



▲ Sessile oak woodland • © Clive Hurford

5. Woodlands: Broadleaved, Mixed & Yew Woodlands and Coniferous Woodland

Summary

Area

- Broadleaved, Mixed & Yew Woodland covered 8.6% (173,600 ha) of the total area of Wales in 2007. No significant net change in area was estimated to have occurred across Wales between 1998 and 2007 however, in the Welsh lowlands a significant increase of 8,900 ha was detected between 1998 and 2007.
- Coniferous Woodland covered 5.0% (105,900 ha) of Wales in 2007. No significant net change in area was seen between 1998 and 2007.
- The total area of woodland in Wales is consistent with other recording schemes although Countryside Survey allocates a much larger proportion of woodland to Broadleaved, Mixed & Yew Woodland relative to Coniferous Woodland.

Vegetation condition

- No significant changes in plant species composition occurred between 1998 and 2007 in either Coniferous or Broadleaved, Mixed & Yew Woodland but a significant reduction in species richness in Broadleaved, Mixed & Yew Woodland was seen between the 1990 and 2007 surveys. Significant changes during this longer time interval were also consistent with a general trend seen elsewhere in Britain for a reduction in abundance of species associated with canopy gaps, disturbance and an increase in more nutrient-demanding taller plants.
- In Broadleaved, Mixed & Yew Woodland only, the significant increase in Competitor Score in the upland zone in Main Plots between 1990 and 2007 was associated with a large standardized effect size. The decrease in butterfly larval food plant richness in the lowland zone in Main Plots between 1990 and 2007 was just below the large effect size threshold reflecting a reduction of an average 3 species per plot over the 17 year period. Both changes may indicate more substantial ecological impacts on the woodland ecosystem.

Soils

- There was no significant change in soil (0-15cm) pH in Broadleaved, Mixed & Yew Woodland in Wales between 1998 and 2007 but soils (0-15cm) in this Broad Habitat were significantly less acid in 2007 than they were in 1978. No change in soil (0-15cm) pH in Coniferous Woodland has been observed since 1978.
- Soil (0-15cm) carbon concentration has remained stable in Broadleaved, Mixed & Yew Woodland in Wales since 1978 but decreased in Coniferous Woodland between 1998 and 2007.
- The estimated soil (0-15cm) carbon stock in 2007 for Broadleaved, Mixed & Yew Woodland and Coniferous Woodland was 71t/c/ha and 61t/c/ha respectively.

5.1 Introduction

In Countryside Survey, woodland is defined as ‘consisting of over 25% canopy cover of trees and shrubs, over a metre high’³⁴. The two woodland Broad Habitats include all broadleaved and coniferous woodlands as well as scrub including Gorse (*Ulex europaeus*)³⁵. Lines of trees and hedges are covered separately as woody linear features, in the Boundary and Linear Features Broad Habitat (Chapter 4).

Two Broad Habitat types distinguish woodland types in Wales: Broadleaved, Mixed & Yew Woodland; and Coniferous Woodland, the only type native to Wales being Juniper scrub. Areas of mapped woodland Broad Habitat often include small patches of other habitats below the minimum mappable unit (20m x 20 m) but located within the surveyed woodland boundary. While small, these nonetheless contribute diversity and distinctiveness to the wooded environment. These habitats maybe associated with past and present human activity within the woods such as paths, ponds and rides. They may also reflect natural variability in conditions for tree growth. For example windthrow, grazing, wet conditions, rock exposures and steep slopes can all interrupt the tree canopy making way for patches of bracken, grassland, bog, flushes and inland rock. In commercial woodland there will also be clear-felled areas awaiting replanting or left to develop as new areas of heathland, grassland or bog (and mapped as such by Countryside Survey). Areas of natural regeneration can also occur, typically along the forest edges where a more natural structure is being encouraged. In addition many commercial plantations are increasingly subject to thinning regimes that open out mature conifer canopies but would not result in a change to the Broad Habitat type. The use of the two plot types, Main Plots and Targeted Plots, enables the differences between the larger areas of wooded habitat and these smaller patches to be examined.



