

Impact of climate change on forests and forestry in Scotland

Duncan Ray
Ecology Division
Forest Research
Roslin

duncan.ray@forestry.gsi.gov.uk



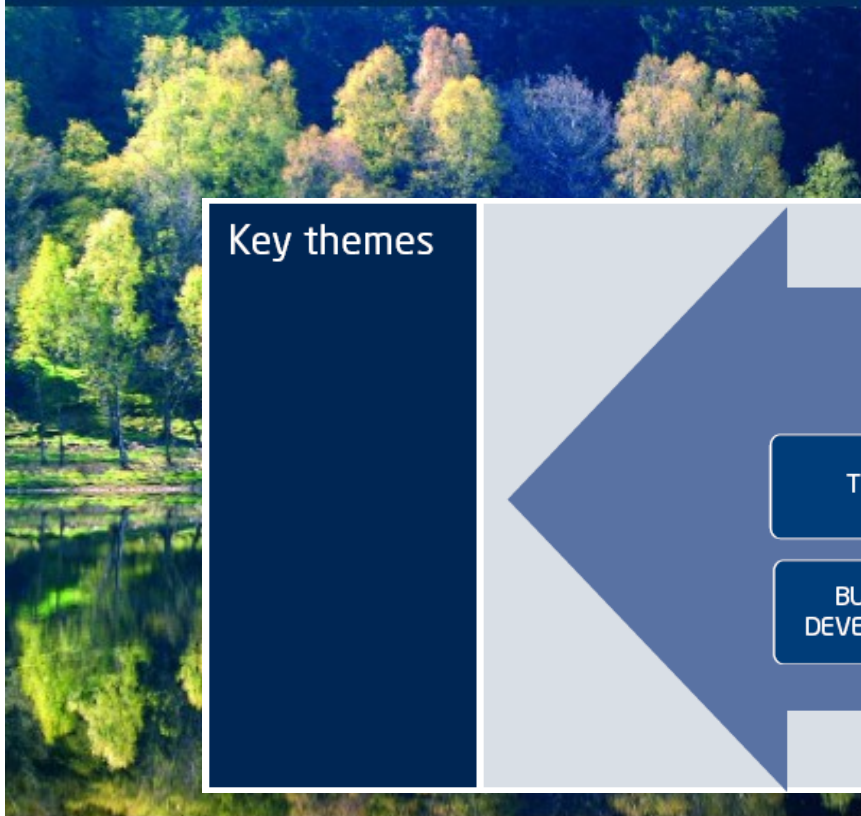
Forest Policy in Scotland



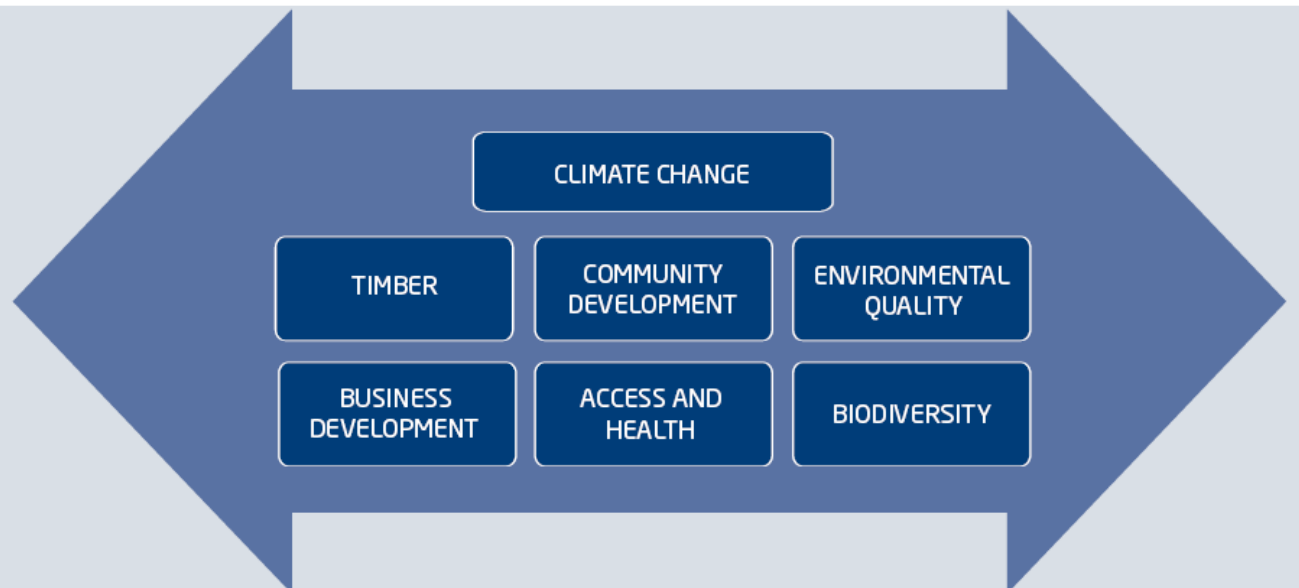
SCOTTISH EXECUTIVE

2006

The Scottish Forestry Strategy



Key themes



The Scottish Forestry Strategy 2006

Achieving the Vision



KEY THEME 1

Climate change



Applied Climate Change Research

- A key issue is to maintain resilient, sustainably managed forests and woodlands well adapted to climate change
 - Species choice & diversification
 - Forest management systems
 - Native woodland management expansion & distribution

