Sitka spruce, the main commercial conifer in Britain, has traditionally been managed using the clearfell/replant system, resulting in uniform, even-aged forest stands. The past decade has seen a policy-shift towards continuous cover forestry (CCF) systems, with the aim of creating and maintaining stands that may be:

- mixed species
- mixed age
- irregular structure.

**Introduction**

The British Isles supports around 20% of the world’s lowland heathland and in yield table format. There are... 3% of upland heath. The total resource in GB amounts to more than 1 million ha.

**Ecosystem services**

The range of ecosystem services provided by uniform and irregular forests is broadly similar, although the balance and level of them may differ:

- slope stability
- biodiversity
- recreation
- timber
- jobs
- landscape
- water quality
- carbon sequestration

**MosesGB**

MosesGB is a forest growth simulator for stands of mixed age and mixed species. Based on the Austrian simulator MOSES, we have adapted it for Sitka spruce in Britain. MosesGB is a single-tree, distance-independent growth model, based on the potential growth concept.

For each 5-year simulation period (up to 200 years), growth of each tree is calculated in terms of its underlying growth potential and its competitive status within the stand.

Input data can be a full stand inventory or survey data. Height and crown models have been developed to allow generation of initial values.

**Applications and future work**

- Whole-model validation is in progress.
- We aim to parameterise MosesGB for other conifer and broadleaf species of importance to British forestry.
- Inputs, outputs and functionality will be modified in consultation with potential users of MosesGB, in order to produce a fit-for-purpose forest growth simulator for irregular forest stands in Britain.
- MosesGB will feed into ongoing silvicultural systems research, including modelling of wind risk, timber quality and carbon accounting. It will also be of use to forest managers wishing to explore the likely effects of different silvicultural activities on diameter distributions, stand structure and yield.

**MosesGB : single stand mode**

In single stand mode of MosesGB the user can:

- view the stand in plan view or 3-D
- nominate frame trees
- select individual trees for removal
- view outputs graphically and save in yield table format.

**MosesGB : batch mode**

In batch mode of MosesGB the user can:

- run growth simulations on many stands at once
- specify different types of thinning to any stand
- view results as bar or line charts through time
- save outputs at stand-level, individual tree level, and in yield table format.

**How will my forest grow?**

Prediction of forest growth is essential both in terms of timber production and carbon sequestration. For even-aged stands, growth and yield are well understood, supported by long-established yield tables. However, there is currently no such tool for predicting stand growth and development in irregular forest stands in Britain.

**MosesGB is being developed to model the growth and development of British forests with mixed-age, mixed-species and irregular structure.**

**Figure 1:** Even-aged Sitka spruce forest, typical of management in Britain.

**Figure 2:** Yield curve for even-aged Sitka spruce stands in Britain.

**Figure 3:** Sitka spruce stand developing an irregular structure through regeneration.

**Figure 4:** MosesGB welcome screen.

**Figure 5:** Simulated forest stand shown in 3-D and plan view. Frame trees have been identified (purple outline), and trees selected for thinning are shaded grey.

**Figure 6:** Change in basal area over time from single stand simulation over 200 years.

**Figure 7:** Interface for batch mode of MosesGB.

**Figure 8:** Batch mode output. The diameter distribution represents the stand shown in Figure 5. The line chart shows the change in basal area through time, including the effect of two thinnings.