▲ Coniferous woodland and clear fell, mid Wales • © Simon Smart

5.2 The Area of Woodland in Wales

5.2.1 Broadleaved, Mixed & Yew Woodland

Broadleaved, Mixed & Yew Woodland covered an estimated 173,600 ha of Wales but with wide 95% confidence intervals (135,100 to 233,900 ha). This amounts to an estimated 8.6% of the total land area of Wales in 2007, nearly equally distributed between the upland and lowland zones (Table 5.1). Across Wales as a whole, no statistically significant change in area was detected between 1998 and 2007 but there was an estimated 12% increase of 8,900 ha (95% CI; 1,200 ha to 15,800 ha) in the lowlands between 1998 and 2007 (Table 5.1).

▼ Table 5.1: Estimates of the area ('000s ha) and percentage of land area of Broadleaved, Mixed & Yew Woodland in Wales and in each environmental zone from 1998 to 2007 are shown. Arrows denote significant change (p<0.05) in the direction shown.

	1998		2007		Direction of significant changes 1998-2007
	Area ('000s ha)	%	Area ('000s ha)	%	
Lowland	75	6.9	84	7.7	↑
Upland	97	9.4	90	8.8	
Wales	172	8.1	174	8.2	

5.2.2 Coniferous Woodland

Woodland dominated by conifers covered an estimated 105,900 ha making up 5.0% of the total land area of Wales in 2007. No significant change to the total area of Coniferous Woodland was observed in Wales between 1998 and 2007 (Table 5.2).

³⁴ Field Mapping Handbook. On-line at: www.countryside-survey.org.uk/tech_reports.html
³⁵ Note that in Countryside Survey a woodland mappable unit with >20% cover of Conifers is assigned to Conifer Woodland. Hence mapped areas of Broadleaved, Mixed & Yew may have much less conifer cover than allowed by the Broad Habitat definition.

▼ **Table 5.2:** Estimates of the area ('000s ha) and percentage of land area of Coniferous Woodland in Wales and in each environmental zone from 1998 to 2007 are shown. No statistically significant change was seen between survey years.

	1998		2007		Direction of significant changes 1998-2007
	Area ('000s ha)	%	Area ('000s ha)	%	
Lowland	7	0.6	4	0.4	NO SIGNIFICANT CHANGE
Upland	89	8.7	102	9.9	
Wales	96	4.5	106	5	



▲ Bluebells, Ceredigion • © Richard Evans

▼ **Table 5.3:** Most frequent 15 species in 2007 in the Broadleaved, Mixed & Yew Woodland Broad Habitat in Wales.

a) Main Plots (n=41)			b) Targeted Plots (n=72)		
% frequency	Mean cover (%)	Plant name	% frequency	Mean cover (%)	Plant name
61	6	<i>Holcus lanatus</i>	85	13	<i>Rubus fruticosus</i> agg.
59	8	<i>Agrostis capillaris</i>	64	17	<i>Fraxinus excelsior</i>
51	3	<i>Rubus fruticosus</i> agg.	60	9	<i>Hedera helix</i>
46	4	<i>Anthoxanthum odoratum</i>	46	7	<i>Agrostis capillaris</i>
46	9	<i>Pteridium aquilinum</i>	46	5	<i>Holcus lanatus</i>
39	1	<i>Crataegus monogyna</i>	40	4	<i>Agrostis stolonifera</i>
37	1	<i>Dactylis glomerata</i>	38	2	<i>Ranunculus repens</i>
37	2	<i>Ranunculus repens</i>	36	3	<i>Urtica dioica</i>
34	1	<i>Festuca rubra</i> agg.	35	21	<i>Alnus glutinosa</i>
34	4	<i>Fraxinus excelsior</i>	35	1	<i>Geranium robertianum</i>
34	3	<i>Juncus effusus</i>	33	2	<i>Dryopteris dilatata</i>
32	2	<i>Agrostis stolonifera</i>	32	3	<i>Thuidium tamariscinum</i>
32	1	<i>Cerastium fontanum</i>	31	10	<i>Corylus avellana</i>
32	<1	<i>Digitalis purpurea</i>	29	3	<i>Juncus effusus</i>
32	1	<i>Rhytiadelphus squarrosus</i>	28	8	<i>Chrysosplenium oppositifolium</i>

5.3 Changes in the vegetation of woodland Broad Habitats

5.3.1 Broadleaved, Mixed & Yew Woodland

The most common species recorded in this Broad Habitat are listed in *Table 5.3*.

