

Integrating ecological, economic, & cultural values in actively managed forests

Jerry F. Franklin

University of Washington

jff@uw.edu

I would note, just for the record --

**All of these values are “social”
values**

All forests are working forests



Currently management of federal lands is not well balanced, even ecologically:

Low rate of restoration on eastside

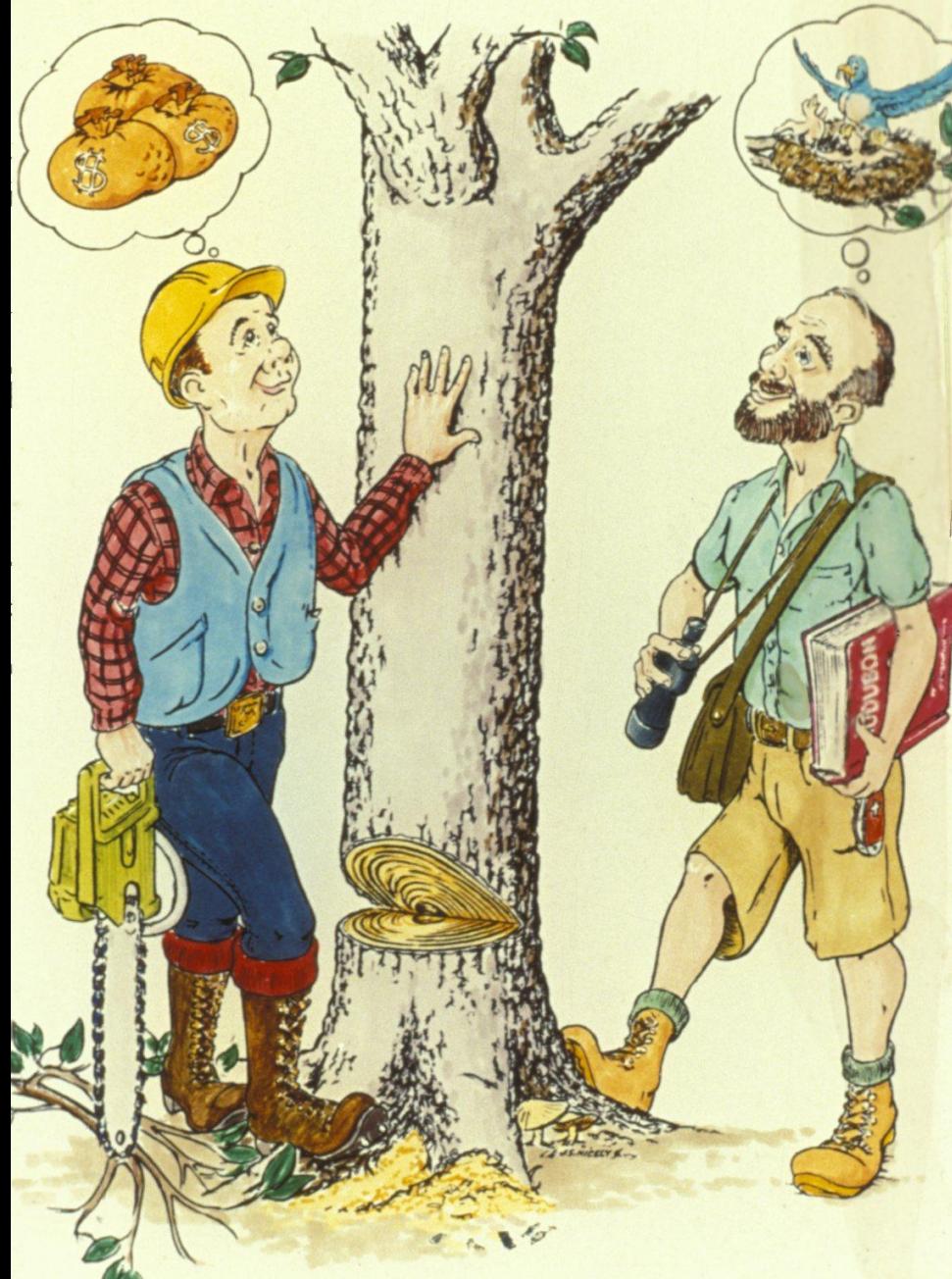
Decline of highly biodiverse early successional conditions

Expanded active management of federal forest land is imperative

- *To support local communities and
industries***
- *To increase forest resiliency***

