Resilient Forests:
What are they? How do we achieve them?
Is our knowledge base good enough?

Gary Kerr

A presentation from the CCFG National Conference 2014

Continuous Cover Forestry:
Delivering sustainable and resilient woodlands in Britain

CCFG National Conference
Lake District, England
3-5 June 2014

www.ccfg.org.uk
Resilient Forests: what are they? how do we achieve them? is our knowledge base good enough?

Gary Kerr

Forest Research, Alice Holt Lodge, Farnham, Surrey
How can we adapt forests to increase resilience to biotic threats and climate change, whilst maintaining productivity?
Resilient forests?
Resilience: the capacity of a plant community to maintain or regain normal function and development following disturbance.

Ways to increase resilience

Three main options:

1. Species choice and deployment
2. Silvicultural systems
3. Genetics
1a. Species choice

<table>
<thead>
<tr>
<th>Species Groups</th>
<th>Silvicultural approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conifer</td>
<td>Broadleaved</td>
</tr>
<tr>
<td>Traditional and so far unaffected</td>
<td></td>
</tr>
<tr>
<td>Douglas-fir</td>
<td>Beech*</td>
</tr>
<tr>
<td>Grand fir</td>
<td>Birch</td>
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<tr>
<td>Noble fir</td>
<td>Cherry</td>
</tr>
<tr>
<td>Norway spruce</td>
<td>Oak*</td>
</tr>
<tr>
<td>Sitka spruce</td>
<td>Sycamore*</td>
</tr>
<tr>
<td>Western hemlock</td>
<td></td>
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<tr>
<td>Western red cedar</td>
<td></td>
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<tr>
<td>Traditional but affected</td>
<td></td>
</tr>
<tr>
<td>Corsican pine</td>
<td>Ash</td>
</tr>
<tr>
<td>Lodgepole pine</td>
<td>Alder</td>
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<tr>
<td>Scots pine</td>
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<tr>
<td>Japanese larch</td>
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<tr>
<td>European larch</td>
<td></td>
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<tr>
<td>Hybrid larch</td>
<td></td>
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<tr>
<td><strong>Potential Species - Read Report Table 6.5</strong></td>
<td></td>
</tr>
<tr>
<td>Abies alba</td>
<td>Acer macrophyllum</td>
</tr>
<tr>
<td>Abies amabalis</td>
<td>Acer saccharinum</td>
</tr>
<tr>
<td>Abies nordmanniana</td>
<td>Alnus rubra</td>
</tr>
<tr>
<td>Cedrus atlantica</td>
<td>Alnus viridis</td>
</tr>
<tr>
<td>Cedrus libani</td>
<td>Eucalyptus gunnii</td>
</tr>
<tr>
<td>Cryptomeria japonica</td>
<td>Eucalyptus nitens</td>
</tr>
<tr>
<td>+ 18 others....</td>
<td>+ 18 others</td>
</tr>
</tbody>
</table>

* could be classified as affected due to Acute Oak Decline/grey squirrels
Thuja plicata D. Don
1. ESC decision support v3
2. Forest Research species and provenance web-pages
FORESTRY COMMISSION
BULLETIN No. 30

Exotic Forest Trees
in
Great Britain

Paper prepared for the
British Commonwealth Forestry Conference
Australia and New Zealand 1957

LONDON: HER MAJESTY'S STATIONERY OFFICE
PRICE 17s. 6d. NET
1b. Deployment of species

Mixtures

Mosaics
Gisburn mixtures experiment

Mason W L, and Connolly T Forestry 2014;87:209-217
Guidance on mixed species stands?
2. Silvicultural systems
Managing Continuous Cover Forests

A guide for FC staff
Management complex CCF stands

Distribution of trees by diameter class

- Target Structure
- Actual Stand

No. trees/ha

Diameter classes (cm)
• To calibrate and validate more flexible models of individual tree and stand growth to evaluate the impacts on stand growth and development of CCF and mixed-species stands.

Team members: T Jenkins, Dr. S Hale, Dr. C Arcangeli
3. Genetics
The natural range of *Abies alba* L.
Data were analyzed using GLMM and results showed that site (P=0.026) and provenance (p<0.001) were significant but site x provenance was not significant (p=0.578).
Figure 5a
Map of the Pacific Northwest showing locations of the seed sources used in the ILFRO and Manning Bonded seedlots experiments.

- BCCO
- British Columbia
- BCIN
- WACO
- NOCO
- SOCD
- DONC
- California
- Washington
- Oregon
- Idaho
- Alberta
- Vancouver Island

EVALUATION OF SEED SOURCES: INTRODUCTION, PHENOLOGY AND MORPHOLOGY

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• **What are they?**
  More diverse forests

• **How do we achieve them?**
  Use a broader palette of species as mixtures or mosaics, a wider range of silvicultural systems and don’t forget genetics.

• **is our knowledge base good enough?**
  No!
..the successful application of some silvicultural systems would be impossible at present for two reasons: (i) the derelict state of many woodlands due to faulty treatment and (ii) the country is so infested with rabbits that economic forestry in any form is often difficult if not impossible.

(Troup, 1928 [paraphrased])