Main Plots: Between 1990 and 2007, statistically significant changes in vegetation condition were mostly observed in the lowland zone or across Wales as a whole (*Table 5.4a*). In lowland Main Plots the Grass:Forb ratio decreased between 1998 and 2007 whilst, between 1990 and 2007, a reduction in species richness, an increase in proportion of more competitive species and a decrease in proportion of ruderal species suggests a response to lack of disturbance and a decrease in species suited to lighter, open conditions. These same changes were significant across Great Britain broadleaved woodland between 1998 and 2007 but

were not found to be significant across Wales between 1998 and 2007 (*Table 5.4a*). Three of the significant changes in vegetation condition between 1990 and 2007 were based on noteworthy effect sizes: the decrease in butterfly larval food plant richness in the lowland zone (mean loss of 3 species per plot) and increase in Competitor Score across Wales both had a standardized effect size of 0.7 and so just below the threshold for a large effect. The increase in Competitor Score in the upland zone in the Main Plots was a large standardized effect size. This means that the increase in representation of more competitive species moved beyond values typical of the natural variability in the sample. This indicates that an ecologically important change in vegetation character may have occurred.

Targeted Plots: The Targeted Plots represent small fragments of other habitats embedded within larger areas of woodland. Within these, a similar response to shading was seen. Ellenberg Light Score decreased significantly between 1998 and 2007 as

▼ **Table 5.4:** Change in the characteristics of vegetation in *a) 200m² Main Plot* and, *b) 4m² Targeted Plots located within mapped areas of the Broadleaved, Mixed & Yew Woodland Broad Habitat across Wales between 1990 and 2007*. W=Wales, Lo=Lowland zone, Up=Upland zone. Arrows denote significant change ($p<0.05$) in the direction shown. Large effect sizes are highlighted in red.

a) Main Plots	Mean values (Wales)			Direction of significant changes 1998 - 2007			Direction of significant changes 1990 - 1998			Direction of significant changes 1990 - 2007		
	1990	1998	2007	W	Lo	Up	W	Lo	Up	W	Lo	Up
Vegetation Condition Measures												
Species Richness (No. of Species)	25.8	22.8	21.5	NO SIGNIFICANT CHANGE						↓	↓	
No. of Bird Food Species	11.2	9.5	9.6					↓			↓	
No. of Butterfly Food Species	11.1	10	8.9					↓		↓	↓	
Grass:Forb Ratio	0.61	0.39	-0.06		↓		NO SIGNIFICANT CHANGE					
Competitor Score	2.73	2.81	2.87							↑		↑
Stress Tolerator Score	2.73	2.72	2.66									
Ruderal Score	2.28	2.18	2.10							↓		
Light Score	6.38	6.33	6.28									
Fertility Score	4.49	4.55	4.62									
Ellenberg pH Score	5.08	5.10	5.06									
Moisture Score	5.58	5.62	5.67									

