

# **ATCZ251 FORRISK Cross-border forest risk management**

## **KICK-OFF MEETING**

**Mendel University in Brno**  
PP2

Date: April 8-9, 2021



## Mendel University Forest Enterprise



*„We create diversified forests for the climate change and future generations“*

Lumír Dobrovolný





# Interreg



EUROPEAN UNION

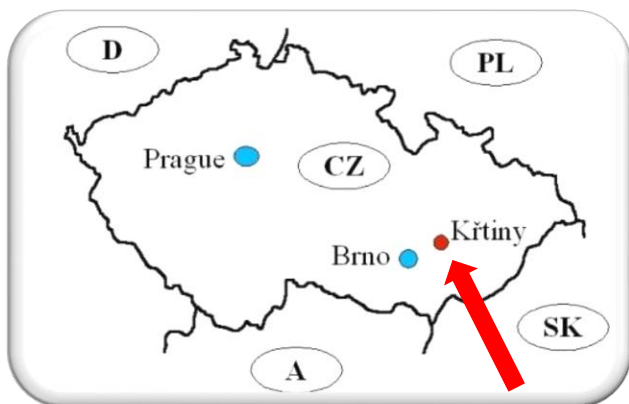
## Austria-Czech Republic

European Regional Development Fund

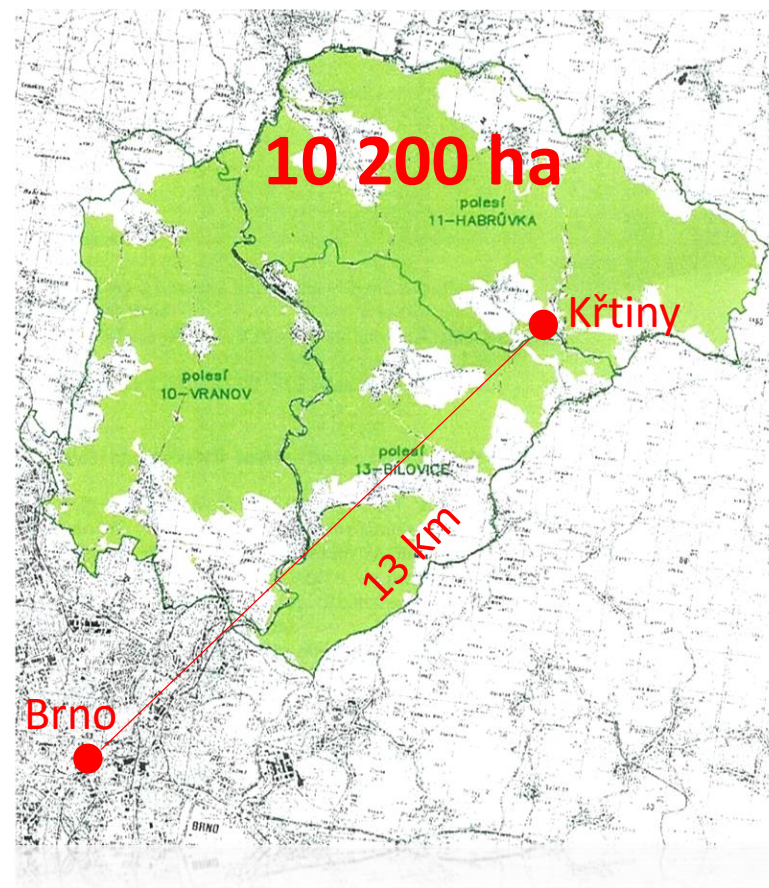


EUROPEAN UNION

- Mendel
- University
- in Brno
- 



Křtiny – location of headquarter....



established 1923







### Our mission:

- ✓ Practical teaching and training in forestry
- ✓ Field laboratory for forestry research
- ✓ Sustainable multifunctional forestry management
- ✓ Organising workshops and excursions for foresters or public - forestry pedagogy for children and all generations
- ✓ Special focus on recreation function / forest aesthetics





- ✓ 3 forest arboretum – collection of 800 species from whole world, oldest est. 1928
- ✓ 60 meadows with exotic tree species
- ✓ 50 buildings with springs
- ✓ 90 memorials for important people in forestry
- ✓ 230 km of forest roads - cycleways and 880 km of walking paths





## Organisation:

- ✓ Headquarter
- ✓ 3 forest units
- ✓ Nursery
- ✓ Sawmill
- ✓ Forest machinery developing
- ✓ Chatteau Křtiny (hotel, restaurant, congress centre)



**Site conditions:**

- ✓ 210 – 574 m a. s. l., indented relief – plateaus with steep slopes and valleys
- ✓ annual average temperature: 7,5 °C, average precipitation: 600 mm
- ✓ geology: granodiorites, lime stones (Moravian karst) - rich nutrient soils predominated

