A FUTURE FOR MOORLAND IN SCOTLAND
The need for a locational strategy

THE SCOTTISH GAMEKEEPERS ASSOCIATION
… managing Scotland's wild places

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The need for a locational strategy

Scottish Gamekeepers Association

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CONTENTS

SUMMARY

1. This document maps the distribution of moorland on mainland Scotland and classifies it into four categories:
A. Core, B. Subsidiary, C. Fragmented, D. Scattered remnants.

2. It is calculated that moorland covers 30,000 sq km, 44% of the land area, with unfragmented 'core' moorland comprising 26,780 sq km, 39% of the area.

3. There needs to be agreement on the areas of moorland to be retained as such in the light of its continual loss and fragmentation through forest/woodland creation.

4. Woodland creation should be targeted on fragmented areas of moorland, particularly those in localities where moorland is still common.

5. The Scottish Government's (SG's) target of 100 sq km of woodland to be created every year for the next 10 years can be achieved without impinging on the remaining core areas of moorland.

6. However, meeting the SG's target of 25% of Scotland under trees would necessarily impinge on the core areas.

7. There are mechanisms in place to safeguard moorland, but it would appear that in practice moorland is not being safeguarded through them. Strategic locational guidance is needed.

A. INTRODUCTION

1. Definition of moorland

Moorland is here defined as any unwooded, open ground composed of natural or semi-natural vegetation, whether dominated by grasses, sedges, rushes, ericoid shrubs, bracken, bog mosses, montane vegetation or fellfield.

The extent of moorland using the above criteria is shown on the maps at the end of this document.

In some instances scrub of low-growing shrubs such as gorse has been included in the maps: the criterion has been to include any unimproved land (excepting salt marsh and dunes) not mapped as woodland in the Forestry Commission's 2014 National Forest Inventory.

As an open ground habitat, peatland has been included in the definition of moorland; in practice the distinction between peat-forming and non-peat-forming ecosystems is not clear-cut. In upland Scotland most of the soil underlying moorland vegetation has a high organic content whether actively accumulating peat or not, and the vegetation type can be relatively independent of the depth of the underlying organic soil.

In farming terms, the definition of moorland used here would equate to 'unimproved hill land'.

2. Why do we need a locational strategy?

The open moors are a key characteristic of the country, currently covering just under half the land area of mainland Scotland. There was significantly greater cover in the past but, particularly in the twentieth century, the area has declined through reclamation for agriculture and woodland/forestry expansion. However, in previous centuries there would also have been long-term loss of moorland, especially in the lowlands, through peat cutting for fuel and taking-in of rough grazings.

Although agricultural improvement of moorland has now largely ceased, moorland is still being lost to woodland expansion (see Maps 4.4, 4.5). The *Scottish Forestry Strategy* has a target of 25% of Scotland to be under trees, with the Scottish Government's *National Planning Framework 3* having a target of 100 sq km of new planting a year.

The *Scottish Land Use Strategy* states on page 9: "the main focus of woodland creation will be away from prime agricultural land". If 'prime land' is here defined as all areas of improved land, then achieving this target could potentially remove 5,000 sq km of moorland, reducing its extent from 44% to 37% of mainland Scotland (Table 1).

O, The peat burns brimming from their cups of stone, Glow brown and blood-red down the vast decline, As if Christ stood on yonder clouded peat, And turned its thousand waters into wine. G K Chesterton (Glencoe)

Deep peats will be largely protected from planting for climate change reasons (see Maps 6.1, 6.2), and also high altitude moorland owing to its unsuitability for trees. Hence it is the remaining non-peaty areas of moorland at low to mid altitudes that are particularly likely to be lost, especially the small, fragmented areas in the lowlands.

There is also a more insidious threat to moorland through seeding onto the moor of commercial conifer species from neighbouring plantations. This is particularly a problem in Argyll and Galloway and is rarely controlled.

Bearing in mind the importance of moorland to Scotland's landscape, biodiversity and economy it is surprising that there is no strategic policy guidance available, similar to the *Scottish Forestry Strategy* for trees and the regional Indicative Forestry Strategies.

Although the justification for new woodland has been made strongly, there is no similar justification for the retention of moorland: hence it can be hard to argue the case for moorland conservation and loss of moorland will continue.

This matters because moorland has been the dominant landscape type for at least the past 4,000 years, comprising largely natural vegetation types (see, for example Smout, 2000; Fenton, 2008). This runs counter to traditional thinking that what is now moorland should really be woodland owing to human activity having destroyed all the trees.

Indeed, the open moors of the Scottish Highlands could be one of the most natural vegetation patterns remaining in Europe. Even where rotational burning takes place on heather moorland, the dominant vegetation type would still be heather.

Additionally the proposed creation of woodland networks has been viewed from a woodland perspective with insufficient thought on how such networks will result in the continual fragmentation of moorland.

Guidance is needed to assist with decisions as to whether a given area of land should remain as moorland or be converted to woodland.

3. The aim of this document

The maps at the end of this document showing the distribution of moorland have identified four broad categories:

A. Core, relatively unfragmented areas
B. Subsidiary areas
C. Fragmented areas
D. Scattered remnants

In the north of Scotland, where there are still significant areas of unfragmented moorland, the maps also subdivide the largest unfragmented areas into 'key core areas'.

In an ideal world, there should be a strategic approach to moorland conservation, with national policy identifying the core moorland areas – and any other areas worthy of conservation as moorland. Other government policies should then take account of this.

However, before this stage is reached, there has to be general agreement as to which areas of moorland are worthy of conservation in their own right, *i.e.* are the core areas. The maps in the document have been produced to instigate a debate on this topic. Although the maps are relatively objective in showing the distribution of moorland, their classification into the four categories given here is more subjective.

Hence the aim of this document is to begin a Scotland-wide debate on the importance of moorland to the Scottish people, leading to agreement on the need for its conservation and on the location of its core areas. Because moorland is found throughout Scotland and comprises a large range of different vegetation types, the debate is in effect on what we want the future landscape of Scotland to look like. It is a landscape debate that is needed.

Note that this document does not discuss any issues related to how moorland should be managed, but instead focuses on the importance and location of our Scottish moors.

B. POLICY FRAMEWORK

1. National policy

The European Landscape Convention (2000)

The Scottish Government is a signatory to this Council of Europe convention, which includes the following paragraphs:

> C. Identification and assessment
>
> 1 … each Party undertakes:
>
> a) i. to identify its own landscapes throughout its territory;
>
> ii. to analyse their characteristics and the forces and pressures transforming them;
>
> iii. to take note of changes;
>
> b) to assess the landscapes thus identified, taking into account the particular values assigned to them by the interested parties and the population concerned.

Scottish Natural Heritage (SNH) in its landscape character assessments has undertaken items a) above. What is needed now is for item b) to be undertaken, particularly an assessment of the value the people of Scotland place on moorland especially as it comprises such an integral part of the Scottish landscape.

SNH's Landscape Policy Framework (2006)

In terms of a Scotland-wide landscape policy, the current guidance is expressed in this SNH document, an extract of which is:

> SNH's landscape work will pursue the following overarching aim:
>
> To safeguard and enhance the distinct identity, the diverse character and the special qualities of Scotland's landscapes as a whole, so as to ensure that tomorrow's landscapes contribute positively to people's quality of life and are at least as attractive and valued as they are today.
>
> For the range of Scotland's landscapes this means working to achieve and maintain:
>
> ● Forests and woodlands which enhance the landscapes of which they form part.
>
> ● Uplands, hills and moorland landscapes characteristically Scottish in their openness and quality of wildness …

The key message here is that the 'openness' of Scotland's moors should be retained. However it would appear that this SNH document has had little impact on overall government policy, or on those organisations seeking to significantly expand woodland cover.

O these large, heathery, silent hills. Treeless, peakless, and nearly rockless! Great masses of solitary silence, broken only by high rills, tumbling into raging and sparkling torrents in the valley! Were I to see it yearly for a thousand years, I cannot conceive that the impression would ever fade.
Lord Cockburn (Circuit Journeys)

The Scottish Forestry Strategy (2006)

This, previously referred to, states "We would like to see Scotland's woodlands increase from 17.1% of our land area to about 25%."

National Planning Framework 3 (2014)

This framework from the Scottish Government states:

> 4.21. We will increase new woodland creation to an average of 10,000 hectares per year from 2015.
>
> 4.23 We aim to increase the rate of woodland creation to deliver 100,000 hectares of new woodland over the next 10 years.
>
> 4.4 Scotland's landscapes are spectacular, contributing to our quality of life, our national identity and the visitor economy. Landscape quality is found across Scotland and all landscapes support place-making. National Scenic Areas and National Parks attract many visitors and reinforce our international image. We also want to continue our strong protection for our wildest landscapes - wild land is a nationally important asset.

Scottish Planning Policy (2014)

Extracts below:

> 194. The planning system should:
>
> ● Protect and enhance ancient semi-natural woodland as an important and irreplaceable resource, together with other native or long-established woods, hedgerows and individual trees with high nature conservation or landscape value;
>
> ● Seek benefits for biodiversity … including the restoration of degraded habitats and the avoidance of further fragmentation or isolation of habitats; [*presumably this includes moorland*]…
>
> 212. Development that affects a National Park, National Scenic Area, Site of Special Scientific Interest or a National Nature Reserve should only be permitted where:
>
> ● The objectives of designation and the overall integrity of the area will not be compromised; or
>
> ● Any significant adverse effects on the qualities for which the area has been designated are clearly outweighed by social, environmental or economic benefits of national importance.

Land Use Strategy for Scotland (2011)

This Scottish Government strategy does not mention moorland, although its proposal 7. states:

> Identify more closely which types of land are best for tree planting in the context of other land-based objectives, and promote good practice and local processes in relation to tree planting so as to secure multiple benefits.

Of relevance also is the statement on page 9: "the main focus of woodland creation will be away from prime agricultural land", *i.e.* largely on unimproved land (mostly moorland), although the strategy identifies the need for further research on carbon storage issues.

The Right Tree in the Right Place: Planning for Forestry & Woodlands (2010)

This Forestry Commission Scotland publication provides guidance on how to produce forest and woodland strategies, but does not mention moorland.

Considering moorland characterises the landscapes of half of Scotland, it is surprising that in the government's policy documents listed here it is rarely, if ever, mentioned.

The Environmental Impact Assessment (Agriculture) (Scotland) Regulations 2006

This is one government document where the importance of moorland is recognised. It is targeted at farmers seeking to improve natural and semi-natural vegetation.

The regulations include unimproved grassland, heath and moorland. The habitats it applies to are: coastal and floodplain marshes, meadows, marsh and grazing pastures, grassland with some tree cover (*e.g.* orchards, parkland, policies and wood pasture), lowland and coastal heathland (including dry and wet heath), moorland (including bog) and rough grazing, machair, other open or enclosed upland grassland, scrubland, watercourses, saltmarsh, ditches, ponds, lowland and blanket bogs, fens and other wetlands.

Hence if a farmer's activities are likely to significantly affect moorland, then an environmental impact assessment is required.

Other agricultural policy

High Nature Value Farming (HNV): The UK has approved EU level requirements for all Member States to identify, monitor and support their existing HNV farming systems (Regulation 1698/2005 establishing the European Agricultural Fund for Rural Development, EAFRD). The European Environment Agency (EEA) has identified three broad types of HNV farmland. 'Type 1' is defined as farmland with a high proportion of semi-natural vegetation. This would include all the moorland now being used for livestock grazing.

Although organisations such as the European Forum on Nature Conservation and Pastoralism are promoting the concept of HNV farming, moorland *per se* in Scotland is not recognised in most government policy as being of 'high nature value' – as indicated, for example, in the lack of mention of moorland in forestry policy and guidance.

Scotland's Biodiversity: It's in Your Hands

This is Scotland's Biodiversity Strategy (2004) which recognises the importance of many moorland habitats:

> Our country is internationally important for its heather moorland, its upland blanket bog and lowland raised bog, for its machair, and for its freshwater and seawater lochs.

As an action under 'Species & Habitats' it has**:**

> To halt the loss of biodiversity and continue to reverse previous losses through targeted action for species and habitats.

2020 Challenge for Scotland's Biodiversity

This 2013 document refers to a 'national ecological network', defined as:

> The array of woodlands, grasslands, moorlands, wetlands, rivers and lochs across great swathes of countryside, and also the smaller mosaics of hedgerows, marshlands and bogs, woodlands, pastures and arable land on individual farms.

Although the above two documents do recognise the importance of moorland habitats, the analysis here shows that there is no government policy dedicated to conserving moorland in the round.

Indeed, it is hard to see how the 'loss of biodiversity' can be halted as stated in the biodiversity strategy if the government's woodland expansion targets continue to reduce the extent of moorland.

Where the high mountains run, And the bonnie blooming heather, Where the ram and the deer, They go bounding together, Spend a long summer day, By the braes of Balquhidder.

Robert Tannahil (The Braes of Balquhidder)

Aneth my feet, The heather lifts its brash tang, An the cotton grass nods in quiet converse, Wi the scarlet cloudberries, Clustering in shy conclave, In the soggy turf.

William Landles (On Ellson Fell)

Scotland's National Peatland Plan (2015)

Much of Scotland's moorland is underlain by peat (see Maps 6.1, 6.2), although, as stated above, the distinction between 'peat' and 'non-peat' moorland is not clear cut owing to the general high organic content of all moorland vegetation types.

The peatland strategy recognises the importance of the peatland component of moorland, and the need for restoration where possible, but is not a locational strategy as such.

2. Landscape designations

The distribution of moorland in relation National Parks and National Scenic Areas is shown in Maps 5.1, 5.2 and 5.3.

Cairngorms National Park

Extracts from the *National Park Partnership Plan 2012-17*:

Vision

1. The distinct character of the Park's landscape and its diverse mix of mountains, straths, glens, forests and farmland will continue to be conserved and enhanced, shaped by natural processes and positive management. *[moorland not mentioned]*

Special Landscape Qualities – Moorlands: Extensive moorland, linking the farmland, woodland and the high tops.

Outcomes

4. The quality and connectivity of habitats is enhanced.

Area of woodland

Increase of 5% (c.4,000 ha) in total woodland area.

The park does recognise the role of moorland in the landscape, as shown in this extract from the *Nature Action Plan 2013-18*:

> Heather moorland in the uplands plays a huge part in the look and life of the National Park. It covers around 40 per cent of the land. The tones of ling, bell heather, other woody shrubs, grasses and sedges that grow in the moors are a fundamental aspect of the seasonal shifts of colour in the Park. These moors support animals like the economically important red grouse, rare netted mountain moths, and reptiles like the adder.

However in its vision for the National Park in 2063 it states:

> A natural transition from woodland to montane scrub to upland heath is developing throughout the National Park.

By 'upland heath' it means the short wind-pruned heathland found at the highest altitudes, not the heather moors that characterise most of the hill slopes and lower hills. It would appear that there is no space for such moorland in this vision: the implication is that the park authority would like to see all developing into woodland and scrub in the long-term. However the vision continues:

> Productive grouse moors and high-quality stalking remains a mainstay of life, contributing environmentally, economically and socially.

There seems to be a contradiction here, for if the vision of woodland ascending to a high altitude tree-line is fulfilled, there will be no space for lower altitude moors.

The Partnership Plan refers to the 'connectivity of habitats' but there is no mention of how this relates to moorland where new woodland connectivity is likely to fragment moorland further.

It would appear that there is no clear long-term locational guidance for moorland within the National Park.

Loch Lomond and The Trossachs National Park

Under the heading 'Conservation', the national park authority states:

> **Landscape Management:** We care for this ancient and diverse landscape and the biodiversity that it sustains. It boasts mountains, moors, geodiversity, forests, farmland, glens, historic sites, cultural traditions.

Extracts from the *National Park Partnership Plan 2012-17*:

> **Con Policy 2**: Natural heritage native species, habitats and geodiversity features within the National Park should be protected and enhanced through management and development that is in keeping with the Park's protected status.
>
> **Priority will be given to:**
>
> c) An ecosystems approach focusing on peatland, wetlands, heath, moorland and woodland at a landscape scale to deliver carbon sequestration, flood management and the creation of integrated habitat networks across the Park as part of the National Ecological Network for Scotland, that delivers resilience to climate change and mitigates fragmentation.
>
> **C3 Integrated Habitat Network**
>
> By end 2013 identify key areas of woodland, wetland, grassland and moorland/heathland habitats that need to be protected, enhanced and/or expanded, connecting to the Central Scotland Green Network.

In this plan, moorland is recognised as one of many habitat types of value in the park but at present it is unclear if there will be locational guidance for moorland in the future, and how it will contribute to any habitat network.

National Scenic Areas

NSAs, together with the National Parks, are Scotland's national landscape designation, identifying the finest landscapes of Scotland. In the majority of these, moorland is recognised as contributing to their special qualities, as indicated below (extracted from *The Special Qualities of National Scenic Areas*, SNH Commissioned Report 374, 2010). Note that woodland and other landscape types are also recognised as 'special qualities' in many NSAs.

