



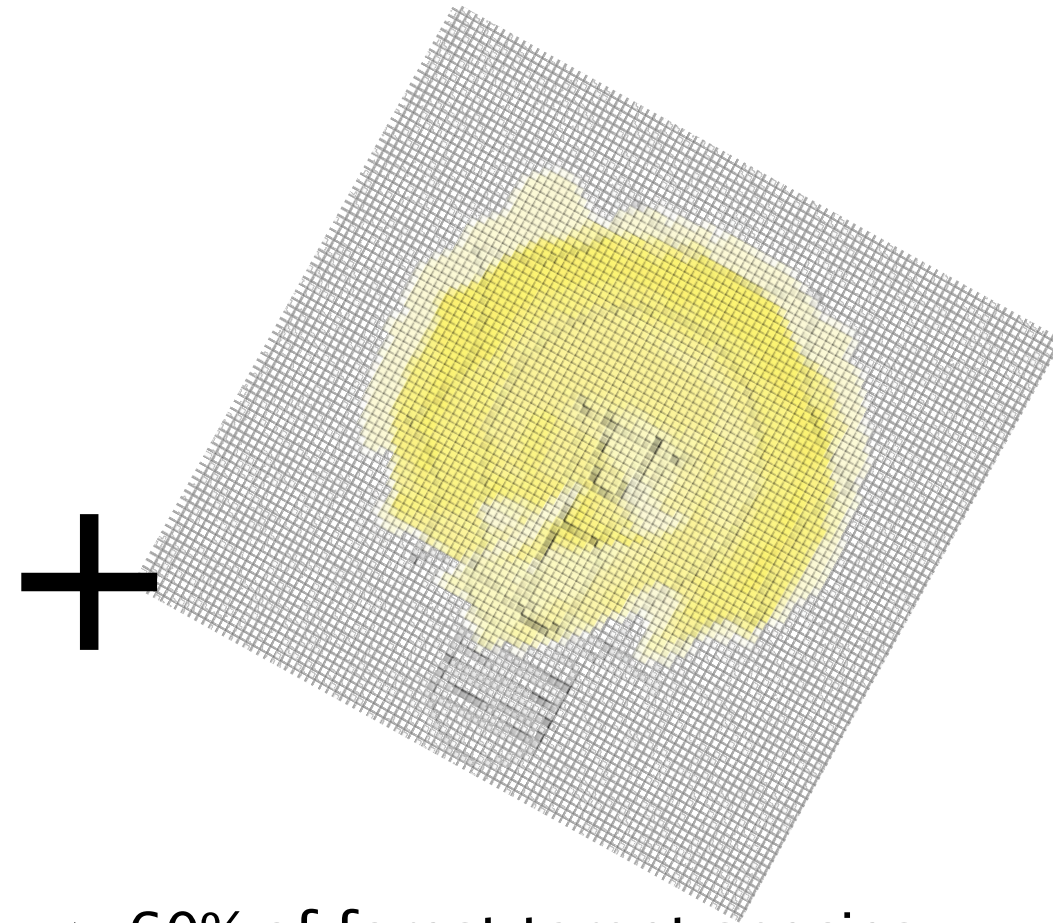
Potential of natural disturbances for integrative forest management

Thibault Lachat, Bern University of Applied Sciences



Berner Fachhochschule
Haute école spécialisée bernoise
Bern University of Applied Sciences

Plenty of species need dead wood and light



+

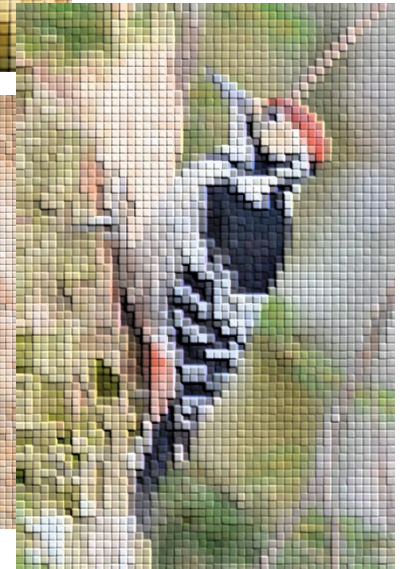
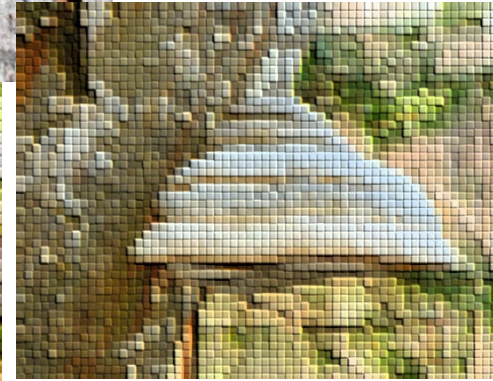
Ca. 25-30% of forest species are saproxylic

> 60% of forest target species are heliophilous and thermophilic (234/382)

Saproxylic species in Switzerland

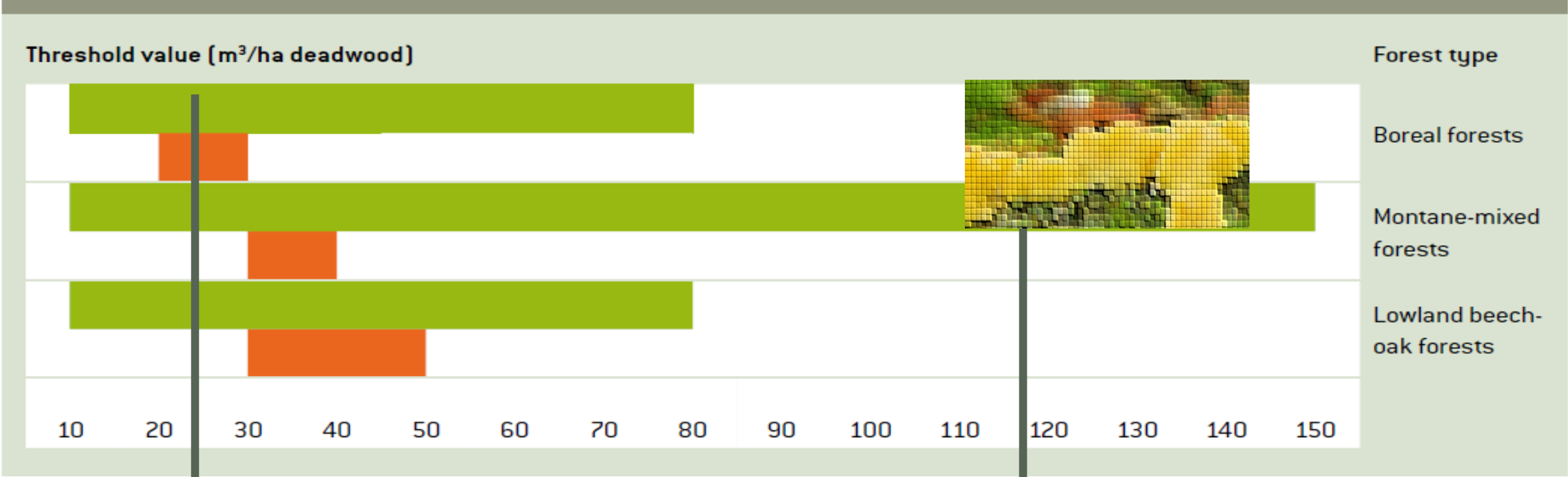
→ 6'000 to 8'000 species

Group	Species	Saproxylic
Beetles	6229	1743 (28%)
Fungi	7526	2750 (36%)
Bryophytes	1093	32 (3%)
Lichens	1795	157 (9%)
Birds	217	30 (14%)
Bats	30	23 (77%)

