

NFI preliminary estimates of the presence and extent of rhododendron in British woodlands

Issued by: National Forest Inventory, Forestry Commission,
231 Corstorphine Road, Edinburgh, EH12 7AT

Date: August 2016

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Summary

The National Forest Inventory provides a record of the size and distribution of forests and woodlands in Great Britain and information on key forest attributes. This Inventory Report provides estimates of the presence of rhododendron within forests and woodlands in Great Britain, including estimates for England, Scotland and Wales, broken down by NFI region and ownership.

The estimates provided in this report are preliminary in nature. They are based on a sub-sample of the NFI first cycle field survey, incorporating results collected from this survey from November 2009 to August 2013. The estimates provided in this report represent areas of rhododendron within woodland and in small areas of trees in close proximity to areas of NFI woodland*. Final results on the presence and extent of rhododendron in British woodland, based on all results collected in the NFI first cycle survey, will be released in a future report.

The National Forest Inventory (NFI) suite of reports provide further detail on how the NFI operates and are published at www.forestry.gov.uk/inventory.

Key findings

- The total area of rhododendron in woodland and in small areas of trees in close proximity to woodland in Great Britain at the reference date of September 2011 is estimated to be 98.7 thousand hectares. This represents 3.3% of the woodland area of GB;
- Estimates of the amounts of rhododendron in each of the countries of GB are 37.6 thousand hectares in England, 53.3 thousand hectares in Scotland and 7.9 thousand hectares in Wales. These represent 2.9%, 3.8% and 2.6% of total woodland areas in England, Scotland and Wales respectively;
- The Forestry Commission/Natural Resources Wales managed woodland estate in GB is estimated to contain 18.2 thousand hectares of rhododendron, representing 2.2% of woodland area within that estate;
- The private sector estate in GB is estimated to contain 80.5 thousand hectares of rhododendron. This represents 3.7% of the area of private sector woodland.

* NFI woodland is defined as woodland that is a minimum of 0.5 hectare in extent, with a minimum width of 20 metres, and canopy cover of at least 20% or the potential to achieve this, and is inclusive of clearfelled areas

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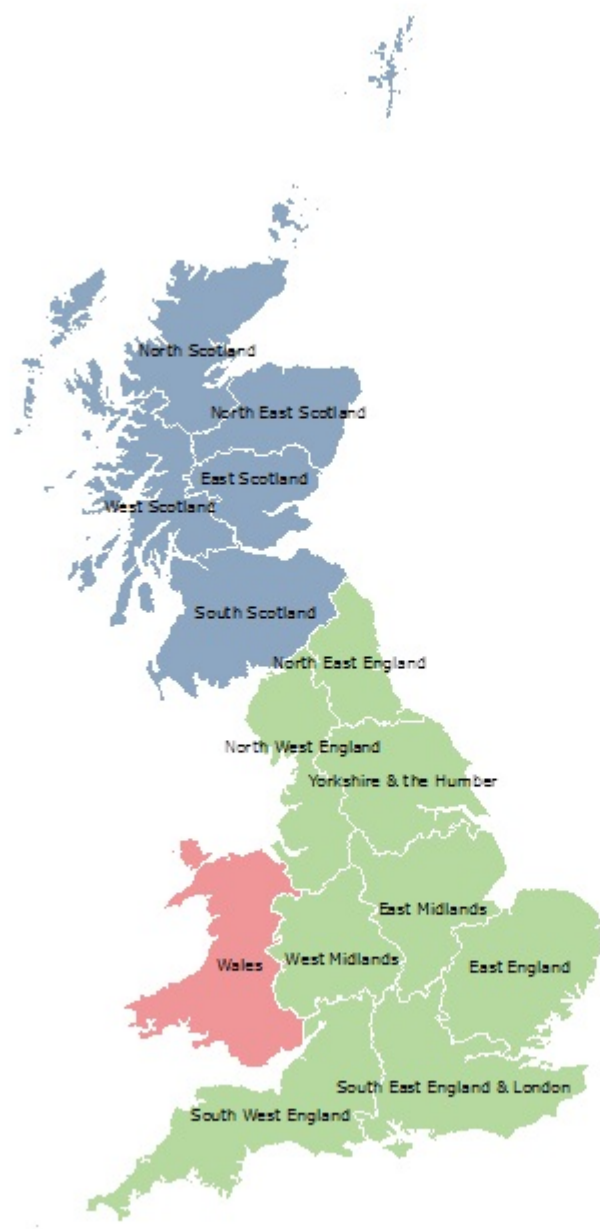
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Introduction

National forest inventories are carried out by the Forestry Commission to provide accurate, up-to-date information about the size, distribution, composition and condition of the forests and woodlands in Great Britain (GB). This information is essential for developing and monitoring policies and guidance to support sustainable forest management. The current National Forest Inventory, which began in 2009, is a multi-purpose operation that has involved the production of a forest and woodland map for GB and a continuing programme of field surveys of the mapped forest and woodland areas. Information and data collected by the National Forest Inventory are used for a number of purposes, including the production of estimates and 25-year forecasts of forest metrics such as:

- Standing volume
- Timber availability
- Tree growth and Increment
- Carbon storage
- Biomass

Estimates of aspects of the health, biodiversity and social value of forests and woodlands can also be provided by the Inventory, with this report being one such output.

The approach taken in the derivation of these results, which should be used in their interpretation, is described in the full suite of reports which can be found at:

www.forestry.gov.uk/forecast.

The estimates reported here are based upon field samples assessed between November 2009 and August 2013 that have been subjected to extensive data quality assurance procedures. The mid-date of this period is September 2011, which is taken to be the reference date for the results quoted in this report.

How the estimates of presence of rhododendron are derived

The National Forest Inventory is composed of two elements: a woodland map and a field survey. The woodland map covers all forests and woodlands over 0.5 hectare with a minimum of 20% canopy cover (or the potential to achieve it), including new planting, clearfelled sites and restocked sites. It is based upon 25 cm resolution colour aerial photography for England and Scotland and 40 cm resolution aerial photography for Wales. The map is updated annually, incorporating further analysis and information obtained from various sources, including satellite imagery, which is being used to provide an independent crosscheck of woodland present and to assign amounts of new clearfell.

Field survey work is used to refine the map-based estimates of woodland and clearfelled areas and to measure detailed aspects of the forest. This involved the ground surveying of one-hectare sample squares that were partially or entirely covered by forest, including clearfelled areas, according to the woodland map. Further details of the mapping work and the derivation of forested areas can be found in the 2010 Woodland Area reports at www.forestry.gov.uk/inventory.

