



# *LTSER platform Silva Gabreta*

Koordinátor LTSER:

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**13 let po té**



## ***LTSER platform Silva Gabreta***

**The Bavarian Forest and Šumava  
National Parks on the way  
to common transboundary ecosystem  
research scheme**

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Garant LTER na ploše:

Šumava NP & Bavarian Forest NP



# *LTSER platform Silva Gabreta*



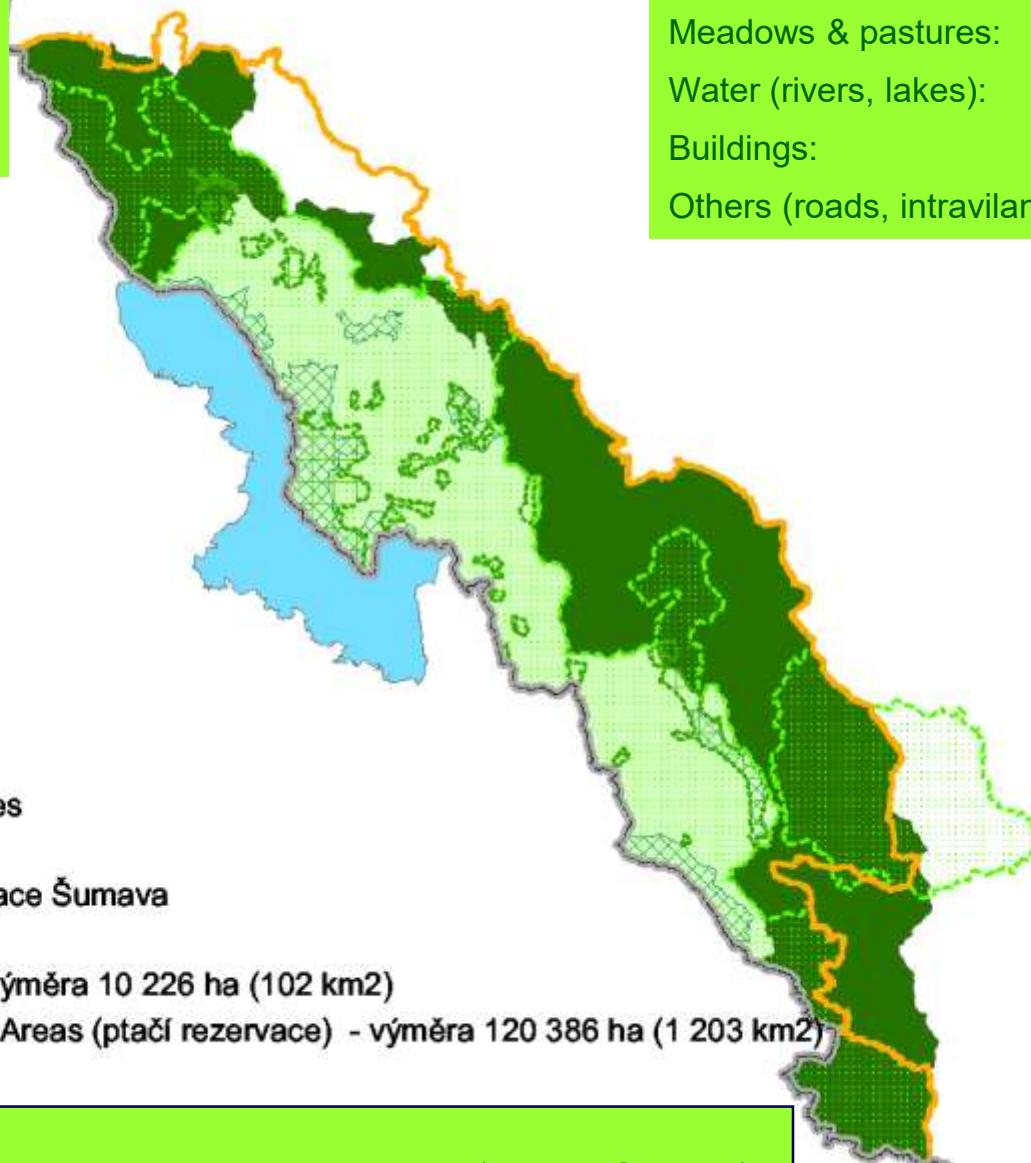
# LTSER platform Silva Gabreta

NP Šumava: 68 064 ha

NP Bavorský les: 25 000 ha

CHKO Šumava: 99 624 ha

BR Šumava: 167 000 ha



## Types of biotopes – NP Šumava:

Forests:	80%
Meadows & pastures:	9%
Water (rivers, lakes):	1%
Buildings:	0,1%
Others (roads, intravilans):	10%

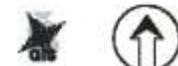
## National Park Sumava

The highest spot:

The lowest spot:

Plechy peak 1 378 m a.s.l. (1 465 m Gr. Arber)

the Otava river valley by Rejstejn 570 m a.s.l.





20 yrs ago

# Long-term ecological research (LTER): The Bavarian Forest and Šumava National Parks on the way to a common transboundary ecosystem research scheme

Zdenka Křenová, Jörg Müller, Heinrich Rall, Jaroslav Vrba

## The Bohemian Forest region

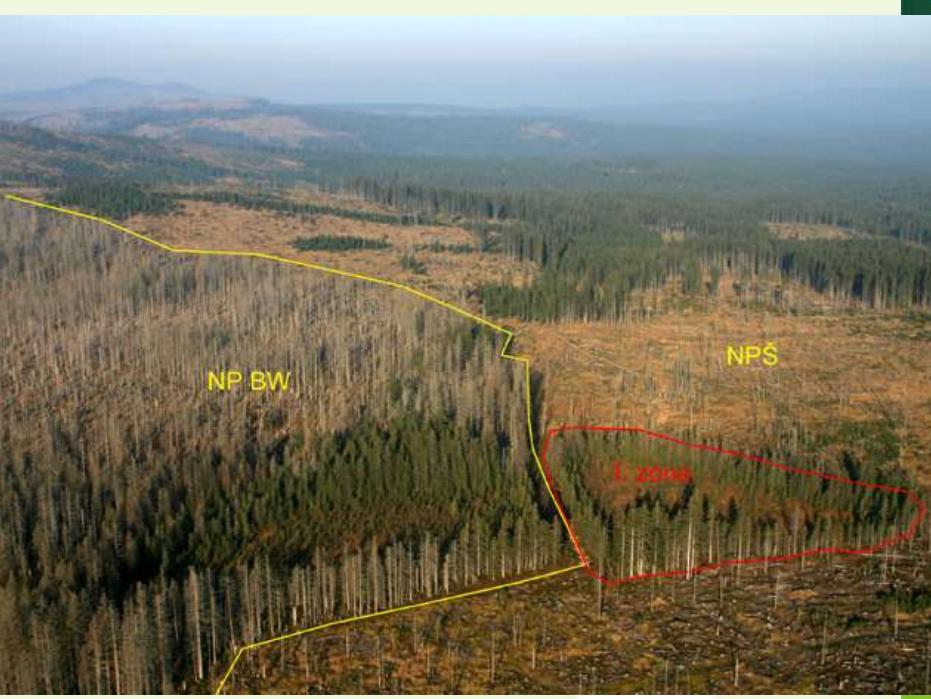
The Bohemian Forest (Böhmerwald in German, Šumava in Czech) creates the most extensive forest landscape in Central Europe. Primeval mountain forest remnants, glacial peat bogs, and mountain secondary grasslands are home to various communities, plant and animal species. The centre of this region is preserved as the Bavarian National Park (242 km<sup>2</sup>) and Šumava National Park (680 km<sup>2</sup>). The Sumava-Landscape Area (1000 km<sup>2</sup>) serves as a buffer zone.

