



What do we mean by old growth?

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Yellow Birch
northern hardwoods old growth,
Big Reed Pond Reserve,
northern Maine

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Outline

- What should definitions do?
- Various conceptions/definitions of old growth
- Challenging issues
- Response by Lee Frelich
- Response by Charlie Cogbill: an old-growth thesaurus & definitions
- Discussion
- If time, 3 recent definitions/inventories (references at end)
 - US Forest Service (2023)
 - Barnett et al (2023)
 - DellaSala et al. (2022)

Definitions: What are They Good For?

- Do we need definition(s) of old growth?
- Can we come up with a definition that applies across all forest types x sites *or* is that counterproductive?
- Do we need two different levels of definitions?
 - Conceptual definition of what we generally mean by old growth
 - Operational definition of what old growth in a particular forest type x site

Various Conceptions of Old Growth

- *Natural forest*: minimal human disturbance (especially logging; *primary forest*)
- *Old trees*: many old trees in the stand (for the species & site)
- *Physical structure*: many big trees in the stand (for the forest type & site); complex structure
- *Climax forest (in a succession context)*
 - Canopy of climax species; ‘equilibrium’; species from earlier stages dead
 - Asymptote for biomass/carbon for forest type x site (i.e., function)
- *Old landscape*
 - Tree populations are old and continuous; some patches have old trees, some have regenerating forest trees; multiple generations of trees
 - “Continuous heritage of natural disturbance and regeneration” (Frelich & Reich 2003)

Challenging Issues

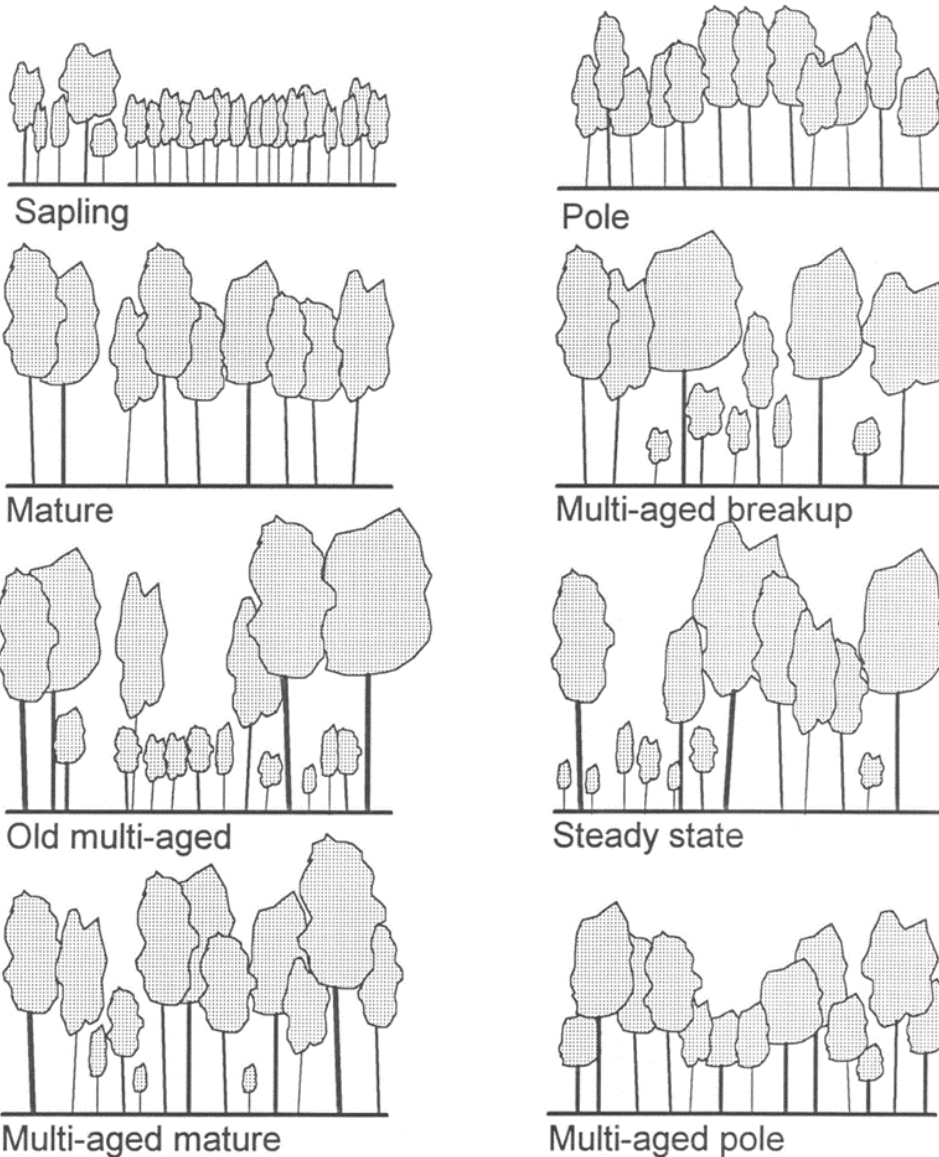
- Applying one definition to diverse forest types & sites
- Problem of 'climax forest' and succession
- What are essential criteria in a general definition?
- 'Managed old growth' (accelerating forest development) – does it count as 'old growth'?
- How can indigenous management of forests be incorporated into definitions of old growth?

