



Ecological Basis for Variable Retention Harvesting and Considerations in Application







Elements of a Silvicultural System for Moist Forests

Goals include include integration of ecological and economic objectives

Silvicultural system includes:

- Variable retention harvesting
- Allow for development of early seral
- Reliance on natural regeneration
- Thin to achieve structure-composition
- Long rotations (e.g., 120-160 years)

Natural disturbances and their
biological legacies provide the
ecological models for
Variable Retention Harvesting
(VRH)









**RETENTION IS ALL ABOUT
BIOLOGICAL LEGACIES
and
PROVIDING FOR CONTINUITY
IN FOREST STRUCTURE,
FUNCTION & COMPOSITION**



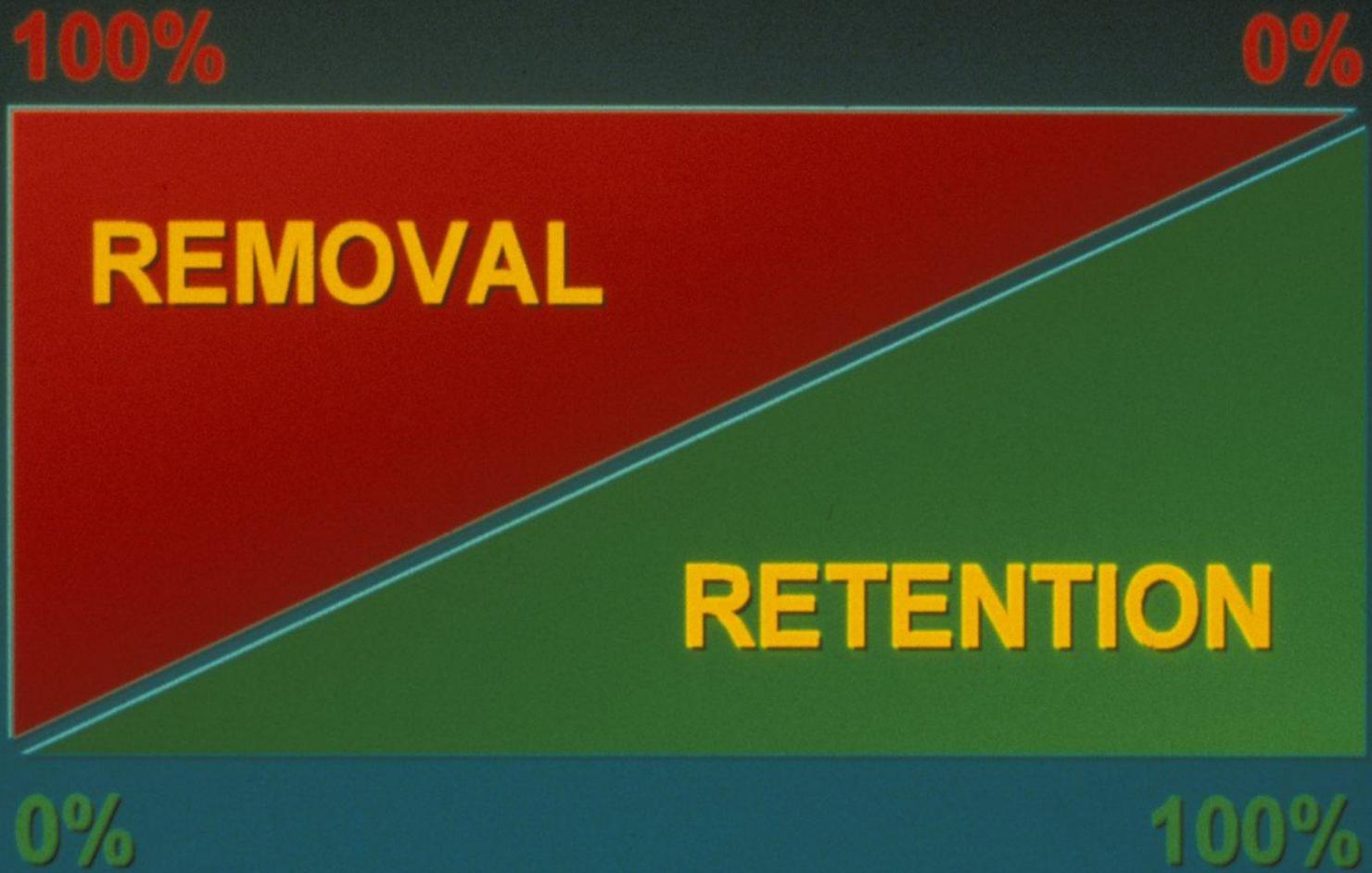


Variable Retention Harvesting

Regeneration Harvests
with varying levels and spatial patterns
of
**STRUCTURAL and COMPOSITIONAL
RETENTION**

The focus is on what is left behind!

