The legacy of coppicing: the present reflects the past

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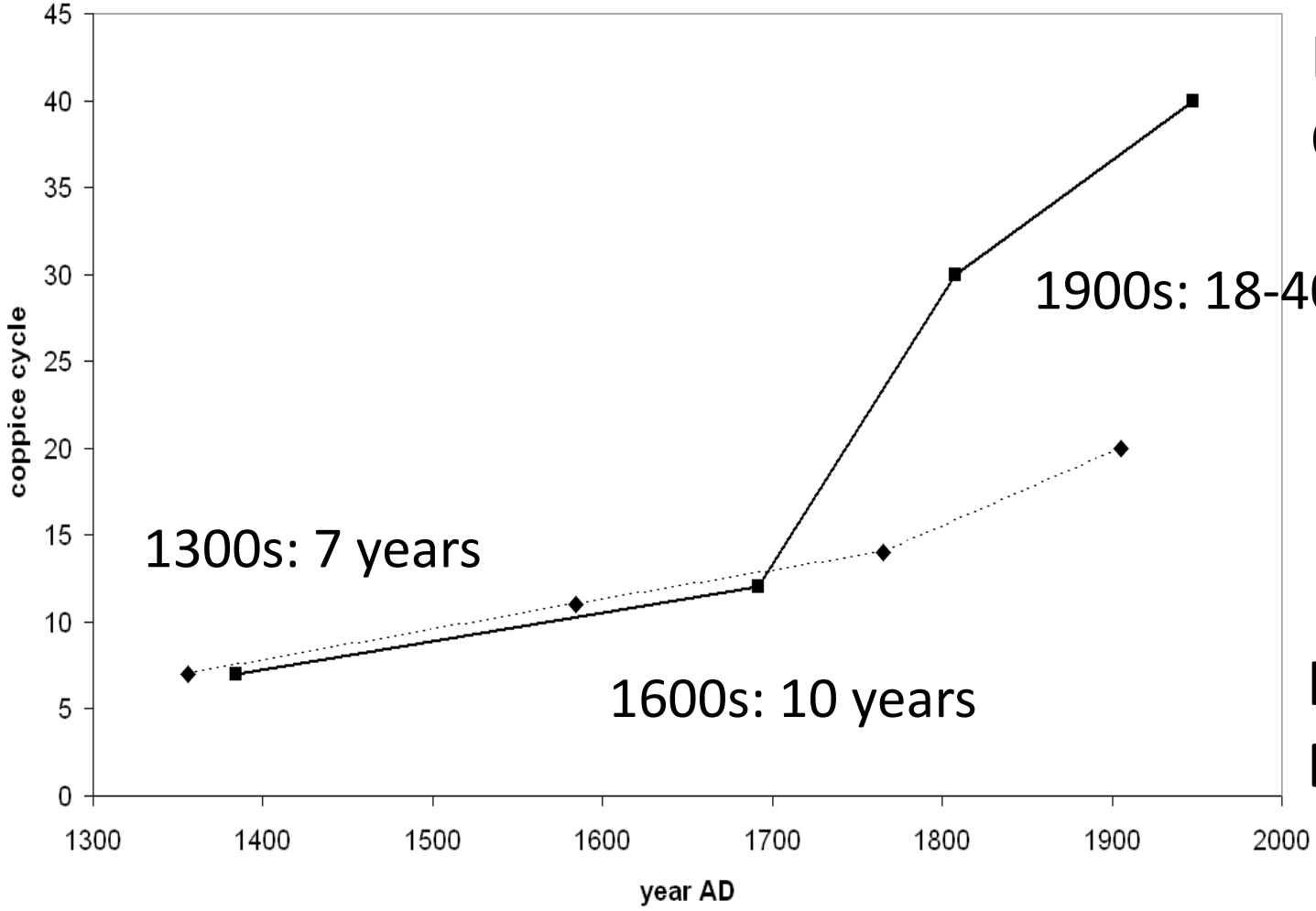
Coppice cycle patterns across Europe