***To insure that there will be a future
for the national forests!!***





**But the challenge of integrating
ecological, economic, and cultural
goals is NOT confined to federal
lands**

**The majority of forest landowners
face with this challenge**

**So I am going to talk about an
emerging philosophy and practice
of forest management**

– ECOLOGICAL FORESTRY –

**that allows for integrating or
“balancing” values**

The Fork in the Forestry Road



- *If you come to a fork in the road, you should take it...”*

» *Yogi Berra?*

*What has driven changes in
forestry?*

**Profound shifts in societal goals and
priorities for forest ecosystems**

**Greatly expanded scientific
understanding of structure &
function of forest ecosystems**

Globalization of commerce & capital

















The Fork in the Forestry Road



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Ecological Forestry

**Manage forests for multiple objectives
based on principles derived from
natural forest ecosystems**

Production Forestry

**Manage forests for wood production
based on agronomic principles and
models, constrained by current
economic models (PNV)**



Ecological Forestry encompasses:

- **Forest practices based on principles of natural stand development, including**
- **Roles of natural disturbances in initiation, development & maintenance of forest ecosystems**
- **Implemented on spatial and temporal scales consistent with recovery of desired structures & processes**



Ecological Forestry applicable where primary objectives of management include:

- **Integration of ecologic, economic and cultural objectives**
- **Restoration or maintenance of ecological processes and biodiversity**

Ecological Forestry

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Some silvicultural principles for ecological foresters

- Providing continuity in structure, function & composition between forest generations
- Creating and sustaining structural complexity, including heterogeneity
- Intervening at ecologically appropriate time intervals

- **Conducting regeneration harvests that leave behind structures and organisms from the pre-harvest stand!**
- **Creating stands that incorporate structural complexity (including dead wood structures) and spatial heterogeneity (non-uniformity)!**

Continuity Principle –

Ecological forestry seeks to provide for continuity in forest structure, function and biota between pre- and post-harvest ecosystems



80

19











Continuity is about:

**Retaining and incorporating
elements (structures and
organisms) from a pre-harvest
stand into a post-harvest stand
(= biological legacies)**

Variable-Retention Harvesting

Regeneration harvests

**with varying levels and
spatial patterns of retention**

Focus: What you leave behind!