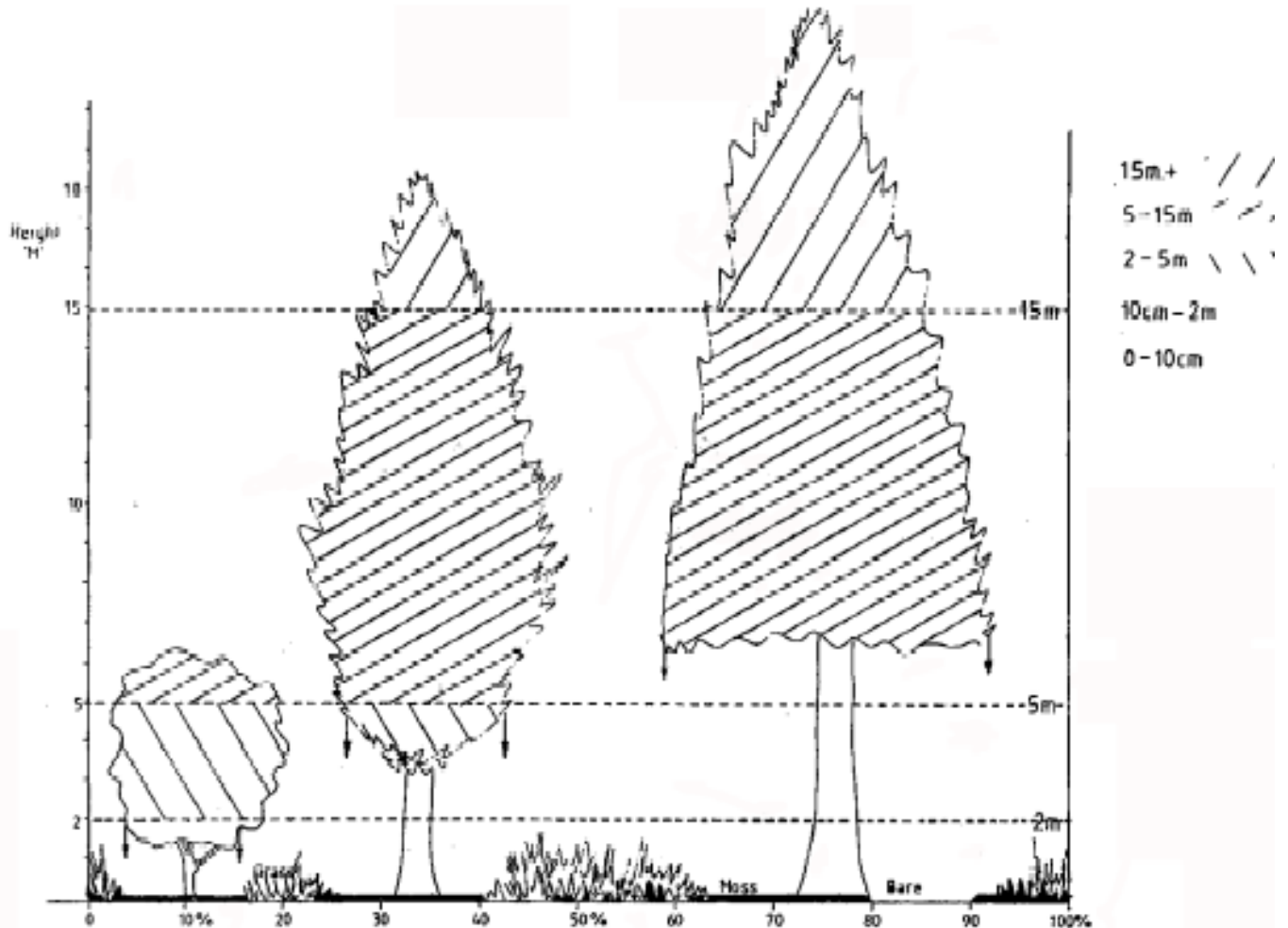
The estimates of areas of rhododendron cited in this report used a woodland area obtained from the map updated to 31 March 2012 (available in shapefile form on the Forestry Commission download site at www.forestry.gov.uk/datasetsanddownloads). Data from 9594 surveyed sample squares were used to produce the results in this report. These sample squares represent a sub-sample of the full first cycle NFI field survey programme which was completed at the end of 2015 and comprised of a statistically representative sample covering all GB woodland of approximately 15,000 survey sites. The sub-sample used to compile this report contains squares that have been returned from survey through to August 2013 and have been subjected to rigorous data quality checks.

At each sample square, the area of the square was stratified by the surveyor into forest and non-forest areas, including small areas of trees in close proximity to NFI woodland. The forested area was then stratified into different woodland types or stands, where information on species, age, management and a range of other parameters was collected. An average of around two or three forest stands per square was found, resulting in 27,490 stands being assessed. Within each stand, a vegetation assessment was undertaken, where vegetation present was stratified into 3 layers based upon their relative height:

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- Shrub layer (2-5m).
- Field layer (10cm to 2m).
- Ground layer (0cm to 10cm).

Figure 1 Identification of rhododendron within vegetation strata



Within the shrub layer (2-5m) and field layer (10cm to 2m) the presence or absence of rhododendron was observed and recorded, alongside its percentage occupancy of the area of that vegetation layer within the stand. Height of the rhododendron was also assessed (less than 1.3m, more than 1.3m) and evidence of management of the rhododendron was recorded.

At least 5% of completed survey squares were visited and re-assessed by an independent quality assurance team to ensure standards. Further details of the methodology are available in documents published on the NFI website.

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The results for individual surveyed squares were aggregated and scaled up to the areas identified by the woodland map, using standard statistical survey methodology, to produce the estimates in this report. Along with these estimates, associated sampling standard errors have also been calculated and reported. The sampling standard error will account for random variation arising from the selection of the sample, and random measurement errors, but not from any systematic biases in the field measurements. However, because of the quality assurance process it is thought unlikely that any substantial biases of this nature are present in the survey data.

Results

The results presented in this report are estimates of the area of rhododendron occurring within woodland areas of Great Britain, including small areas of trees in close proximity to main NFI woodland areas. Such small areas of trees were a minimum distance of 20 metres from main areas of NFI woodland (otherwise they would be included within the NFI woodland area) and generally up to a maximum of 100 metres distant from identified NFI woodland. Across Great Britain as a whole, the area of rhododendron occurring in these proximate small areas of trees is estimated to be less than 5% of the total area of rhododendron quoted in this report. The areas of rhododendron are derived using results from the NFI field survey through to August 2013 in combination with the NFI 2012 woodland map and have a reference date of September 2011.

A fuller description of these data sources and how they are used in the production of estimates, including sampling standard errors, are provided in earlier published NFI documents.

Map 1 shows the locations of NFI survey sites across Great Britain in which the presence of rhododendron was recorded. **Maps 2, 3** and **4** provides these locations for each of England, Scotland and Wales respectively.