Fleet Valley: Moving inland there is a gentle transformation through ordered farms and fields, to a landscape with a wilder feel of hills and moors

Eildon and Leaderfoot: Contains a rich intermingling of landscape types, with sharp delineation between the long-established settlements, the fertile fields, the woodlands, the rough grazing and the steep, heather-clad slopes. The visual and spatial patterns formed by woodlands, enclosed fields, unenclosed moorlands, together with the colours of fallow or ploughed lands and pastures, all give a strong sense of unity and lively rhythm

Upper Tweeddale: Expansive, open hills with panoramic views

North Arran: The interior is rocky, wild, unpopulated and mountainous, with a surrounding foil of moorland and coniferous forestry

Jura: Human settlement on the margins of a vast moorland terrain

Knapdale: The ridges are often bare rock or grassy moorland where the variety of skylines are revealed

On the hillside by the shieling, My Mairi my beloved, Like the white lily floating in the peat hag's dark waters.
Kenneth Macleod, trans. Marjory Kennedy-Fraser (An Island Sheiling Song)

Oh the green hills, the clean hills, I lue them weel aneuch, But mair still the bare hills, Wi mony a craig and cleugh; The rouch hills, the teugh hills, That froun dour and grim, The hie hills, the stey hills, They daur ye to sclim.
Douglas Fraser (The Spell o' the Hills)

as rounded, undulating, sweeping, crenulated or toothed moorland

Loch na Keal: There is little tree cover to break-up the exposed hills and slopes, woods only occurring in sheltered gullies and on a few steep slopes

Loch Rannoch and Glen Lyon: The high tops, slopes and moors are mountain terrain, only accessible on foot. A climb to the summits is a journey from habitation into a wild landscape of ridges, corries and cliffs, seemingly remote from civilisation and at the mercy of the elements

River Earn (Comrie to St Fillans): With its bare, rocky open hills descending through slopes of wood and bracken to the fields on the flat valley floor, this area of Strathearn exhibits a unity and coherence

Assynt-Coigach: The lone mountains stand as the hallmark of the area, but there are also bluffs, sweeping moorlands, sea cliffs, lush grassy slopes with rocky outcrops, massive boulder fields and scree slopes, caves and shallow gorges, sink holes, jagged pinnacles and broad, powerful sweeping summits. Concentrations of pasture around small crofting settlements on the coast and inland around Elphin, offer an occasional contrast to the general dominance of mountains, moorland and rock. A landscape of vast open space and exposure

Ben Nevis and Glencoe: A land of classic highland vistas. The mountains, moors and glens are visited by many of those in search of the outstanding scenic experience. Human settlement dwarfed by the mountain and moorland

The Cuillin Hills: A fitting contrast to the dramatic steep-sided mountains is provided by the undulating moorland and grassland that surrounds them, and by the flat-bottomed, once glaciated glens. Signs of human activity are minimal and the whole area comes across as wild and untamed

Glen Affric: A glen of transition, from dense forest to exposed moorland

Glen Strathfarrar: This is an inspiring and invigorating landscape where many of the features considered as romantic and iconic of the Highlands are found within a small area: distant views of snow-capped mountains; rocky ridges and heather-clad slopes; a rock-bound loch and glen; a rushing river; dark Caledonian pinewoods and beautiful individual trees

Knoydart: The landscape is clothed with a natural vegetation of open moorland, and in many places native woodland clings to the lower and steeper slopes. The combination of wildness, naturalness and remoteness is a major draw to those seeking an experience of wilderness

Kyle of Tongue: Ben Hope and Ben Loyal, standing isolated above the open moorland, are well known as two of the finest mountains in the north

Loch Shiel: The rich variation in topography results in exciting scenery. There are rugged massifs, interlocking peaks, linear ridges, extensive areas of moorland, rough pasture and a complex shoreline

Morar, Moidart and Ardnamurchan: The interior is rugged, rock-strewn moorland, with great tracts of land uninhabited and not served by any roads, being accessible only to the walker. This imbues the landscape with a strong sense of solitude and peace, although at times tinged with melancholy owing to the evidence of long-gone populations

Northwest Sutherland: A complex cnocan landscape of rock, water and sky. Across this uneven and treeless topography no two horizons are the same, although the sky always a dominant feature. It is an unusual landscape of great fascination

The Small Isles: Populated fertile areas within a hinterland of moorland

Trotternish: The mountain ridge, with its undulating horizon and its landslip below, provides an ever-present backdrop, hanging over the moorland and crofts beneath

Wester Ross: The large sweeps of open, expansive moorland

South Lewis, Harris and North Uist: The different island landscapes of mountain, moorland, croftland, coast and sea here come together to create an area of exceptional scenery

Hoy and West Mainland*:* The contrast between the fertile farmland and the unimproved moorland

Shetland: Coastal settlement and fertility within a large hinterland of unsettled moorland and coast

In theory the Scottish Planning Policy (see above) should provide protection for moorland where it has been identified as a special quality of an NSA through the policy steer: "Any significant adverse effects on the qualities for which the area has been designated are clearly outweighed by social, environmental or economic benefits of national importance." However experience to date suggests that new woodland creation schemes are taking place on moorland in such NSAs, for example Wester Ross (Map 4.4).

It is perhaps surprising that, considering moorland is identified as a special quality of so many NSAs, there is no government policy directed at conserving it.

Additional to NSAs there are local landscape designations identified in local authority development plans, but note that no analysis of their content has been undertaken here.

3. Nature conservation designations

The distribution of moorland in relation to Sites of Special Scientific Interest (SSSI) is shown in Maps 5.1, 5.2 and 5.3. Sites designated under the EU Habitats Directive (SACs – Special Areas of Conservation) have not been included on these maps because they are all underlain by SSSIs.

Each SSSI contains a list of 'notified features' and moorland plant communities are often included in the list. However, where woodland communities are also included then expansion of woodland is often accepted, which in general means a loss of moorland.

Hence designation of a site as an SSSI does not necessarily protect the moorland from further loss. The exception is where the site underlies a Special Protection Area (SPA) for golden eagles under the EU Birds Directive, and the aim is to keep the land open as a feeding ground for the birds. The SPA then becomes a *de facto* landscape designation. See Forestry Commission Scotland (2013) for further information on this. The extent of SPAs is also shown on Maps 5.1-3; note that, unlike SACs, not all SPAs are underlain by SSSIs.

There has been no analysis here of which SSSIs possess moorland plant communities as notified features, and on which of these woodland is to be encouraged. Hence it is not possible to state how much protection is provided to moorland through the SSSI system – more analysis is needed.

Blows the wind to-day, and the sun and rain are flying, Blows the wind on the moors to-day. Robert Louis Stevenson (Blows the Wind Today)
Sharing the hilltop with the Border wind, the whispering heather and the curlew's cry. Will H Ogilvie (If I Were Old)

Table 1. Area statistics

FEATURE *Order of magnitude figures*	**Sq km**	**Percentages**	**Notes** *None of the moorland areas have been adjusted for slope*
Total land area Scotland	78,770		*Source: Scottish Government*
Land area mainland Scotland	68,370	87% total area	Area of Scottish islands >40ha deducted from above figure *Source: Wikipedia*
Area woodland/forest	14,200		Includes islands *Source: FCS*
Area SRDP Woodland Creation option	520		Includes some non-moorland areas *Source: Forestry Commission Scotland*
Total area of woodland	14,720		Woodland inventory + SRDP
Total area woodland on mainland Scotland	14,000	20% mainland Scotland	Estimated 700 sq km woodland on islands
A. Core moorland area (mainland Scotland)	26,780	39% mainland Scotland	Includes the area of some freshwater lochs *Source for A-D: dataset created here*
A. Subdivided core moorland in the north	6,800		Area within dashed lines on maps
B. Subsidiary areas of moorland (mainland Scotland)	1,700	6% mainland Scotland	Brown on maps; Includes the area of some freshwater lochs
C. & D. Fragmented & isolated areas of moorland (mainland Scotland)	1,660	6% mainland Scotland	Estimated at 50% moorland cover
Total area of moorland (mainland Scotland)	30,000	44% mainland Scotland	Includes the area of some freshwater lochs
Area under trees assuming 25% Forestry Strategy target achieved	20,000	25% land area Scotland	
Area additional planting required	5,000		This is the area of moorland which could be lost
Assuming most new planting on moorland on mainland Scotland, resultant area of moorland on mainland Scotland	25,000	37% mainland Scotland	

C. THE CURRENT STATUS OF MOORLAND

1. Extent of moorland

A new moorland dataset in shape file (vector) format has been created for this exercise, consisting of 1760 polygons. This has been derived from SNH's EUNIS Landcover (2014), Forestry Commission National Forest Inventory (2014), the FC Woodland Creation Options (under the SRDP (2015), and with some checking under Google Earth (2015).

The maps at the end of this document illustrate the distribution of moorland using this dataset. Map 1.1 presents an overview of the current distribution of moorland in mainland Scotland, with more detailed maps 2.1-2.3 and 3.1-3.9. The extent matches well the distribution of 'perceived naturalness' as identified in SNH's wildness mapping exercise (Map 1.2). Additionally all the moorland is within the agriculturally-determined 'Disadvantaged Areas' and 'Severely Disadvantaged' areas (Map 1.3).

As previously mentioned, four categories of moorland have been identified. This categorisation should be seen as a starting-point for debate rather than a definitive classification because an element of subjectivity is inevitable in allotting a given area to a given category.

However the mapped polygons should be relatively accurate in showing the current distribution of moorland (as at September 2015). But note that areas identified under the SRDP have been mapped as woodland even though the area might not yet have been planted.

For categories A and B, the map shows the actual extent of moorland. For categories C and D, the mapped areas often include non-moorland habitat between the moorland fragments. In category D, the non-moorland area is often in the majority.

A. Core areas

These are the larger continuous areas of moorland, with minor inroads only. In the Lowlands they also include the last remaining relatively unfragmented areas, which may be small in area, such as in Banffshire, the Sidlaws or the Cleish Hills. All core areas have been given names, illustrated in Maps 3.2-3.9.

In the North Highlands, the core areas are large and so have been subdivided into the least fragmented 'key core areas', as shown in Map 3.1. They are also named.

B. Subsidiary areas

Other significant areas of moorland which remain relatively unfragmented, generally adjacent to core areas.

C. Fragmented areas

Moorland with significant inroads or discontinuous areas which were once part of a larger area.

D. Scattered remnants

Small, discontinuous remnants, sometimes widely separated, particularly in the lowlands.

Table 1 gives order of magnitude area statistics for the different moorland categories and also relates the area of moorland to other Scotland-wide statistics.

Hae ye whupped the whurling eddies, By the brow'd, loud linn? Hae ye tracked the tired buck upon the brae? When ye couched it in the heather, We ye chittered by the win? Hae you waukened in the mist at skreigh o Day?
Matt Marshall (Wine o Living)

Wiry heathpacks, flitches of fern, And the beadbonny ash that sits over the burn. What would the world be, once bereft, Of wet and wildness? Let them be left, O let them be left, wildness and wet; Long live the weeds and wilderness yet.
Gerard Manley Hopkins

In summary, mainland Scotland has 30,000 square kilometres of moorland (44% of the land area), which would reduce to 25,000 sq km (37% of the land area) if the *Scottish Forestry Strategy* is implemented in full and most new planting were on moorland in mainland Scotland.

It is estimated that in 1700 woodland covered less than 5% of Scotland and now there is a target of 25% cover. Considering that most plantations since 1700 have been on moorland and, taken together with the loss of moorland to agricultural improvement, the reduction in moorland must represent one of the biggest losses and fragmentation of natural and semi-natural habitats of any country in Europe in recent centuries. Because habitat loss is seen as one of the biggest ecological issues facing the planet, it is surprising that there has not been more concern about the continuing loss of Scotland's moorland.

2. The importance of moorland

Landscape and culture

SNH's Landscape Policy Framework referred to previously succinctly states the importance of moorland to the Scottish landscape: "Uplands, hills and moorland landscapes characteristically Scottish in their openness and quality of wildness."

Over most of history, moorland has been by far and away the dominant landscape type in Scotland and has shaped the character of the Scottish people. It characterises upland Scotland. Even though most people now live in the towns and cities, the concept of 'the hills' remains strong in the Scottish psyche. This is illustrated in the quotes given here at the bottom of each page.

The European Landscape Convention commits the government to identifying the country's landscape and the values the people ascribe to them. Although the landscapes of Scotland have now been well described by SNH, the assessment of their value has not as yet been carried out.

Biodiversity: Habitats

The following habitats are those moorland habitats listed on Annex 1 of the EU Habitats Directive as being of international importance, and for which the UK has a special responsibility as assessed by the Joint Nature Conservation Committee (JNCC, 2015):

- Wet heathland with cross-leaved heath
- Dry heaths
- Alpine and subalpine heaths
- Montane acid grasslands
- Species-rich grassland with mat-grass, in upland areas
- Active raised bogs
- Blanket bog

The following woodland/scrub types are similarly recognised, although it should be noted that they occupy a very small percentage of the land area of Scotland:

- Mountain willow scrub
- Western acidic oak woodland
- Caledonian forest

An additional internationally important habitat is liverwort-rich moorland. Note that the classification 'species-rich grassland with mat-grass, in upland areas' is a habitat type specifically designed for the Habitats Directive to prevent 'species-poor mat grass' communities, which are abundant in southern Scotland, from being included in the directive. Mat grass habitats are in fact rare in European terms but it was felt that the habitat type had to be restricted to prevent too onerous a burden falling on Scotland (information from the late John Miles, ecological adviser to the then Scottish Executive).

It would appear that the majority of vegetation types found on moorland are of international importance and for which the UK has a special responsibility. Hence it is surprising that no account is taken of this international importance when woodland expansion is being planned outwith SSSIs.

Additionally, many plant species found commonly on moors are rare in a European context, such as bog asphodel and cross-leaved heath; and heather (*Calluna*) is a much rarer plant globally than Scots pine: heather moorland can be seen as a rare global habitat, with Scots pine woodland a common one. However, owing to the importance of 'rarity' as a criteria for assessing conservation value, it is perhaps the case that locally rare species and habitats are perceived to have more value even if globally common.

But from an international perspective, our locally common but globally rare species and habitats are the most important. It is always likely to be more successful to conserve species and habitats at the core of their ranges – and when they are still common. Scotland is the core range for most European moorland habitats. However, woodland expansion continues to cause a reduction in the area of these internationally important areas.

Biodiversity: Birds

In terms of birds found on moorland, many species are found on both moorland and non-moorland habitats. An initial list of the commoner predominantly moorland birds (excluding waterfowl) is given below. All are 'Birds of Conservation Concern' (Amber or Red Listed – see Eaton *et al.,* 2009) except the stonechat.

- Red grouse (-1%)
- Golden plover (-29%)
- Lapwing/peewit (-59%)
- Curlew (-55%)
- Snipe (+12%)
- Skylark (-28%)
- Stonechat (-36%)
- Wheatear (-20%)
- Meadow pipit (-19%)

Additionally the black grouse is found on the moorland edge, generally adjacent to woodland.

The figures in brackets represent the population change in the period 1995-2013 (data from the British Trust for Ornithology (BTO) Breeding Bird Survey 2014). Additional birds characteristic of moorland, but which are not included in the BTO survey, are:

- Golden eagle
- Hen harrier
- Merlin

The population trend data indicates that the majority of moorland birds have suffered a significant decline in recent years. It is a possibility that this is brought about by a decline in open habitats through the increasing preponderance of woodland in the landscape, which also encourages more potential predators. As moorland continues to be replaced by woodland, it should be noted that species associated with woodland will increase. This is reflected in SNH's biodiversity indicator 'Abundance of Terrestrial Breeding Birds' which indicates a decline in upland birds since 1994 and an increase in woodland birds (SNH, 2015).

Economy

Viewed in economic terms, Scotland's moorlands provide a range of economic benefits:

And all around hills huddled in silent spaces, long brown moors crowned with cairns, or steep fortresses of rock and shingle rising to foreheads of steel-like grey. The autumn blue faded in the far sky-line to white, and lent distance to the furthest peaks… I am an old connoisseur in the beauties of the uplands, but I held my breath at the sight.

John Buchan (Streams of Water in the South)

– Extensive, high nature value farming
– Recreation (outdoor activities)
– Field sports
– Tourism (draw of tourists to Scotland)
– Energy (wind and hydro)
– Ecosystem services/natural capital

There have many reports over the years on the economic benefits of such activities, but ascribing precise economic value tends to be fraught with difficulties. Suffice it to say here that the presence of moorland provides significant economic benefit to Scotland.

In terms of ecosystem services, on which there is an extensive literature, only carbon storage will be highlighted here, although it should be noted that there has probably not as yet been an objective comparison between the services provided by woodland or moorland on the same site.

Maps 6.1. and 6.2 illustrate the coincidence of carbon-rich soils and peat, and show a high correlation between the two – except for steep slopes, the higher mountain tops (classified here as moorland) and certain more eastern moors. Calculations suggest that an organic layer of only 15 cm can hold as much carbon as an equivalent forest (see, for example, Fenton 2014); hence the benefits of woodland over moorland as a carbon store tend to be overstated. Peat can continue to sequester carbon for thousands of years, whereas the amount of carbon stored in a forest will eventually stabilise. Additionally, trees planted on organic soils can cause soil carbon to be released through oxidation; and forestry practise, particularly clear felling, can also release stored carbon through soil disturbance.

The work of Richard Tipping indicates how blanket peat can slowly spread over the landscape (Tipping, 2008). Hence even moorland underlain by shallow peat or a deep humus layer could in time become a significant carbon store. Indeed, the shallower the organic layer at present, the greater the long-term potential for carbon storage because the deeper the peat becomes the more likely it is that carbon sequestration will slow down and/or erosion set in.

D. A VISION FOR MOORLAND

Suggested vision

There is still a debate to be had in Scotland on how much we want moorland to remain part of the Scottish landscape, which in practice means the optimum balance of woodland and moorland. The vision below is based on SNH's Landscape Policy Framework and should be seen as starting point for discussion.

We wish the uplands, hills and moorland landscapes to remain characteristically Scottish in their openness and quality of wildness, with the current area of unfragmented moorland being retained.