GRADIENT OF FOREST HARVEST

100%

0%

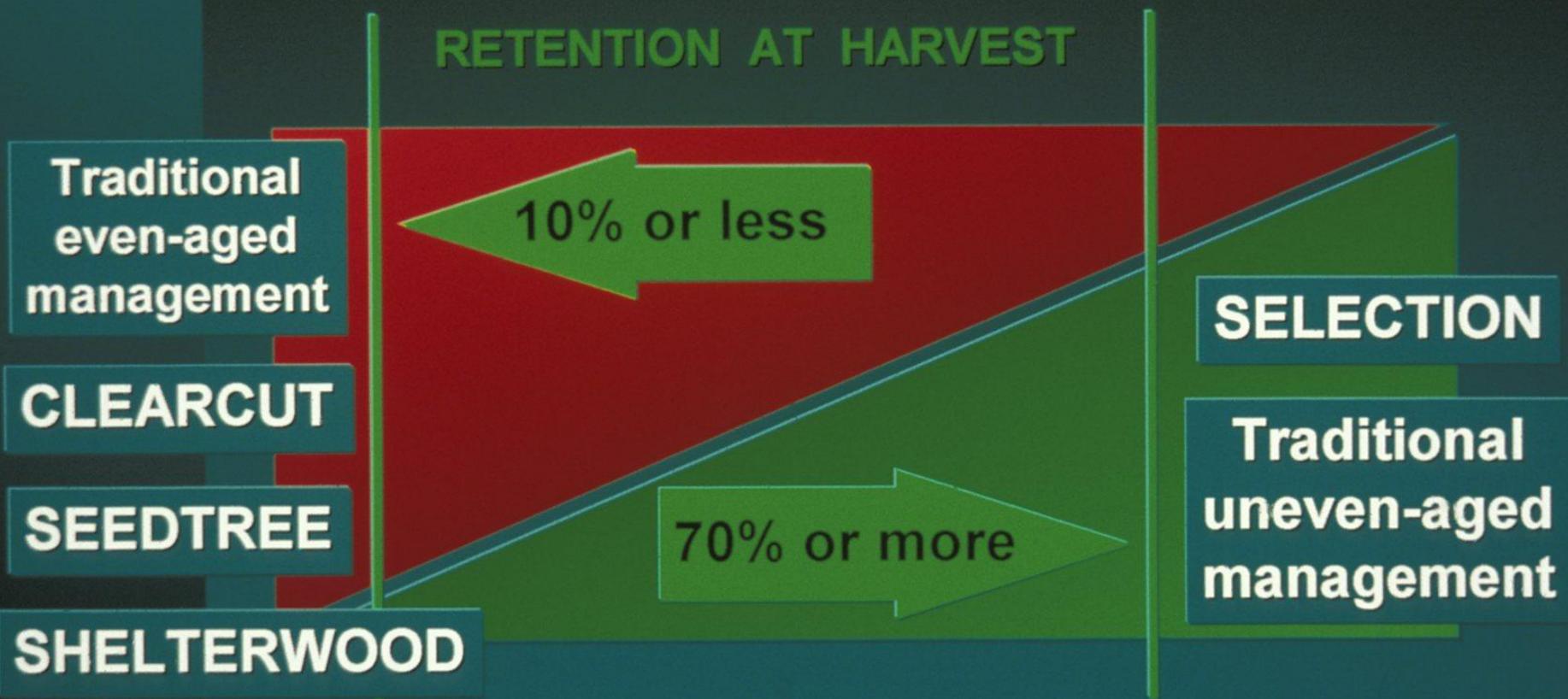
REMOVAL

RETENTION

0%

100%

GRADIENT OF FOREST HARVEST





Objectives of Variable Retention:

- **Lifeboating biological diversity**
- **Structurally enriching the new stand**
- **Improving landscape permeability (“softening the matrix”)**
- **Buffering sensitive areas**









Variable Retention Harvesting

- **Extremely flexible approach – easy to adapt to varied conditions and goals**
- **Extensively tested and applied on 5 continents**
- **Extensive scientific study**









Ecological Forestry Simulation

(DRAFT 11/25/13)

Lower Smith/Siuslaw
Watershed
BLM Matrix
Western Oregon
T21S:R9W:SEC13

Aggregated Retention

Category: % of Harvest
Unit:

Riparian Reserve 12

Harvest Landscape 20

Total Aggregated
Retention 32

Dispersed Retention 4

Total Retention 36

0 0.1 0.2 0.4 0.6 Miles



Smith Post-Harvest Oblique – Ecological Forestry Simulation (*draft: 11/25/2013*)

