

Site preferences of endangered species in a former coppice of high conservation value



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Abandonment of traditional forest management caused retreat of many characteristic species across Central Europe

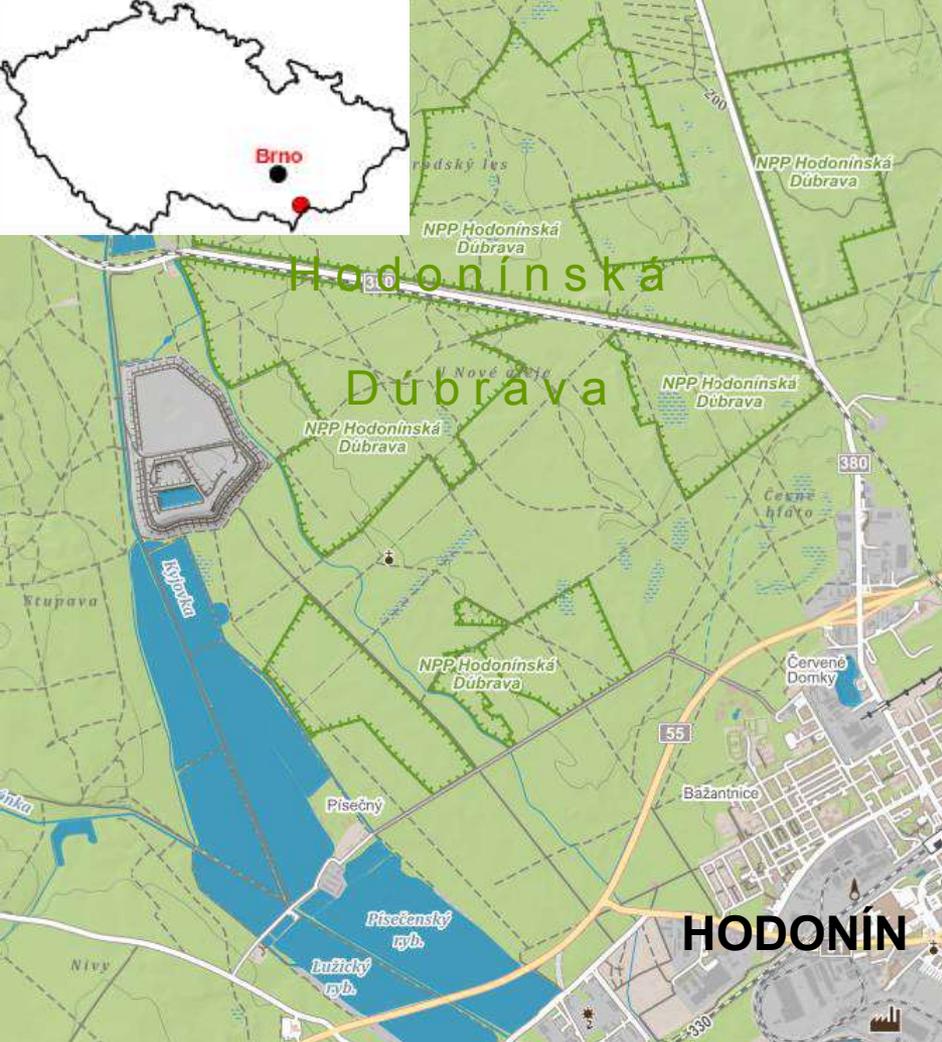
Lowland oak forests are particularly affected

- open-canopy oak forests --> closed canopy mixed forests with hornbeam (*Carpinus betulus*), lime (*Tilia cordata*) or ash (*Fraxinus excelsior*)

- large pool of light-demanding forest-steppe species of Pleistocene and Early Holocene origin

Therefore forests with continuity of traditional management such as former coppices are often biodiversity hotspots in modern landscape