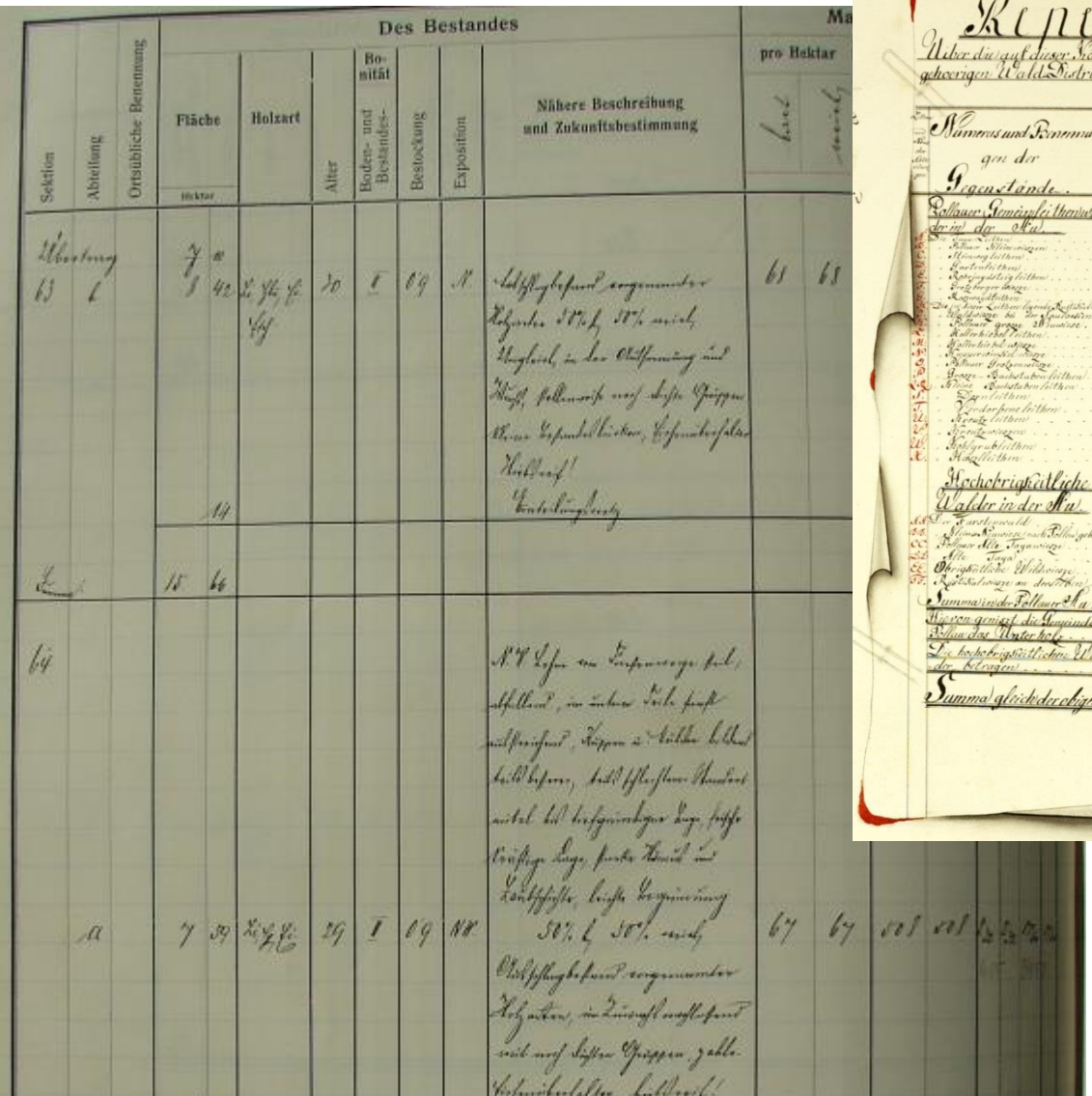


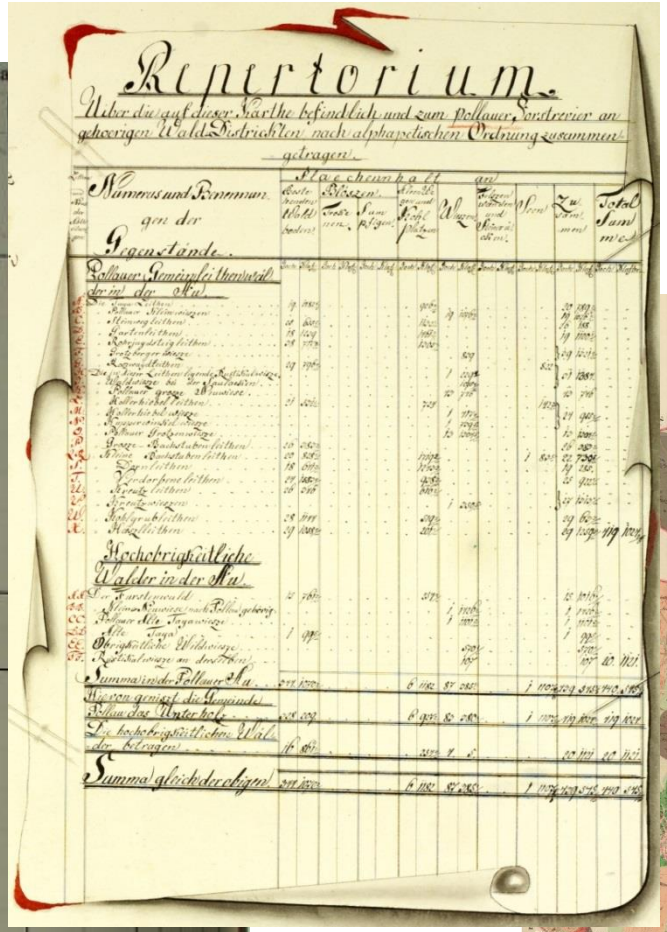
Děvín
Czech Rep.

Hayley Wood
England

P. Szabó, 2010, ForEcolManag

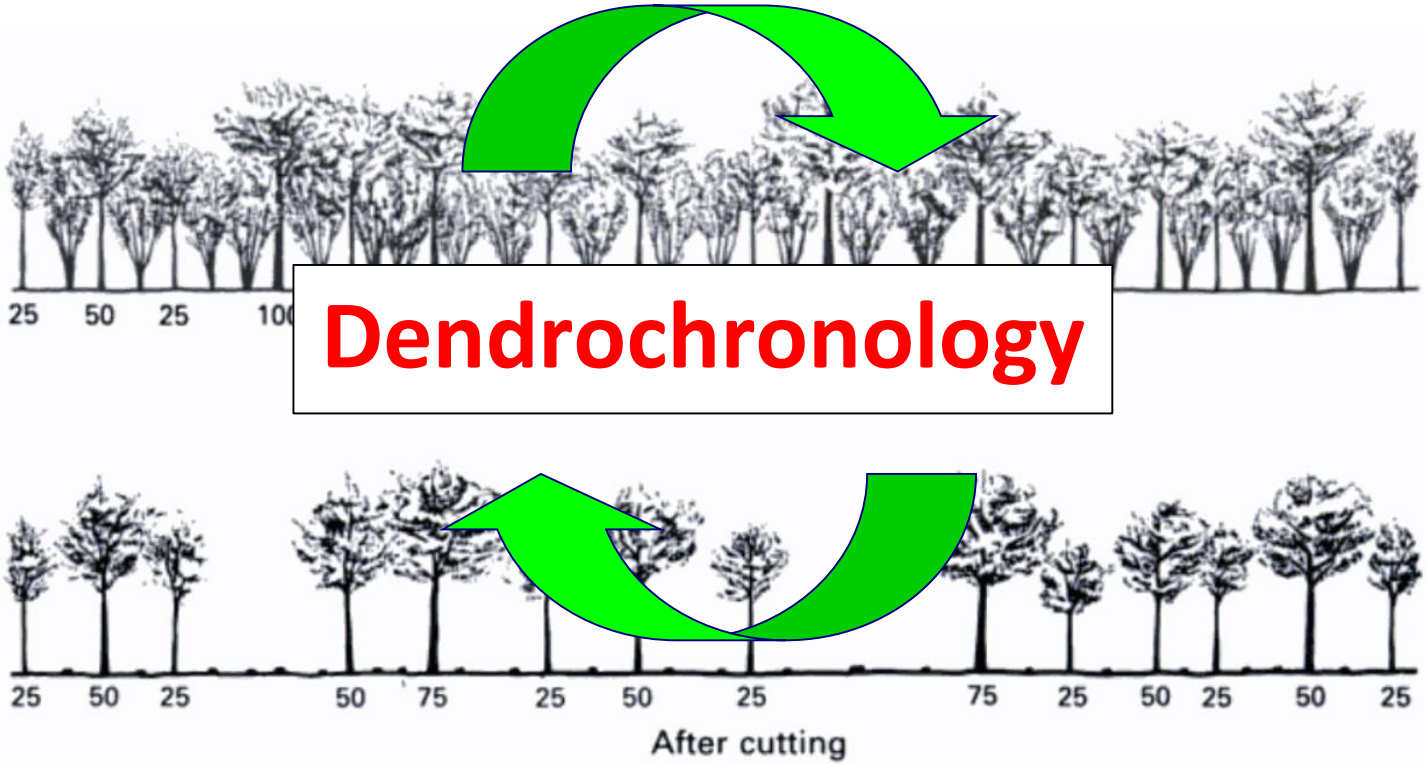
Reconstructing coppicing history from archives





