Back to the wild: reappearance of old-growth characteristics in set-aside forests

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Vlaanderen
is wetenschap

INSTITUUT
NATUUR- EN BOSONDERZOEK

Outline

1. Old-growth and the ‘harvest shortcut’

2. Successional pathways towards ‘secondary old-growth’

    Dead wood amounts
    Very large trees

3. Effects on species richness

    ground flora
    species associated with old-growth

4. Conclusion and outlook

1. Old-growth forest and the harvest shortcut

Life-cycle of a tree:

Source figure: CentennialParklands.com.au

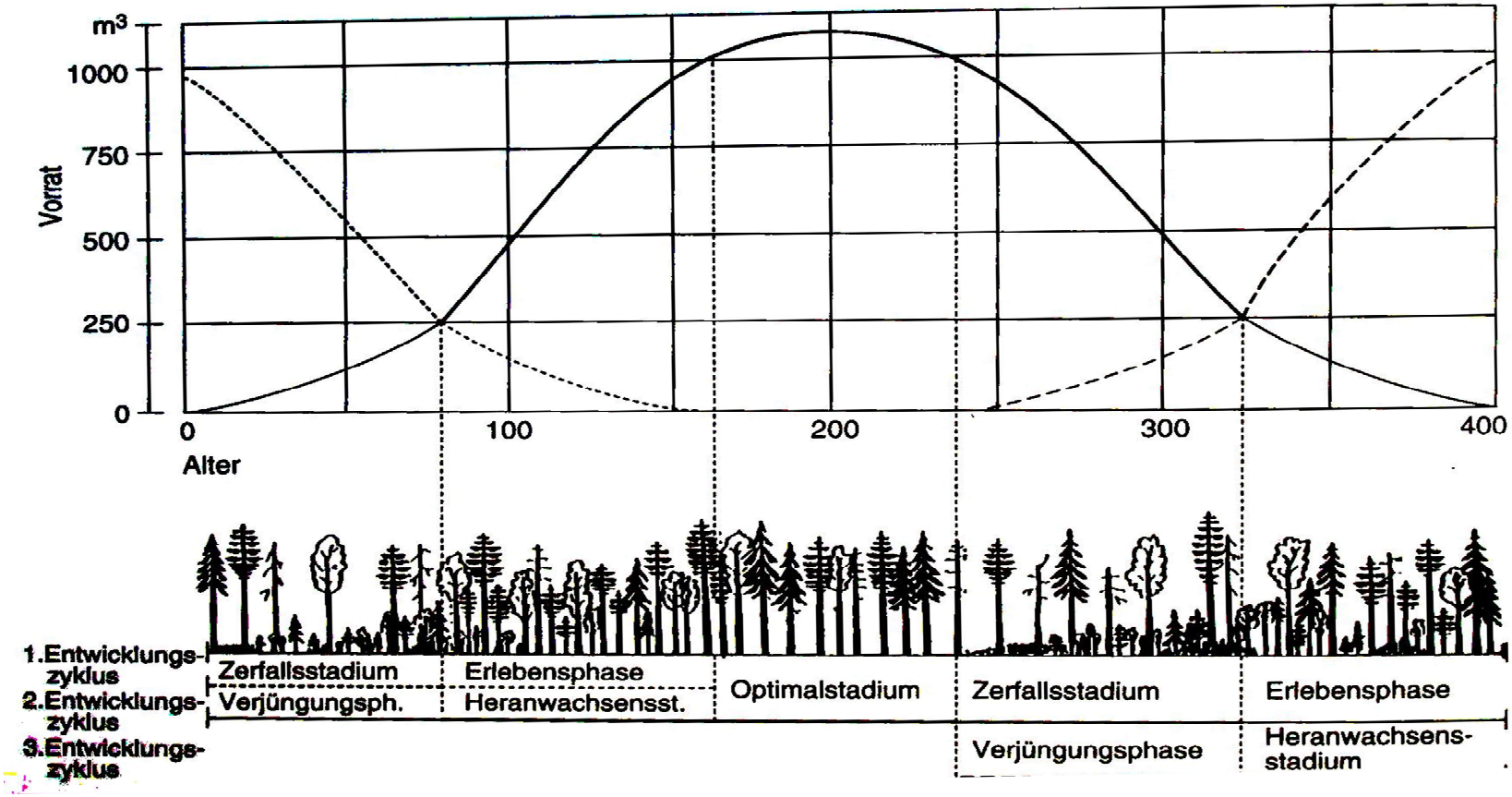
1. Old-growth forest and the harvest shortcut

At population level:

(Scherzinger, 1996)

1. Old-growth forest and the harvest shortcut

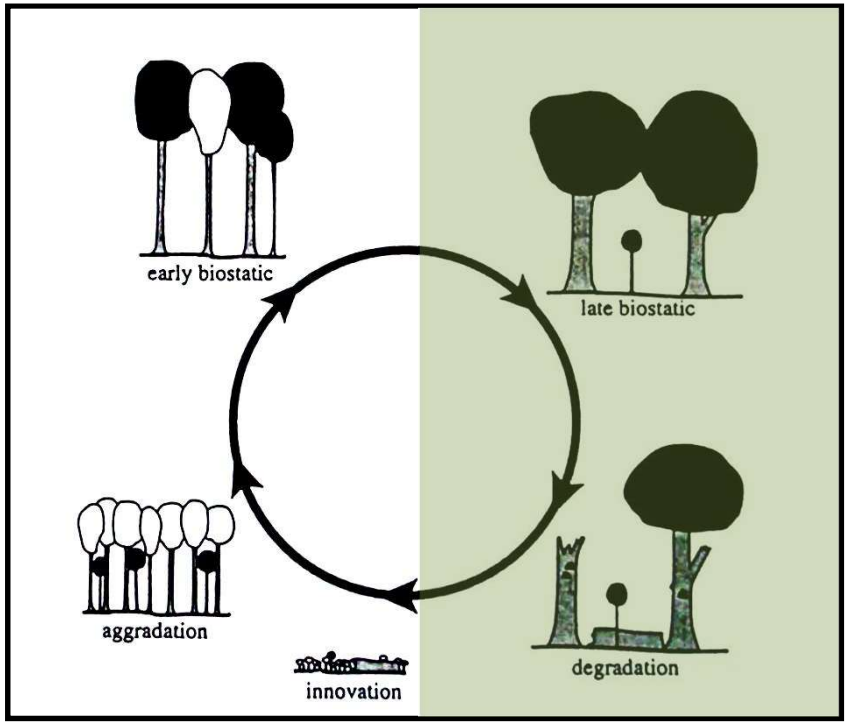
At population level:

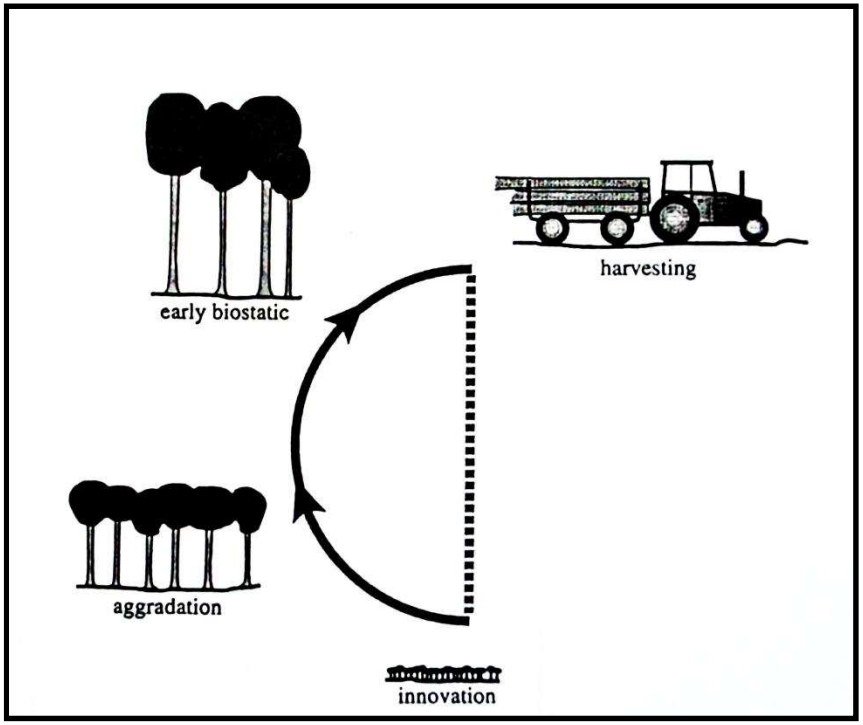


(Korpél, 1995)

1. Old-growth forest and the harvest shortcut

The ‘harvest shortcut’





(Christensen & Emborg, 1996)

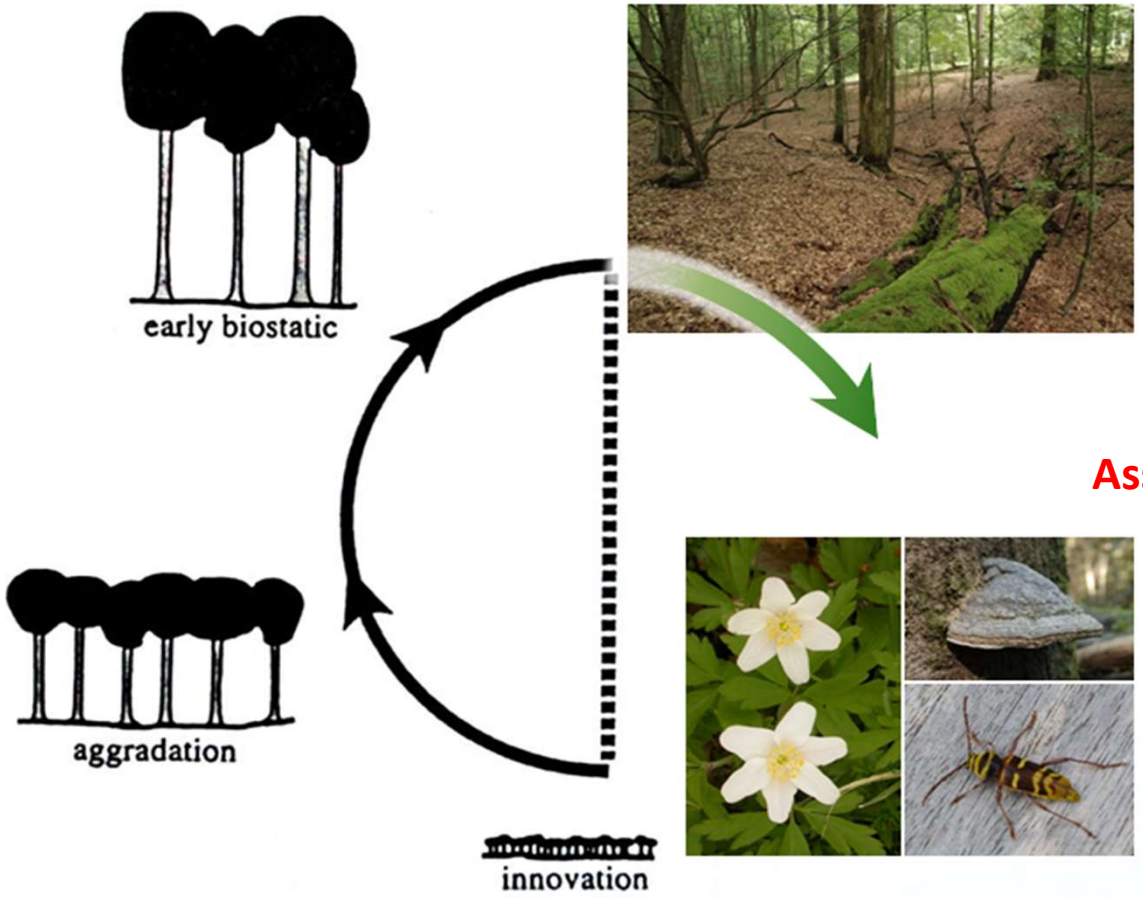
1. Old-growth forest and the harvest shortcut

EU: draft definition of ‘old-growth’

> *“forest areas or stands of native tree species that have developed -predominantly through natural processes-* ***structures and dynamics normally associated with late-seral stages in primary or undisturbed forests*** *of the same type.*
>
> ***There may be visible signs or records of former human impact, but they are gradually phased*** *out due to abolishment of human interventions, and ecological processes have redeveloped or are not significantly disturbed*