## R platform

Existence of these protected areas offers unique opportunities to observe, study and learn from the nature. Especially now, in the time of rapid climatic changes, it is a source of certain knowledge covering enormously wide variety of themes. As permanently protected ecosystems in a process of near natural development, national parks serve as highly attractive "control" areas for long-term ecosystem research and monitoring, and more research and monitoring projects are operated transboundary following spatial distribution of biotopes as well as natural migration of wild animals in the area of both National parks, which are not respecting the borders either. The main focus of long-term research and monitoring is on ecosystem processes such as natural regeneration of mountain forests after wind storm disturbances and spruce bark beetle attacks, as well as on changes of water regime and species diversity in response to climatic changes. Changes in ecosystem services and better awareness of the National Parks for public are the most discussed topics of currently emerging economical studies. To address interdisciplinary issues of socio-ecological problems a common Czech-Bavarian LTER (long-term ecological research) platform Silva Gabreta was launched.

## Gabreta

One of our common LTER platform is named after an ancient Roman name for mountains that has been also used in scientific journal *Silva Gabreta* published since 1996. Results of many ongoing research projects from Bohemian Forest region have been published there.



## NPŠ & NPBW = common LTER site



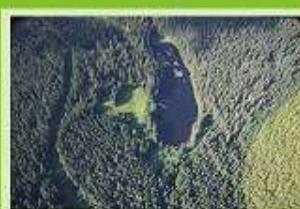
**Forest inventories**  
The condition of the forest, on a landscape level, is determined by means of a permanent inventory sampling procedure (control sampling method) on permanently marked plots. Numbers of important variables are periodically recorded.



**Remote sensing**  
Forest development is being documented through aerial photographic series, which have been produced annually, in the NP Bavarian Forest since 1988, and in the Šumava NP during last 5 years.



**Telemetry**  
Telemetry is used for monitoring of deers, roe, and lynx. As soon as a radio-tagged animal enters a transmission area, its collar sends out a text message. It helps to display an animal's route in detail on a map. Additionally, the collar stores data of the animal's activity and the temperature on its body surface that help researchers get to know the animals better. Also Ural Owls are monitored by telemetry.



**Hydrology**  
Long-term plankton data from 8 glacial lakes (since 1871) have documented both decrease in biodiversity due to atmospheric acidification in the last century and current recovery of the lake ecosystems. The 19 km<sup>2</sup> catchments area of the Gräse Ohe lies completely within the "nature zone" of the Bavarian Forest NP. Intensive, long-term scientific investigations on the interactions between climate, atmospheric deposition of material, and forests have been carried out here since 1978.



**Peat bog monitoring**  
Water condition and chemistry are permanently recorded in several peat bogs. The main focus is on monitoring of changes after water regime restoration projects.



Národní park  
Sumava

www.wild-europa.eu

We are going to built and run the Research and Training Centre located in Kvilda, very close to the Wild Europa's Heart, the wilderness area and common core zone of both NPs. The mountain spruce forest, mixed forest, and large peat bogs are the most important and valuable biotopes of this wilderness area of over 12.000 ha large, where the icon species as the lynx and capercaillie occur. Transboundary and interdisciplinary research projects together with projects offering interpretation of scientific results are going to be nested in RTC Kvilda.



## The concept of ecosystem long-term monitoring in Šumava NP

### Data collection

- A network of permanent plots & transects
- New units can be add in this network in future.

### Three main rules:

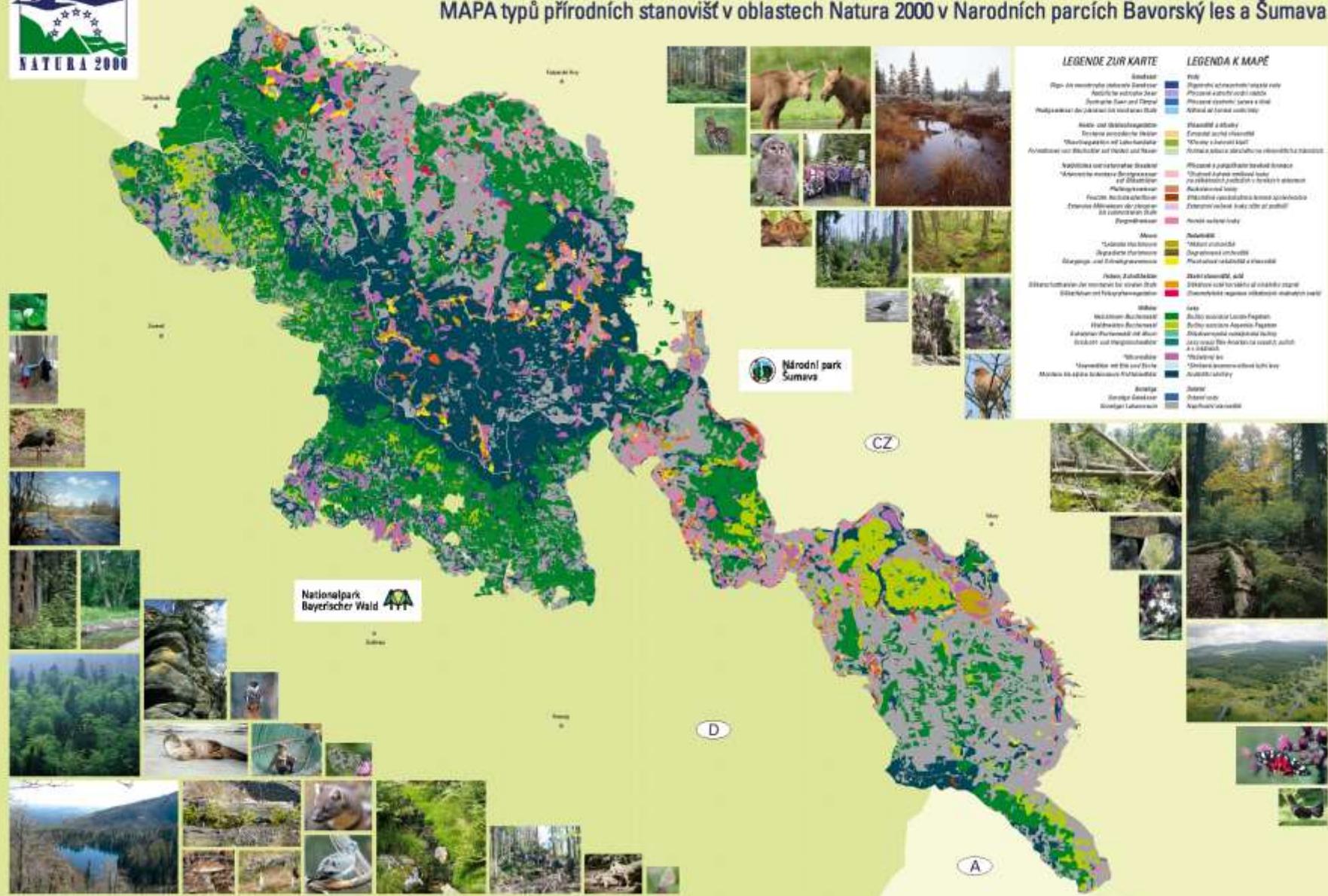
1. All main biotopes & Variability of habitats
2. Statistic analyses & Sharing data with partners
3. Interpretation of results to public & Implementation for management