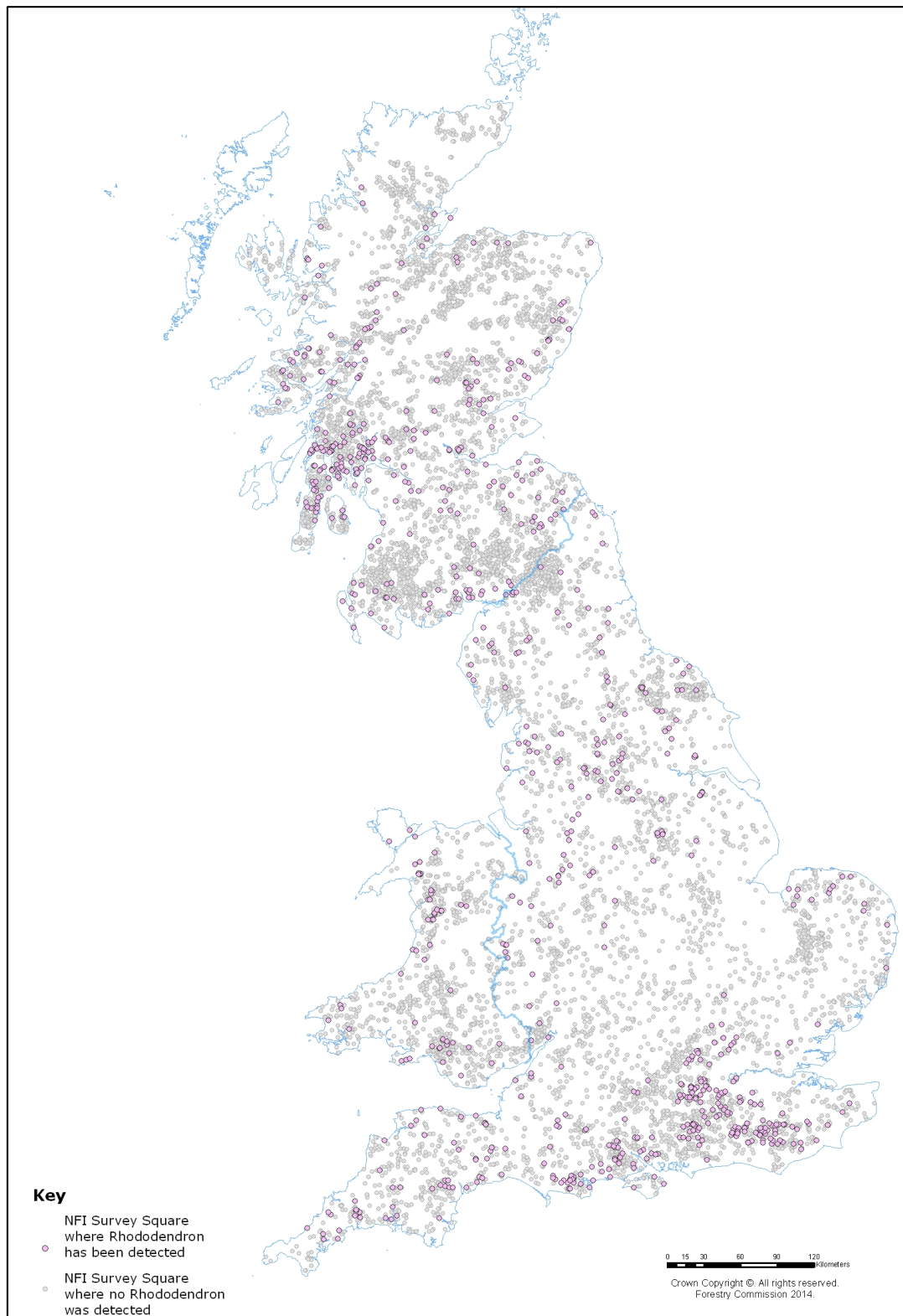
Table 1 provides the estimates of total areas occupied by rhododendron in GB, countries and NFI regions, and the percentages these represent of total woodland areas. (Total woodland area within each entity is that derived from the NFI 2012 woodland map.)

Figures 2 and **3** show these percentages in graphical form.

Table 2 shows the estimates of areas of rhododendron on the Forestry Commission/Natural Resources Wales (FC/NRW) estate in GB, countries and NFI regions, and the percentages these represent of total FC/NRW woodland, and **Figures 4** and **5** show these percentages in graphical form. **Table 3** and **Figures 6** and **7** provide the same information for the private sector estate.

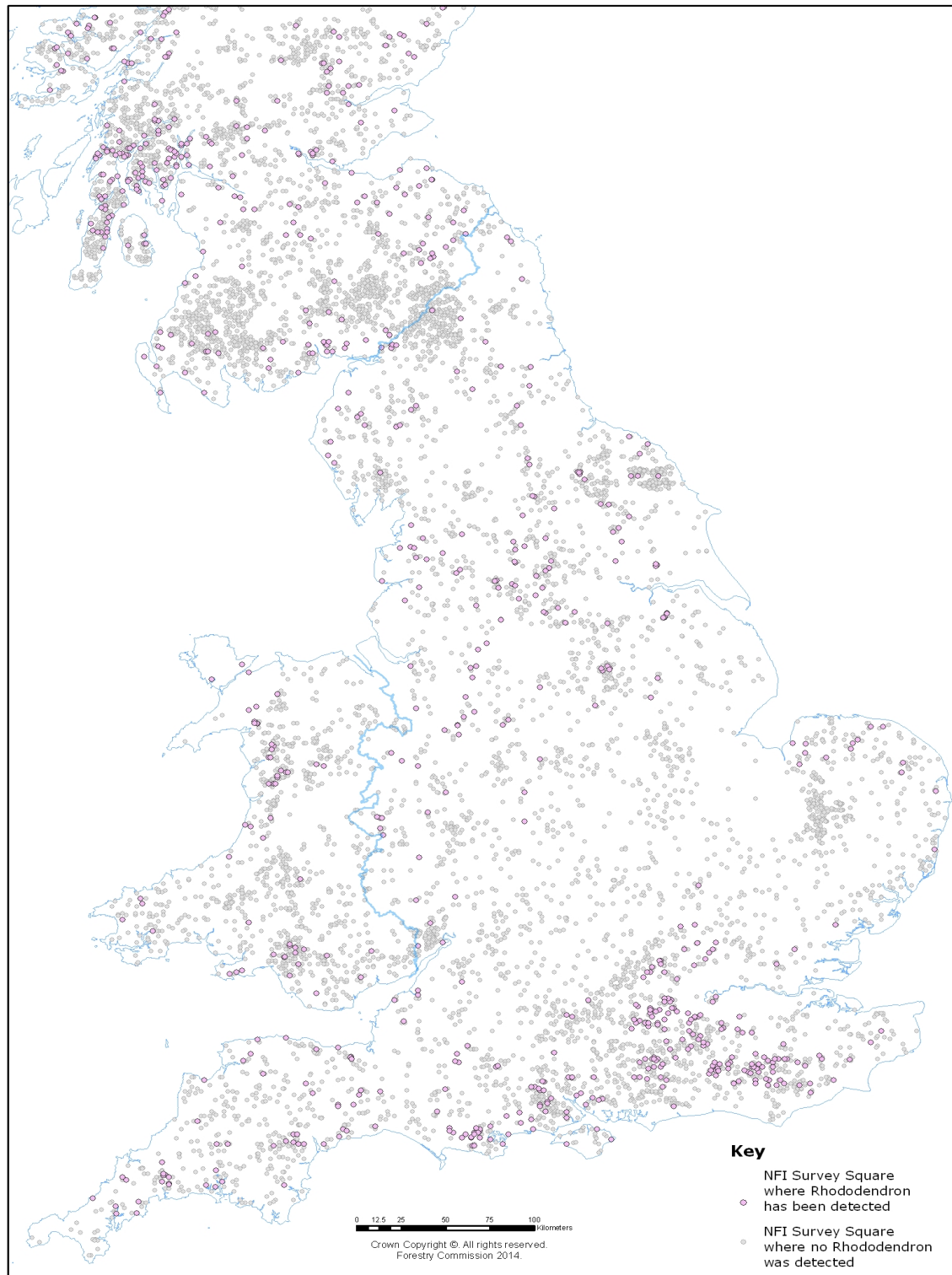
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Map 1 Locations of NFI sample sites in GB with presence of rhododendron

