National Park Bohemian Switzerland

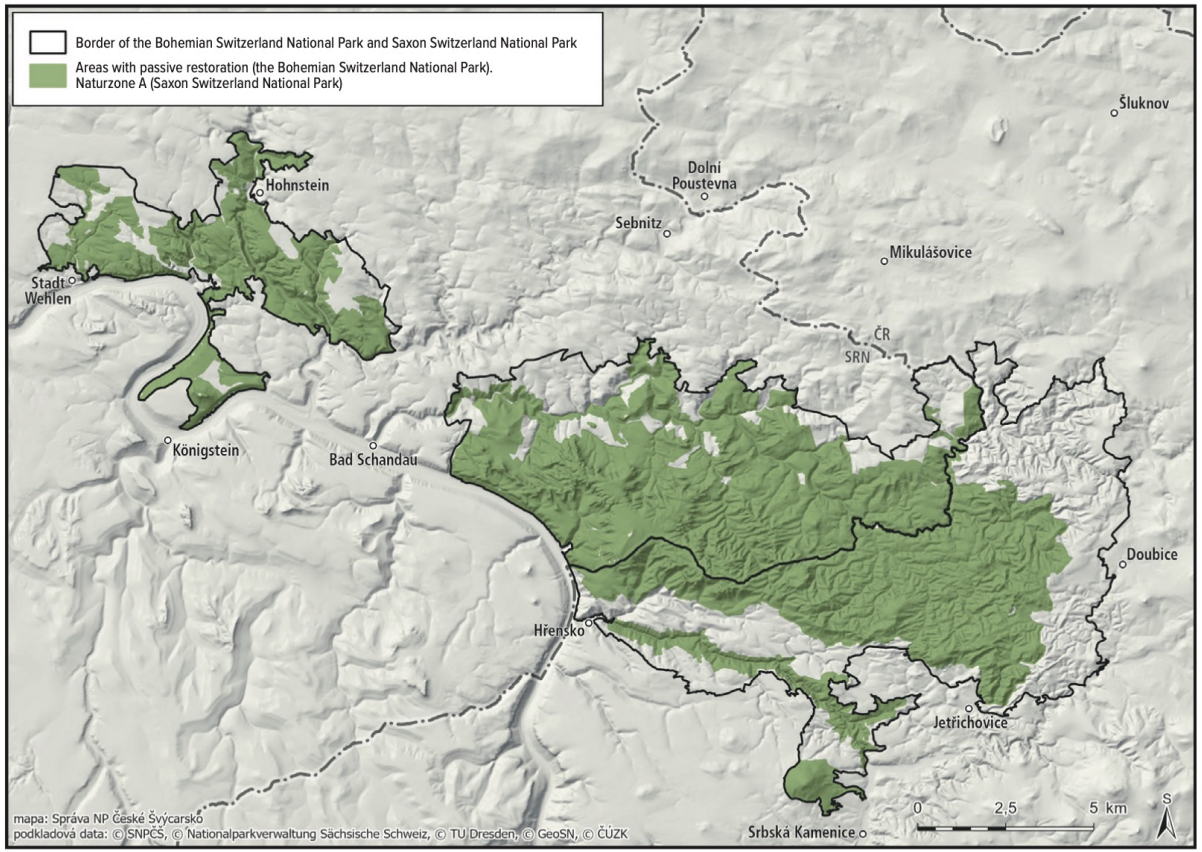
Materials for USA visitors

4/1-4/14/2024

Funding source: TransAdapt (Translace poznatků a transfer postupů pro adaptaci na klimatickou změnu do zemědělské a lesnické praxe a veřejné správy: co-creative přístup)

