Forest Research

Growth and yield models for improved Sitka spruce

Talk to the Timber Quality Steering Group,
Northern Research Station

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11th June 2009

Growth and yield models for improved SS

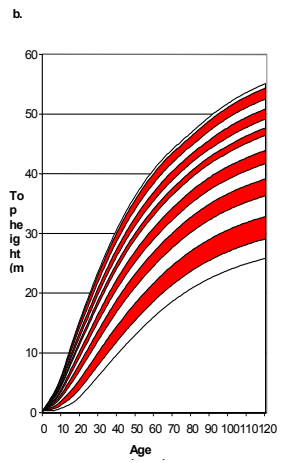
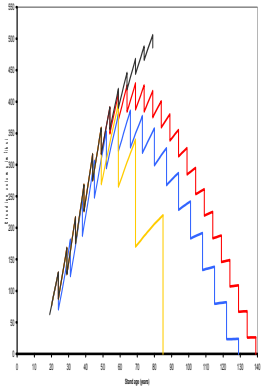
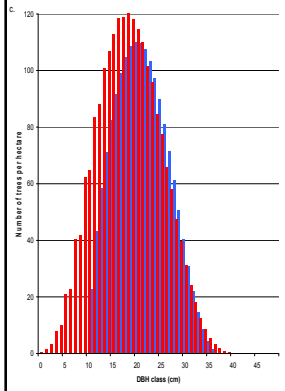
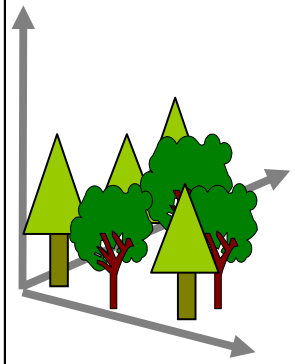
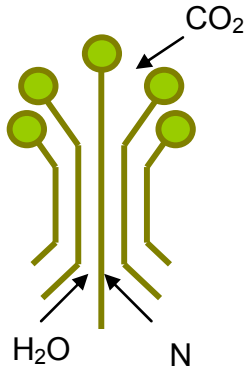
- Update on the current state of development of growth and yield models within Forest Research
- Questions underlying the use of these for modelling production from improved Sitka spruce
- Wider issues
- Example output

Where are we now?

Growth models currently under development

- Yield Lookup (Forest Yield)
- M1
- M3 (Dynamic Forest Yield)
- M1-CCF
- DSORT
- ASORT
- BSORT
- CSORT
- MOSES.

Strategic approach: 'M-series' model classification

Type	M1	M2	M3	M4	M5
Detail					
Production Forecasting	★★★	★★★	★★	★	
Decision Support	★	★★	★★★	★★★	★
Scenario Analysis	YL4	M1	★★	M3	MOSES
Climate Change Impacts	★	★★★	★	★	★★★

