

What does silviculture for resilient forests in a changing climate look like?



Klaus Puettmann
Edmund Hayes Professor in Silviculture Alternatives

Outline/Background

- **Assumptions**
 - Global change leads to a variety of perturbations
 - No single/generic prescription
 - Providing multiple ecosystem services
 - Resistance, resilience, and adaptability are important
- **Three Rules**
 - Support/Explanation

The dog and the Frisbee



Sensu A. Haldane

Complex problems = simple rules

Haldane)

Simple Rule 1:

Essays

Command and Control and the Pathology of Natural Resource Management

C. S. HOLLING* AND GARY K. MEFFE†

*Department of Zoology, University of Florida, Gainesville, FL 32611, U.S.A.

†University of Georgia's Savannah River Ecology Laboratory, Drawer E, Aiken, SC 29802, U.S.A.

Conservation Biology 1996. 10: 328 - 337

*Encourage bottom-up
adaptation*



Simple rule 2



Neighborhood

Stand

Landscape

$$\text{Variability} = \int_{\text{Neighborhood}}^{\text{Landscape}}$$

Simple rule 3



Opportunities for natural development

Simple Rule 1:

Essays

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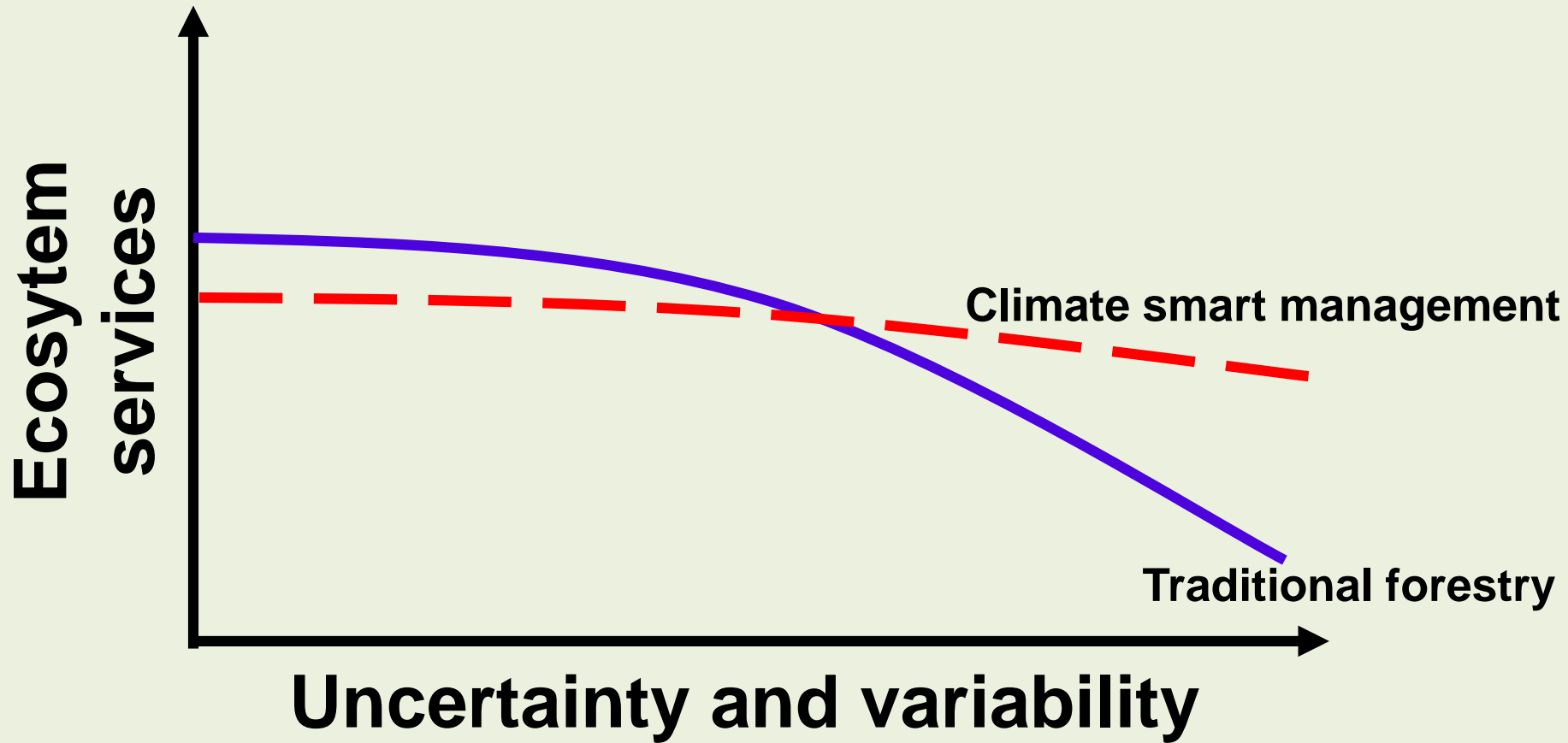