## The Socio-Economy monitoring in Šumava NP – *in preparation*

The same methodology as was used in NPWB (prof. Job) is planned



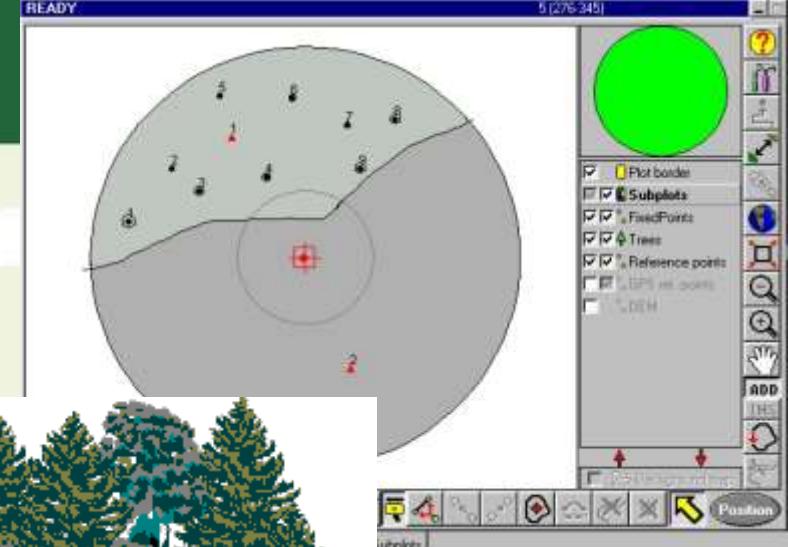
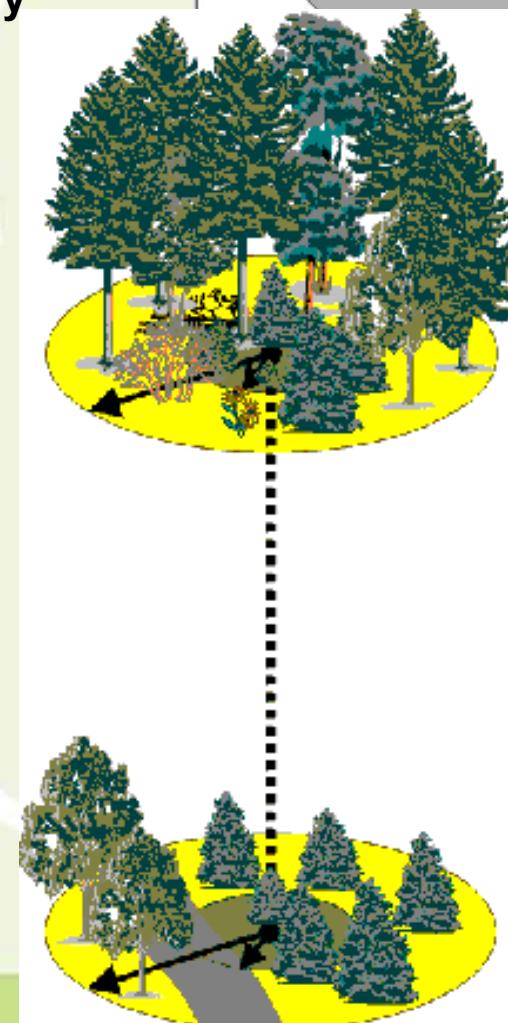
KARTE der Lebensraumtypen in den Natura 2000 Gebieten Nationalpark Bayerischer Wald und Nationalpark Šumava  
MAPA typů přírodních stanovišť v oblastech Natura 2000 v Národních parcích Bavorský les a Šumava



# Forest monitoring



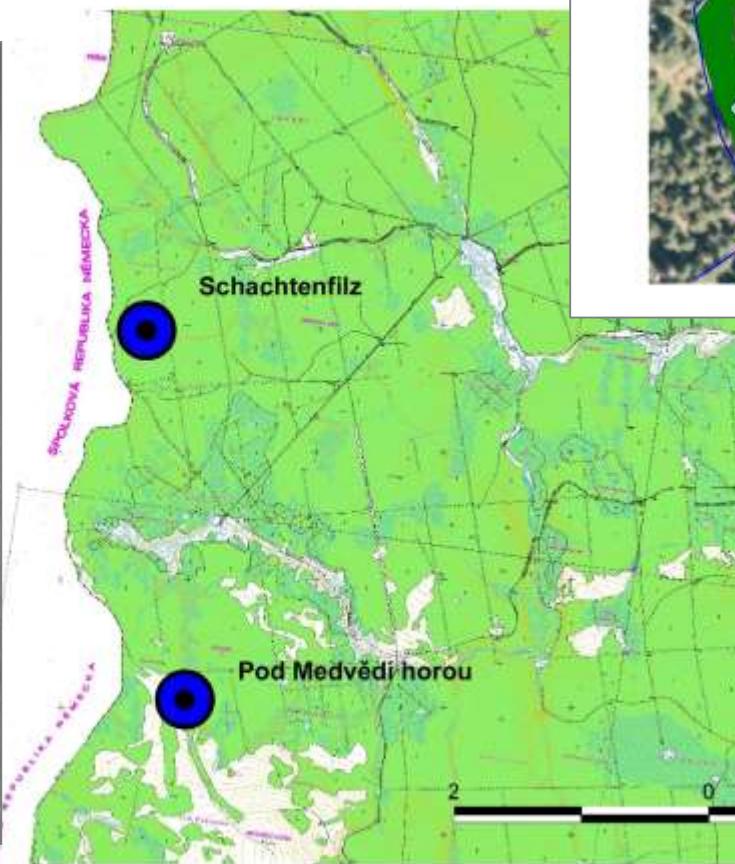
**INVENTORY:** The condition of the forest, on a landscape level, is determined by means of a permanent inventory sampling procedure (control sampling method) on permanently marked plots. Numbers of important variables are periodically recorded.