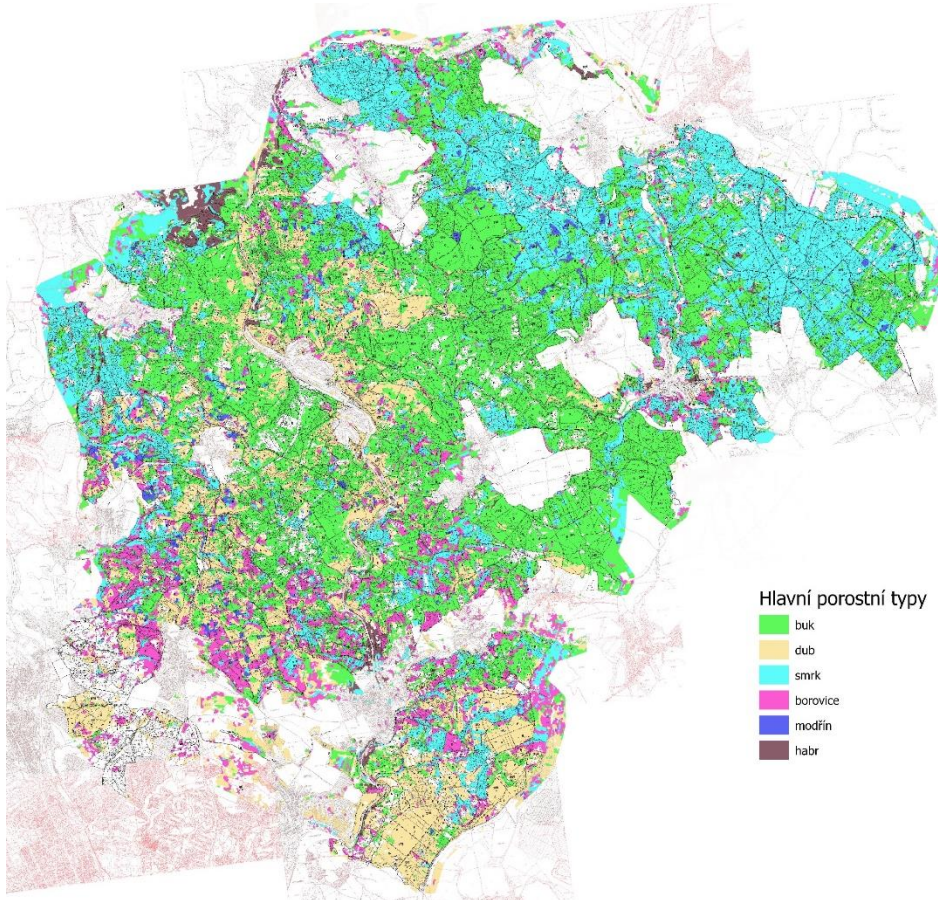


- ✓ various forest sites covering most of conditions in CZ
- ✓ predominated natural vegetation types: *Carpineto-Quercetum*, *Querceto-Fagetum*, *Fagetum pauper*





- ✓ mixed forests – **39% conifers** (19% spruce, 8% pine, 8% larch, Douglas fir, etc.), **61% broadleaved** (33% beech, 15% oak, 8% hornbeam, maples, ashes, cherry, etc.)



