



Forslag til skogbehandling for de neste 10-årene

Svein Solberg

Årsmøte Skogselskapet i Østfold og Skogselskapet i Oslo og Akershus

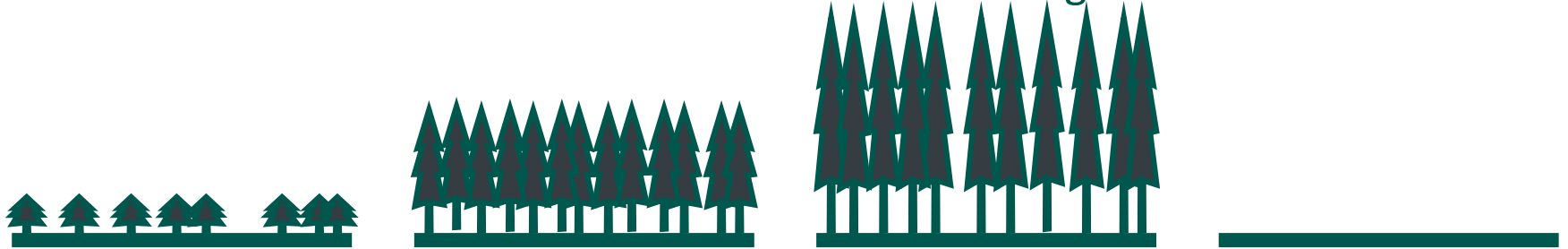
Vitenparken, Ås, 5. juni 2023

NIBIO

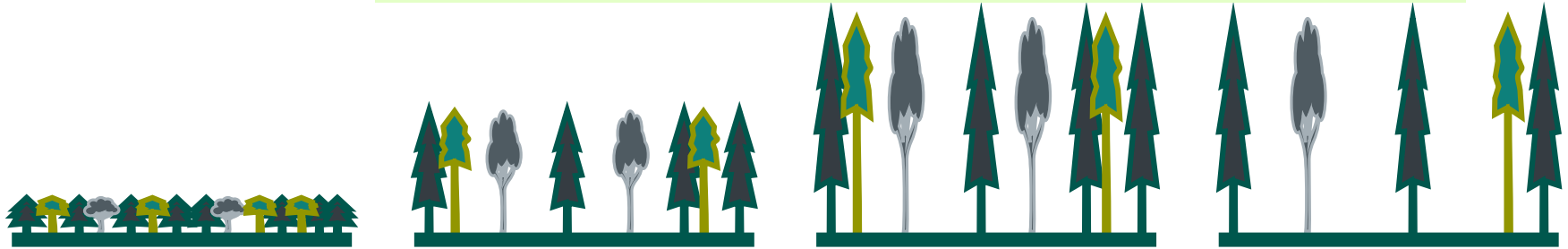
NORSK INSTITUTT FOR
BIOØKONOMI



Ensaldret monokultur med snauhogst



BLAG-skogbruk (Blandingskog, LAV tetthet, Gjensetting)