E. DEVELOPING A LOCATIONAL STRATEGY

1. Identification of core areas

The essence of a locational strategy is to identify the core areas of moorland to be retained as such. To provide clarity, it needs to be map-based, in the same way as indicative forestry strategies. The maps here provide a starting point for discussion on the location of the core and subsidiary areas.

If areas are to be identified as core areas there needs to be a reasonable expectation that they can be retained as such. Ecological theory indicates that the larger the area, the greater likelihood of conserving the ecological processes which maintain the relevant ecosystems.

Isolated fragments in the lowlands are vulnerable to successional change, particularly to scrub and woodland. This is especially true if livestock grazing ceases on a previously grazed area, or they are surrounded by woodland or conifer plantations. If there is no possibility of reinstating grazing, then it might be unrealistic for the areas to remain as open moorland.

In larger areas, external factors may cause vegetation change from one moorland type to another moorland type, *e.g.* heather to grass or grass to heather, or unburnt to burnt heather. This is of little importance if the aim is to conserve moorland in the round, but if the aim is to conserve a specific vegetation type, then this can be more difficult to achieve; this is because some changes may be brought about by factors which are hard to influence such as climate change or grazing by indigenous herbivores.

In terms of climate change, moorland habitats are in general more robust (resilient) than woodland habitats, as demonstrated by their long-term dominance in Scotland over the millennia (at least 4,000 years) – during a period when there have been many climatic shifts. Native woodland is particularly sensitive (less resilient) to change owing to the vulnerability of seedlings and saplings to external forces.

The maps here have identified 27,000 sq km of core moorland (39% of mainland Scotland), with a further 1,600 sq km of subsidiary moorland. The maps also identify the largest, unfragmented areas in the north, covering 6,800 sq km. These latter areas should be seen as the absolute minimum to conserve in an unfragmented state.

It is in Argyll and southern Scotland that there has been the most widespread fragmentation, with the remaining core areas having a high ratio of edge to volume. Such long perimeters enclosing relatively small areas result, long-term, in the least stable areas with the maximum potential for colonisation by non-moorland species.

As well as conserving the remaining small core areas in the lowlands (discussed below), there is a strong case for retaining some of the smaller identified core areas in the Highlands, such as Dunnet Head in the north or Southend (Mull of Kintyre, see front cover) in order to retain a locally distinctive landscape type.

In summary: There needs to be agreement on the areas of moorland to be retained as such in the light of its continual loss and fragmentation through forest/woodland creation.

2. Fragmented areas

There is a dilemma here because the fragmented areas of moorland are the most vulnerable to change but might also represent the last reservoir of species or

How finely swept the noble deer across the morning hill, While fearless played the calf and hind behind the running rill; I heard the black and red cock crow, and the bellowing of the deer – I think these are the sweetest sounds that man at dawn may hear.

Duncan Ban Macintyre, trans Robert Buchanan (On Ben Dorain)

landscape-types which were once common in the locality.

Hence there is a strong case for both prioritising them for conservation, and for accepting change to a non-moorland habitat.

The maps here have got around this problem in the lowlands by identifying the largest remaining fragments as core areas (even though they may be small), and hence a priority for conservation.

But generally the fragmented moorland would be the best areas for targeting new woodland, particularly in areas where moorland is still common. However, in some cases in the lowlands, the fragmented areas might be valuable stepping-stones in a wider habitat network; hence in certain instances there might be a case for re-joining/restoring fragmented areas to provide more resilient stepping stones. They will probably have to be considered on a case-by-case basis.

In summary: Woodland creation should be targeted at fragmented areas of moorland, particularly those in localities where moorland is still common.

3. Relation to the Forestry Strategy

The *National Planning Framework 3* has a target of another 1,000 sq km of forestry within the next ten years. Table 1 indicates that there is 1,650 sq km of fragmented moorland and 1,620 sq km of subsidiary moorland.

Hence the target could be achieved without impinging on the areas identified here as core moorland.

However it will be impossible to achieve the *Scottish Forestry Strategy*'s target of 5,000 sq km of new forestry without significantly impinging on the core areas. The small remaining cores on the upland fringe and in the lowland areas are under the most threat.

In summary: The Scottish Government's (SG's) target of 100 sq km of woodland to be created every year for the next 10 years can be achieved without impinging on the remaining core areas of moorland.

However, meeting the SG's target of 25% of Scotland under trees would necessarily impinge on the core areas.

4. Conservation mechanisms

There is no government Moorland Strategy to balance the *Scottish Forestry Strategy,* and hence no strategic guidance on the conservation of moorland.

Such a strategy could help guide the existing conservation mechanisms previously mentioned: Scottish Planning Policy, National Park Plans, National Scenic Area policies/strategies, local landscape designations, local authority development plans, environmental impact assessment, and agri-environment schemes; it could also help clarify for SSSIs whether to prioritise woodland over moorland or *vice-versa.* Fundamentally, though, it would guide future indicative forestry strategies.

It would appear that there are enough mechanisms in place to retain moorland in its rightful place as a key element of Scotland's landscape – but only once the people of Scotland and its government have provided the necessary strategic push in this direction.

In summary: There are current mechanisms in place to safeguard moorland, but it would appear that in practice moorland is not being safeguarded through them. What is needed to achieve this is strategic locational guidance.

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Let us give thanks for the things of the north…For winds and rain that scour endless miles of rippling heather, for an elemental wildness that knows little of cities and towns, for an understanding that in stark harshness blinding beauty there abounds, for those who walk and seek to find.

Rennie McOwan (The Things of the North)

MAP CONTENTS

MAP KEY: MOORLAND CATEGORIES

Note that to date only the moorland on mainland Scotland has been mapped

A. Core areas
Continuous areas of moorland, with minor inroads only.
In the Lowlands, the last remaining relatively unfragmented areas.
Mapped area matches extent of moorland

Subdivisions of core areas in the Highlands, – north and west of the solid black line.

B. Subsidiary areas
Other significant areas of moorland.
Mapped area matches extent of moorland

C. Fragmented areas
Areas with significant fragmentation, often discontinuous.
Mapped area includes non-moorland

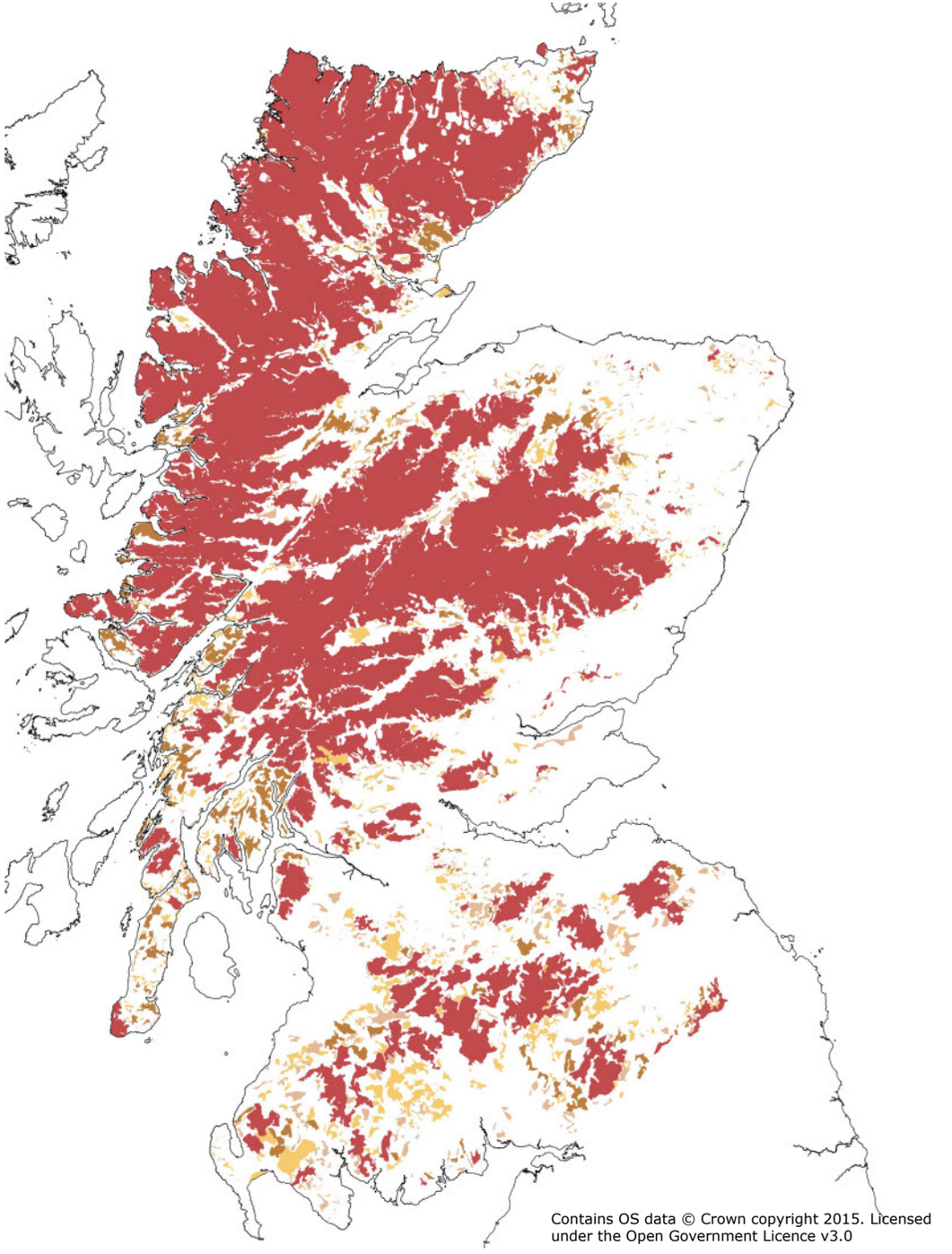
D. Scattered remnants
Small, discontinuous remnants.
Mapped area often includes significant areas of non-moorland

All maps except 1.2 derived from the following datasets:
EUNIS Land Cover Scotland (Nov 2014)
Forestry Commission National Forest Inventory 2014
Forestry Commission Woodland Creation Boundary (SRDP, May 2015)
Google Earth (Sept 2015)

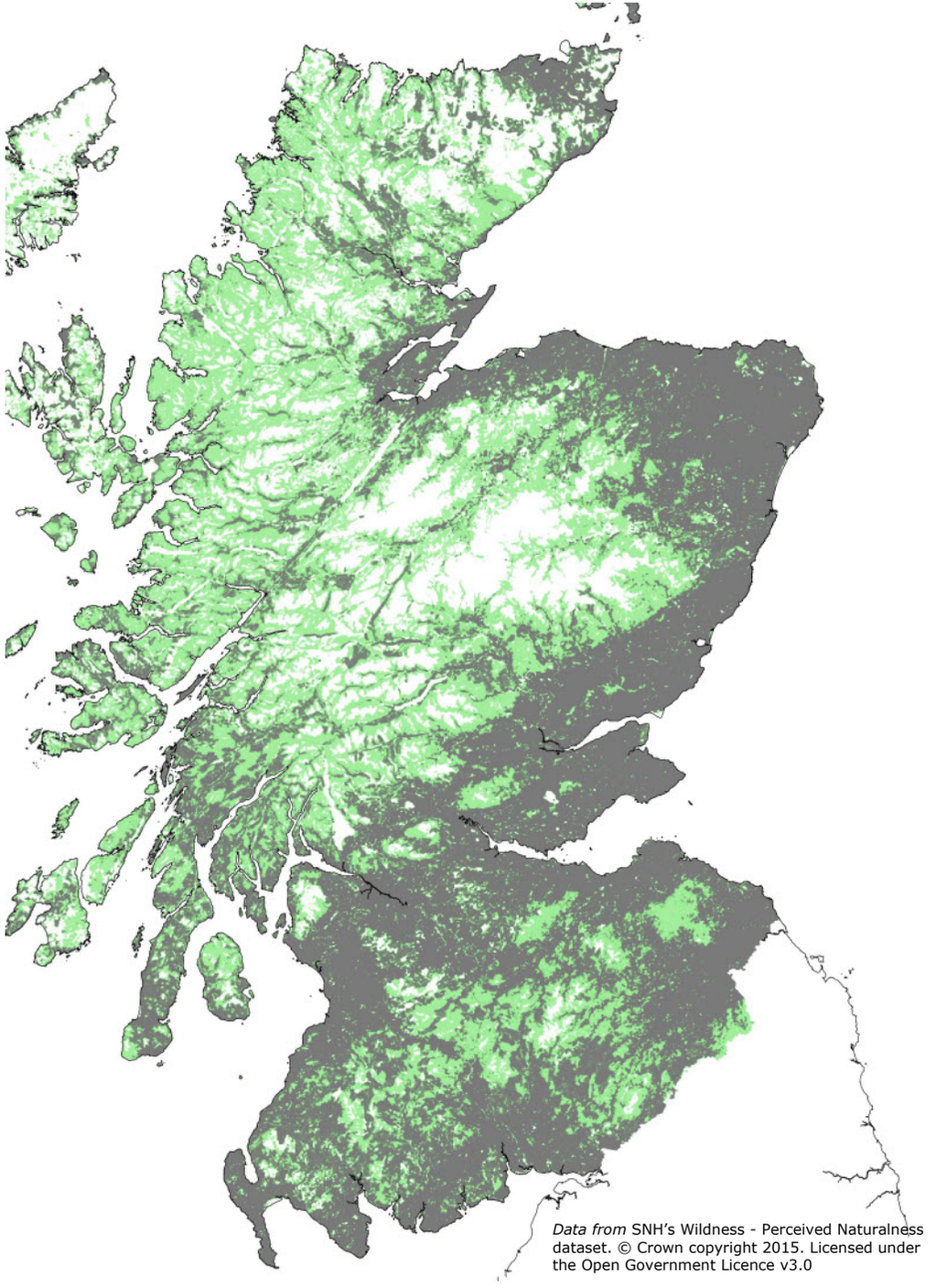
Moorland dataset produced by James Fenton using QGIS. Higher resolution maps are available on request.

Shape files of the 1760 mapped polygons of moorland can be provided by James Fenton.

Contact info@james-hc-fenton for further information.