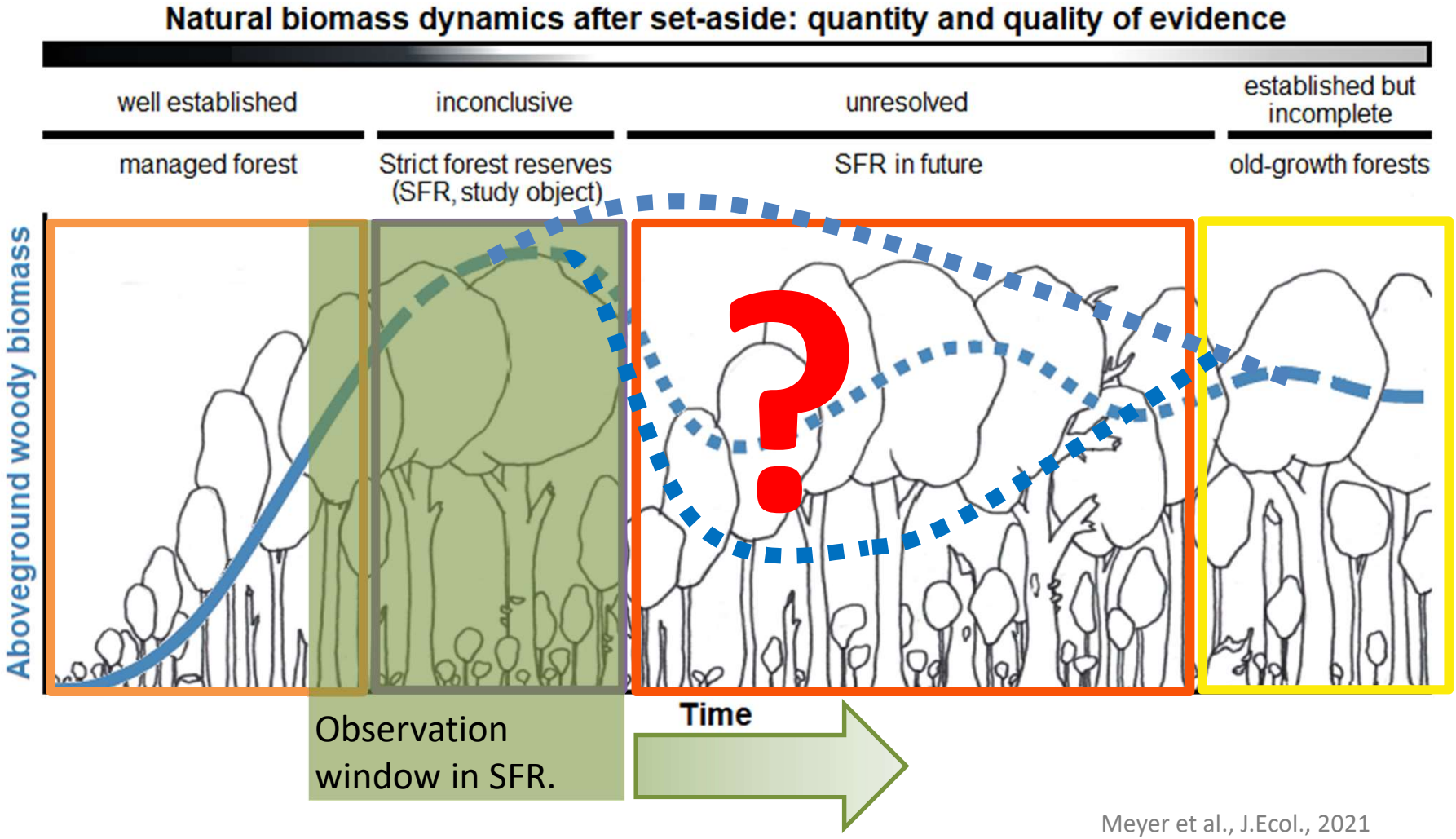
1. Old-growth forest and the harvest shortcut

Old-growth Characteristics ?



Associated species ?

2. Successional pathways towards secondary old-growth



Meyer et al., J.Ecol., 2021
Figure by Eike Feldmann

2. Successional pathways towards secondary old-growth

Criteria and indicators of old-growth :

- Large dead wood amounts
- Presence of large and overmature trees
- Structural complexity (horizontal + vertical)
- Species composition and mixture
- Microhabitats and micro-topography
- Indicator species present

2.1. Dead wood accumulation

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Deadwood buildup

Analysis:

Own data + unpubl. + literature

Lowland Europe (< 700m ASL)

Quercus and *Fagus* dominated

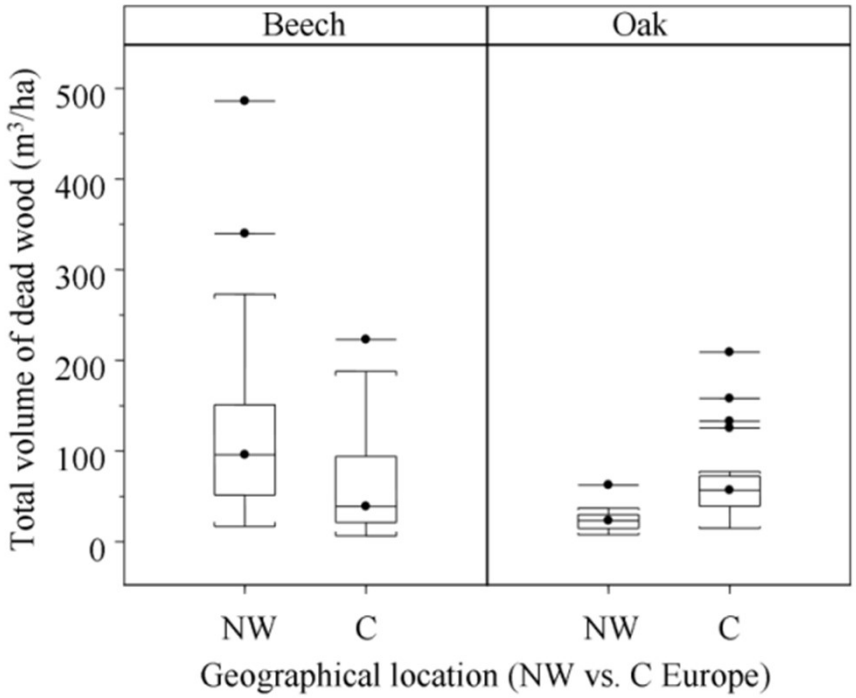
Unmanaged > 10 years

109 sites

(Vandekerkhove et al. 2009, Forest Ecology & Management)