Support for Rule 1:

Resistance, resilience, and adaptative capacity
provided by:



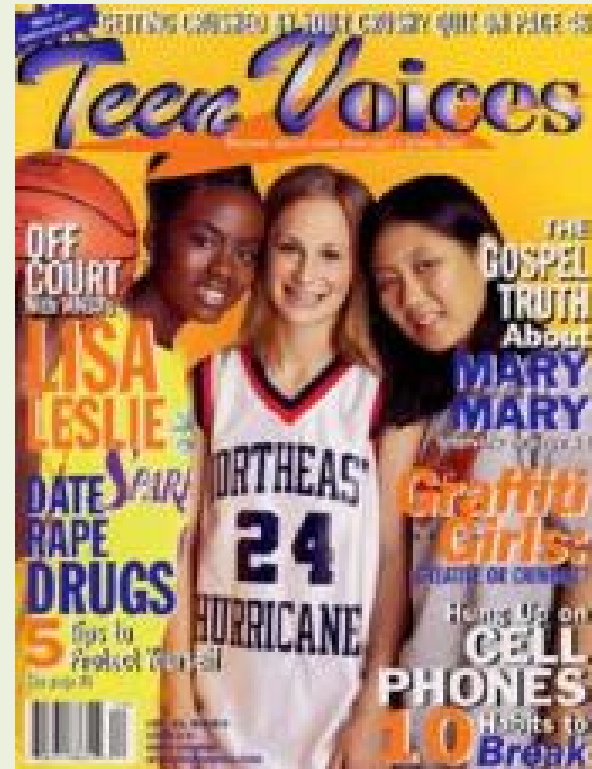
Support for Rule 1:



Support for Rule 1:

Preparing forests for “surprises” is like:

Raising Teenagers



Simple rule 2



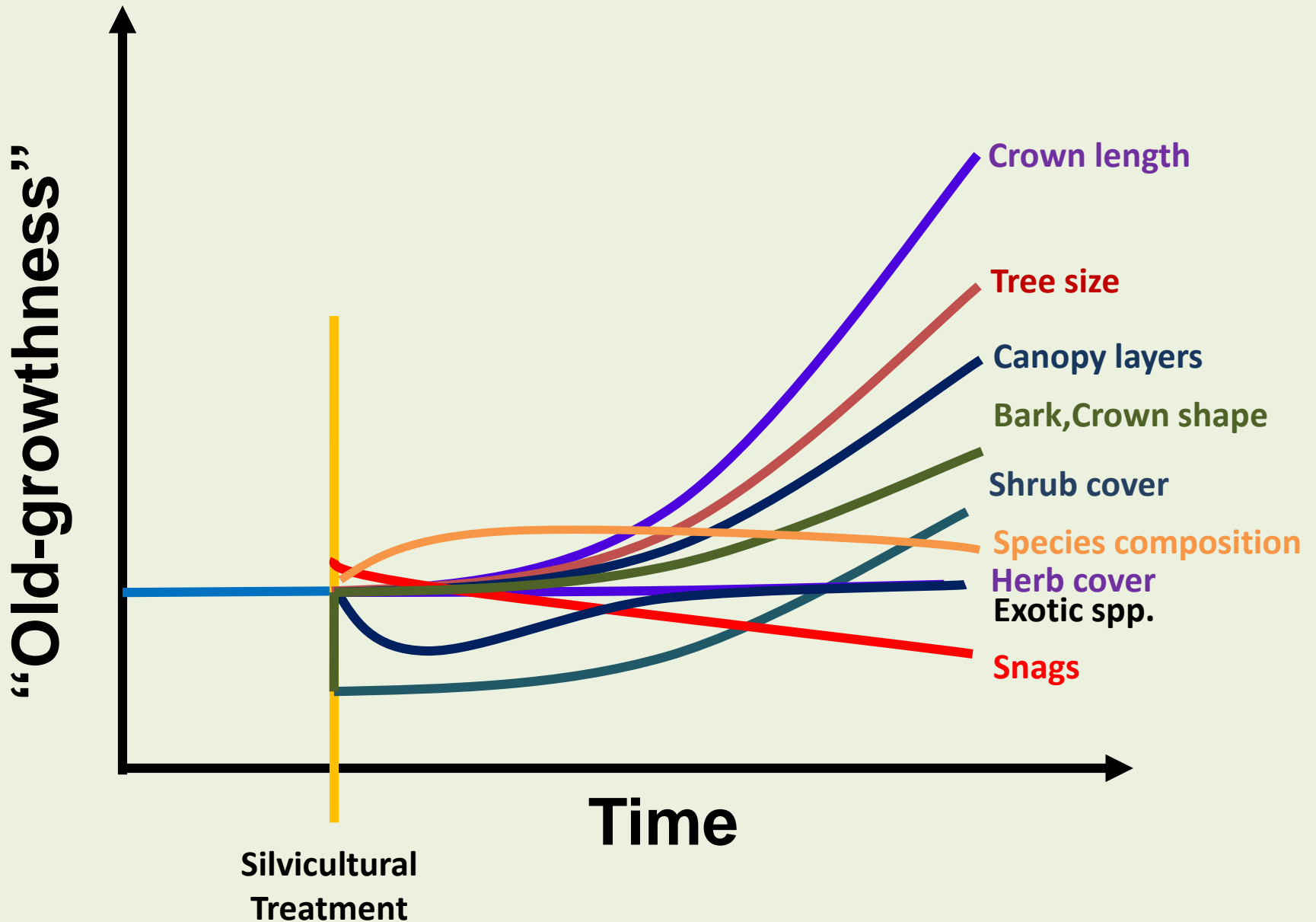
Neighborhood

Stand

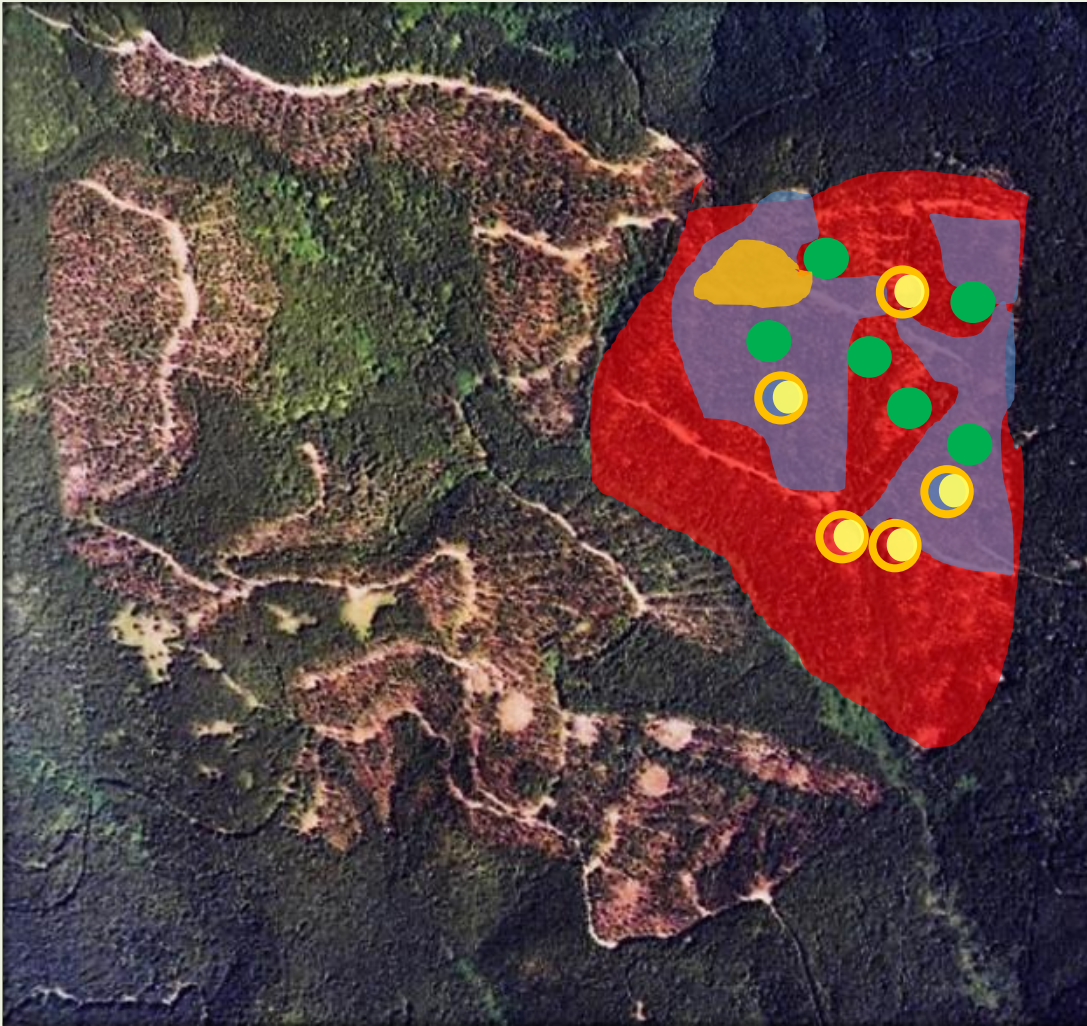
Landscape

$$\text{Variability} = \int_{\text{Neighborhood}}^{\text{Landscape}}$$

Support for Rule 2:



Support for Rule 2:



*Seedling
establishment*

*Seedling/sapling
growth*

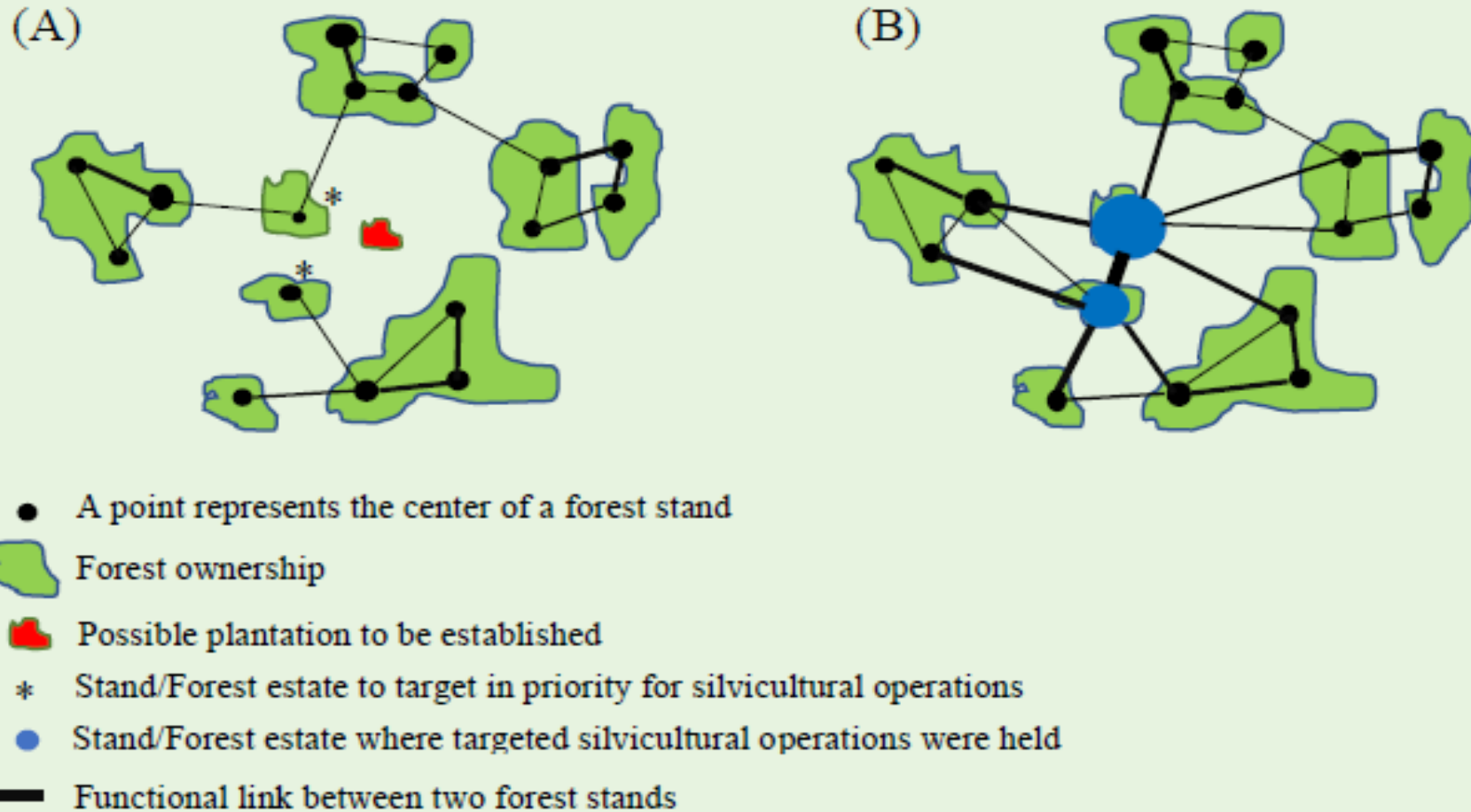
*Early successional
vegetation*

Tree growth

Mortality

*Large tree growth
Large crowns*

Support for Rule 2:



Simple rule 3



Opportunities for natural development

Support for Rule 3

Drought in recently thinned stands

- lower growth reduction**
- quicker recovery**

Benefits are reduced

- over time**
- after multiple thinnings**



Support for Rule 3



In fully stocked stands:

Species mixtures (alder/D-fir) did not differ from monoculture in terms of water use.