Grandominert kontinuitetsskogbruk

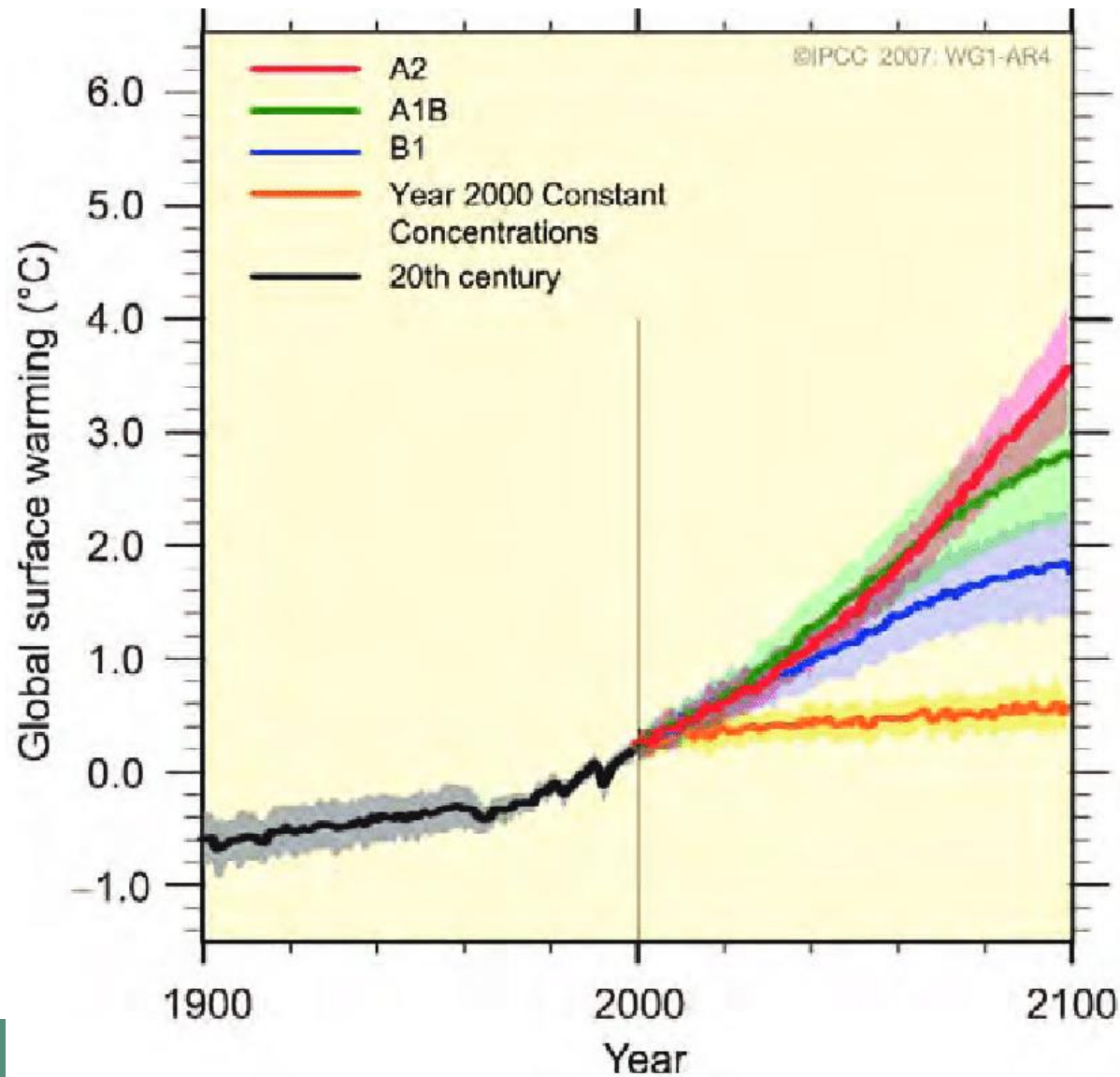


Bestandsutvikling over tid

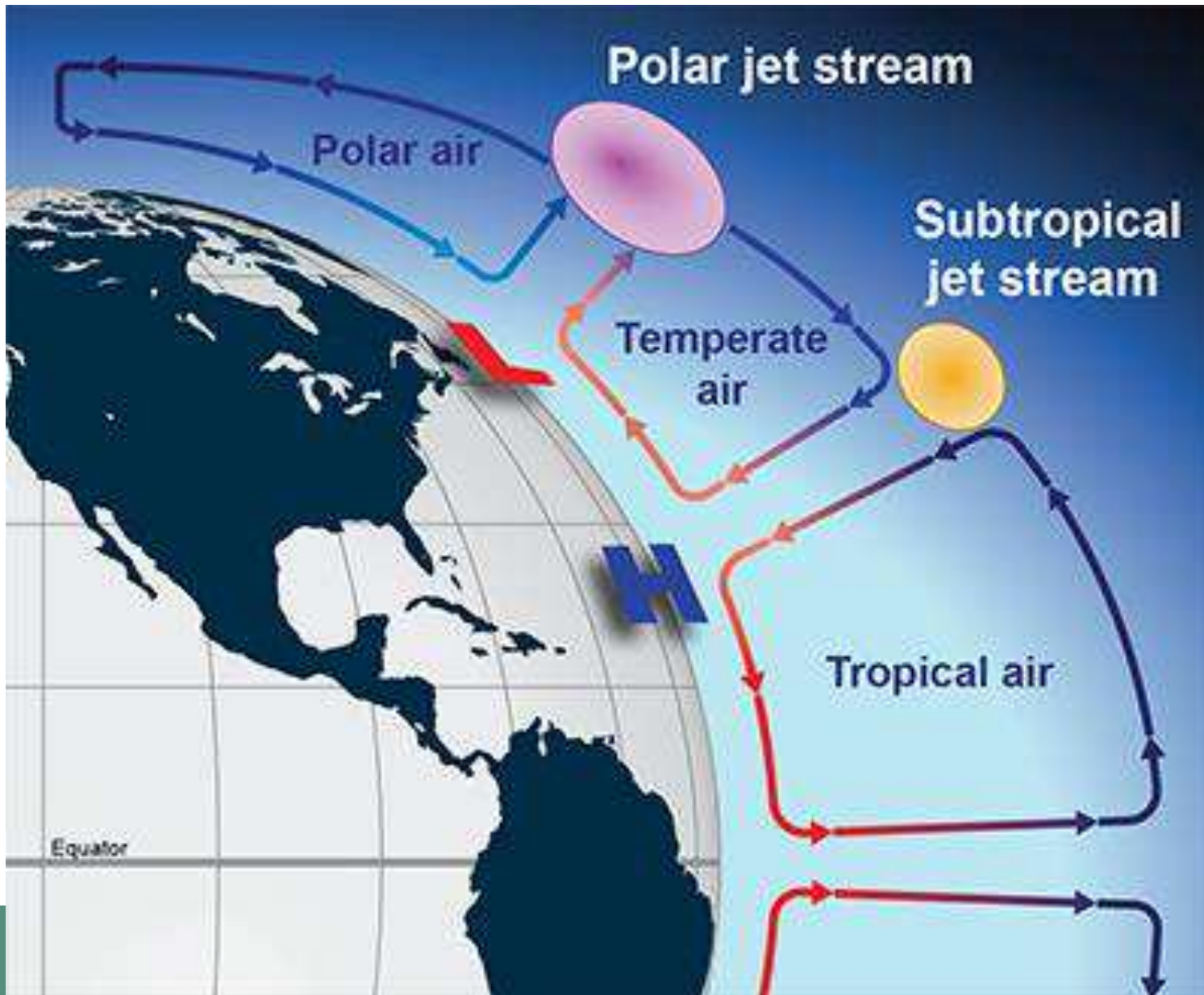
Veteranisering av trær



Klimaendring



Svekkelse av jetstrømmen gir mer langvarige værtyper!