Natural heritage definition (Frelich and Reich 2003):

Old-growth forests are those that meet some threshold(s) determined by a scientific and political process. The main issue is what criteria to use to determine these thresholds; they must be practical enough to allow managers to delimit and manage old-growth stands in the field. People value forests with old and (or) big trees and primary forests that have a continuous heritage of natural disturbance and regeneration, even though the latter may include all stages of stand development and succession. We advocate uniting these two and using "primary forest", also called "natural heritage forest", as the criterion for delimiting old growth in regions where primary forest still exists. This criterion recognizes that the stage of development with big, old trees is part of a cycle of development, and it is necessary to have all the parts to continue to produce new examples of the older stages (continues).

Recent update by LEF would include the Ecological Legacy of fragmented old growth stands spreading to adjacent areas so that old growth stands can increase in size—in other words acknowledge a 'secondary old-growth' stand type.

Stand development types, hardwood-hemlock in Upper MI

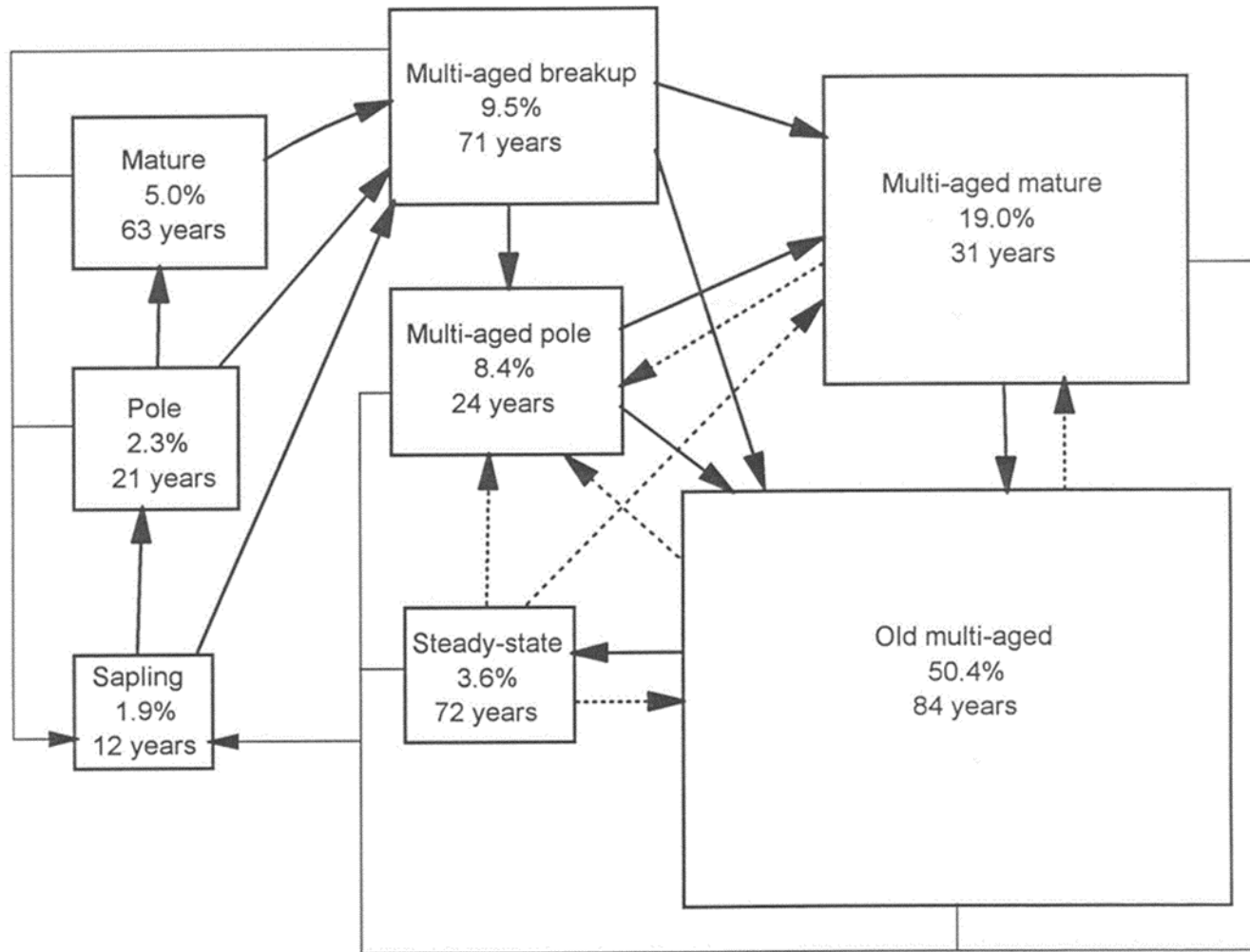


The even-aged types (sapling, pole, mature) are not very common on the landscape.

