Forest Research

Annual Report and Accounts

2007–2008

The Research Agency
of the Forestry Commission

HC 717

The second National Inventory of Woodland and Trees

Mark Lawrence and Helen McKay

Woodland is important to many types of user – the public, policy makers and the forest industry. Forest Research is responsible for collecting information on the amount, location and condition of British woodland and trees, by mapping and then surveying them.

In prehistoric times Britain was largely covered with woodland but, by the end of the 19th century, woodland had decreased to less than 5% of land area. The last major survey indicated that, by the end of the 20th century, woodland cover had increased to almost 12% (2.7 million hectares). The next major survey, the second National Inventory of Woodland and Trees (NIWT2), is now underway and has four elements.

First, the baseline map of main woodland blocks is being created. Main woodland is defined as woodland of half a hectare or more, with at least 20% canopy cover or the potential to achieve 20% cover. Woodland areas are divided into Interpreted Forest Types, such as Conifer, and Interpreted Open Areas, such as Grass (Figure 1). The mapping is being carried out by Infoterra and quality-assured by Forest Research; it should be completed by autumn 2009. Up to March 2008, almost one million hectares of woodland had been mapped and quality assured.

Second, a pilot survey will be carried out during 2008–09 to ascertain the timing and costs of measuring the field data required by Scotland, Wales and England, and for international reporting. This will allow Forest Research to finalise the list of woodland properties to be assessed, given the available budget. The pilot exercise will collect data on tree numbers and sizes, woodland structure and management, deadwood, soils, vegetation and veteran trees.

The third element is the full survey of main woodland, which it is estimated will take 6–8 years. Indicative results will be published at the halfway stage. It is envisaged that some of the sample plots will be revisited regularly to update the NIWT dataset.

Finally, small woods (those of less than 0.5 ha), linear features and individual trees, which were first mapped in the late 1990s, will be remapped, and a proportion surveyed again. These woodlands are often especially important for wildlife, landscape and recreation.

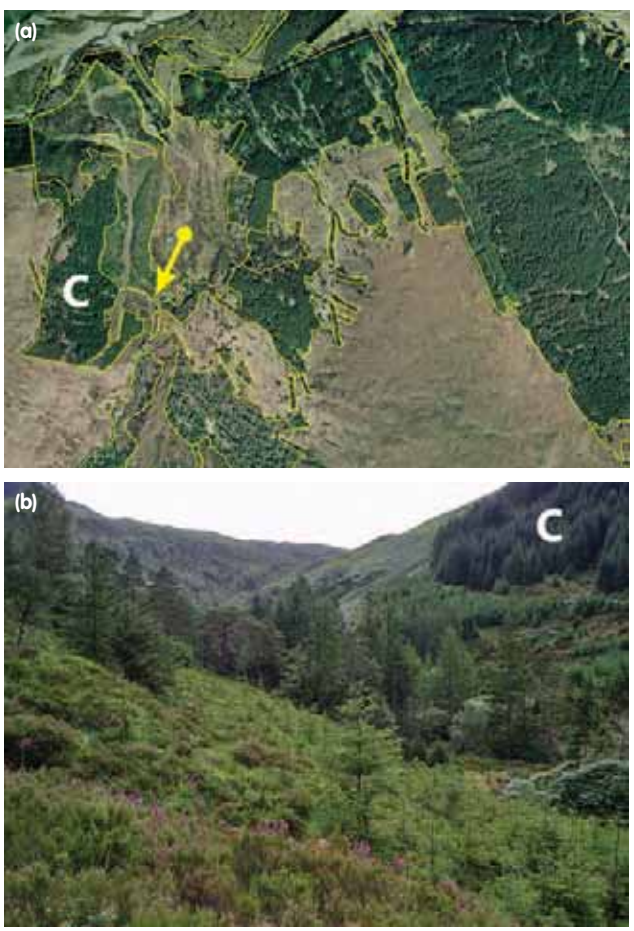

Figure 1 Scottish woodlands: aerial image and ground view. (a) Aerial image, 2005, with boundaries of NIWT2 Interpreted Forest Types.* (b) Ground view, 2006. C represents 'conifer'. The circle and arrow in (a) show the location and direction of the ground view in (b).

The temperature response of photosynthesis

Eric Casella

The concentration of carbon dioxide (CO_2) in the Earth's atmosphere has been rising over the past two hundred years, and rising much faster since the middle of the 20th century, as shown by direct measurements from atmospheric samples and ice cores. This increase in CO_2, and other greenhouse gases, is predicted to produce an increase in mean global temperatures of up to 5.5 °C by the end of the 21st century (Figure 1) unless very significant mitigation efforts are put in place. Temperature is one of the principal controls of the distribution and productivity of forest tree species, with large effects on physiological activity at all spatial and temporal scales. The central role of temperature in tree success was apparent to the earliest biologists and its influence on yield and tree fitness has led to extensive research on temperature effects throughout the modern history of plant biology.