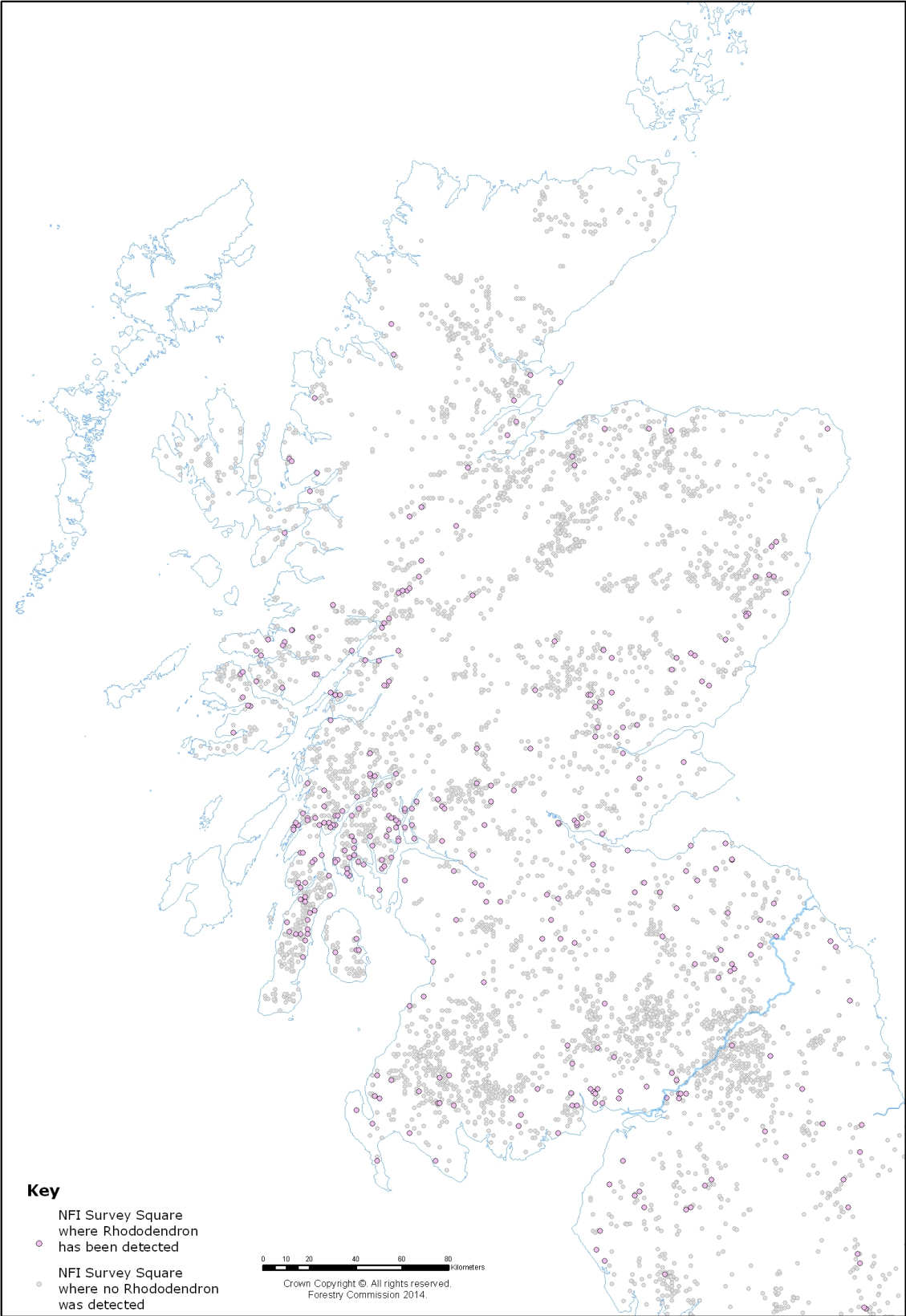


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Map 2 Locations of NFI sample sites in England with presence of rhododendron