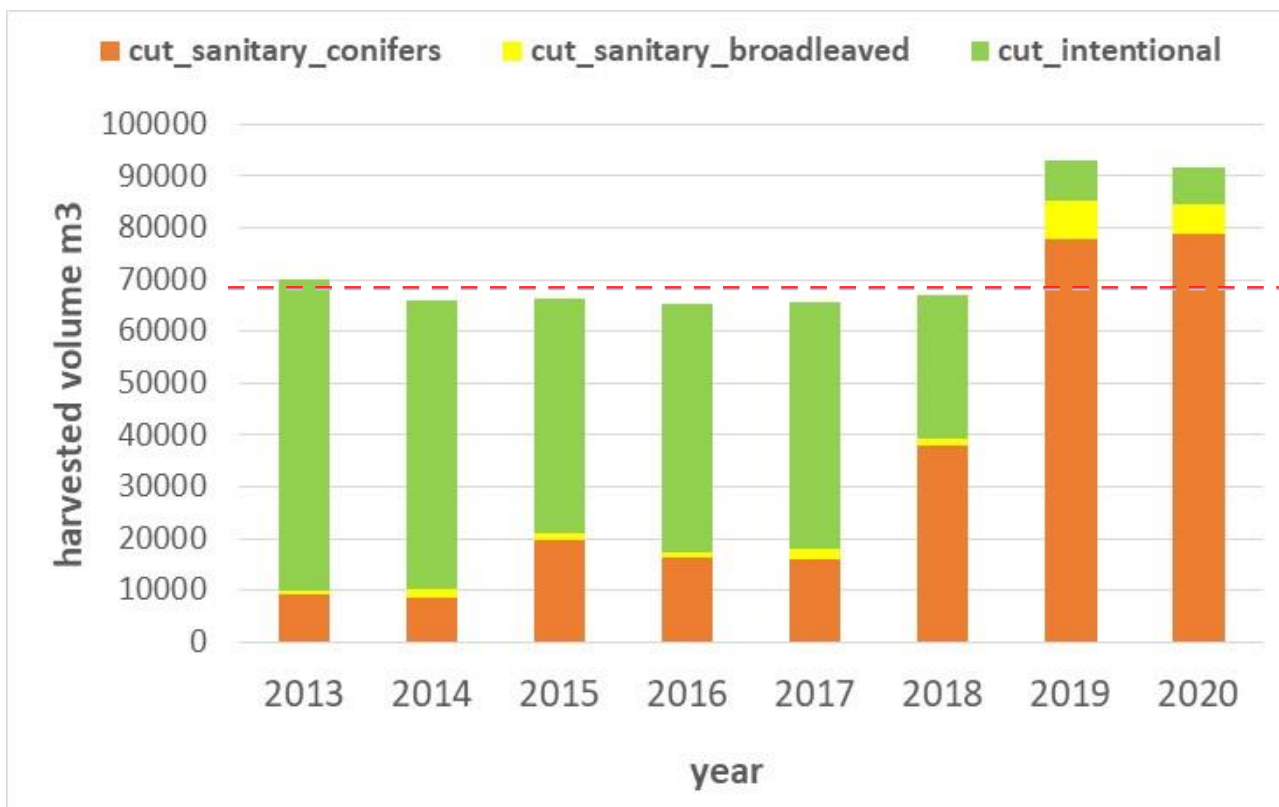


## Forest management:

- ✓ 10.200 ha of forest area
- ✓ average rotation: 112 years, average regeneration period: 32 years
- ✓ average standing volume: 248 m<sup>3</sup>.ha<sup>-1</sup>
- ✓ volume increment: 7,4 m<sup>3</sup>/ha-1/year
- ✓ harvesting volume: 69.400 m<sup>3</sup>/year
- ✓ natural regeneration - up to 50 %
- ✓ 19 strict forest reserves (9 % of the forest area)
- ✓ FSC, PEFC certification