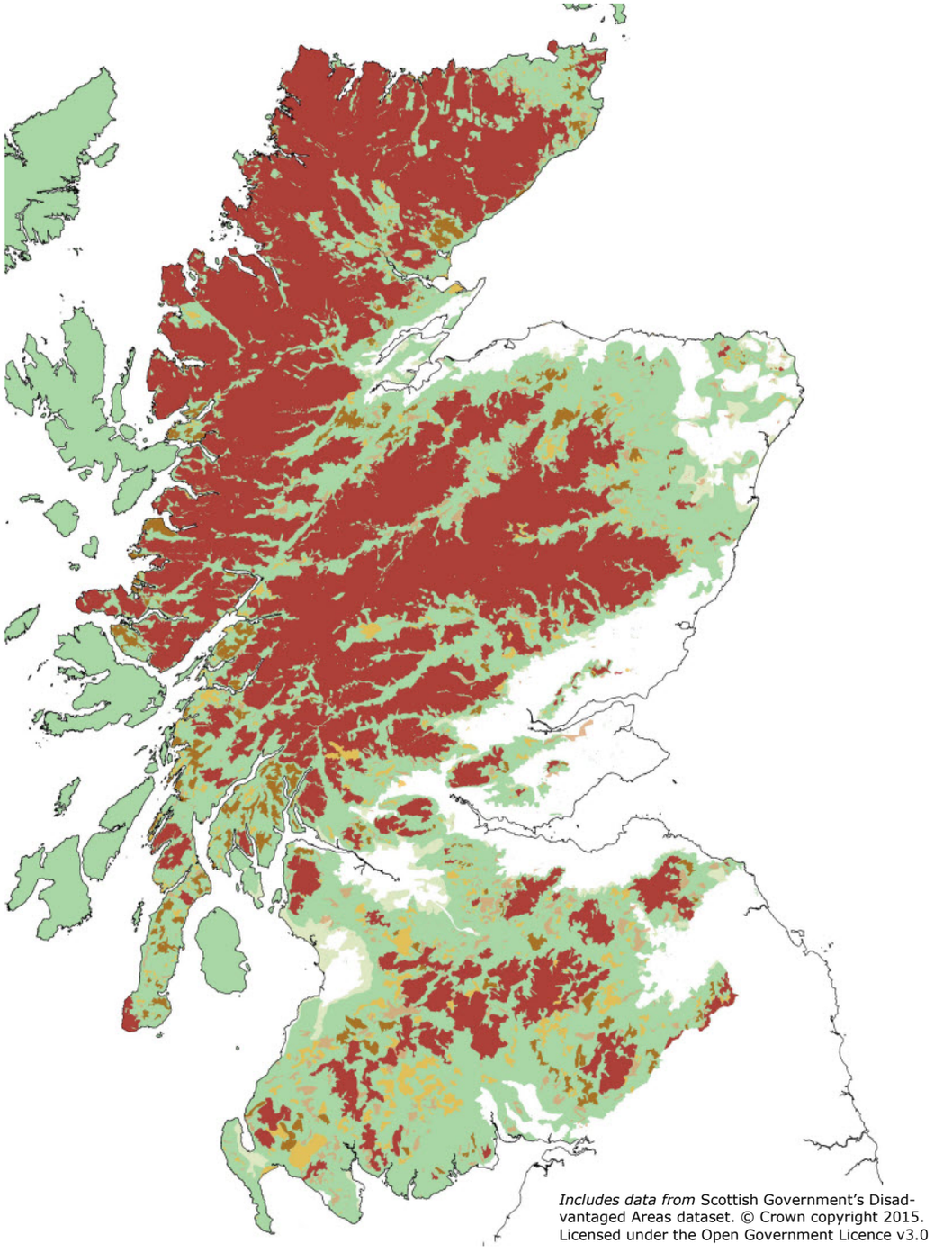


Map 1.1. Overview of distribution of moorland in mainland Scotland



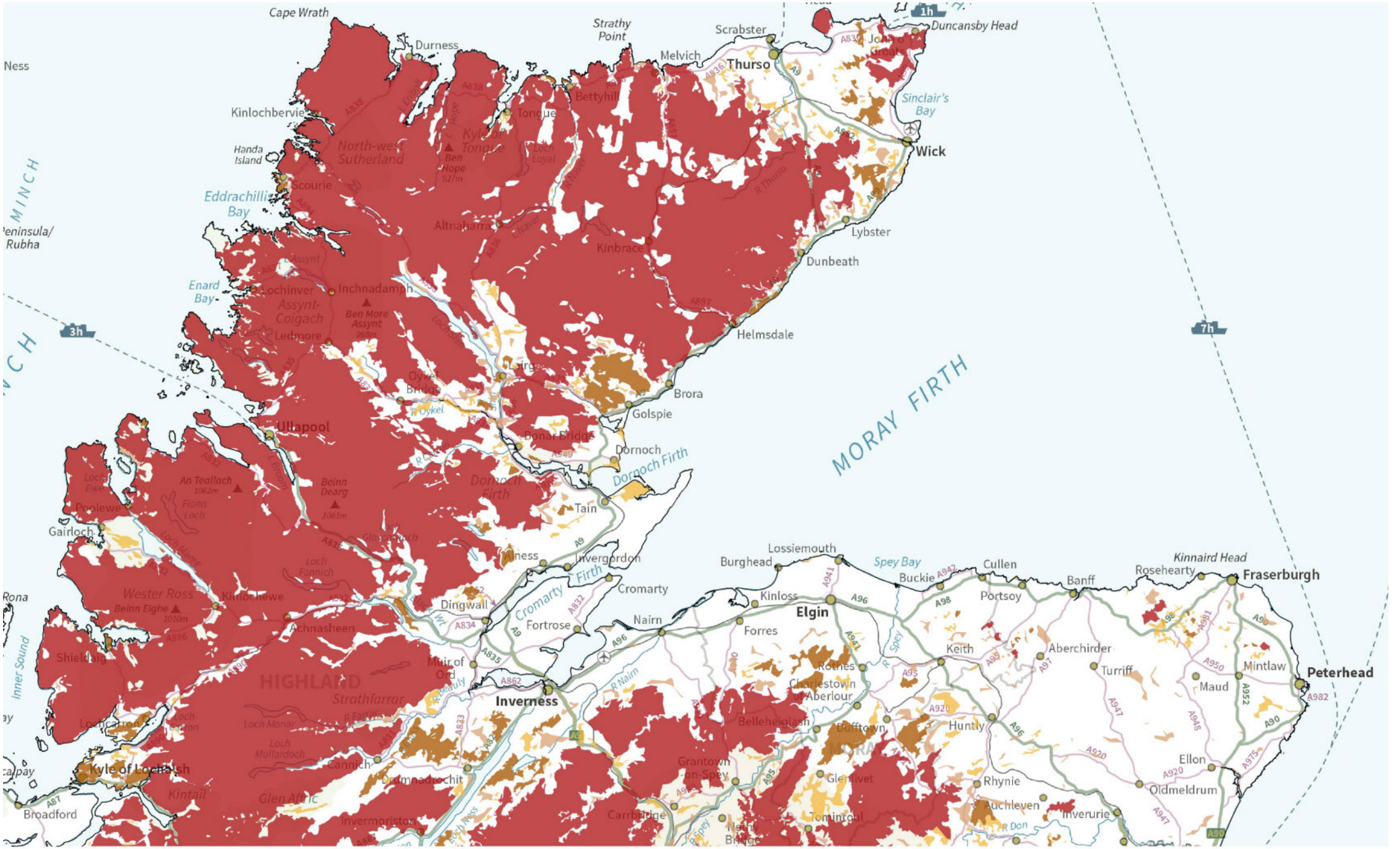
Data from SNH's Wildness - Perceived Naturalness dataset. © Crown copyright 2015. Licensed under the Open Government Licence v3.0

Map 1.2. SNH's map of 'perceived naturalness' for comparison
KEY: **White** – natural; **green** – intermediate natural; **grey** – least natural

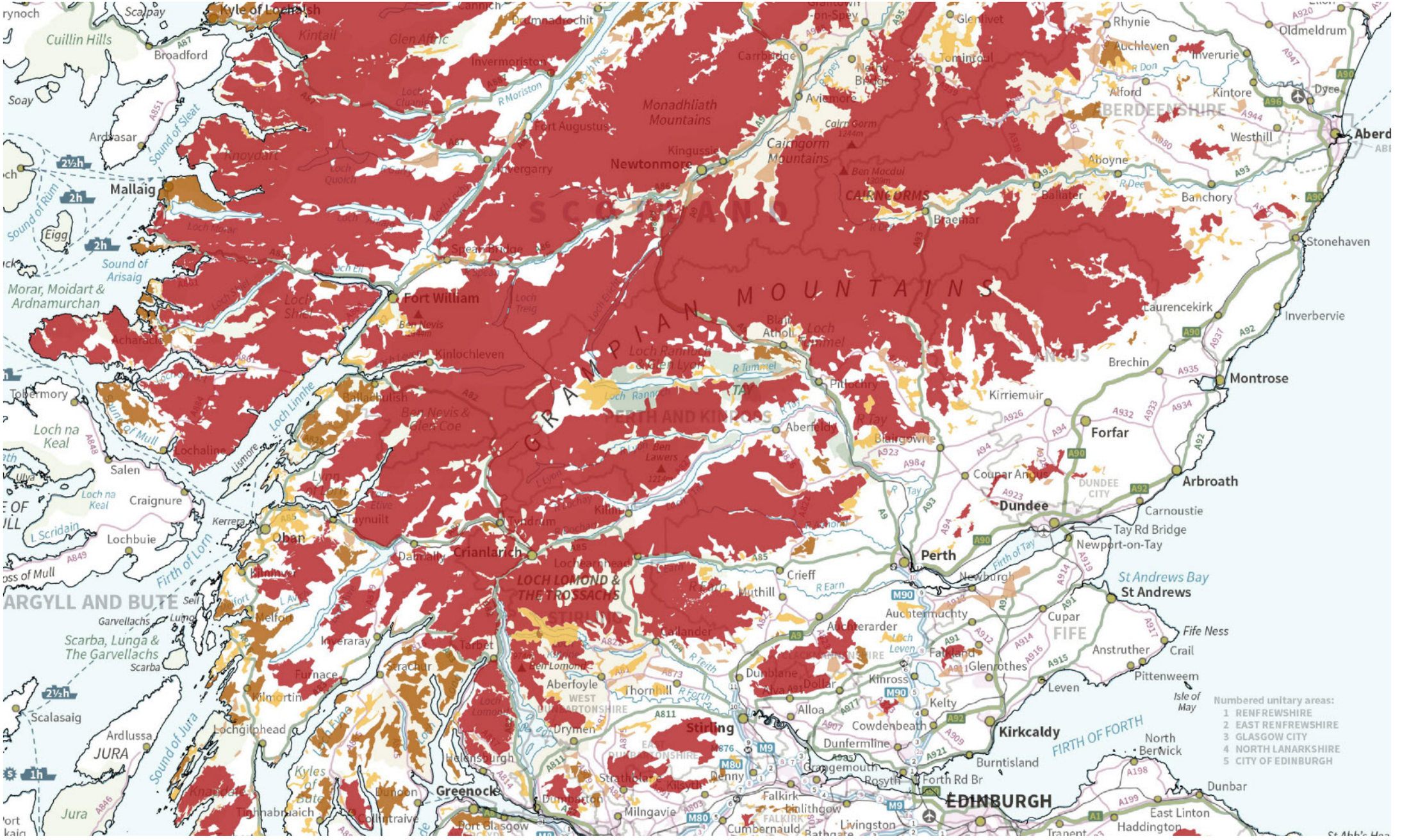


Includes data from Scottish Government's Disadvantaged Areas dataset. © Crown copyright 2015. Licensed under the Open Government Licence v3.0

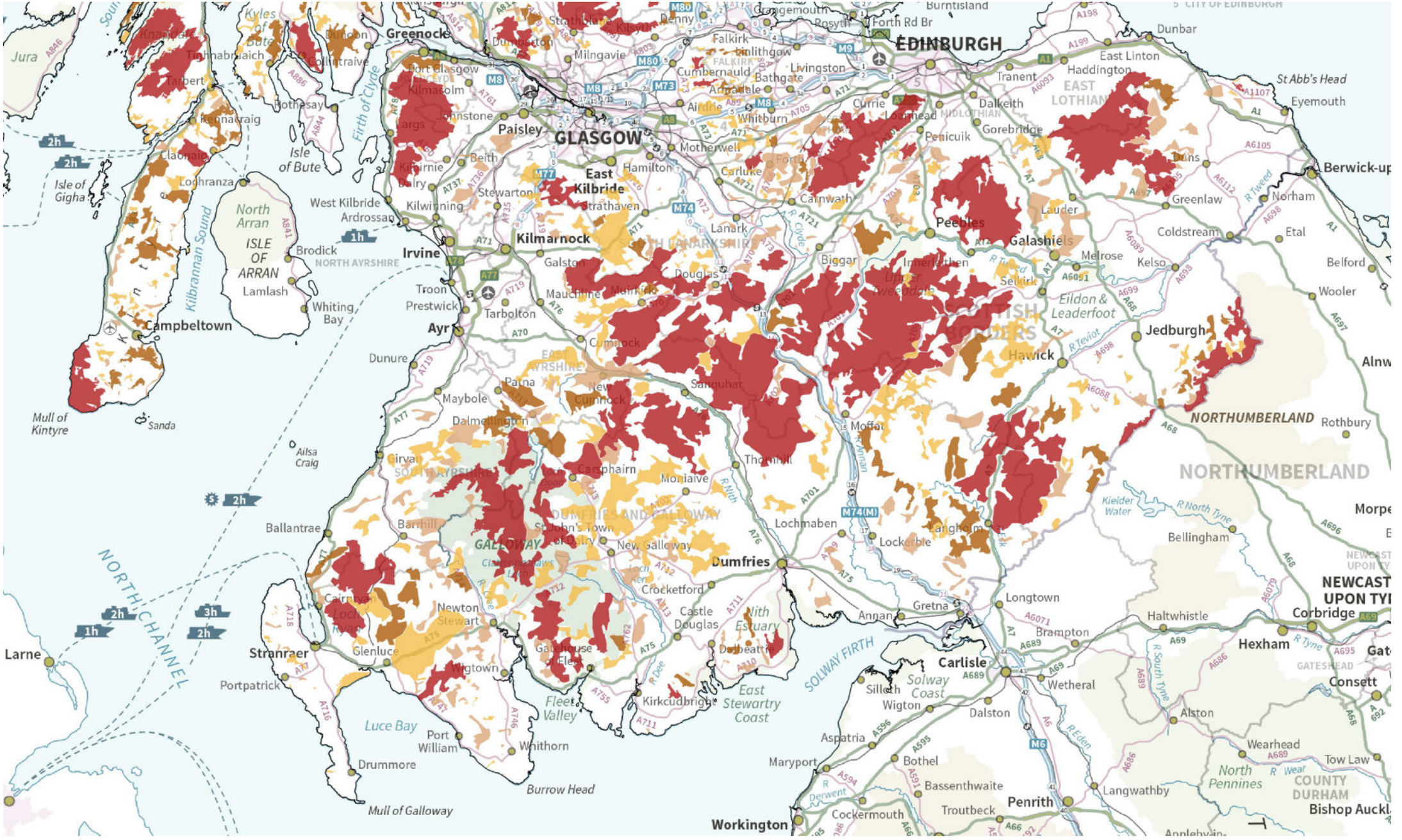
Map 1.3. Comparison of moorland areas with agriculturally 'disadvantaged' areas
KEY: **dark colours -** moorland (as on Map 1.1.); **green** – 'severely disadvantaged'; **light green** – disadvantaged



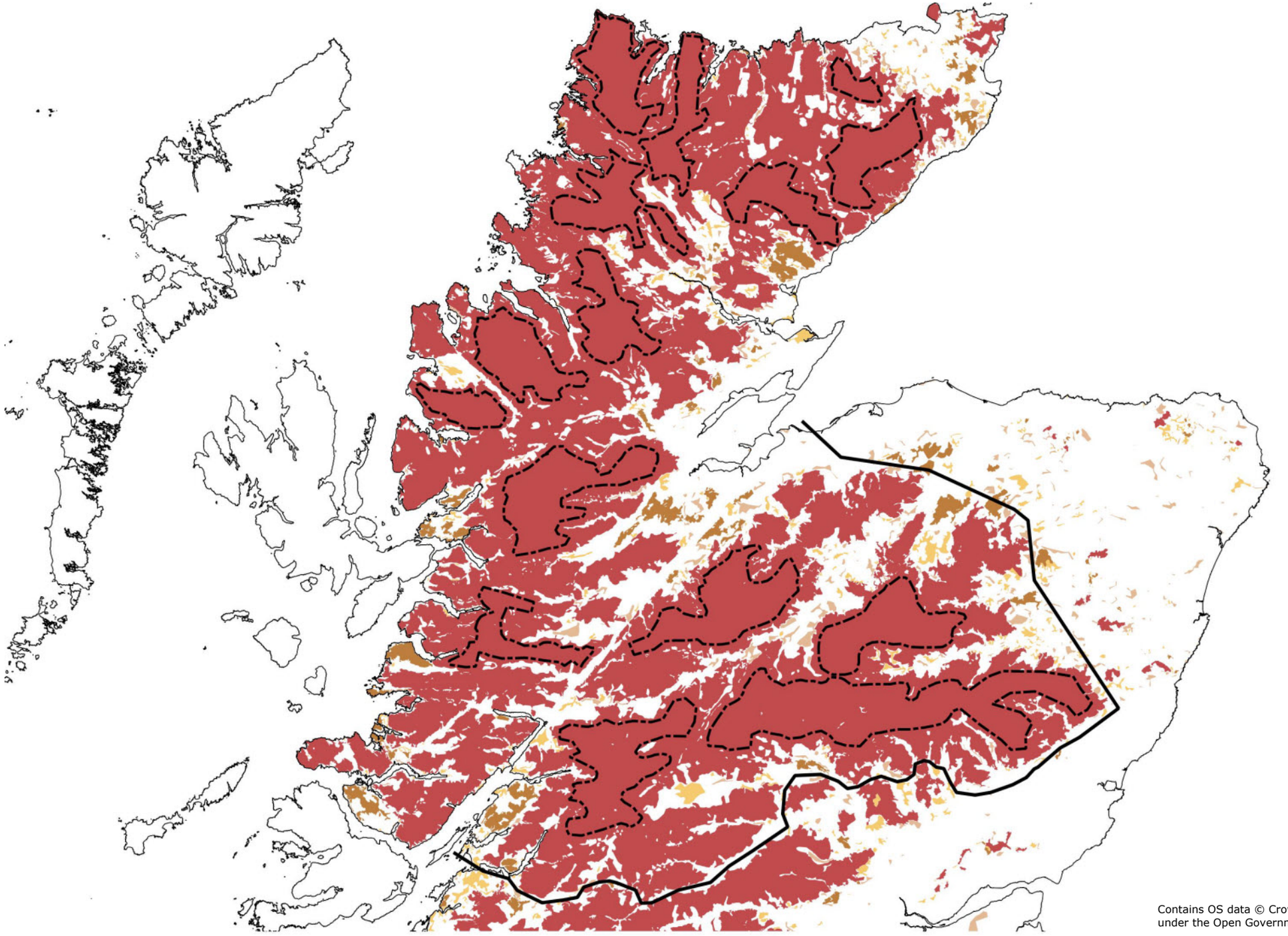
Map 2.1. Overview of moorland distribution in northern Scotland