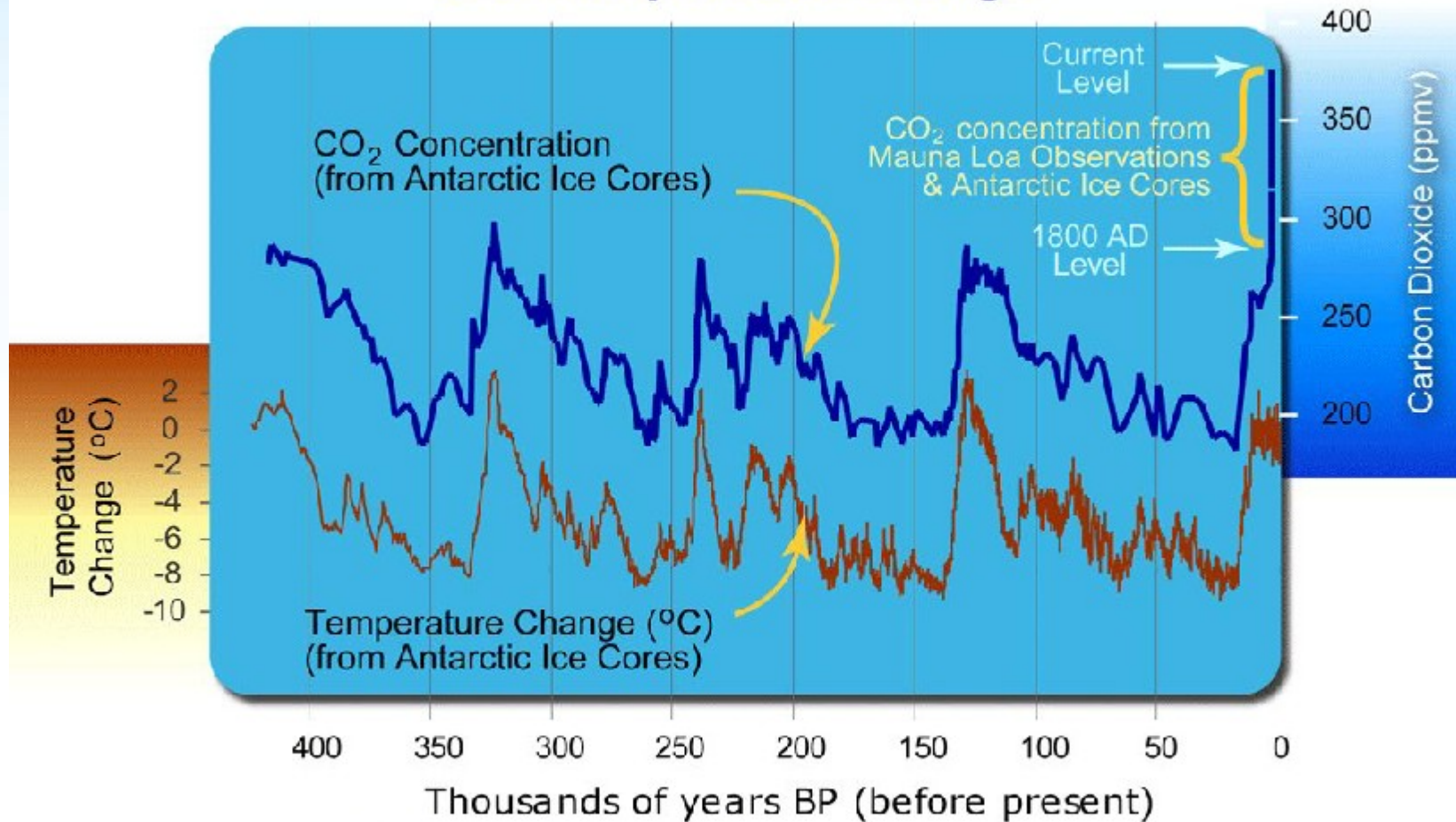


Overview

- CO₂ concentrations
- Climate change scenarios
- Changing climate of Scotland
- Impacts on forests and forestry
- Conclusions