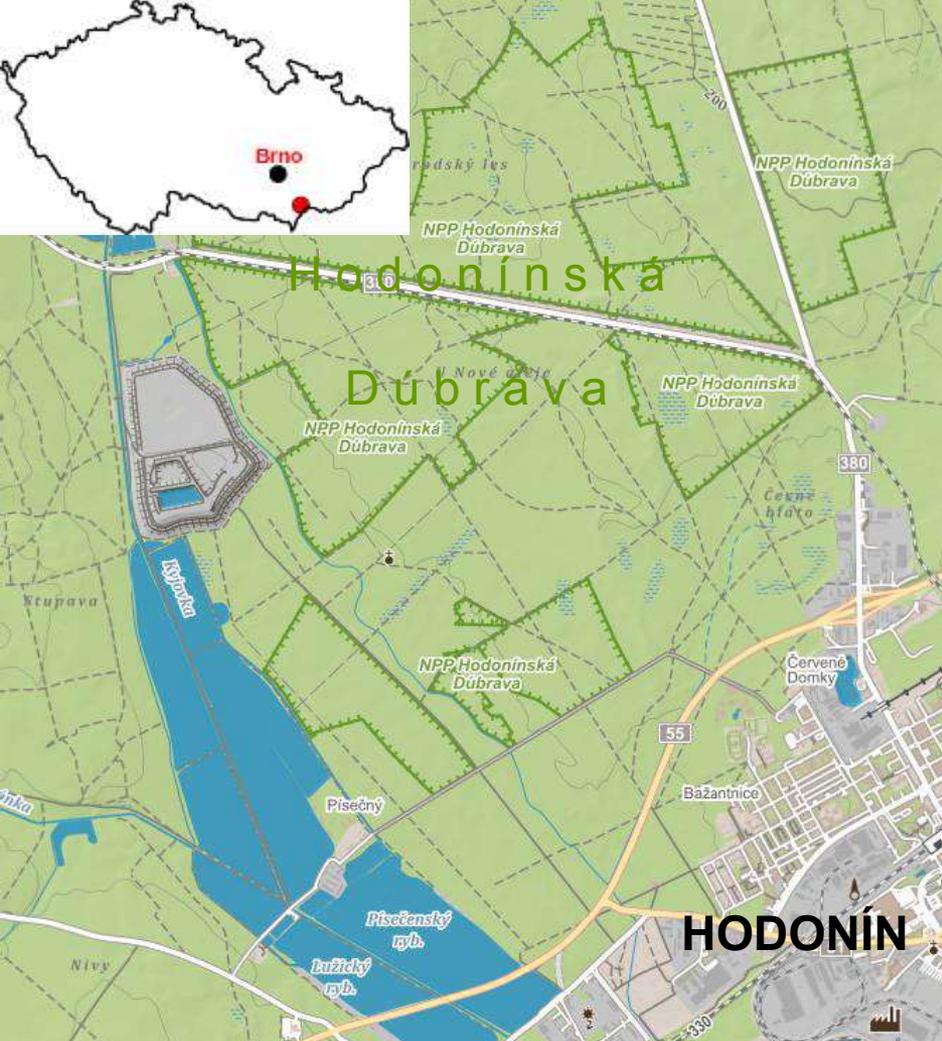
To properly manage the most endangered populations, information on their current state and site preferences is needed



Hodonínská Důbrava

- largest wood in the lowlands of southern Moravia (Czech Republic)
- historical management (Szabó 2013): wood pasture, hay making, coppicing
- coppicing gradually abandoned since mid 19th century, plantations of *Pinus*, *Quercus*, *Tilia*, spread of *Robinia*, *Prunus serotina*, *Acer negundo*





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Lopinga achine

- most valuable remnant of subcontinental oak wood (*Carici fritschii-Quercetum roboris*) in the country (Site of Community Importance, National Nature Monument)
- favourable conservation status and sustainable management are being discussed

Aims

- to improve our understanding of ecology of endangered species of subcontinental oak woods and facilitate establishing effective measures for their conservation
- to show whether the largest population of the most endangered plant species have specific site preferences or are they distributed more or less randomly in the ecological space