Map 2.2. Overview of moorland distribution in central Scotland

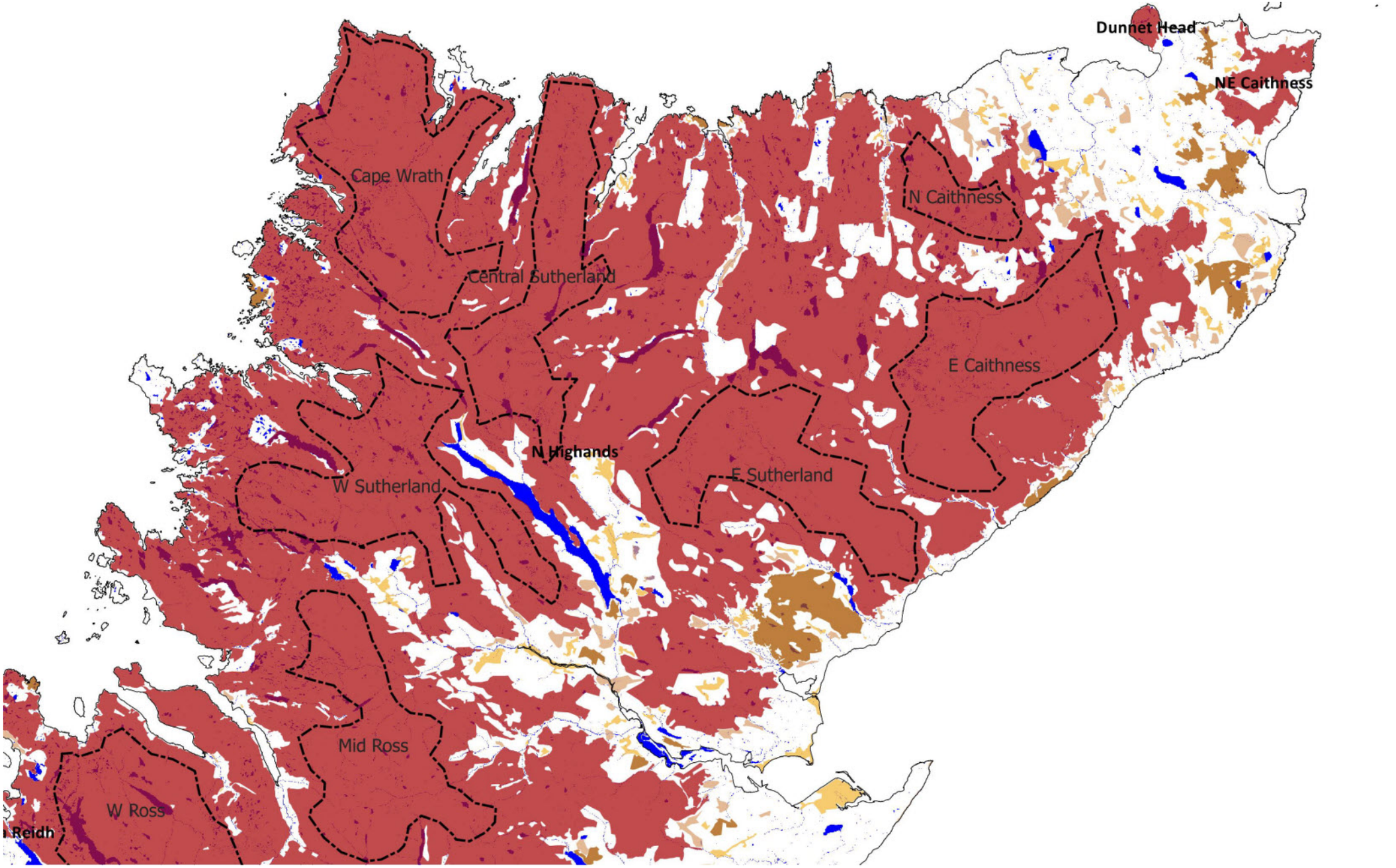


Map 2.3. Overview of moorland distribution in southern Scotland

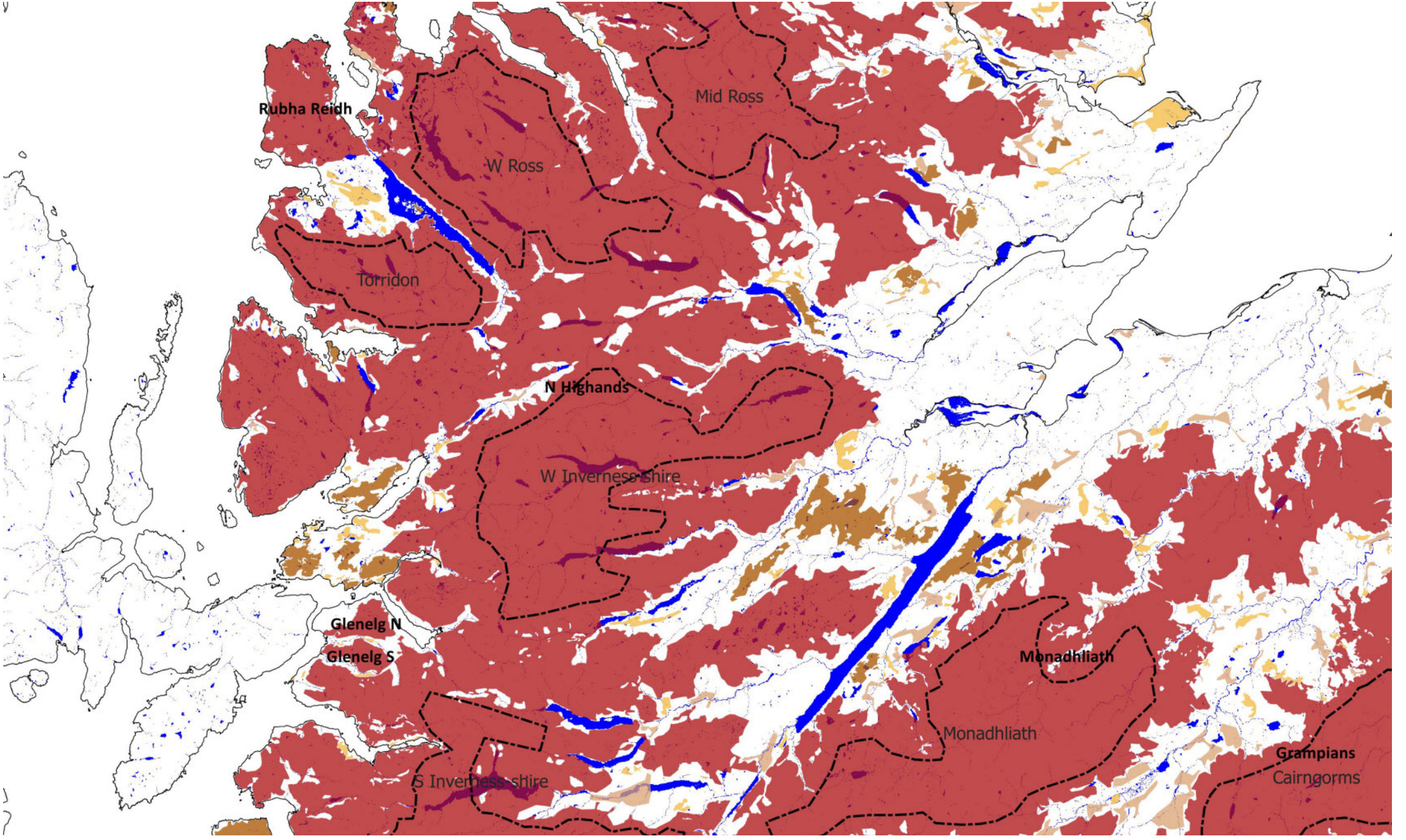


Map 3.1.Subdivisions of core areas of moorland in northern Scotland

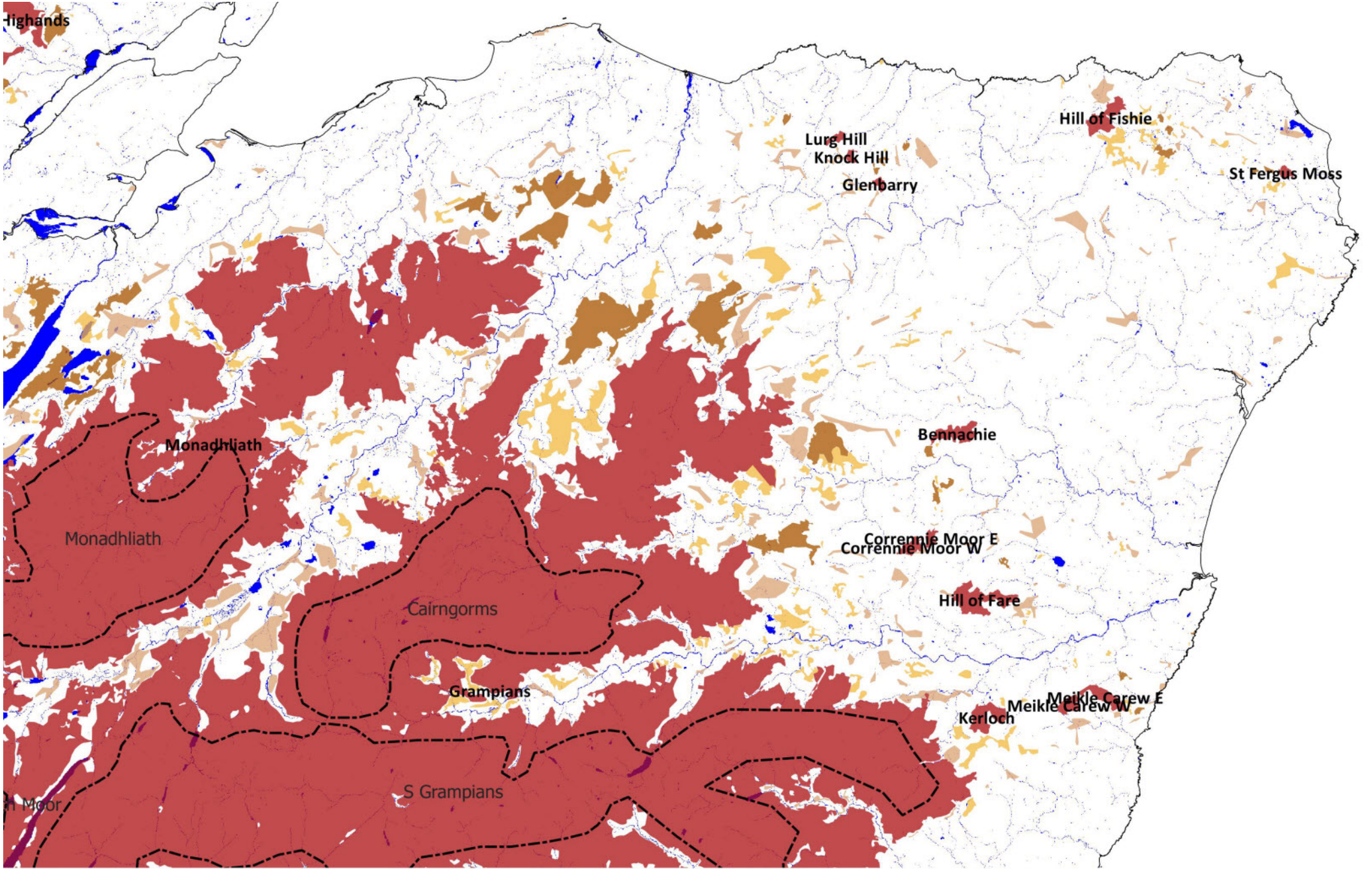
A significant area has been **mapped in red** as 'core moorland'. This map identifies the least fragmented areas within this larger area, and is an initial identification of 'key core areas'.



Map 3.2. Core areas of moorland in northern Scotland
KEY: **Dashed lines** – subdivision of main core area; outlying **core areas in red** with name. Other areas of moorland also included (un-named).

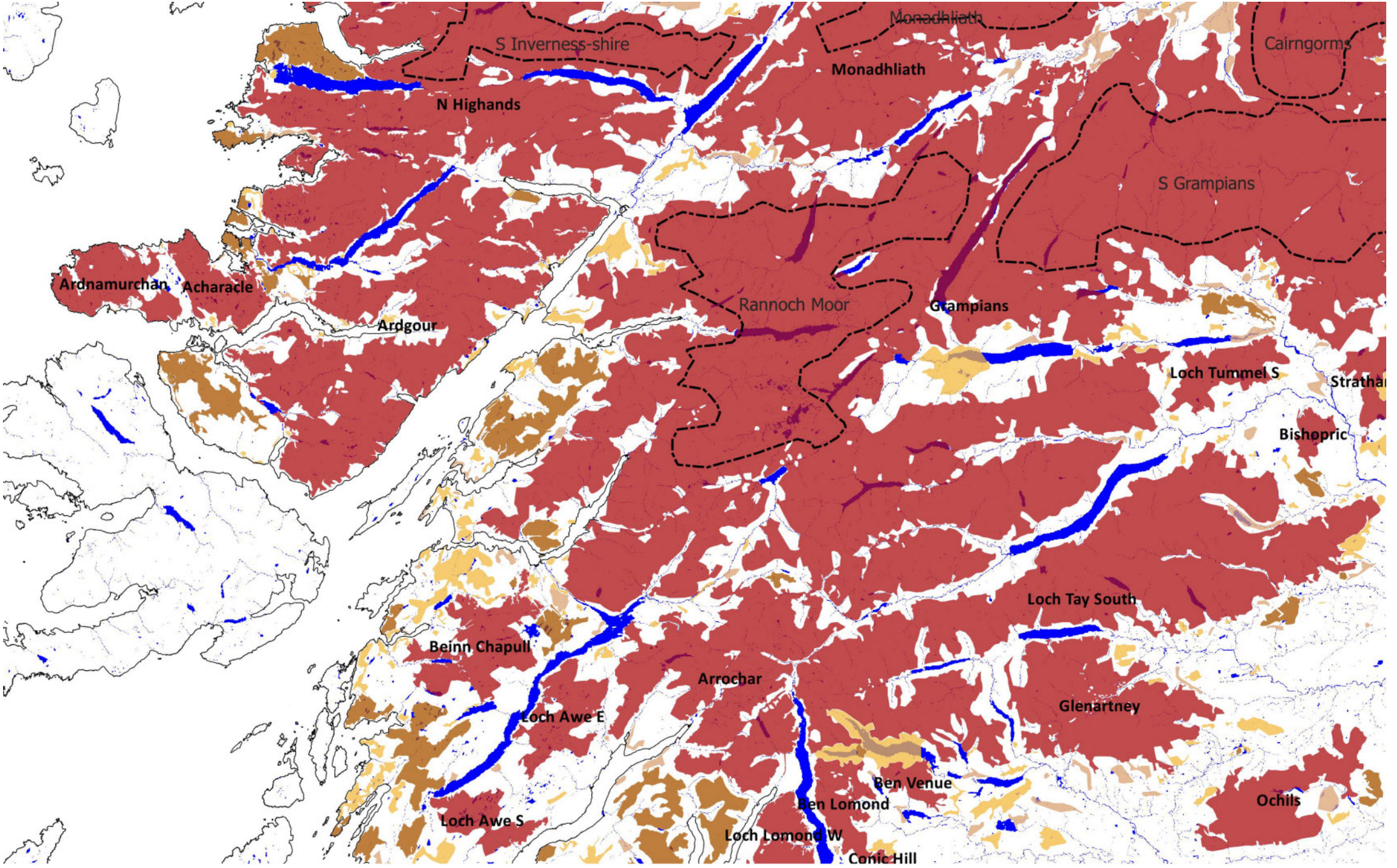


Map 3.3. Core areas of moorland in northwestern Scotland
KEY: **Dashed lines** – subdivision of main core area; outlying **core areas in red** with name. Other areas of moorland also included (un-named).



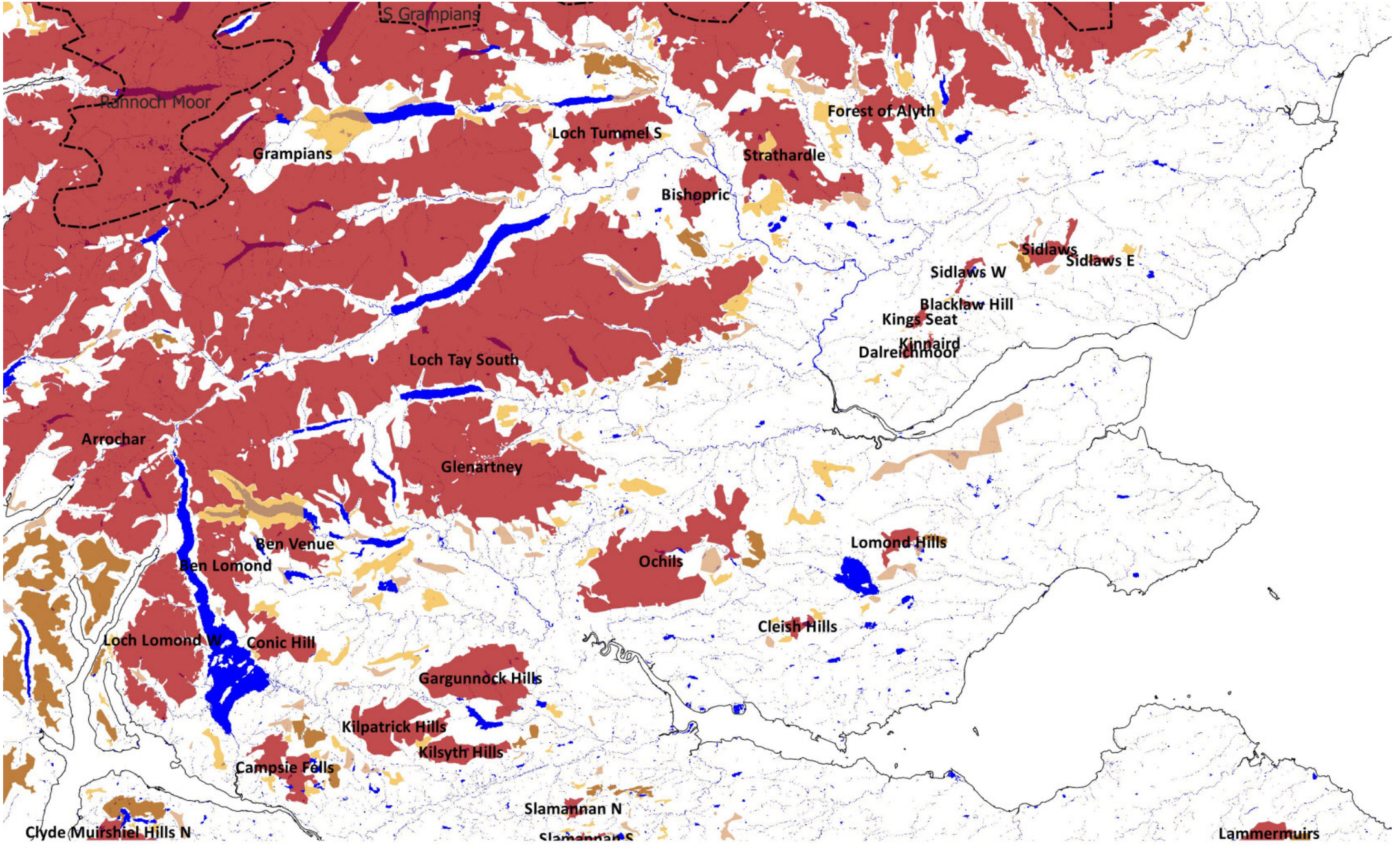
Map 3.4. Core areas of moorland in northeastern Scotland

KEY: **Dashed lines** – subdivision of main core area; outlying **core areas in red** with name. Other areas of moorland also included (un-named).

