Variable Retention silviculture in Tasmania, Australia and western North America

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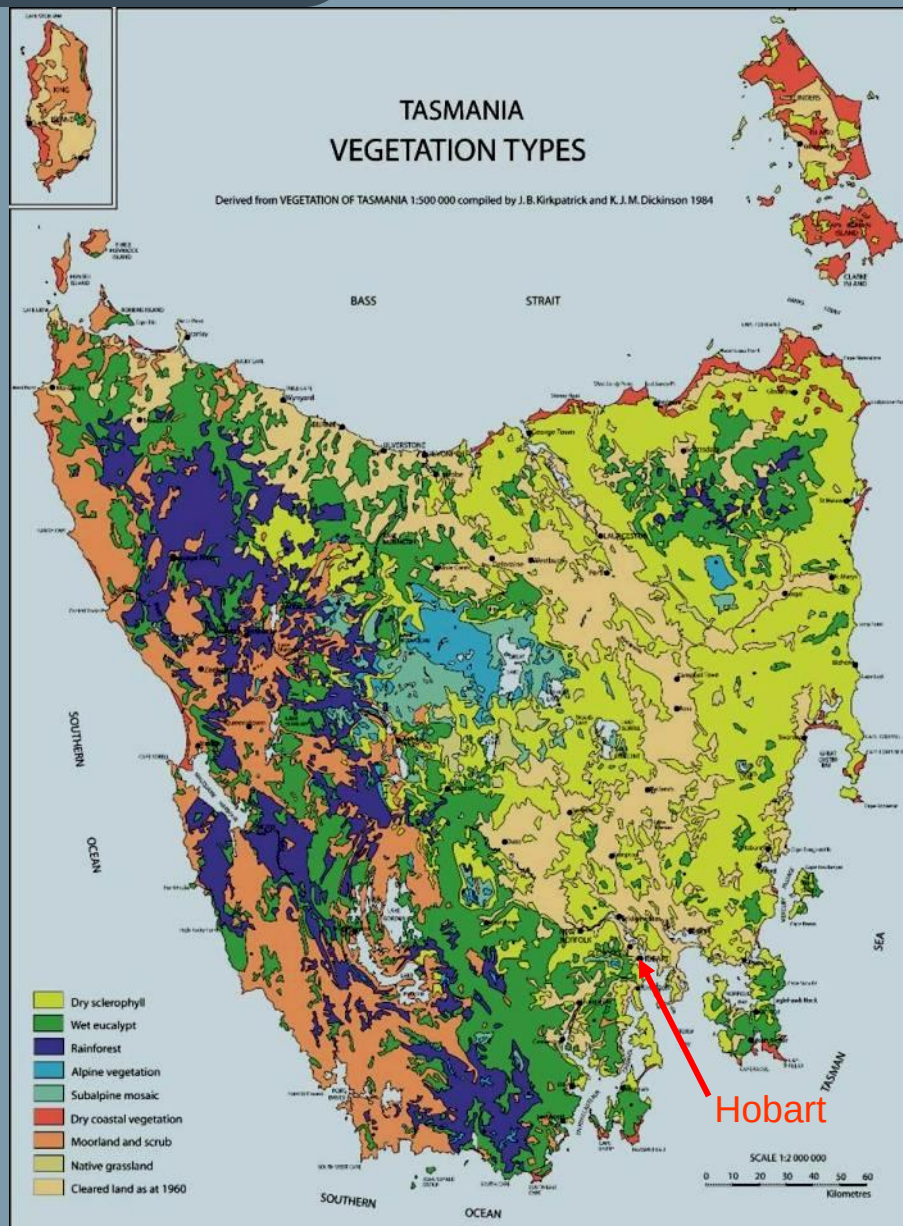
Forestry Tasmania

Talk Outline

- Introduction to Tasmania
- What is VR, and why do we need an alternative to clearcutting?
- Researching alternatives to clearcutting
- Surveys about VR practices and PNW case studies
- VR in the landscape

Forests in Tasmania

- Forests cover 49% of Tasmania (93% native and 7% plantation)
- 66% of pre-European forest cover
- 51 native forest communities