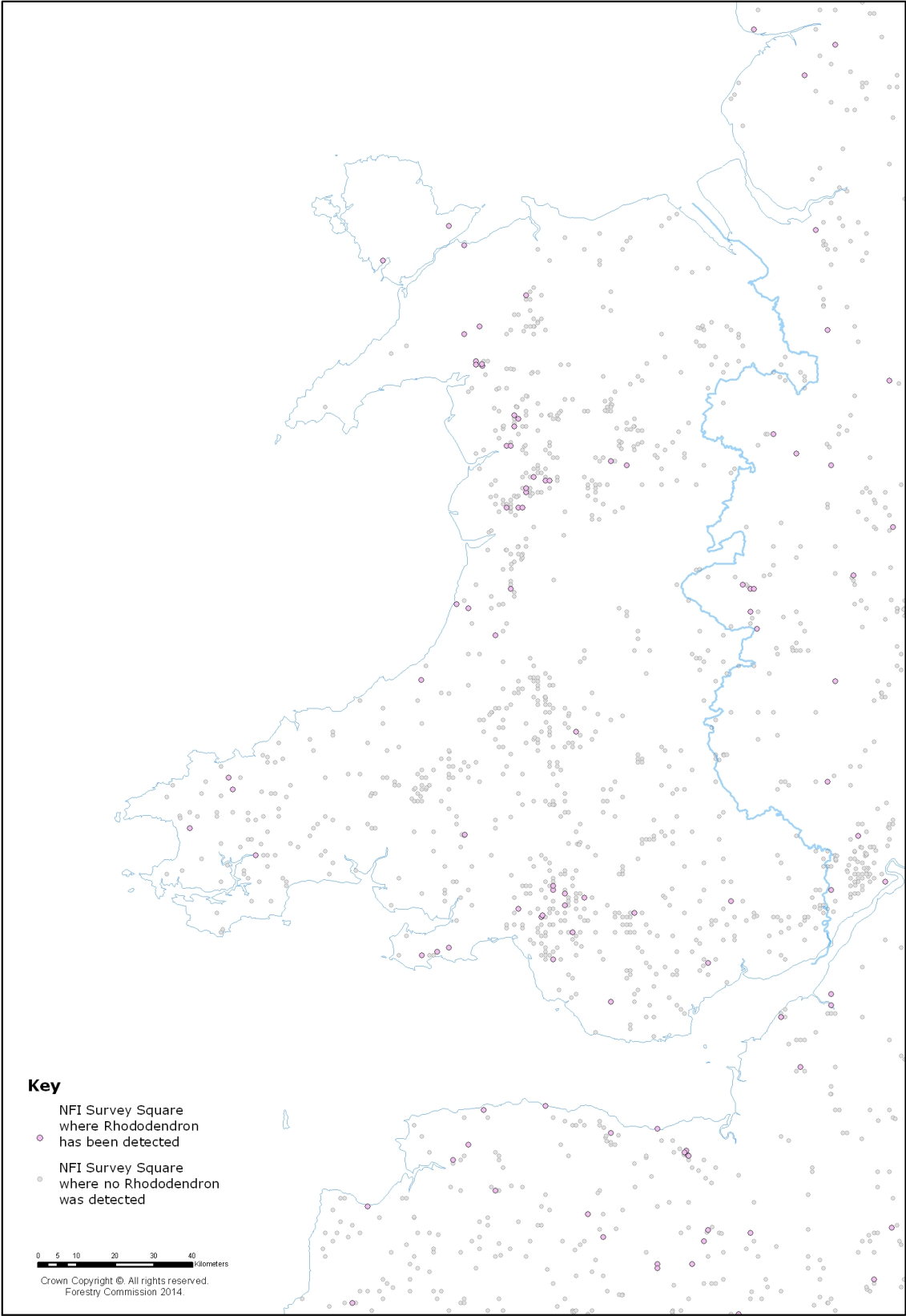


Map 3 Locations of NFI sample sites in Scotland with presence of rhododendron



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Map 4 Locations of NFI sample sites in Wales with presence of rhododendron



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Table 1 Areas of rhododendron in and proximate to woodland in GB, countries and NFI regions at the reference date of September 2011

Country / region	Area of rhododendron (000 ha)	Standard error %	Woodland area (000 ha)	% woodland area occupied by rhododendron
England	37.6	7	1,297.7	2.9
North West England	4.2	21	117.7	3.6
North East England	2.0	35	116.1	1.7
Yorkshire and the Humber	3.5	18	115.2	3.1
East Midlands	1.1	41	99.8	1.1
East England	3.4	27	154.1	2.2
South East England and London	14.0	11	324.2	4.3
South West England	6.6	15	252.5	2.6
West Midlands	2.7	40	118.1	2.2
Scotland	53.3	8	1,403.0	3.8
North Scotland	3.0	29	230.2	1.3
North East Scotland	1.5	46	233.8	0.6
East Scotland	6.4	21	136.2	4.7
South Scotland	15.3	18	426.7	3.6
West Scotland	27.0	11	376.2	7.2
Wales	7.9	17	305.0	2.6
GB	98.7	5	3,005.7	3.3

Figure 2 Percentage of total woodland area occupied by rhododendron in GB and countries at the reference date of September 2011

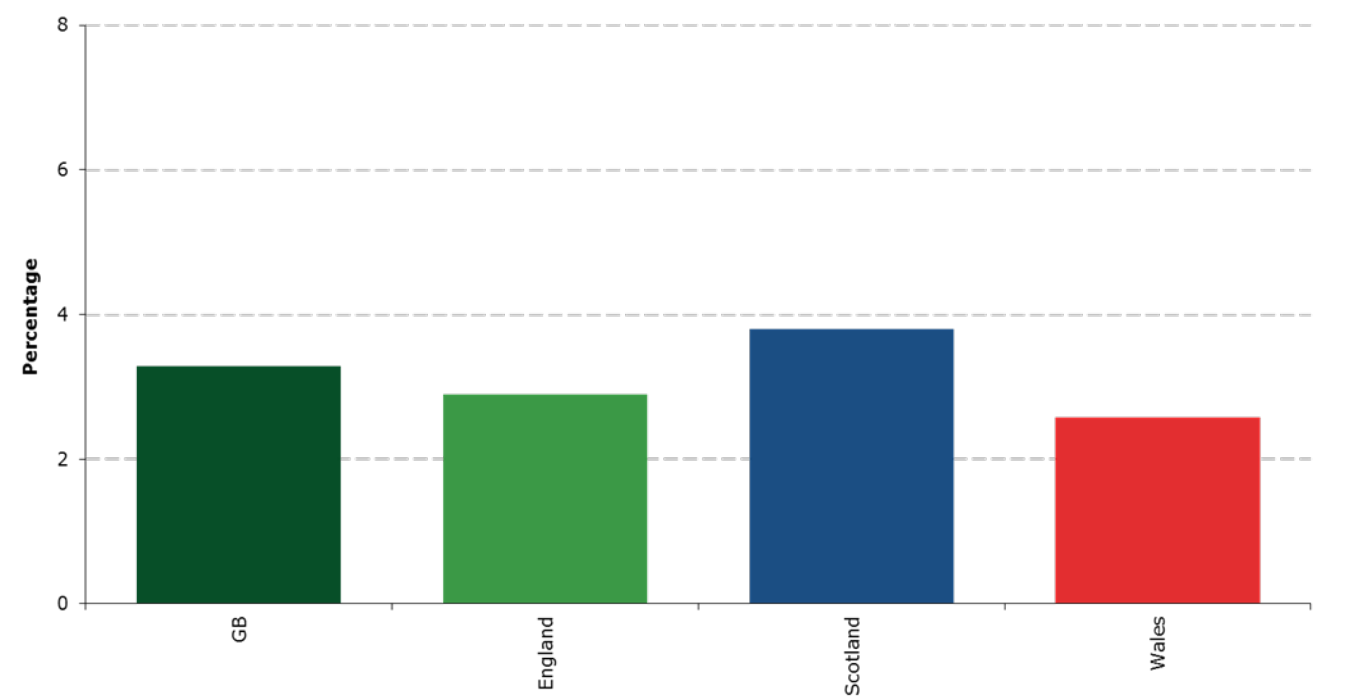
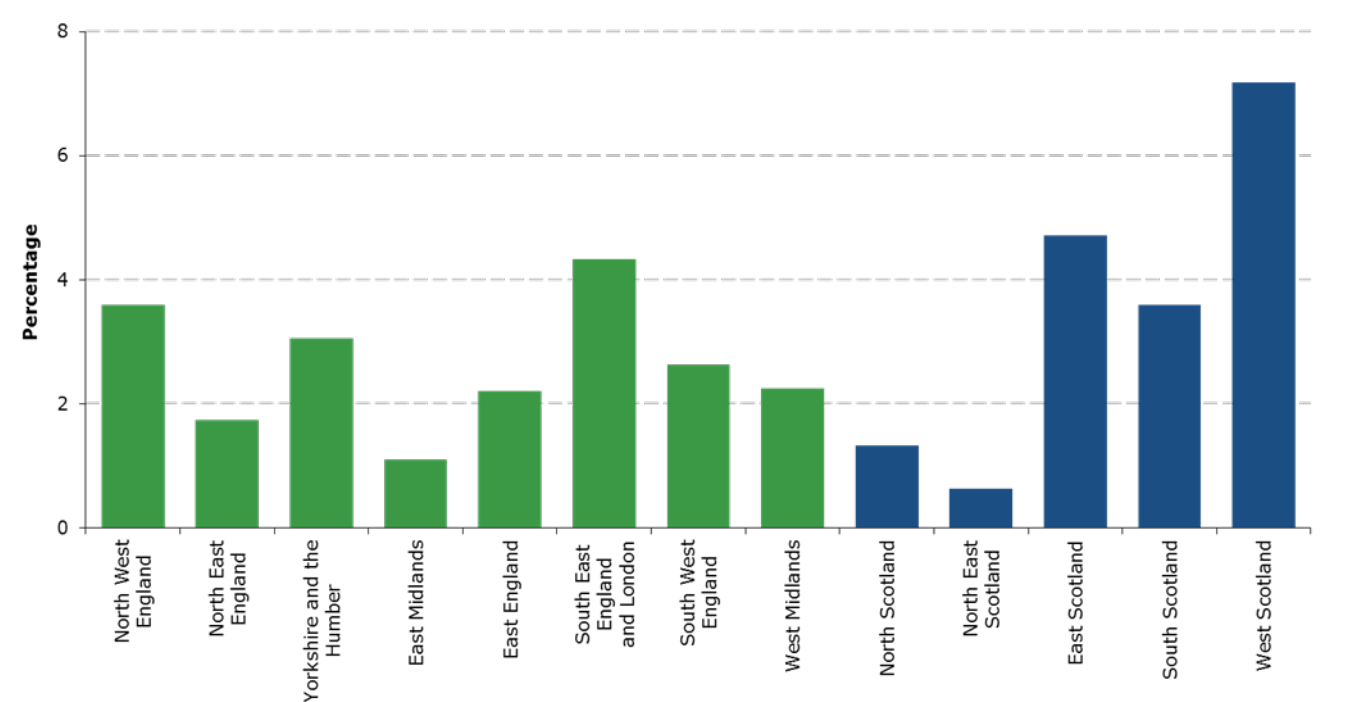