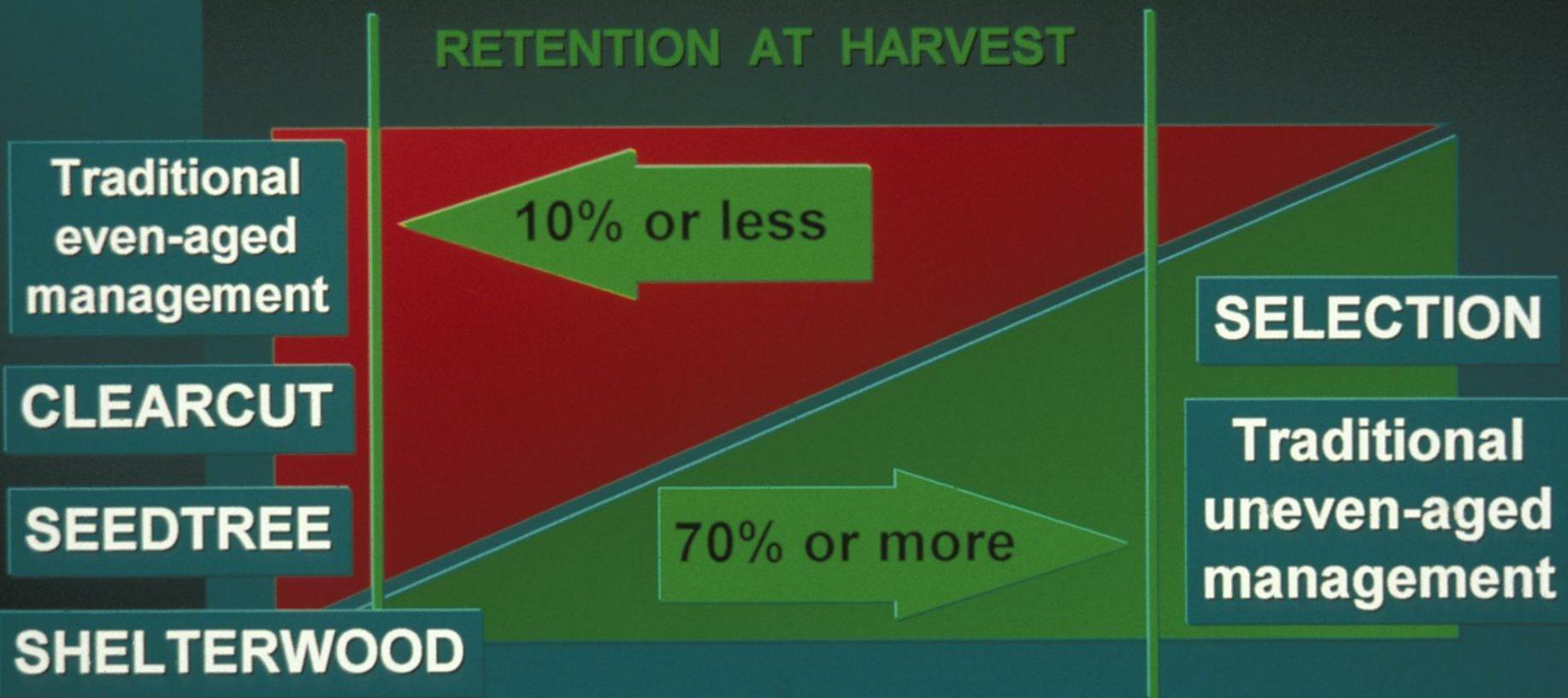


Vincent Creek Fire Road





GRADIENT OF FOREST HARVEST



Complexity Principle –

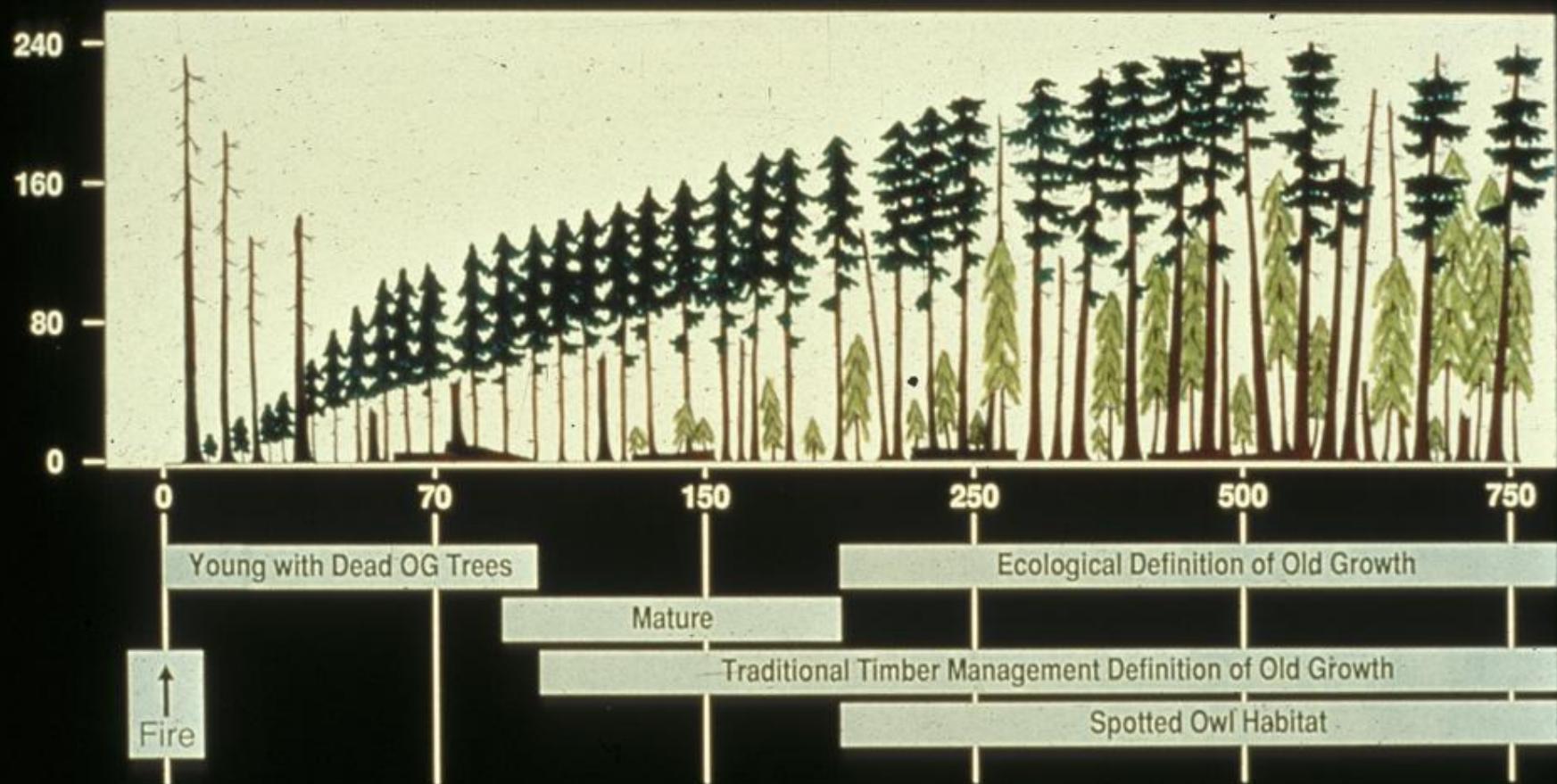
**EF seeks to create and
maintain ecologically-desirable
levels of structural complexity
and biological diversity in
established forests**