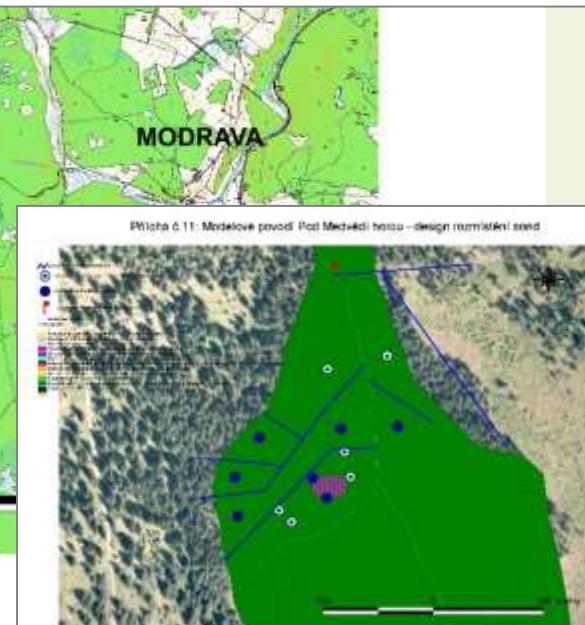
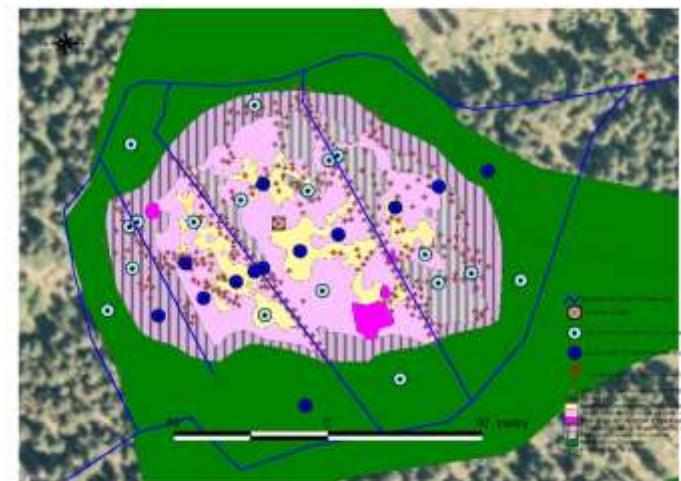
# Peat bog monitoring



Water condition and chemistry are permanently recorded in several peat bogs. The main focus is on monitoring of changes after water regime restoration projects.



Příloha č. 10: Modelové povodí Schachtenfilz - design rozmístění sond

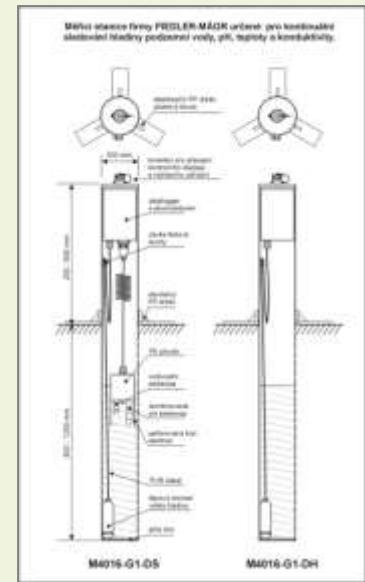


# Methods

- permanent plots (57) with associated water wells were established to characterise different mire sites

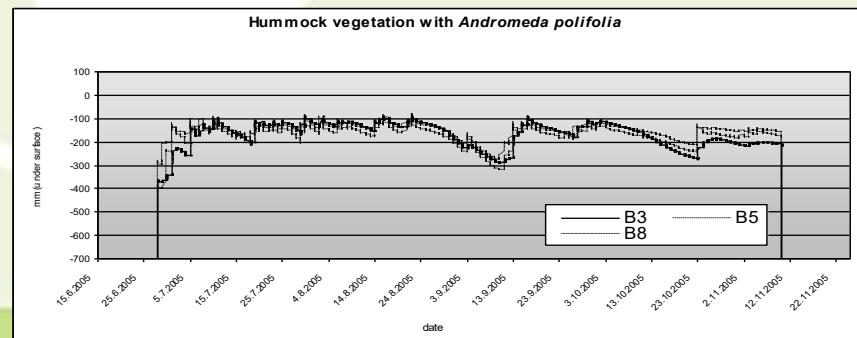
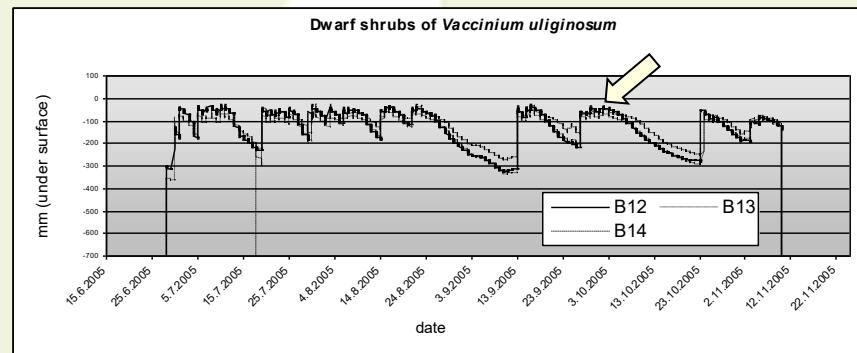
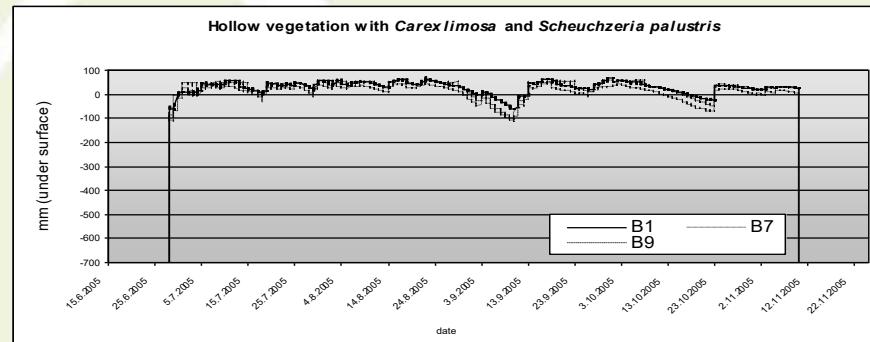
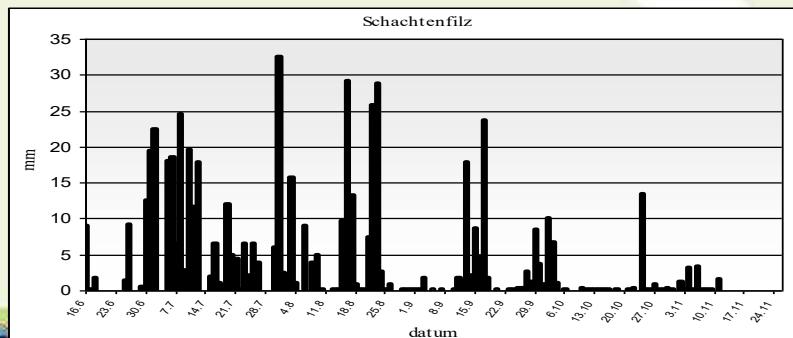
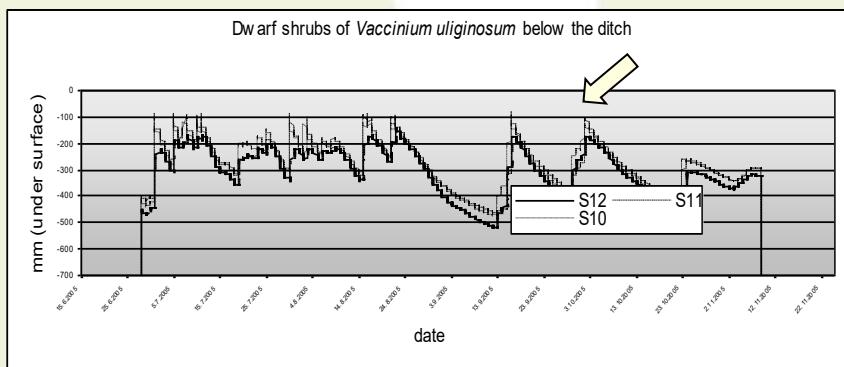
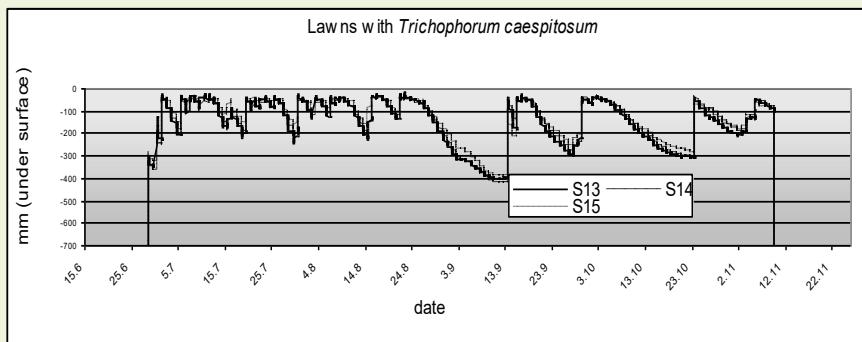
**monitored variables:**

