Old-growth On Federal Lands

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Fig. 8.1 Extent of uncut 'virgin' forest in 1620, 1850, and 1920. Areas of forests are based on estimates by states. Each dot represents 25,000 acres. Dots are not all correctly located: The Black Swamp region of northwestern Ohio, for instance, was almost a solid forest in 1850. Reprinted with permission of publisher from W. B. Greeley (1925), *Economic Geography* 1:4–5.
Conversion of old growth to Douglas-fir Plantations on 40 to 70 year rotations
Outline

- Definitions
- Ecology
- Historical reference
- Geographic variation
Outline

- The Northwest Forest Plan
  - How much
  - Changes and threats
  - Targets and efforts to reach them

- Policy problems and options
Changing Terminology in Forest Ecology

Forest Science (Forestry Abstracts): % of forestry publications* from 1936-2005 with reference to phrases in any data-base field pertaining to old forests

*Defined as all publications in the Forest Science data base

- 'virgin forest' OR 'primeval forest'
- 'old growth' AND 'forest'

5-year periods:
- 1936-1940
- 1941-1945
- 1946-1950
- 1951-1955
- 1956-1960
- 1961-1965
- 1966-1970
- 1971-1975
- 1976-1980
- 1981-1985
- 1986-1990
- 1991-1995
- 1996-2000
- 2001-2005
Old-growth forests area ecosystems distinguished by old trees and related structural attributes. Old-growth encompasses the later stages of stand development that typically differ from earlier stages in a variety of characteristics, which may include tree size, accumulations of large dead woody material, number of canopy layers, species composition and ecosystem function.”
Process vs Structural Definitions

Oliver and Larson (1990) “Old growth implies a uniformity of process….stands composed entirely of trees which have developed in the absence of allogenic processes.

Allogenic = external to the stand (e.g. fire)
A structural definition: PNW Research Note 447 (1986)

- Douglas-fir on western hemlock sites
- 2 or more tree species
- Douglas-fir => 8/acre >32 in dbh or >200 years old
- Tolerant associates => 12/ac and 16 in dbh
- Deep multilayered canopy
- Snags =>4/ac > 20 in dbh and 15 ft tall
- Logs =>15 tons/ac => 24 in dbh and 50ft long
A structural index approach
Based on tree size, variation in tree size, snags and logs
Old-Growth Habitat Index (OGHI) (*structure-based, age not included*)
for GNN629 inventory plots in the Oregon Coast Range
Examples of classifications of Douglas-fir Stand development

<table>
<thead>
<tr>
<th>Typical Age</th>
<th>Oliver and Larson 1990</th>
<th>Franklin et al. 2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Stand initiation</td>
<td>Legacy</td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>Pioneer Establish</td>
</tr>
<tr>
<td>30</td>
<td>Stem exclusion</td>
<td>Canopy closure</td>
</tr>
<tr>
<td>80</td>
<td>Understory rein.</td>
<td>Maturation</td>
</tr>
<tr>
<td>150</td>
<td>Old-growth</td>
<td>Vertical divers.</td>
</tr>
<tr>
<td>300</td>
<td></td>
<td>Horizontal divers.</td>
</tr>
<tr>
<td>800-1200</td>
<td></td>
<td>Pioneer loss</td>
</tr>
</tbody>
</table>
Legacy/Disturbance

- HOH Fire
- Wind Storm
- Tillamook Fire
Establishment
Canopy Closure/Competitive Exclusion stages
Maturation/Vertical Diversification Stages
Horizontal Diversity/Pioneer loss
Mixed Severity Fire Regimes
Three Centuries Of Simulated Pre-Columbian Fire History in Oregon Coast Range

By Nonaka Wimberly and Spies
a) Province Scale  
(2,250,000 ha)

b) National Forest Scale  
(302,500 ha)

c) Reserve Scale  
(40,000 ha)
Simulated Historical Range of Variation in Age Classes in Oregon Coast Range Over a 1000 year period

% of Landscape

Age Class

0 - 20  20 - 40  40 - 80  80 - 200  200 - 400  > 400

Current

HRV
Fire Severity Regimes and Forest Types of the PNW Region

Based on Agee 1993

Moisture Stress

Cool

Wet

Mixed

Mixed Conifer

Pacific Silver Fir

Western hemlock

Cool

High

Wet

Warm

Dry

Douglas-fir

Ponderosa Pine

Oak Woodland
Coastal Douglas-fir/hemlock
Also Spruce/Hemlock

High Severity
100-300+ yr return interval
Large patch sizes
Ponderosa Pine/Mixed Conifer in Eastern Cascades