2.1. Dead wood accumulation

Average net accumulation rate:
Median = **1.64 $m^3.ha^{-1}.year^{-1}$**
Range = 0.1 - 19 $m^3.ha^{-1}.year^{-1}$



(Vandekerkhove et al. 2009, Forest Ecology & Management)

2.2. Very Large Trees

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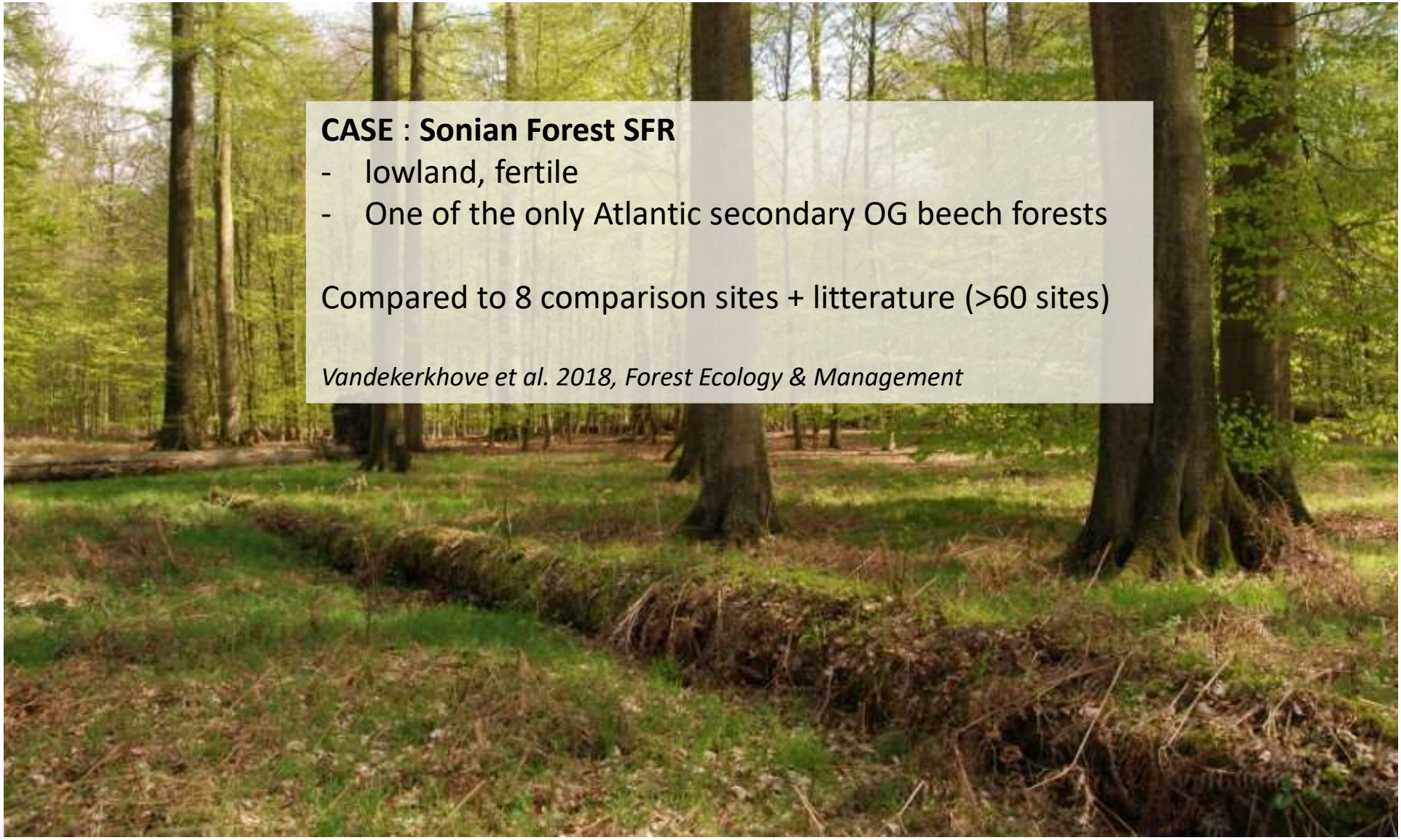