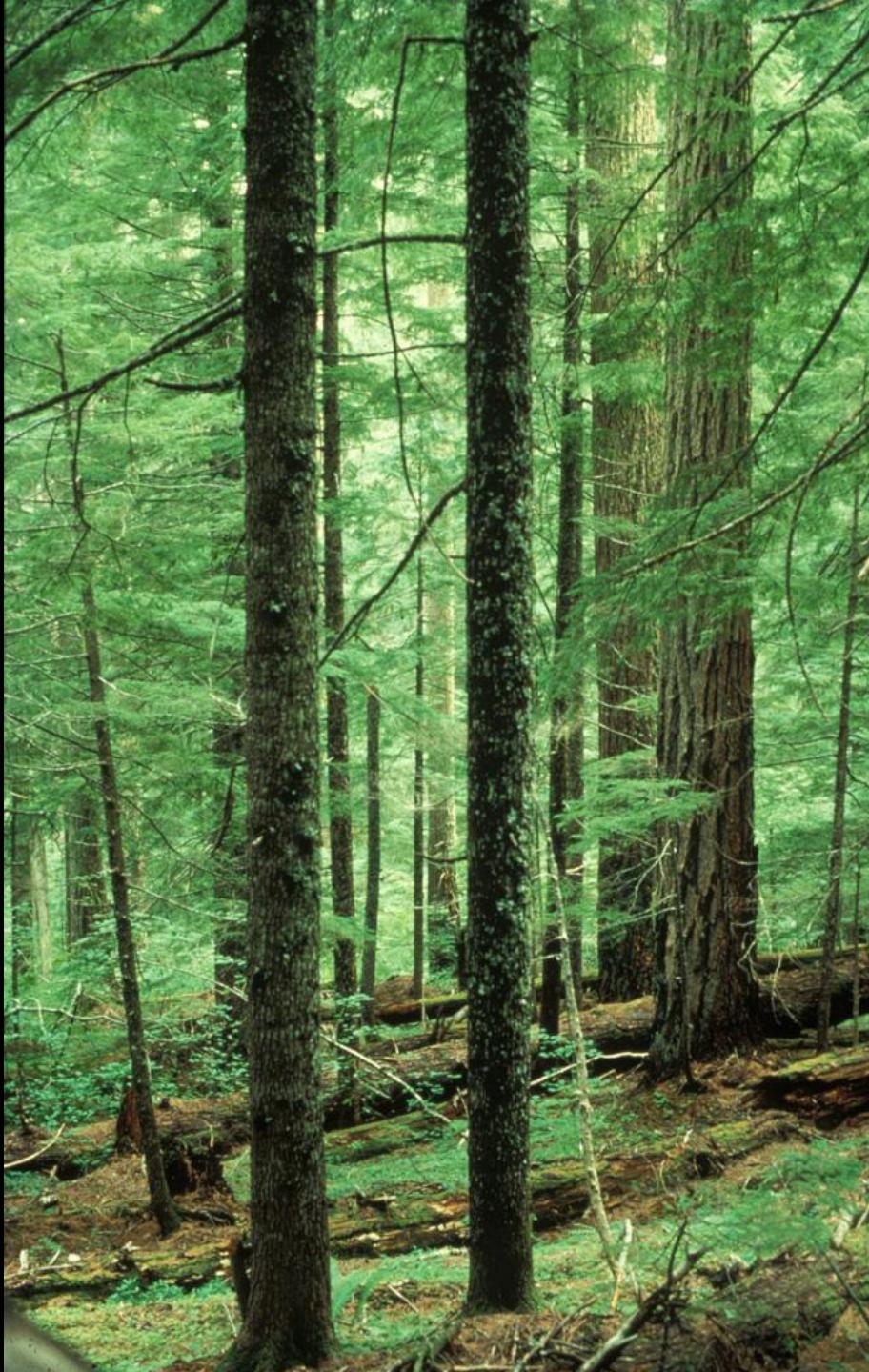
**The models here are natural
stand development processes**