John D. Matthews: Silvicultural systems. Oxford, 2001, p. 216

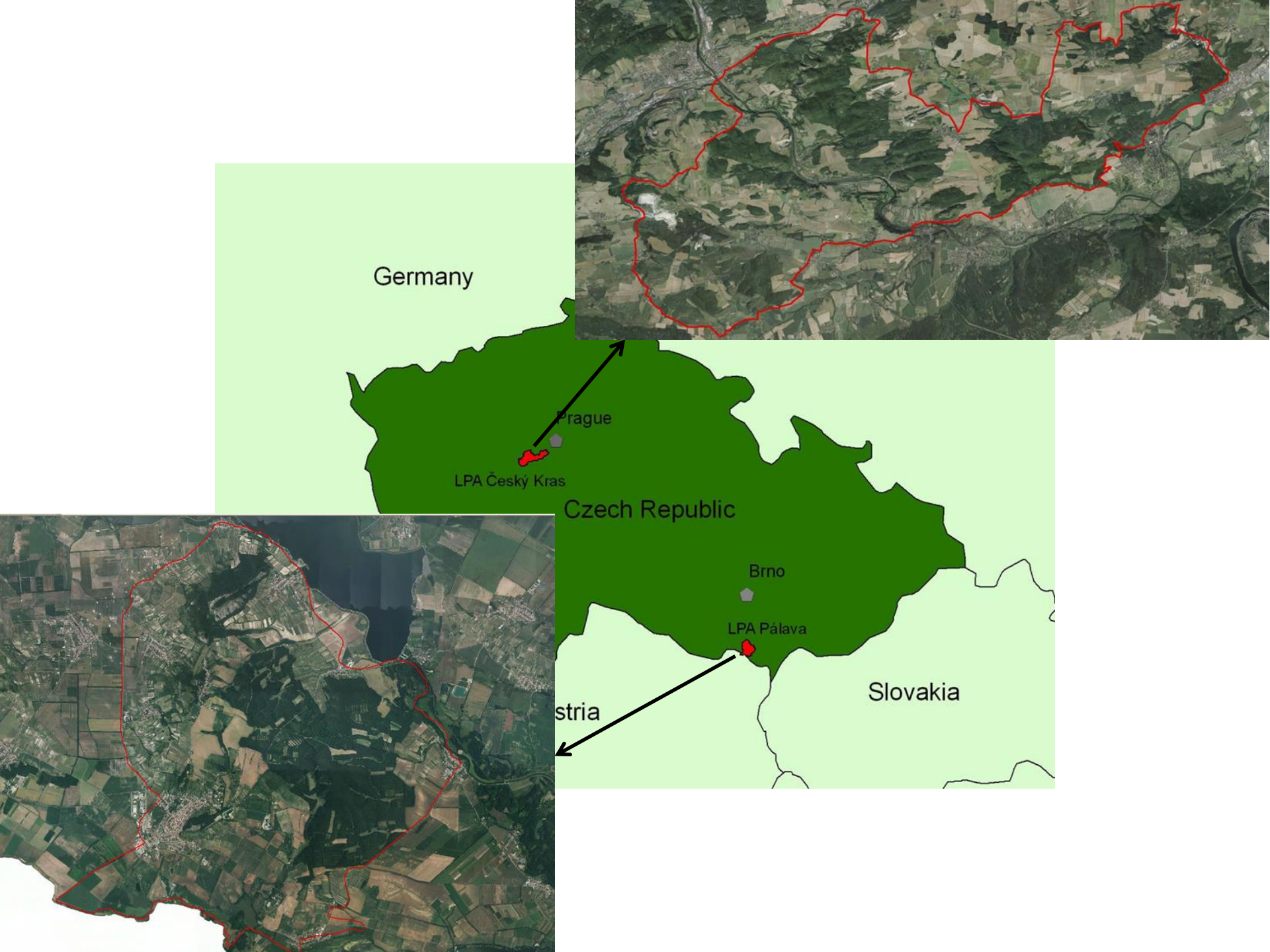
Coppice with standards



Dendrochronology

Aims were to test

- use of dendroecological methods for reconstruction of coppicing history
- ability of tree-rings to reflect coppicing history
- role of competition in response of standards to coppicing
- connections between oak regeneration patterns and historical coppicing events


Germany
Prague
LPA Český Kras
Czech Republic
Brno
LPA Pálava
Slovakia
stria

Czech Karst (Český Kras)

- karst area of 128 km^{2,}
- xerothermic to mesic forest types (38%)
- protected since 1972 – non-intervention management
- forests preserved on hills surrounded by arable fields

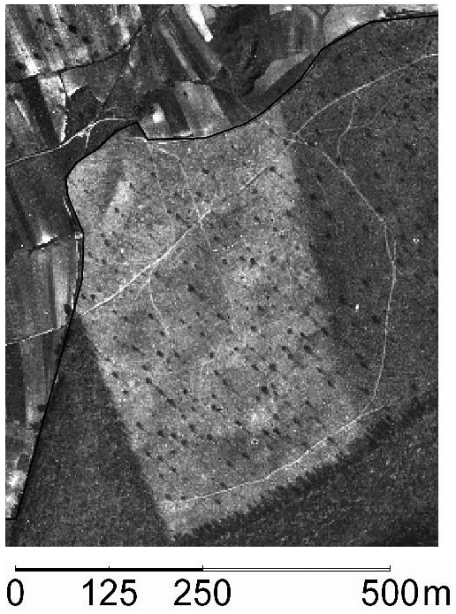
Pálava

- karst area of 83 km^2
- xero & thermo to mesophilous forests
- protected since 1976 (1946) - non-interv. management
- surrounded by intensive agriculture (vineyards, orchards and arable fields)
- popular tourist destination (over 80.000 visitors per year)

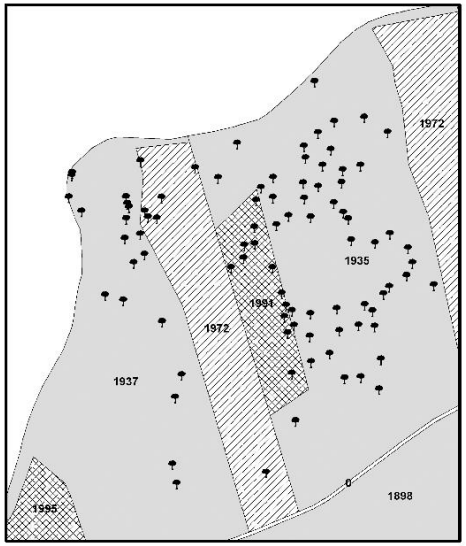
Pálava site

a)

b)



c)



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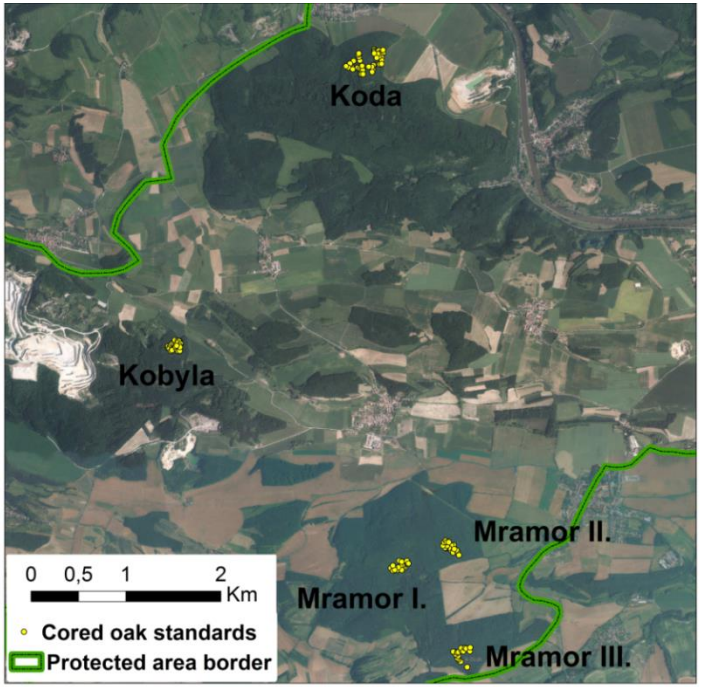
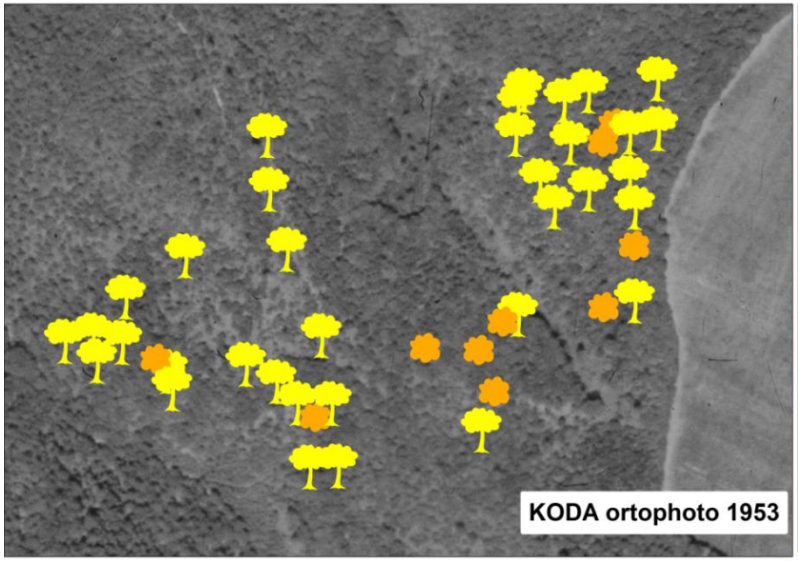
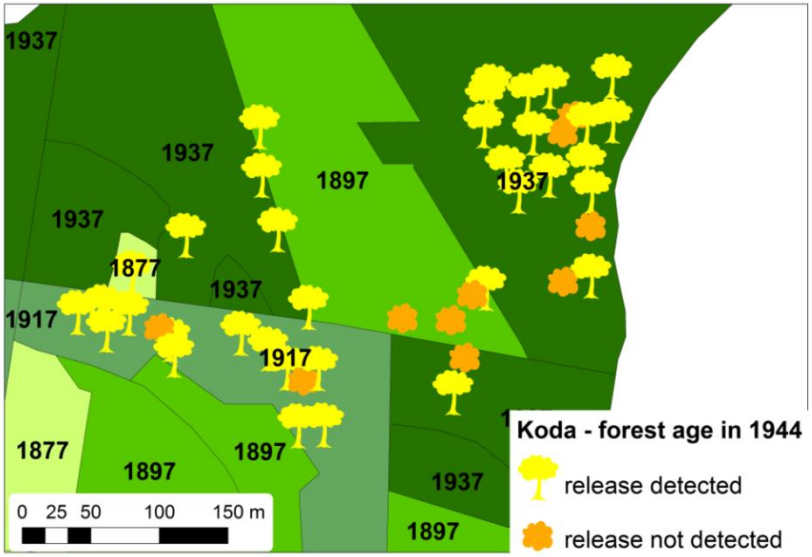
Czech Karst site