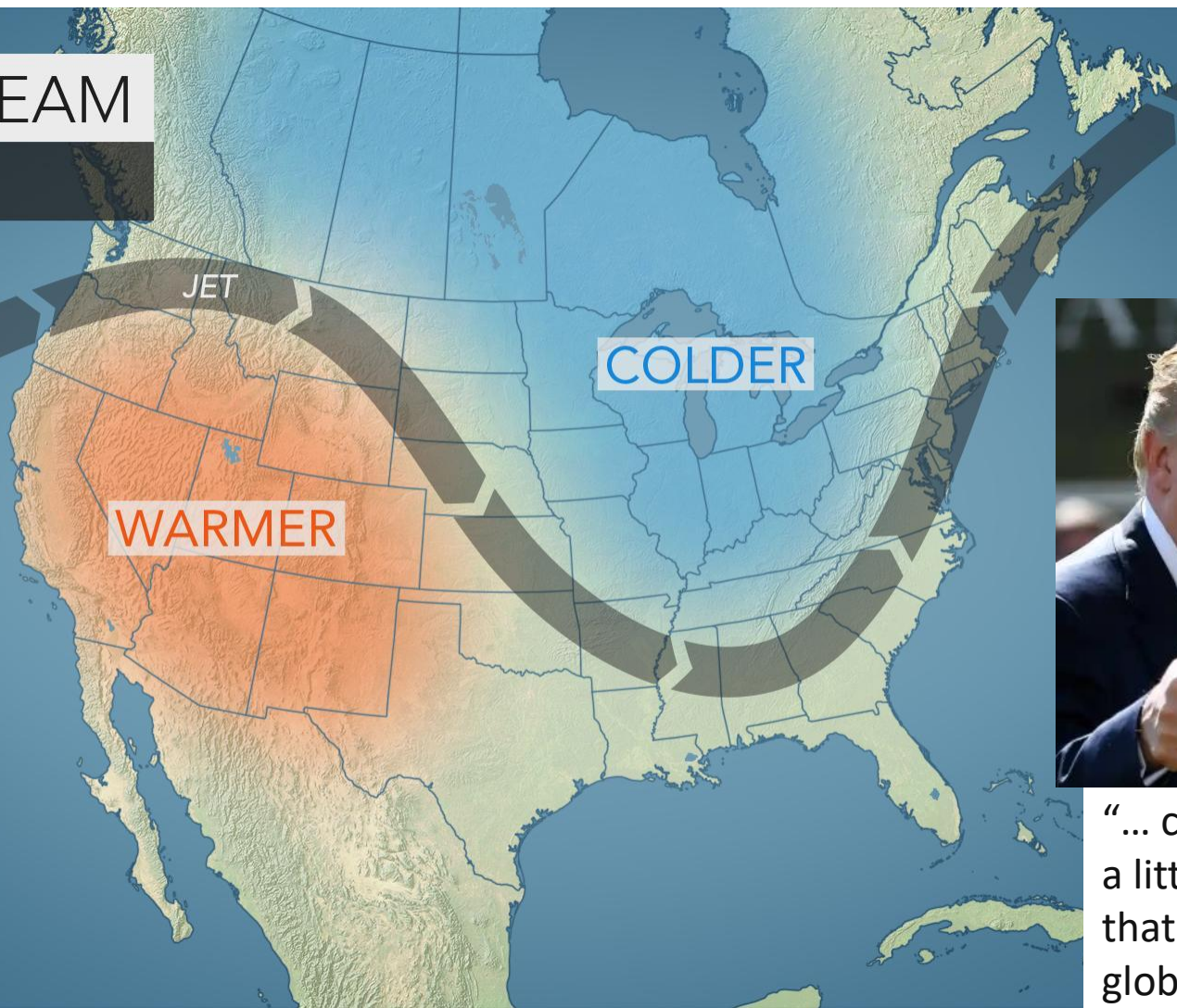


Svekkelse av jetstrømmen gir mer langvarige værtyper!



JETSTREAM

Example



 AccuWeather



“... could use a little bit of that good old global warming...”

Mer skader pga storm, tørke, barkbiller og skogbrann

A. Weakened root anchorage

Climate change can cause increased storm damage because of

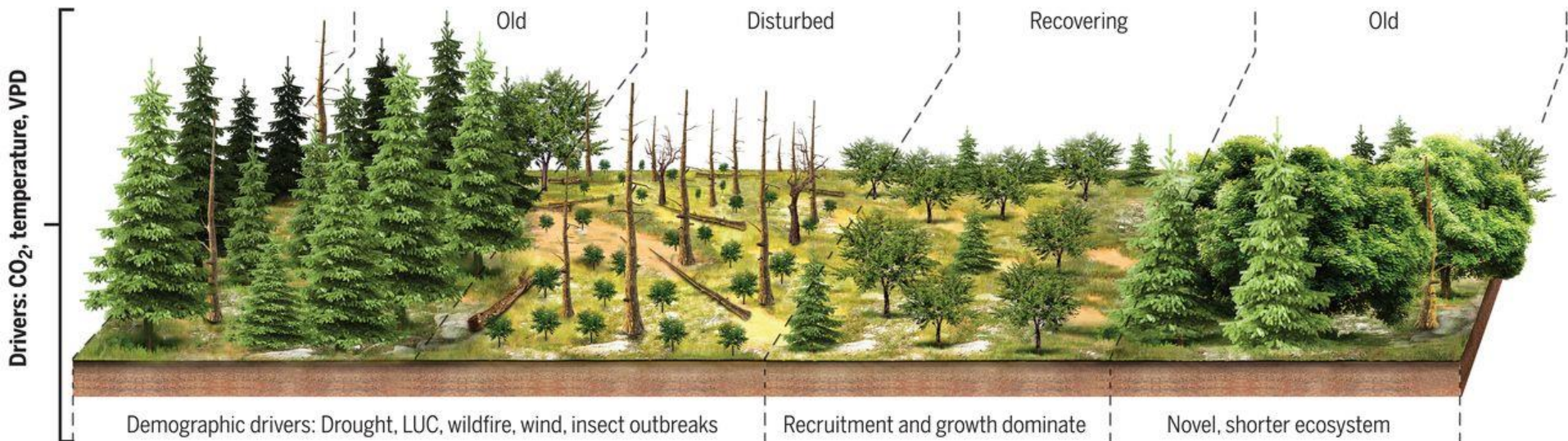
- reduced root anchorage with wet and unfrozen soils
 - Less frozen soils in winter
 - Precipitation as rain in winter
 - Heavy precipitation events
- More heavy, wet snow

B. More storm?

It is unclear if climate change will affect storm frequency and severity, because

- On one hand, the weakening of the temperature gradient between the equator and the poles is expected to reduce wind speeds. This gradient is essential for the formation of extratropical cyclones.
- On the other hand, increasing air temperature will lead to more water vapour, and hence latent energy, which contributes to the growth of storms
- Remains of tropical cyclones may (increasingly) end up in Europe.