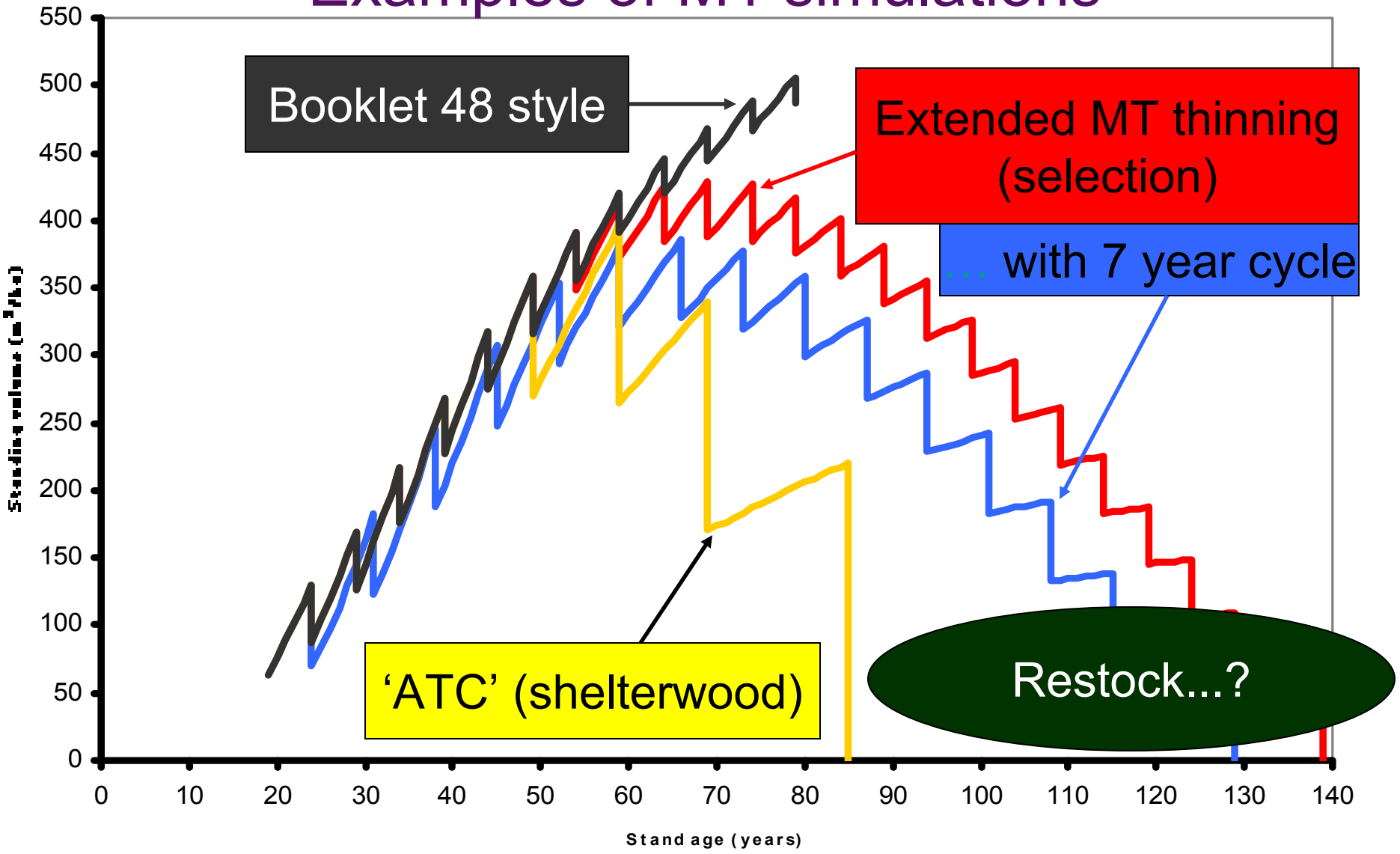
Yield Lookup (Forest Yield)

- Electronic presentation of Booklet 48
- Stand-level estimates
- Static yield tables
- Extended to later stand ages than in Booklet 48
- Includes ‘LISS’ yield tables
- In final stages of development
- ‘Polished’ user interface
- Being prepared for publication end 2009

M1 growth model

- Dynamic representation of Booklet 48
- Based on 'Christie' paradigm
- Stand-level estimates
- Wide range of thinning regimes
  - cycle, type, intensity
- Some representation of LISS
- Advanced stage of development
- Already in use within FC PF system
- 'Dirty' user interface
- Currently no plans for publication.