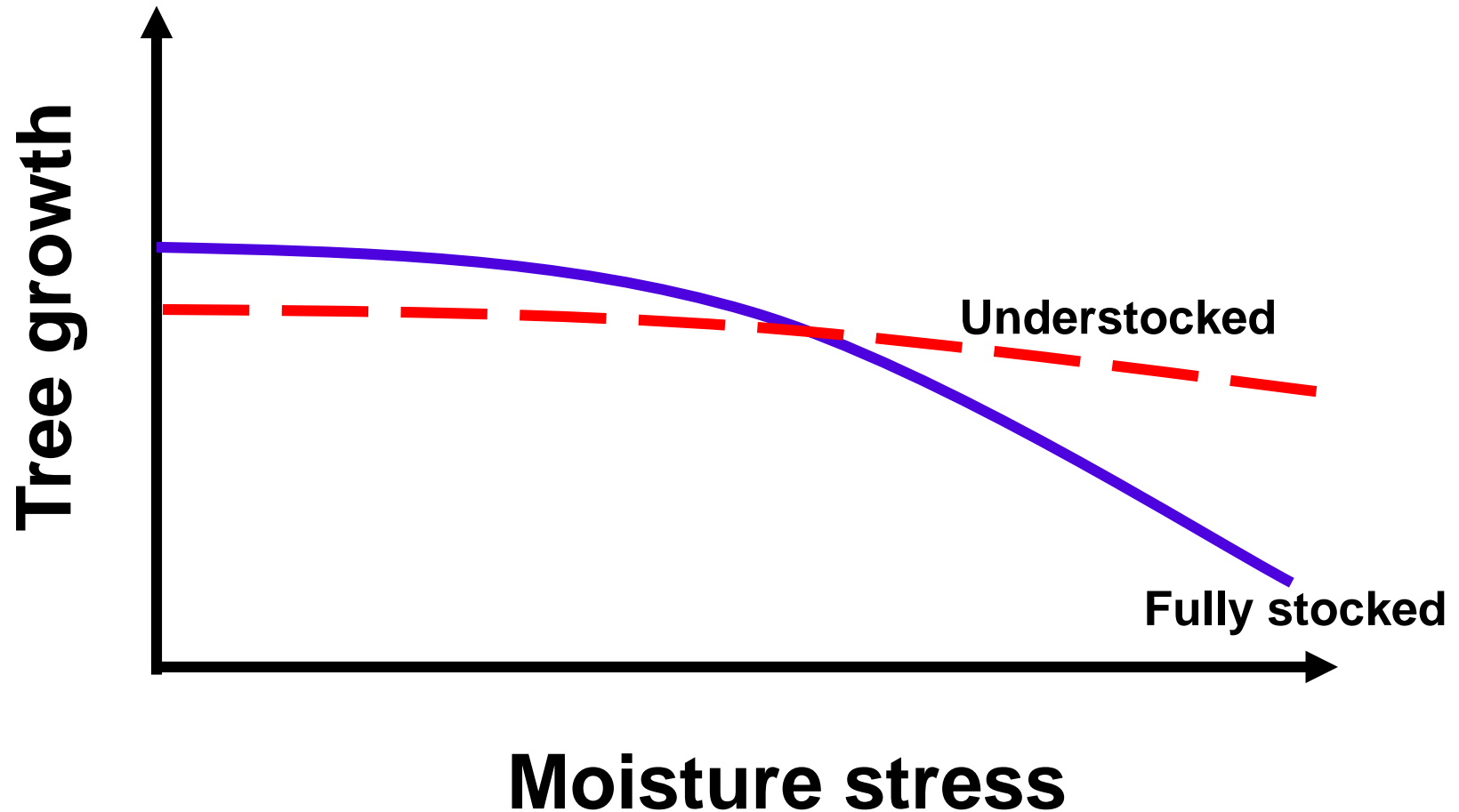
From Moore, G. 2003 PhD-thesis, OSU



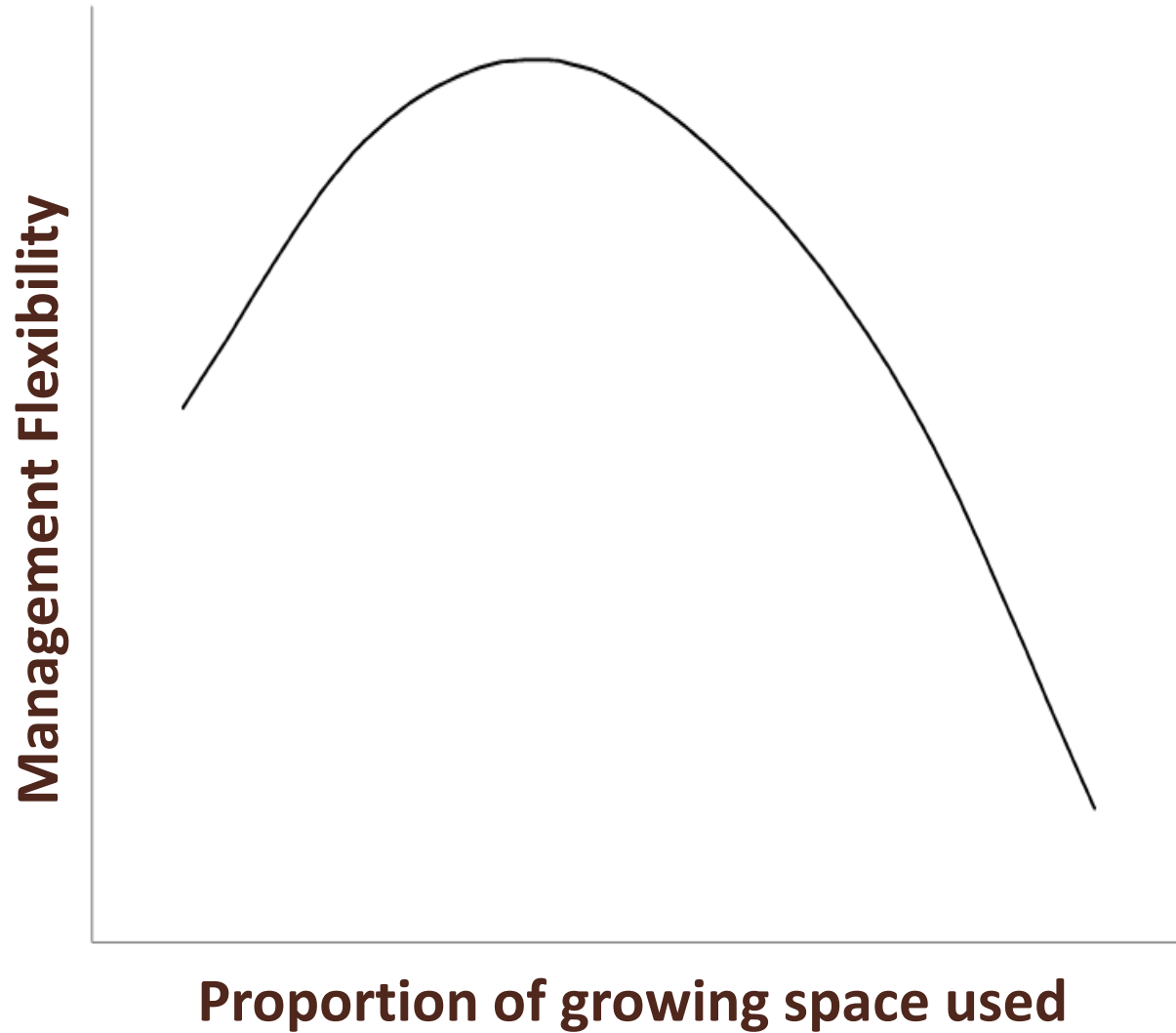
“Structural diversity had no influence on increment stability during the extreme summer drought.”

Dănescu et al. in press ForEcolMan

Support for Rule 3:



Support for Rule 3



Modified from Wilson and Baker 2001

Final thoughts

**Thanks for
listening!**

**Questions and
Comments ?**

**Rules are mostly made
to be broken and are
too often used for the
lazy to hide behind.**

Gen. Douglas MacArthur

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For publications: <http://www.cof.orst.edu/cof/fs/kpuettmann/group.htm>