400 Thousand Years of Atmospheric Carbon Dioxide Concentration and Temperature Change

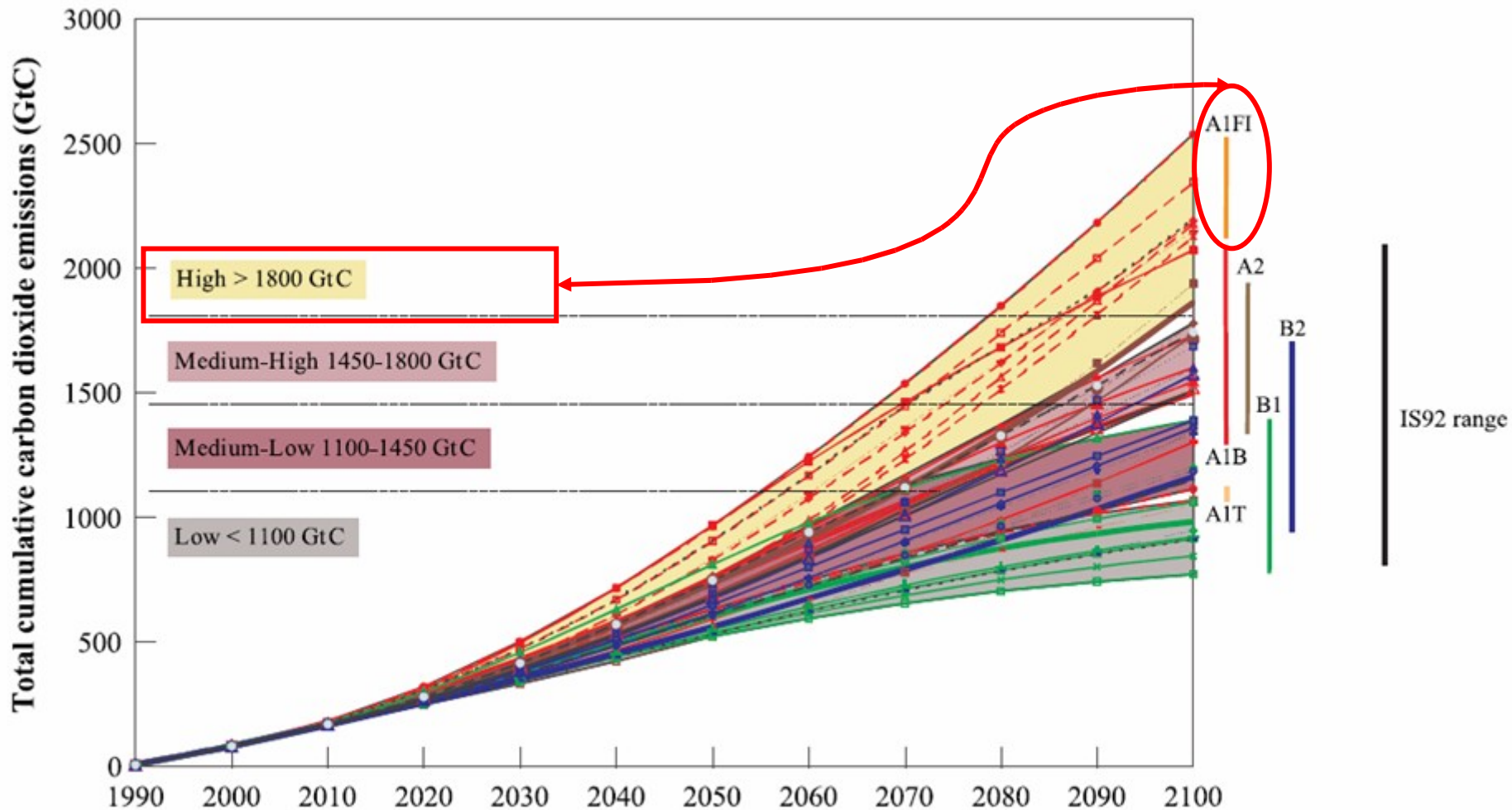


Data Source CO₂: <http://cdiac.ornl.gov/pub/trends/co2/vostok.icecore.co2>
Data Source Temp: <http://cdiac.esd.ornl.gov/ftp/trends/temp/vostok/vostok.1999.temp.dat>

Graphic: Michael Ernst, The Woods Hole Research Center



IPCC emissions scenarios



SRES (2000) IPCC Special Report, WMO/UN



Key issues for forests in Scotland