- **Thinning**
- **Decadence creation**
- **Prescribed burning**

Natural Forest Development Following Catastrophic Wildfire











Complexity Principle –

**including spatial heterogeneity
at multiple spatial scales**

Managing for structural complexity:

A primary tool for creating and sustaining structural complexity is thinning or partial cuttings that produce spatially heterogeneous results – variable density treatments

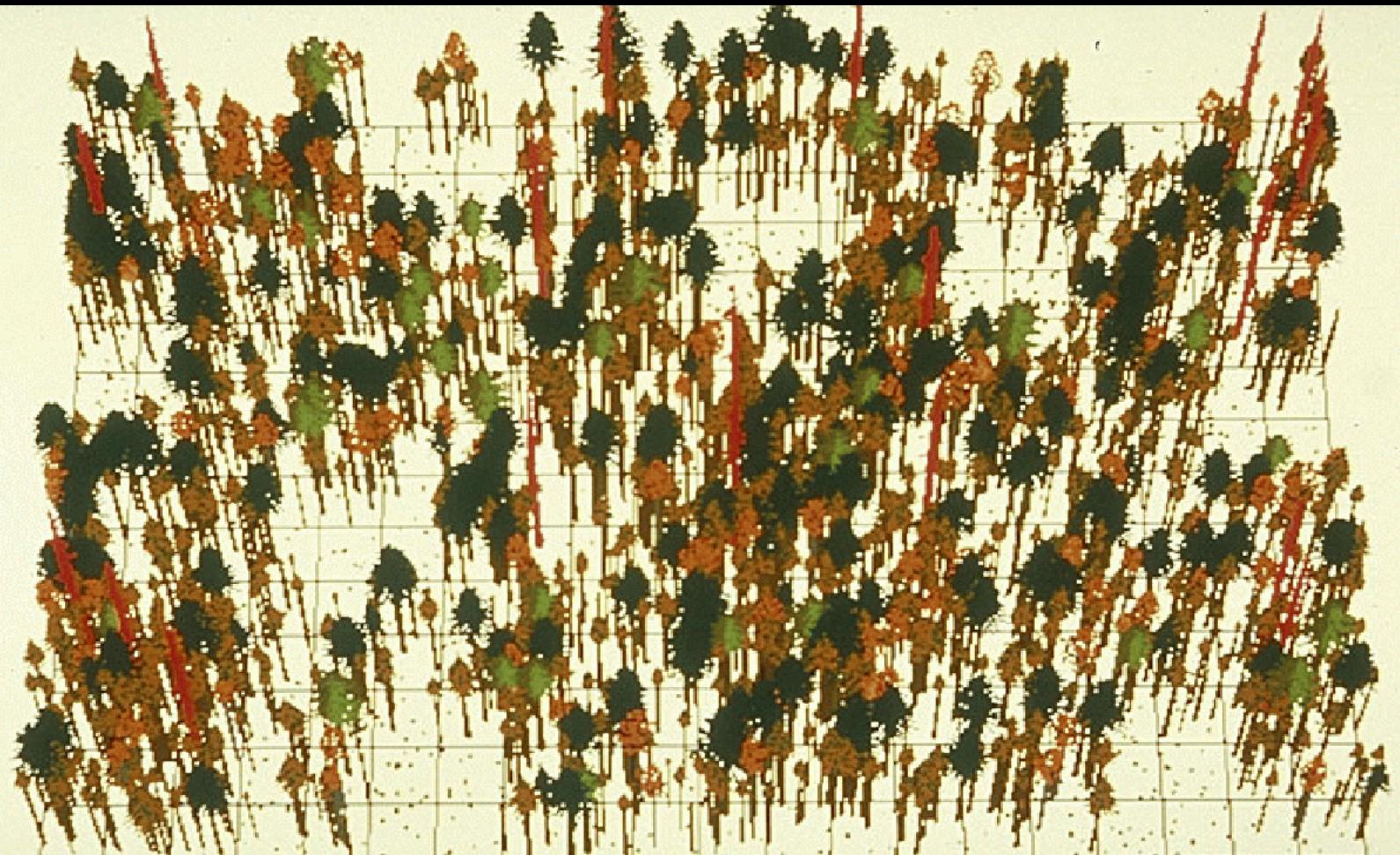
**Example from PNW:
Accelerating development of
complexity in simplified young
stands (plantations!)**