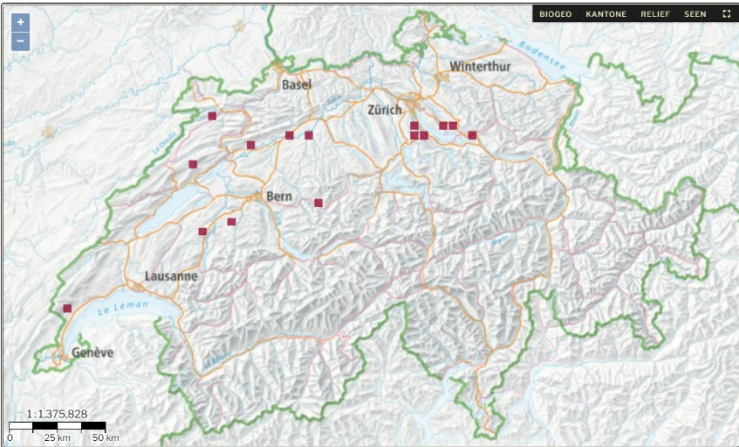


Lachat et al. 2019

How much dead wood is needed?



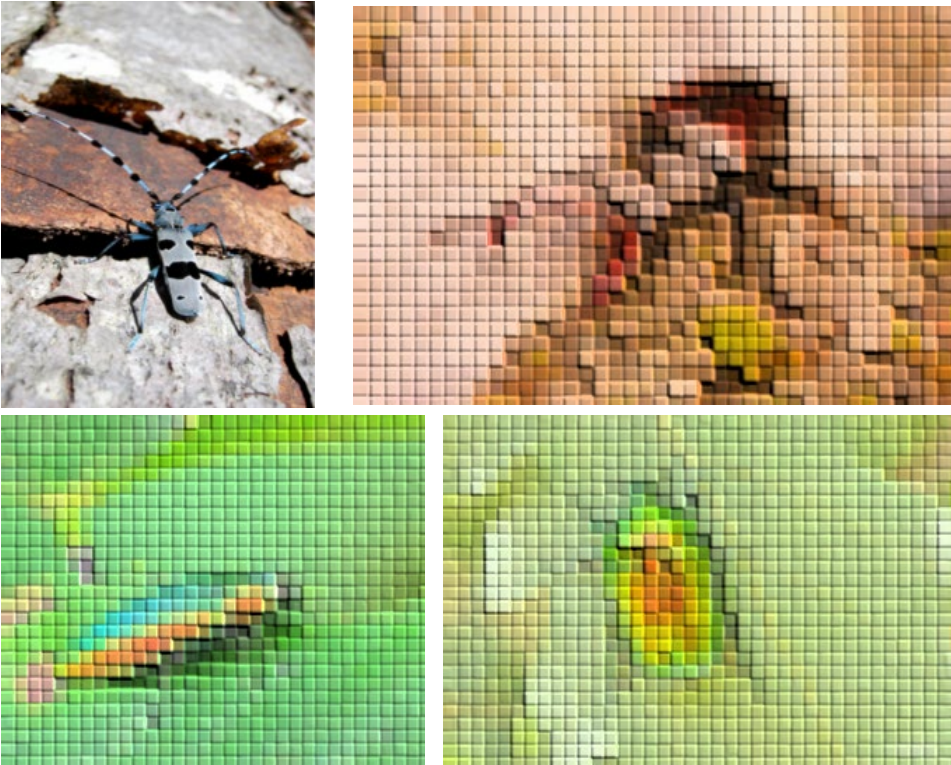
24.2 m³/ha
CH-average



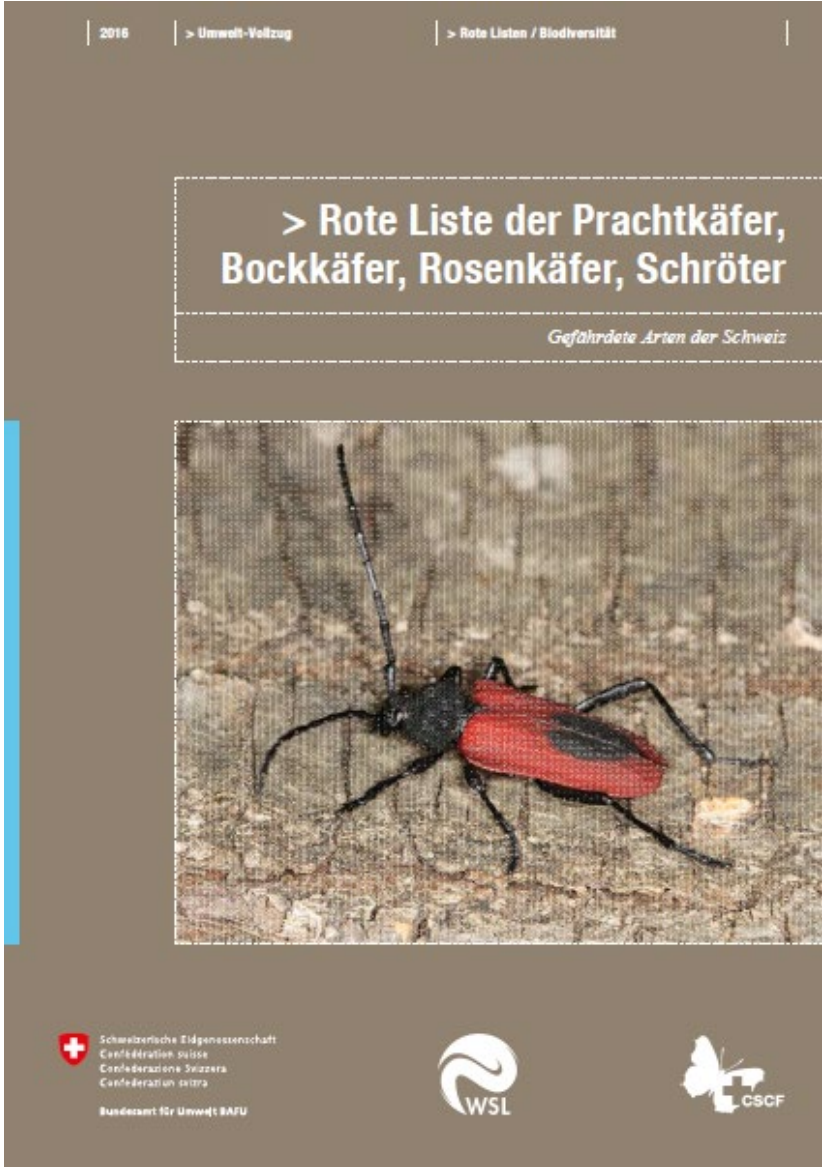
Antrodiella citronella,
Very rare in Europe
> 120 m³ /ha

Müller & Bütler, 2010
CSCF, 2021
LFI, 2020

Threatened species



46% of the longhorn beetles, jewel beetles, stag beetles flower chafer are threatened in Switzerland