- Warmer growing season
- Longer growing season
- Milder winters
- Drier summers in south and east Scotland
- Higher frequency of drought
- Wetter winters
- No change in mean wind speed!

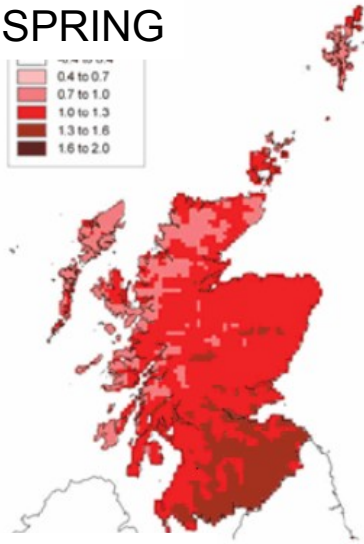
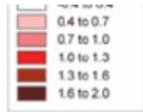


Evidence - seasonal trends between 1961-2004

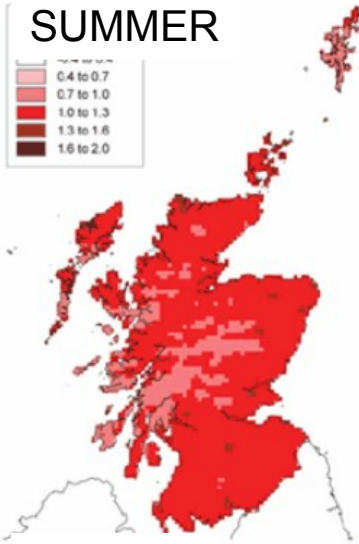
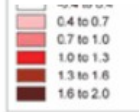
Temperature (°C)

Rainfall (%)