GRADIENT OF FOREST HARVEST



GRADIENT OF FOREST HARVEST

RETENTION AT HARVEST

Traditional
even-aged
management

CLEARCUT

SEEDTREE

SHELTERWOOD

10% or less

70% or more

SELECTION

Traditional
uneven-aged
management

Dictionary of Forestry (1998):

*"variable retention harvest system
an approach to harvesting based on the
retention of structural elements or
biological legacies. . . From the
harvested stand for integration into
the new stand to achieve various
ecological objectives . . ."*

Clayquot Sound Scientific Panel:

“. . . replace conventional silvicultural (clearcut) systems in Clayquot Sound with a 'variable retention silvicultural system'. The purpose is . . . to preserve, in managed stands, far more of the characteristics of natural forests. . .”



Legal Definition of VRH System by BC Government:

Retention system means a silvicultural system that is designed to: (a) retain individual trees to maintain the structural diversity over the area of the cutblock for at least one rotation, and (b) leave more than half of the total area of the cutblock within one tree height from the base of a tree or group of trees. . . .

Objectives of Structural Retention include:

- Lifeboating biological diversity
- Structurally enriching the new stand
- “Softening” the matrix - improving connectivity and buffering sensitive areas

Lifeboating Species and Processes

Provides refugia and inocula by:

- providing structural elements that fulfill habitat requirements
- ameliorating microclimatic conditions on the harvested site
- providing energetic substances to maintain non-autotrophic organisms -- supplying energy to the soil





Structural Enrichment

Large and decadent live trees, snags, and logs retained at the time of harvest:

- increase the structural complexity of managed stands for entire rotation
- allow for earlier development of suitable conditions and specific structures needed by some species than would otherwise be possible





"Softening" the Matrix

- Improving connectivity in the managed landscape facilitates the movement and migration of forest organisms
- A less hostile matrix buffers reserves from disturbances and edge influences

Elements of a Retention Harvest Silvicultural Prescription

Of course, management objectives
come first!

Then the VRH prescription has
three basic elements:

- What elements to retain
- How much to retain
- Spatial pattern for retention

IT DOESN'T WORK OVER HERE!



What elements to retain?