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Dendrochronological analysis

- detection of radial growth **releases**
- **Boundary-line** criteria – BL calculated using large dataset of oak chronologies (used at both sites)

  GC 20 - 49.9% of BL = moderate, 50 - 100% = major release
- **Radial-growth averaging** criteria (used at C. Karst only)

  $\%GC = ((M_2 – M_1)/M_1) * 100$

  (GC = growth change, M_1 = avg. growth of preceding 10 years, M_2 = avg. growth of subsequent 10 years)

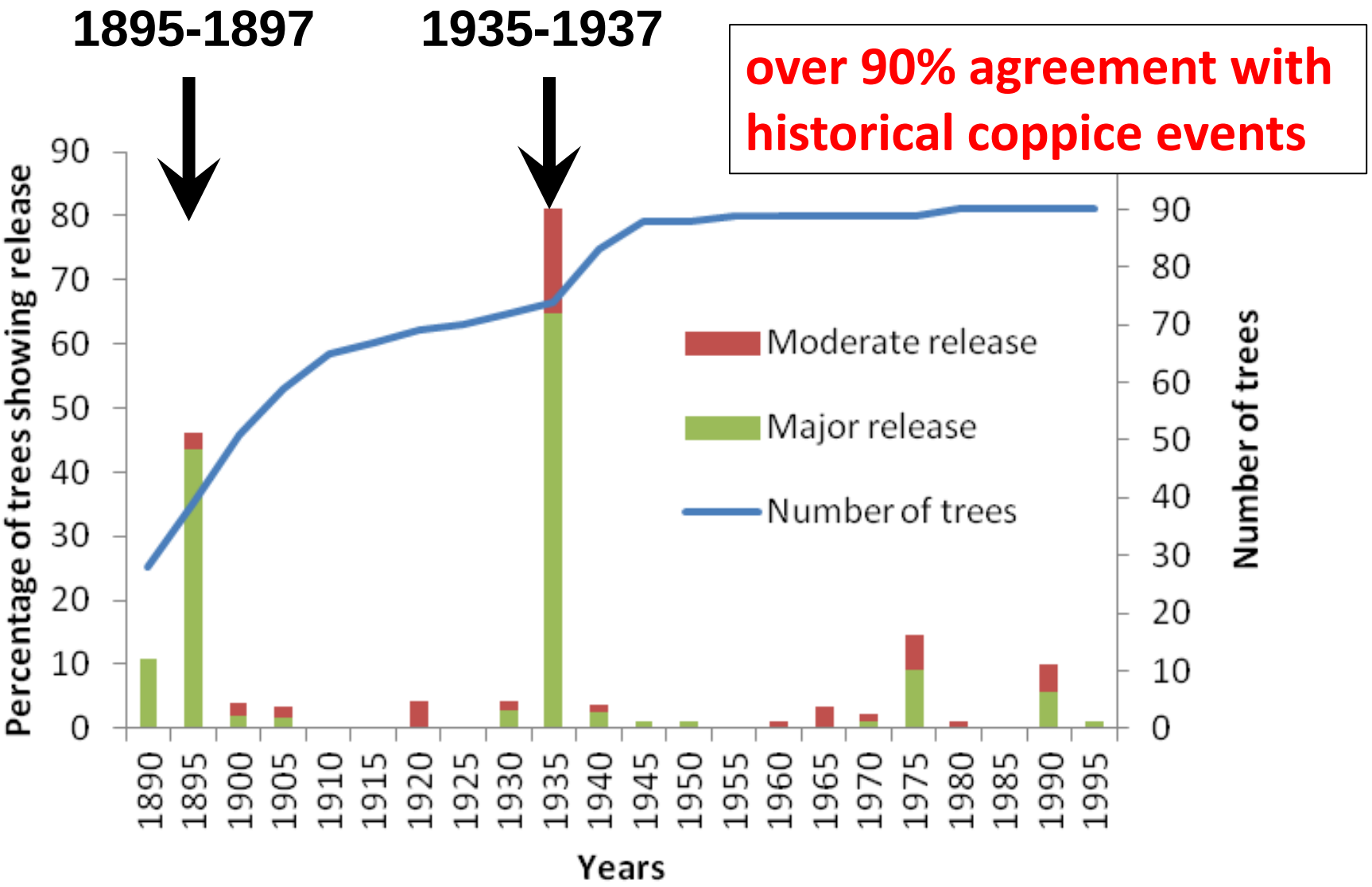


Cored oaks	Děvín	Czech Karst
Number	90	117
Age	28 - 146	90-215
DBH	144-215	111-225
No. of releases detected	126	241
Avg no. of releases per tree	1.4	2.1
Avg no. of maj. releases per tree	1	1
Proportion of trees with release	96%	94%
Proportion of major releases	72%	49%

Comparison to forest archives

- **sensitivity** (commission error, accounting for undetected coppicing) = correctly detected/all archival coppice records
- **positive predictive power** (omission error, probability of correct detection), PPP = correctly/total detected releases
- 5-year difference allowed
- missing records ➡ releases excluded

Release in oak standards (Děvín)