Low to moderate severity
Mixed severity pattern
8-50 year frequency
Patchy severity pattern
Different types of Old Growth in Fire Prone Landscapes

Courtesy of Norm Johnson
Mixed Conifer/Evergreen Forests SW Oregon

Low to high severity
Mixed severity pattern
25-100 year frequency
Heterogeneity in a mixed-conifer forest under a low to moderate severity fire regime

Franklin et al. 1996
Patchy Douglas-fir/Mixed Conifer/Hardwood--Mixed severity fire
Variation in fire severity in Biscuit Fire
Forest Ecosystem Management: An Ecological, Economic, and Social Assessment

Report of the Forest Ecosystem Management Assessment Team (FEMAT)

July 1993
Major Objectives of the Plan

- Habitat to provide for viability of northern spotted owl and marbled murrelets
- Habitat for viable populations of other old-growth associated species
Major Objectives of the Plan
100 year horizon

- Habitat on federal lands for viable populations of salmonids
- Connected old-growth forest ecosystem on federal lands
- Attain greatest economic and social contributions and meet requirements of environmental laws
Late successional Reserves

Adaptive Management Areas

Matrix

Major Land Allocations

Washington

Oregon
Monitoring Old-growth

- Vegetation structure and composition from:
  - Inventory plot grid
  - Vegetation mapping with TM imagery
  - Change analysis with TM imagery
How much and where?
Table 1. Area of older forest on all federal land by definition in NWFP area (table 11, Moeur et al. 2005)

<table>
<thead>
<tr>
<th>Type</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>ML</td>
<td>7,800,000 ac</td>
</tr>
<tr>
<td>LMS</td>
<td>2,700,000 ac</td>
</tr>
</tbody>
</table>

ML = Medium-Large: =>20 in quadratic mean diameter, single or multi-story

LMS = Large Multi-story: => 30 in quadratic mean diameter, multi-story
Table 2. Area of older forest (ML definition) in Northwest Forest Plan by State. Reserves do not include riparian reserves. (Acreages are somewhat lower than in Table 1 because of smaller landbase used). (Figure 21a, Moeur et al. 2005).

<table>
<thead>
<tr>
<th></th>
<th>Oregon</th>
<th>Washington</th>
<th>California</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>All lands</strong></td>
<td>3,500,000</td>
<td>1,550,000</td>
<td>2,250,000</td>
<td>7,200,000</td>
</tr>
<tr>
<td><strong>Reserves</strong></td>
<td>2,200,000 (63%)</td>
<td>1,250,000 (81%)</td>
<td>1,400,000 (62%)</td>
<td>4,850,000 (67%)</td>
</tr>
<tr>
<td><strong>Nonreserve</strong></td>
<td>1,300,000</td>
<td>300,000</td>
<td>750,000</td>
<td>2,350,000</td>
</tr>
</tbody>
</table>
Table 3. Area (1,000s of acres) and percentage of older forest on federal and non-federal land in Oregon in NWFP area (From Spies 2006)

<table>
<thead>
<tr>
<th>Province</th>
<th>Federal</th>
<th>Nonfederal</th>
<th>Federal % of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Medium-Large</td>
<td>Large Multi-story</td>
<td>ML</td>
</tr>
<tr>
<td>Coast</td>
<td>523</td>
<td>296</td>
<td>727</td>
</tr>
<tr>
<td>E Cascades</td>
<td>223</td>
<td>27</td>
<td>94</td>
</tr>
<tr>
<td>W Cascades</td>
<td>1,910</td>
<td>734</td>
<td>268</td>
</tr>
<tr>
<td>Klamath</td>
<td>719</td>
<td>384</td>
<td>233</td>
</tr>
<tr>
<td>Willamette</td>
<td>4.6</td>
<td>0</td>
<td>194</td>
</tr>
</tbody>
</table>

Medium-Large (ML): => 20 in quadradic mean diameter, single or multi-story
Large Multi-story: => 30 in quadradic mean diameter, multi-story
How much older forest (>100 years) did we have on Federal in the NWFP Region before Euroamerican settlement?

23 million acre land base

~ 50 to 75% was forest with older trees (~100+ years) (based on historical and simulation studies)

Historically: 11.5 to 16.1 million acres of 100 + forest

Today: 7.8 million acres (ML definition)

45 to 67 percent of the historical amount
What is the target amount in the NWFP area?