“...global forests are tending toward younger stands with faster turnover as old-growth forest with stable dynamics are dwindling.”



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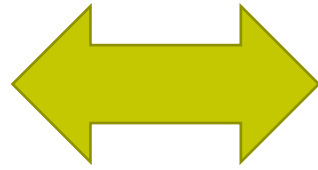
HOME > SCIENCE > VOL. 368, NO. 6494 > PERSVASIVE SHIFTS IN FOREST DYNAMICS IN A CHANGING WORLD

REVIEW f t in r s e

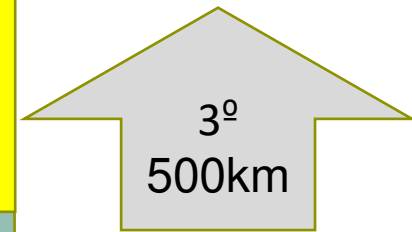
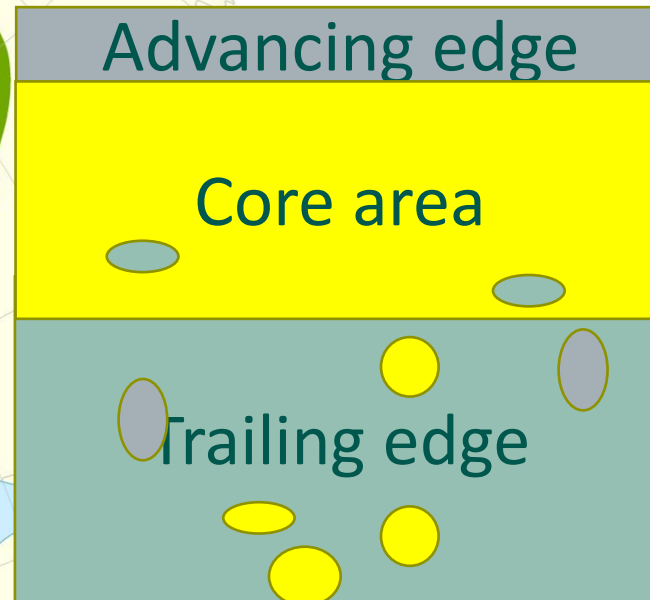
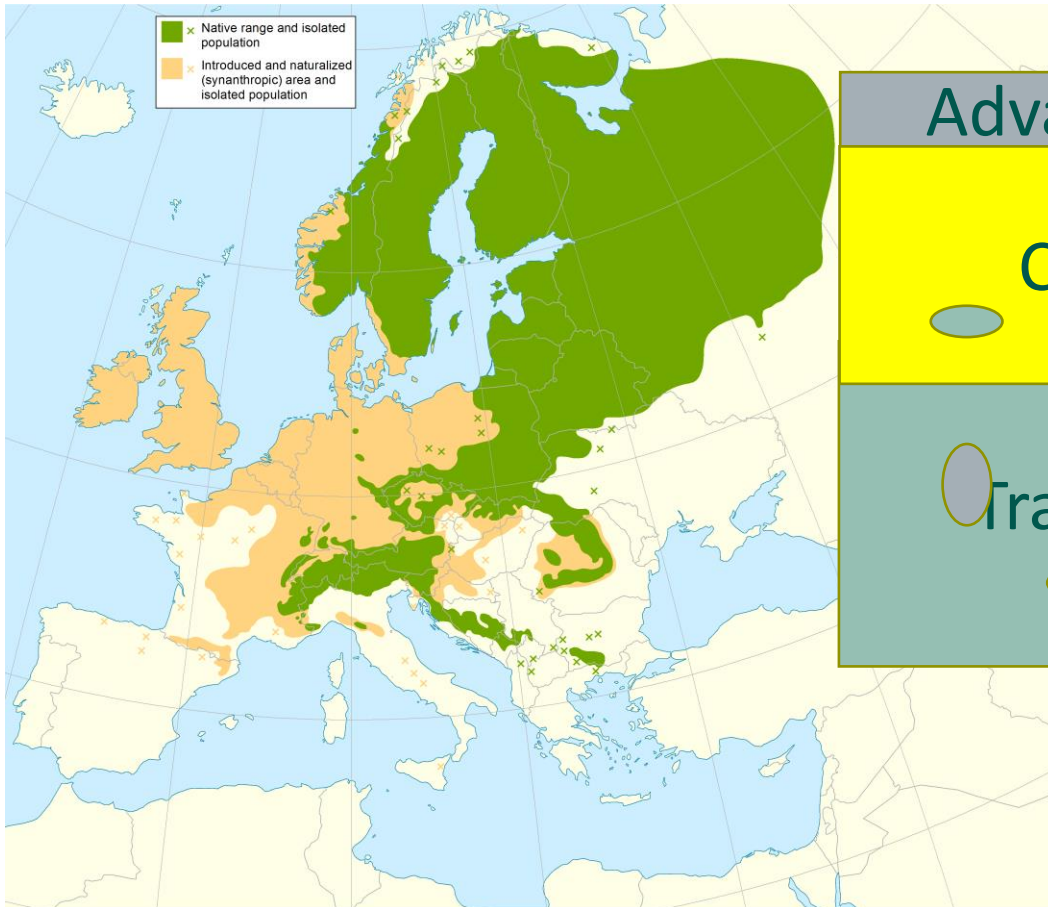
Pervasive shifts in forest dynamics in a changing world