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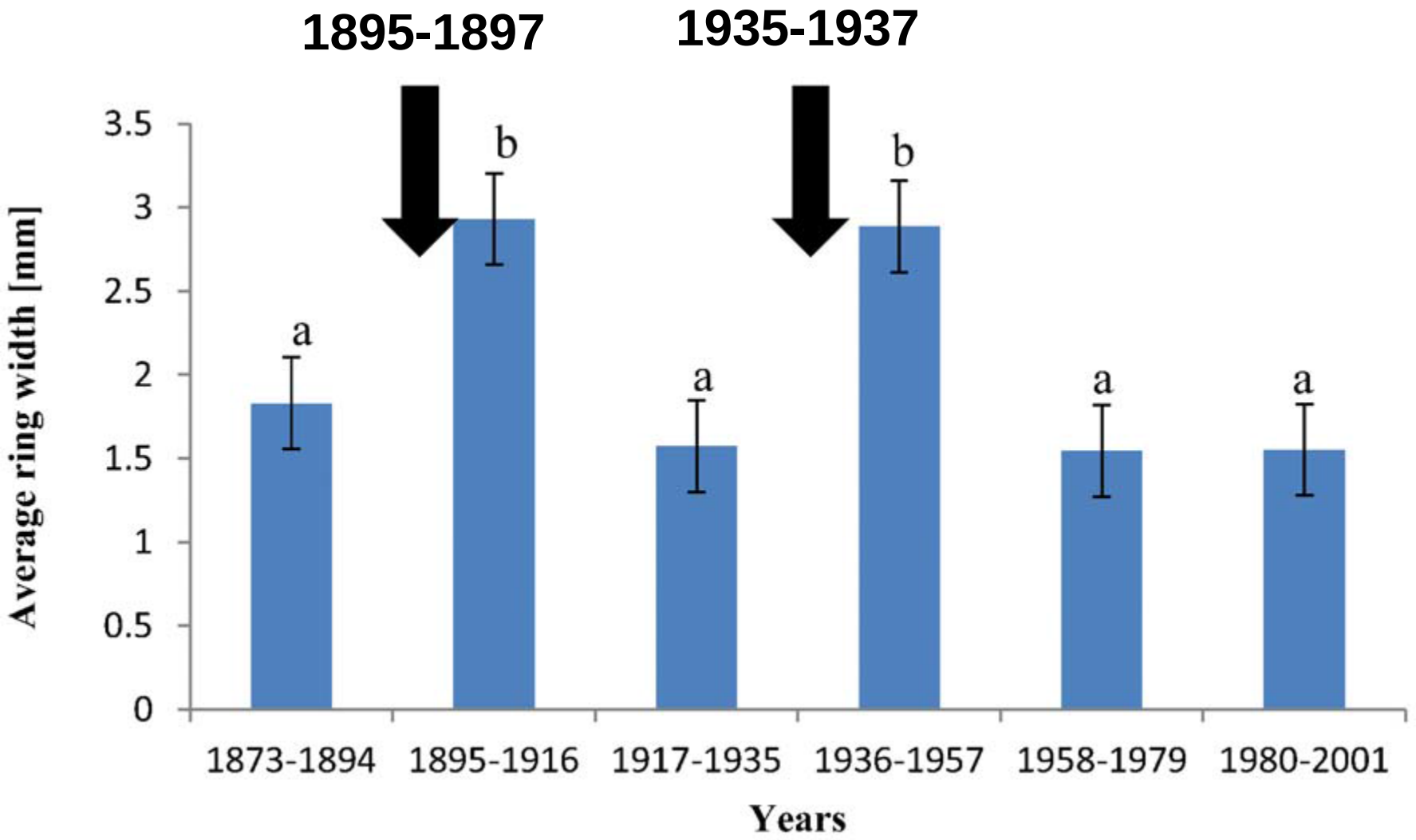
Average annual tree-ring increment (Děvín)



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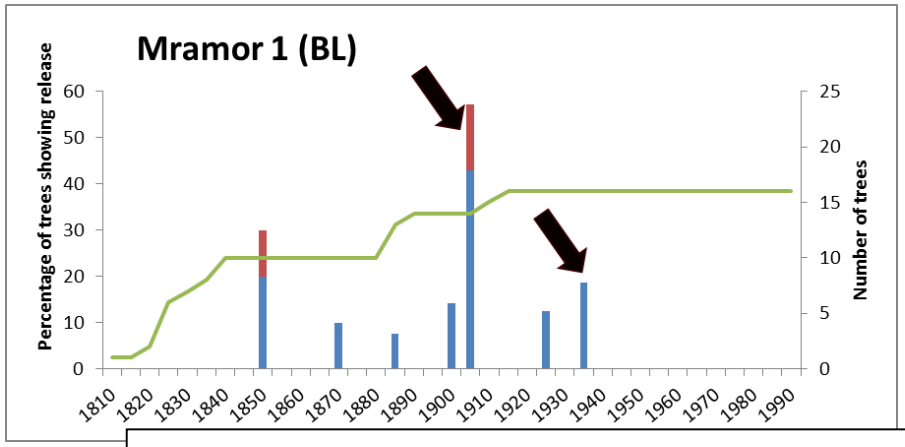
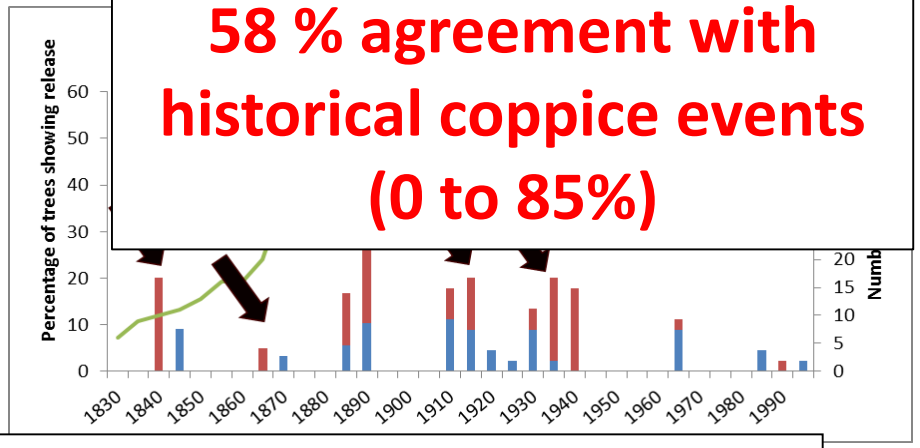
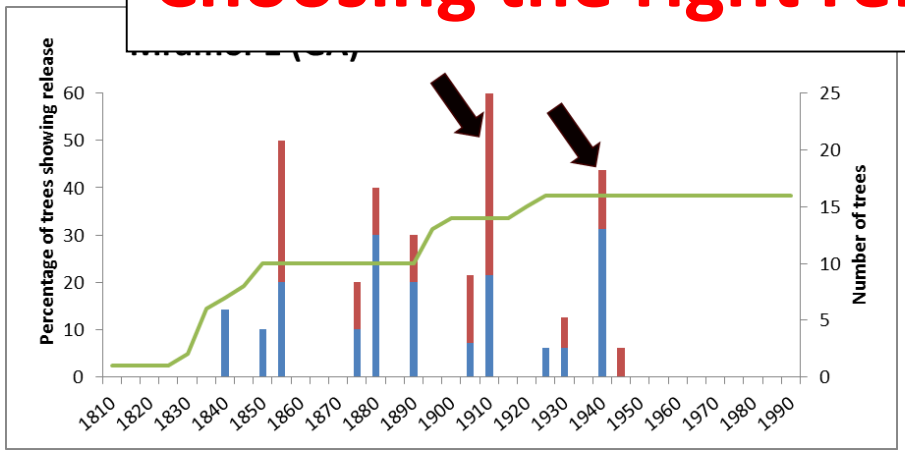
Release in oak standards (Czech Karst)