- 7.7 million acres of ML for (Oregon and Washington) in large reserves (FEMAT page IV-70)
- Currently about 3.45 million acres in large reserves (Mouer et al. 2005)
What are efforts to reach Target?
Current Late Successional Reserve-Matrix Concept
In the Northwest Forest Plan

Activities Allowed:

All Provinces
Thin Plantations
Timber Production

Fire- Frequent Provinces
Fuel Reduction

Older Forest
Younger Natural Forest
Younger Forest/Plantation
Matrix
Reserve
Distribution of Plantations In a Late Successional Reserve in Coastal Oregon
Diversification of young plantations using variable density Thinning
Simulated Effects of Thinning and No Thinning on Density of Large Conifers

![Graph showing simulated effects of thinning and no thinning on density of large conifers.](chart.png)
Dynamics and Threats
Loss of Old Forest to Wildfire in 10 years

Expectation: 2.5%
Actual: 1.9%

Biscuit Fire 2002—200,000ha
Percent Loss of Older Forest on a Decadal Basis By Province
Net Gain in Older Forest in 10 yrs

Expectation: 11%
Actual: 19%
• Much Less Old Forest Logged in Matrix
• Less loss to wildfire than expected
• Size Distribution of All Forests Across Landscape
Climate Change?

- Direct effects
  - Growth
  - Regeneration
  - Within Stand Mortality

- Indirect effects
  - Wildfire
  - Insects and disease
Some observations on the Northwest Forest Plan
Some Outcomes and “Surprises”

- Increase in “older” forest in just 10 years
- Losses to wildfire, while large still fell within overall expectation
- Losses to fire high in some areas
- Owl populations declined at higher rate than expected in parts of range
- More timber harvested from reserves than from matrix
The Old-Growth Policy Problem

- A policy that allows old growth logging but does not implement it does not make many stakeholders happy
  - Those who value old growth for non-commodity reasons don’t like a federal policy that allows cutting old growth
  - Those who want more revenue from timber on the federal lands are concerned that wood production targets set in the Plan have not been met because old growth has not been cut
Multiple Choice Question:

Current Federal old-growth policies are:

a) Not working
b) Working but have significant short comings
c) Working but need some fine tuning
d) Protecting old growth from logging but not fire
e) Not politically sustainable in the longer run because of lack of long-term source of timber revenue
f) Not ecologically sustainable in the longer run because of lack of strategy to deal with landscape dynamics and climate change
How much do we need?

- Species approaches
- Historical dynamics approaches
- Socio-political approaches
Some alternatives

- Stay the course
  - Continued stress
  - Have 30 + years of thinning in plantations
- Redesign the Plan to focus timber production on younger forests and plantations while protecting the remaining old growth
  - Timber production effects?
  - Landscape/biodiversity effects?
  - Need agreement on definition
Alternatives continued

- Incremental/fragmentary changes in federal plans
  - e.g. BLM does own thing
  - Cumulative effects not clear
- Don’t break landscape up into reserves and production lands but have a goal for distribution of successional stages that management is moving toward
  - Requires trust
  - Most appropriate for fire-prone landscape
  - Complicated for planning
Alternative Landscape Designs for Maintaining Owl Habitat and Old-growth Diversity in Fire Prone Forests

Matrix = Treated forest/Open OG

Fuel Treatment
Open Old Growth

Limited or no fuel Treatment
Dense Old Growth

Matrix = Owl habitat/Dense OG
Conclusions

- Society will never agree on a definition and it will change
- But, managers and policy makers still need definitions to make decisions on the ground
- Old growth has become an icon for social and political reasons resulting in overly simple thinking about its conservation and unintended consequences
- Current federal policies have improved the outlook for conservation of old growth on federal lands relative to the pre 1990’s period--BUT
- Plans still call for logging some of the remaining old growth
- But, implementation has largely avoided cutting old growth
- Thus, timber production targets have fallen short
- Restoration efforts in fire-prone old growth forest have fallen short and many acres of old growth there have burned up
Suggestions

- Still need definitions but should be broadly based in science and social perspectives.
- Think beyond the old growth icon—conserving biodiversity means recognizing variation, dynamics, scale, and other forests in addition to older forests.
Suggestions continued

- Rethink Reserves—especially in dry landscapes
- Think across landscapes including non-federal lands
- Rethink economics—ecosystem goods and services
- Reinvigorate adaptive management to adapt to change
How much older forest (>100 years) did we have in the NWFP Region before Euroamerican settlement?

All ownerships: 56 million acres
Assume stand replacement fires every 150 to 300 years

50 to 75% of that was forest with older trees (~>100 years)
28 million to 42 million acres

Today: 12.2 million acres of ML older forest

Approximately 29 to 43 percent left