Figure 3 Percentage of total woodland area occupied by rhododendron in individual NFI regions at the reference date of September 2011



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Table 2 Areas of rhododendron on the Forestry Commission/Natural Resources Wales estate in GB, countries and NFI regions at the reference date of September 2011

Country / region	Area of rhododendron (000 ha)	Standard error %	Woodland area (000 ha)	% woodland area occupied by rhododendron
England	3.5	17	214.4	1.6
North West England	0.4	49	22.2	1.7
North East England	0.0	-	50.3	0.0
Yorkshire and the Humber	0.5	39	19.3	2.8
East Midlands	0.2	64	17.6	1.2
East England	0.0	107	24.4	0.1
South East England and London	0.7	37	34.0	2.0
South West England	1.4	30	33.7	4.0
West Midlands	0.3	71	13.0	1.9
Scotland	12.0	20	481.1	2.5
North Scotland	0.2	76	81.4	0.3
North East Scotland	0.4	77	60.6	0.7
East Scotland	1.3	61	33.6	3.9
South Scotland	1.5	37	146.1	1.0
West Scotland	8.5	26	159.4	5.4
Wales	2.8	28	117.1	2.4
GB	18.2	14	812.6	2.2

Figure 4 Percentage of woodland area occupied by rhododendron in the FC/NRW estate within GB and countries at the reference date of September 2011