- water table fluctuation (continually by piezometers)
- runoff from drained catchment (continually)
- water chemistry (pH, conductivity, DOC, SO<sub>4</sub>, NO<sub>3</sub>, NH<sub>4</sub>, PO<sub>4</sub>, Ca, Mg, Al, Fe - monthly)
- amount of precipitation (continually)
- vegetation (1x1m permanent plots for herb layer, 20x20cm for bryophytes )



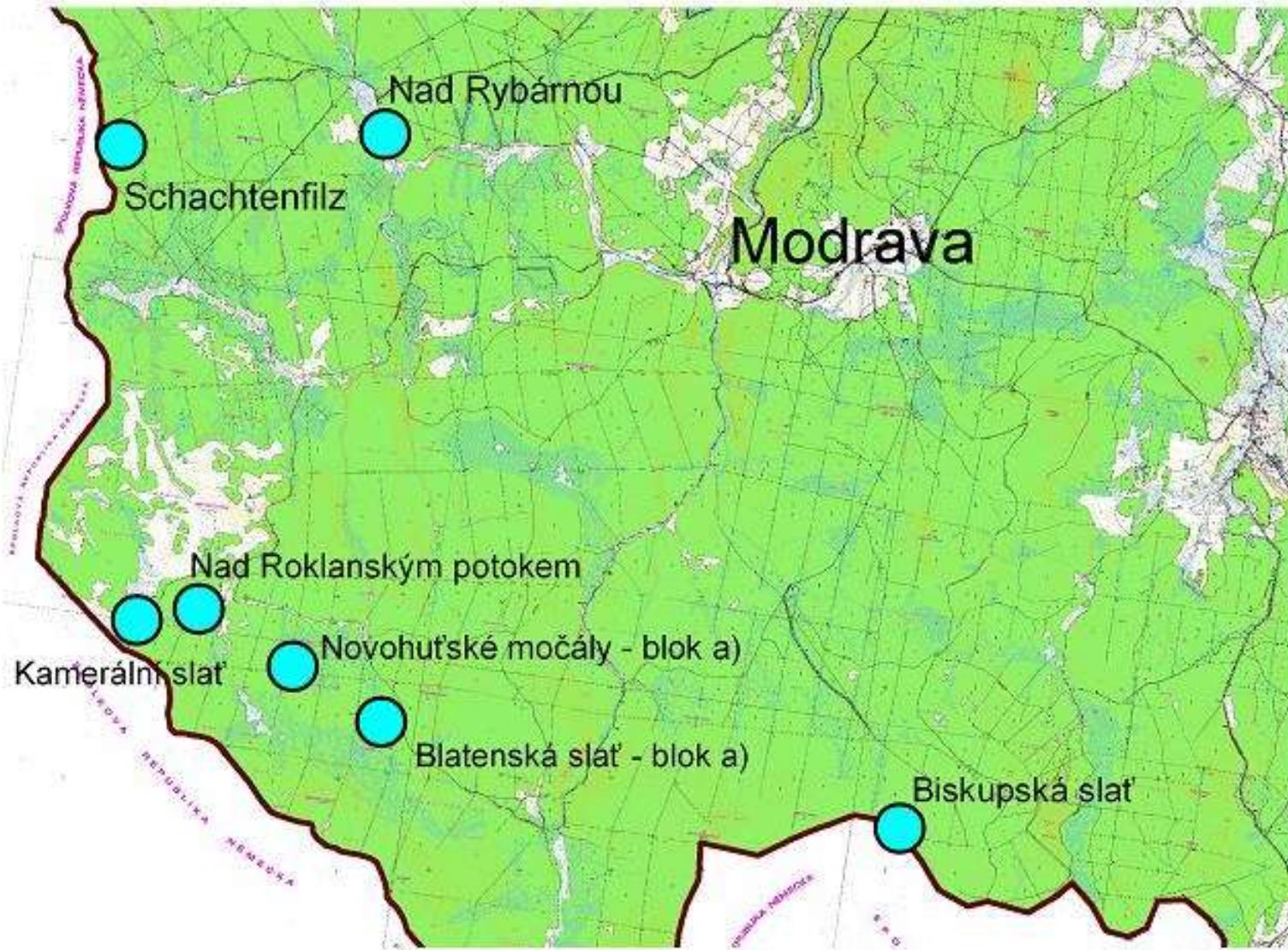
# Position of water table in drained and intact peatbog

Drained



Intact

# Peat bog monitoring



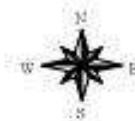
3

0

3

6

Kilometers



# Meteorology



Due to the breadth of the elevation range, between 600 and 1,453 m asl, and the particularities of the landscape, several weather stations must be maintained to adequately depict the weather patterns of the area. Several new automatic meteorological station were established after the Kyrill wind storm (January 2007) to better record mesoclimatic conditions.