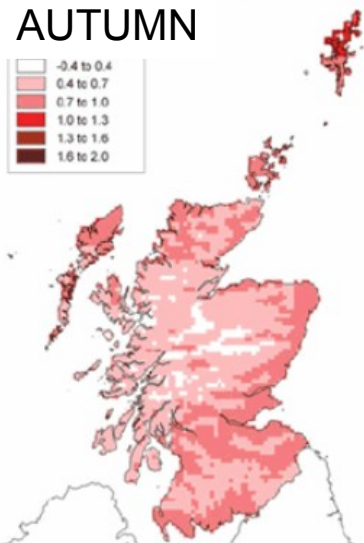
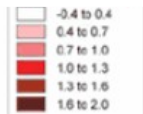
SPRING



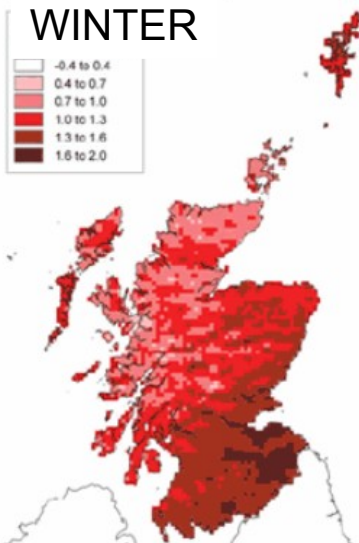
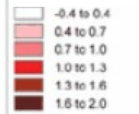
SUMMER



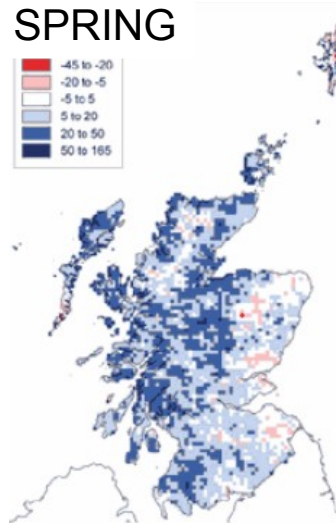
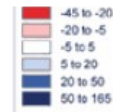
AUTUMN



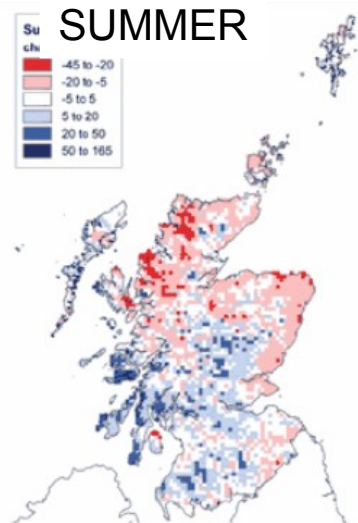
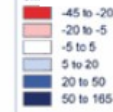
WINTER



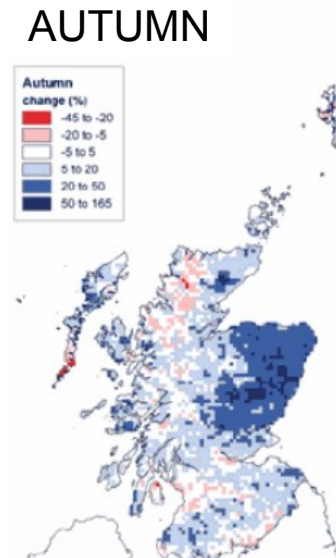
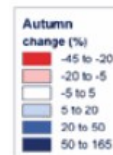
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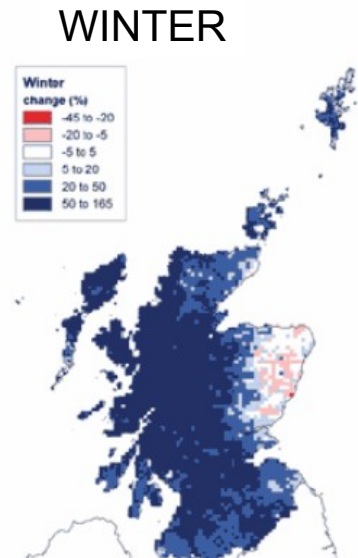
SUMMER