Deficits in CH-forest

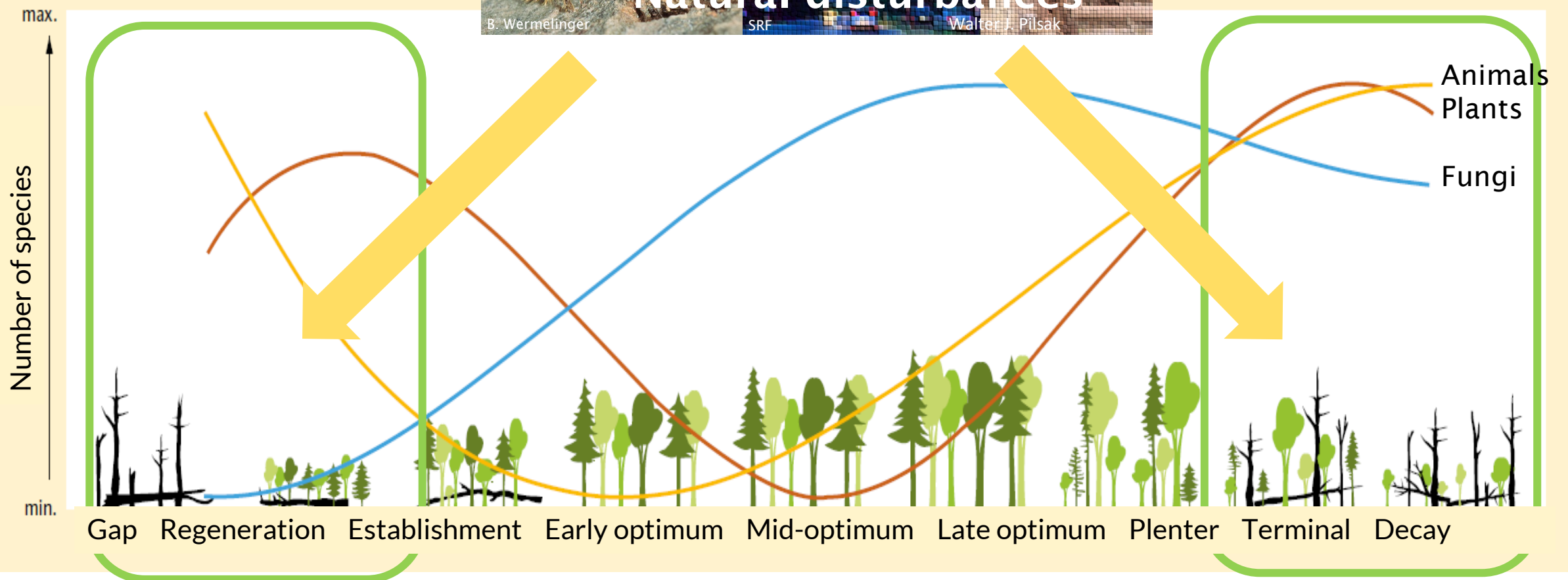
4 Biodiversity

Rolf Holderegger, Nicole Imesch

Forests play a central role in maintaining biodiversity in Switzerland. Since the Forest Report 2005, about half of the forest reserves planned for completion by 2030 have already been established, and the populations of forest birds, large carnivores and wild ungulates have grown. Despite these positive developments, some problem points still remain. Thus open forests and late phases of forest development with old trees and deadwood are rare in the lowlands, and the total number of vulnerable species has not decreased.