b) Targeted Plots	Mean values (Wales)			Direction of significant changes 1998 - 2007			Direction of significant changes 1990 - 1998			Direction of significant changes 1990 - 2007		
	1990	1998	2007	W	Lo	Up	W	Lo	Up	W	Lo	Up
Vegetation Condition Measures												
Species Richness (No. of Species)	12.1	12.8	11.3	↓			NO SIGNIFICANT CHANGE			NO SIGNIFICANT CHANGE		
No. of Bird Food Species	4.6	4.9	4.3									
No. of Butterfly Food Species	4.3	4.5	3.7	↓								
Grass:Forb Ratio	-0.11	0.27	-0.79	↓	↓						↓	
Competitor Score	2.81	2.93	2.95					↑			↑	
Stress Tolerator Score	2.76	2.67	2.63									
Ruderal Score	2.13	2.11	2.01									
Light Score	6.01	6.08	5.84	↓	↓	↓						
Fertility Score	4.67	4.78	5.00									
Ellenberg pH Score	5.13	5.23	5.37	↑						↑		
Moisture Score	5.82	5.92	5.95									

did species richness. Between 1990 and 2007, Grass:Forb ratio decreased significantly and the proportion of more competitive species increased significantly. Ellenberg pH Score also increased indicating a greater representation of species typical of less acid conditions (*Table 5.4b*). None of the significant changes in the Targeted Plots were based on large standardized effect sizes, hence ecological impacts on the vegetation are likely to have been minor although possibly part of a longer term and more ecologically significant trend.

Ancient Woodland Indicator species

There was no statistically significant change in mean number of indicators in either Main or Targeted Plots either at the country level or within each Environmental Zone.

5.3.2 Coniferous Woodland

The most common species recorded in this Broad Habitat are listed in *Table 5.5*.

Soon after planting, Coniferous Woodland understoreys can be subject to a number of management regimes. In the past, increasingly heavy shading would have occurred as the canopy developed, until felling decades later. Whilst this is still a common regime in many plantations, forest management has recently shifted toward the maintenance of continuous cover in many places with thinning cycles carried out to open out the canopy and promote new regeneration. In both situations however, established plantation is often associated with a species-poor understorey reflecting the influence of acidic soils and dense shade. As expected therefore, few changes were detected over the 1990 to 2007 period.

Main Plots: Only Grass:Forb ratio increased significantly between 1990 and 1998 before declining again, but not significantly, between 1998 and 2007 (*Table 5.6a*). The increase in Grass:Forb ratio between 1990 and 1998 was based on a large standardized effect size. Hence, despite decreasing again between the most recent surveys, the increase in cover of grasses relative to forbs was substantial between 1990 and 1998 relative to the variability in values across the sample.

▼ **Table 5.5:** Most frequent 15 species in 2007 in the Coniferous Woodland Broad Habitat in Wales.

a) Main Plots (n=30)			b) Targeted Plots (n=18)		
% frequency	Mean cover (%)	Plant name	% frequency	Mean cover (%)	Plant name
73	47	<i>Picea sitchensis</i>	39	1	<i>Vaccinium myrtillus</i>
60	2	<i>Dryopteris dilatata</i>	33	1	<i>Galium saxatile</i>
57	6	<i>Rubus fruticosus</i> agg.	33	4	<i>Juncus effusus</i>
43	2	<i>Sorbus aucuparia</i>	33	5	<i>Polytrichum commune</i>
43	3	<i>Vaccinium myrtillus</i>	33	4	<i>Rubus fruticosus</i> agg.
40	4	<i>Agrostis capillaris</i>	28	5	<i>Agrostis capillaris</i>
37	1	<i>Deschampsia flexuosa</i>	28	2	<i>Agrostis stolonifera</i>
37	1	<i>Galium saxatile</i>	28	4	<i>Holcus lanatus</i>
33	1	<i>Betula seedling/sp</i>	28	19	<i>Picea sitchensis</i>
33	1	<i>Holcus lanatus</i>	22	4	<i>Calluna vulgaris</i>
33	1	<i>Polytrichum commune</i>	22	2	<i>Deschampsia flexuosa</i>
33	2	<i>Pteridium aquilinum</i>	22	6	<i>Molinia caerulea</i>
30	<1	<i>Blechnum spicant</i>	22	<1	<i>Potentilla erecta</i>
30	1	<i>Digitalis purpurea</i>	22	6	<i>Sphagnum (green/thin)</i>
30	1	<i>Juncus effusus</i>	17	1	<i>Deschampsia cespitosa</i>