AUTUMN



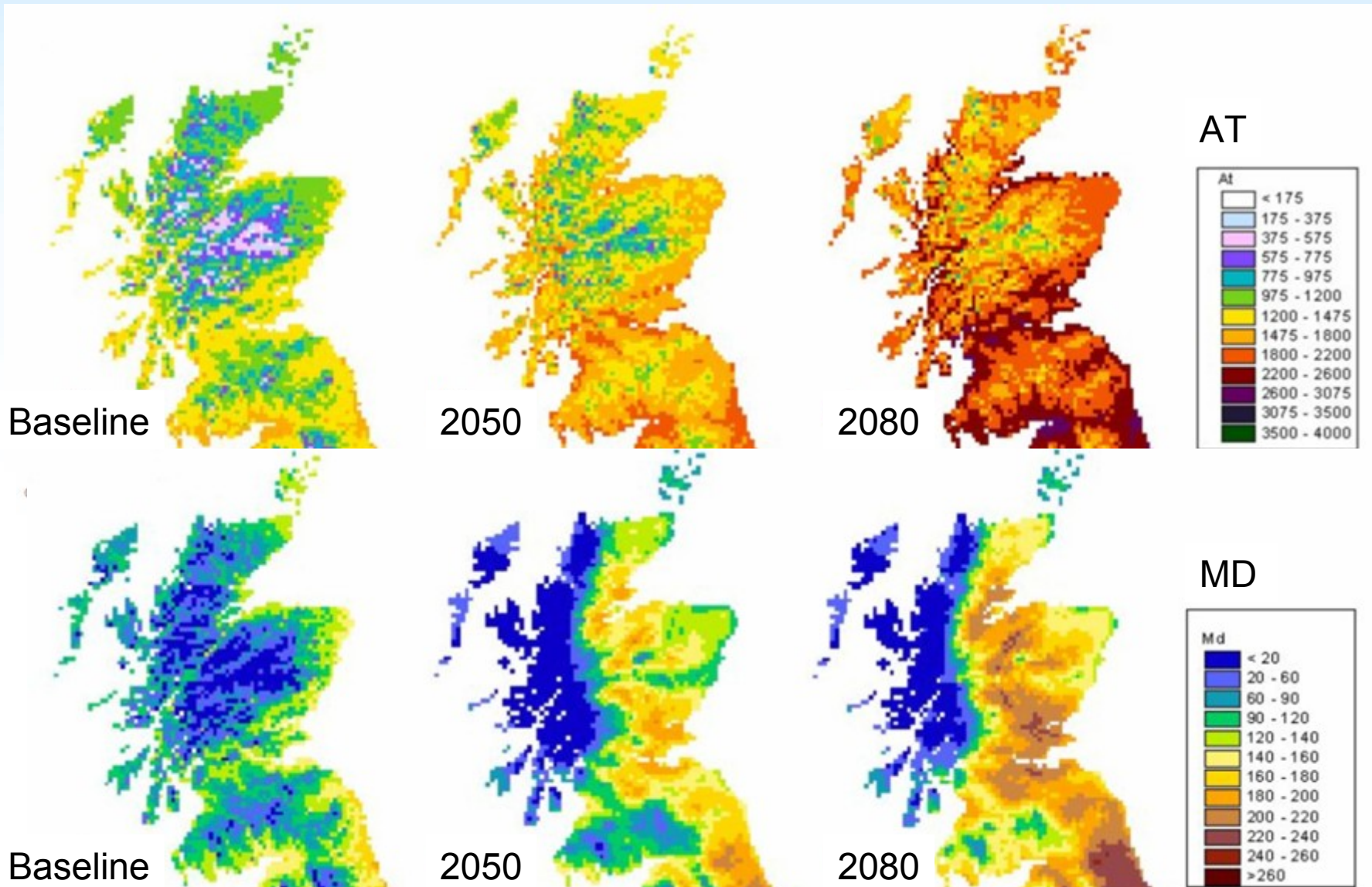
WINTER