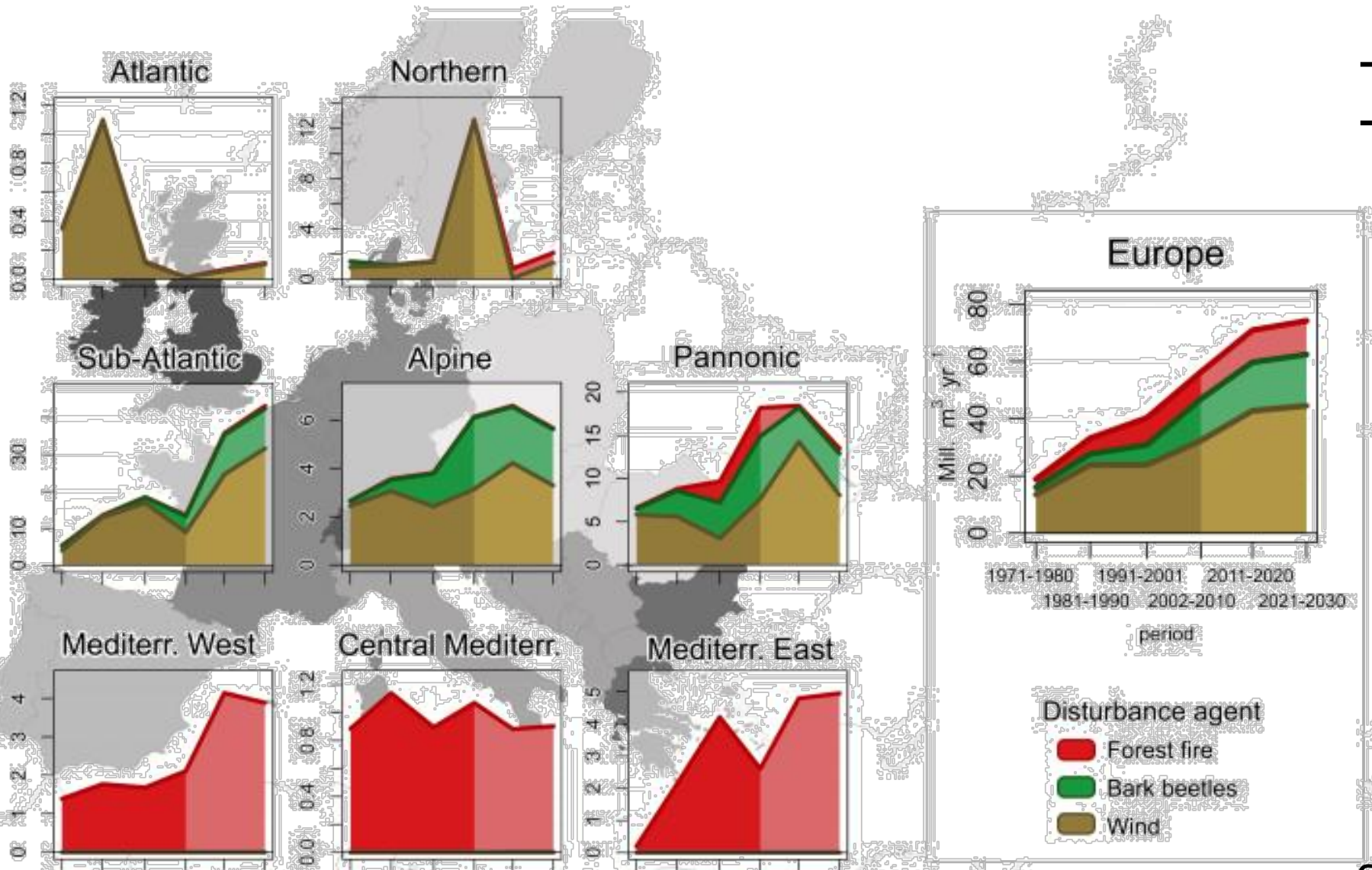


Early and late forest development stages are biodiversity hotspots

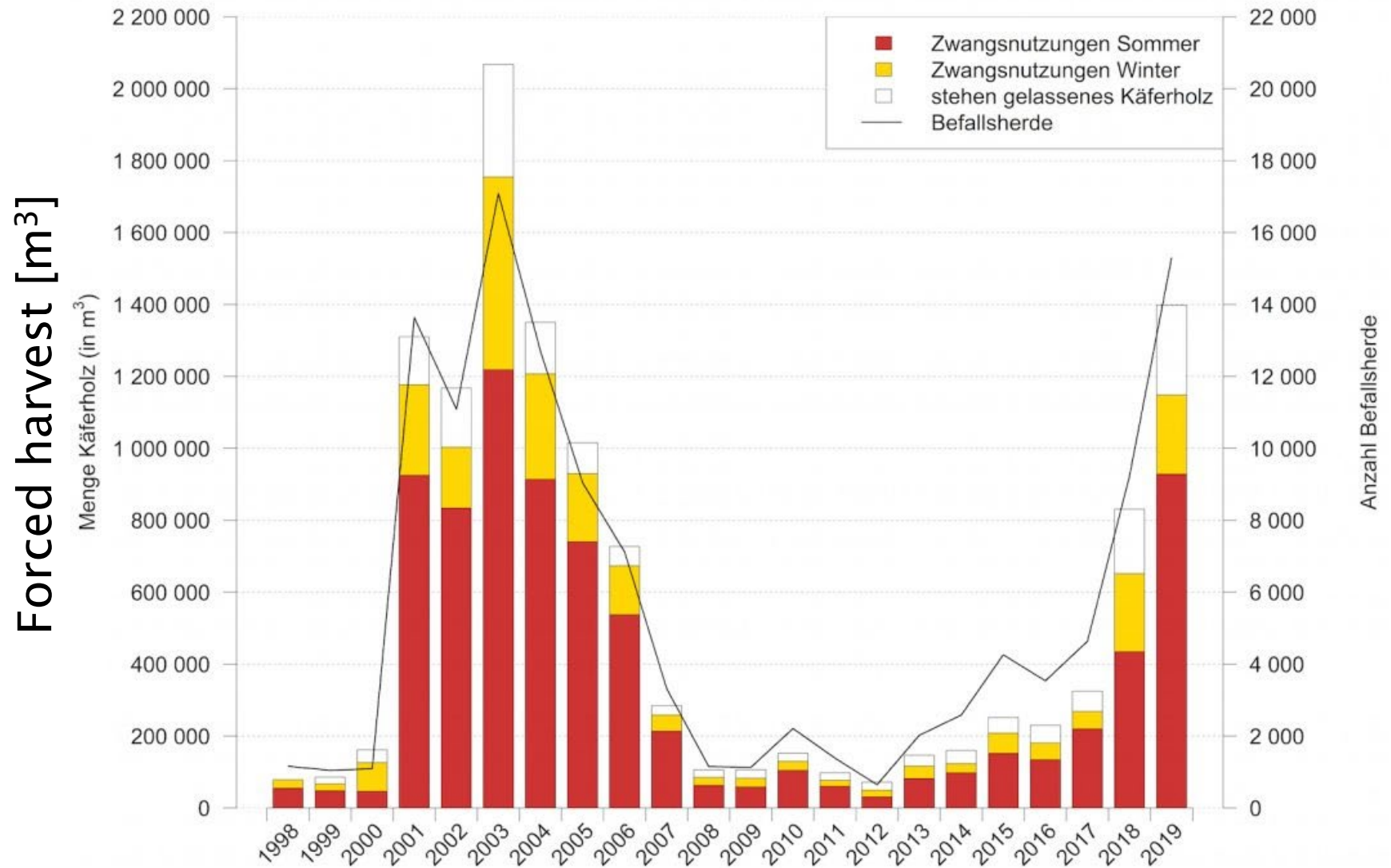


European Forest: Increase of disturbances

- Regional differences
- General increase



Spruce bark beetle in Switzerland



Source: Swiss Forest Protection (WSS)

Disturbance paradox: ecosystem services at risk while simultaneously facilitating biodiversity

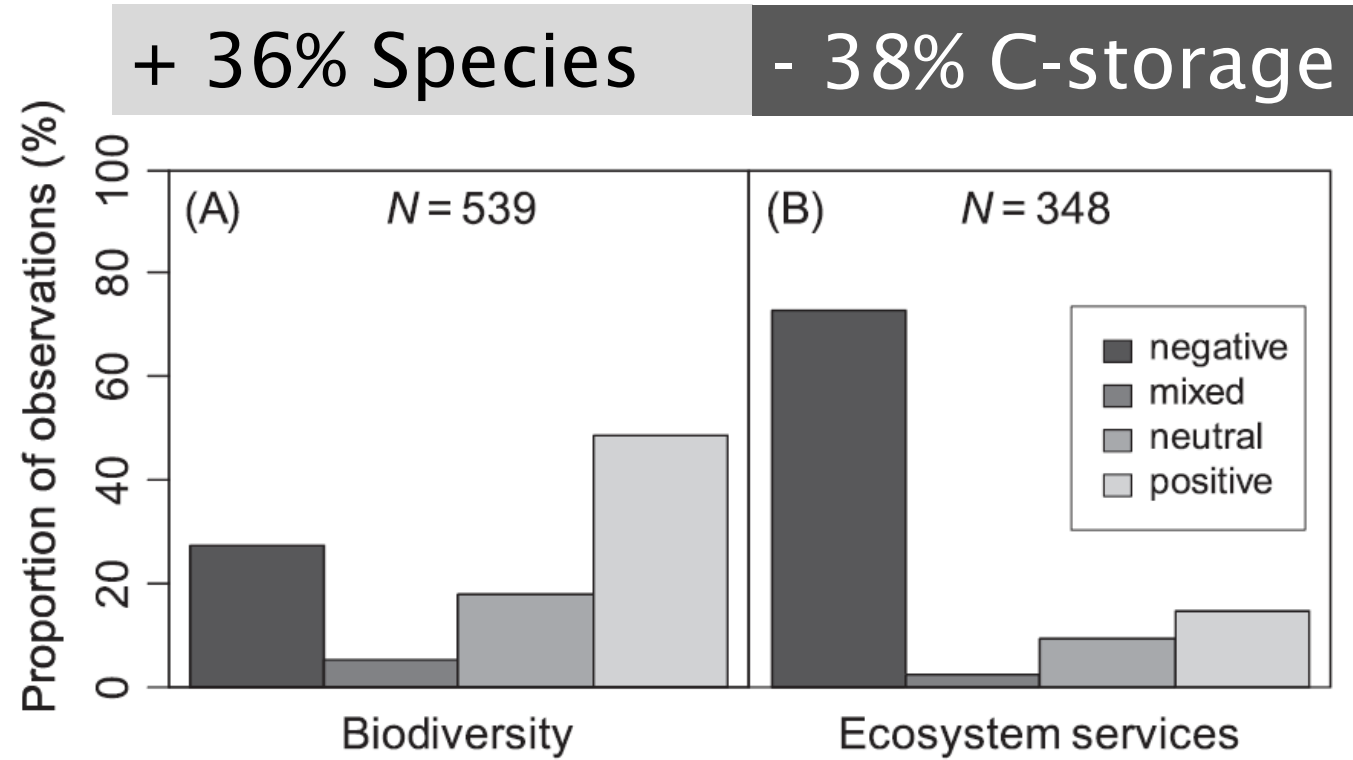
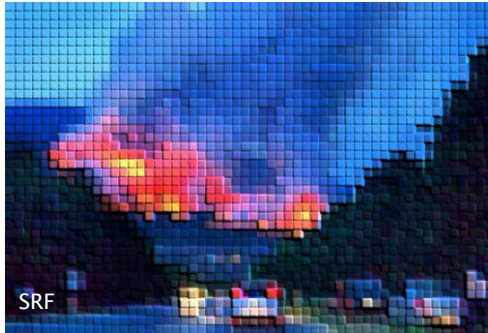