*harvested volume 2013 - 2020 (divided by salvage and intentional cutting)*



**Etat**

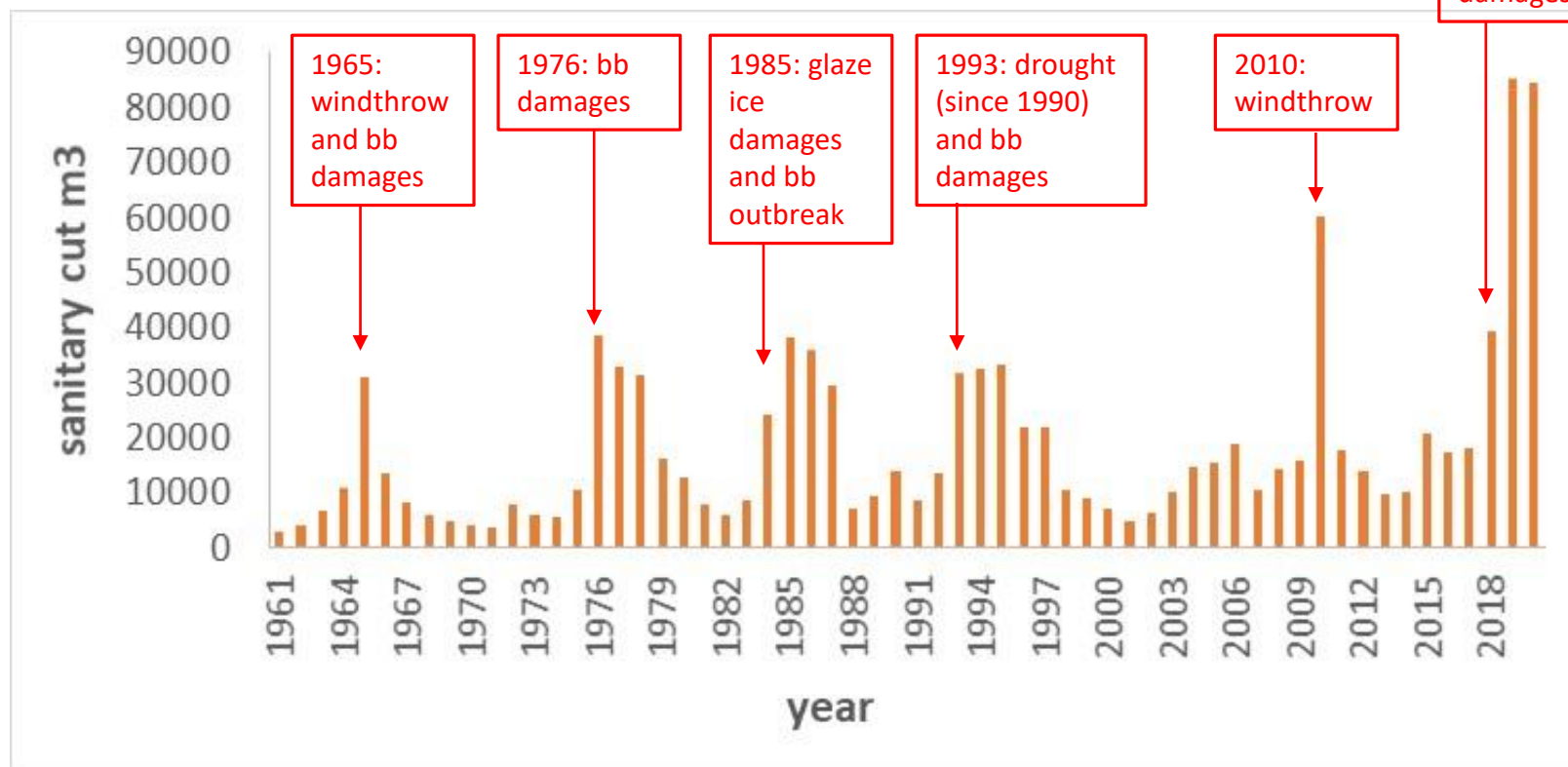
**round vs. pulp timber:**

- year 2013: 13533 m3 (67 %) vs. 6584 m3 (33 %)
- year 2020: 43705 m3 (60 %) vs. 29619 m3 (40 %)