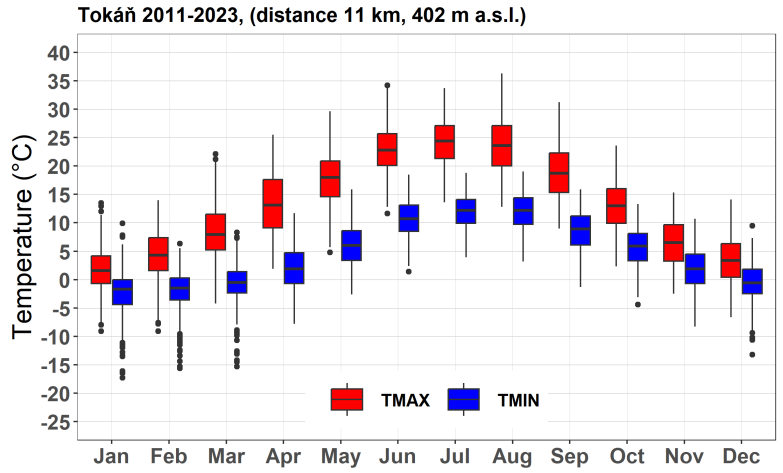
Background

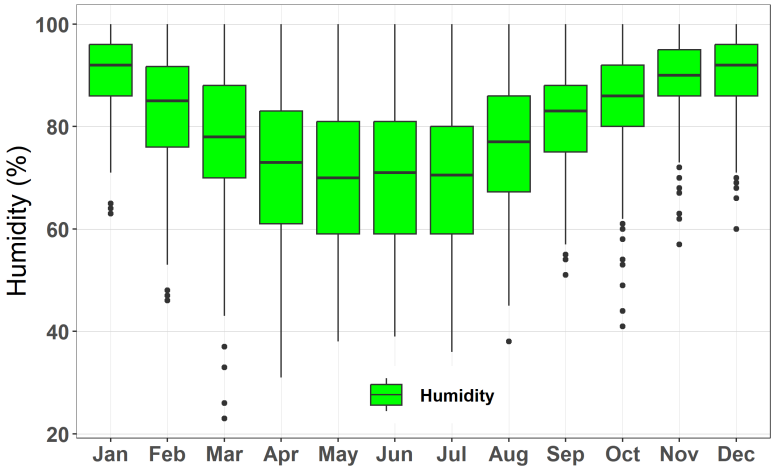
- The youngest of National Parks (est. 2000, before a PLA since 1972)
- Is a part of a larger complex of protected areas that continue beyond the German border

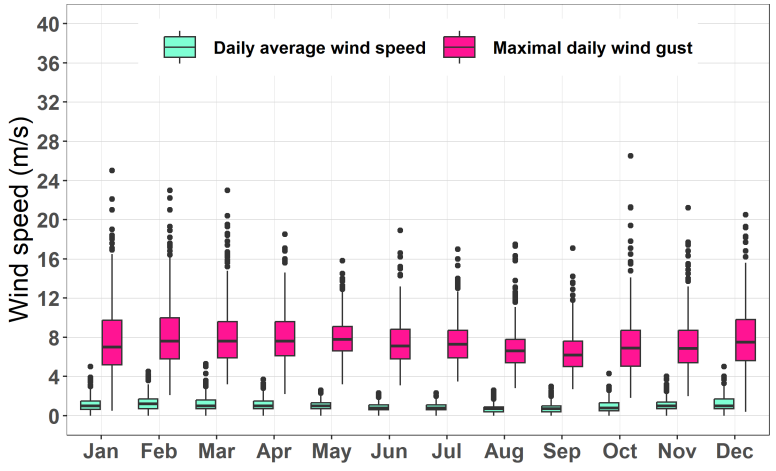


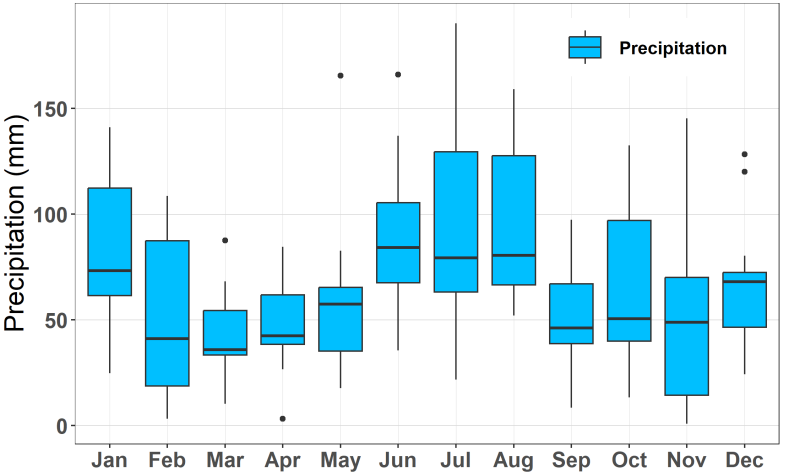
- The objectives of park service are to:
  - Increasing the degree of ”naturalness of ecosystems and the area left to spotaneous development
  - Protection of some species – requires presence of more decisuous trees and dead wood
  - Landscape protection – sandstone formations