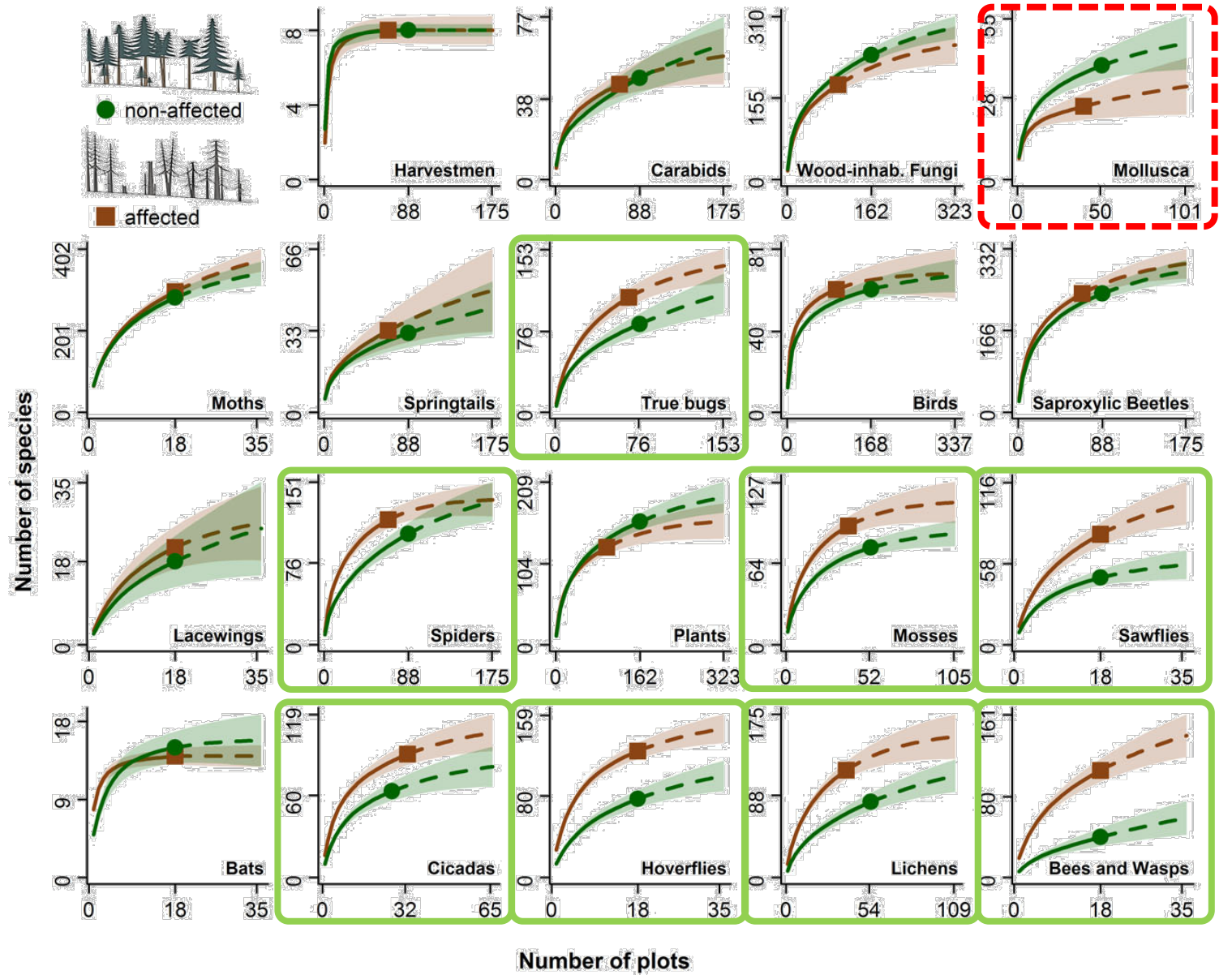
Fig. 2. Disturbance effects on (A) biodiversity and (B) ecosystem services. *N* indicates the number of observations in our database of disturbance effects synthesized from 478 peer-reviewed articles.

Spruce bark beetle

Looser (1)

Winners (8)

Egal (10)