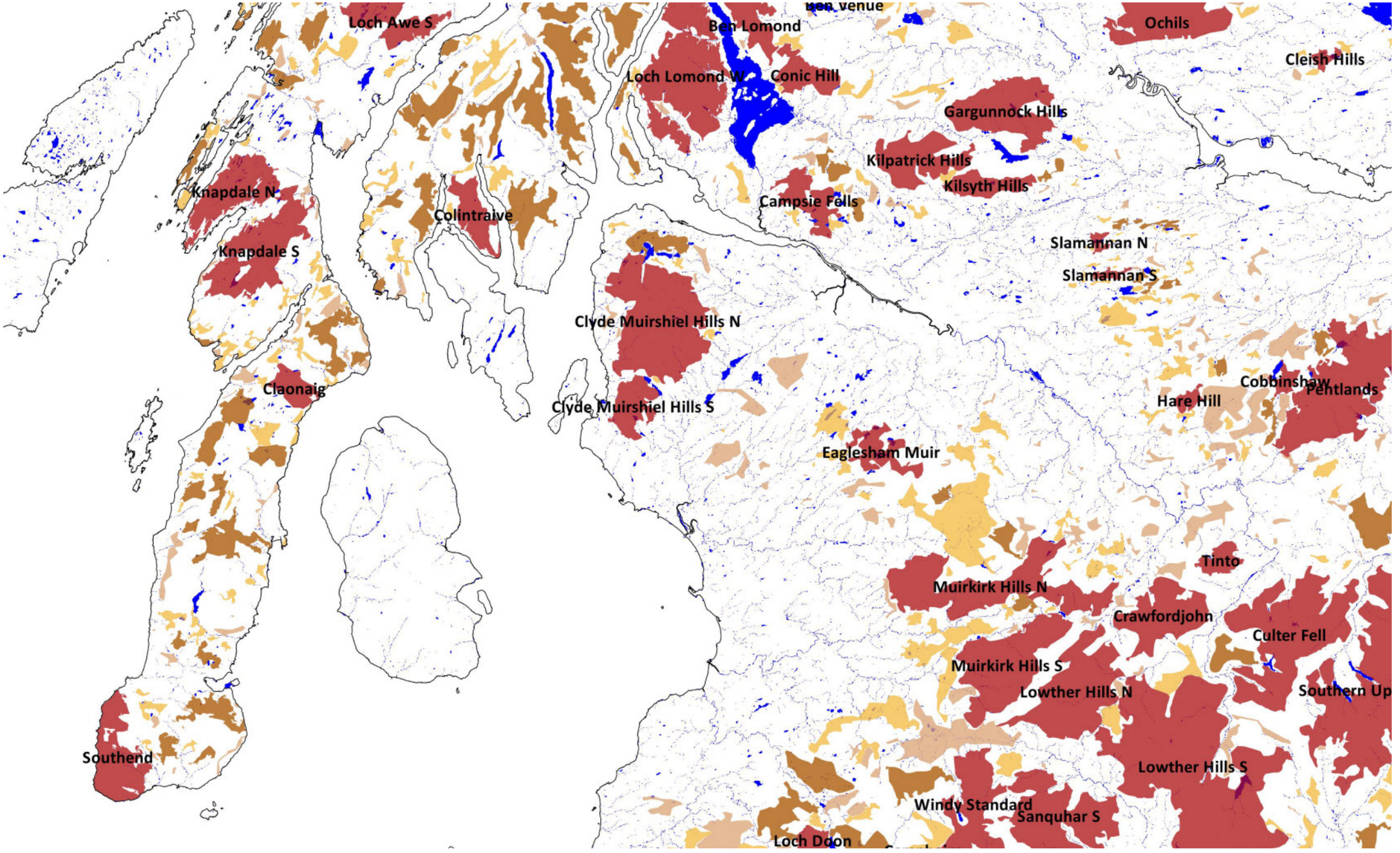


Map 3.5. Core areas of moorland in west central Scotland

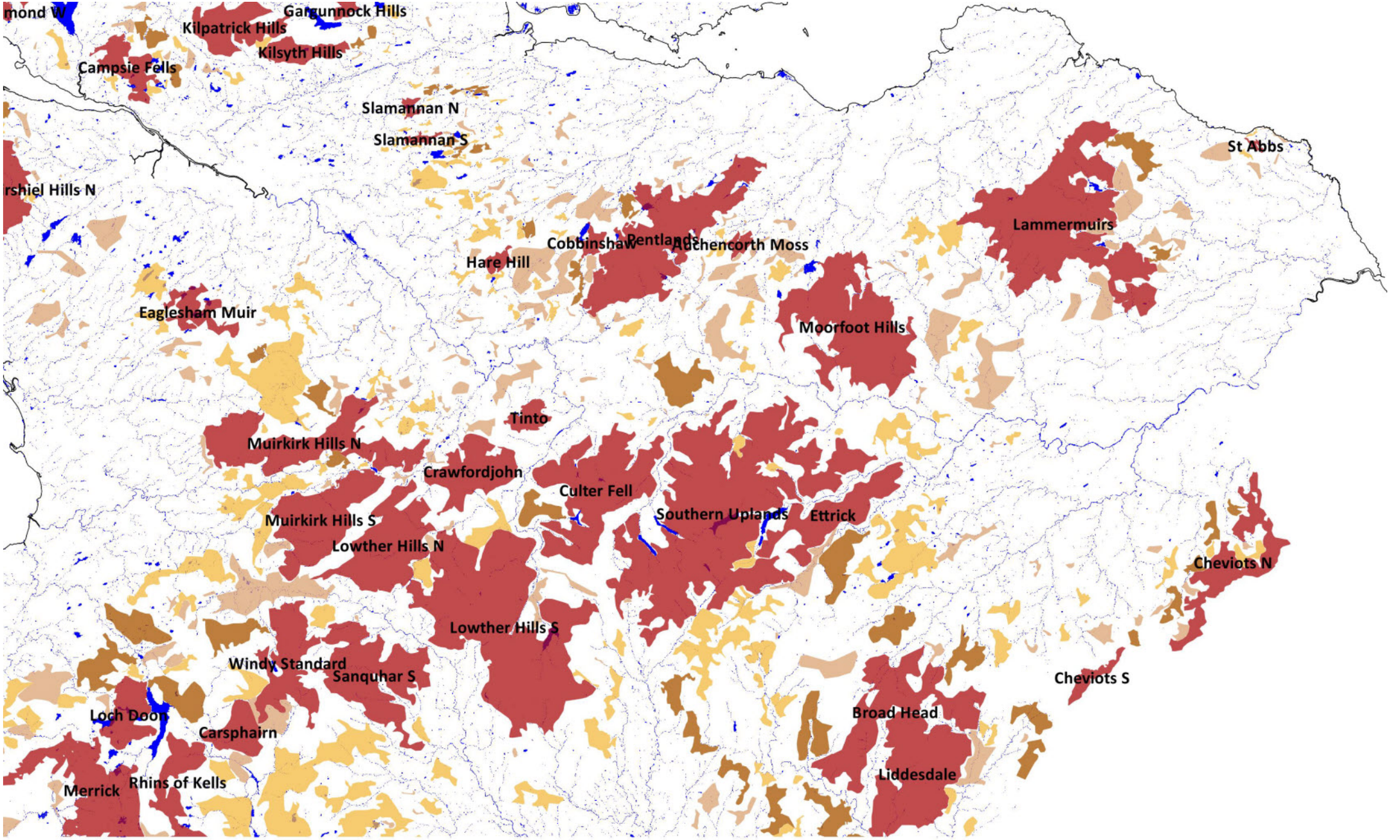
KEY: **Dashed lines** – subdivision of main core area; outlying **core areas in red** with name. Other areas of moorland also included (un-named).



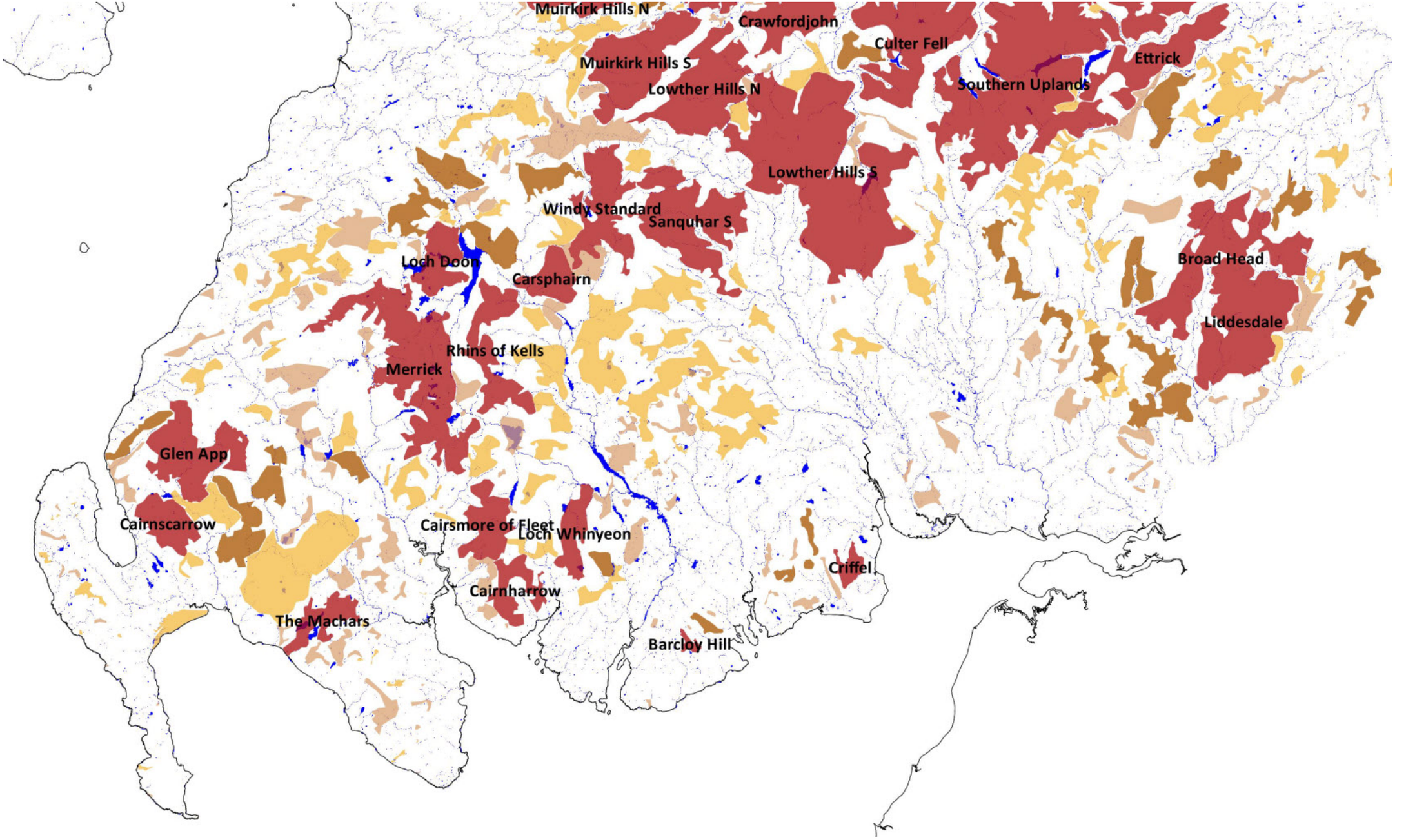
Map 3.6. Core areas of moorland in east central Scotland
KEY: **Dashed lines** – subdivision of main core area; outlying **core areas in red** with name. Other areas of moorland also included (un-named).



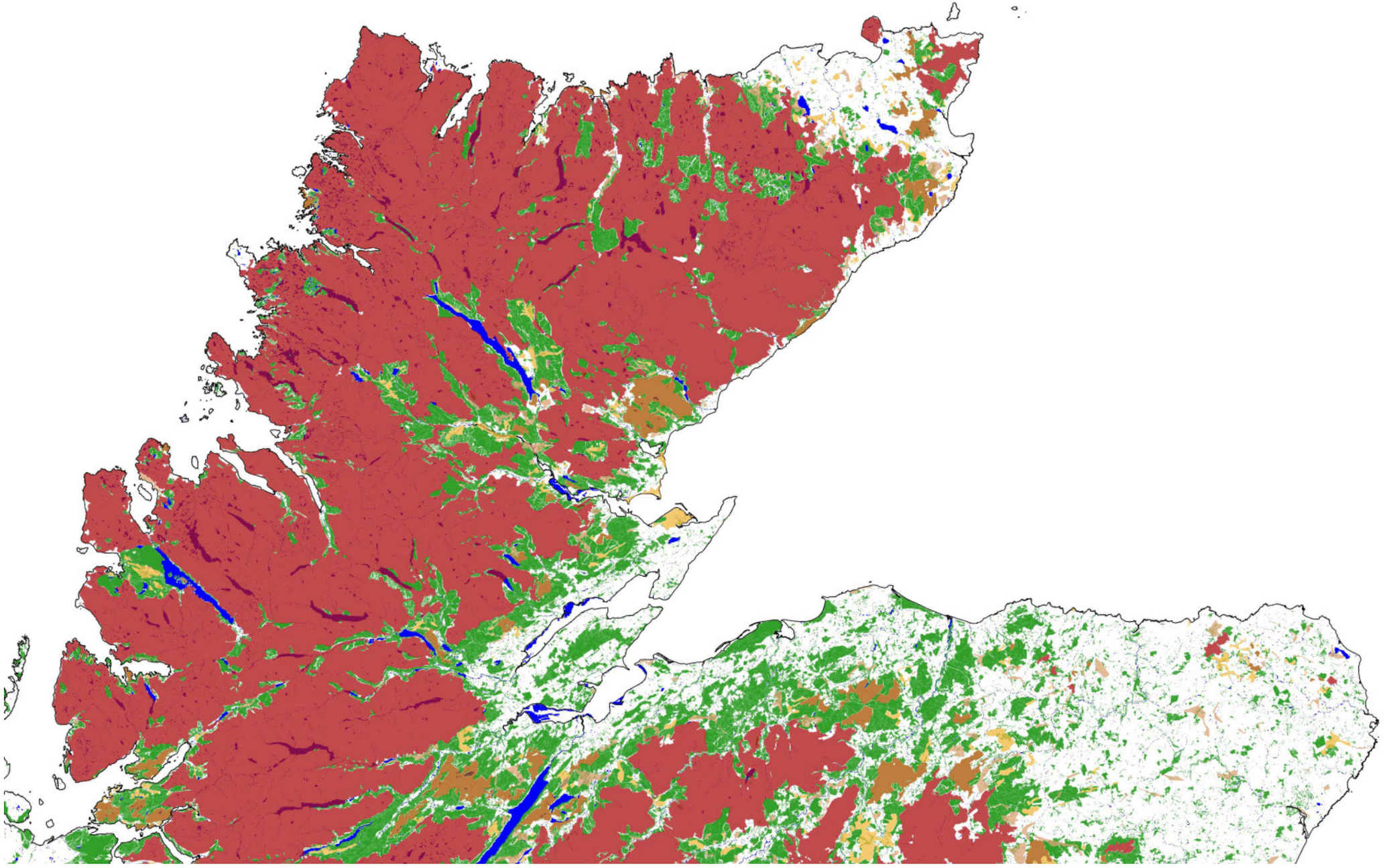
Map 3.7. Core areas of moorland in the Strathclyde area
KEY: **Core areas in red** with name. Other areas of moorland also included (un-named).



Map 3.8. Core areas of moorland in the Scottish Borders
KEY: **Core areas in red** with name. Other areas of moorland also included (un-named).