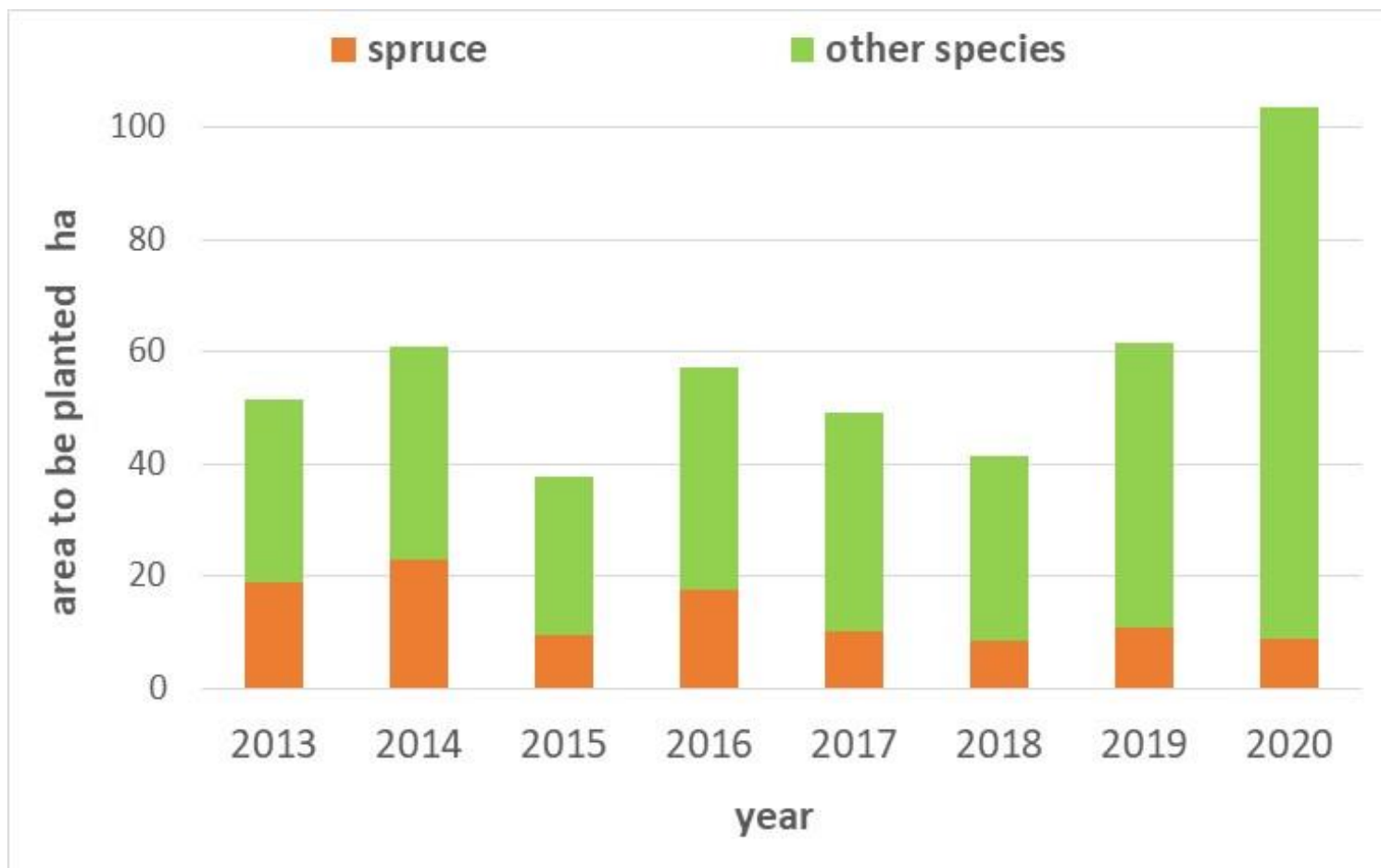




*salvage cut 1961 - 2020*

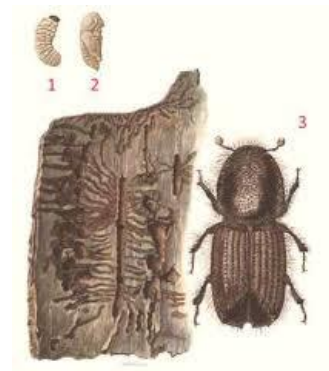
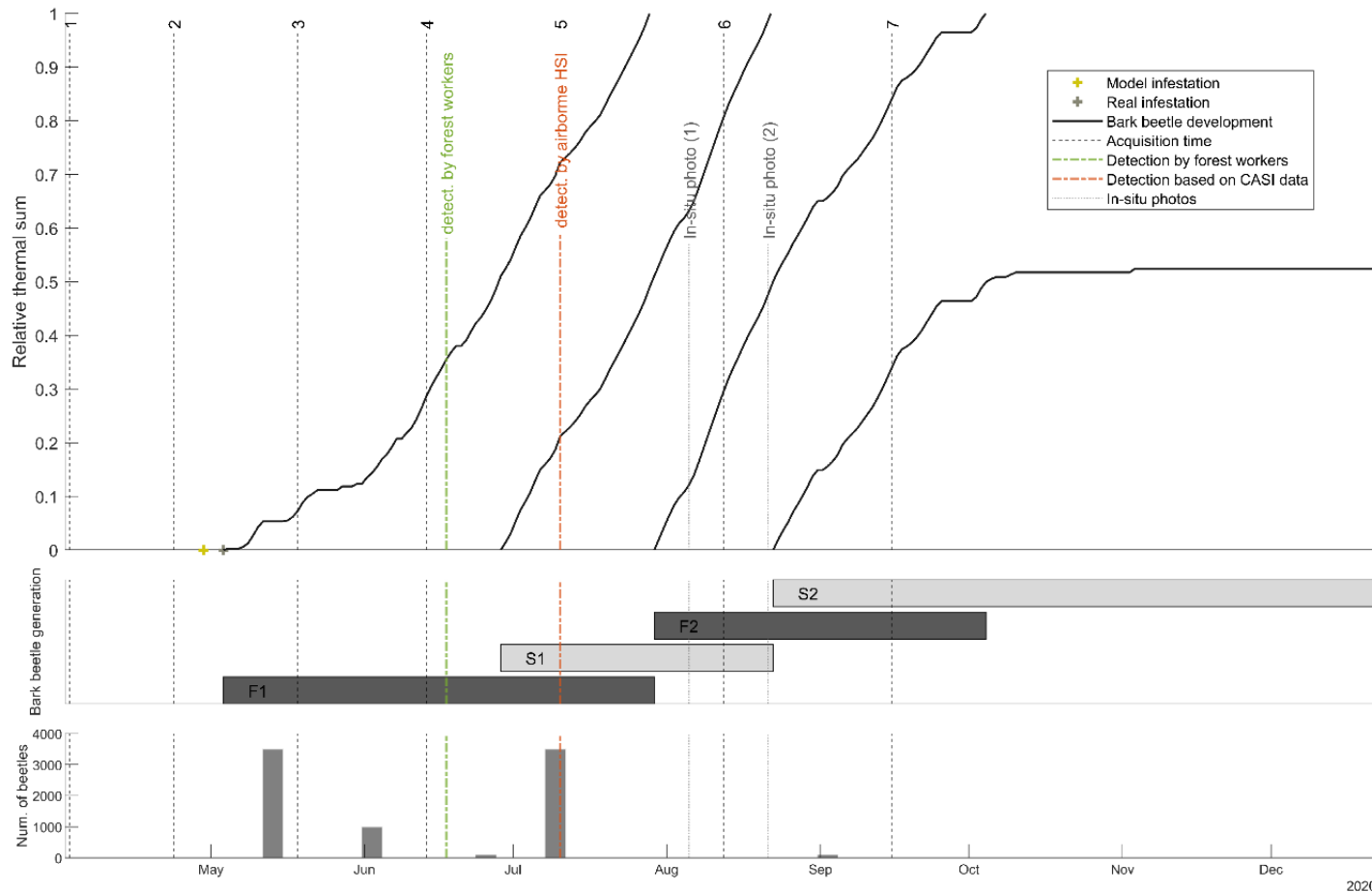


*Development of afforested area 2013 – 2020 (divided by spruce and other species)*