Forest fires also promote biodiversity

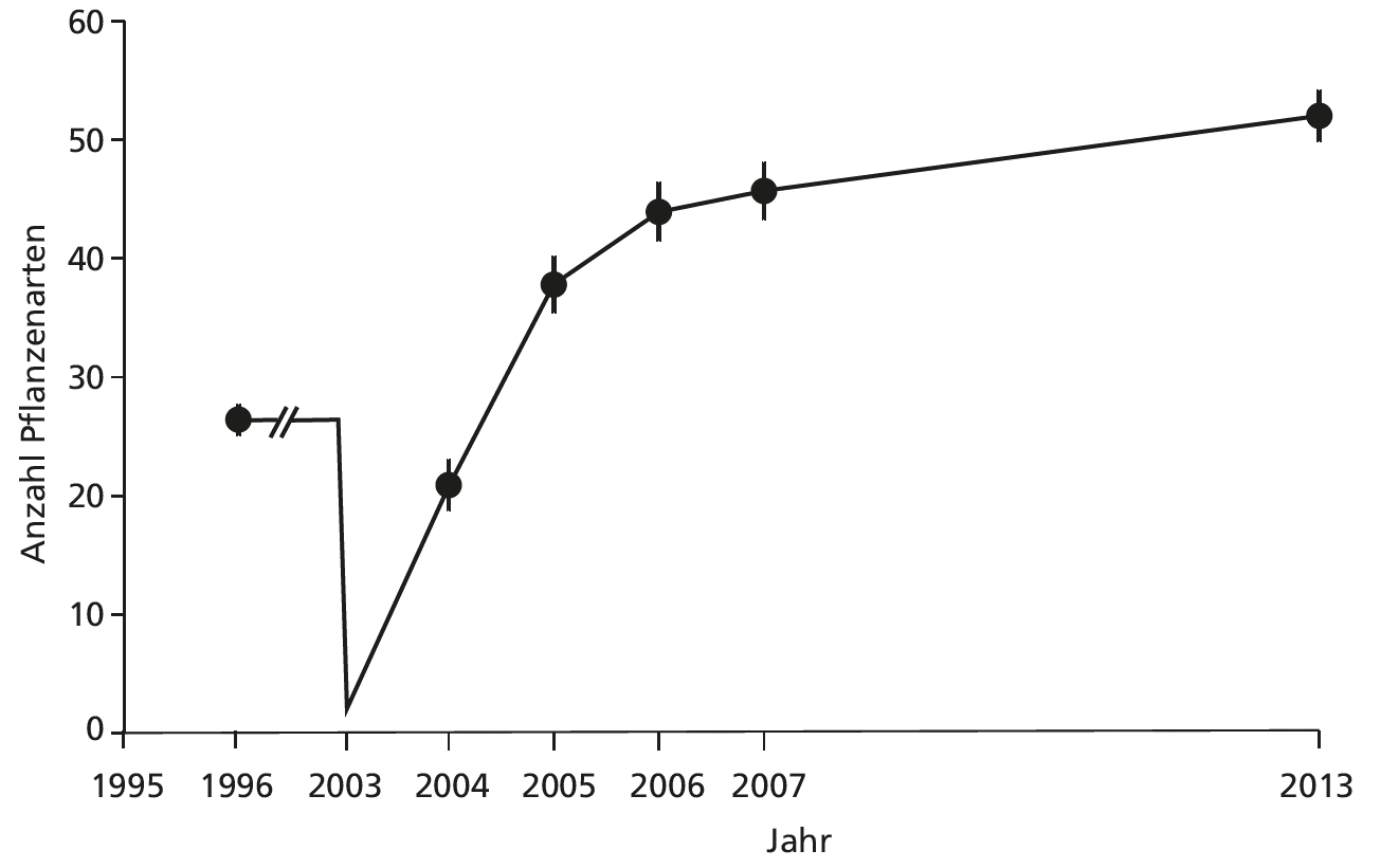
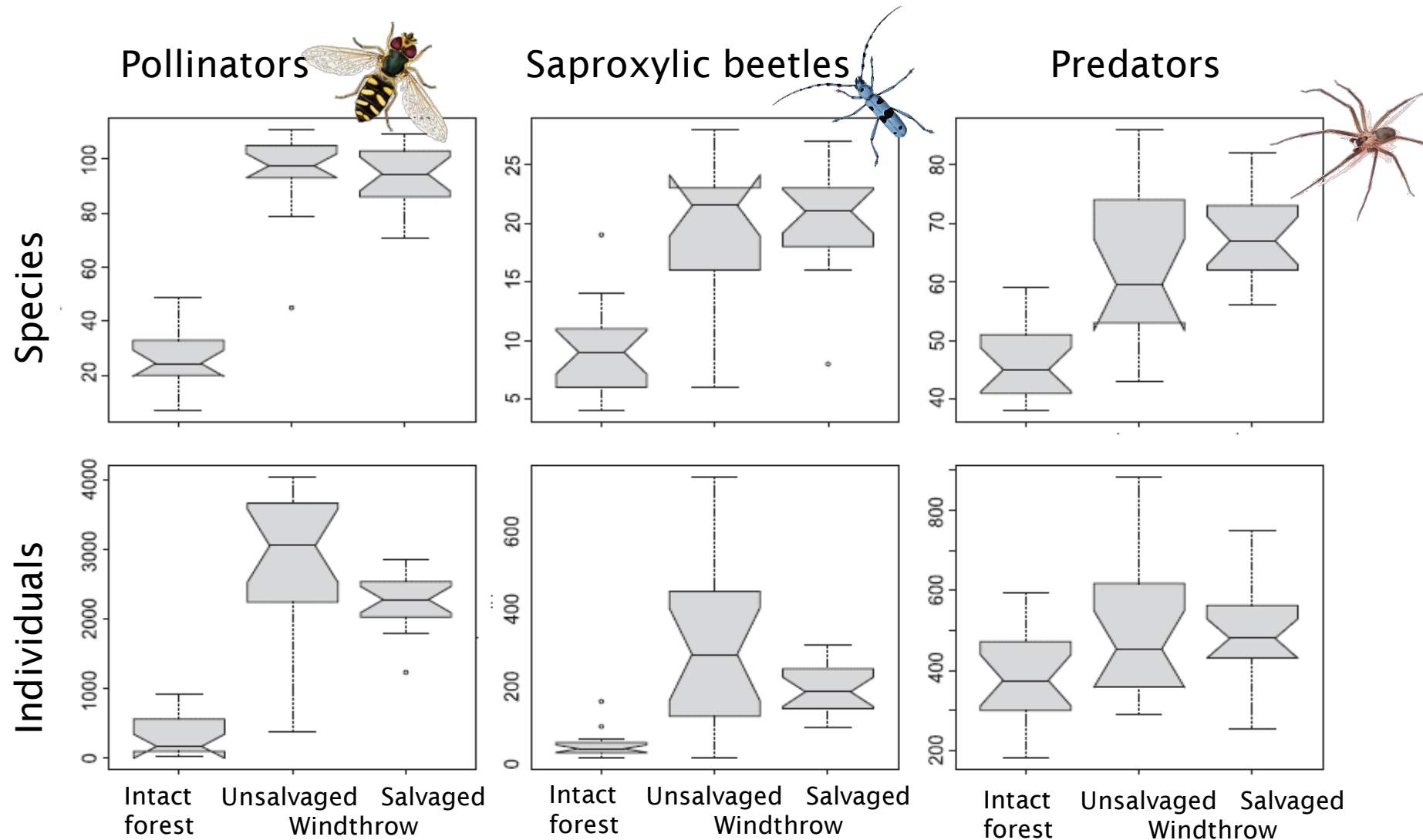
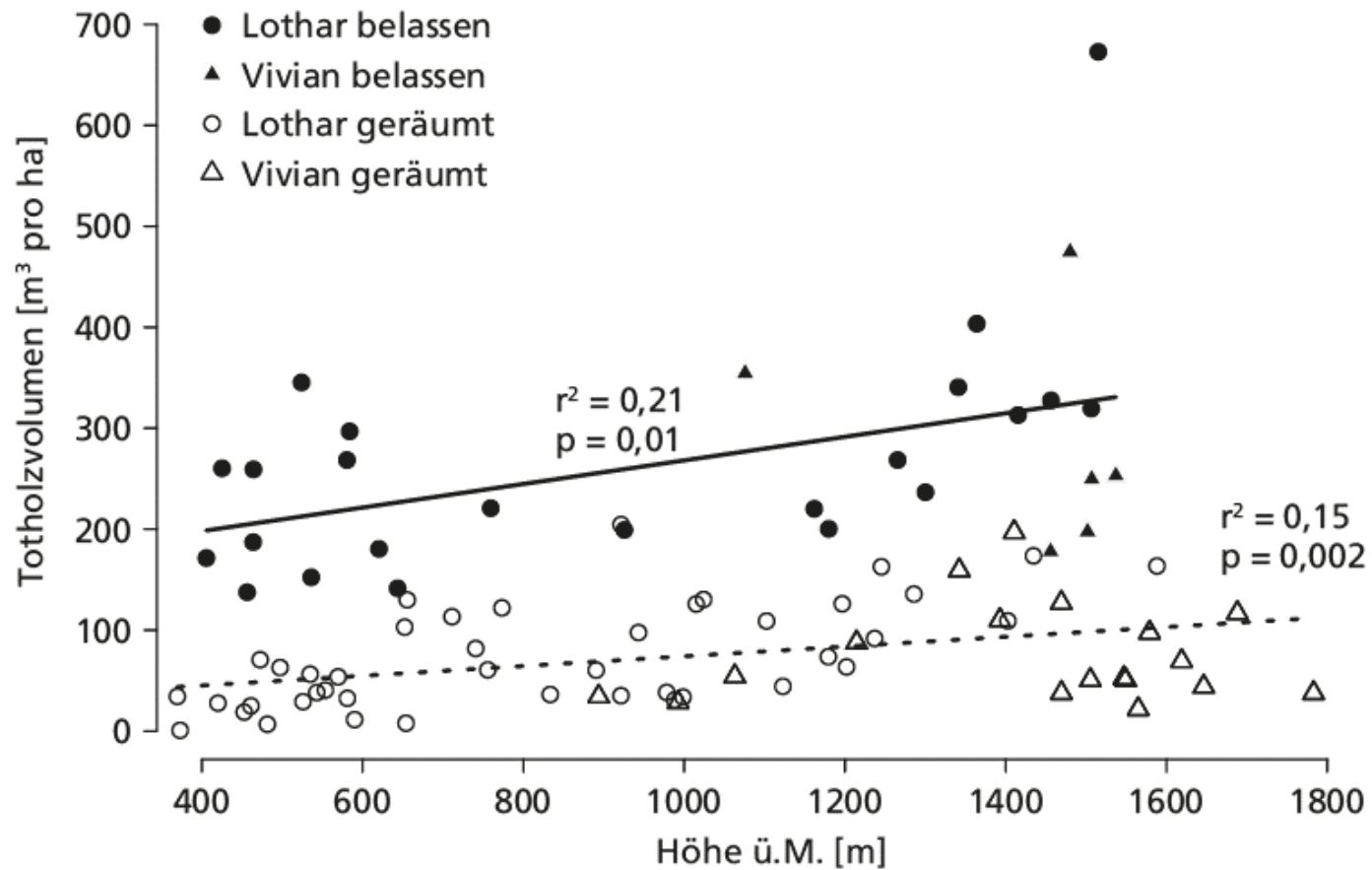


Abb. 3. Entwicklung der mittleren Artenzahlen und Standardfehler von Gefässpflanzen auf der Waldbrandfläche von Leuk (2003), mit Angaben vor dem Waldbrand aus GÖDICKEMEIER (1998), nach dem Waldbrand aus WOHLGEMUTH *et al.* (2010) sowie unpublizierte Daten für das Jahr 2013.