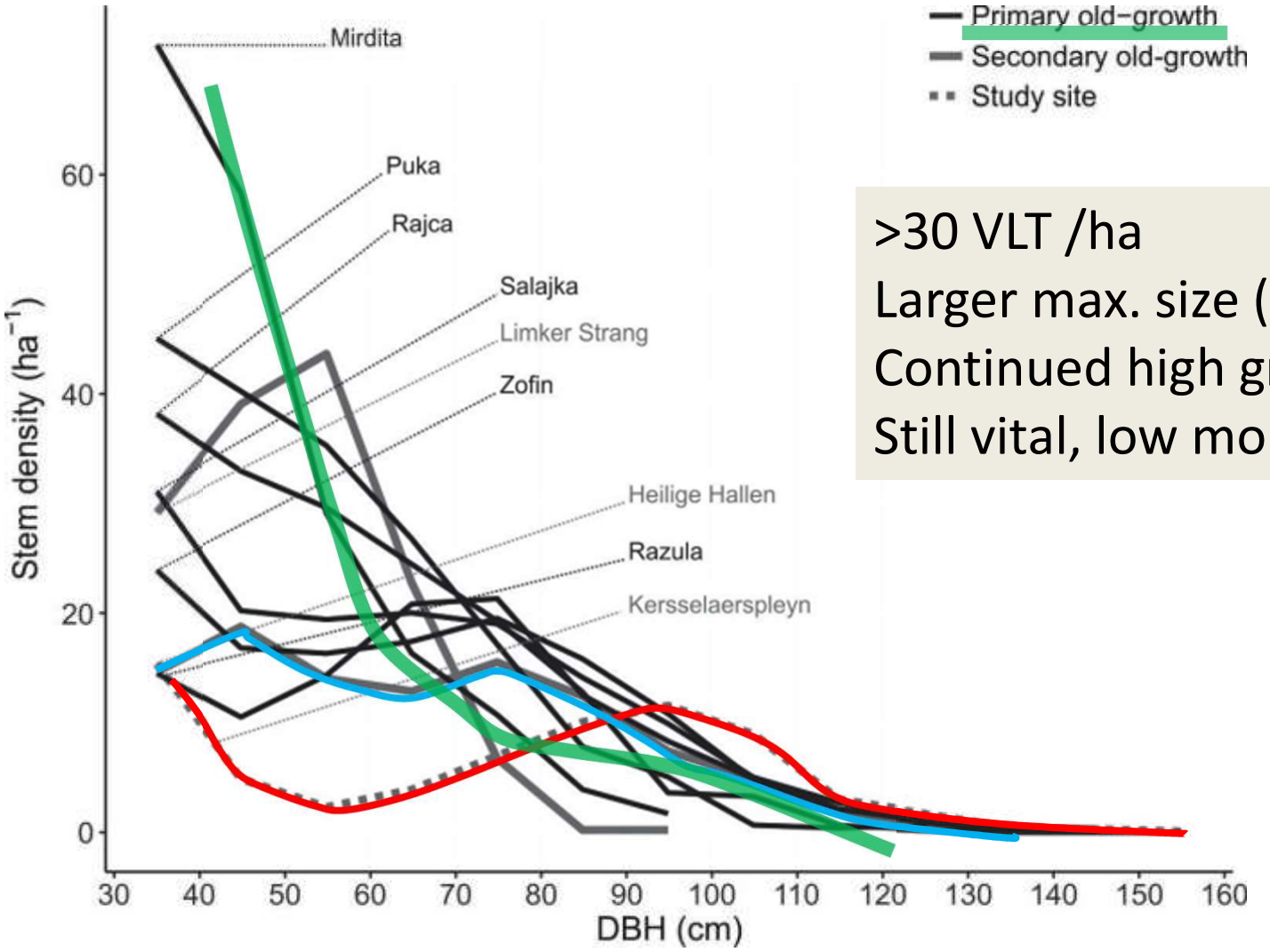
CASE : **Sonian Forest SFR**

- lowland, fertile
- One of the only Atlantic secondary OG beech forests

Compared to 8 comparison sites + litterature (>60 sites)

Vandekerkhove et al. 2018, Forest Ecology & Management

2.2. Very Large Trees



>30 VLT /ha
Larger max. size (DBH 160 cm)
Continued high growth rate
Still vital, low mortality

3.2. Very Large Trees

Exceptional size :

- Site + climate conditions
- released growth

Exceptional density

- Age structure
- overshoot peak

reset certain baseline assumptions for tree size and longevity potential of beech in Northwestern Europe.

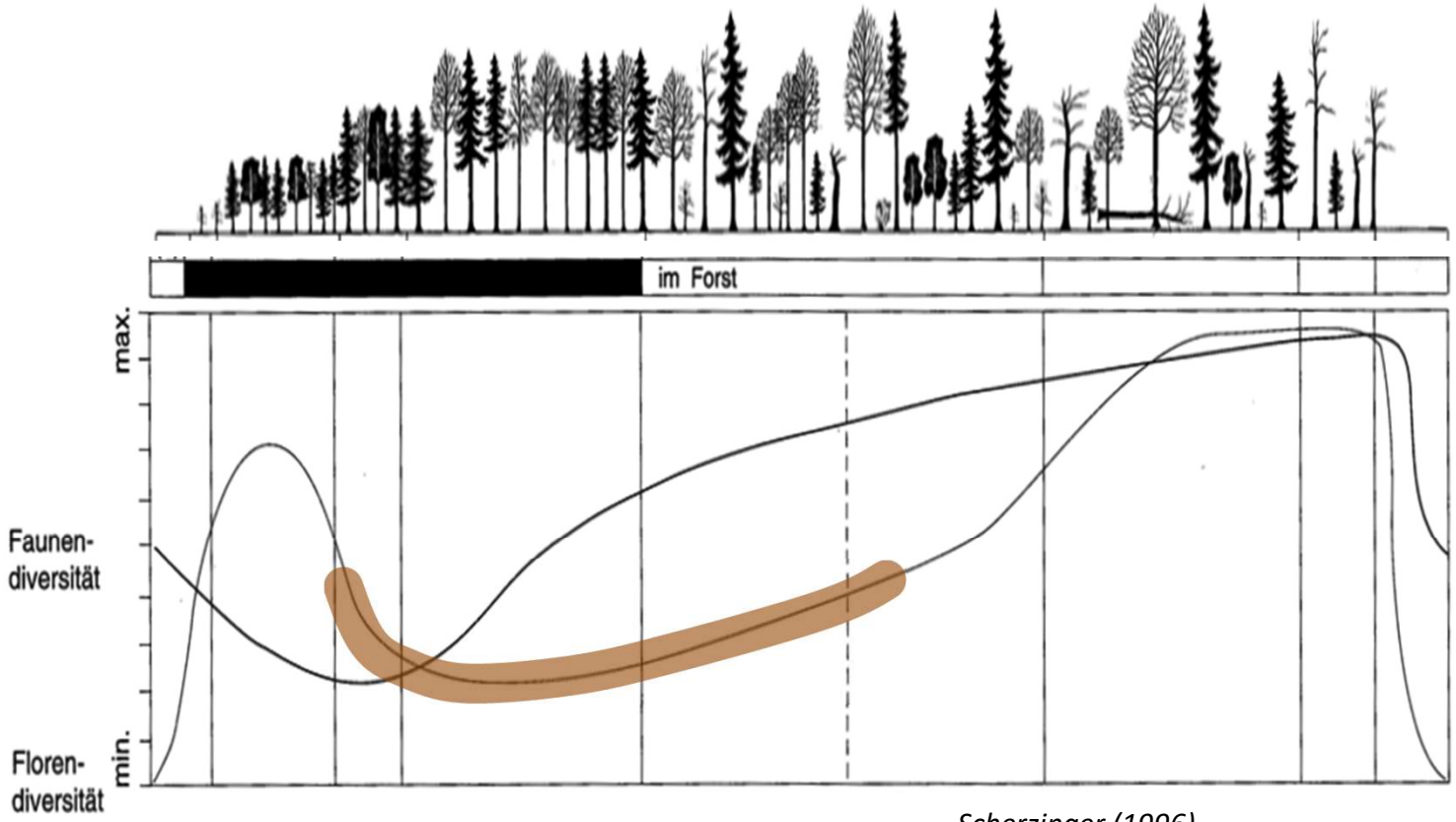
3. Effects on species richness

3.1. Ground flora

Previously managed forests, now left for free development

Go through a ‘dark age’