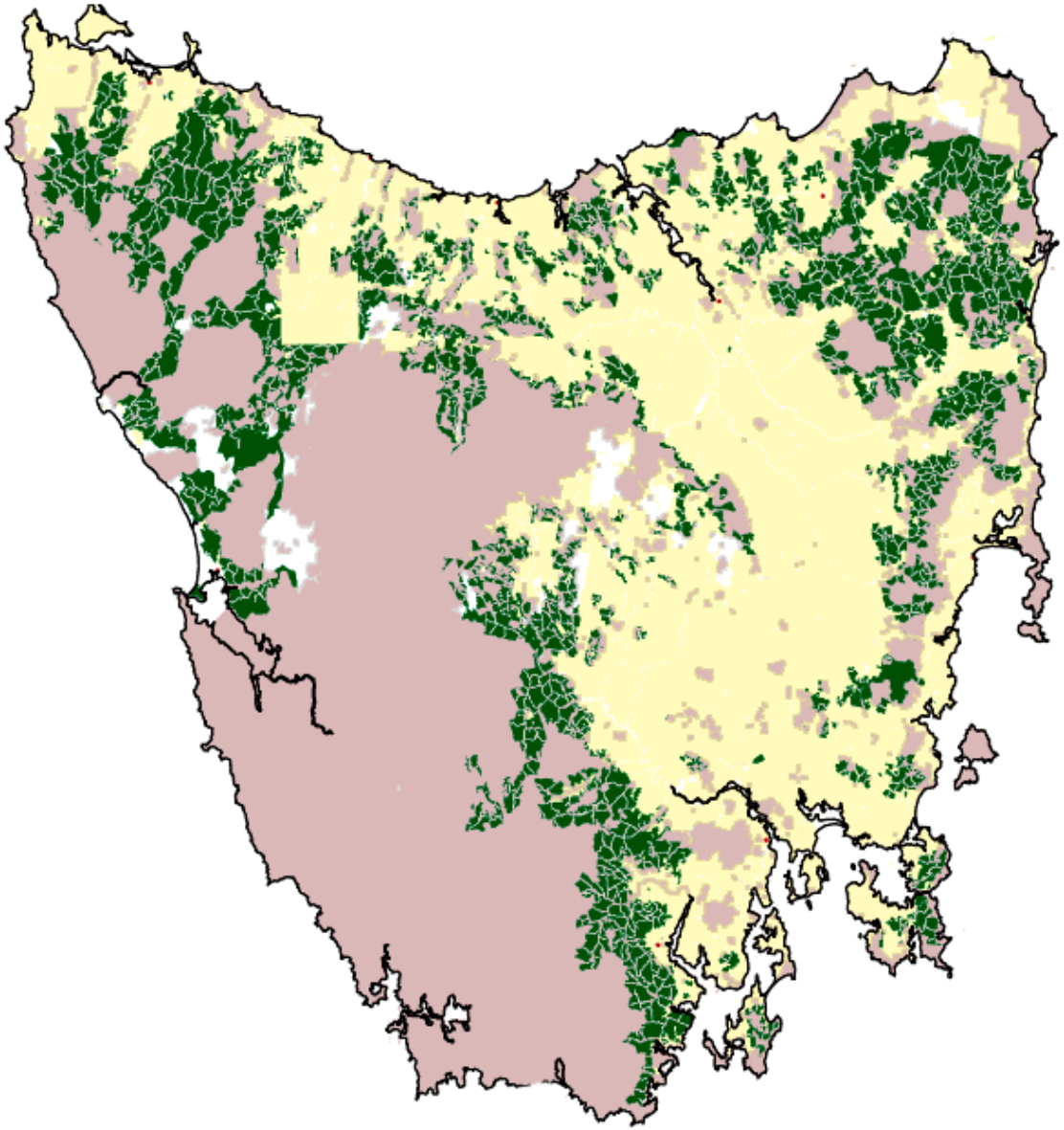


Land tenure

Reserved land
40% of the land
39% of the forest

Multiple-use forest land
(State forest)
17% of the land
29% of the forest

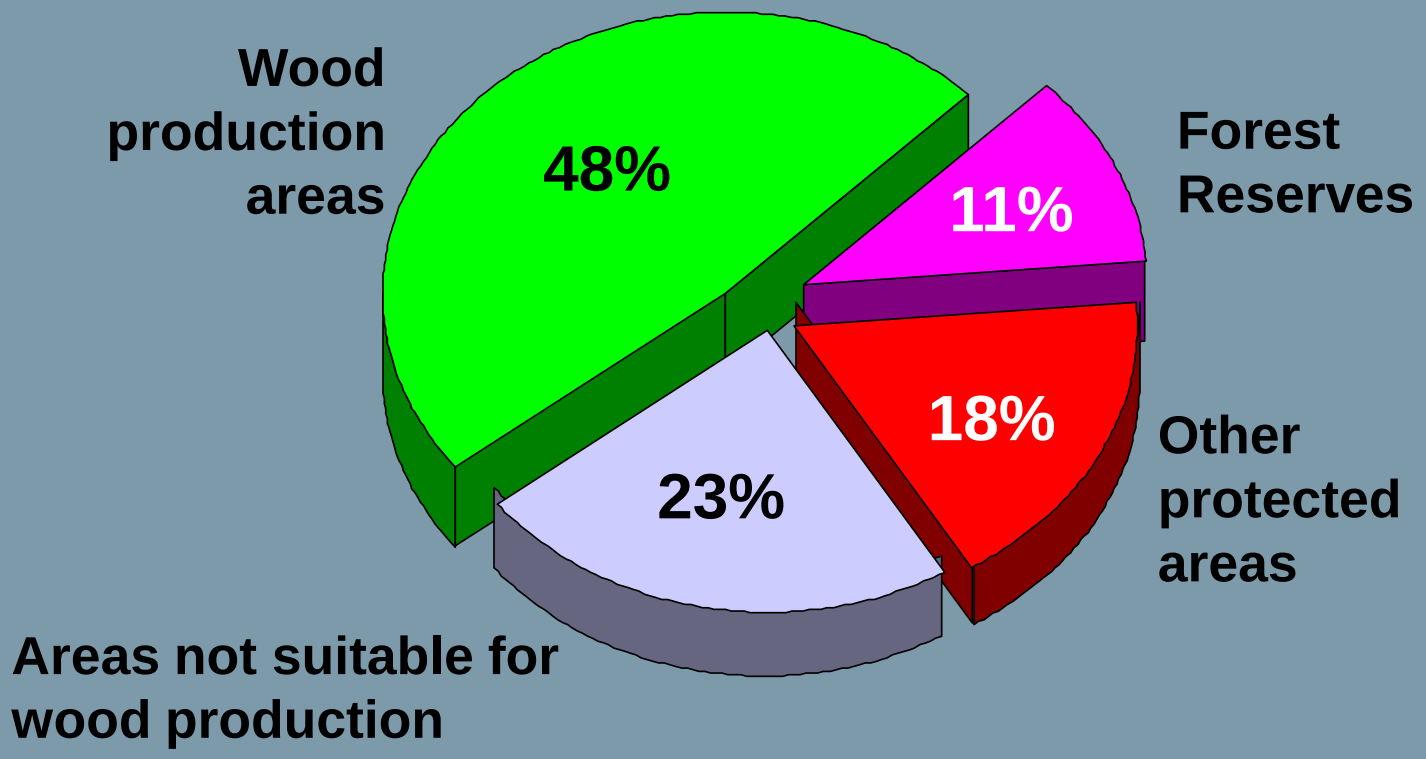
Private land
39% of the land
31% of the forest



Management of Tasmanian State forest

Forestry Tasmania manages 1.5 million hectares of land

About half (48%) of this land is available for wood production



Clearcutting was the main harvesting system for Tasmanian wet forests

After clearcutting in 1989

Regenerating sites have plant and animal species typical of young forests

Same site in 2009

But clearcutting leads to very uniform stands

Why do we need an alternative to clearcutting?

- Not comparable to natural disturbance
- Clearcutting on a repeated rotations disadvantages some late-successional species
- Large gap areas discourage recolonisation of harvested areas

What is variable retention?

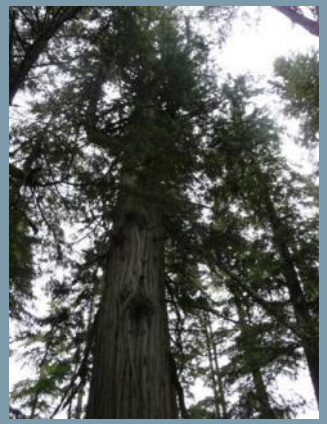
- An approach to silviculture and harvesting guided by natural disturbance
- VR maintains mature-forest values (species, structures, habitats) within sites for the long-term

Forms of variable retention

- Aggregated retention – undisturbed forest left in groups
- Dispersed retention - scattered individual trees distributed across the cutblock
- Mixed retention – a combination of aggregated and dispersed trees at the one site

Objectives of variable retention

- Retention of biological legacies (lifeboating)
- Forest influence and structural enrichment in regenerating forest stands (inc. favourable conditions in harvested area)
- Enhancing connectivity in the managed landscape

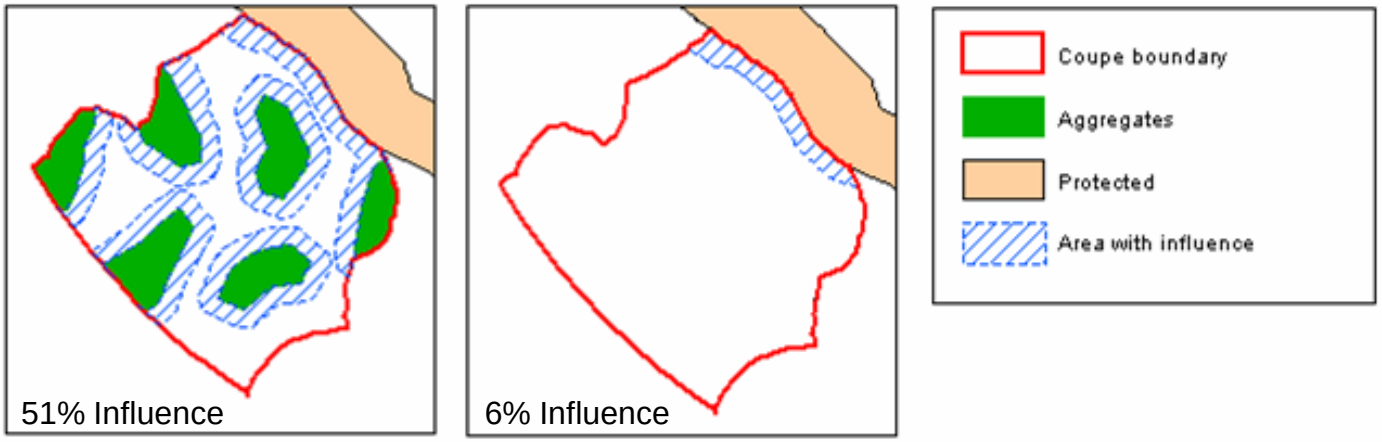



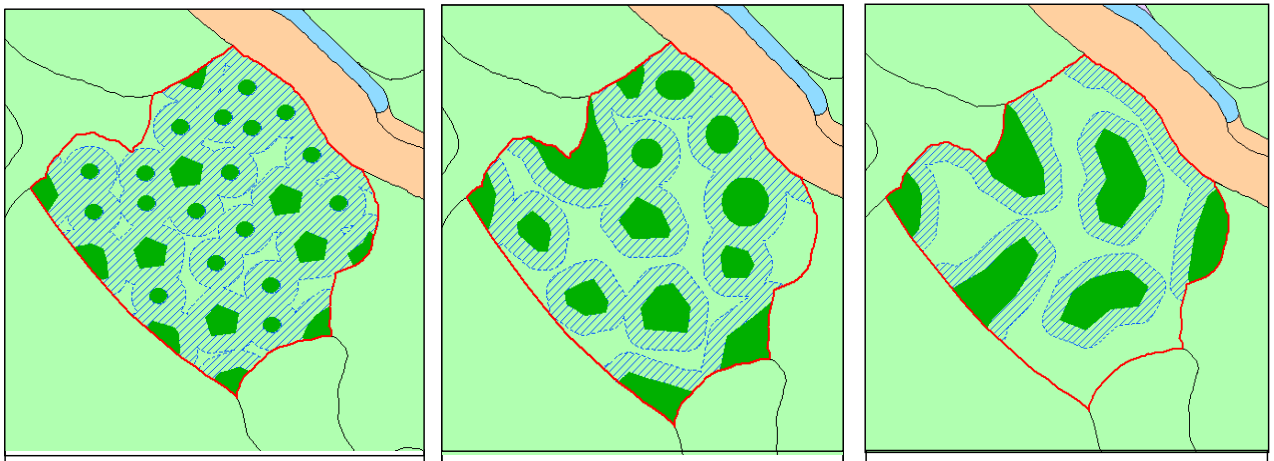
Understanding ‘forest influence’

- For Tasmanian VR, >50% of the harvested area should be within 1-tree-length of mature forest that is retained for at least one rotation

- But how does that ‘influence’ recolonisation of the harvested area by late-successional species?