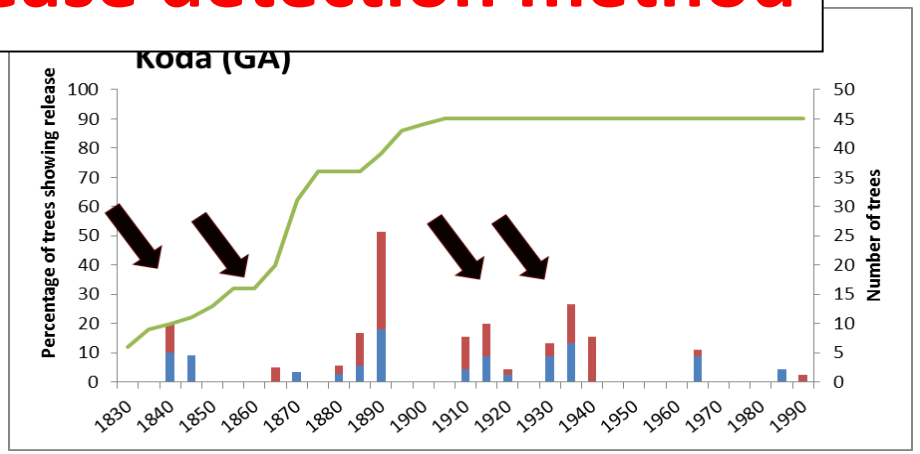


58 % agreement with historical coppice events (0 to 85%)

Choosing the right release detection method



missing records



missing records

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Accuracy of Growth averaging method

C. Karst	Detected (major/ moderate)	False det. (major/ moderate)	Not detected	PPP	PPP (major)	Sensitivity
Mramor I.	9/4	4/6	17	57%	75%	43%
Mramor II.	8/8	3/9	14	57%	73%	53%
Mramor III.	10/3	6/7	16	50%	63%	45%
Kobyla	5/10	0/11	28	58%	**100%**	35%
Koda	26/10	5/13	26	67%	82%	58%

PPP = Positive Predictive Power, probability of correct detection
Sensitivity = accounting for undetected coppicing

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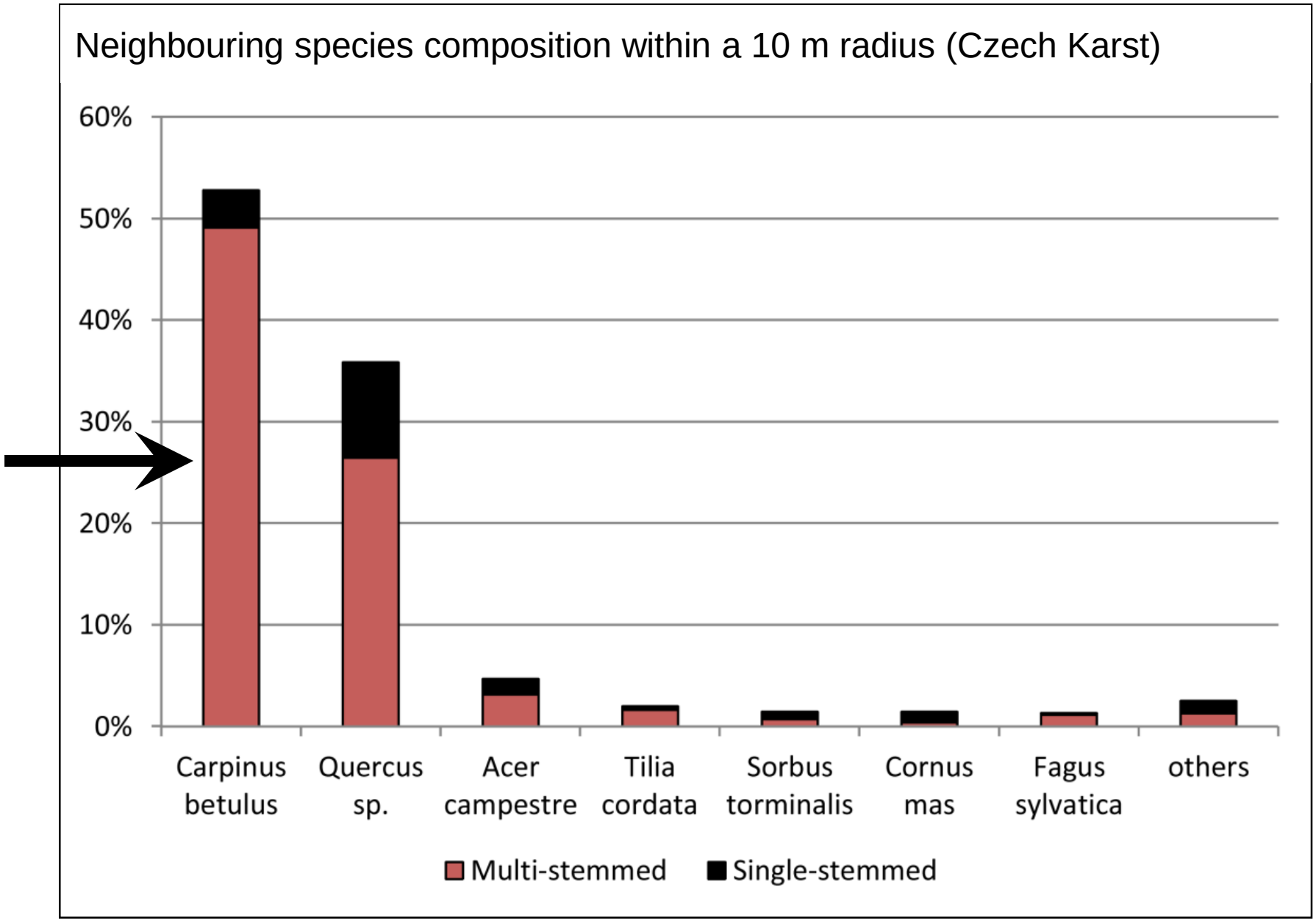
Effects of competition

- trees of DBH > 4 cm in 10 m radius - distance, DBH

- indices of crowding intensity
- based on density (No of stems)
- size-related neighbour effect (distance-weighted basal area - DWBA)