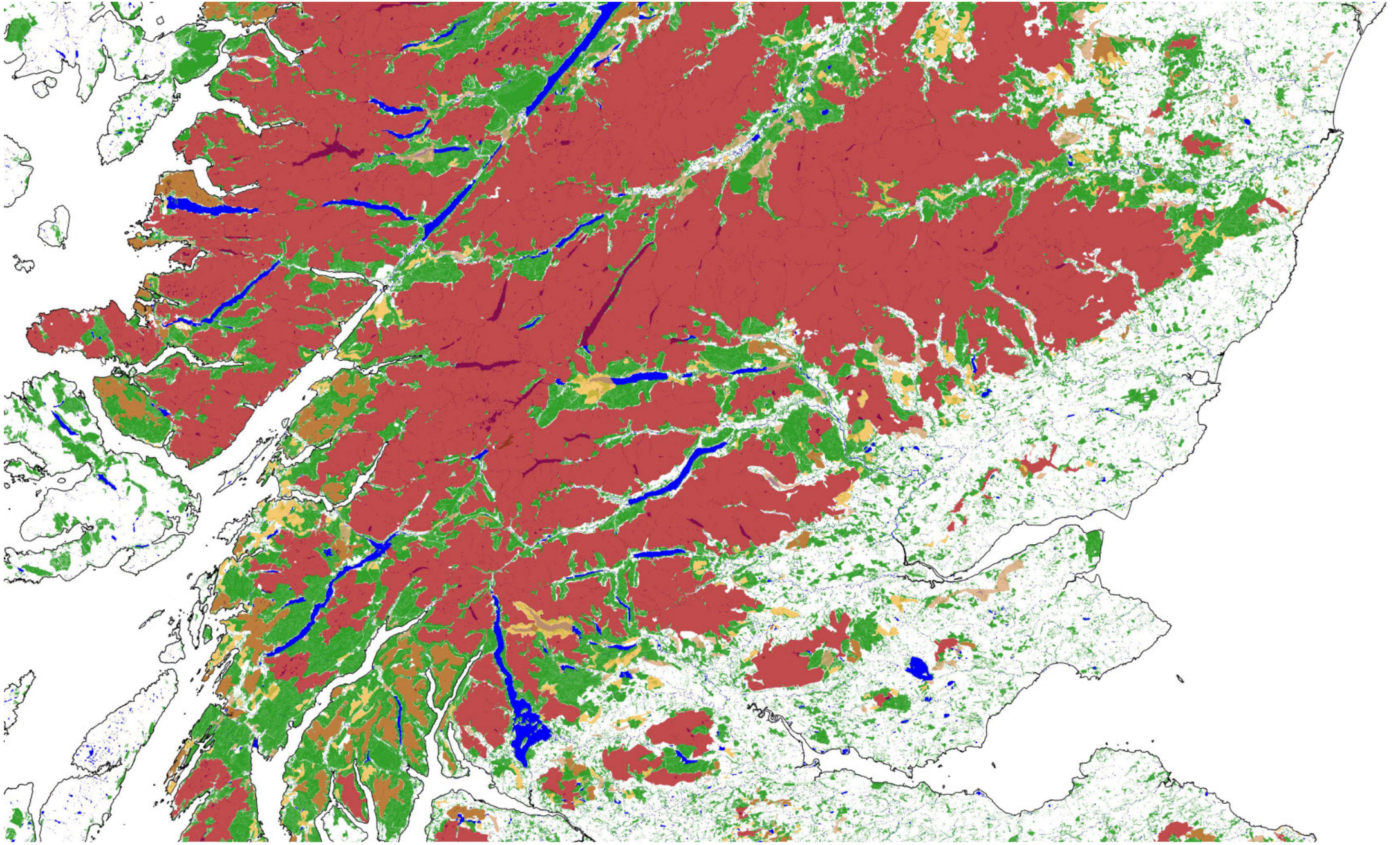


Map 3.9. Core areas of moorland in southwest Scotland
KEY: **Core areas in red** with name. Other areas of moorland also included (un-named).



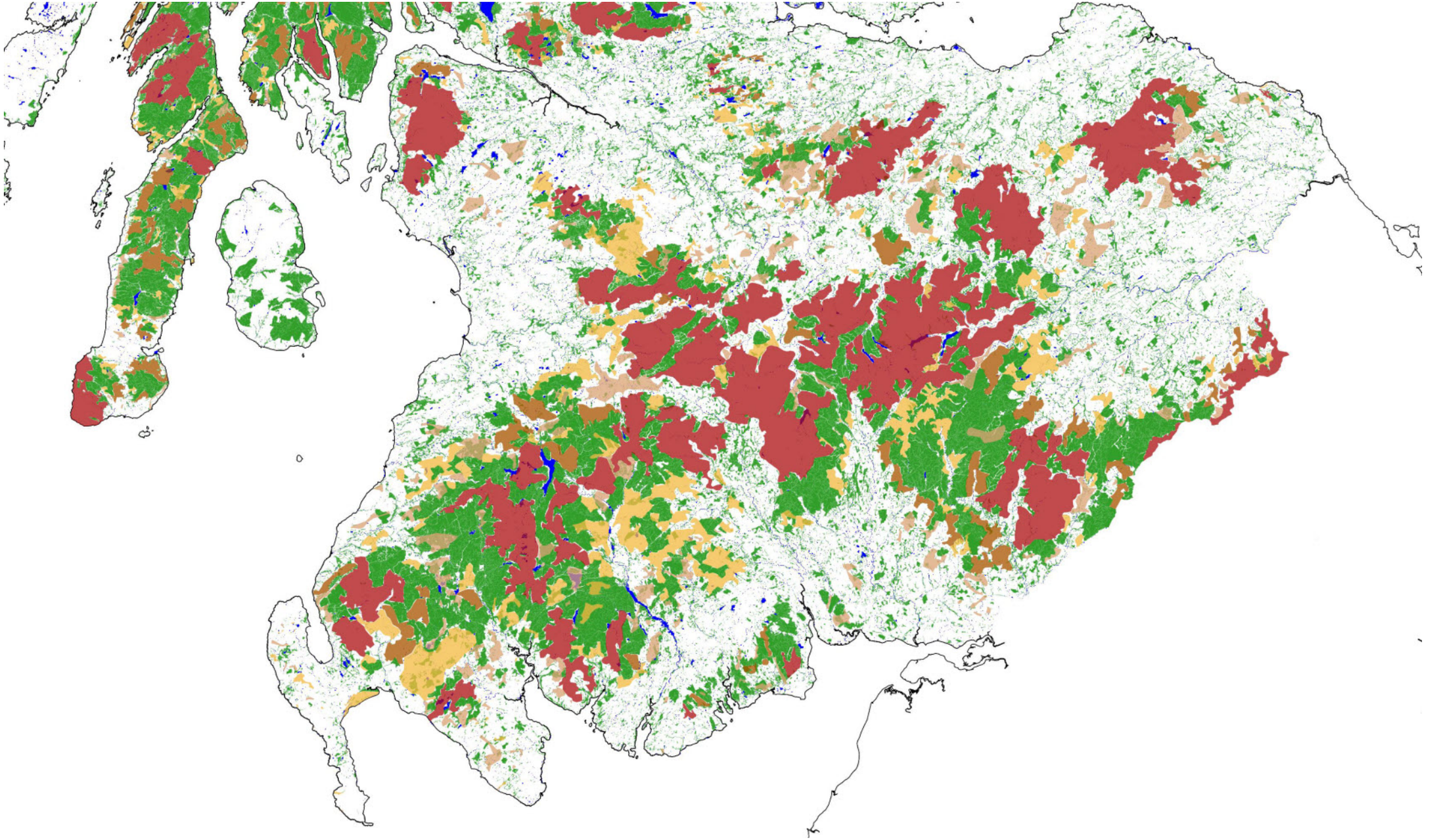
Map 4.1. Juxtaposition of moorland and woodland/forestry plantations in northern Scotland

KEY: **Green** – woodland/forests identified in the Scottish Woodland Inventory (2014) and 'woodland creation boundary' under the Scottish Rural Development programme (SRDP).



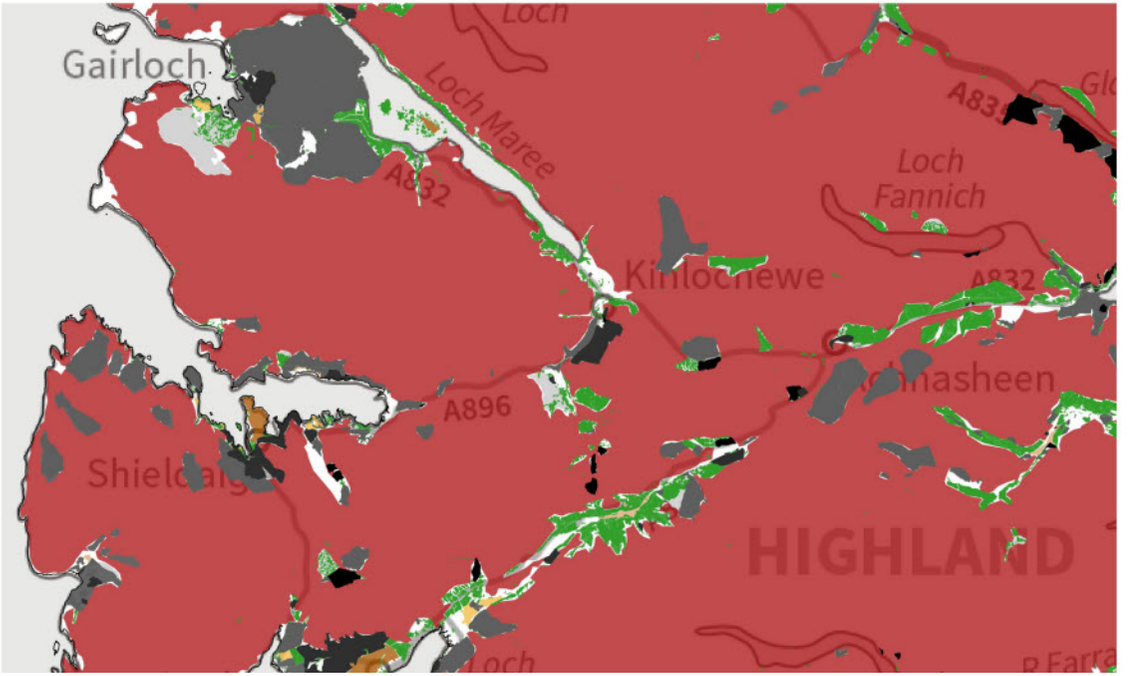
Map 4.2. Juxtaposition of moorland and woodland/forestry plantations in central Scotland

KEY: **Green** – woodland/forests identified in the Scottish Woodland Inventory (2014) and 'woodland creation boundary' under the Scottish Rural Development programme (SRDP).

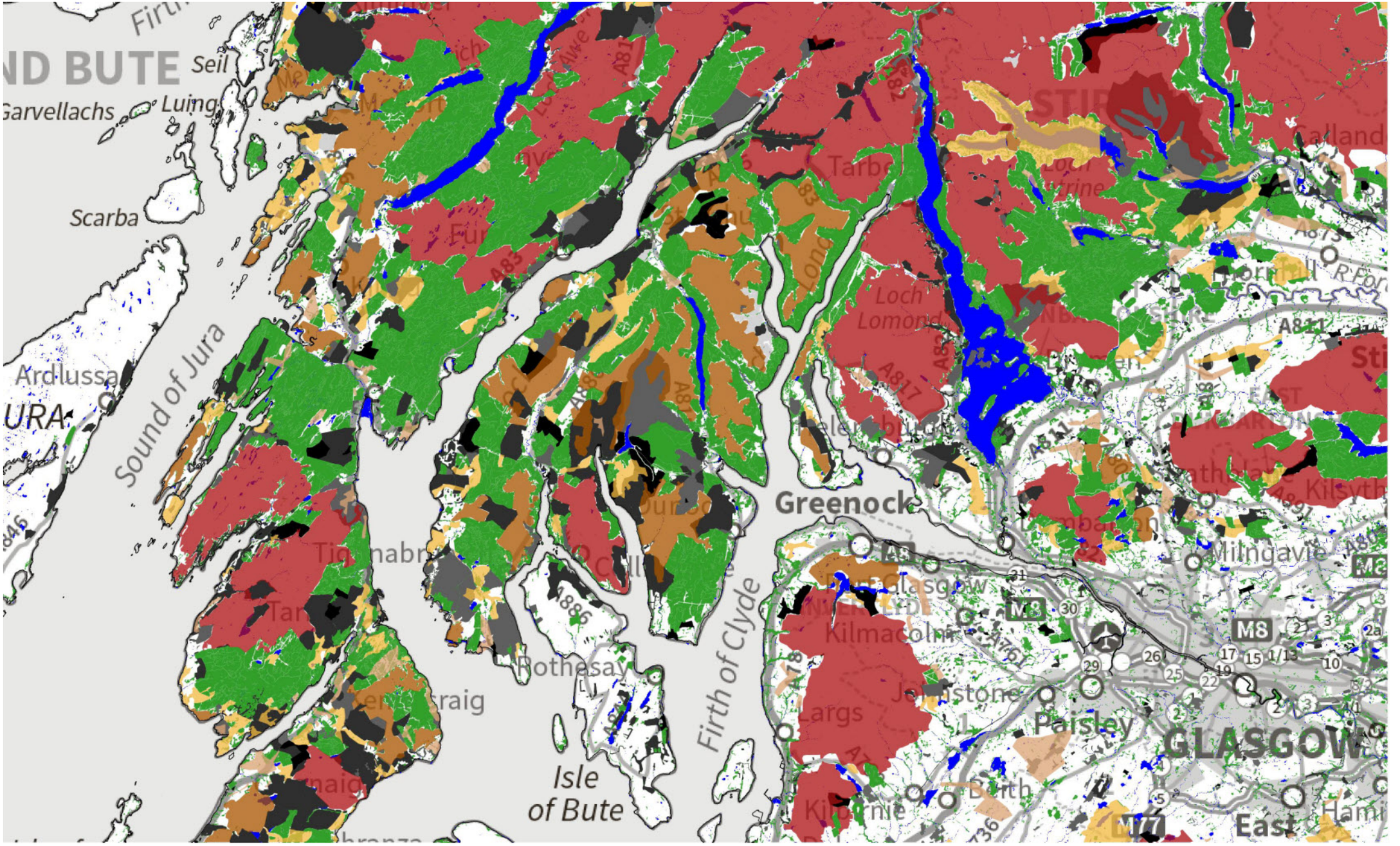


Map 4.3. Juxtaposition of moorland and woodland/forestry plantations in southern Scotland

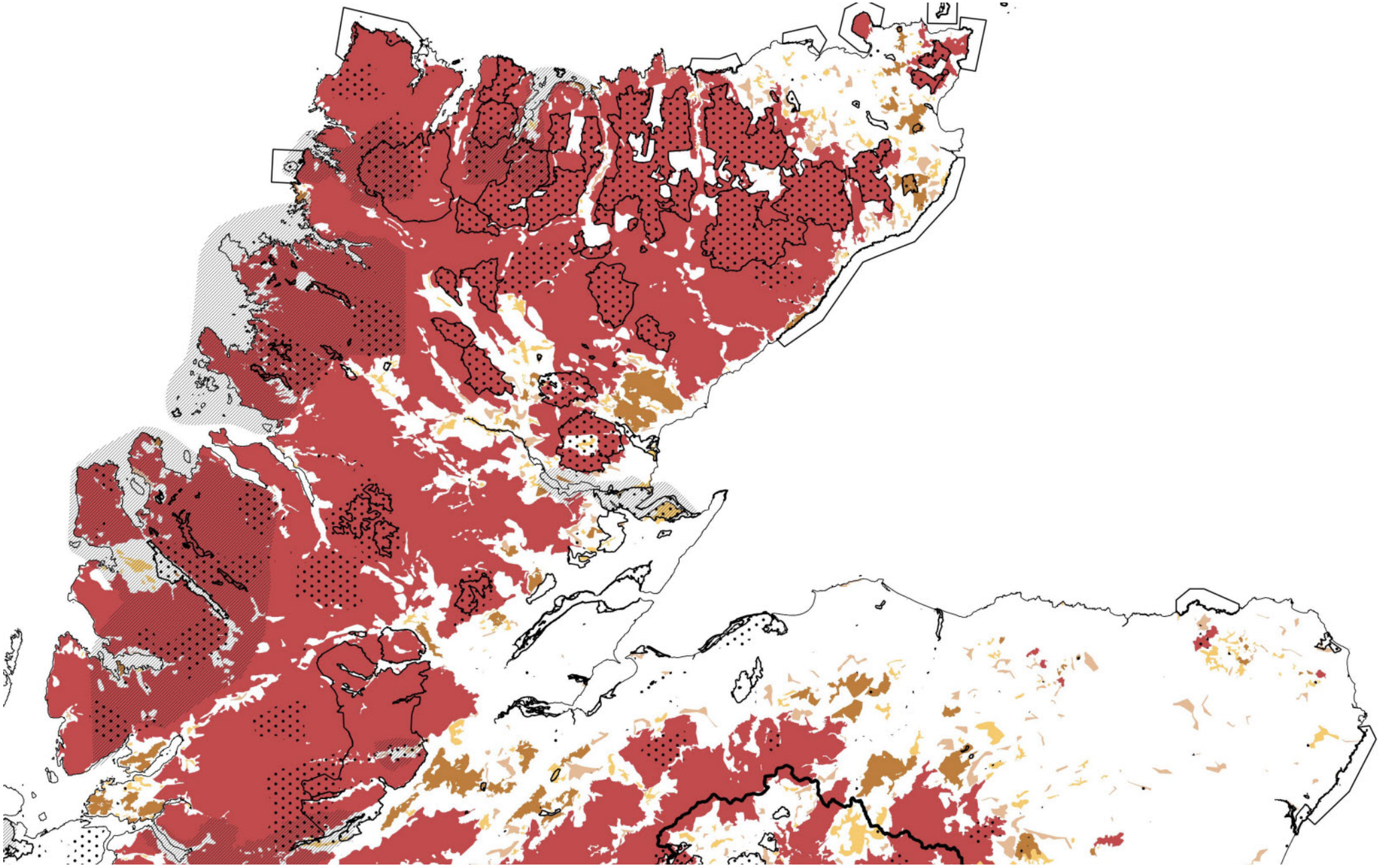
KEY: **Green** – woodland/forests identified in the Scottish Woodland Inventory (2014) and 'woodland creation boundary' under the Scottish Rural Development programme (SRDP).