Forest influence with 23% retention





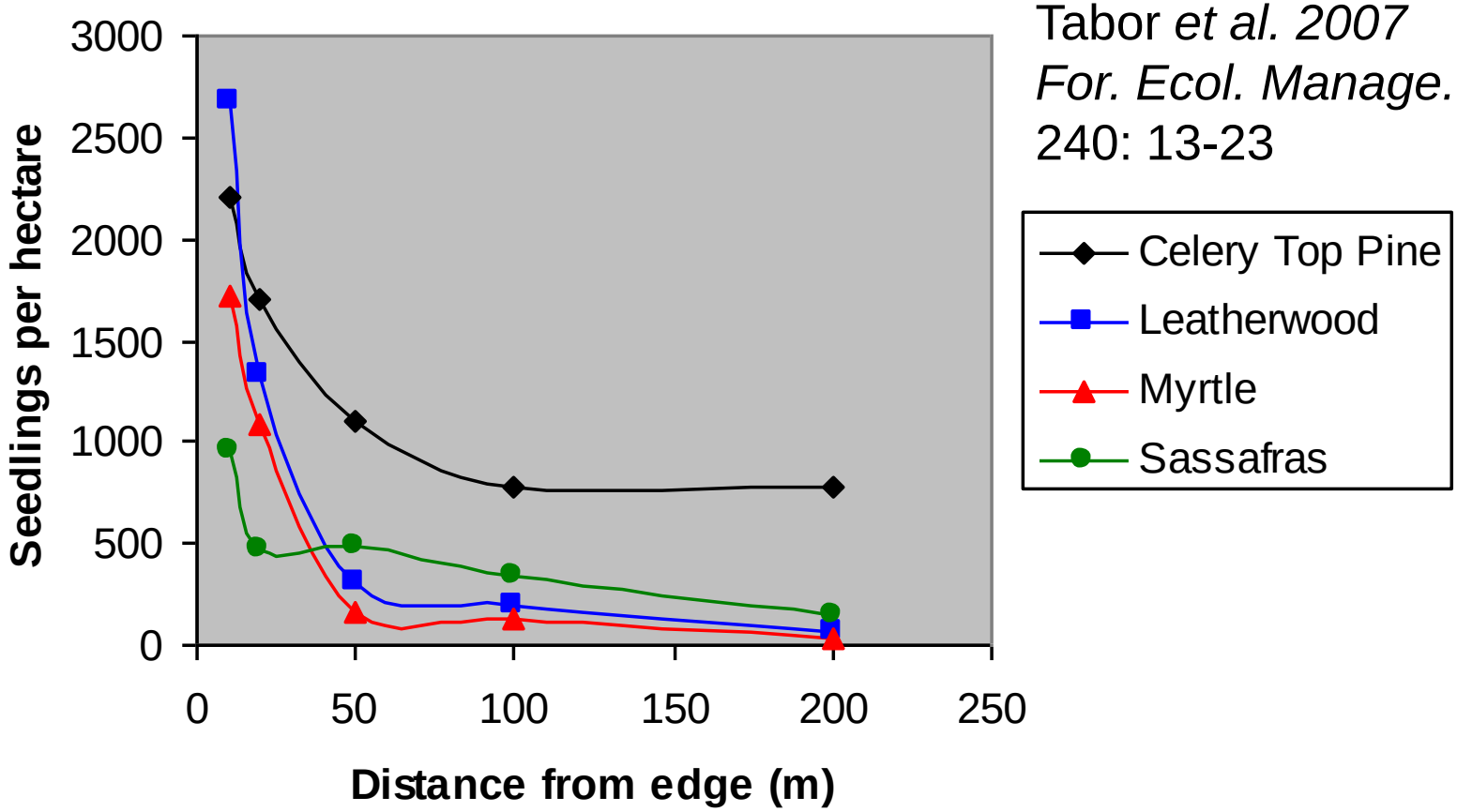
Avg aggregate size = 0.4 ha
87% Influence

Avg aggregate size = 0.9 ha
70% Influence

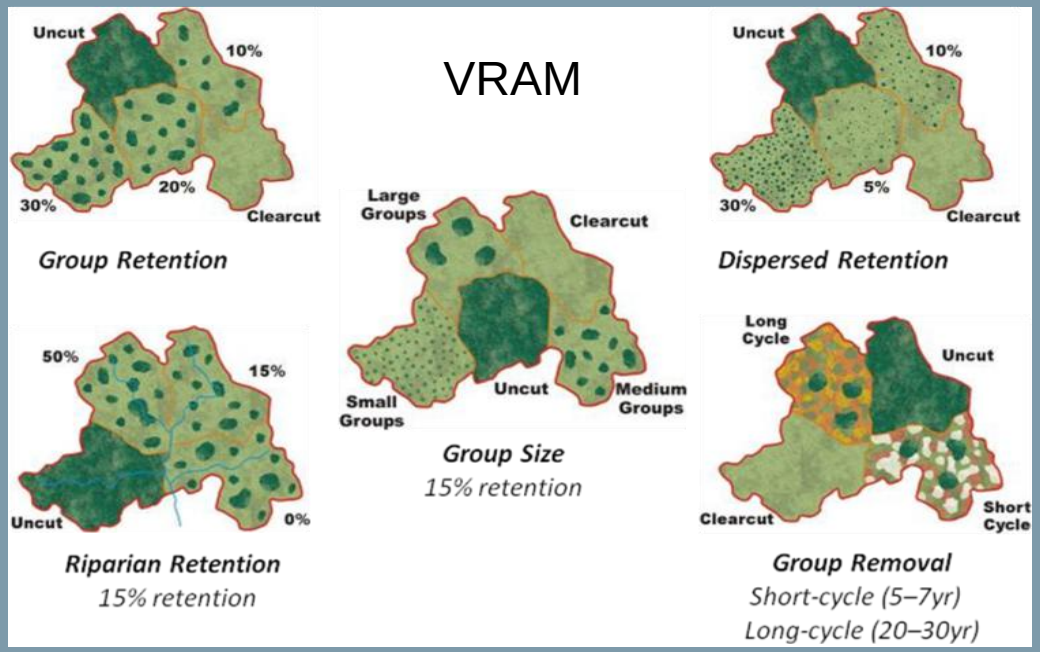
Avg aggregate size = 2.0 ha
51% Influence

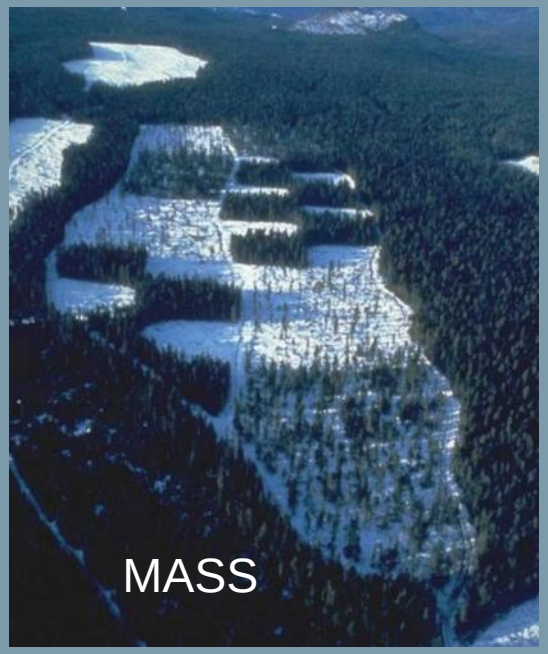
Forest Influence

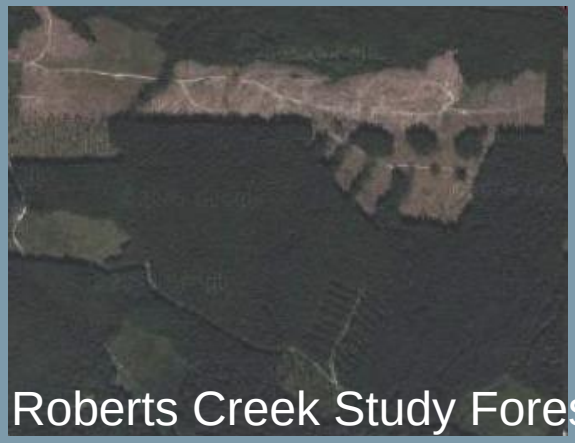
Rainforest tree regeneration declines with distance from seed sources in unlogged oldgrowth forest