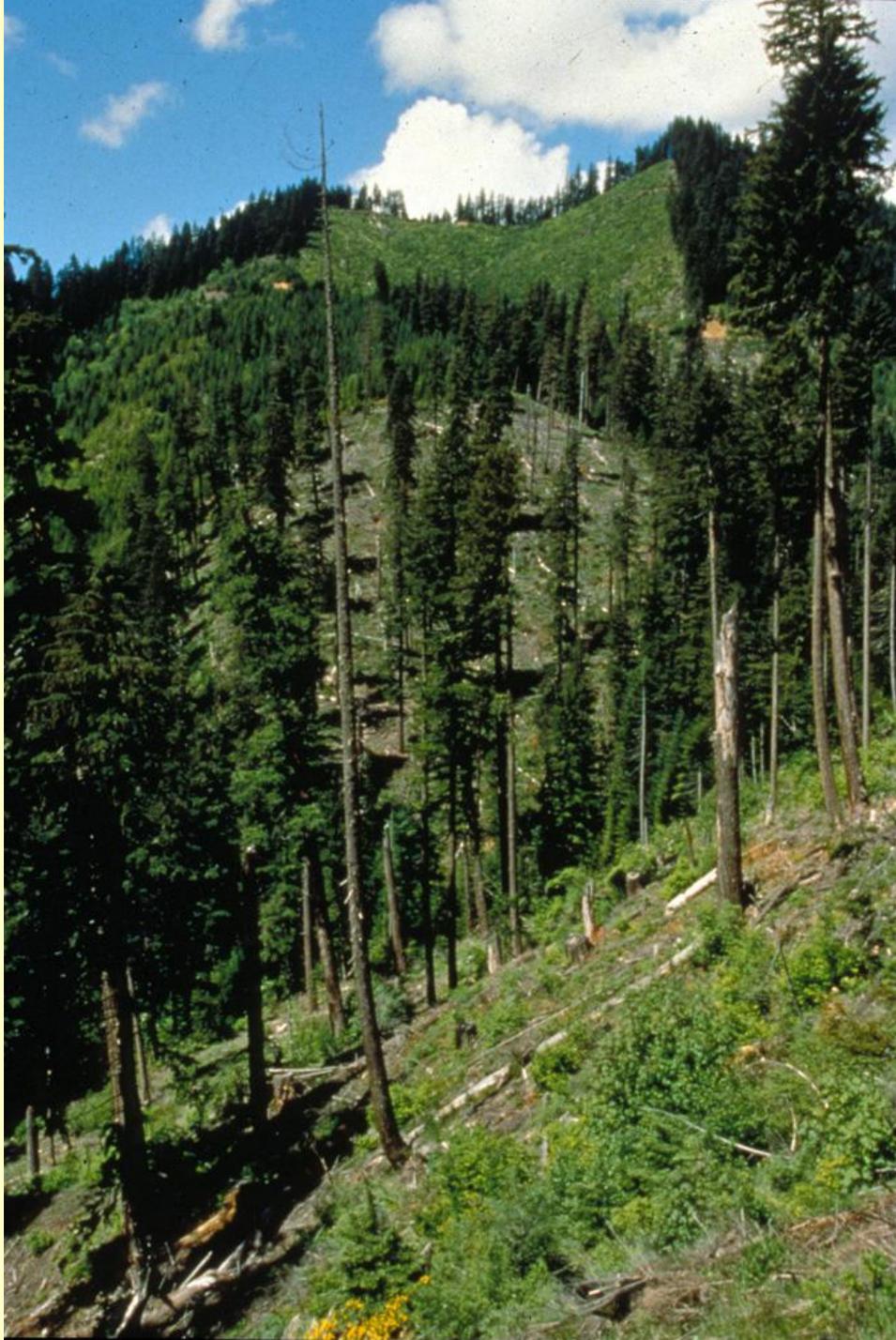
- Structures that are hard to replace
- Species with special attributes
- Elements of the understory