Clavicle 301, S 1/2, Unthinned



Clavicle 301, S 1/2, Thinned





Spatial heterogeneity – non-uniform or clumped patterns of trees and other features – are important and universal features of natural forests. This heterogeneity has important consequences for forest function, resistance, and resilience

**ICO conceived by two young foresters:
Derek J. Churchill et al. 2013. Restoring
forest resilience from reference
patterns to silvicultural prescriptions
and monitoring. For. Ecol. & Mgmt 291:
442-457.**

**Andrew J. Larson & Derek Churchill.
2012. Tree spatial patterns in fire
frequent forests of western North
America. . . FE&M 267:74-92**

ICO or Clustering Algorithm

ICO = individuals, clusters & openings

**Quantitative replicable approach for
creating spatially heterogeneous
silvicultural outcomes!**

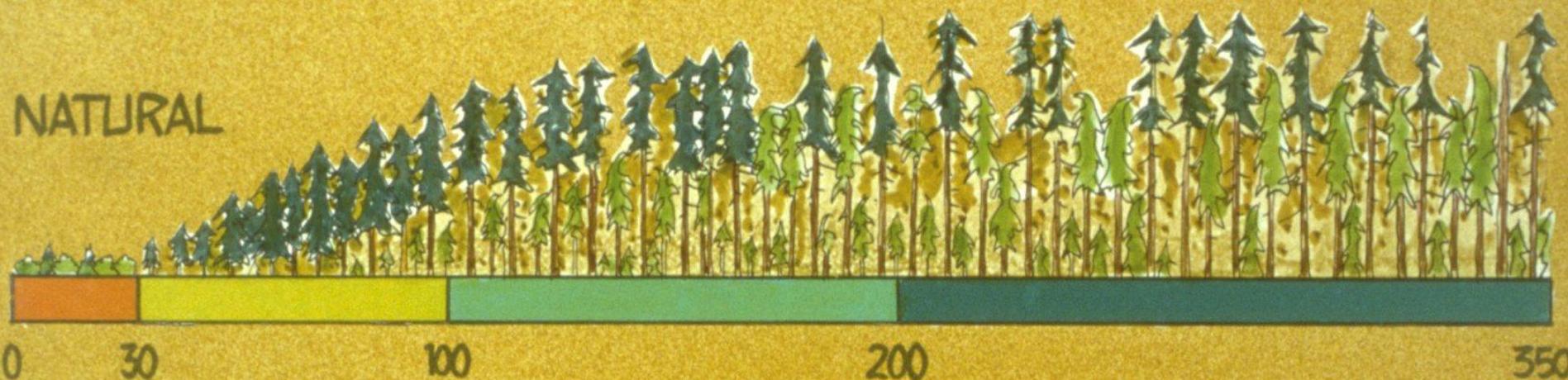
**Based on clustering patterns in
appropriate reference forests**

**Results in outcomes that are spatially
heterogeneous**

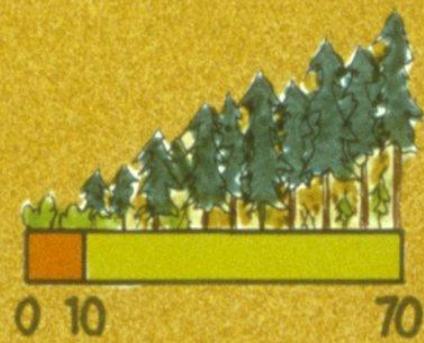
Timing Principle –
in ecological forestry
interventions are conducted at
ecologically appropriate time
intervals

**We had been thinking about the need for
longer rotations between regeneration
harvests to all for redevelopment of
desired structural conditions**

NATURAL



MANAGED



**Timing of interventions –
in ecological forestry silvicultural
interventions are implemented at
ecologically appropriate time
intervals**







Context Principle –

Silvicultural interventions are planned and implemented in the context of plans developed at larger (landscape) spatial scales in ecological forestry

