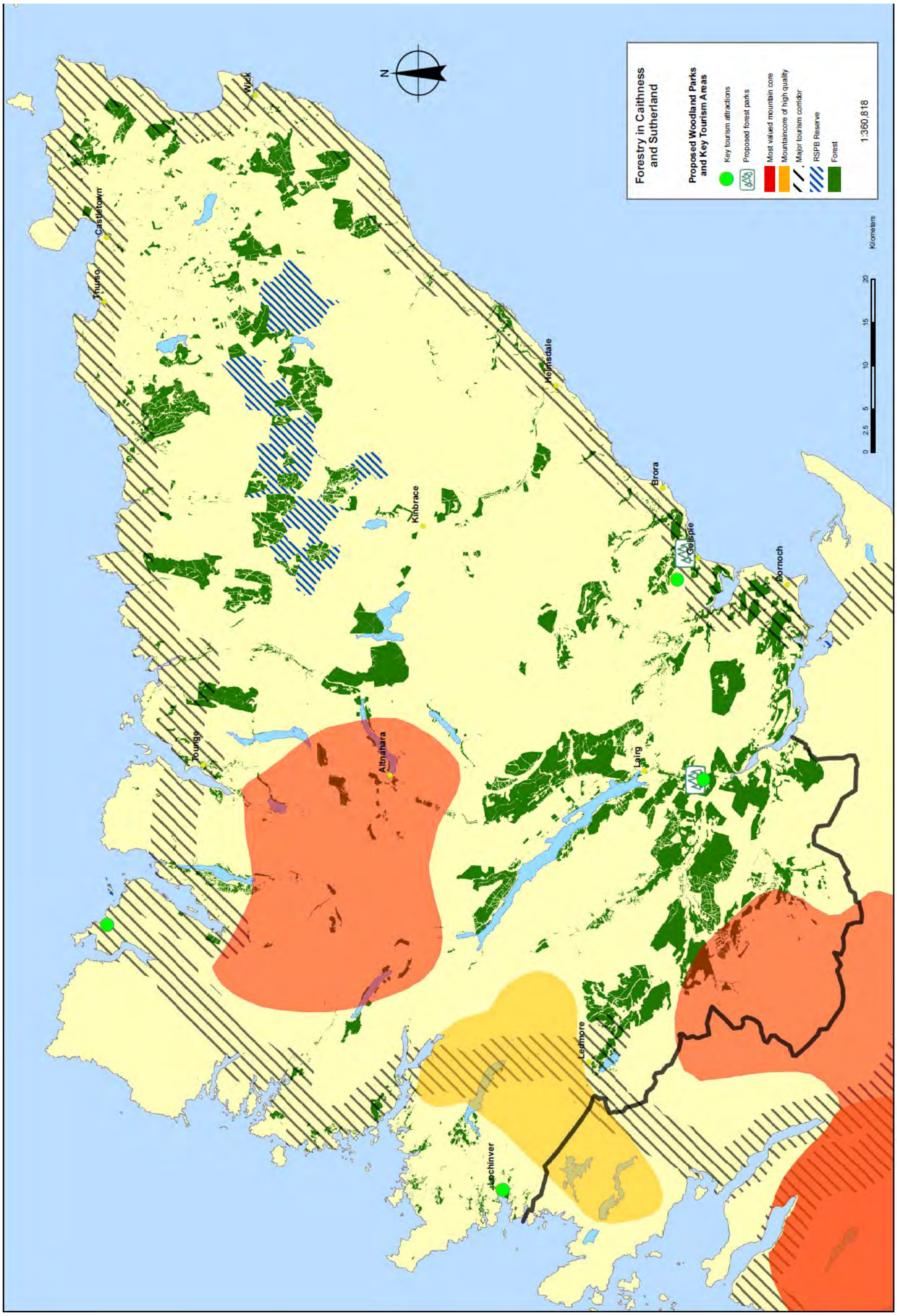
2. Organised health and recreation activities and initiatives occurring in forest environments in Caithness and Sutherland

Cubs/Scouts/ Guides/ Brownies	Engaging with local packs/troops etc to provide cycling, conservation, canoeing and general outdoor activity on the National Forest Estate. A number of camps hosted through out the year on FCS land.
Highland Council Rangers	Working with local rangers to put on events in local forests. Forthcoming events include conservation and cycling events. Aimed at encouraging people to be active in a safe environment.
Orienteering	Four woods now mapped across North Highland Forest District for orienteering. Two permanent sites: Camore and Carbisdale.
Nordic Walking	One trained instructor in North Highland Forest District. Open events run as resource allows.
Greenwood Workshop	Coppice restoration project involving 'green gym' type opportunities. Initiative likely to develop further during 2009.
YOFI (Youth Opportunities for Independence) and SOAR (Socialisation Opportunities Activities Recreation)	Groups of young people from Sutherland who have learning difficulties or mental/physical disability who visit National Forest Estate for volunteering and sports sessions. Facilitates opportunities for socialising and recreation.
APEX Scotland	Once a week attendance by ex-offenders, engaged in physical labour on recreation sites to promote health and provide work experience.