Photosynthesis is the driving process here and is a key determinant of the rate of tree growth. In trees from temperate habitats, photosynthesis operates between 10 and 40 °C (Figure 2). It has an optimum temperature that roughly corresponds to the middle of this range, and

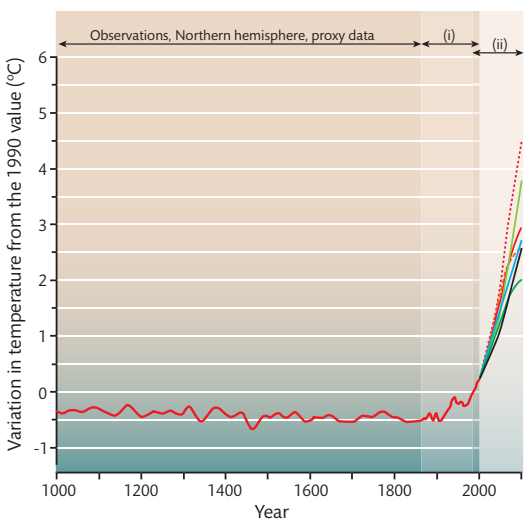

Figure 1 Predicted global averages of surface warming for contrasting climate-change scenarios*.
(i) Direct temperature measurements; (ii) model predictions. Different colour lines show different model scenarios.

* Adapted from IPCC Climate change 2001

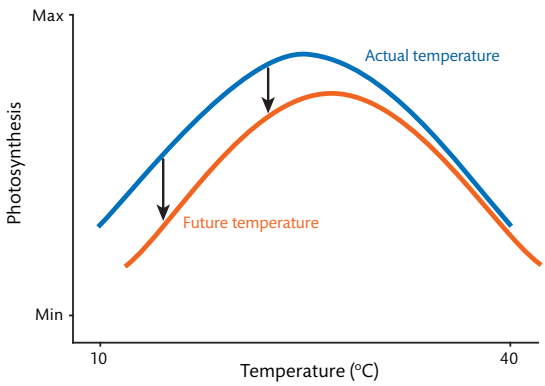

Figure 2 Typical pattern of thermal acclimation expected in temperate tree species.

photosynthesis declines as temperatures rise above or below this optimum. However, some forest plant species can acclimate, or adjust, to temperature changes, as indicated by shifts in the thermal response that will affect photosynthesis. Preliminary work over the past year has shown that the rate of photosynthesis of some poplar trees is adversely affected by an increase in temperature up to the current optimum, although most scientists would expect this to increase photosynthesis. This clearly illustrates that forest responses to increasing temperatures must not be assumed but should be checked experimentally.

Many different aspects of tree growth are affected by climate change, not just in response to temperature but also CO_2, water availability and wind. These responses are numerous and interlinked yet they can only be investigated gradually using experimentation. By adding our results together into mathematical models, we then get an indication of the effects of global warming on the overall function of forest ecosystems. With the predicted greenhouse-gas-induced rise in global surface temperature already under way, the effects of increasing temperature on tree growth and forest ecosystem function have become a major area of work for Forest Research. For more information on our research in this area, visit **www.forestresearch.gov.uk/climatechange**

Pension benefits 2007–08 (information subject to audit)

	Real increase in pension and related lump sum	Total accrued pension at age 60 at 31/3/08 and related lump sum	CETV @ 31/3/07	CETV @ 31/3/08	Real increase in CETV after adjustment for inflation and changes in market investment factors	Employer contribution to partnership pension account including risk benefit cover
	£000	£000	£000	£000	£000	nearest £100
Jim Lynch*	0–2.5	5–7.5	107	121	13	–
Peter Freer-Smith	0–2.5 plus 5.0–7.5 lump sum	22.5–25 plus 67.5–70 lump sum	363	462	45	–
Ken Charles	0–2.5 plus 0–2.5 lump sum	22.5–25 plus 67.5–70 lump sum	513	559	18	–
Tony Cornwell*	0–2.5	5–7.5	119	133	10	–
Bill Mason	0–2.5 plus 0–2.5 lump sum	20–22.5 plus 62.5–65 lump sum	466	538	12	–
Sam Evans	0–2.5 plus 0–2.5 lump sum	5–7.5 plus 20–22.5 lump sum	97	87	2	–
Hugh Evans	0–2.5 plus 0–2.5 lump sum	25–27.5 plus 77.5–80 lump sum	553	642	16	–
Chris Quine	0–2.5 plus 2–2.5 lump sum	17.5–20 plus 55–57.5 lump sum	279	336	13	–
Andy Moffat	0–2.5 plus 2.5–5.0 lump sum	20–22.5 plus 62.5–65 lump sum	375	459	30	–
Xanthe Christophers	0–2.5	2.5–5	23	39	10	–
Helen McKay	0–2.5 plus 5–7.5 lump sum	15–17.5 plus 50–52.5 lump sum	287	373	38	–
Sandra Smith	0–2.5	0–2.5	0	3	2	–
Janet Dutch	0–2.5 plus 0–2.5 lump sum	5–7.5 plus 20–22.5 lump sum	99	123	7	–
Alison Melvin	0–2.5 plus 0–2.5 lump sum	2.5–5 plus 7.5–10 lump sum	47	63	9	–

CETV: Cash Equivalent Transfer Value.
*Left during 2007–08.

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Photographs: Forest Research Photo Library, Forest Life Picture Library and individual authors and photographers
Graphics: George Gate, Forest Research

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Published by TSO (The Stationery Office) and available from:

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ISBN 978-0-10-295211-7

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