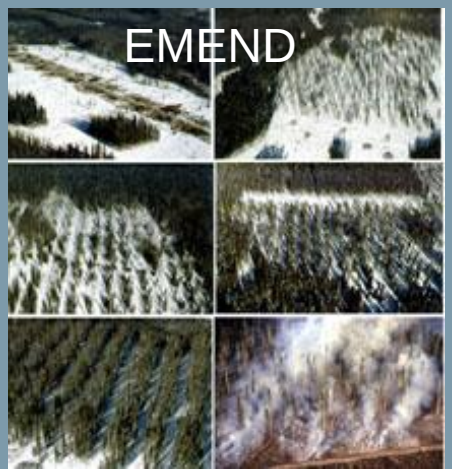


Researching variable retention



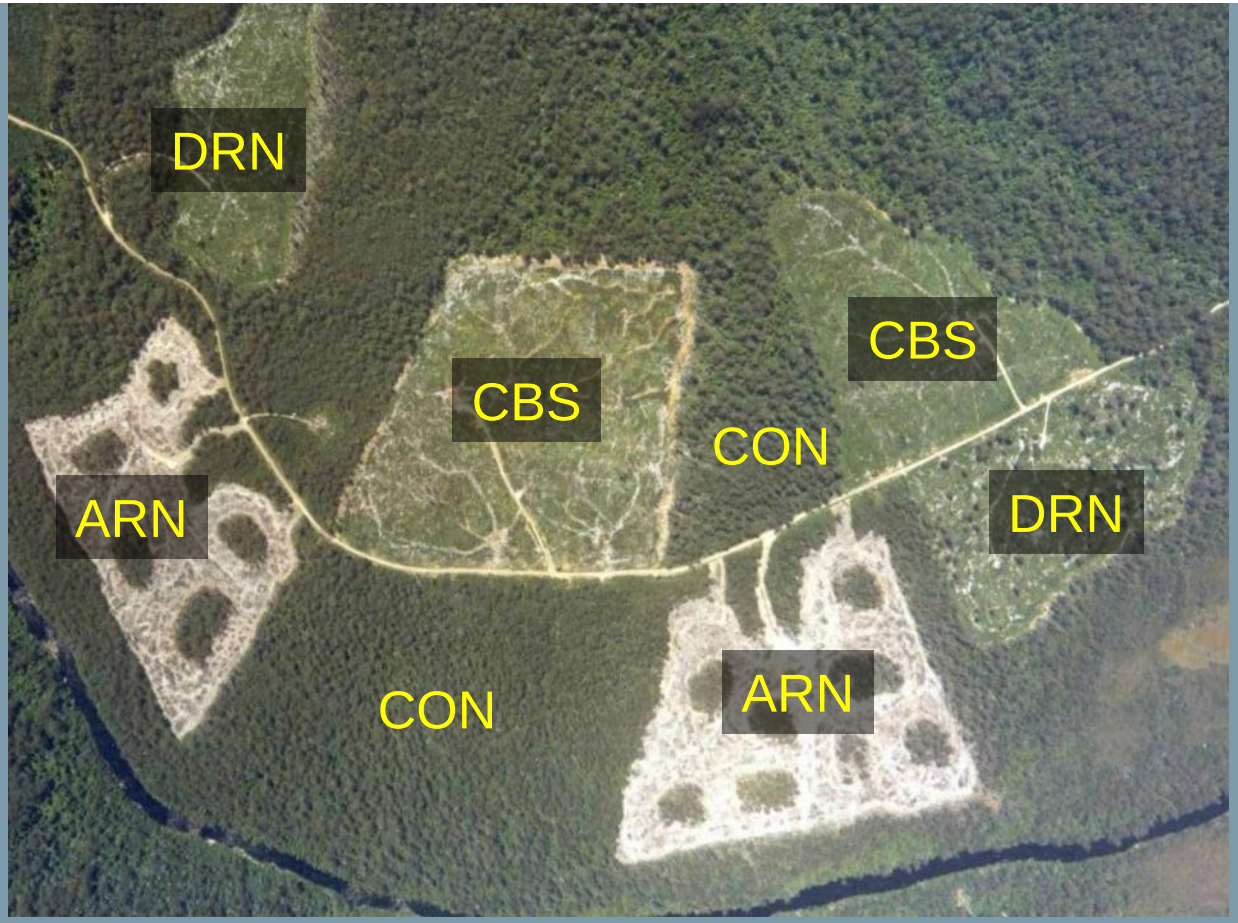






Warra Silvicultural Systems Trial (SST)

Aim: to compare alternatives to clearcutting for harvesting oldgrowth wet eucalypt forest



LEGEND

CON = Control

CBS = Clearfell, burn & sow (with islands)

DRN = 10% dispersed retention

ARN = 30% aggregated retention

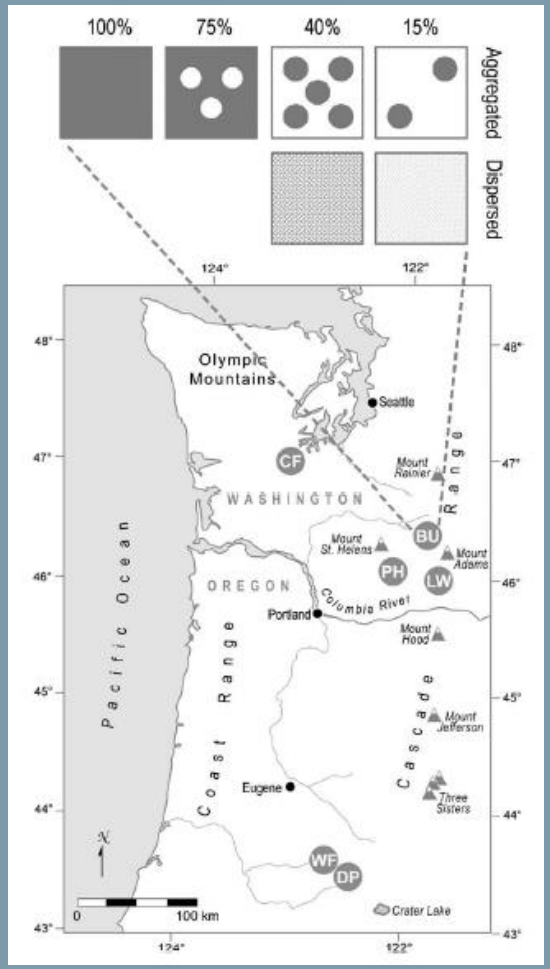
http://www.warra.com/warra/research_projects/research_project_WRA025.html

Warra SST biodiversity synthesis

Ranking the ability of silvicultural systems to maintain mature-forest elements within coupes over the first 3 years post-harvesting. 1 is best, 4 is worst.

Biodiversity attribute	ARN	DRN	CBS + UI	CBS
Widely used by shrub, mid-layer and canopy birds	1	2	4	4
‘Lifeboat’ mature-forest litter beetles	1	2	3	4
Maintain mature-forest vascular plants	1	3	2	4
Maintain mature-forest bryophytes	1	3	3	4
Maintain mature-forest lichens	1	4	4	4
Maintain mature-forest ectomycorrhizal fungi	1	2	3	4
Provide habitat trees for hollow-dependent fauna	1	2	3	4
Provide continuing availability of CWD	2	2	3	4
Sum of the above rankings	9	20	25	32
Overall value for mature-forest biodiversity	**1**	**2**	**3**	**4**

Demonstration of Ecosystem Management Options (DEMO)