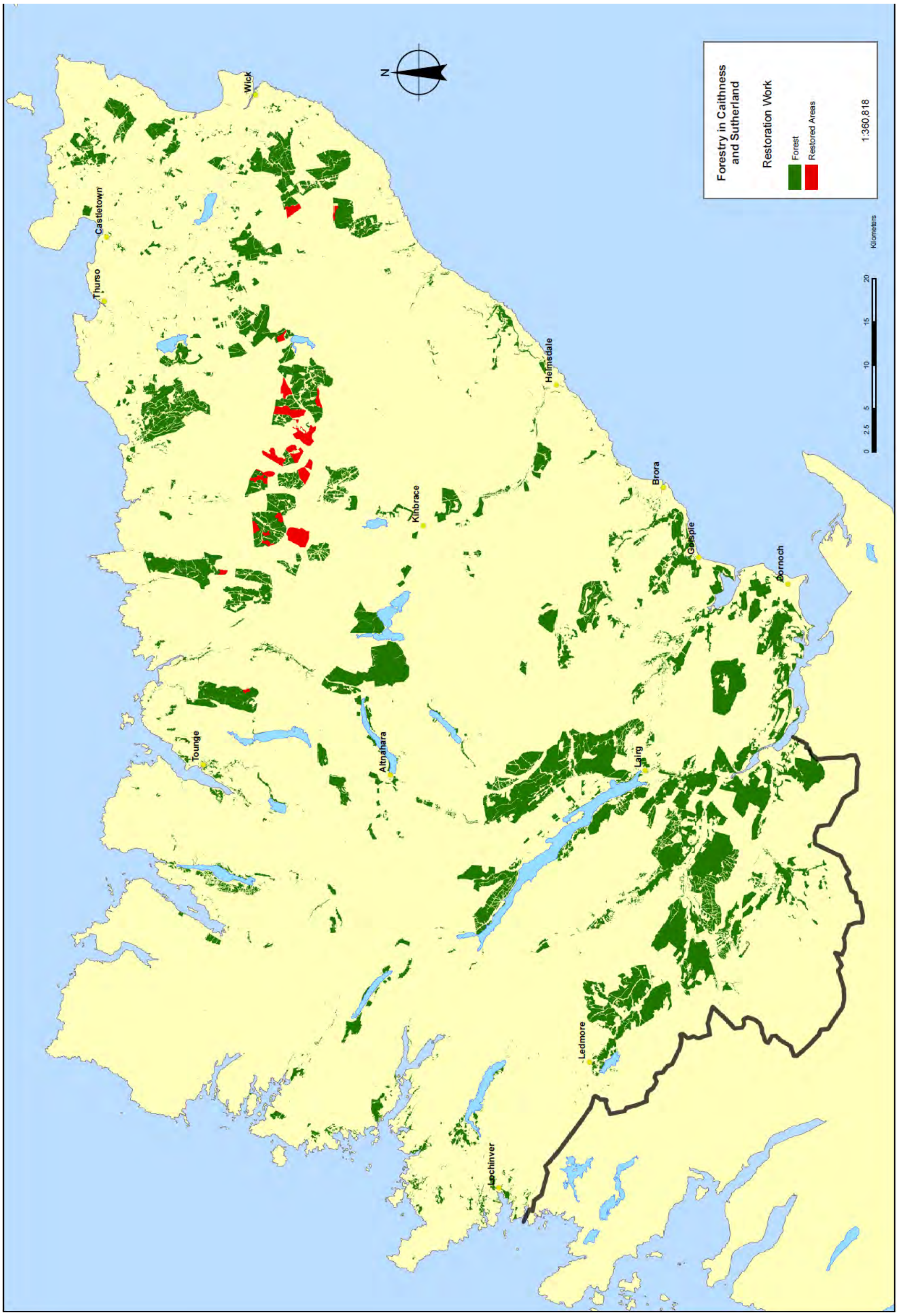
3. Education initiatives utilising forest environments in Caithness and Sutherland

FCS Liaison with Highland Outdoor Education	Primarily to encourage use of National Forest Estate by schools by promoting resource centrally to Highland Education. Also useful source of advice and resources.
Forest Education Initiative (FEI)	Forest District staff initiated the North Highland Cluster Group to promote use of local forests for education.
Forest Schools	An FEI initiative, Andrew Murray is currently training to become a forest schools leader
Homeschool Group	Based in Golspie, a group of homeschooled children age 6 – 10 have been out on a basic bushcraft session and are scheduled for forest cycling sessions. Opportunity to use the fleet of bikes to help familiarise the group with the local National Forest Estate
FCS Rural skills programme	Currently engaged with delivering to 5 schools – 3 schools weekly plus 2 schools intermittently. Programme involves involving young people in working on conservation and recreation projects as well as core operations.
Work experience with FCS	Currently have one pupil on a long term weekly placement working on recreation projects and one New Deal placement working at a recreational facility. Also routinely take on work experience week long placements.

Appendix 10 Map of key recreation resources, key tourism areas and corridors in Caithness and Sutherland



Appendix 11 Map of key moorland restoration areas



Appendix 12 Map of agreed timber transport routes in Caithness and Sutherland