NATE G. MCDOWELL , CRAIG D. ALLEN, KRISTINA ANDERSON-TEIXEIRA , BRIAN H. ALKEMA , BEN BOND-LAMBERTY , LOUISE CHINI , JAMES S. CLARK, MICHAEL DIETZE , CHARLOTTE GROSSIORD , [...] CHONGGANG XU [+14 authors](#) [Authors Info & Affiliations](#)

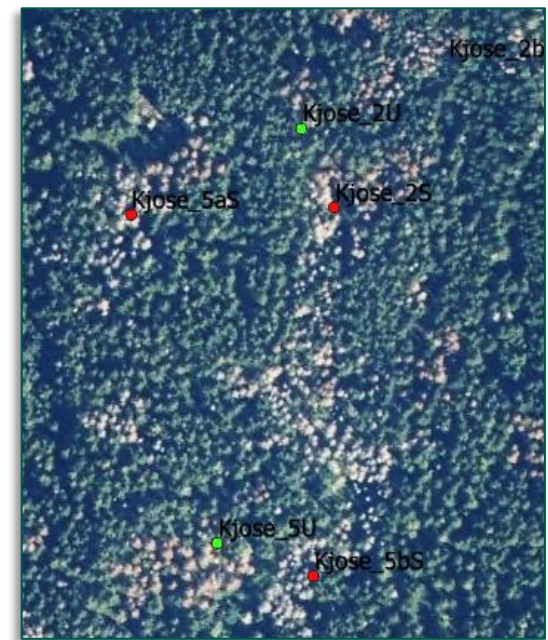
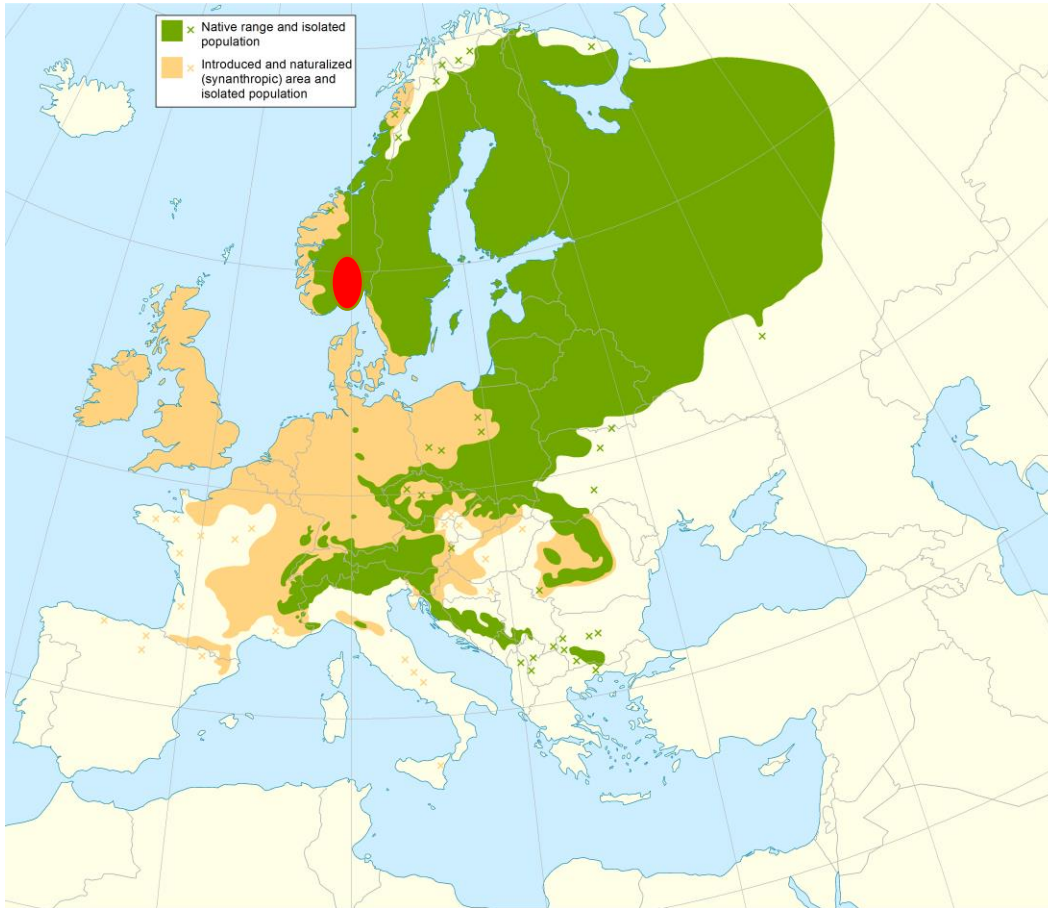
Skogbehandling 1: Treslagsvalg