▼ **Table 5.6:** Change in the characteristics of vegetation in **a) 200m² Main Plot** and **b) Targeted Plots located within mapped areas of the Coniferous Woodland Broad Habitat across Wales between 1990 and 2007**. Arrows denote significant change ($p < 0.05$) in the direction shown. Large effect sizes are highlighted in red.

a) Main Plots	Mean values (Wales)			Direction of significant changes 1998 - 2007			Direction of significant changes 1990 - 1998			Direction of significant changes 1990 - 2007		
	1990	1998	2007	W	Lo	Up	W	Lo	Up	W	Lo	Up
Vegetation Condition Measures												
Species Richness (No. of Species)	12.2	15.7	13.9	NO SIGNIFICANT CHANGE			NO SIGNIFICANT CHANGE			NO SIGNIFICANT CHANGE		
No. of Bird Food Species	3.9	4.8	4.4									
No. of Butterfly Food Species	4.1	5.3	4.9									
Grass:Forb Ratio	-0.58	0.41	-0.32	NO SIGNIFICANT CHANGE			↑			NO SIGNIFICANT CHANGE		
Competitor Score	2.80	2.80	2.89									
Stress Tolerator Score	3.05	2.98	2.93									
Ruderal Score	1.51	1.57	1.58									
Light Score	6.11	6.24	6.11									
Fertility Score	3.56	3.65	3.84									
Ellenberg pH Score	3.65	3.79	3.88									
Moisture Score	5.94	6.05	6.04									

b) Targeted Plots	Mean values (Wales)			Direction of significant changes 1998 - 2007			Direction of significant changes 1990 - 1998			Direction of significant changes 1990 - 2007		
	1990	1998	2007	W	Lo	Up	W	Lo	Up	W	Lo	Up
Vegetation Condition Measures												
Species Richness (No. of Species)	11	11.6	8.8	↓		↓	NO SIGNIFICANT CHANGE			NO SIGNIFICANT CHANGE		
No. of Bird Food Species	3.4	2.9	2.7									
No. of Butterfly Food Species	3.7	3.9	3.1									
Grass:Forb Ratio	1.26	0.81	-0.24	↓			NO SIGNIFICANT CHANGE					
Competitor Score	2.54	2.74	2.89							↑		
Stress Tolerator Score	3.13	3.04	2.90									
Ruderal Score	1.80	1.79	1.74									
Light Score	6.36	6.45	6.38									
Fertility Score	3.94	3.84	3.71									
Ellenberg pH Score	4.35	4.06	4.03									
Moisture Score	6.25	6.29	6.30									

▼ **Table 5.7:** Changes in the pH and carbon concentration of soils (0-15cm depth) within all the vegetation types and woodland Broad Habitats across Wales. Arrows denote a significant change ($p < 0.05$) in the direction shown.

Broad Habitat	Mean pH			Direction of significant changes			Mean carbon concentration (g/kg)			Direction of significant changes		
	1978	1998	2007	1998-2007	1978-1998	1978-2007	1978	1998	2007	1998-2007	1978-1998	1978-2007
Broadleaved, Mixed and Yew Woodland	4.5	5.2	5.4		↑	↑	63.1	68.4	79			
Coniferous Woodland	3.7	4.2	3.7				161.5	197.8	144	↓		

▼ **Table 5.8:** Comparative estimates of the extent of woodland habitats ('000s ha) are available from the Habitat Survey of Wales, and from Forestry Statistics. 95% CI on the Countryside Survey estimates are given in brackets.

	Broadleaf, Mixed & Yew Woodland	Conifer Woodland	Total Woodland
Countryside Survey (2007)	174 (135.1-233.9)	106 (33.7-180.8)	280 (Not avail)
Habitat Survey of Wales (1979 - 1997)	113	172	285
Forestry Statistics (2008)*	128	157	285

* Forestry statistics are derived from the National Inventory of Woodland and Trees (1995-1999) adjusted for new planting and sales of FC woodlands.