## Cooperation with CHMI

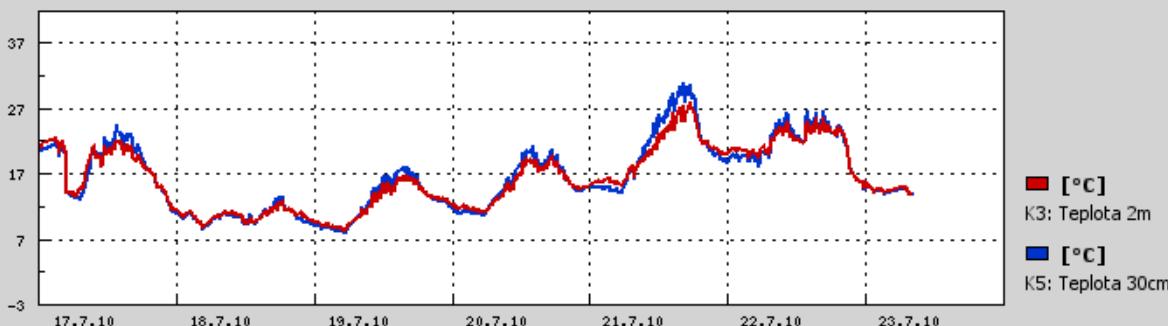
10 mesoclimatic stations

8 hydrological stations

operated Sumava NP +  
several other partners



Teplovy vzduchu



Automatization of the meteostation in Kašperské Hory

# Hydrology monitoring



## Chemistry:

8 locations, 3x / yr.

### parameters:

pH (laboratory)

conductivity (25°C)

DOC A<sub>254</sub> A<sub>300</sub> A<sub>350</sub> A<sub>400</sub>

A254/DOC\* 100

RP (F0,4)

RRP (F0,4)

Alkalita (Gran)

Cl- NO<sub>3</sub>-N+ NO<sub>2</sub>-N

SO<sub>4</sub> F Na NH<sub>4</sub>-N K Ca Mg

## Hydrobiology:

28 locations, spring

### parameters:

Algae, pH, conductivity, temperature





## Grosse Ohe

The 19 km<sup>2</sup> catchments area of the Grosse Ohe lies completely within the “nature zone” of the Bavarian Forest NP. Intensive, long-term scientific investigations on the interactions between climate, atmospheric deposition of material, and forests have been carried out here since 1978.

+ 3 small catchments Sumava NP – managed by Charles University

## Šumava LAKES → doc. Vrba

More than 130-year limnological research of glacial lakes perfectly has documented effects of environmental pressures, such as acid rain; palaeolimnological analyses of lake sediments and mires give further evidence of past landscape development, land use or climate changes, etc.



# Research Training Centre Silva Gabreta



We are going to build the international RTC Silva Gabreta in a former military base building in Kvilda.

Main partners:

NP Šumava, NP Bavarian Forest, University of South Bohemia, Technical University München



# Research Training Centre Silva Gabreta



# LTSER Silva Gabreta

## Ledovcová jezera

Plocha LTER:	Ledovcová jezera (komplexní plocha, část LTSER Silva Gabreta)
Hlavní ekosystémy:	jezera, horské smrčiny
Dostupná data od:	1979 (1871)
Koordinátor plochy:	Jiří Káňa   <a href="mailto:jiri.kana@centrum.cz">jiri.kana@centrum.cz</a>
Instituce:	Biologické centrum AV ČR, v. v. i., Hydrobiologický ústav   <a href="http://www.hbu.cas.cz">www.hbu.cas.cz</a>
Rozloha:	2,6–18,8 ha (plocha jezer); 67 a 89 ha (experimentální povodí)
Nadmořská výška:	918–1087 m n.m.
Zeměpisná šířka:	48°47' – 49°11' s.s.
Zeměpisná délka:	13°07' – 13°52' v.d.
Roční srážkový úhrn:	cca 1450 mm
Teploplota (vzduch):	cca 3,8 °C
Jiný status plochy:	Národní park, Biosférická rezervace



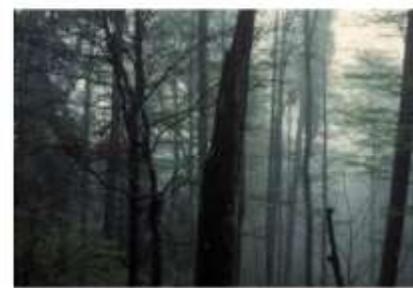
## Šumavské horské smrčiny

Plocha LTER:	Šumavské horské smrčiny
Hlavní ekosystémy:	třtinové smrčiny, rašelinné a podmáčené smrčiny, papratkové smrčiny
Dostupná data od:	2005 (1995)
Koordinátor plochy:	Jaroslav Červenka   <a href="mailto:jaroslav.cervenka@npsumava.cz">jaroslav.cervenka@npsumava.cz</a>
Instituce:	Správa Národního parku Šumava   <a href="http://www.npsumava.cz">www.npsumava.cz</a>
Nadmořská výška:	1100 m n.m.
Jiný status plochy:	Ramsar sites, Natura 2000; součásti NP Šumava a NP Bavorský les



## Šumavské pralesy

Plocha LTER:	Šumavské pralesy (Boubín, Milešice a Stožec)
Hlavní ekosystémy:	smíšené jedlo-buko-smrkové lesy, horské smíšené lesy na sutích, podmáčené smrčiny
Dostupná data od:	1972
Koordinátor plochy:	Dušan Adam   <a href="mailto:dusan.adam@vukoz.cz">dusan.adam@vukoz.cz</a>
Instituce:	Výzkumný ústav Silva Taroucy pro krajinnu a okrasné zahradnictví, v. v. i.   <a href="http://www.pralesy.cz">www.pralesy.cz</a>
Rozloha:	72 ha
Nadmořská výška:	938 m n.m.
Zeměpisná šířka:	48°55'57" s.s.
Zeměpisná délka:	13°49'31" v.d.
Roční srážkový úhrn:	cca 812 mm
Teploplota (vzduch):	cca 4,5 °C
Jiný status plochy:	I. zóna NP Šumava (Stožec); NPR Boubinský prales, NPR Milešický prales, součásti CHKO a BR Šumava



## Rašeliniště

Plocha LTER:

### Rašeliniště

Hlavní ekosystémy:

otevřené zvýšené bažiny, rašeliniště, přírodní travní porosty

Dostupná data od:

**2005 (1995)**

Koordinátor plochy:

Zdenka Křenová | [zd.krenova@gmail.com](mailto:zd.krenova@gmail.com)

Instituce:

Správa NP a CHKO Šumava | [www.npsumava.cz](http://www.npsumava.cz)

Rozloha:

celkem 6000 ha; 7 (Blatenská); 13 (Šárecká); 1,2 (Schachtenfilz); 3 (Nad Rybárnou)

Nadmořská výška:

1100 m nm; 1250 (Blatenská); 1020 (Šárecká); 1140 (Schachtenfilz); 1020 (Nad Rybárnou)

Zeměpisná šířka:

49 ° 0 's.š.