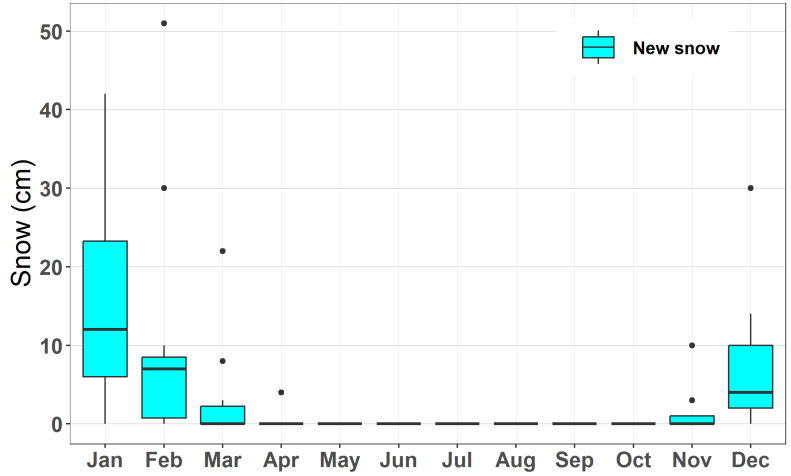
Climatology

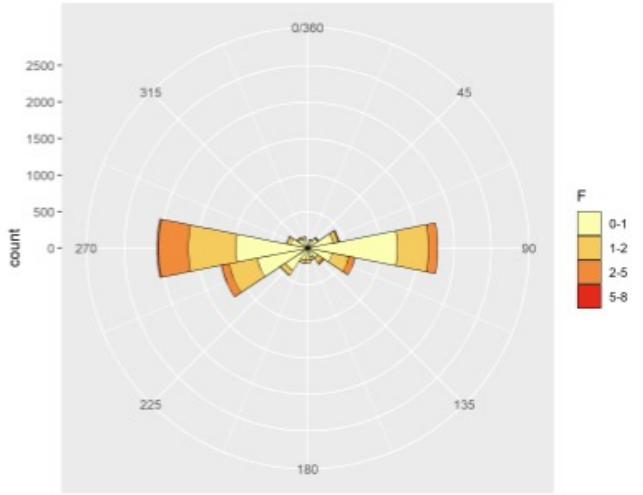






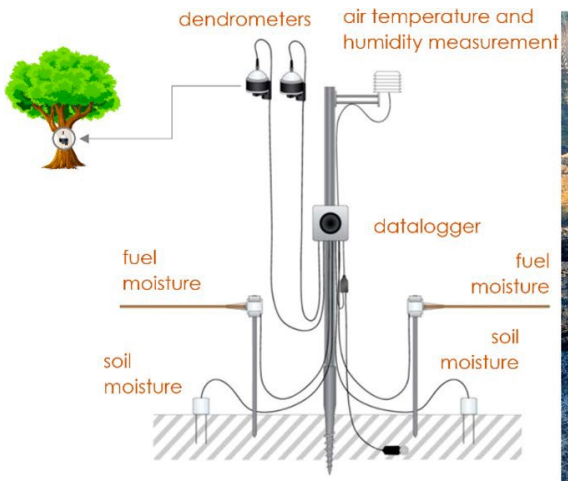




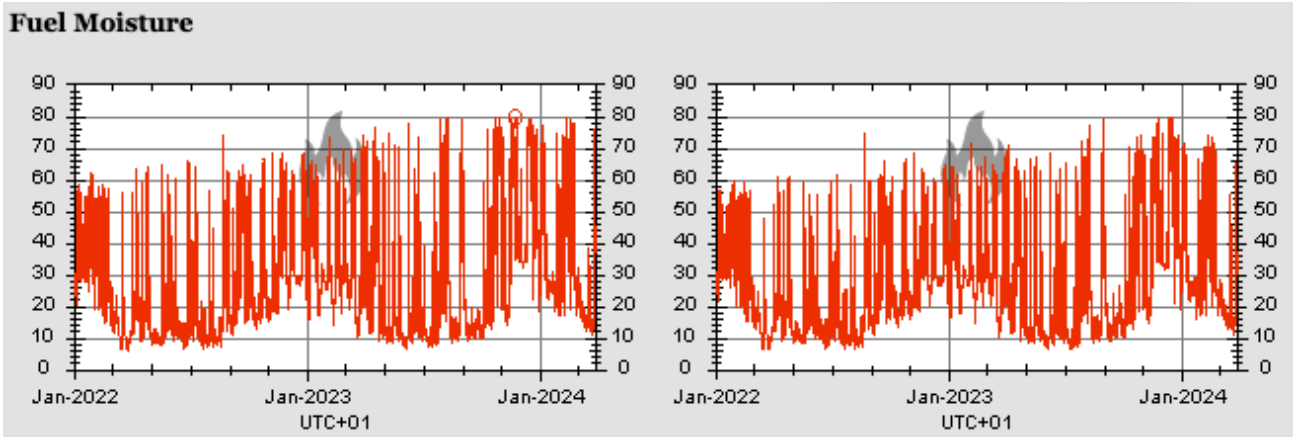


Fuel moisture measurements

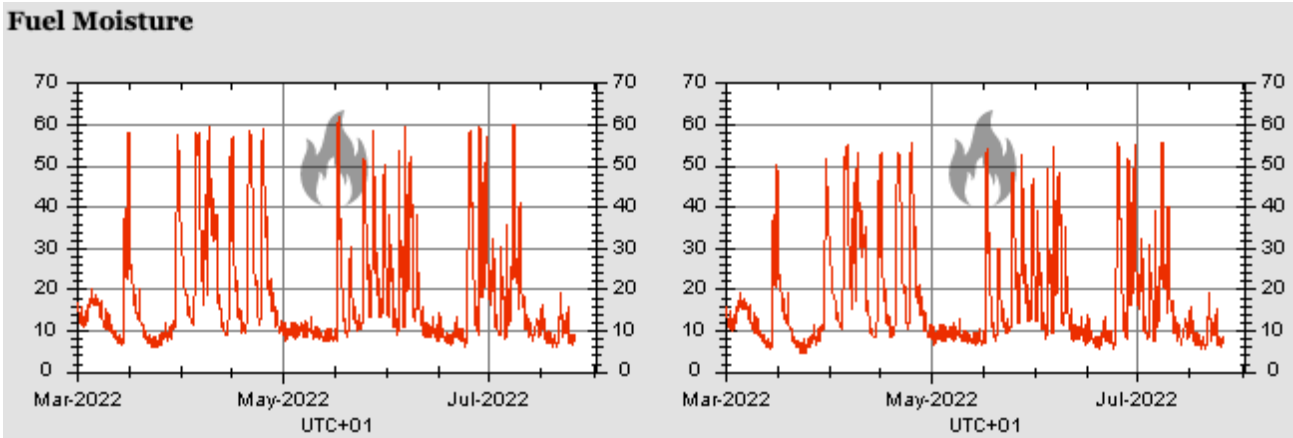
Total of 6 stations
- 2 installed in spring 2022 - 1 of them burned in fire of 2022
- Other installed in summer 2023
- Stations installed at “risky” locations
- Part of the FireRisk monitoring network
  - Accessible at https://www.firerisk.cz