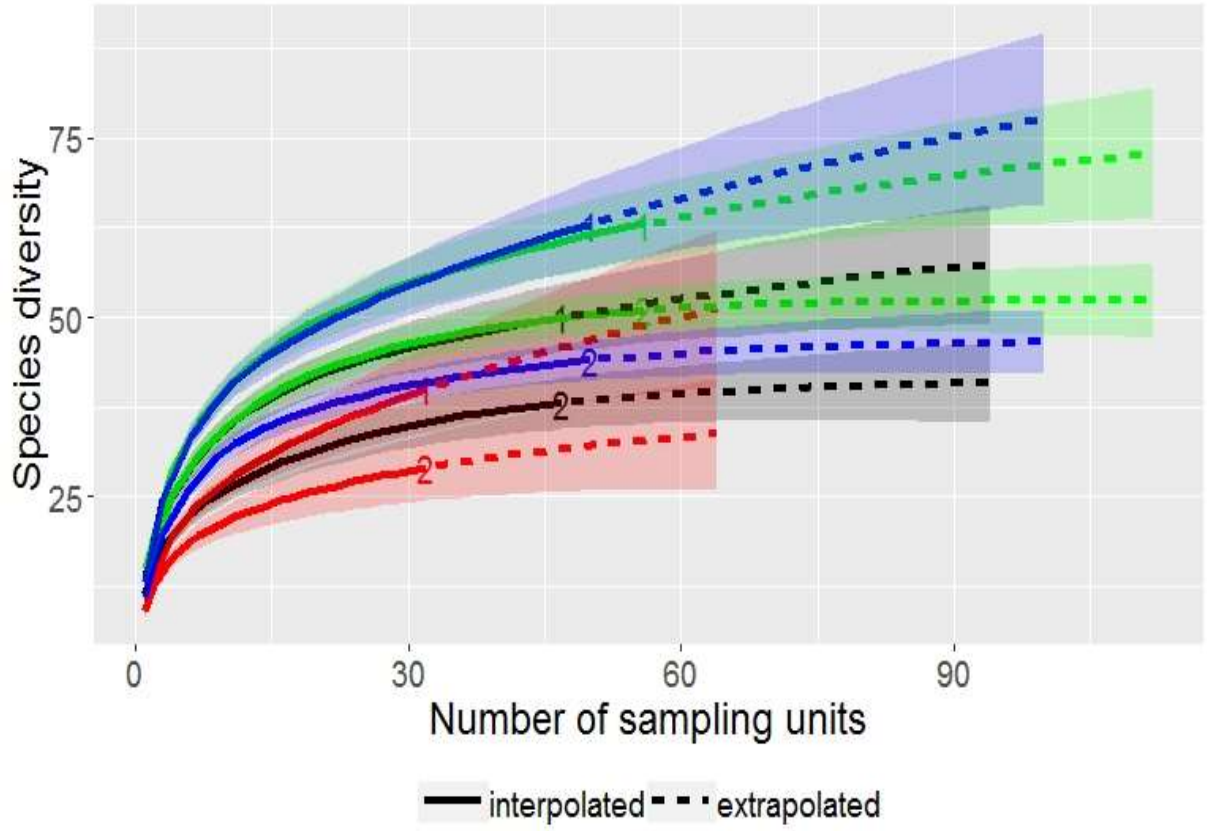
- Concerns from conservationists (botanists)



Scherzinger (1996)

3.1. Effects on ground flora

CASE : four strict reserves on rich loamy soils (rich vegetation)
Unmanaged since ca. 1995
183 vegetation relevés, repeated after 10 years



3.1. Effects on ground flora

Species Richness at site level :

Forest affinity classes (Schmidt et al.2011)

1.1 = closed canopy forest; 1.2 = gaps and edges in forests; 2.1 = forest as well as open countryside; 2.2 = also in forests, but mainly open countryside; O = no forest affinity, species of open countryside

	Everzwijnbad		Jansheideberg		Pruikenmakers		Terrijst		All sites	
survey	1	2	1	2	1	2	1	2	1	2
Class 1.1	28	26	22	22	30	27	27	23	37	37
Class 1.2	3	2	3	1	4	2	4	2	8	3
Class 2.1	14	10	11	5	23	18	23	16	33	21
Class 2.2	2	0	2	1	1	1	3	1	4	2
Class O	1	0	0	0	1	0	2	0	3	0
All	49	38	39	29	59	43	60	47	86	64


Photos : field team forest ecology - INBO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3.2. Effects on other oldgrowth-related species

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Survivors :

Continuity and connectivity in suitable habitat/substrate

Recolonisors : potential depends on :

- dispersal limitations
- availability (and density) of required habitat

Did species dependent of 'old-growth characteristics manage to survive or recolonise the forest, especially 'secondary old growth' sites ?

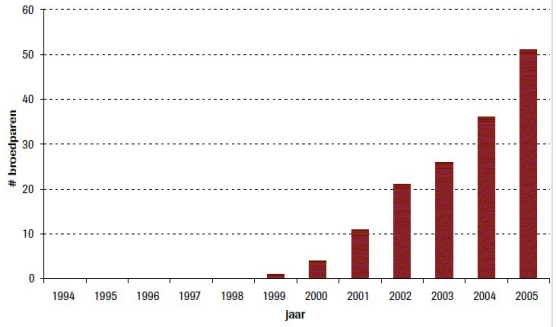
Vandekerkhove et al. 2011, Silva Fennica

3.2. Effects on other oldgrowth-related species

Forest birds

- Good dispersal capacities
- Good recruitment (not too selective)