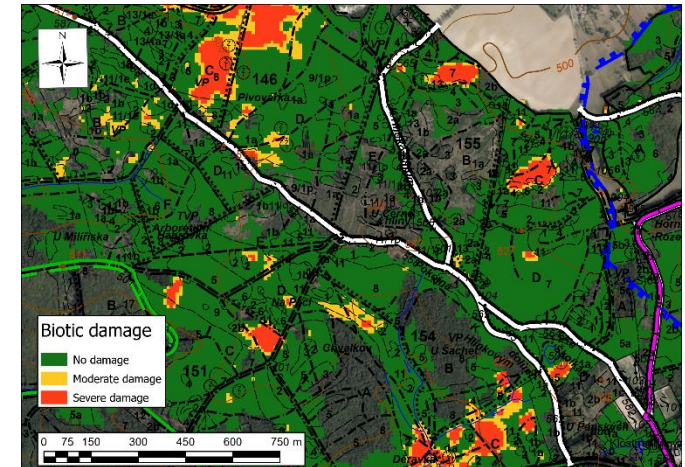
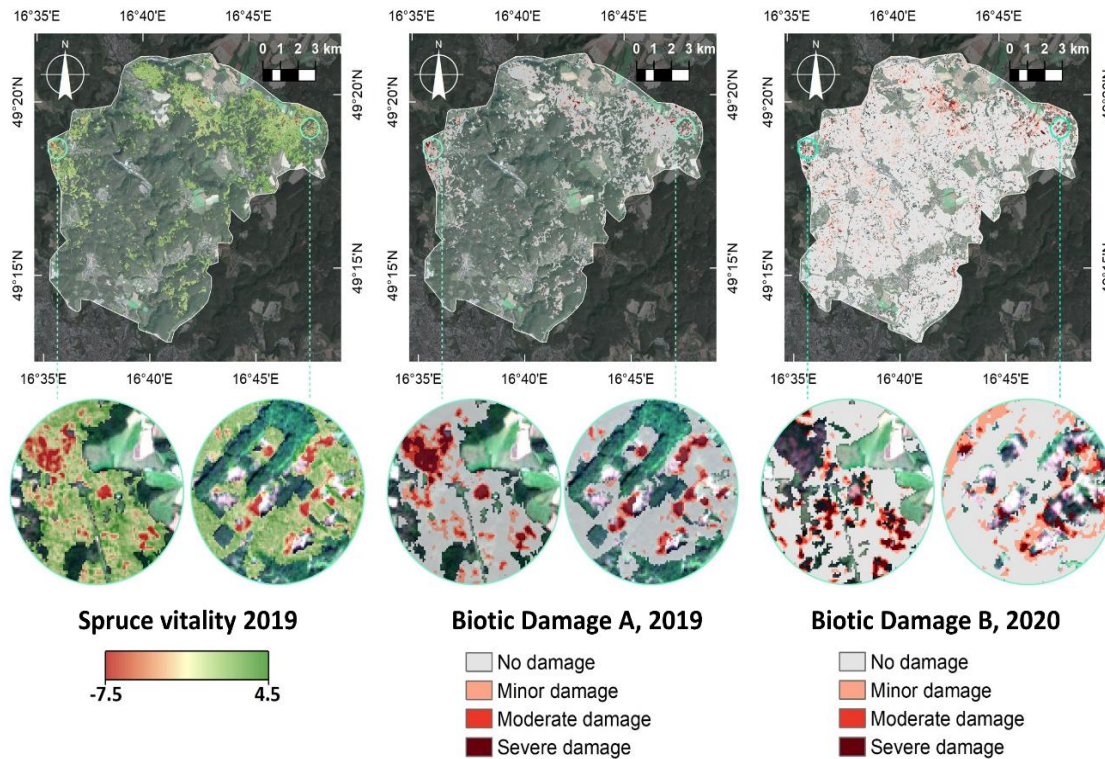




## *Ips typographus* development - year 2020 (Bárta 2021 – not published)



## Horizon 2020 „MySustainableForest“ - using Sentinel 2 and LiDAR in forest inventory and protection



Fernandez-Carrillo, A.; Patočka, Z.; Dobrovolný, L.; Franco-Nieto, A.; Revilla-Romero, B. Monitoring Bark Beetle Forest Damage in Central Europe. A Remote Sensing Approach Validated with Field Data. *Remote Sens.* **2020**, *12*, 3634.