Methods

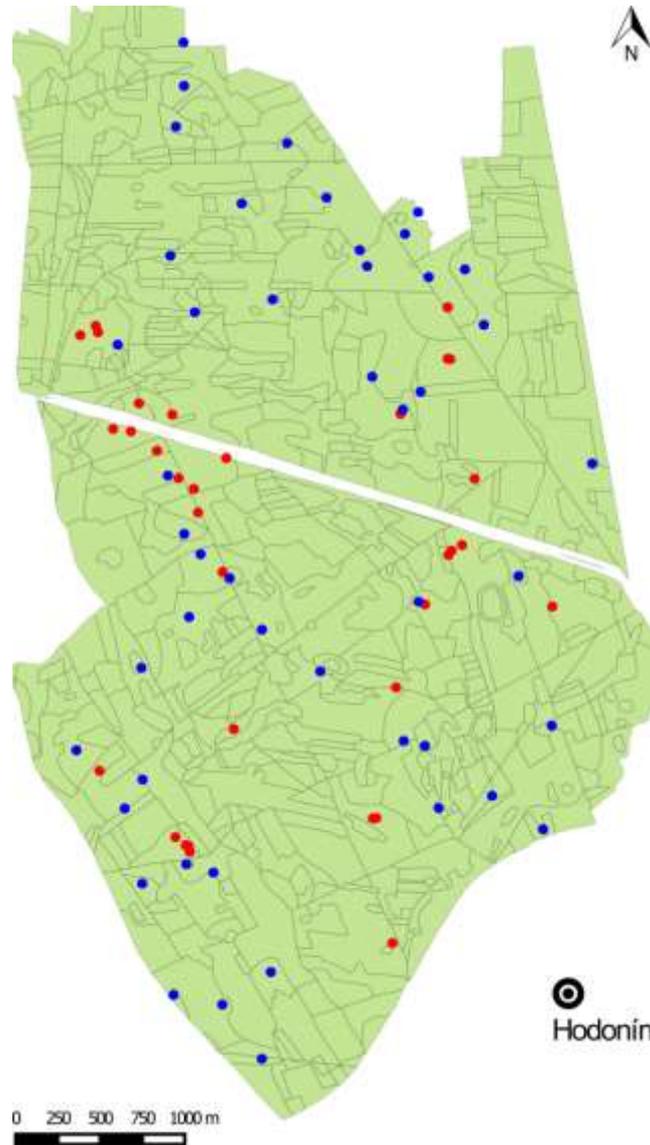
- we mapped sites of 20 species most endangered from the national perspective (CR, EN)
- we sampled vegetation composition and site conditions around their two largest populations in the wood (altogether 35 plots)
- we compared these samples with random samples from all major forest habitats in the wood (altogether 47 plots)

Which species

Species name	Red List status
<i>Campanula cervicaria</i>	CR
<i>Cardamine parviflora</i>	CR
<i>Carex buxbaumii</i>	CR
<i>Carex ericetorum</i>	EN
<i>Carex fritschii</i>	EN
<i>Cnidium dubium</i>	EN
<i>Crepis praemorsa</i>	EN
<i>Daphne cneorum</i>	EN
<i>Equisetum hyemale</i>	EN
<i>Festuca amethystina</i>	CR
<i>Gladiolus palustris</i>	CR
<i>Hieracium onegense</i>	EN
<i>Holoschoenus vulgaris</i>	EN
<i>Iris graminea</i>	EN
<i>Juncus atratus</i>	CR
<i>Potentilla rupestris</i>	CR
<i>Pulmonaria angustifolia</i>	EN
<i>Scorzonera purpurea</i>	EN
<i>Tephrosieris integrifolia</i>	EN
<i>Thalictrum simplex</i>	CR