Unlogged control

75% group selection

15% aggregated retention

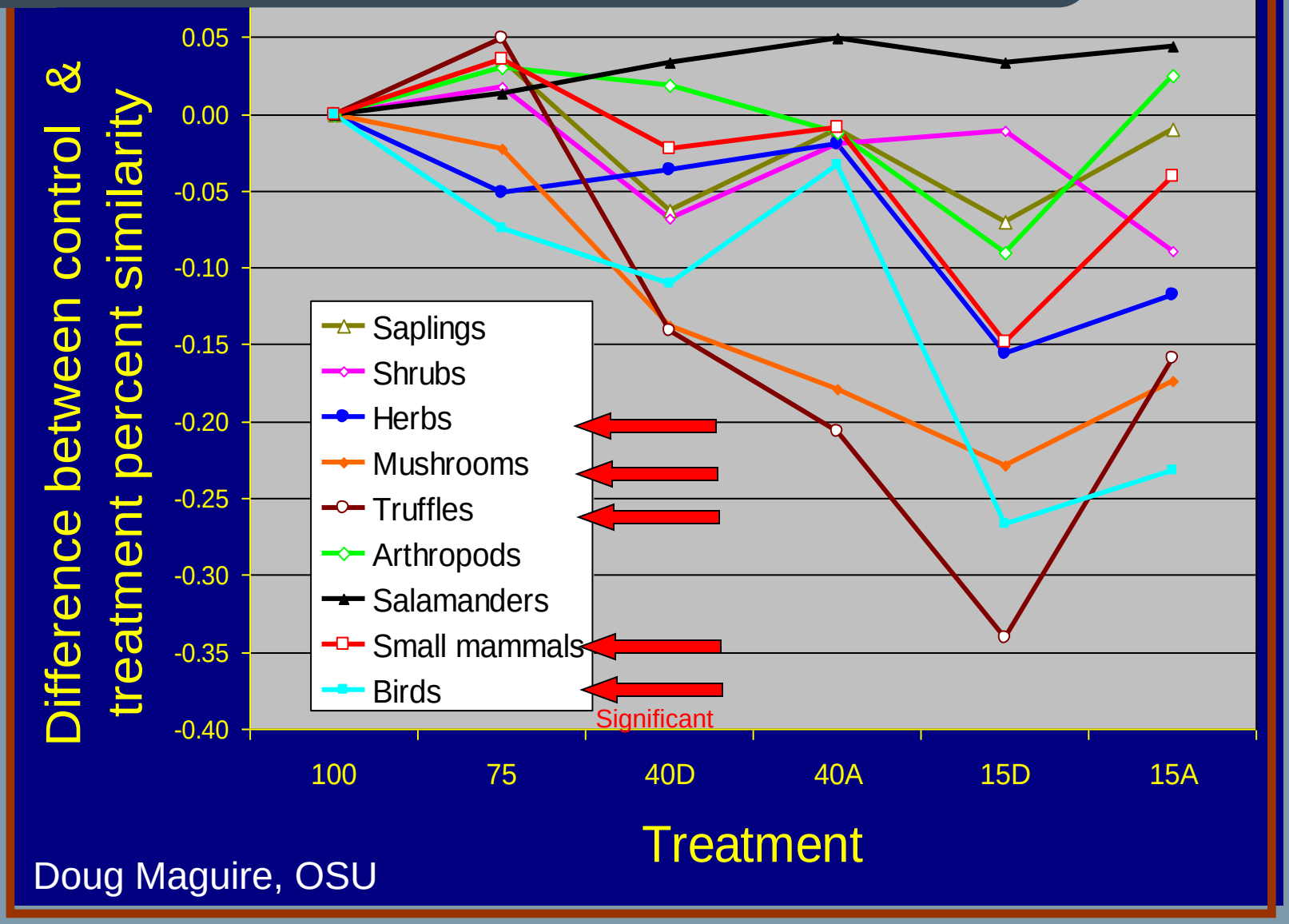
40% aggregated retention

15% dispersed retention

40% dispersed retention

www.cfr.washington.edu/Research.demo/

DEMO: % similarity, before vs. after harvest



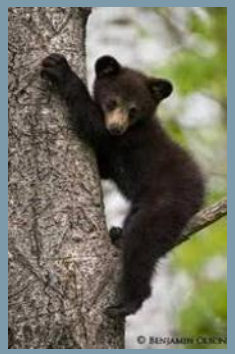
Doug Maguire, OSU

Advantages of aggregated retention

- Greater variety of habitat conditions and species maintained – e.g. intact soil and leaf litter, understorey vegetation, decayed snags
- More buffered microclimatic conditions
- Less windthrow of retained trees and snags, especially for larger aggregates
- Ease of operations (especially cable), safety (ground crews, helicopters), lower costs
- Less impact on growth of regeneration

Advantages of dispersed retention

- Better dispersal over the cutblock – advantages for some territorial birds and mycorrhizae, bear cub escape routes, well distributed CWD and oldgrowth legacy trees or uncommon species
- Improved visual outcomes
- Greater microclimate amelioration may facilitate recolonisation of harvested areas



Guiding principals (and trade-offs)

- Variability is desirable, both within and between sites
- Retention should be anchored on important habitats and structures
- Aggregates have advantages over dispersed trees for most, but not all, species. Mixed retention combines the advantages of both systems
- Larger rounder aggregates have advantages over smaller, narrower aggregates
- More retention is generally better than less retention
- More forest influence is generally better than less forest influence

Interviews with organisations using VR

- Semi-structured interviews with 12 growers
  - 6 Canadian; 2 in Alberta, 4 in BC (1 First Nations)
  - 6 US; 1 in CA, 3 in OR, 2 in WA; 1 industrial, 2 State Departments, 2 small private forests
- Interviews about motivations for using VR, implementation, adaptive management, success of system

Drivers for using VR

Initial drivers included improved social acceptability (5 organizations), improved environmental outcomes (5), government policy (2) and certification (2)

"Customers don't want to buy their two-by-fours with a protester attached to it. If we don't end it, they will buy their products elsewhere." *Bill Dumont, Western Forest Products, 2000*

Objectives for using VR

Objectives generally related to the environment and biodiversity (11 organizations), although social factors were important in 7 cases. Restoration was a goal in 3 cases.

Old-style clearcutting in Clayoquot Sound

Managing a viewshed on Vancouver Is.