Full record from Vlčí Hora



Fuel moisture the season before fire in July 2022



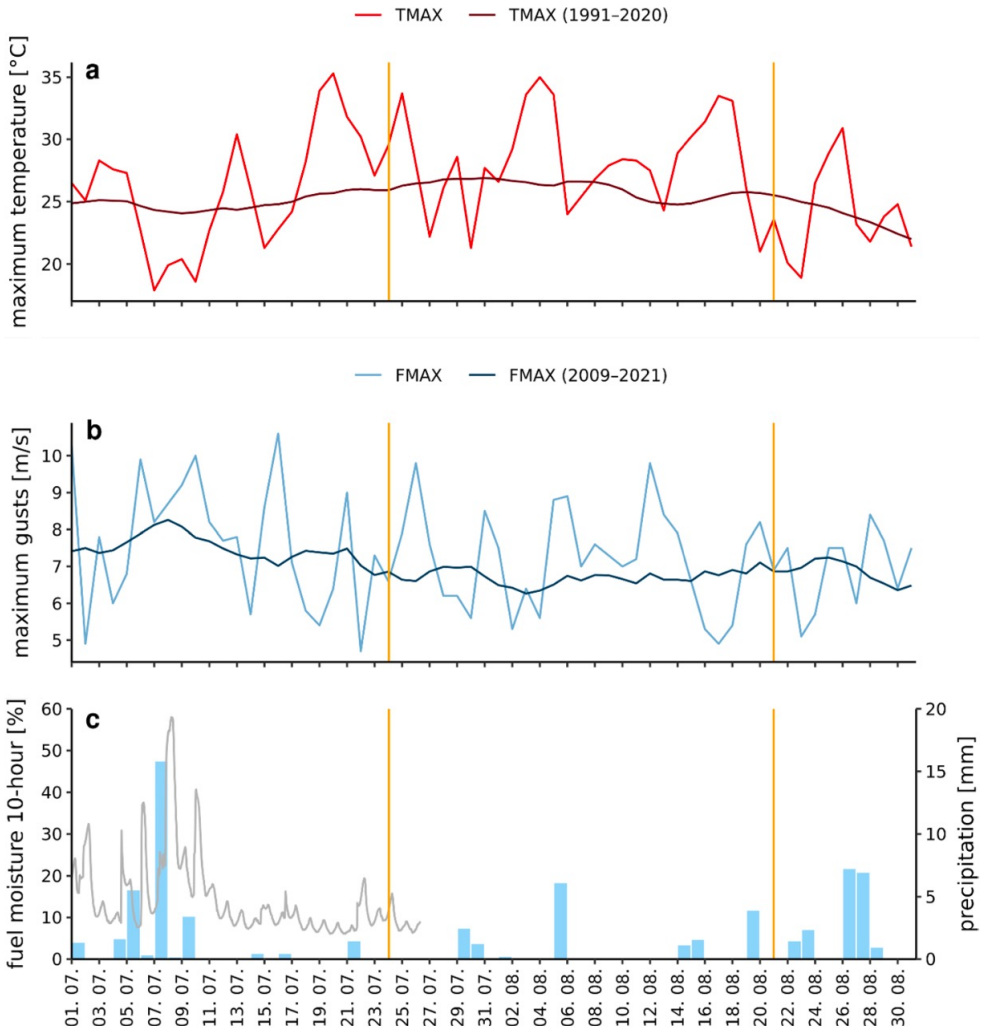
Wildfire behavior modelling

7/2022 - the largest wildfire in CZ (over 1000ha)

complex and inaccessible terrain, bark beetle kill areas, WUI areas, low DFM, high temperature and wind gusts