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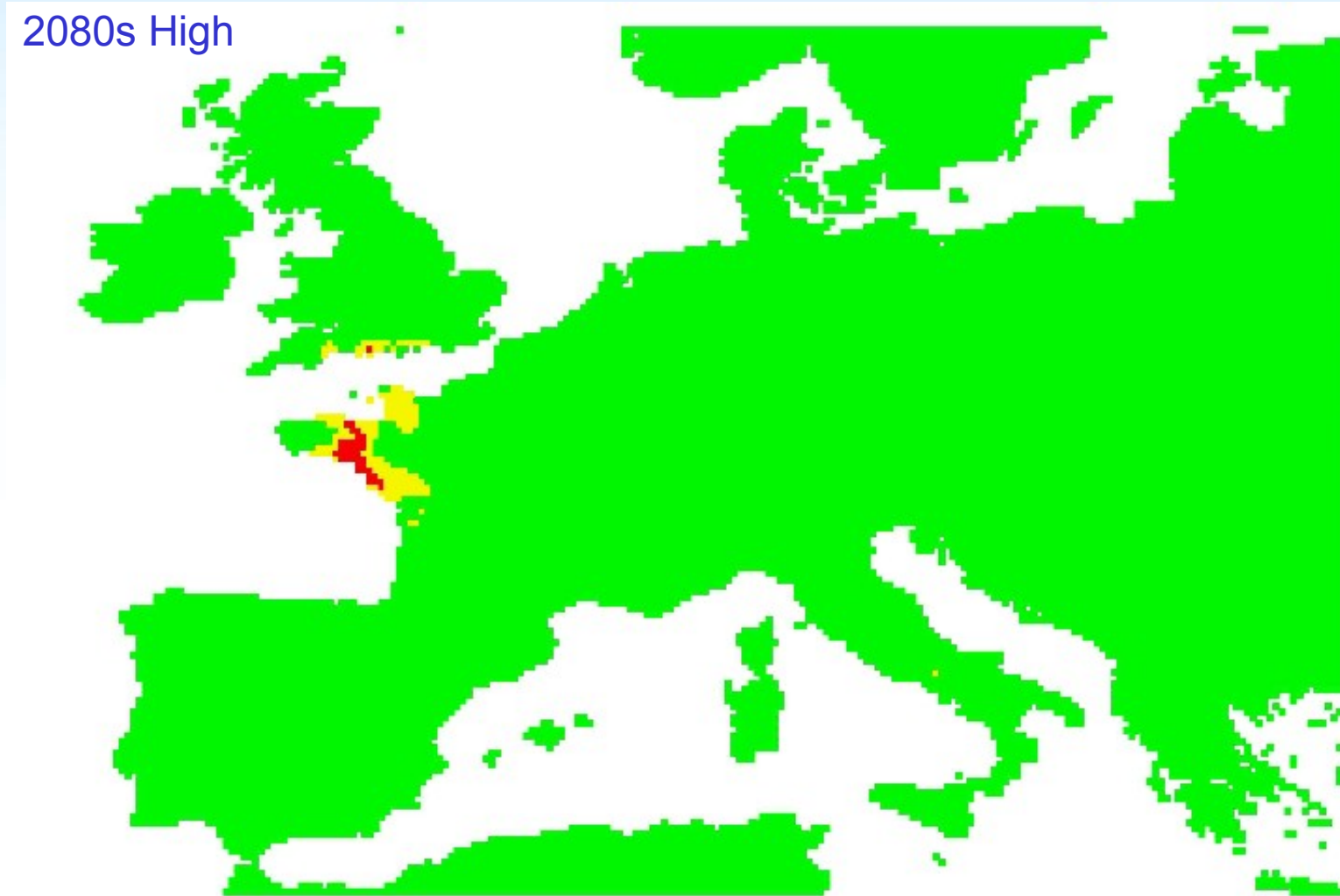