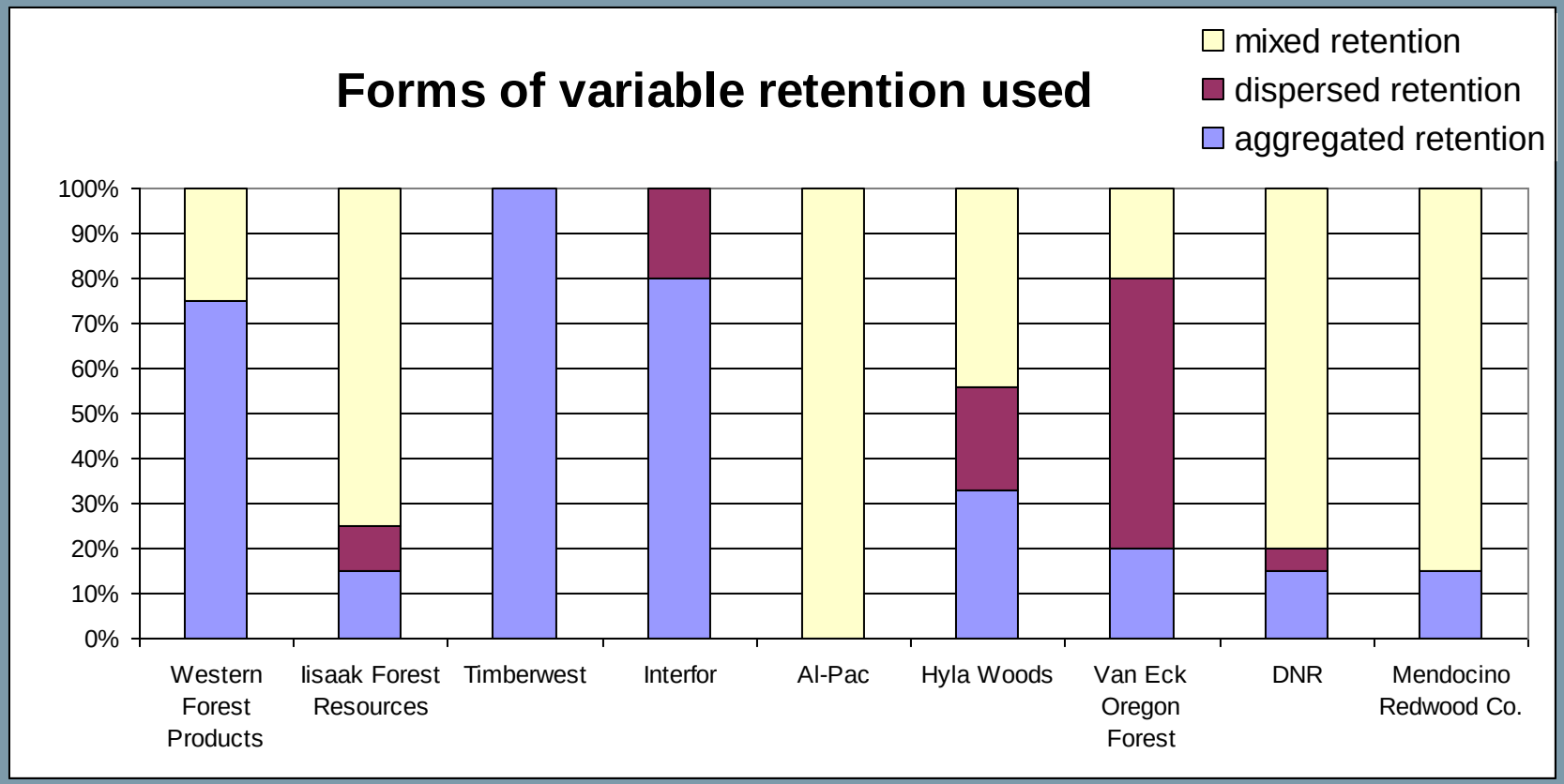
VR landscape in WA

Implementation

- VR is used in a wide range of forest types and in both oldgrowth (Canada only) and second/third growth forest
- The ‘retention’ goal was usually considered more important than the ‘influence’ goal of VR. 3 organizations considered retention and influence equally important. ‘Forest influence’ was poorly understood outside of BC
- Retention levels ranged from 0% to >40%. >15% typical
- Majority of organizations specify that retention is for the entire rotation
- Average aggregate size varied from approx. 1/3 acre to 5 acres. Aggregates were generally bigger in Canada (usually >1 acre) than USA (usually <1 acre).
- Retention is frequently anchored on important structural legacies, species and habitats

Forms of VR

Aggregated and mixed retention are more common than dispersed retention



Adaptive management

- Cable yarding methods
- Designs to minimise windthrow
- More use of aggregates vs. dispersed trees
- Improved understanding of habitats for anchoring retention
- Organisations with direct relationships with research programs benefit more readily from knowledge transfer
- Training of planners and harvesters important to maximising site-level benefits of the system

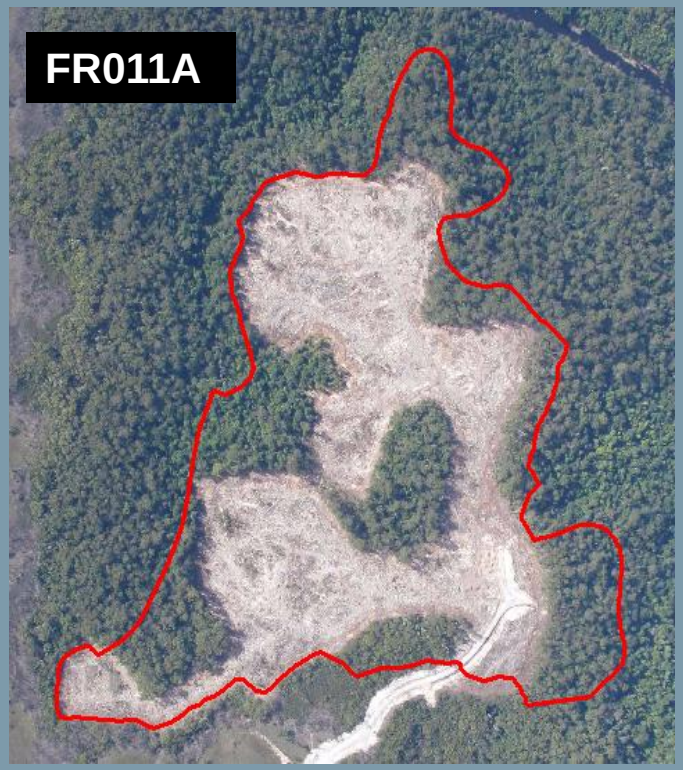
Continuing challenges and uncertainty

- Windthrow, especially in second growth hemlock
- Increased costs, especially in current market
- Growth impacts on regeneration
- Public visual preferences conflict with ecological goals and operational aspects
- Legislation that creates disincentives for restoring late-successional habitat

Has VR been successful?

- VR Implementation was considered successful by 10 of 12 organizations (1 “no” and 1 “don’t know”)
- Some uncertainty over whether VR had met objectives (6 “yes” and 6 qualified responses). Unable to predict long-term outcomes
- VR was generally considered successful at maintaining structural complexity and biodiversity at the stand-level in the short-term, although some uncertainty over long-term
- All 12 organizations considered that using VR had resulted in improved social acceptability
- 11 “yes” and 1 “maybe” for continuing to implement at least some VR in the medium to long-term

Operational implementation of aggregated retention in Tasmania

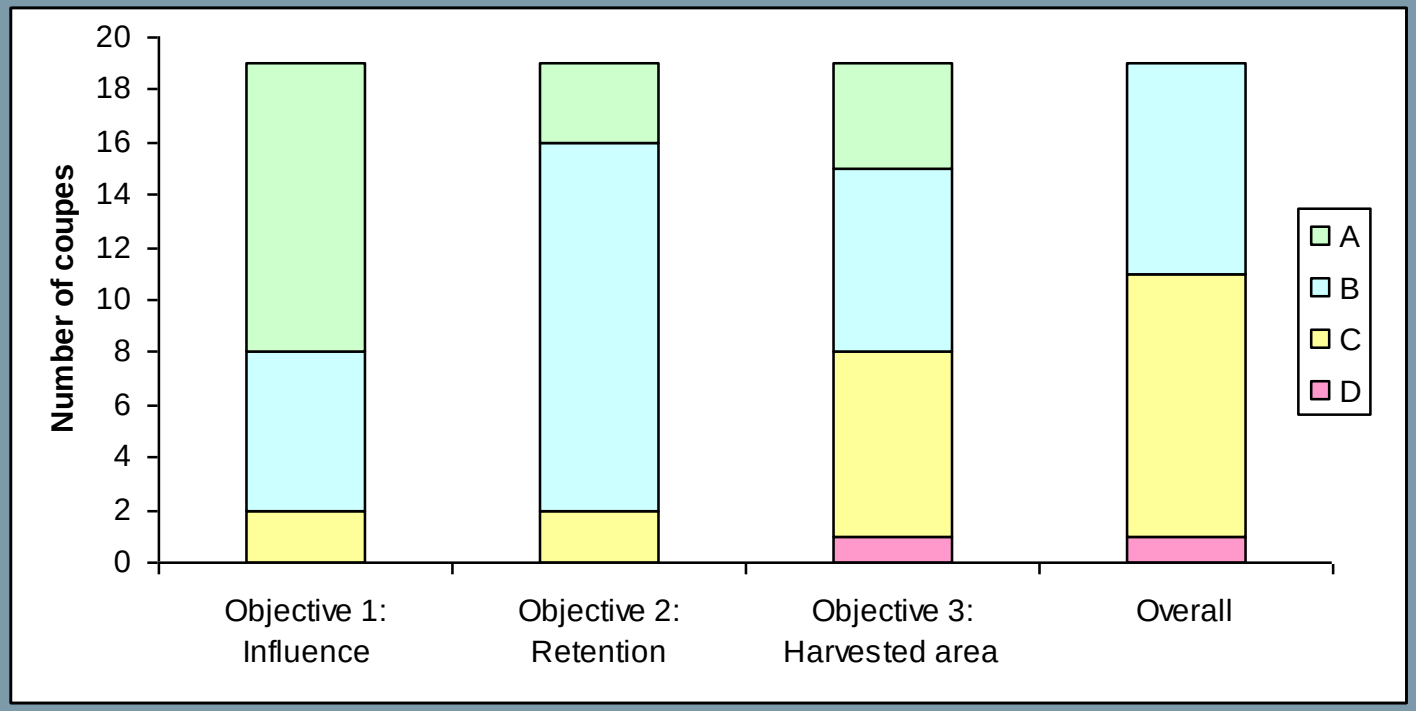


>1,400 ha of coupes containing oldgrowth forest harvested by variable retention

VR Biodiversity metrics

A. Very clearly meets ecological goals
B. Meets ecological goals
C. Not clear whether adequately meets ecological goals
D. Does not meet ecological goals