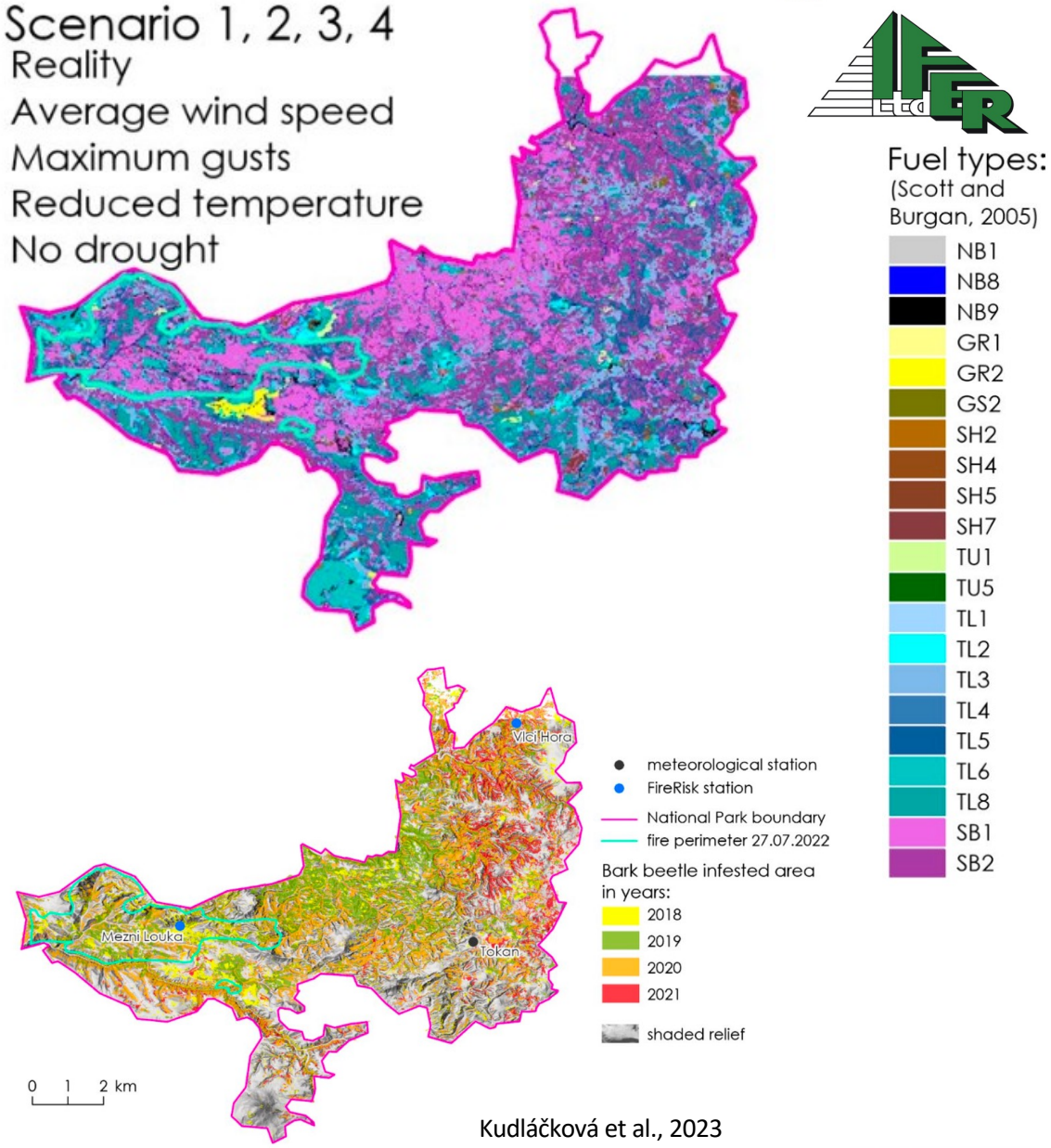
fall 2022 - visiting Missoula Fire Sciences Lab to get help with the modelling (recreating observed fire behavior)

Using FARSITE to assess wildfire behavior in Bohemian Switzerland National Park (Kudláčková et al., 2023) and a report for the Ministry of Environment



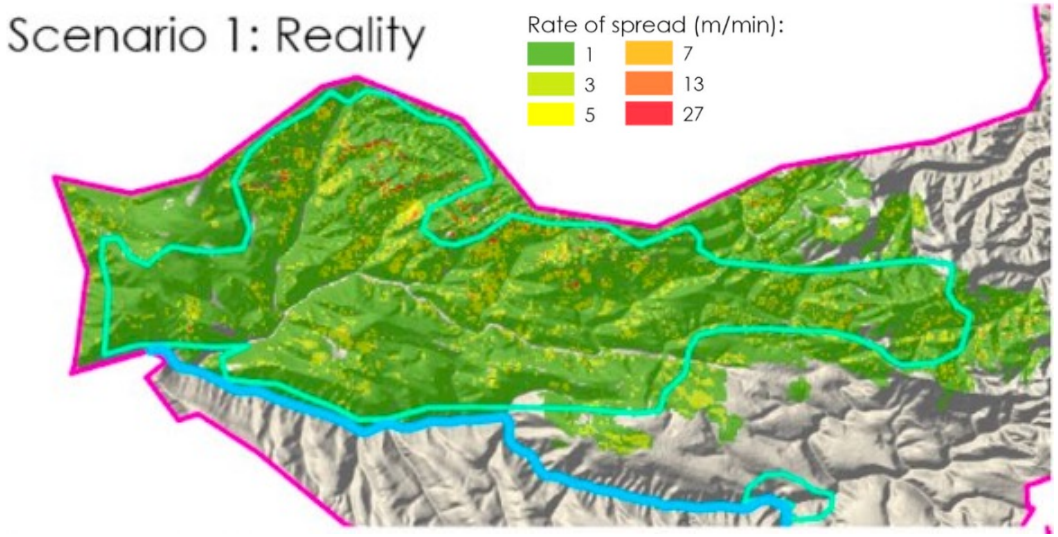
Using FARSITE - recreating observed wildfire behavior