Targeted Plots: Few changes were also seen in the Targeted Plots that pick out patches of different vegetation types within the Coniferous Woodland environment. Mean species richness declined across Wales and in the upland zone between 1998 and 2007. Grass:Forb ratio also decreased between 1998 and 2007 (*Table 5.6b*), however none of the significant changes were based on large standardized effect sizes.

5.4 Changes in woodland soils in Wales (0-15cm)

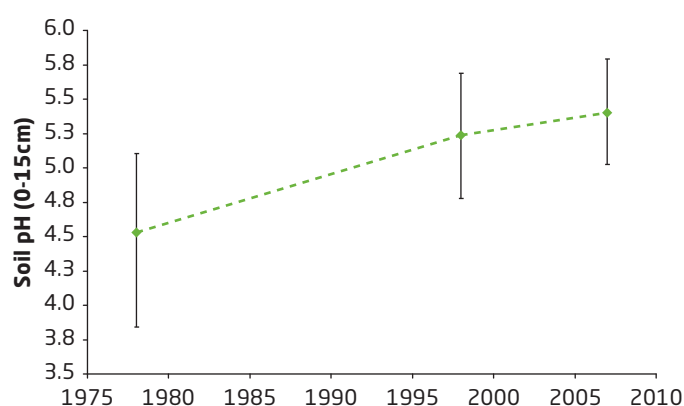
5.4.1 Broadleaved, Mixed & Yew Woodland

Soil (0-15cm) pH: There was no significant change in the mean pH of soil (0-15cm) samples in Broadleaved, Mixed & Yew Woodland across Wales between 1998 and 2007 (*Table 5.7*). However, over the longer period the mean pH increased significantly from 4.50 in 1978 to 5.21 in 1998 which mainly accounted for the significant increase in pH between 1978 and 2007 (*Fig 5.1*).

Soil (0-15cm) carbon concentration: There was no observed significant change in the mean carbon concentration of soil (0-15cm) in Main Plots within Broadleaved, Mixed & Yew Woodland in Wales between any of the surveys (*Table 5.7*).

Bulk density and soil (0-15cm) carbon stock: The mean bulk density of Broadleaved, Mixed & Yew Woodland soils (0-15cm) in Wales was 0.7 g/cm³. Combined with mean soil (0-15cm) carbon concentration, the estimated soil (0-15cm) carbon stock is 71 t/c/ha. Bulk density data and hence soil carbon stock estimates are only available from the 2007 survey.

▼ **Figure 5.1:** The change in pH in soils (0-15cm) from Broadleaved, Mixed & Yew Woodland in Wales between 1978 and 2007. Significant change (at least $p < 0.05$) occurred between 1978 and 1998, and 1978 and 2007. Error bars are the 95% Confidence Intervals on the pH in each survey year.

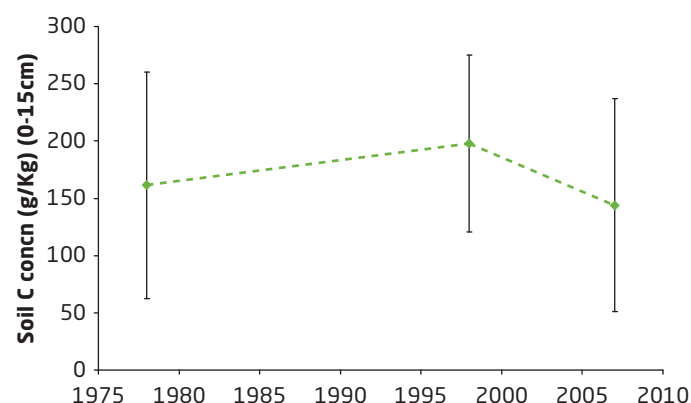


5.4.2 Coniferous Woodland

Soil (0-15cm) pH: No change in the mean pH of soils (0-15cm) in Coniferous Woodlands was detected in Wales between 1978, 1998 and 2007 (*Table 5.7*), which is consistent with the results for Great Britain as a whole.