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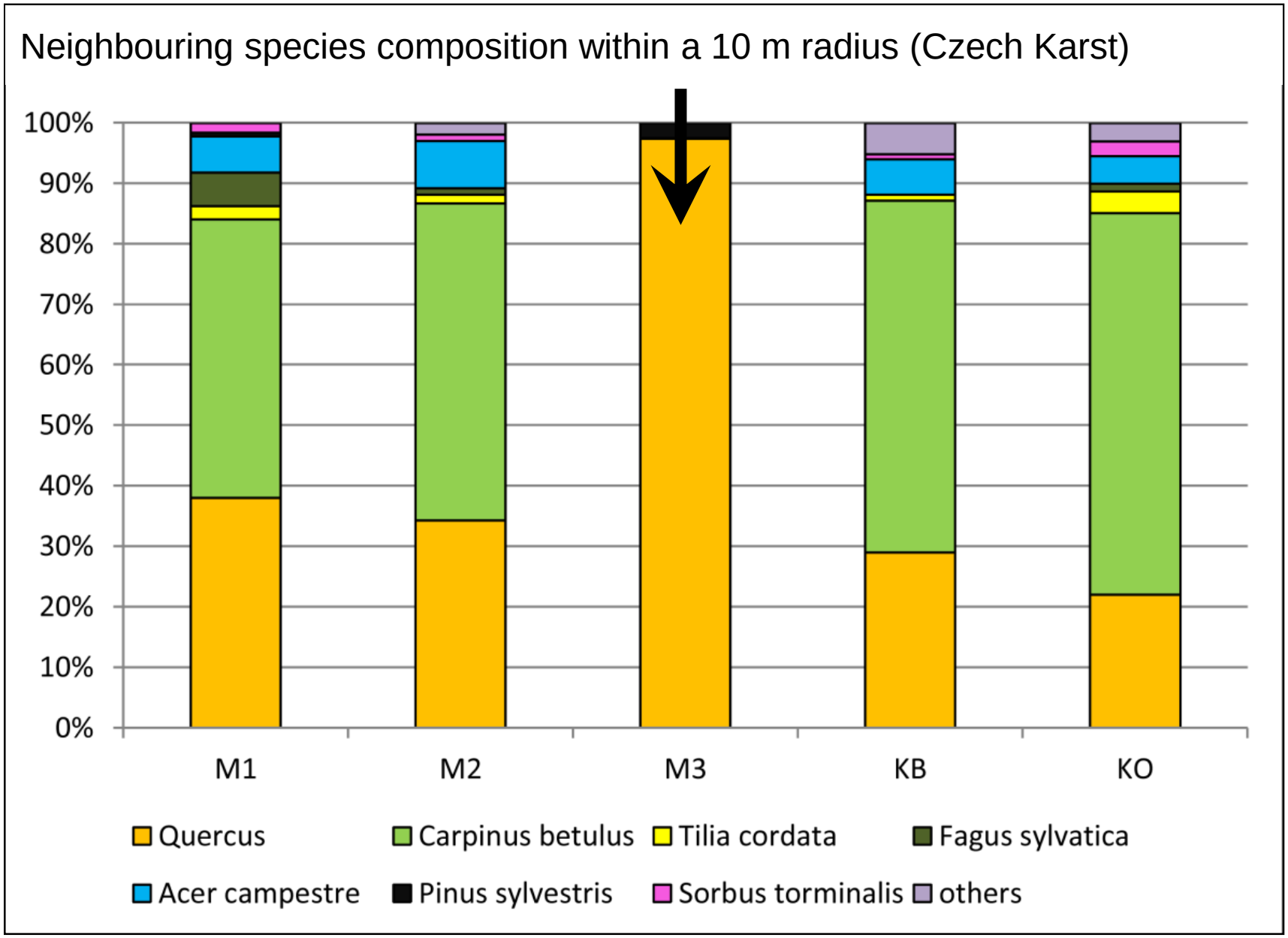

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Generalized linear models

Initial variables: MGR; No. neighbors and DWBA by species; age

Number of releases age ***

AIC: 328.1

Mean gro

AIC: -326.

Initial vari

Mean gro

AIC: -331.

Initial vari s; age

Sensitivity

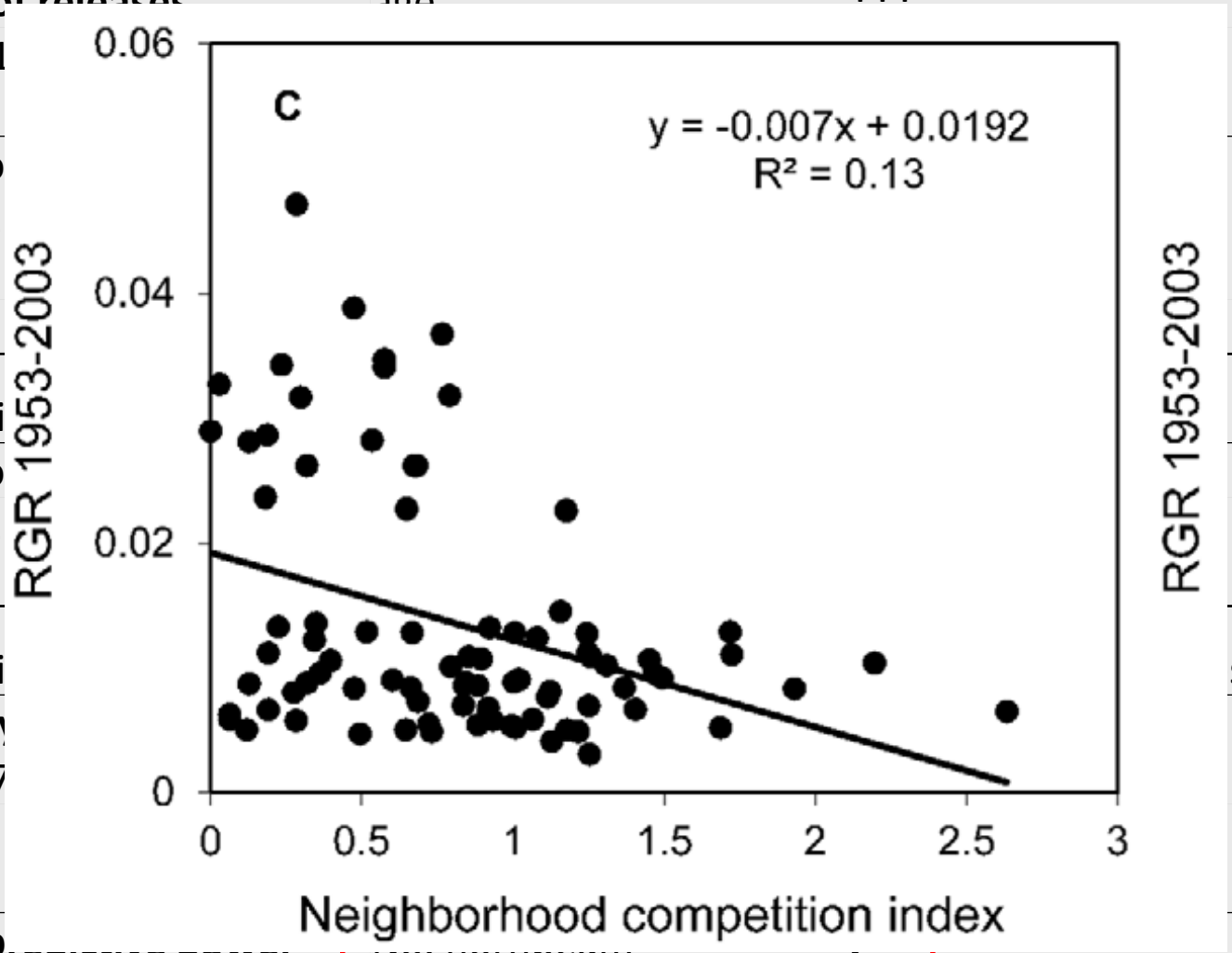
AIC: 104.7

Positive p

AIC: 132.47

MGC .