=> quick response : population trend 1970-2000



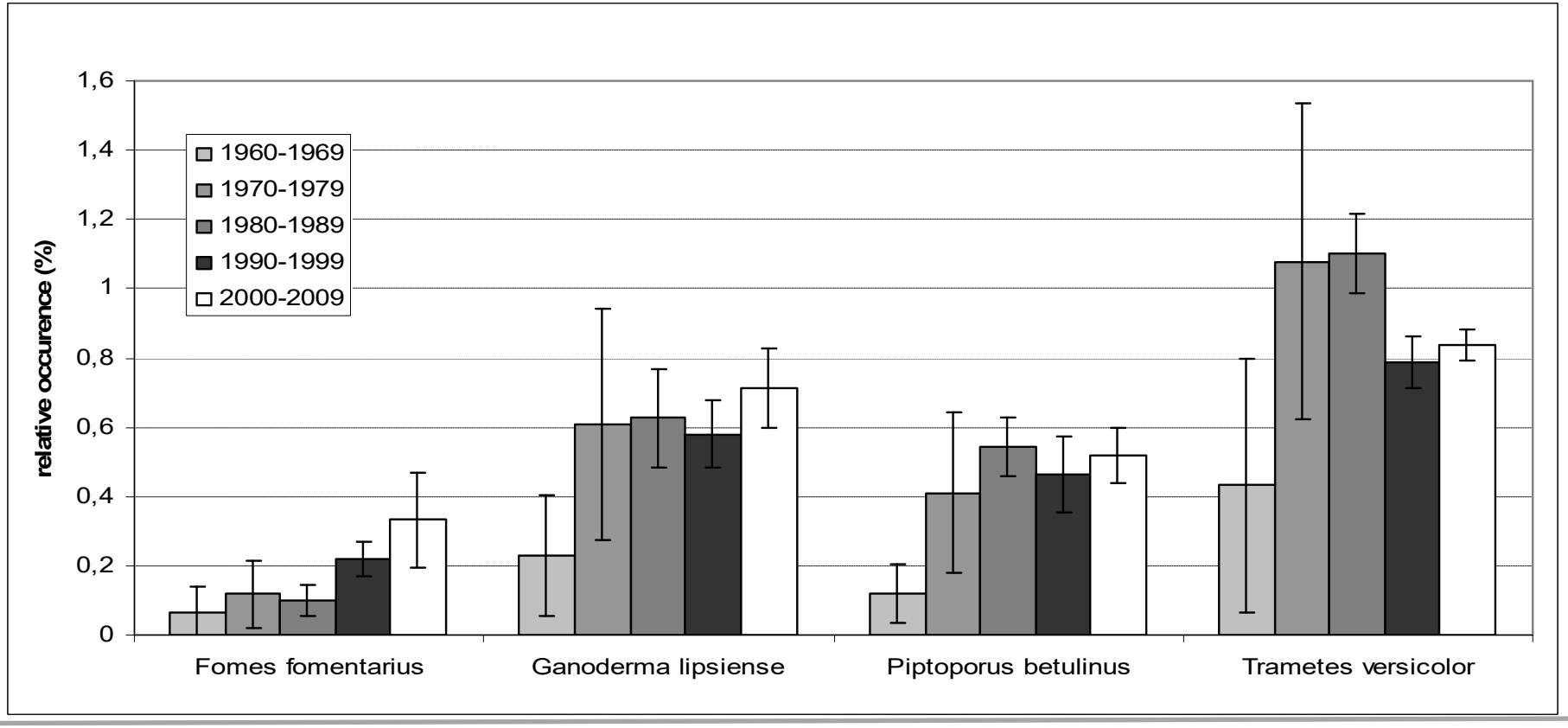
Vandekerkhove et al. 2011
Silva Fennica

3.2. Effects on other oldgrowth-related species

Fungi :

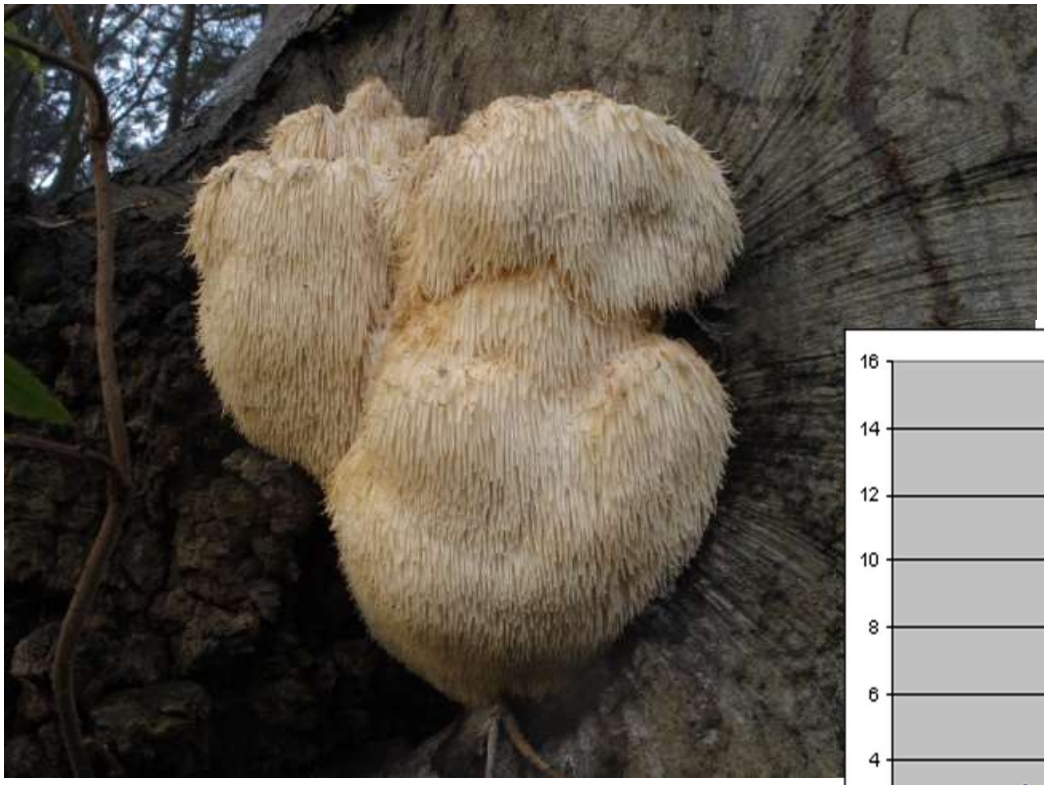
Good dispersal capacities (?)