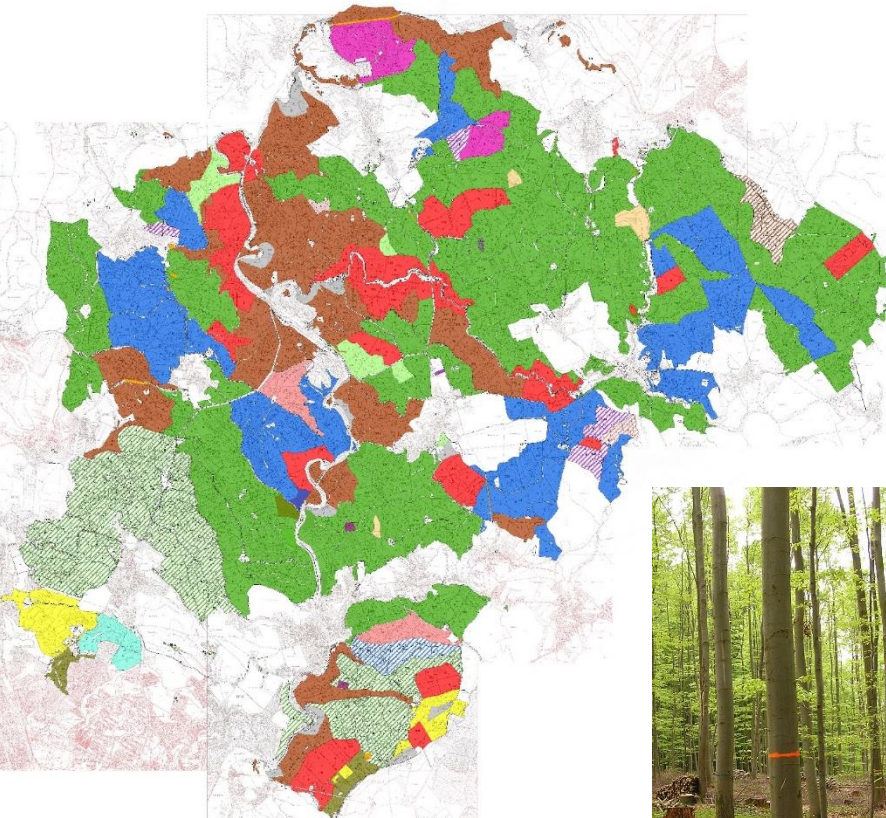


**Silvicultural strategy – forest adaptation  
regarding climate change**

- ✓ risk dispersion by heterogeneous forest structure
- ✓ high biodiversity and species mixture (at least - 3 species and 20 % each, individual or group mixing – max 0,2 ha)
- ✓ diversified horizontal, vertical and age structure
- ✓ using natural processes as much as possible – esp. natural regeneration
- ✓ keeping habitat trees and deadwood
- ✓ maintaining balance between game and forest ecosystem
- ✓ small-scale / more individual and unevenaged focused silviculture technique



- ✓ For this purpose we use **24 silvicultural models** (nowadays most of evenaged forests are in transformation process)



<i>Silvicultural models</i>	%
Dauerwald – freestyle – indiv. and group selection (spruce-beech-silver fir-maple)	40
Dauerwald – freestyle – indiv. and group selection (oak-pine-broadleaved sp.)	10
Patch / mosaic model	15
Single selection	2
Coppice (with standards)	3
Value increment silviculture – oak, beech	4
Shelterwood variants (located on steep slopes, etc.)	15
Extensive management	1
etc.	10

Dauerwald (unevenaged mixed forest) concept – use of more intensive thinning focusing on care about high quality trees (incl. pruning) and structure diversification