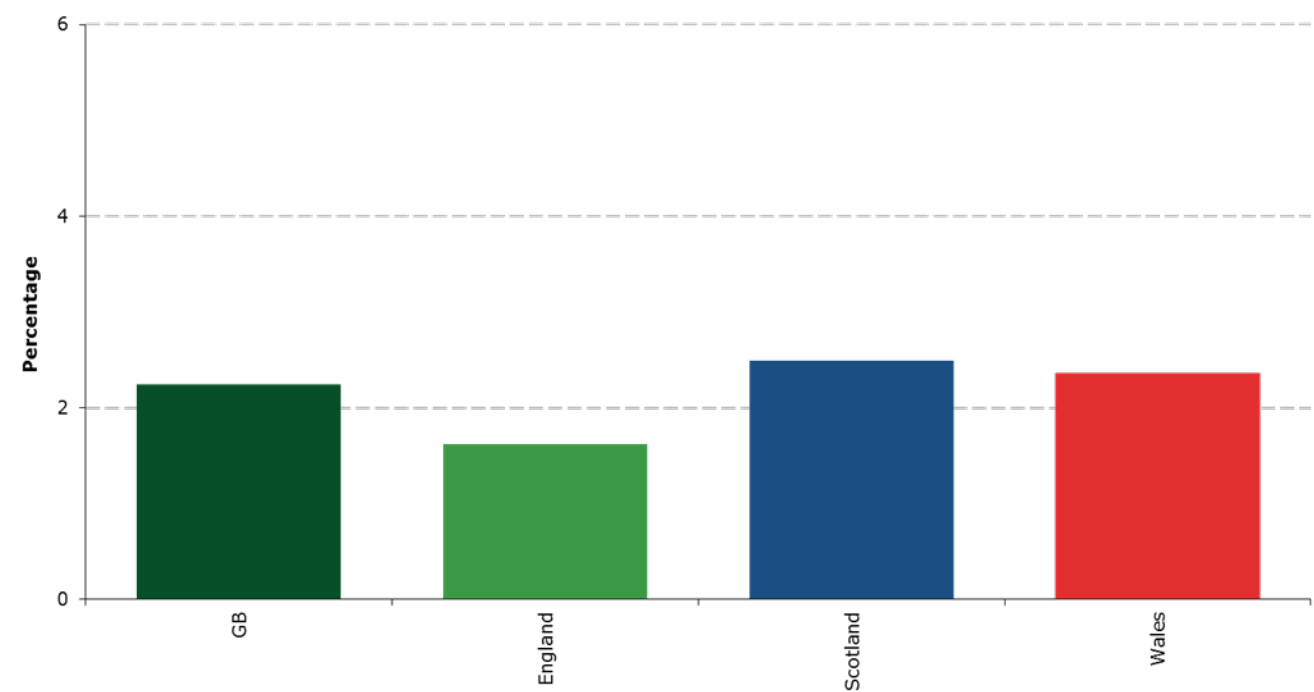
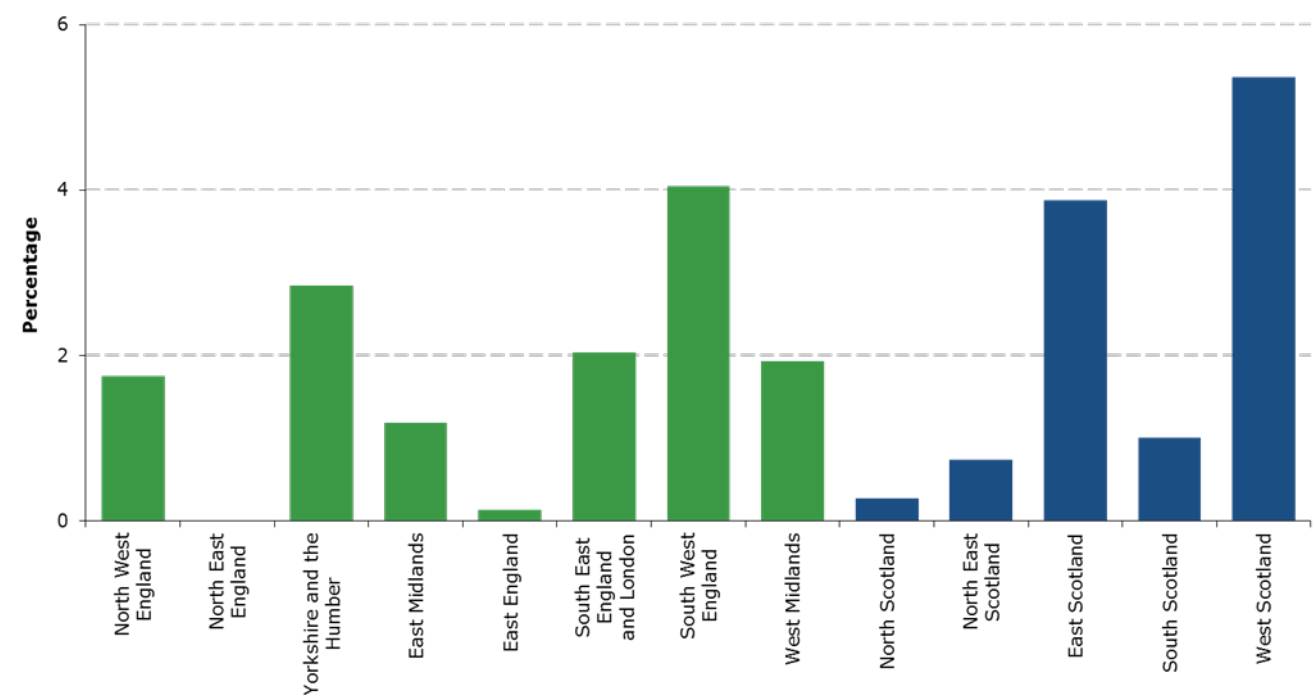


Figure 5 Percentage of woodland area occupied by rhododendron in the FC/NRW estate within individual NFI regions at the reference date of September 2011



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Table 3 Areas of rhododendron in the private sector estate in GB, countries and NFI regions at the reference date of September 2011

Country / region	Area of rhododendron (000 ha)	Standard error %	Woodland area (000 ha)	% woodland area occupied by rhododendron
England	34.1	8	1,083.2	3.1
North West England	3.8	23	95.5	4.0
North East England	2.0	35	65.8	3.1
Yorkshire and the Humber	3.0	20	96.0	3.1
East Midlands	0.9	48	82.2	1.1
East England	3.4	27	129.7	2.6
South East England and London	13.3	11	290.2	4.6
South West England	5.3	17	218.8	2.4
West Midlands	2.4	44	105.1	2.3
Scotland	41.3	9	921.9	4.5
North Scotland	2.8	31	148.8	1.9
North East Scotland	1.0	57	173.2	0.6
East Scotland	5.1	21	102.5	5.0
South Scotland	13.9	19	280.6	4.9
West Scotland	18.5	11	216.8	8.5
Wales	5.1	22	188.0	2.7
GB	80.5	6	2,193.1	3.7

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Figure 6 Percentage of woodland area occupied by rhododendron in the private sector estate within GB and countries at the reference date of September 2011