Soil (0-15cm) carbon concentration: Overall there was no significant change in the carbon concentration in Coniferous Woodland between 1978 and 2007. However, there was a significant decrease in the carbon concentration of soil (0-15cm) in the Coniferous Woodland Broad Habitat for Wales between 1998 and 2007 (*Fig 5.2; Table 5.7*). These findings are consistent with the results for Great Britain as a whole.

▼ **Figure 5.2:** The change in mean carbon concentration in soils (0-15cm) from Coniferous Woodland in Wales between 1978 and 2007. Significant change (at least $p < 0.05$) occurred between 1998 and 2007. Error bars are the 95% CI on the mean carbon concentration in each survey year.



Bulk density and soil (0-15cm) carbon stock: The mean bulk density of Coniferous Woodland soils (0-15cm) in Wales was 0.4 g/cm^3 , which when combined with mean soil (0-15cm) carbon concentration indicated a soil (0-15cm) carbon stock of 61 t/c/ha . Bulk density data and hence soil carbon stock estimates are only available from the 2007 survey.

5.5 The results in context

This chapter has considered the two Broad Habitats that make up the woodland resource in Wales. Of the UK countries, Wales has the highest percentage cover of Broadleaved, Mixed & Yew Woodland although this is low by European standards. Of the UK countries, only Scotland has a higher total woodland cover, a consequence of the much higher percentage cover of Coniferous Woodland there than elsewhere.



▲ Improved Grassland Broad Habitat with young trees

• © Lindsay Maskell

In Wales, only broadleaf-dominated woodland is native, and this type is the main focus of nature conservation interest. It includes eight Priority Habitat types recognised in the UK Biodiversity Action Plan, and Broadleaved, Mixed & Yew Woodland is recognised as a feature of interest on many SSSIs. Most Coniferous Woodland is managed as commercial forestry, and has a restricted and more localised conservation interest (e.g. black grouse use the coniferous woodland – heather moorland transition zone).

Estimates of total woodland extent are much closer across surveys than are estimates of Broadleaved, Mixed & Yew Woodland and Coniferous Woodland (**Table 5.8**). This tends to suggest that differences in definition of woodland types contribute to the reported differences. The estimates of Coniferous Woodland extent from Habitat Survey of Wales and Forestry Statistics, in any case, fall within the confidence interval of the Countryside Survey estimate. But comparisons at this level do tend to suggest that Countryside Survey might overestimate the amount of Broadleaved, Mixed & Yew Woodland in Wales – further work is needed to better understand whether the sample design of Countryside Survey is adequately representing the distribution of the woodland resource in Wales.

A further source of comparative data arises from the 20 woodland sites (320 plots) revisited in Wales as part of the Great Britain-wide resurvey of the 'Bunce' 1971 sites³⁶. Similar to the patterns recorded by Countryside Survey, changes in the 'Bunce' plots were consistent with an impression of Broadleaved, Mixed & Yew Woodland undergoing a successional response to relaxed disturbance and less intensive management. Between 1971 and 2001, basal area of trees and shrubs increased, site level counts of tree seedlings decreased, and the abundance of open habitats and signs of recent management all decreased. These changes accompanied a highly significant decrease of 12 ground flora species per plot. Despite no significant changes in mean Ellenberg or CSR scores, the same strong signals of change were seen at the Great Britain level and were associated with a shift toward a more shade-tolerant ground flora.

³⁶ Kirby et al (2005) *Long term ecological change in British woodland (1971-2001)*. English Nature Research reports. No 653. Peterborough.

Key results and follow-up questions:

- **An increase in the area of Broadleaved, Mixed & Yew Woodland in lowland Wales - how does this relate to biodiversity objectives?**
- **A decrease in species richness and other changes in vegetation condition - a negative change or a reflection of a maturing woodland resource as well as other factors such as progressively wetter survey seasons?**
- **An increase in pH of surface soils under Broadleaved, Mixed & Yew Woodland - is this part of a general trend of recovery?**

These questions, together with those identified in each of the other habitat chapters, are considered further in *Chapter 9*.