Results to 2008

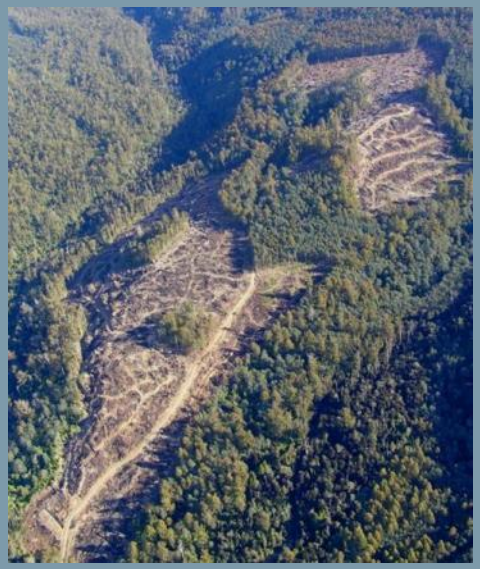


Forestry Tasmania

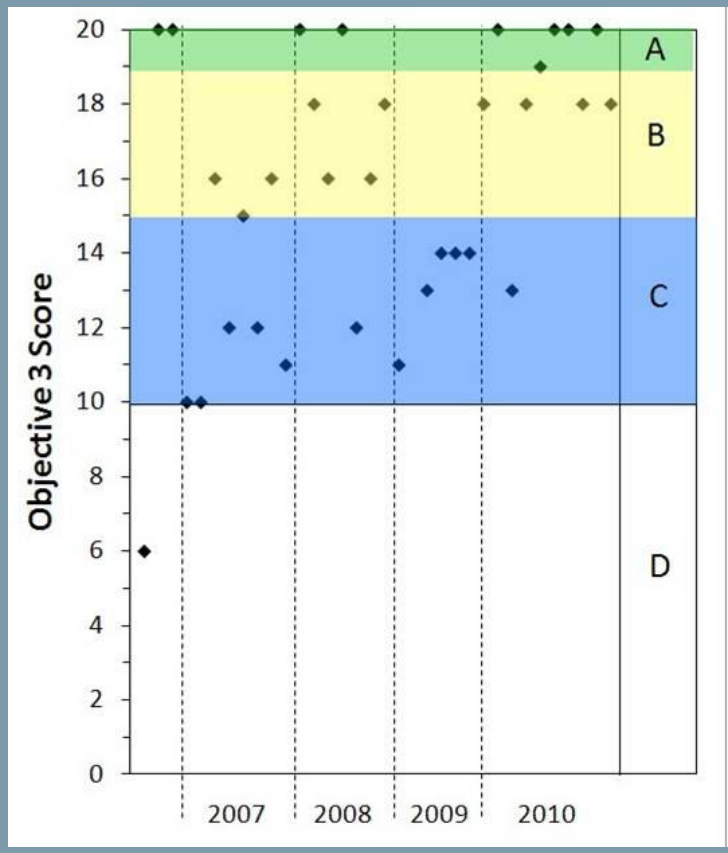
Monitoring assists adaptive management

Objective 3: Ensuring favourable habitat conditions in the harvested area (minimising the impacts of firebreaks, snigtracks and landings)

SX007A: 10/20 (C)



HU323Y: 20/20 (A)



Western Forest Products – Vancouver Is.

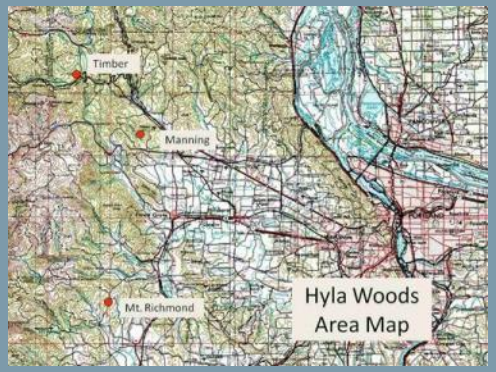
- Went from clearcutting to 100% VR within 5 years under MacMillan Bloedel and Weyerhauser (>50,000 ha harvested)
- Currently returning to some clearcutting with reserves to allow bigger aggregates – ‘The Retention System’ limits flexibility
- Strong effective leadership
- Well funded adaptive management program - includes research, monitoring and training programs
- Independent science panel gave credibility with E-NGO’s
- Worker safety improved during phase-in of VR

Iisaak Forest Resources – Clayoquot Sound

- First Nations Company
- High retention levels: 40-45%
- Emphasis on biodiversity, cultural values, and aesthetics

Hyla Woods – Oregon family forest

- VR is most intensive silviculture currently used
- Exotic weeds are a challenge
- Role in sites where higher volume/acre of timber extraction is a primary objective
- Uncertainty about long-term biodiversity benefits of VR is a disincentive for use



DMI – FMA on provincial land, Alberta

- Retention target for landscape-level (15%) leads to wide variation in site-level retention (0-30%)
- Excellent training program
- Engagement with EMEND trial and researchers guiding adaptive management
- Knowledge of natural disturbance helps guide local retention levels

KEYS TO SUCCESS:

- ☑ **High-variability** block-to-block (wildfire patterns are our guide)
- ☑ **A mixture** of dispersed retention and aggregated retention forms
- ☑ **Specific retention targets** at the landscape scale (15%) and block-to-block (0-30%)
- ☑ **Specific instructions** to contractors (block-plans, retention-prescription, training)
- ☑ **Additional non-harvest areas** outside blocks (eg incised valleys, wetlands, water buffers, sensitive slopes) -"Continuous Reserve Network"
- ☑ **High Conservation Value Forest** locations identification and special considerations
- ☑ **Worker safety considerations** (dead snags proximity to roads/landings)
- ☑ **Protecting all 'unmapped' discoveries**: subtle watercourses, wetland pockets (willow, grass or vernal pools), dens, raptor nests, pockets of downed deadwood

Variable-retention integrated with other practices...

Dens + Raptor Nests

Wetland Pockets

Watercourses + Riparian Areas

Pockets of Downed Deadwood

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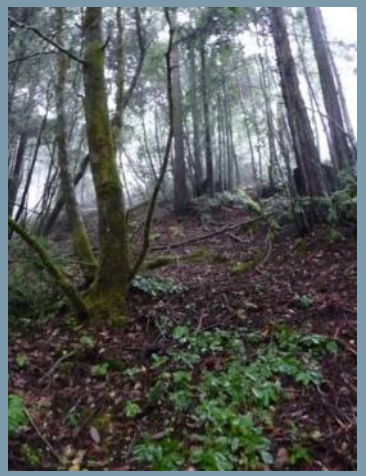
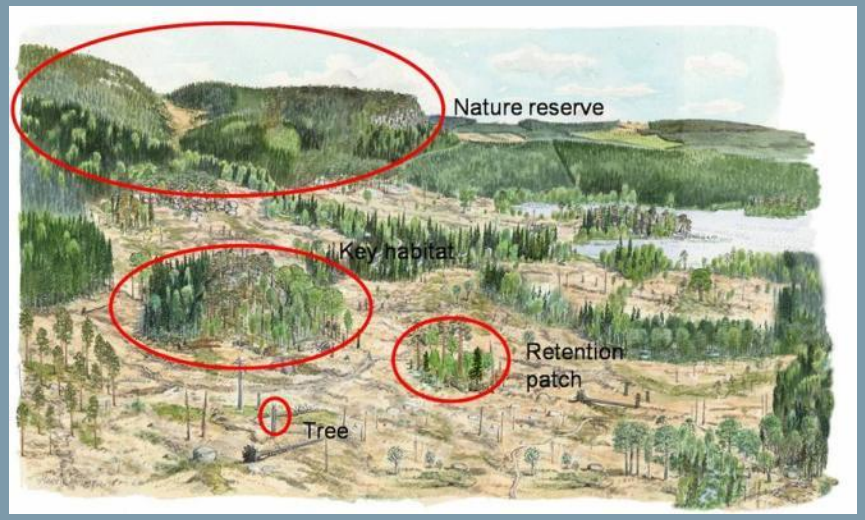
Mendocino Redwood Company-restoration VR

- Use VR to restore structural variability and return hardwood-dominated stands to conifer-dominated ones
- Temporary phase in life of forest – future management by uneven-aged silviculture
- Retention levels required under California Forest Practice Rules vary with size of site