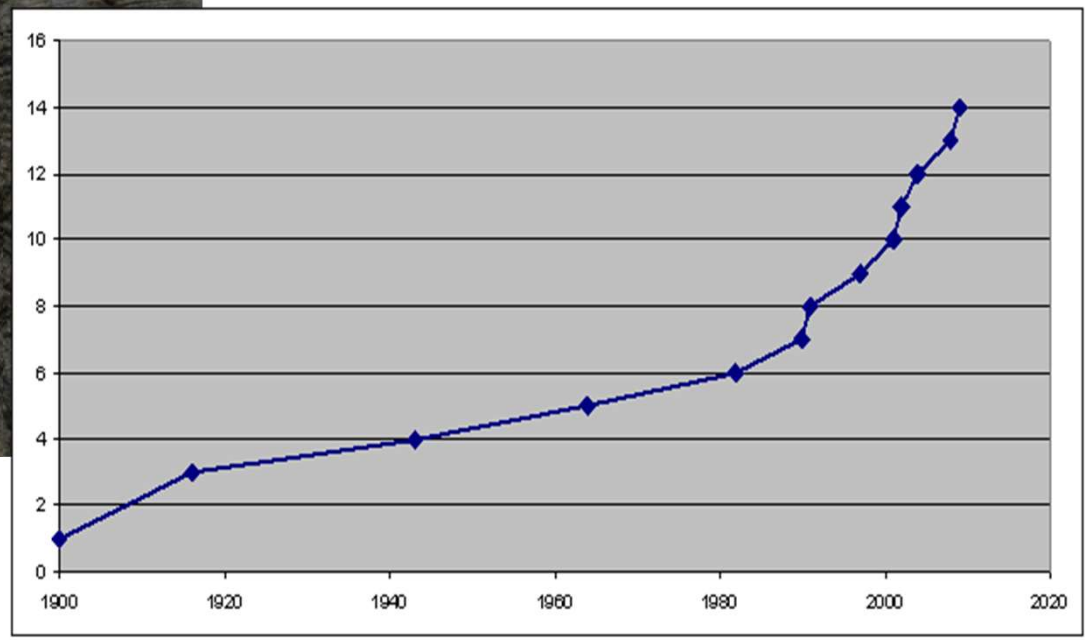
Recruitment requirements are very diverse



3.2. Effects on other oldgrowth-related species

European indicator species (*Christensen et al., 2005)*





3.2. Effects on other oldgrowth-related species

Saproxylic beetles :

Case : Kolmont Forest

Isolated ancient woodland site, very small (15 ha)

High density of 'old-growth elements' :

> 60 m^3/ha of CWD

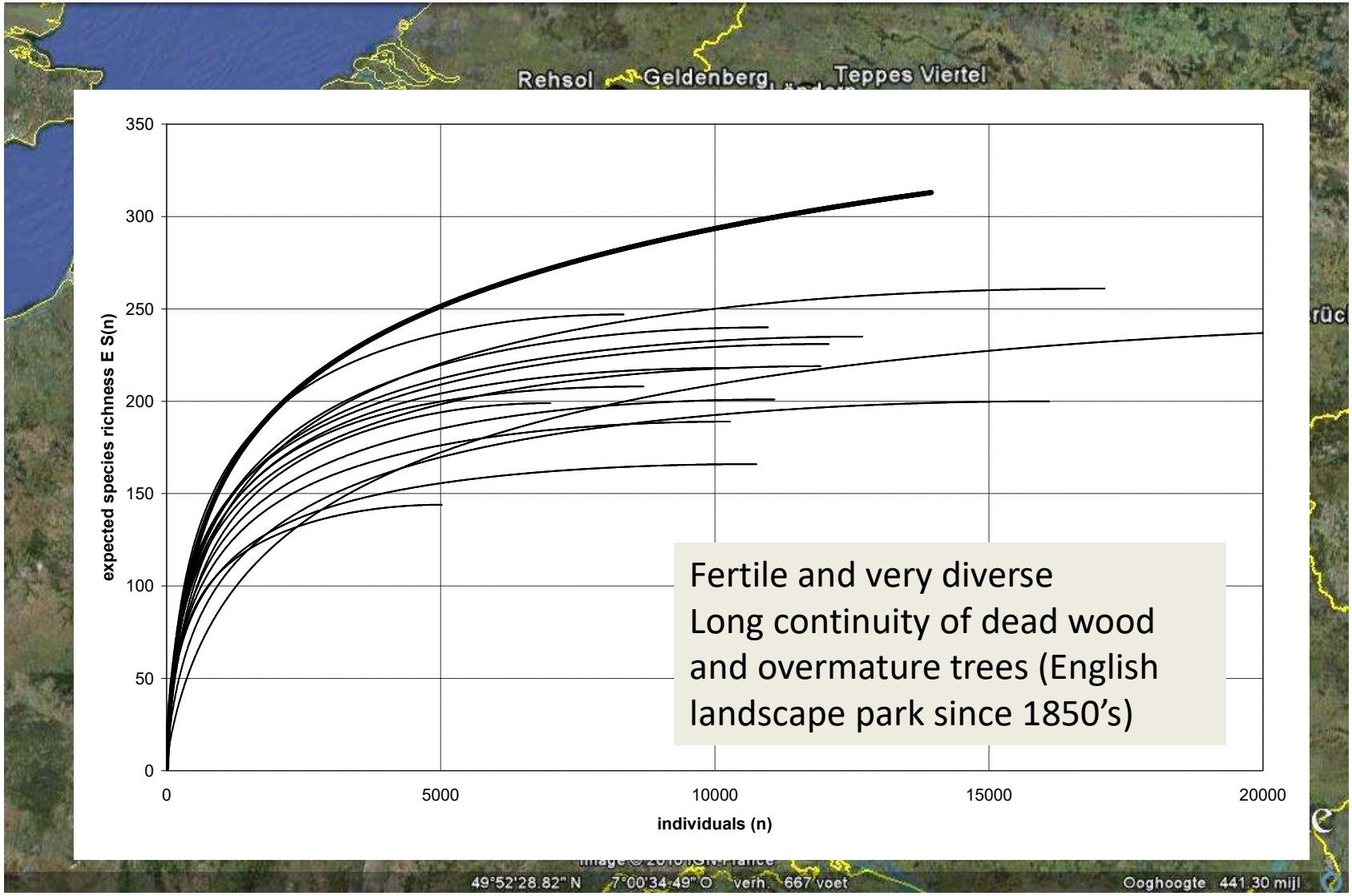
High density of overmature trees

Method :

2 year sampling : window traps 2x4; glue-rings 2x4;

light traps, active catch

3.2. Effects on other oldgrowth-related species



4. Conclusions and outlook

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- Re-establishment of oldgrowth features = slow & steady

- Our viewing window is narrow : continued effort needed to extend it !

- Some observations urge us to reset baseline assumptions

- Species richness :
  - Old-growth associated species manage to recover (dispersal abilities)
  - SFR are important 'hubs' for recolonisation

- Still many 'blind spots' :
  - Development of belowground carbon ?
  - Development of soil biota ?

- Relation to climate change: SFR threatened by Climate changer
or important 'coldspots' ?