Effect of salvage logging on Lothar-windthrows



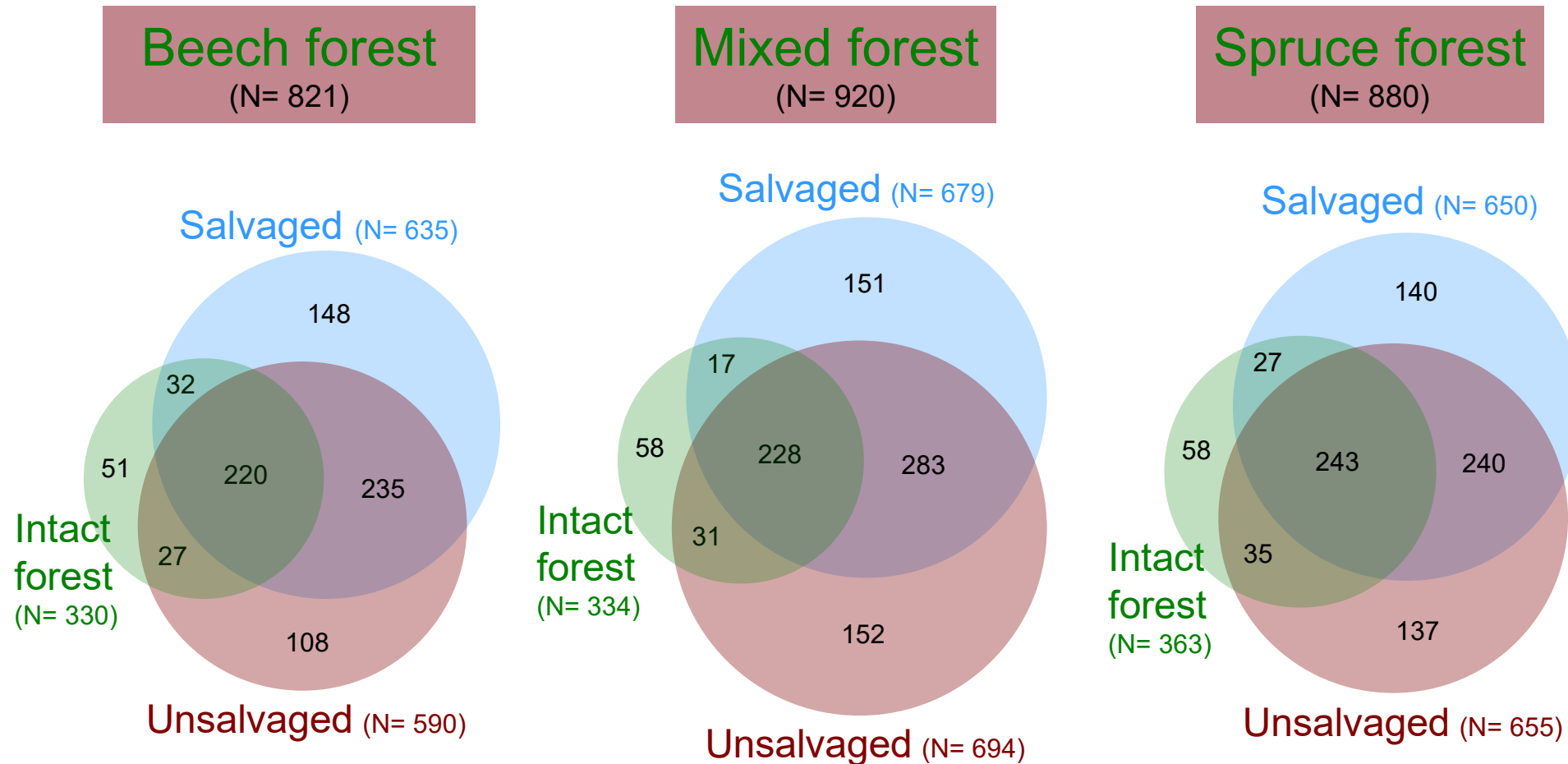
Still a lot of dead wood on salvaged windthrows



Recommendation:
Partial salvage

Abb. 4. Totholzanteil in Windwurfflächen, 10 Jahre nach Vivian und 20 Jahre nach Lothar.
Quelle: PRIEWASSER *et al.* (2013). Die Regressionslinien beziehen sich auf alle belassenen (durchgezogen) und alle geräumten (gestrichelt) Flächen.

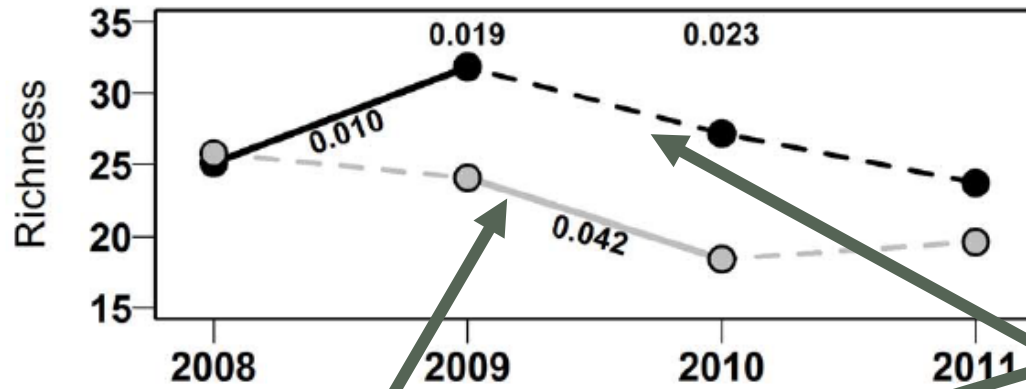
Big differences in species communities



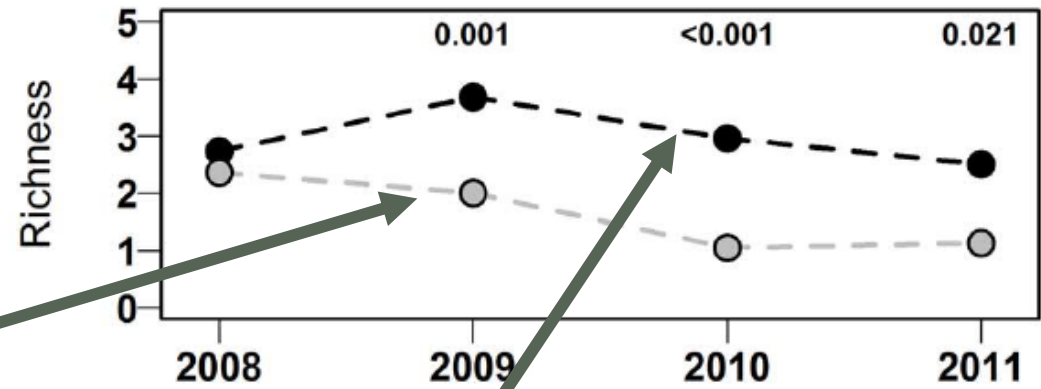
Recommendation: Mosaic of salvaged and unsalvaged windthrows

Differences in species richness when «properly salvaged»