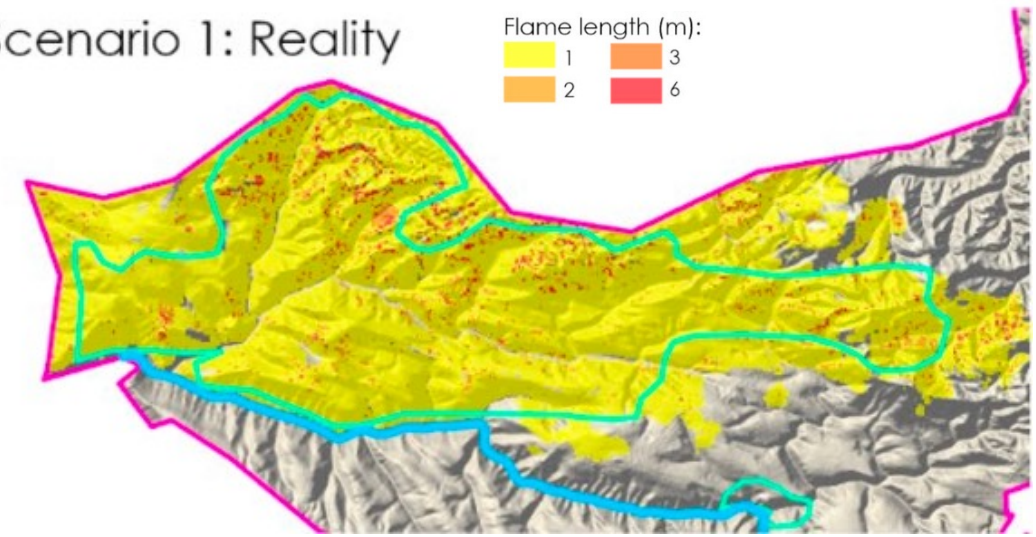
- Assessment of fire perimeter and described behavior
- Creating all 8 necessary landscape layers
- Fuel types – using established Czech method
  - Mosaic of forest, agriculture, and developed areas
  - Changes based on observed pre-fire conditions
  - Adding layers of bark beetle infestation
- Development of crown parameters (CC, SH, CBH, CBD)
  - LiDAR data + expert knowledge
  - No existing accessible in-situ observations
- Investigating possible weather data sources and their adjustments (e.g. using max wind gusts for modelling)