Examples of M1 simulations

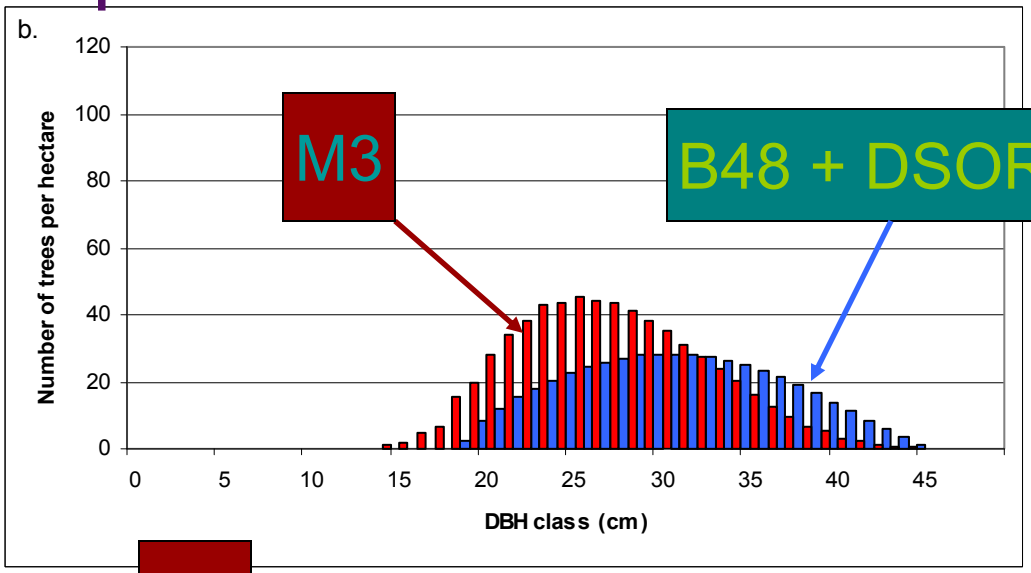


M3 growth model (Dynamic Forest Yield)

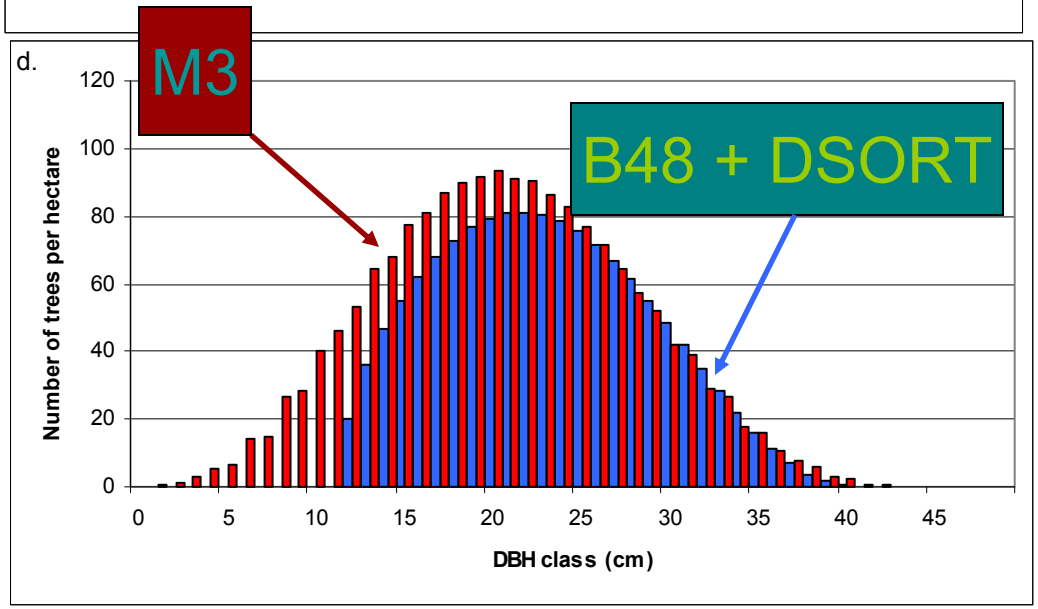
- Dynamic representation of tree size classes
- Stand and tree level estimates
- Wide range of thinning regimes
  - cycle, type, intensity
- Some representation of spatial variation
- Advanced stage of development
- ‘Polished’ user interface
- Should be published in due course.

M3 predictions: dbh distribution

MT thin



No thin



Modelling improved Sitka spruce

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- We have a number of working models of varying sophistication
- We will however need further information in order to appropriately apply the best of these to improved Sitka spruce
- The necessary input assumptions will ideally be informed by hard data…

  …although it is likely that we will have to make a number of “intelligent guesses”.

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- The diameter distribution is likely to be narrower in improved SS…

  …but by how much?

  …will the shape of the distribution change?
- Mean tree diameter may be greater at a given age…

  …but by how much?
- Because of the anticipated uniformity of the distribution, will the upper tail contain as many [larger diameter] trees?

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- Will tree mortality be the same as in stands of "traditional" origin?

  (A change in mortality will affect stocking levels, and consequently mean tree size).
- All of the above will have an effect on the volume assortment…

  …but how significant will this be in economic terms?

Wider issues…

Wider modelling questions and issues:

- **Availability**

  How do we best distribute interim [growth and yield] models within Forest Research?

- **Version control**

  How do we ensure that our researchers are always using (and know about) the latest available releases?

- **Training seminars and web briefings**

  To communicate the known limitations of the models and the key underlying assumptions.

Wider modelling questions and issues:

- Component Object Model (COM) implementation.
- Application Programming Interface (API) publication (and wider “training”).
- Future modelling requirements (*e.g.* outputs, and integration)…?