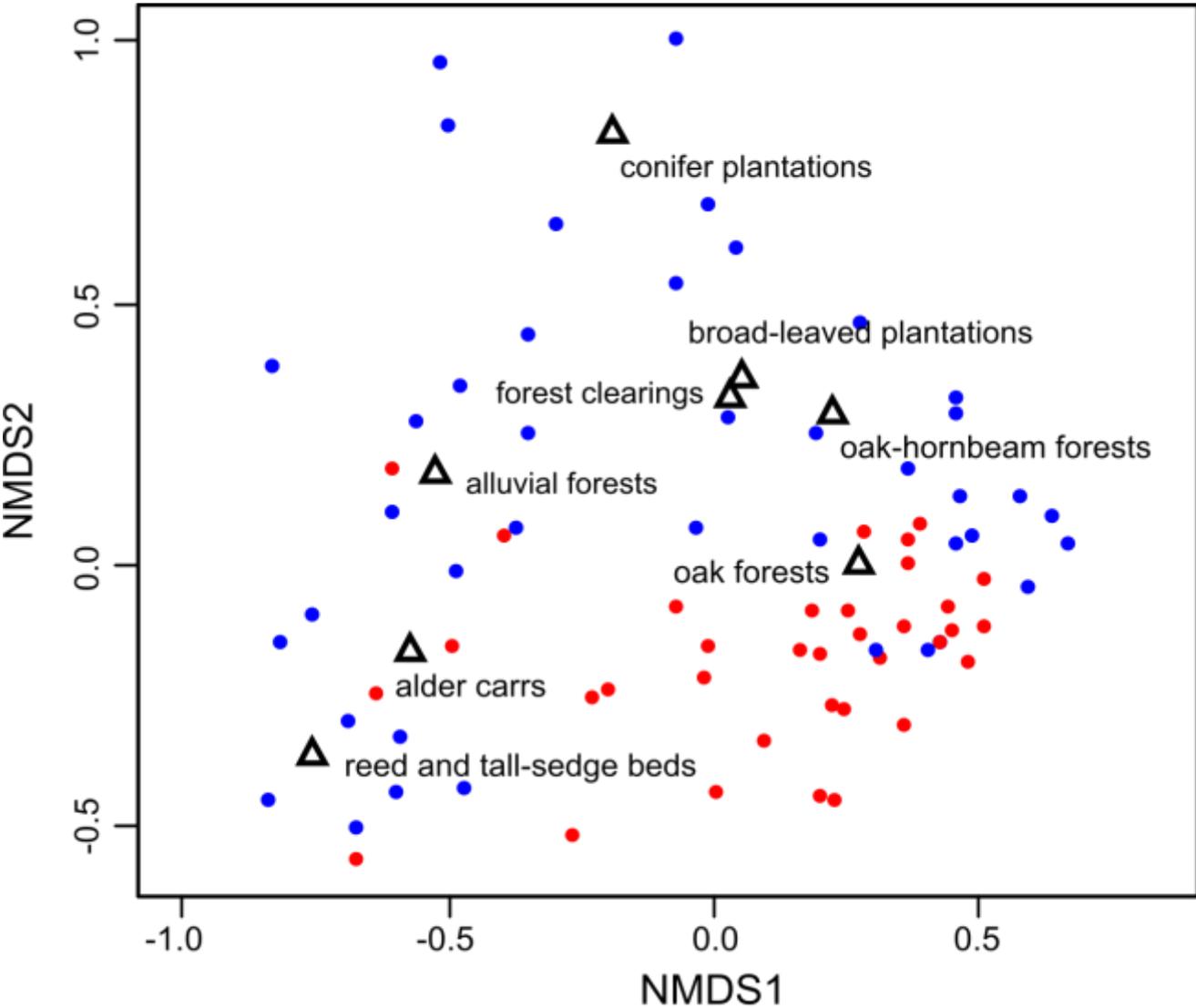
Results



Blue dots – stratified random samples (n = 47)

Red dots – largest populations of endangered species (n = 35)

Results



Results

Characteristic species of open-canopy oak forests (n = 19): *Potentilla alba*, *Carex fritschii*, *Geranium sanguineum*, *Galium boreale*, *Anthericum ramosum*, *Betonica officinalis*, *Brachypodium pinnatum*, *Asperula tinctoria*, *Achillea millefolium* agg., *Convallaria majalis*, *Serratula tinctoria*, *Filipendula vulgaris*, *Carex humilis*, *Polygonatum odoratum*, *Campanula rotundifolia*...

Characteristic species of shady mixed stands (n = 3): *Poa nemoralis*, *Moehringia trinervia*, *Mycelis muralis*

Results

Variable	Study plots	Control plots	<i>p</i>
Canopy openness [%]	14.3	10.7	0.04
Soil water content [vol%]	16.9	15.7	0.12
Topographic convexity	-4	-11	0.85
Soil pH (H ₂ O)	5.34	4.78	0.03
Ca [mg/kg]	841	730	0.34
Mg [mg/kg]	78	58	0.25
C/N	16.6	15.8	0.15
P [mg/kg]	2.2	2.5	0.76
K [mg/kg]	97	72	0.17
Cover shrub layer [%]	0	1	0.37
Cover herb layer [%]	35	20	0.10
Cover moss layer [%]	1	1	0.91
Stand age class	12	8	0.43
No. species	24	12	0.01
No. endangered species	4.5	0	0.00

Conclusions

- sites with endangered species have highly uneven distribution in ecological space of the studied former coppice
- endangered species are concentrated in places with high light availability and high soil pH
- light-demanding species characteristic for subcontinental oak forests are best indicators of the valuable places, while broadly distributed shade-tolerant and nutrient-demanding species avoid them

Management recommendations

- our results support the view that the occurrence of many endangered species in Hodonínská Důbrava Wood is a legacy of the long history of traditional management that kept the canopies open
- light-demanding species are threatened by ongoing successional changes
- active management measures are required, including opening up the canopies, early thinning of young growths, control of expansive and invasive species and understorey grazing or mowing

Practical limitations

- reluctance of some people in state nature conservation bodies, and also some experts, to active management or alternative management practices
- the war of some key forest managers, particularly Forests of the Czech Republic, state enterprise, against re-introduction of alternative management practices



Thank you for your attention!