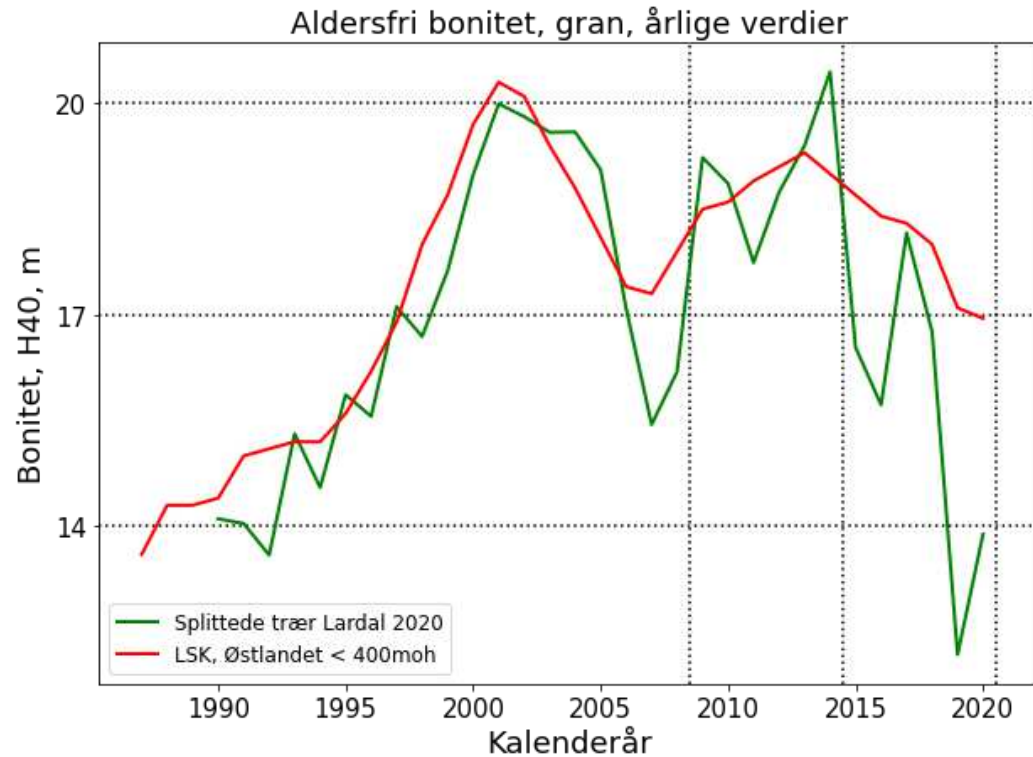
Forflytning av treslagene mot nord og oppover i terrenget



Her gran allerede en «trailing edge» her?



Bonitetstrend, gran, lavlandet Sørøst-Norge



Metode = «periodebonitet» (aldersfri bonitet)

Stormskader på furu, Sør-Aurdal, november 2021



Tørkeskader på furu i Polen

Contents lists available at [ScienceDirect](#)

Ecological Indicators

journal homepage: www.elsevier.com/locate/ecolind

Original Articles


Tree height, growth rate and stand density determined by ALS drive probability of Scots pine mortality

Luiza Tymińska-Czabańska^{a,*}, Paweł Hawryło^a, Piotr Janiec^{a,b,c}, Jarosław Socha^a




Fig. 2. Dying pine trees in the Regional Directorate of State Forests in Katowice, Southern Poland (fot. Kamil Śledziona).


More broadleaves:



Global Change Biology

Primary Research Article |  Full Access

Anthropogenic-driven rapid shifts in tree distribution lead to increased dominance of broadleaf species

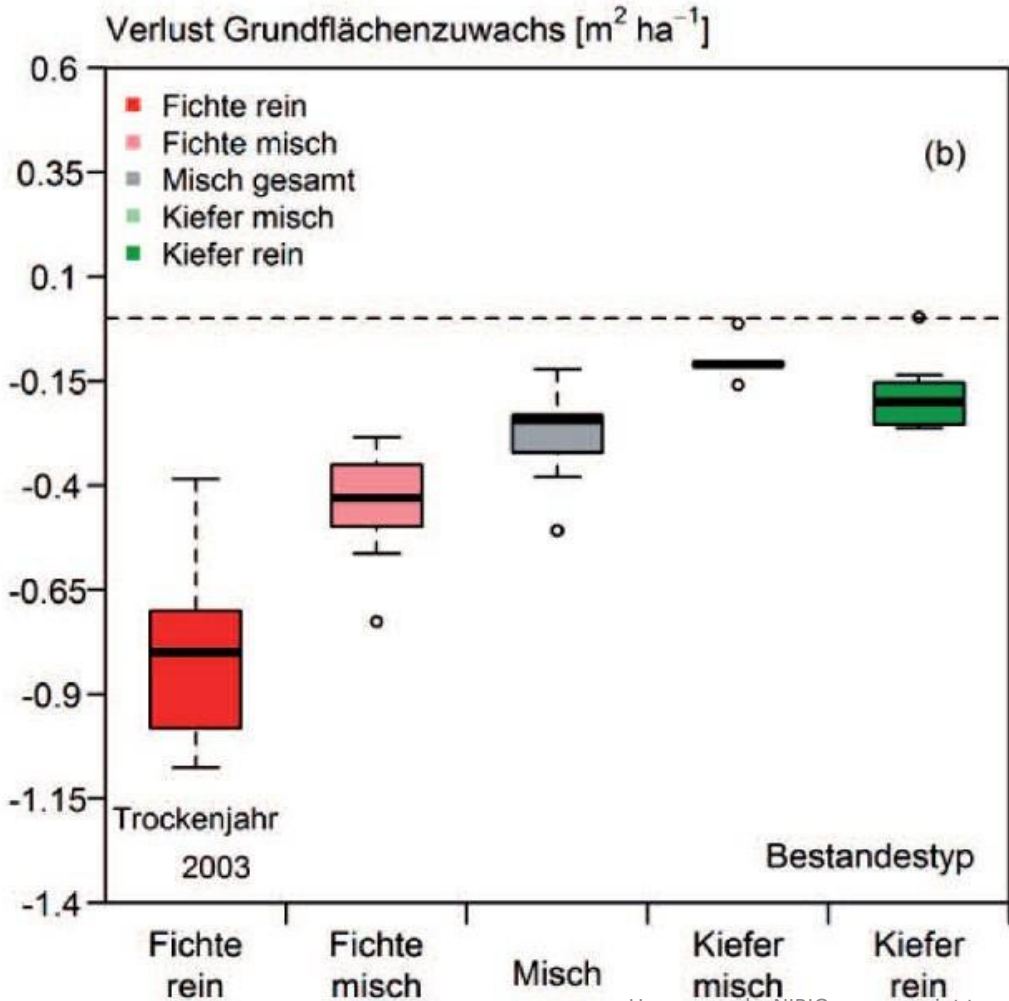
Jordi Vayreda , Jordi Martinez-Vilalta, Marc Gracia, Josep G. Canadell, Javier Retana

“We analyse species distribution and abundance from about 33 000 forest inventory plots in Spain..”