Some example output…

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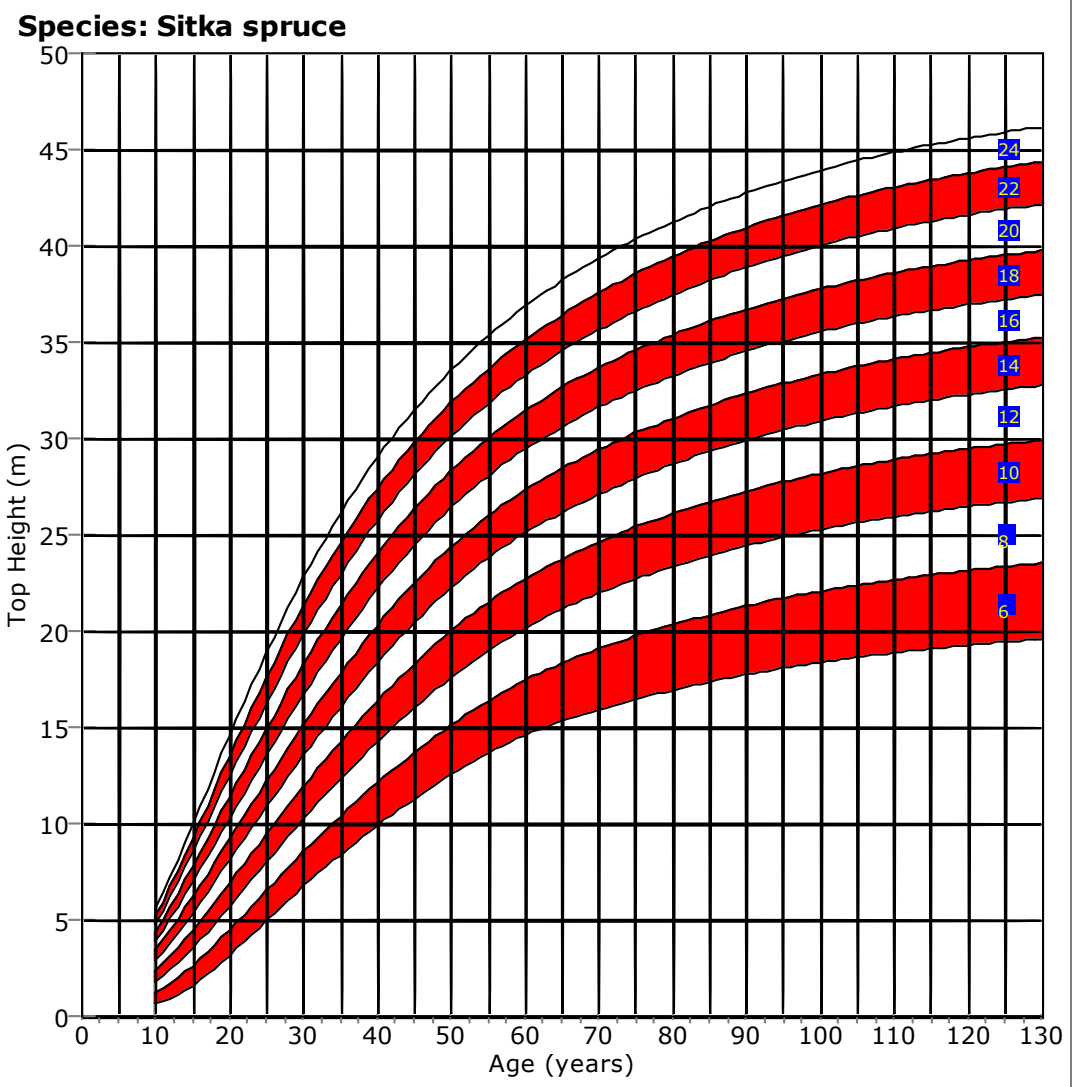