Further information and future analysis

More details of the methodology, analyses and results from Countryside Survey can be found in other companion reports and data resources available from the Countryside Survey website.

This report for Wales is one of a suite of reports that have either already been published or are scheduled for publication in the next year or two. The UK results of Countryside Survey were published in November 2008, and this report is one of several country reports that are being produced in summer 2009.

More detailed analysis of particular components of the survey – soils, streams and ponds – will be reported later in 2009 in separate themed reports. A detailed, integrated assessment of Countryside Survey data alongside other datasets, exploring what the results mean for provision of selected ecosystem goods and services, will be reported in 2010. While these reports will make use of the fuller Countryside Survey dataset, rather than a single country dataset, the results will have considerable relevance for Wales. Rather than marking the end of our evaluation of what Countryside Survey results mean for the Welsh countryside, this current report only marks the beginning.

Reports:

- UK Headline Messages – *published November 2008*
- UK Results from 2007 – *published November 2008*
- Detailed Northern Ireland Countryside Survey results – *published 2010*
- England Results from 2007 – *due to be published August 2009*
- Scotland Results from 2007 – *published 25th June 2009*
- Ponds – *due to be published Summer 2009*
- Streams – *due to be published October 2009*
- Soils – *due to be published November 2009*
- Integrated Assessment – *due to be published 2010*

Data resources:

- Web access to **summary data** – a systematic summary of the results used to inform the UK and country level reports – *launched in November 2008 and updated in January 2009*
- Web access to the **actual data** – data from individual survey squares used to generate all the results presented in Countryside Survey reports from the 2007 survey – *licensed access available from June 2009*
- The UK Land Cover Map for 2007 – *September 2009*

The data generated by Countryside Survey will continue to be investigated in conjunction with other information such as climate, pollution and agricultural statistics. It is anticipated that future analysis of Countryside Survey data will lead to many scientific journal articles over the coming years. These investigations will improve understanding about the possible causes of the changes detected in the countryside and, for example, provide an opportunity to explore the results for Priority Habitats in more detail.

Contacts

For further information on Countryside Survey see **www.countryside-survey.org.uk** or contact:

Countryside Survey Project Office,
Centre for Ecology and Hydrology,
Lancaster Environment Centre, Library Avenue,
Bailrigg, Lancaster LA1 4AP

Telephone: **01524 595811**

Email: **enquiries@ceh.ac.uk**

COPYRIGHT: This publication is the Copyright of the Natural Environment Research Council, July 2009

Copyright: of all graphs, diagrams and charts is owned by the Natural Environment Research Council

Copyright of photographs: Copyright of photographs is as acknowledged in individual captions

Copyright enquiries should be addressed to:

Knowledge Transfer Team, Centre for Ecology and Hydrology,
Macleon Building, Benson Lane, Wallingford OX10 8BB

This publication, excluding logos, may be reproduced free of charge in any format or medium for research, private study or the purposes of internal use within an organisation. This is subject to it being reproduced accurately and not being subject to any treatment that could be considered derogatory. The reproduced material must be acknowledged as NERC Copyright (except where otherwise stated) and the publication named in full.

Disclaimer

Any decisions or actions informed by these results are taken entirely at your own risk. In no event shall NERC be liable for any damages, including loss of business, loss of opportunity, loss of data, loss of profits or for any other indirect or consequential loss or damage whatsoever arising out of the use of or inability to use the results presented in this report.

The Countryside Survey partnership has endeavoured to ensure that the results presented in this report are quality assured and accurate. Data has been collected to estimate the stock, change, extent and/or quality of the reported parameters. However, the complex nature of the experimental design means that results can not necessarily be extrapolated and/or interpolated beyond their intended use without reference to the original data.



This document has been design and optimised to be printed as portrait A4 double-sided pages. When printing from the software application Adobe® Reader®, please use the 'Fit to paper' or 'Shrink to Printable Area' options found in the 'Page Scaling' drop down menu of the 'Print' dialogue box.

Designed by Countryside.