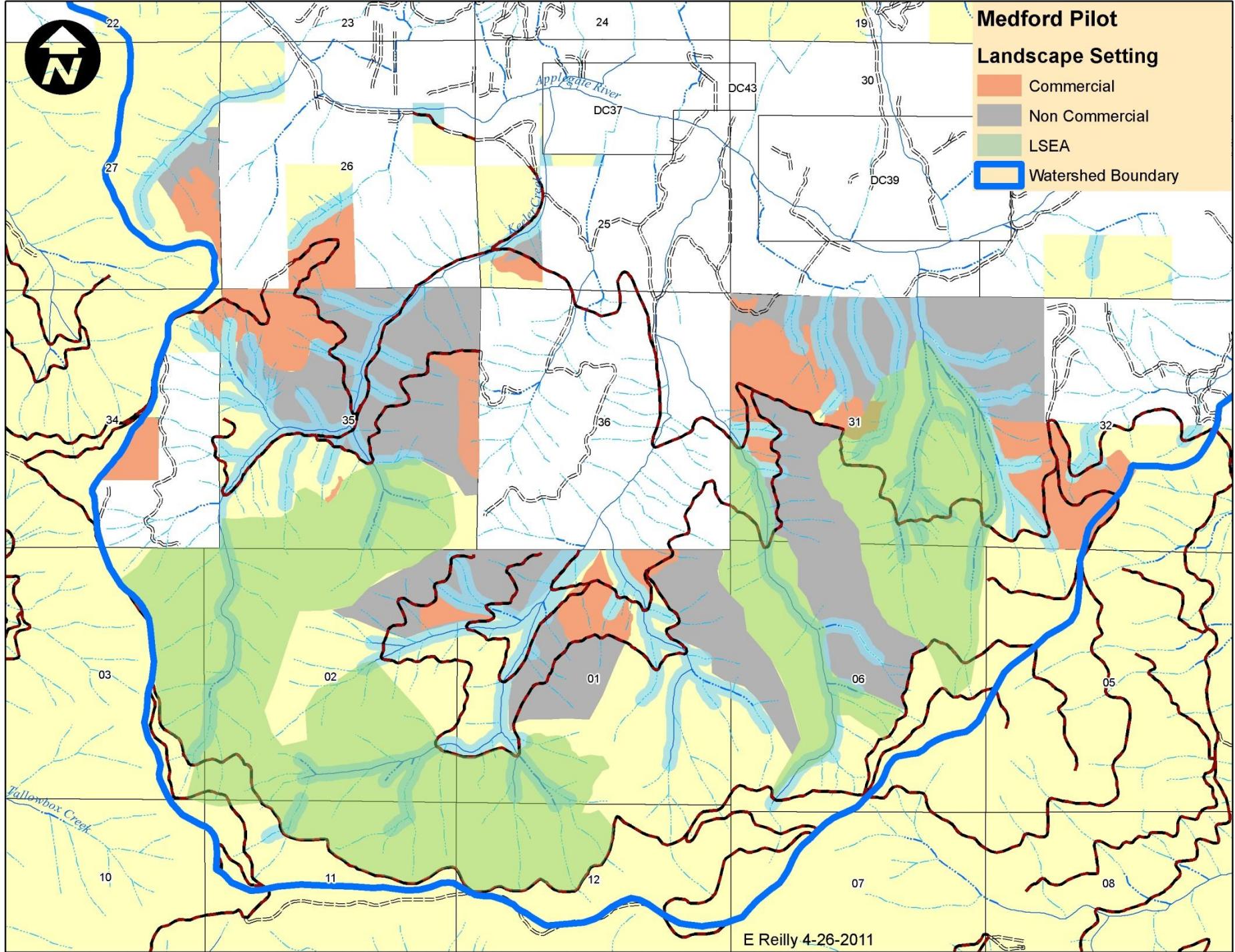




Medford Pilot

Landscape Setting

- Commercial
- Non Commercial
- LSEA
- Watershed Boundary





Landscapes as “black and
white”?

(habitat or non-habitat, etc.)

...or as “shades of gray”?



(a range of value
for habitat or other functions)



...or even “shades of green”!

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THE GREENHOUSE EFFECT



COMING SOON TO A PLANET NEAR YOU?

**Broad social goals for ecological
foresters in the highly uncertain
21st century include:**

***Reducing risks of significant loss of
forest values***

***Increasing options available to
future generations***