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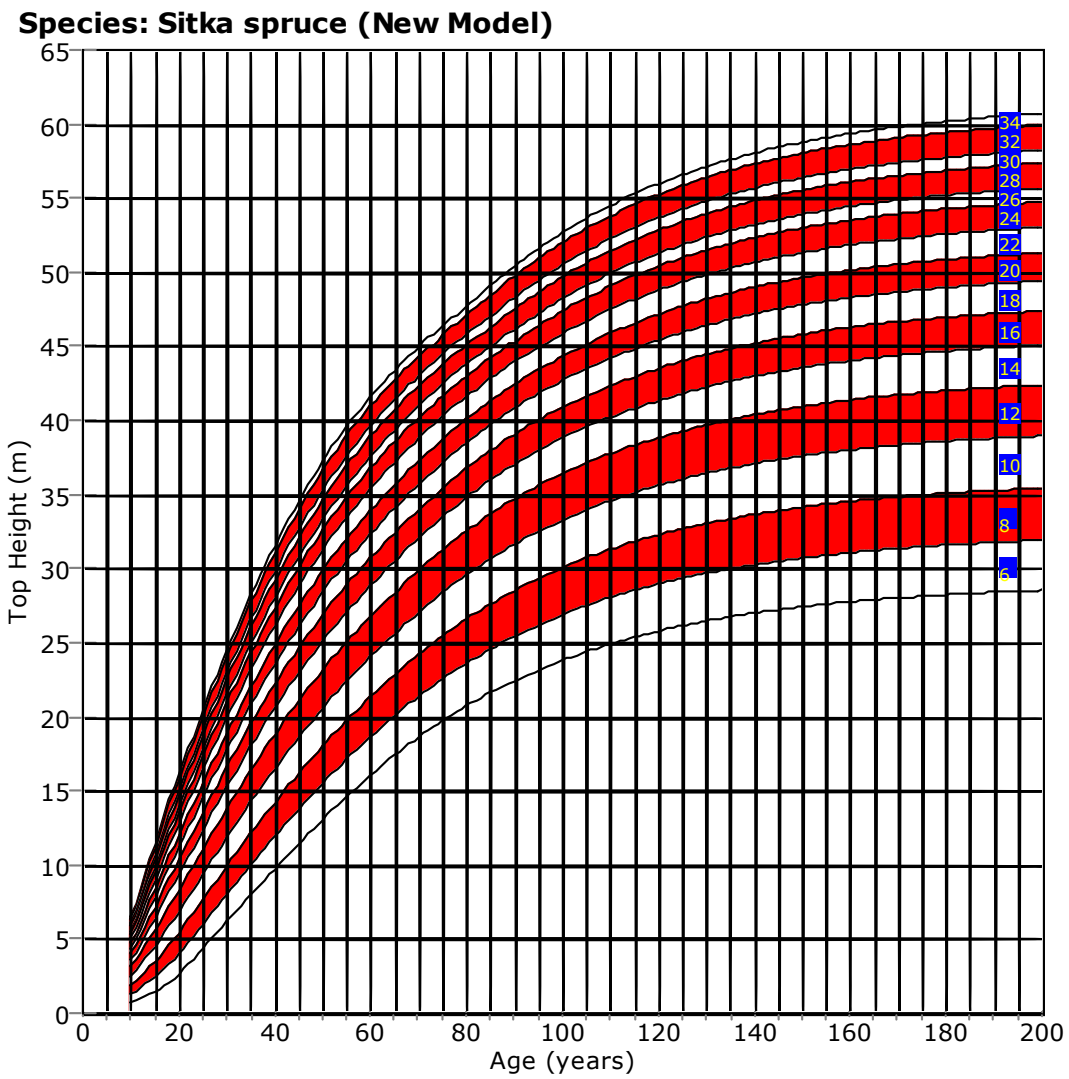

Some example differences (age 50)

YC12: 2.0m × 2.0m initial spacing, intermediate thinning

(N.B. main crop values, before thinning)

	Existing	New
Age of 1st thin	25	28
Top height (m)	21.0	21.9
Trees/ha	571	525
Mean dbh (cm)	31	30
BA (m^2/ha)	42	38
Mean vol (m^3)	0.63	0.71
Vol (m^3/ha)	360	374
Cum. vol (m^3/ha)	570	585

Some example differences (age 50)

YC12: 2.0m × 2.0m initial spacing, no thinning

	Existing	New
Top height (m)	21.0	21.9
Trees/ha	1405	1665
Mean dbh (cm)	23	23
BA (m^2/ha)	61	69
Mean vol (m^3)	0.38	0.39
Vol (m^3/ha)	534	650
Mortality (%)	6	0

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With thanks to Robert Matthews and other members of FREG at Alice Holt.