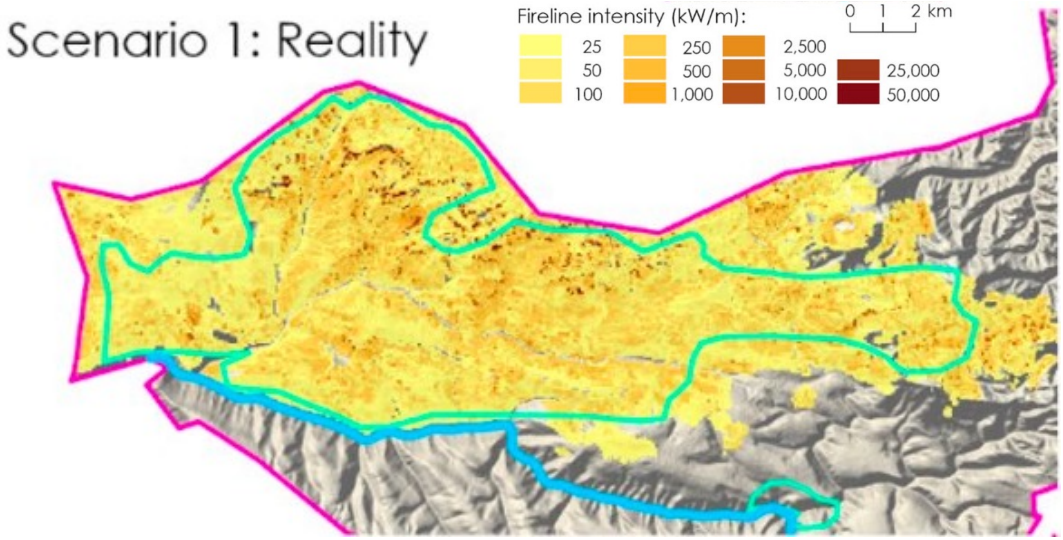


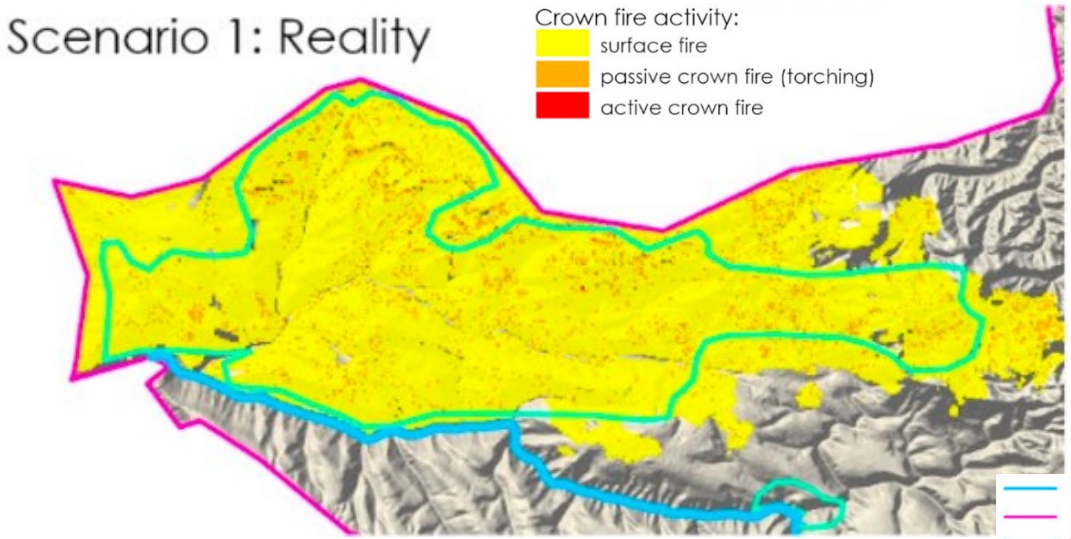
Kudláčková et al., 2023

Using FARSITE - recreating observed wildfire behavior





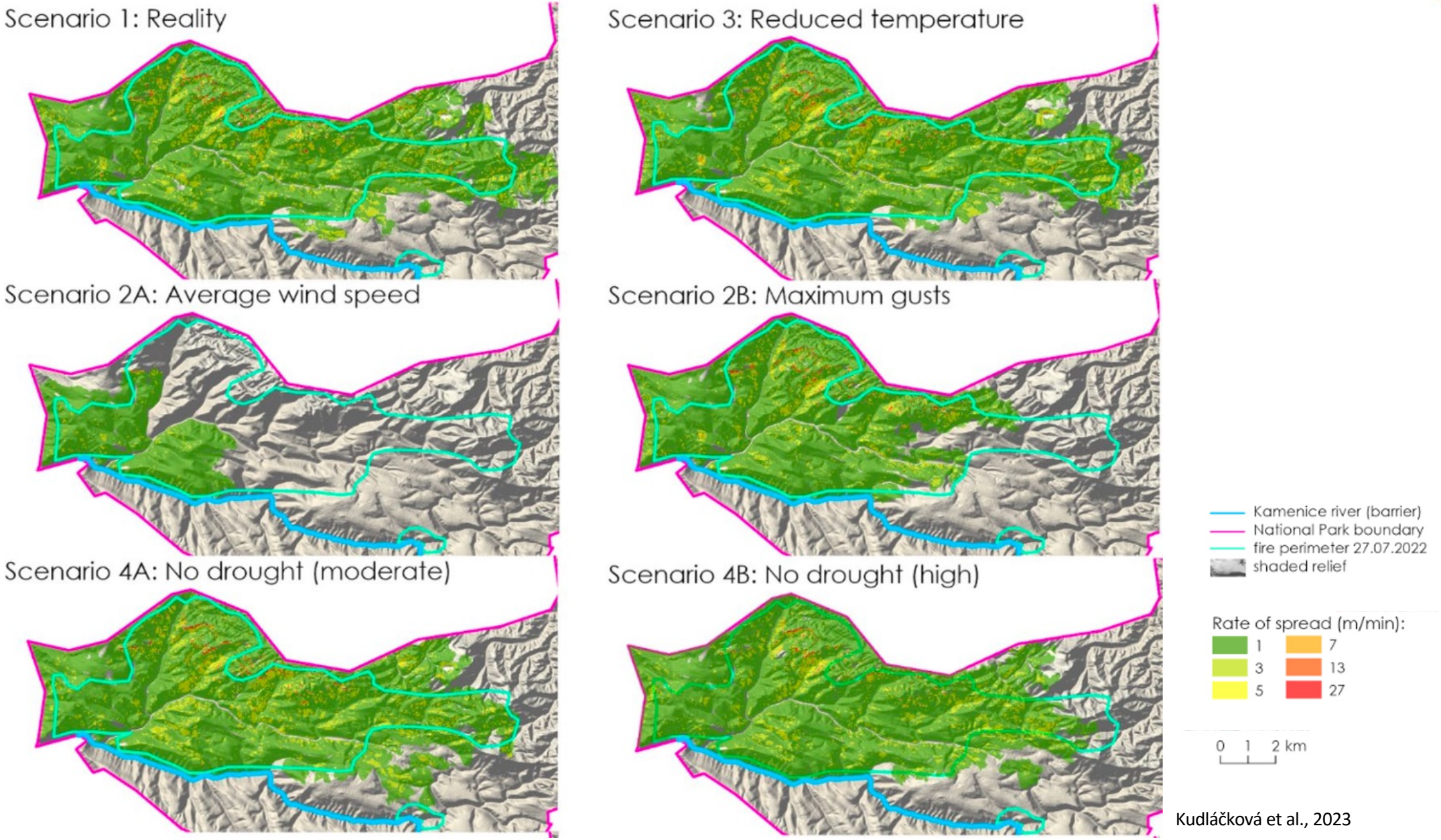




Kamenice river (barrier)
National Park boundary
fire perimeter 27.07.2022
shaded relief