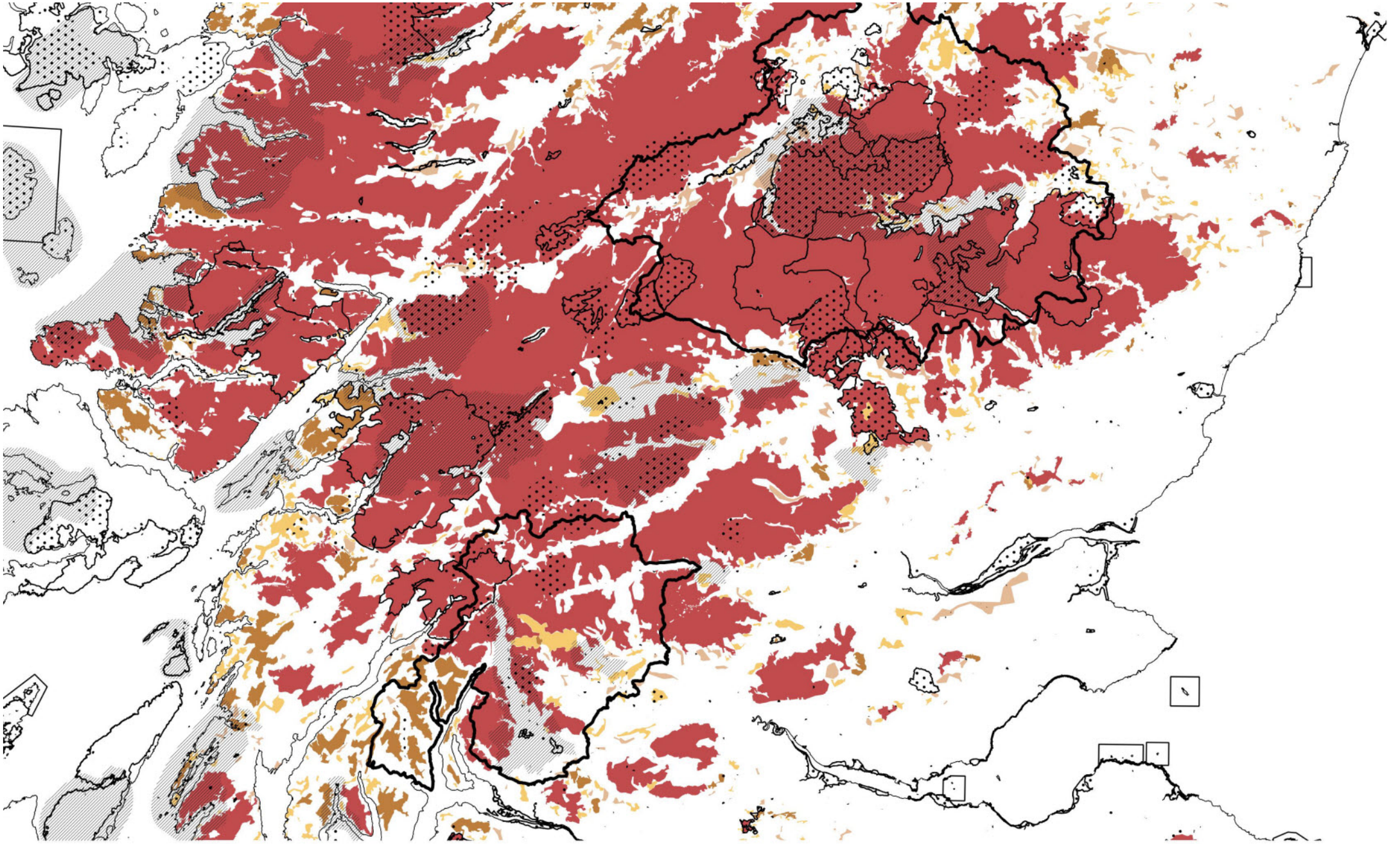
Map 4.4. Example of early stages of long-term moorland fragmentation by forestry/woodland plantations (Gairloch and Torridon area, Wester Ross)
KEY: **Green** – woodland existing before 1988. **Black** – plantings under WGS1 scheme from 1988. **Dark grey to light grey** – progressive plantings under WGS2, WGS3, SFGS to current SRDP grant scheme.



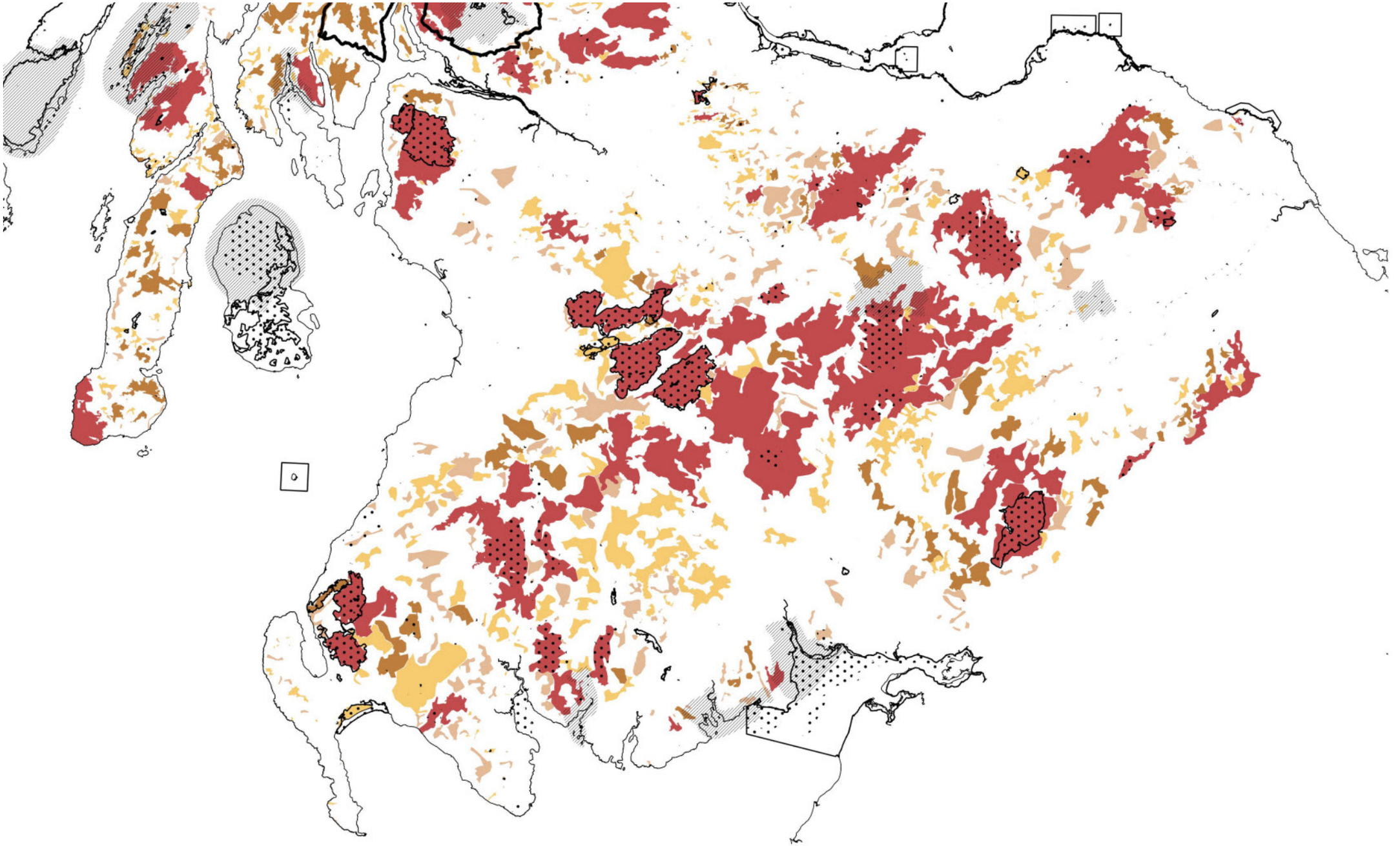
Map 4.5. Example of long-term moorland fragmentation by forestry/woodland plantations (Loch Lomond and surrounds)
KEY: **Green** – woodland existing before 1988. **Black** – plantings under WGS1 scheme from 1988. **Dark grey to light grey** – progressive plantings under WGS2, WGS3, SFGS to current SRDP grant scheme.



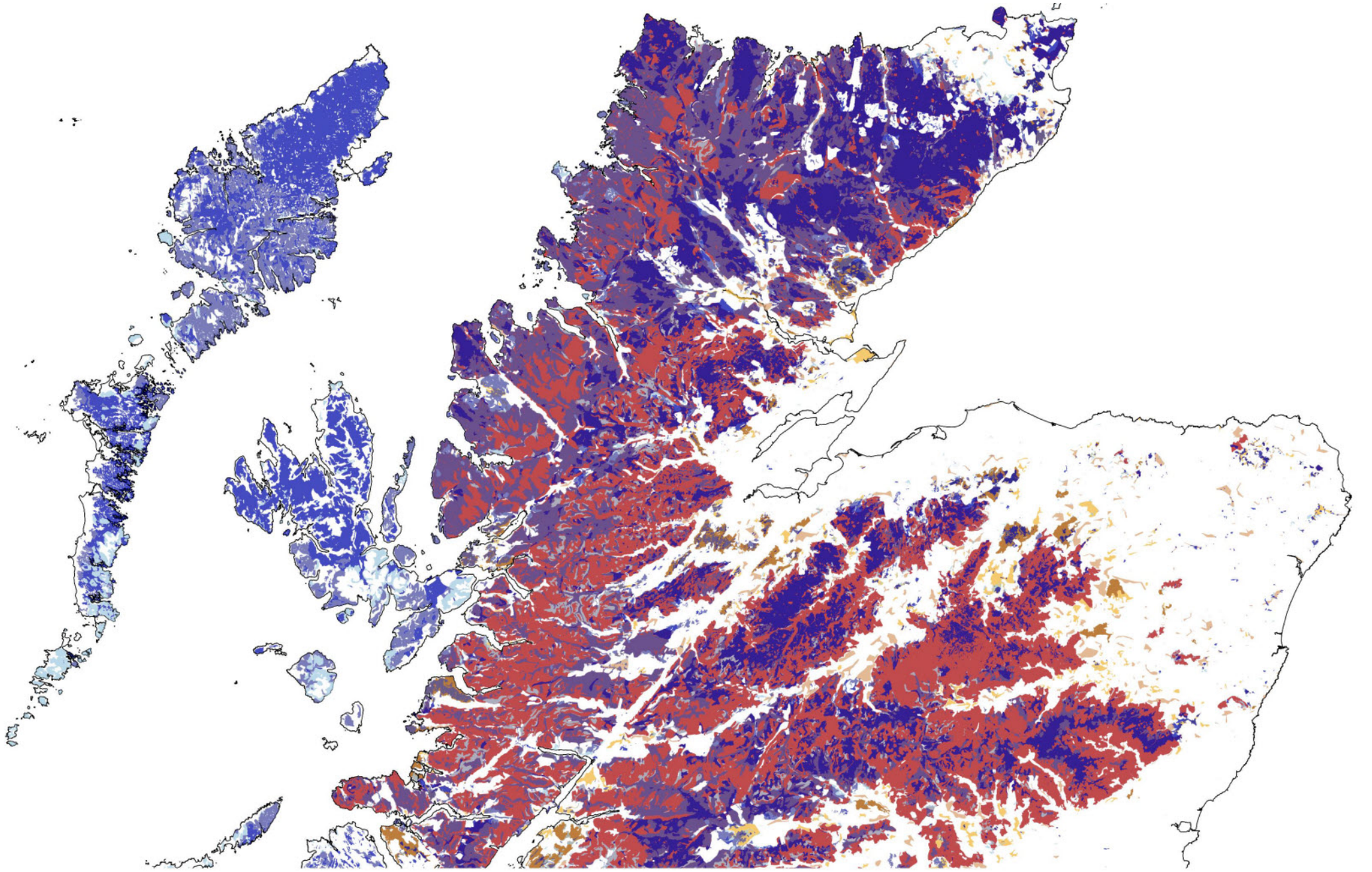
Map 5.1. Moorland in relation to conservation designations – northern Scotland
KEY: **Diagonal hatching** – National Scenic Area (NSA); **black dots** – Site of Special Scientific interest (SSSI); **thin line** – Special Protection Area (SPA)
thick line – National Park boundary.



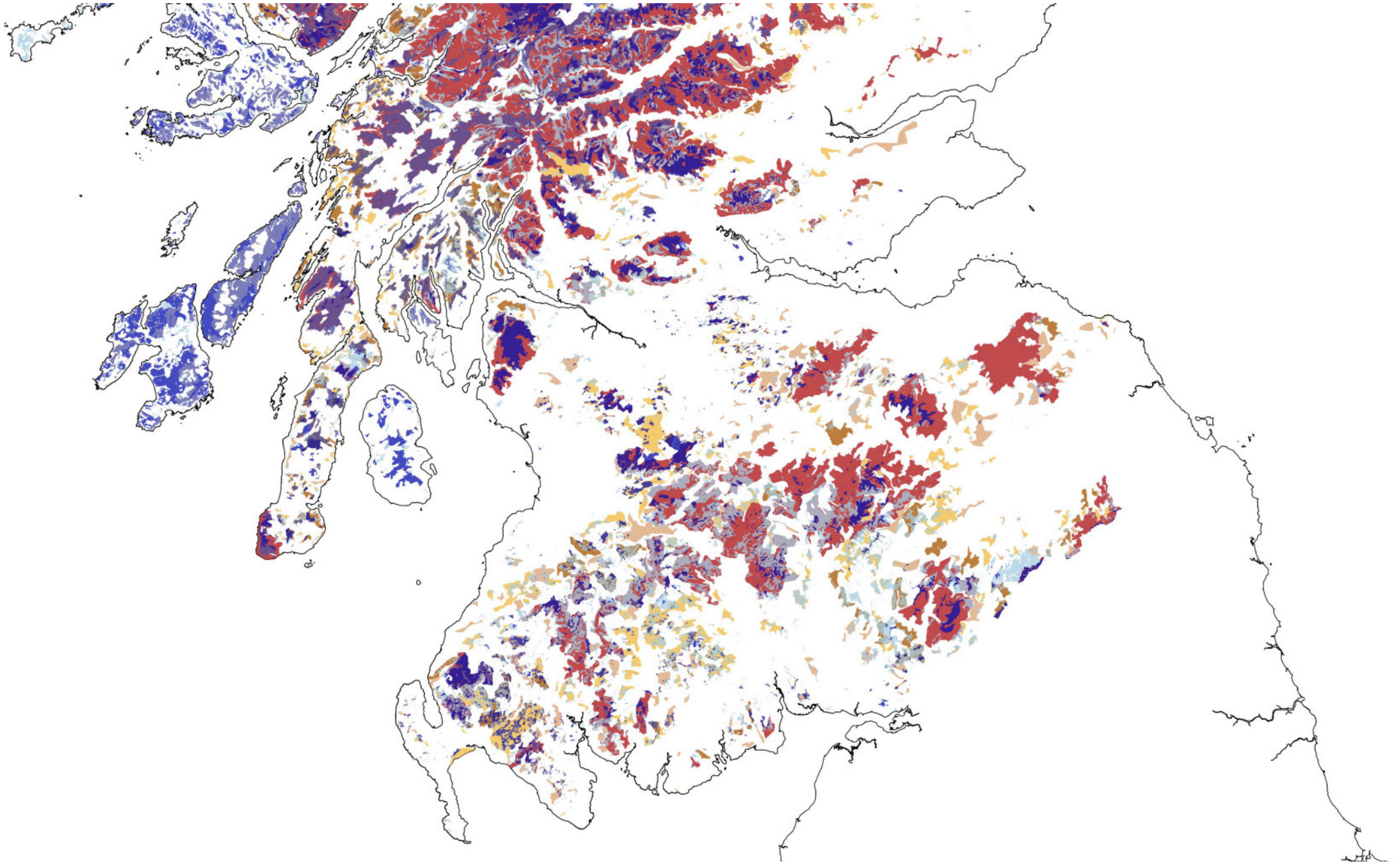
Map 5.2. Moorland in relation to conservation designations – central Scotland
KEY: **Diagonal hatching** – National Scenic Area (NSA); **black dots** – Site of Special Scientific interest (SSSI); **thin line** – Special Protection Area (SPA)
thick line – National Park boundary.



Map 5.3. Moorland in relation to conservation designations – southern Scotland
KEY: **Diagonal hatching** – National Scenic Area (NSA); **black dots** – Site of Special Scientific interest (SSSI); **thin line** – Special Protection Area (SPA)
thick line – National Park boundary.



Map 6.1. Moorland in relation to peat depth/soil carbon store – northern Scotland
KEY: **Dark blue** – high soil carbon; **medium blue** – medium soil carbon; **light blue** – medium/low soil carbon; **white** – minimum soil carbon.
Red – Moorland with the least stored soil carbon (includes steep sided mountains and mountain fellfield).



Map 6.2. Moorland in relation to peat depth/soil carbon store – southern Scotland
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A FUTURE FOR MOORLAND IN SCOTLAND
The need for a locational strategy

"The loss of moorland in Scotland since the 1940s should be of concern to everyone with conservation at heart. Not only do our moorlands provide homes for iconic and endangered species, they help define our upland landscapes. The need for a 'plan' for moorland in this country is something the Scottish Gamekeepers Association has been aware of for some time. That is why we were delighted to commission ecologist Dr James Fenton to compile this document which will inform future debates about our moorlands and how we value them.

"Within our membership there are many who have the privilege to work in these precious environments as guardians and who combine a duty of care with a genuine concern for their future wellbeing. This document, though, is not only important for people who derive employment from moorland, it is required reading for anyone with an interest in how we can best use our land to meet differing, and sometimes competing, objectives without sacrificing the key habitats we should be retaining. Only by mapping and evaluating the moorland we have can we make sound decisions about its future. Dr Fenton's strategy bridges this knowledge gap and will make a significant contribution to the land use debate."

Alex Hogg, Chairman, The Scottish Gamekeepers Association

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