Evidence – actual and predicted climate warming



Climate matching – N E Scotland

2080s High

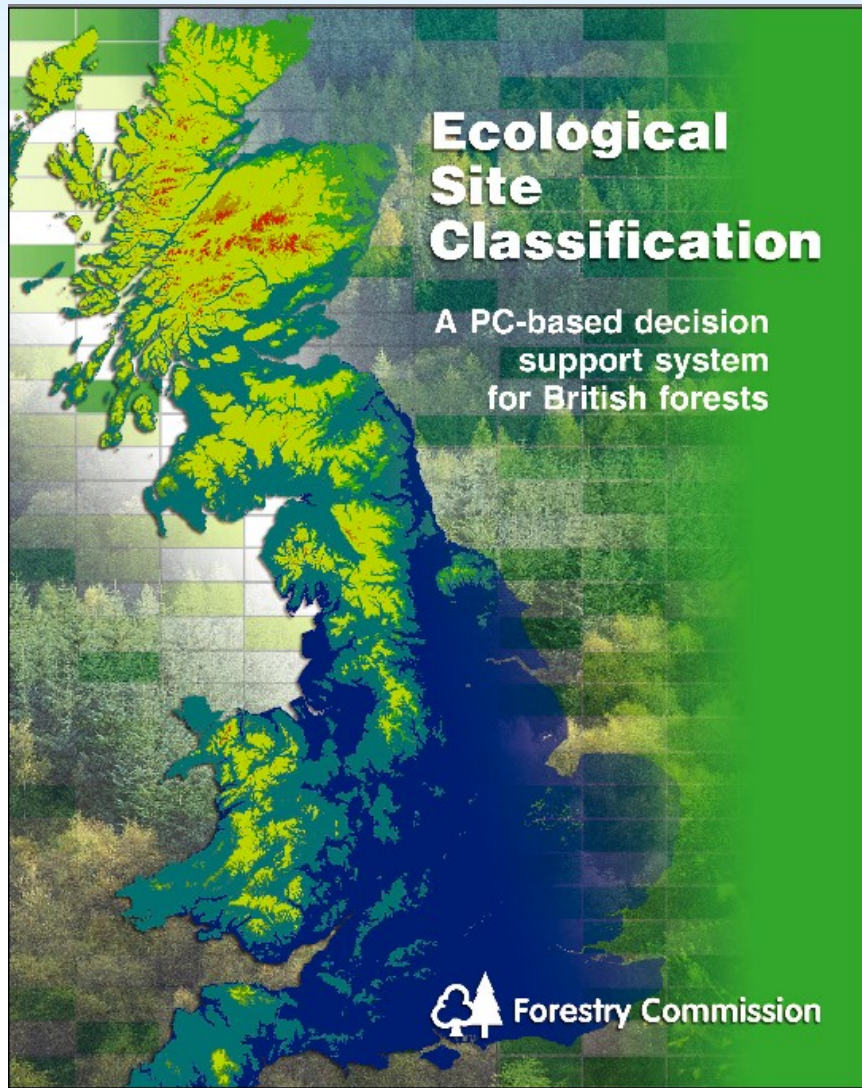


CC impacts on forests and forestry

- Increased productivity
- Forest fire
- Deer – milder winters and increased cover
- Structural grade timber
- Pests and pathogen ecology
- Ground preparation
- Increased flooding
- Shallow rooting
- Wind damage
- Drought stress
- Tree species suitability



Ecological Site Classification (ESC)



Ecological Site Classification (ESC) is a decision support system that matches suitable timber species and native woodland communities to a site type.

Conclusions

- Warmer climate increased growth (>1 YC)
- S & E more favourable for quality broadleaves
- Changes in seasonal rainfall
- Increased winter water logging – shallower roots
- Increased wind damage - exposure limit?
- Droughty soils - unsuitable for spruce
- Pest and pathogens ecology?
- Mixed species - management systems
- Colonisation of 'non-native' trees
- Nurseries - E Scotland – adaptation challenging
- Contingency plans
- Decision support – strategic and operational
- Knowledge transfer





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Midlothian

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