Zeměpisná délka:

13 ° 27 'vd

Roční srážkový úhrn:

cca 1330 mm

Teplota (vzduch):

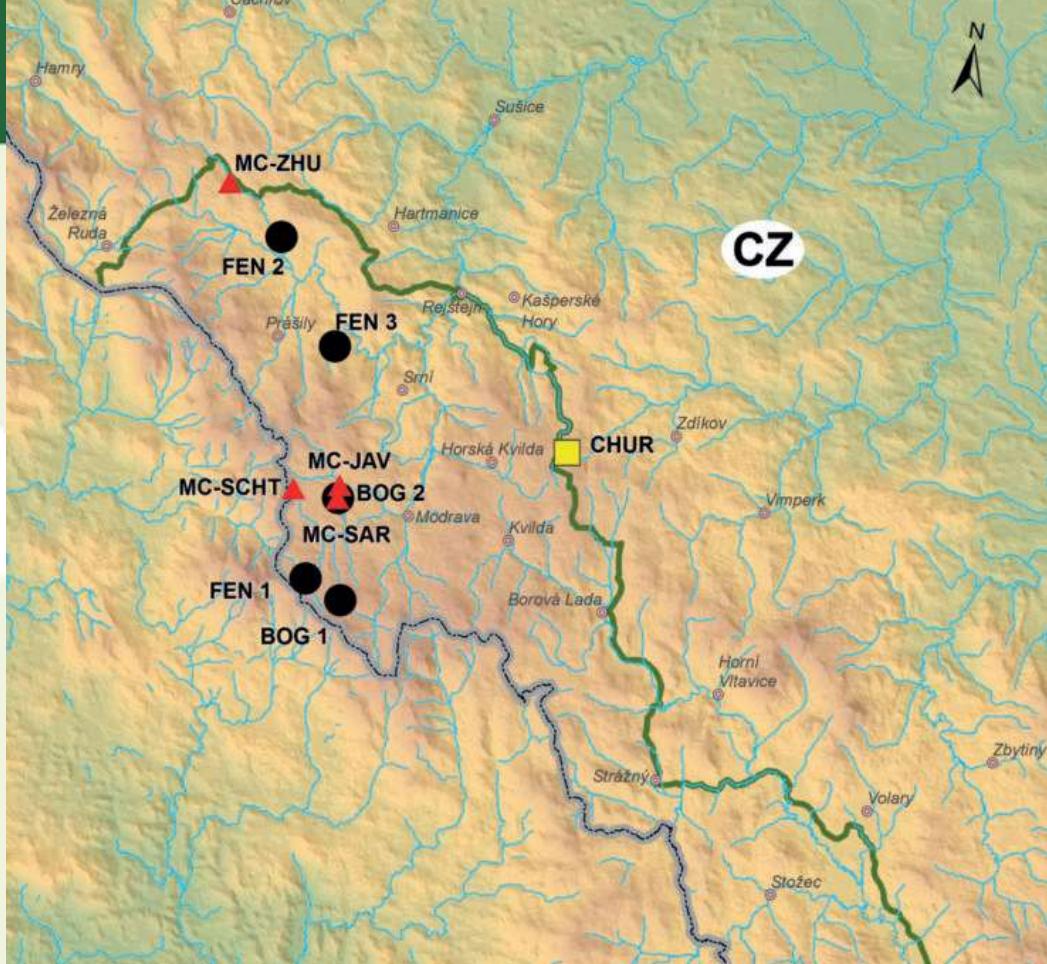
cca 3,2 °C

Jiný status plochy:

Ramsar sites, Natura 2000; součásti NP Šumava

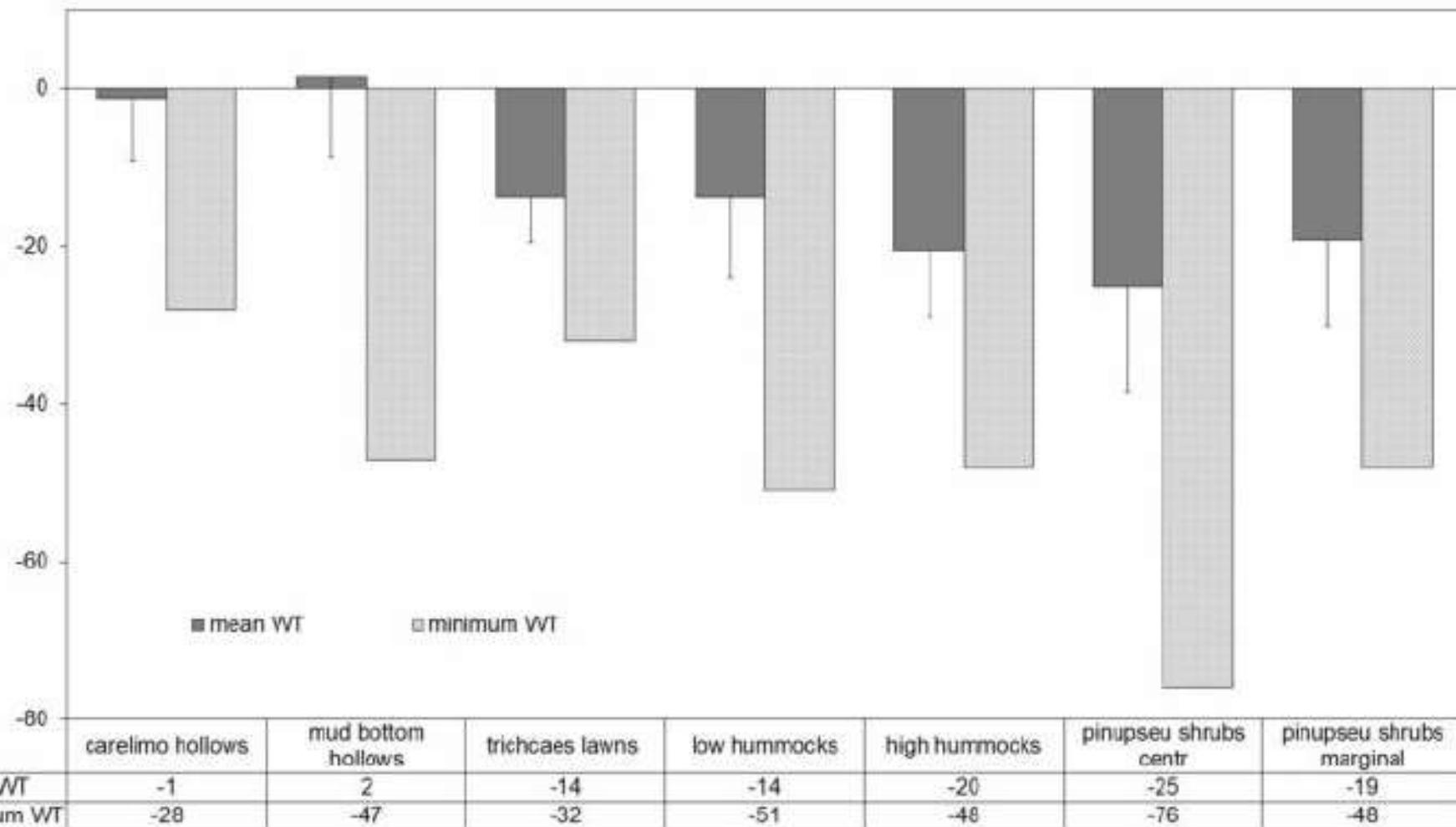


Mire monitoring scheme			Site	Altitude (m a.s.l.)	Scheme: D=detailed, S=simple	Start of monitoring	Water table position (boreholes)	Boreholes sum	Hydrochemistry	Microclimate - air	Microclimate - soil	Runoff	Precipitation	Vegetation permanent plots	
OMBRO-TROPHIC	Control	High raised bog	Blatenská sláť	1250	D	2005	18	24	x				1	18	
			Šárecká sláť	1020	D	2007	6		x	1	1		1	6	
	Restored	High raised bog	Schachtenfiz	1140	D	2005	21	49	x	1	1	1	1	21	
			Rybárny	1020	D	2005	4		x					4	
			Křemelná	930	D	2007	8		x			1	1	8	
			Novohuťské močály	1220	S	1994	11							11	
			Kamerální	1210	S	1994	5							5	
			Tetřevská	1110	D	2015			x						
	Control	Spruce mire	Transitional mire	Malý Bor	900	D	2005	3	12	x					3
			Roklanský les	1190	S	1994	9	x					9		
			Meadow mire	Velký Bor	870	D	2007	2	x					2	
			Spruce mire	Schachtenfilz	1140	D	2005	7	14	x					7
	Restored		Rybárny	1020	D	2005	5	x			1		5		
			Blatenská sláť	1250	D	2005	2	x	1	1			2		
			Filipohutské polesí	1120	D	2014		x							
			Transitional mire	Křemelná	930	D	2007	6						6	
		Meadow mire	Křemelná	930	D	2007	12	12	x						12
			SUMA						119	119	3	3	3	4	119

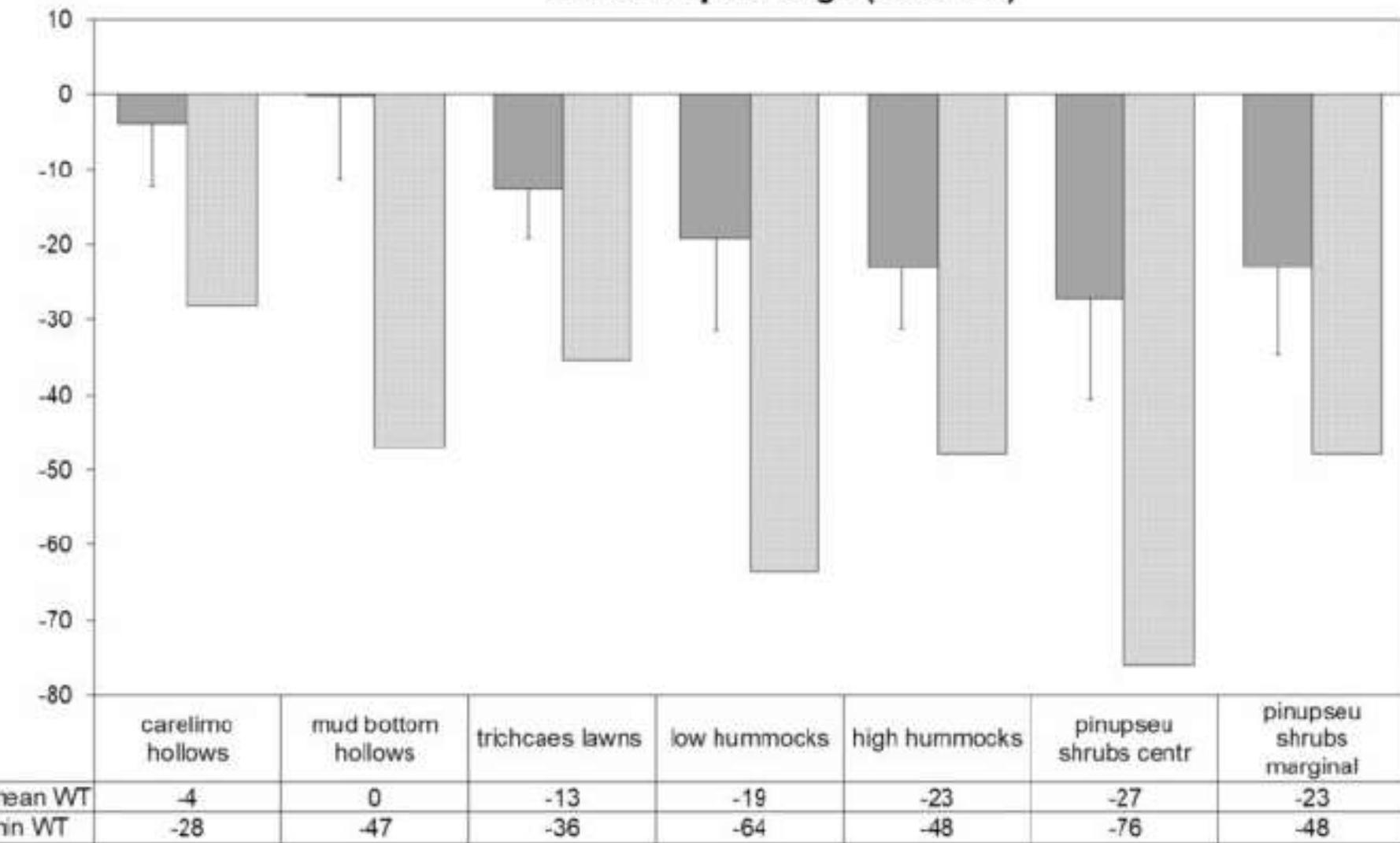


**Ten years of changes in hydrology and vegetation in  
montane mires of temperate zone in Central Europe  
(*Šumava National Park*)**

## Mean and minimum WT for period 2005–2018 in BOG1



## Ombrotrophic bogs (BOG 1-2)



## Minerotrophic fens (FEN 1-3)