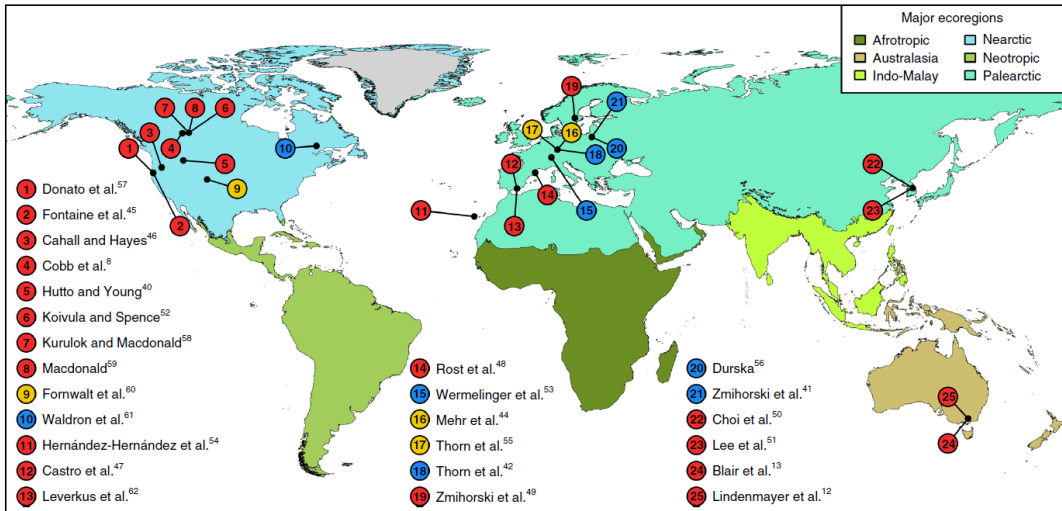
All saproxylic species



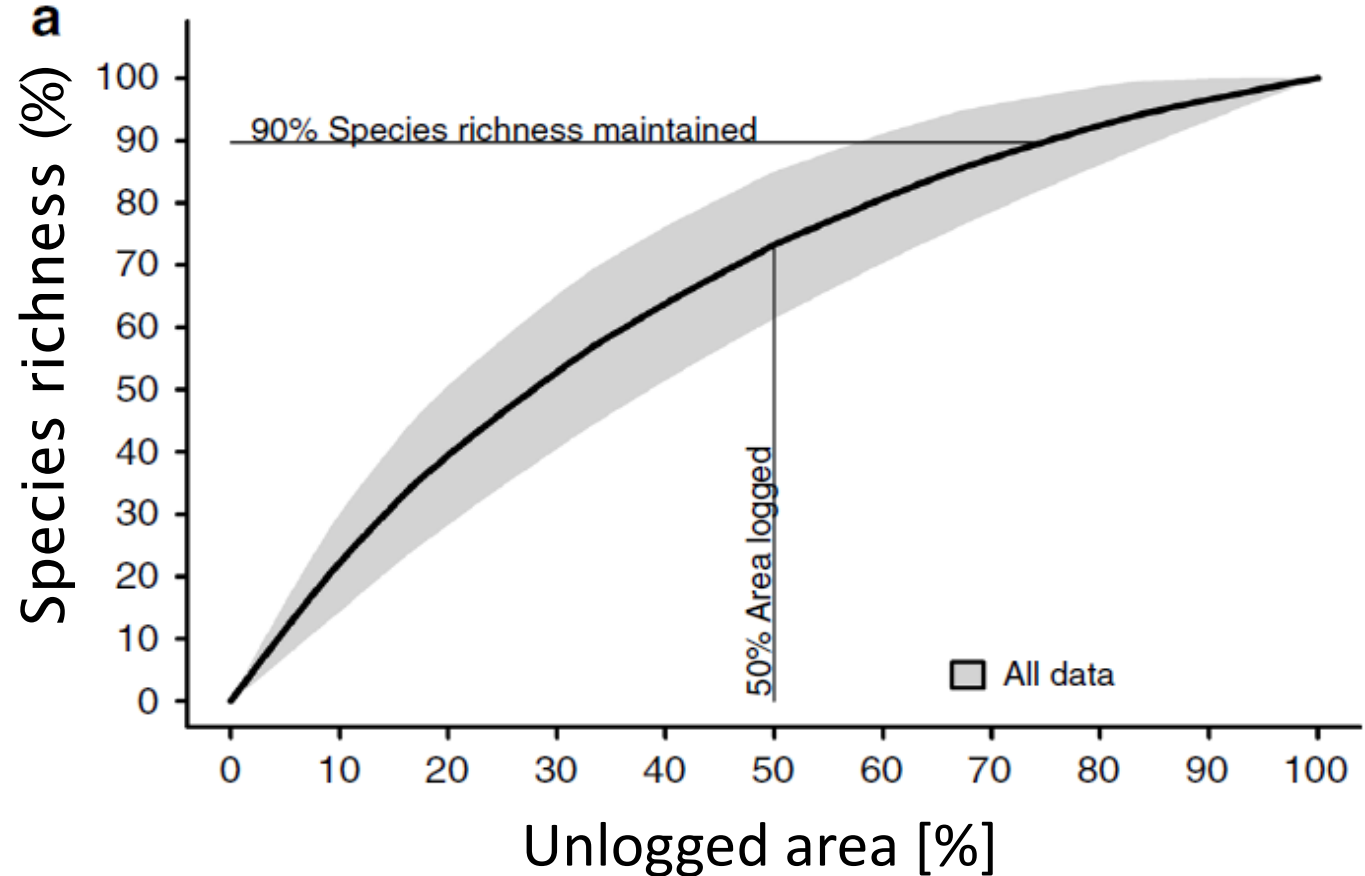
Threatened saproxylic species



Retention benchmarks for salvage logging to protect biodiversity

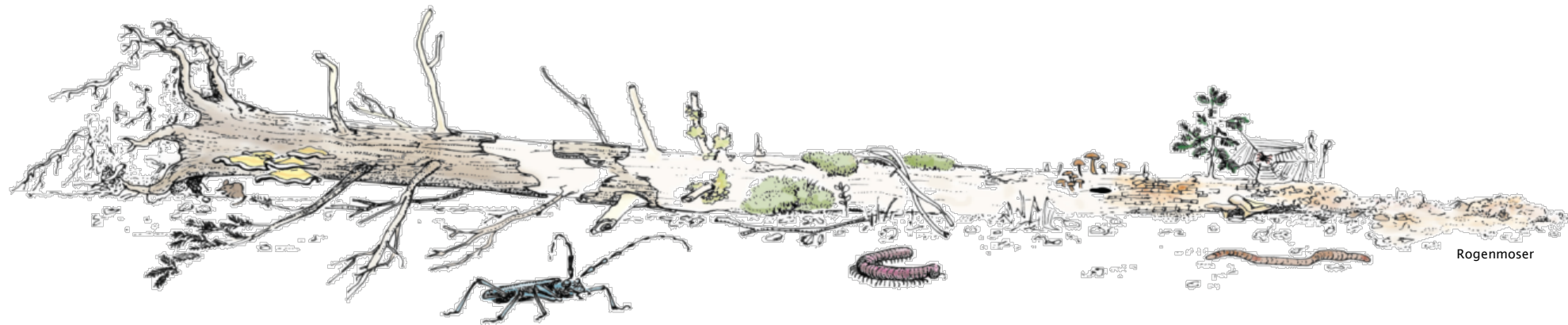


- Wildfire
- Windstorms
- Insect outbreaks



Conclusions and recommendations

- ▶ Natural disturbances rapidly increase the amount of deadwood and light: 2 large deficits in CH-forests.
- ▶ Natural disturbances can be considered as a form of restoration in forests that are far from their natural state.
- ▶ Natural disturbances promote biodiversity in forests, also of demanding rare species, especially when leaving deadwood.
- ▶ Natural disturbances are an opportunity for biodiversity promotion in the forest and should be more integrated into management plans



Are we prepared
for the next natural
disturbance?