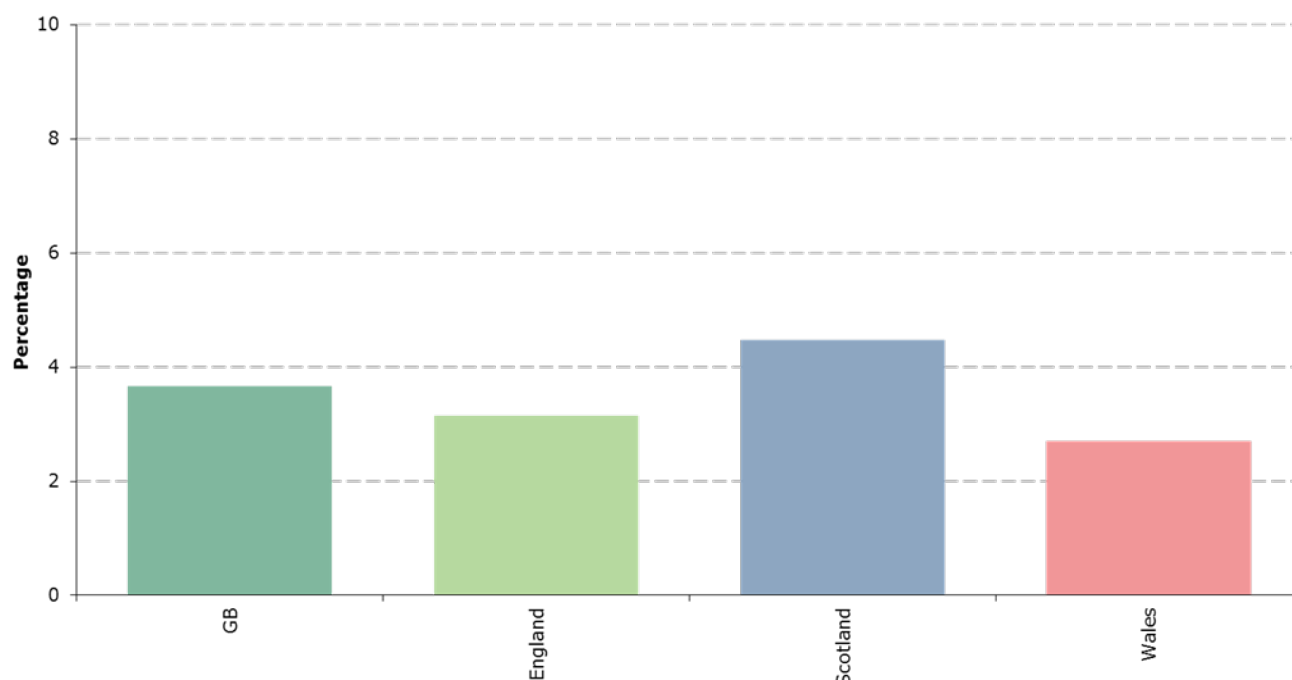
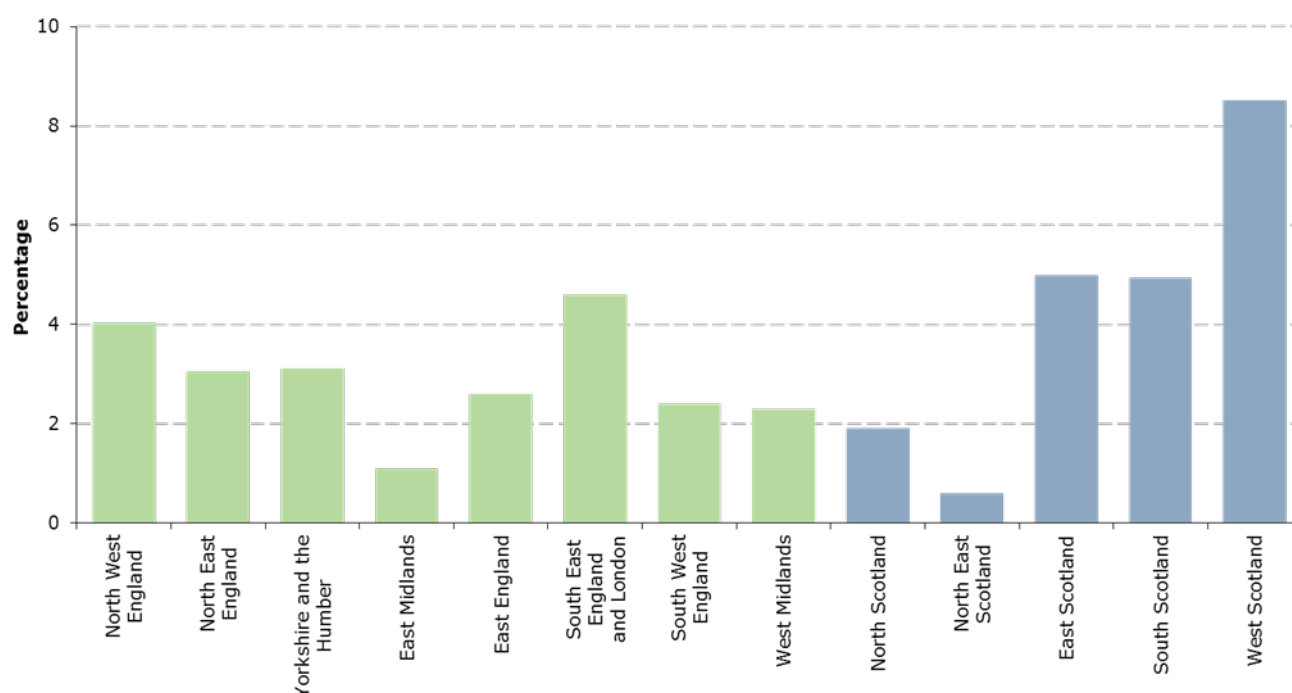


Figure 7 Percentage of woodland area occupied by rhododendron in the private sector estate within individual NFI regions at the reference date of September 2011



What the results tell us

This National Forest Inventory report provides the first formal quantified estimates of areas of rhododendron within all woodland types in Great Britain. Previous information on rhododendron in woodlands throughout Great Britain has tended to be informal or targeted upon particular regions or woodland types. The results provide estimates of the total area of rhododendron, its percentage occupancy in British woodlands, and information on its geographic distribution.

The results show that there are an estimated 98.7 thousand hectares of rhododendron growing within and in close proximity to woodlands in Britain, which represents 3.3% of total woodland area. Of this total area, 37.6 thousand hectares are found in England, 53.5 thousand hectares in Scotland and 7.9 thousand hectares in Wales, representing 2.9%, 3.8% and 2.6% of woodland area in each country respectively.

Of the National Forest Inventory regions in England, the largest presence of rhododendron within and in close proximity to woodlands is found within forests and woodlands in South East England and London with an estimated area of 14.0 thousand hectares, representing 4.3% of all woodlands within this region.

Of the National Forest Inventory regions in Scotland, the largest area of rhododendron within and in close proximity to woodlands is found in West Scotland with an estimated area of 27.0 thousand hectares, representing 7.2% of woodlands within this region. West Scotland has the highest overall incidence in percentage terms of all NFI regions in England, Scotland and Wales and is also the highest in percentage terms within each of the FC/NRW and private sectors. The estimates for Scotland vary from those reported in 'Scotland's Native Woodlands: Results from the Native Woodland Survey of Scotland' (<http://scotland.forestry.gov.uk/supporting/strategy-policy-guidance/native-woodland-survey-of-scotland-nwss/national-nwss-report>), but as these pertain to Native Woodland only, they are not directly comparable to the NFI estimates, which cover all woodland types.

This is a preliminary report based on a partial sample of NFI survey sites and has been confined to reporting on estimates of the areas of rhododendron within and in close proximity to woodlands in GB. A later final report, using all sample squares surveyed in the course of the first cycle of the NFI, will provide a more comprehensive analysis, including information on the relative heights of the rhododendron found, whether it is managed, and the type of woodland it is found within, including classification by priority woodland habitat type.

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A direct measure of changes in presence of rhododendron will be available when the National Forest Inventory reports on the second cycle of the field survey.

The presence of rhododendron will form one element in the forthcoming National Forest Inventory assessment of woodland ecological condition.

NFI national reports and papers

The principal themes reported on by the NFI to date have been:

- GB 2011 preliminary estimates of broadleaved species
- GB 2011 standing coniferous timber volume
- UK 25-year forecast of softwood availability
- GB 25-year forecast of coniferous standing volume and increment
- GB 50-year forecast of hardwood timber availability
- GB 50-year forecast of softwood timber availability
- Biomass in live woodland trees in Britain
- Carbon in live woodland trees in Britain
- Preliminary estimates of the changes in canopy cover in British woodlands between 2006 and 2015

Some of these themes have a series of associated reports, papers and data, tailored for different audiences and uses. All the documents and data can be found on the NFI website www.forestry.gov.uk/inventory.

Glossary

A glossary of terms is presented in the full suite of forecast reports which can be found at www.forestry.gov.uk/forecast.

Official Statistics

This is an Official Statistics publication. More information about Official Statistics and the UK Statistics Authority is available at www.statisticsauthority.gov.uk

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