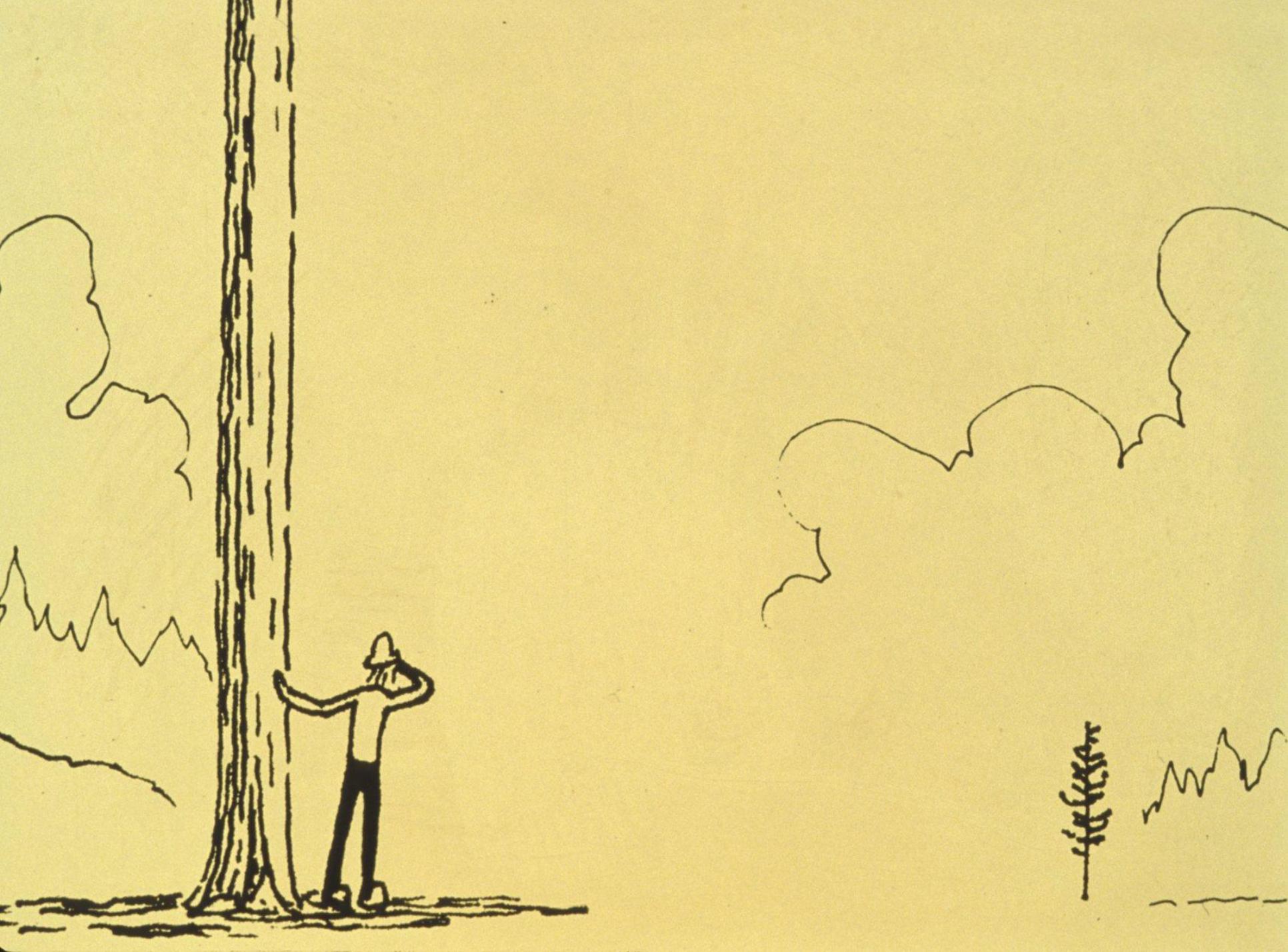


How much to retain?

- What numbers, volume, area etc.?
- Enough to achieve your objectives!
- Often lack quantitative guides
(but many studies underway)
- Will often utilize expert opinion







Spatial pattern of retention?

- Dispersed or aggregated or a mixture of both?
- Each approach has advantages and disadvantages
 - Achieves different ecological goals
 - Provides different mgmt challenges















DISPERSED VS. AGGREGATED RETENTION

<i>Objective</i>	Dispersed	Aggregated
Diversity of tree "states"	Low probability	High probability
Large-diameter trees	More emphasis	Less emphasis
Multiple canopy layers	Low probability	High probability
Undisturbed forest floor	No	Yes

DISPERSED VS. AGGREGATED RETENTION

<i>Objective</i>	Dispersed	Aggregated
Microclimate modification	Less, but generalized	More, but localized
Hydrologic influences	Same as above	Same as above
Root strength maintenance	Same as above	Same as above

DISPERSED VS. AGGREGATED RETENTION

<i>Objective</i>	Dispersed	Aggregated
Management flexibility	Less	More
Harvest costs	More	Less
Safety issues	More	Less





Consensus on Variable Retention:

- *Minimum level of retention is necessary to be socially & ecologically effective*
- *Some retention has to be of larger structures*
- *Spatial distribution in harvest unit is important (can't put it all off in one corner or edge!)*
- *Structures must be retained for 1 rotation*

*Variable Retention Harvesting
emphasizes continuity of forest
structure and function
rather than discontinuity*

*-- as do most natural disturbance
regimes!!*

Silvicultural System for Moist Forests

- Variable retention regeneration harvest prescriptions
- Depend primarily upon natural regeneration
- Thin to attain structural & compositional objectives in stands
- Use longer rotations (e.g., 120-160 years)

The Ecological Forester will often have the objective of creating structural heterogeneity within the treated stand!

*Variable-density thinning
Variable-retention regeneration
harvests*

*Important to respond to the
"opportunities" provided by
the stand in applying
spatially variable
silvicultural prescriptions
(Is this a no-brainer?!)*

Consensus on Variable Retention:

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- *Some retention has to be of larger structures*
- *Spatial distribution in harvest unit is important (can't concentrate)*
- *Structures must be retained for 1 rotation*