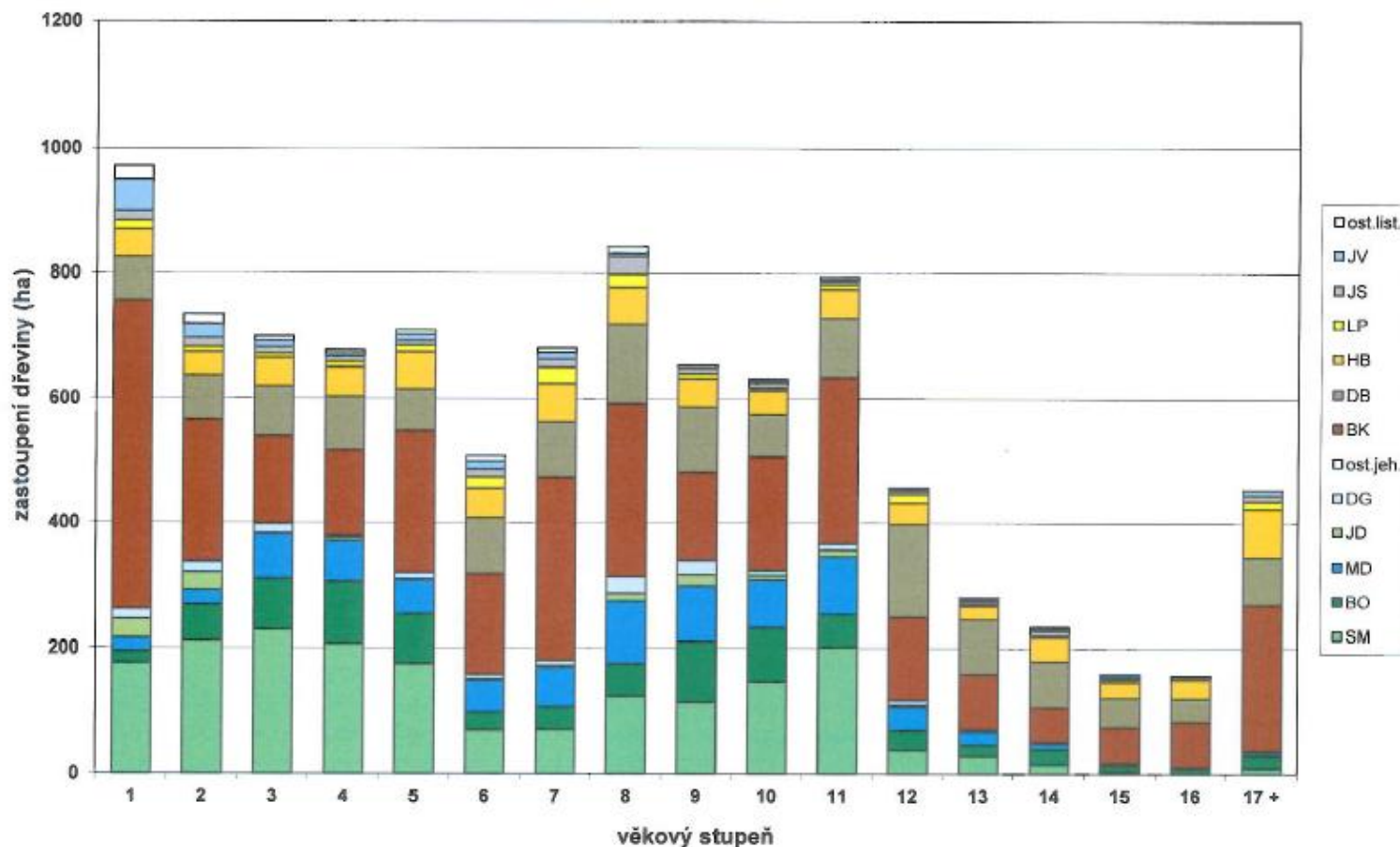




## Norway spruce management

*age classes distribution (year 2013)*

share of spruce - 19 %  
(570.000 m<sup>3</sup>, 1813 ha)



*silviculturist's dream: beech 71%, larch 12%, spruce 8%, oak 5 %, pine 1%, Silver fir 1 %, Douglass fir 1 %, hornbeam 1 %*





*last year here was standing classic adult - evenaged - full canopy – soil sterile spruce stand...  
currently well opportunity to give oak back by afforestation, natural regeneration of birch, larch and Douglass fir is  
expecting*





*classic type of large-scale (patch) mixture spruce with beech doesn't work well...  
new forest have to be more diversified – succession processes on clear areas could help us in this task*





*classic type of large-scale (large groups) mixture spruce with beech doesn't work well...  
new forest have to be more diversified – succession processes on clear areas could help us in this task*





*this mixture looks much more perspective... beech + spruce were planted in rows, larch came from natural reg.*





*and here small groups of spruce were planted into beech natural regeneration to increase diversity and economical value as well*





*This sample forest stand (age: 110 years, spruce 40 %, larch 35 %, beech 20 %, pine 4 %, D. fir 1 %) was regenerated by „Femelschlag“ over 30 years  
Spruce was harvested after barkbeetle outbreak and diversified structure was lost (but regeneration stay - no clear area)*



year 2013 (before bb outbreak)

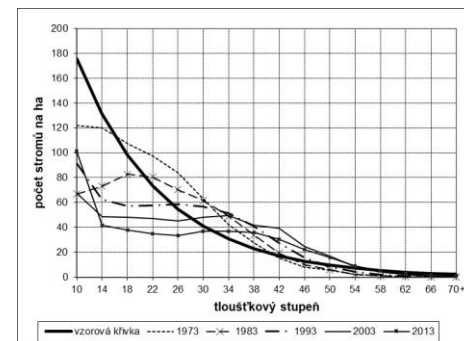


year 2021 (after bb outbreak)





*This spruce dominated stand is being in transformation process to unevenaged forest using individual selection over 50 years (unique object in CZ). Unfortunately, here as well we recognize some areas with bark beetle outbreaks and complete loss of selection structure.*



## Summary of Norway spruce silviculture

### ✓ In new established forest stands:

- In forest regeneration to reduce (not to resign) spruce proportion and more focus on drought-resistant species (oak, maple, *S. torminalis*, birch, etc.) including perspective exotic species (southern oaks, *Corylus colurna*, *Cedrus*, *Sequoiadendron*, etc.)

our strategy in afforestation:

	oak	beech	larch	spruce	Douglas fir	pine	Silver fir	maple	cherry	etc.
%	33	13	6	7	9	4	7	11	2	7

- maximal effort to new forest diversification – using natural processes (succession, etc.), different regeneration variants, etc.
- on spruce fitted sites to create mixed stands using (if possible) natural regeneration - proportion of spruce up to 10 % (max 20 %) and individual mixing (with beech, maple, larch, etc.)
- to create diversified vertical structure by structural thinning (not from below)

### ✓ In spruce predominated forest stands established in the past:

- to do high intensive thinning (from above) focusing on more individual growth (crown, roots) and improving h/dbh ratio – in young age phase if possible
- to introduce autochthonous tree species (beech, Silver fir, etc.) into gaps
- to support all admixed species by thinning
- to reduce rotation time (under 80 years)







Thanks for your attention!