“... expansion of broadleaf species (i.e. family Fagaceae) over areas formerly dominated by conifer species (i.e. family Pinaceae), due to the greater capacity of the former to respond to most disturbances...”

<https://onlinelibrary.wiley.com/doi/full/10.1111/gcb.13394>

Mischbestände aus Kiefer (*Pinus sylvestris* L.)
und Fichte (*Picea abies* (KARST.) L.):
Ökologie, Ertrag und waldbauliche Behandlung



Basal area
growth in 2003
drought relative
to years before

Mixtures with spruce species can be more productive than monocultures: evidence from the Gisburn experiment in Britain 

W. L. Mason ✉, T. Connolly

Overyielding with Norway spruce and common alder (*A. glutinosa*)

“Basal area growth of three combinations

- *Sitka spruce/Scots pine*
- *Norway spruce/Scots pine*
- *Norway spruce/common alder*

was about 40 per cent greater than (and significantly different from) that predicted from performance in pure plots of the same species, evidence of transgressive overyielding.”

Skogbehandling 2: tetthet




ELSEVIER

Forest Ecology and Management

Volume 517, 1 August 2022, 120278

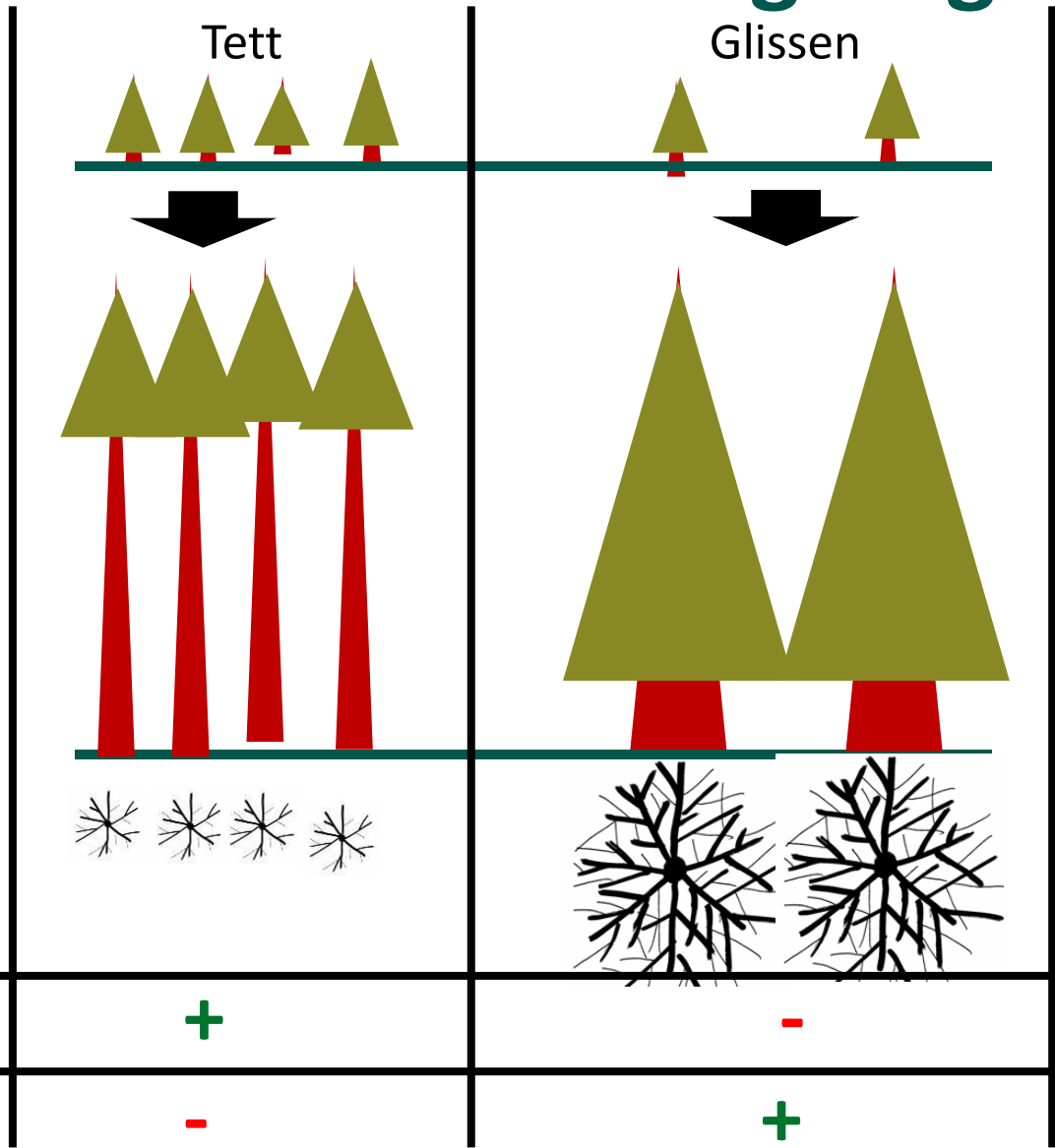


Pre-commercial thinning could mitigate drought stress of black spruce stands

Amy R. Wotherspoon ^{a, 1}  , Louis Duchesne ^b, Martin Barrette ^b, Daniel Houle ^c

“Forest stand density management, such as pre-commercial thinning (PCT), can reduce moisture stress for residual trees by reducing canopy evaporation and increasing soil water availability”

Hva er optimal tetthet i ungskog?