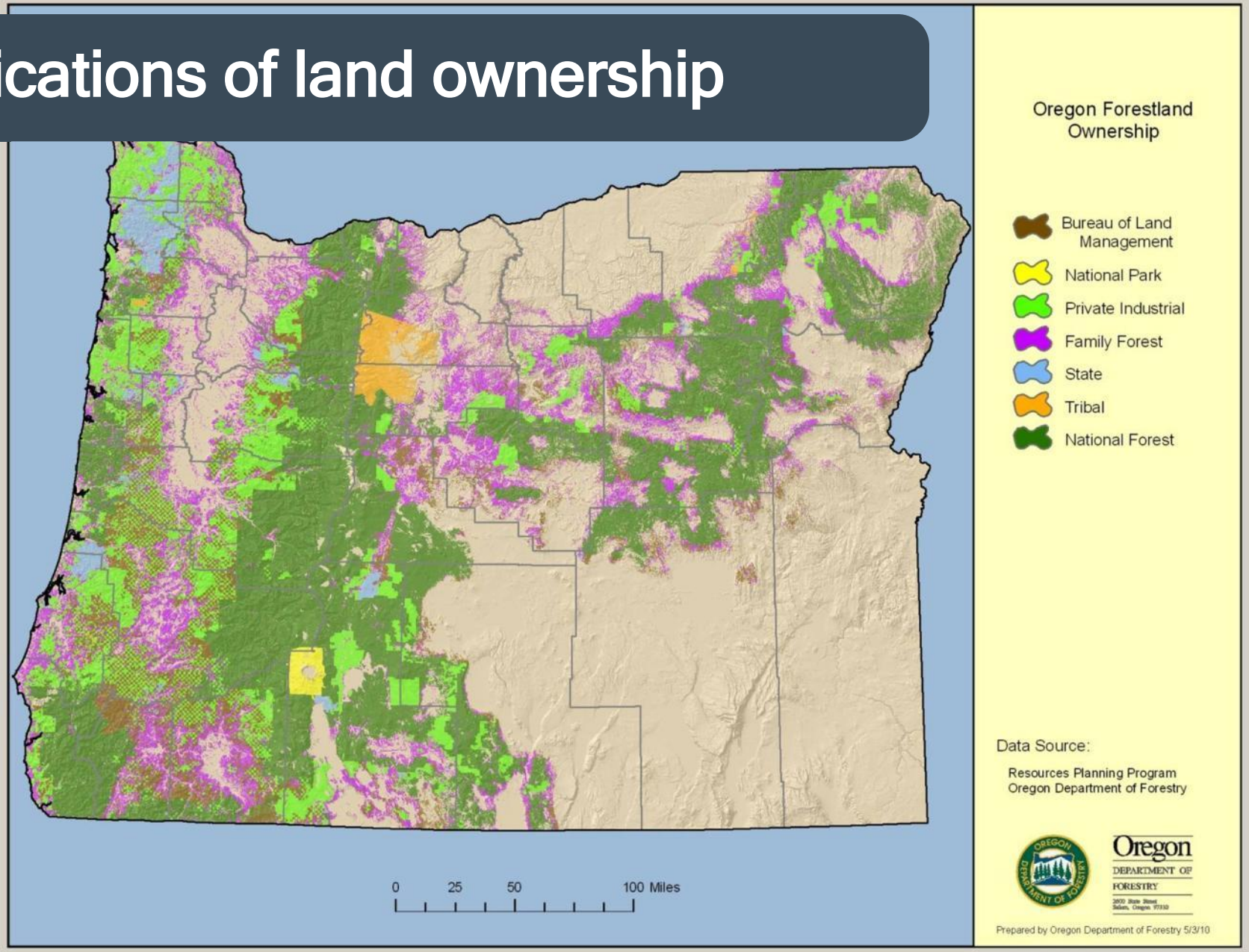



Sweden



Tierra del Fuego

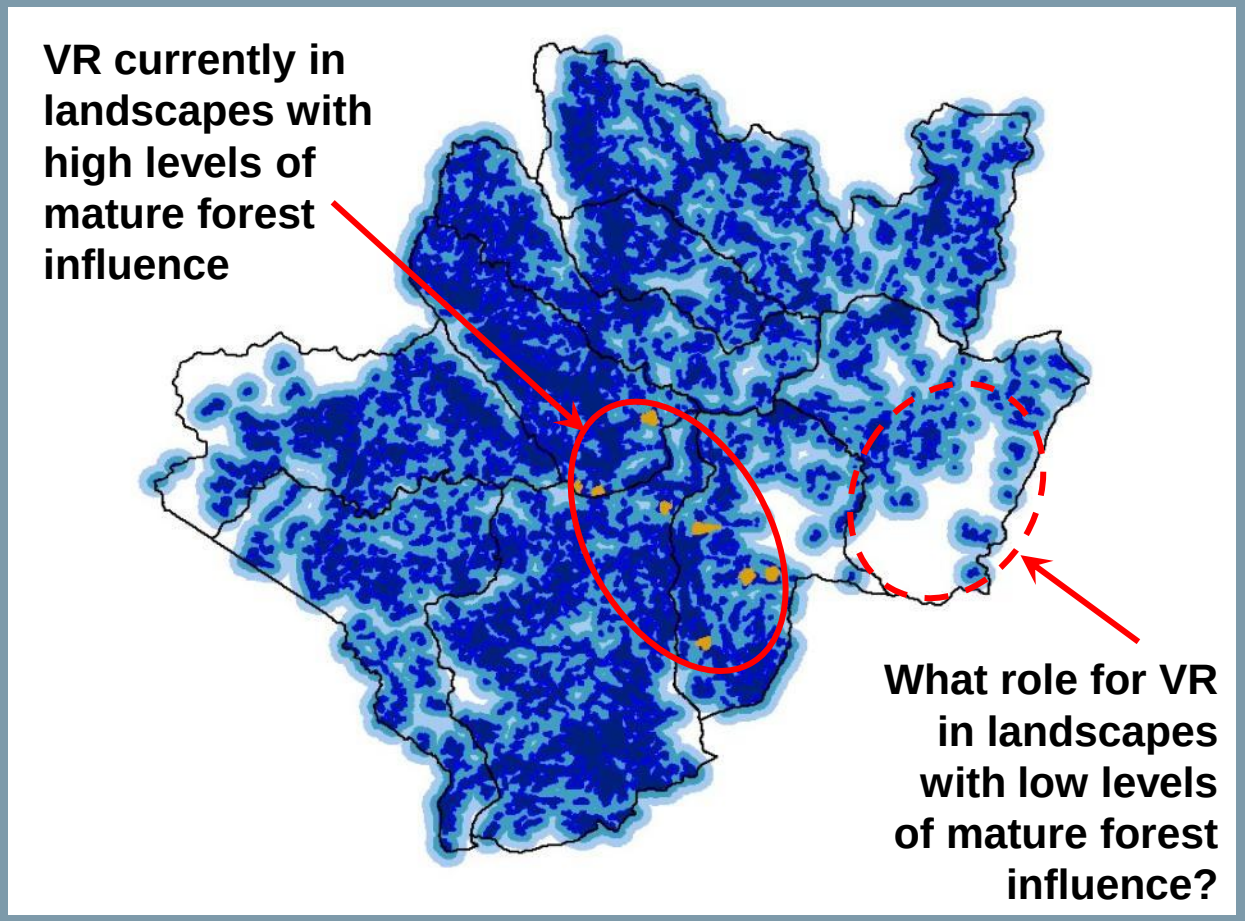
Implications of land ownership



WFP Zoning Guidelines

	ZONE		
	Enhanced	**General**	**Special**
Use of the retention system	30% - 60%	40% - 70%	90%
Minimum Long-term retention in each cutblock	10% - 15%	15% - 20%	20%
Primary silvicultural systems	Retention, CC+reserves	Retention, CC+reserves Shelterwood	Retention, Selection

VR and landscape contect (Tasmania)



The landscape context can guide how much stand-level retention is necessary to meet biodiversity conservation goals

VR and local landscape context

Conclusions

- VR is a flexible silvicultural system. Implementation varies widely amongst forest growers
- VR is successful at meeting biodiversity and social licence objectives
- Research indicates that structures and species associated with mature forest are retained within sites
- Organizations using VR have used adaptive management to overcome most challenges, and plan to continue using VR
- Ongoing research and monitoring is required to further refine implementation

Background reading

- Franklin *et al*. (1997). Alternative silvicultural approaches to timber harvesting: variable retention harvest systems. Pages 111-139 in K. A. Kohm, and J. F. Franklin, editors. Creating a Forestry for the 21st century: the science of ecosystem management.
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Recommendations

- Variability is the key – don’t do the same thing everywhere
- Advantages of mixed retention for biodiversity. Larger aggregates have benefits vs small ones
- Let the site guide anchoring retention on important habitats and structural legacies
- More consideration should be given to providing forest influence to facilitate recolonisation of harvested areas
- Plan silviculture in relation to broader landscape context and natural disturbance dynamics
- Emphasize training and knowledge transfer in many formats accessible to people at all levels
- Share and learn from the experiences of other organizations
- Adaptive management assists success. Actively engage with relevant research and monitoring. Continue/increase research funding – high value from long-term research
- VR helps with social licence – don’t be tempted to return to widespread clearcutting. Industrial growers should consider more ecologically sustainable forestry practices
- Overcome impediments to sustainable forestry and introduce incentives