The 5 multi-aged types dominate the landscape, but vary greatly over time and space in number of large trees, amount of CWD and other criteria.

From Frelich 2002, Forest dynamics and disturbance regimes, Cambridge University Press

Partial disturbance dynamics among multi-aged types



Does it make sense for an old multi-aged stand that has the largest trees removed in a windstorm to be old growth, then not old growth for 31 years (multi-aged mature), then be old growth again (old multi-aged)? From Frelich 2002, *Forest dynamics and disturbance regimes* Cambridge University Press.



Forests with a history of burning by indigenous peoples can be incorporated as part of the old growth. Frequent understory burning of red pine stands in northern MN allowed trees to get older and larger, because the balsam fir understory was prevented from forming, leading to lower fire severity when a wildfire occurred. Photo of post-prescribed burn red pine forest at Cloquet MN by Lee Frelich.

Charlie Cogbill's Old-growth Thesaurus & Definitions

+ Thesaurus of Old-Growth Forest Concepts

Origin	History	Development	Structure
aboriginal	intact	all-aged	cathedral
ancestral	natural	autogenic	diverse
ancient	perpetual	climax	exemplary
indigenous	pristine	decadent	glorious
eternal	timeless	forest-grown	great
native	unaltered	late-successional	handsome
old-aged	uncut	multi-layered	legendary
original	unimproved	potential	massive
pre-colonial	unmanaged	primal	majestic
pre-discovery	unmerchantable	primary	spectacular
pre-European	unspoiled	(over)mature	sublime
preindustrial	undisturbed	stagnant	magnificent
presettlement	untouched	self-maintaining	superior
primeval	virgin	senescent	well-developed
primitive	vestigial	stable	venerable
primordial	wild(wood)	stagnant	heritage
relict(ual)	wilderness	steady-state	
remnant		terminal	
veteran		uneven-aged	

Character

age	disturbance	dynamics	robustness
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Criteria

<i>time</i>	+	<i>integrity</i>	⇒	<i>continuity</i>	+	<i>superlative</i>
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Objective Definitions:

Median canopy age	documented	two stand <u>generations</u>	<u>threshold</u> of basal
>50% of species	land use history	on site	area or biomass
Longevity	with	not on	to be determined
	dendrochronology	successional path	by type

Three Recent Inventories. Thoughts?

- USFS national inventory (2023)
 - *Narrative Framework*: “...dynamic...old trees... structure...later stages of stand development...tree size...large dead woody material...canopy layers...species composition...ecosystem function (USDA For Serv 1989).
 - *Working Definitions*: criteria for minimum stand age, density of trees above a certain size, etc. for specific forest types x site x geography

- Barnett, Aplet, and Belote (2023)
 - Equations estimate how much carbon in a forest based on age, type, site quality.
 - Old growth: those that had reached 95% of potential total carbon accumulation

- DellaSala et al. (2022)
 - Remotely sensed canopy height, canopy cover, and above-ground living biomass to assess relative maturity.

References Mentioned in Talk

- Barnett, K., Aplet, G. H., & Belote, R. T. (2023). Classifying, inventorying, and mapping mature and old-growth forests in the United States. *Frontiers in Forests and Global Change*, 5, 1070372.
- Barton, A.M. & Keeton, W.S., editors (2018) *Ecology and Recovery of Eastern Old-Growth Forests*. Island Press.
- DellaSala, D. A., Mackey, B., Norman, P., Campbell, C., Comer, P. J., Kormos, C. F., ... & Rogers, B. (2022). Mature and old-growth forests contribute to large-scale conservation targets in the conterminous United States. *Frontiers in Forests and Global Change*, 5, 979528.
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- Exec. Order No. 14072, 87 Fed. Reg. 24851 (April 22, 2022). to “define, identify, and complete an inventory of old-growth and mature forests on Federal lands, accounting for regional and ecological variations” One year
- Forest Service, USDA (2023) Mature and Old-Growth Forests: Definition, Identification, and Initial Inventory on Lands Managed by the Forest Service and Bureau of Land Management , Fulfillment of Executive Order 14072, Section 2(b)