Skogbehandling 3: Hovedhogst





Continuous cover management reduces wind damage

Timo Pukkala ^{a,*}, Olavi Laiho ^b, Erkki Lähde ^b

^a University of Eastern Finland, PO Box 111, 80101 Joensuu, Finland

^b Joen Forest Program Consulting, Rauhankatu 41, 80100 Joensuu, Finland

Konklusjon:

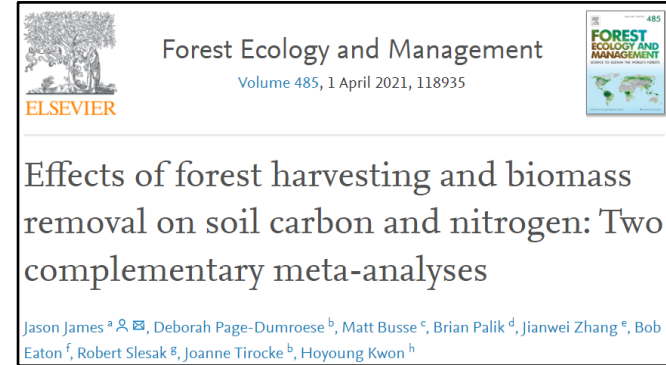
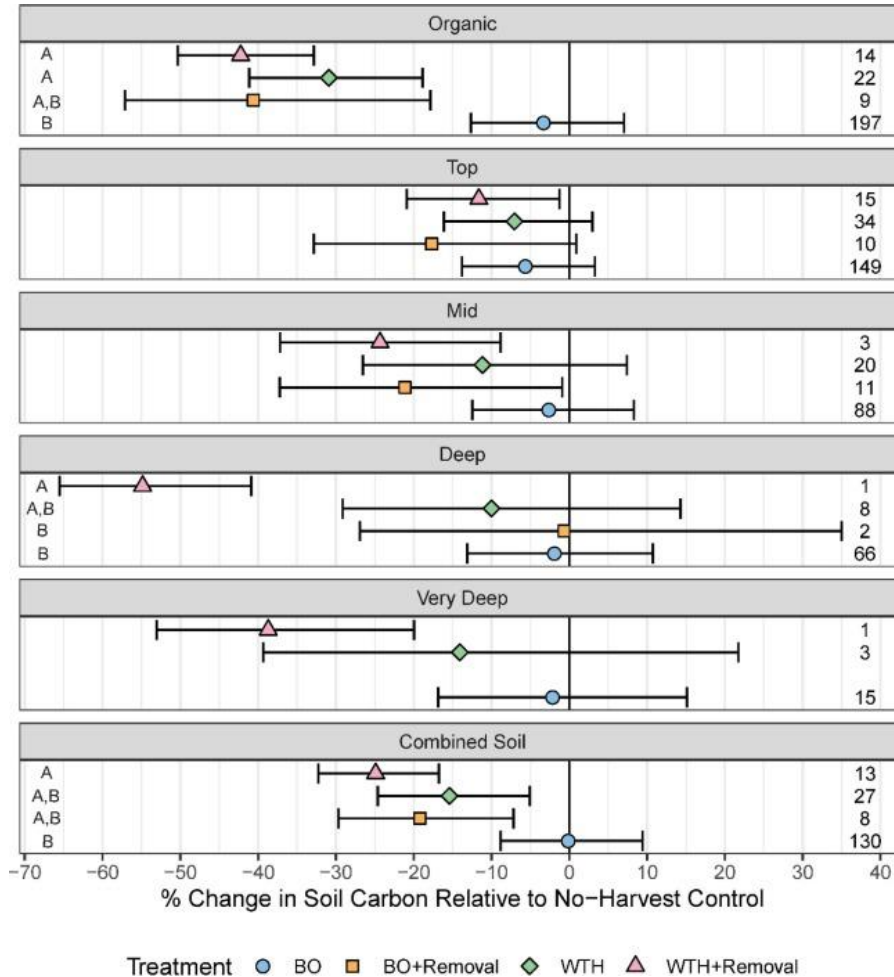
« ...continuous cover management decreases wind damage, as compared to even-aged management.»

	Kontr	CCF		Ensaluret			
	0	D	S	L	H	M	R
Number of measured plots	7	8	33	6	6	4	17
Number of measured trees	692	753	1721	61	93	36	99
Mean diameter (cm)	11.8	7.5	9.3	23.6	17.9	23.3	22.6
Mean height (m)	14.2	9.1	10.0	23.7	19.9	23.4	23.1
Stand basal area (m ² /ha)	47.1	20.7	16.8	23.5	13.7	17.1	9.2
Shelter basal area (m ² /ha)	18.6	16.8	18.5	12.8	18.0	9.1	16.7
Number of trees / ha	3295	3188	1699	508	517	400	220
Time since cutting, years	49.0	14.9	2.5	11.5	1.2	0	0
<i>Proportion of wind damages, % of stand basal area</i>							
All species	0	2.3	3.7	15.5	25.7	14.9	52.4
Spruce	0	1.9	4.8	21.0	33.5	17.2	50.1

Gjensetting, “selfie-trær”



«Bole-only» hogst (●) har liten effekt på jordkarbon, dersom man lar hogstavfall bli igjen og man unngår markberedning



- ▲ WTH+Removal
- ◆ WTH
- BO+Removal
- BO

Skogbehandling 4: Unntak

På høy bonitet og ved sikker vanntilgang



Copyright: John Yngvar Larsson

Development of Sustainable Willow Short Rotation Forestry in Northern Europe

By Theo Verwijst, Anneli Lundkvist, Stina Edelfeldt and Johannes Albertsson



Overgang til BLAG-skogbruk (Blandingskog, LAV tetthet, Gjensetting)

Monokultur

Snauhogst



Treslagsblanding



Gjensetting