DWBA hornbeam



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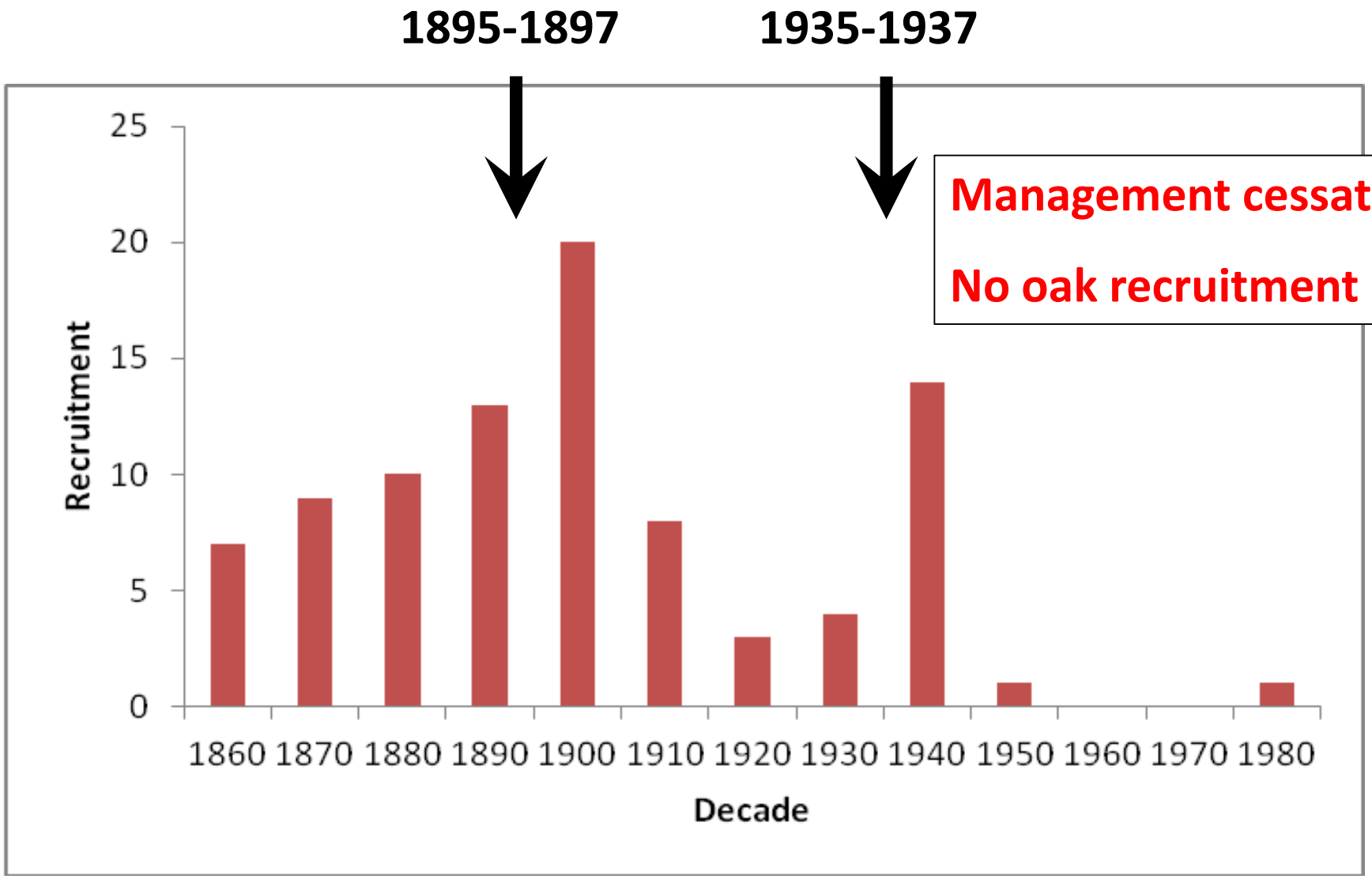
Recruitment of oak standards follows coppicing (Děvín)



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Long-term woodland dynamics in Central Europe: from estimations to a realistic model (ERC, 2012-16; http://longwood.cz)

Coppice forests as the production and biological alternative for the future (OPVK, 2012-15; www.coppice.eu)

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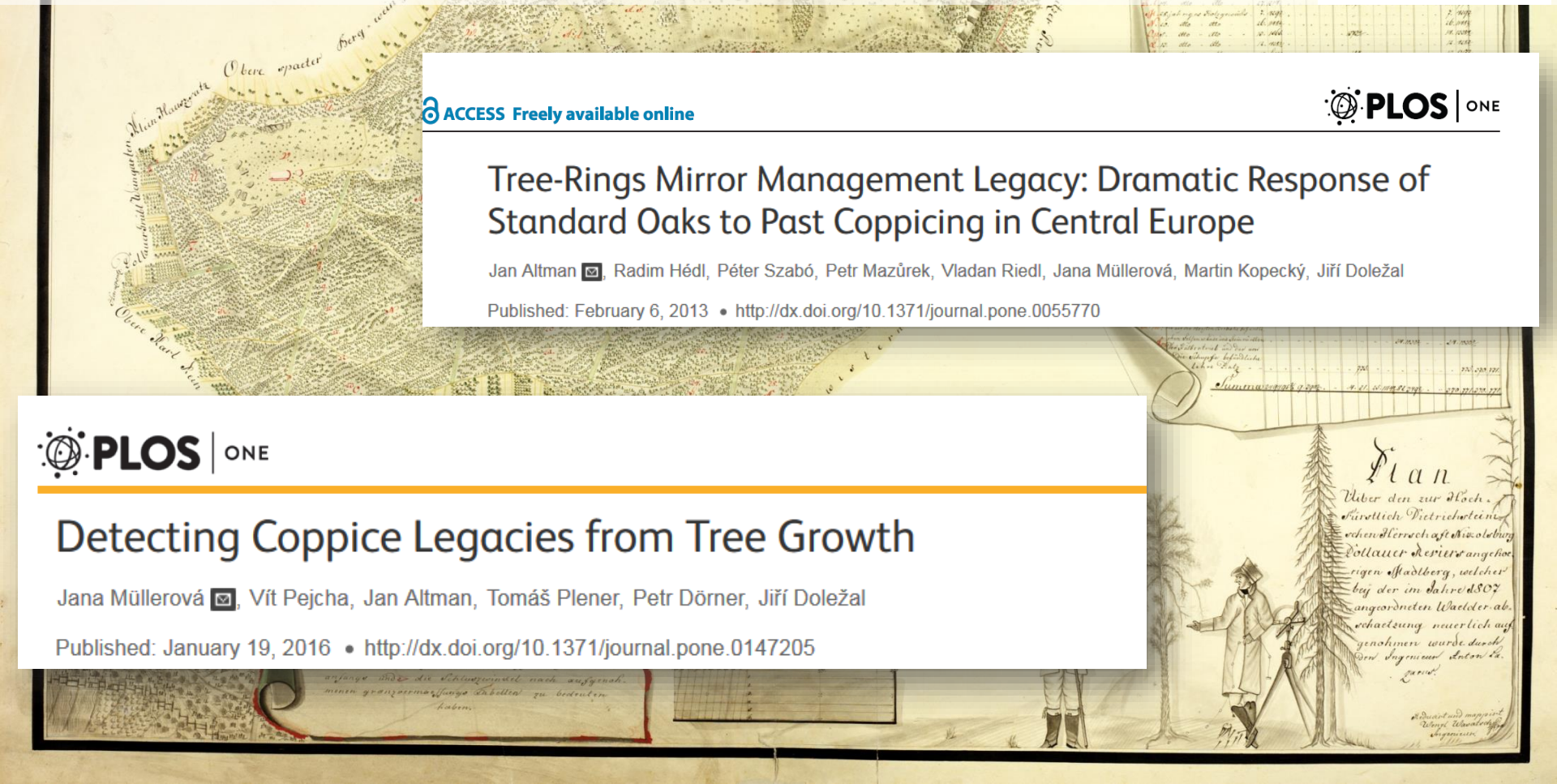

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Tree-Rings Mirror Management Legacy: Dramatic Response of Standard Oaks to Past Coppicing in Central Europe

Jan Altman, Radim Hédl, Péter Szabó, Petr Mazůrek, Vladan Riedl, Jana Müllerová, Martin Kopecký, Jiří Doležal

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Detecting Coppice Legacies from Tree Growth

Jana Müllerová, Vít Pejcha, Jan Altman, Tomáš Plener, Petr Dörner, Jiří Doležal

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