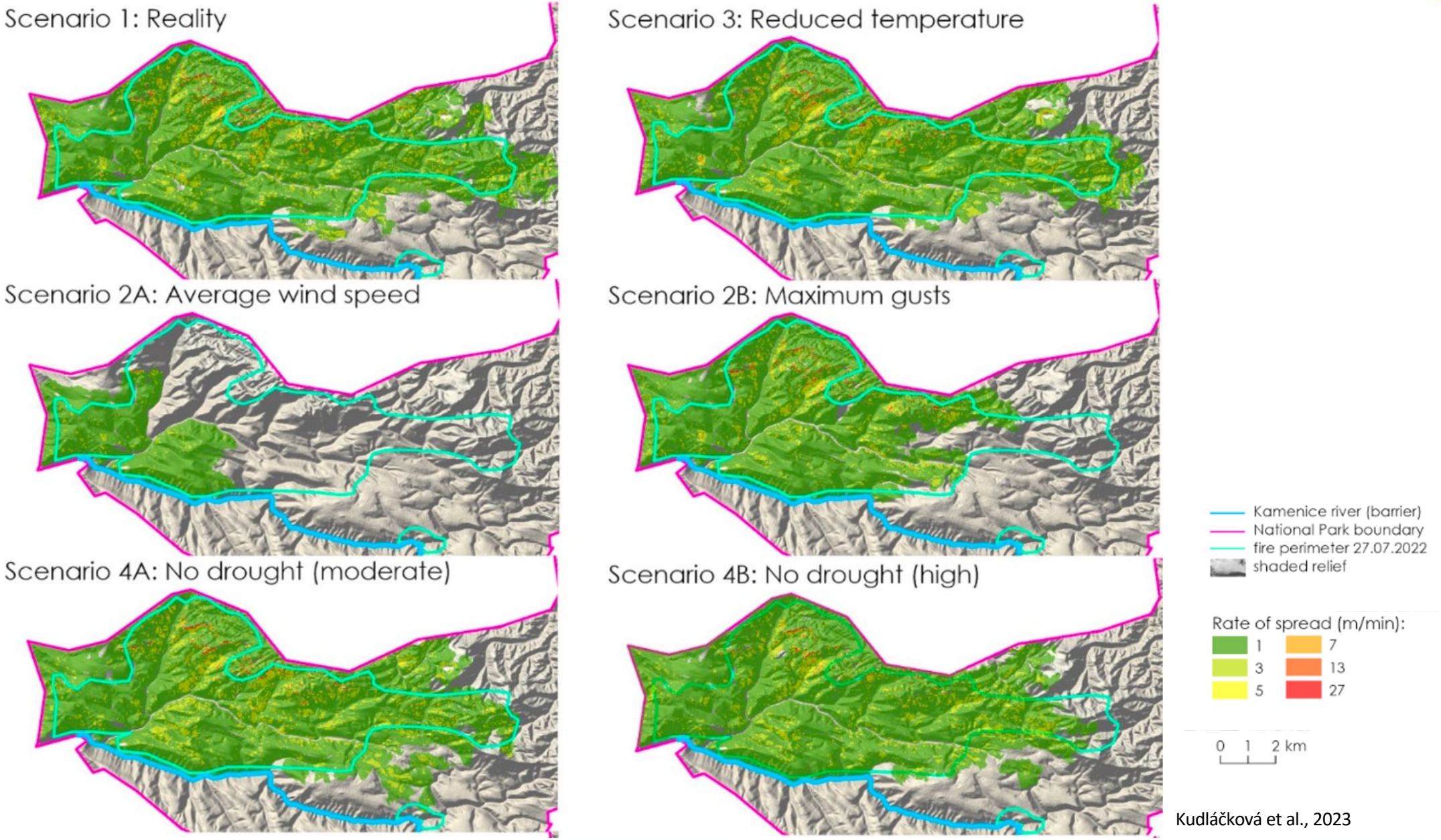
Kudláčková et al., 2023

Using FARSITE – influence of weather and climate



Kudláčková et al., 2023

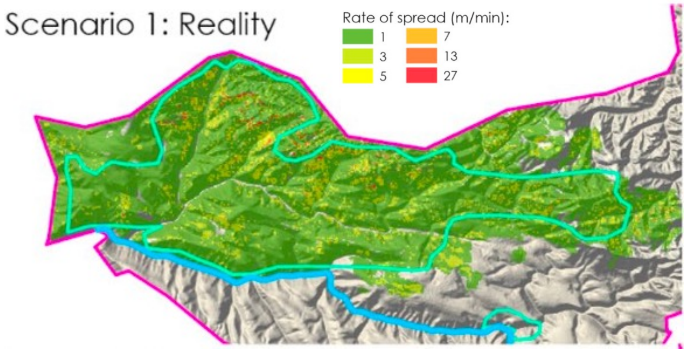
Using FARSITE – influence of weather and climate

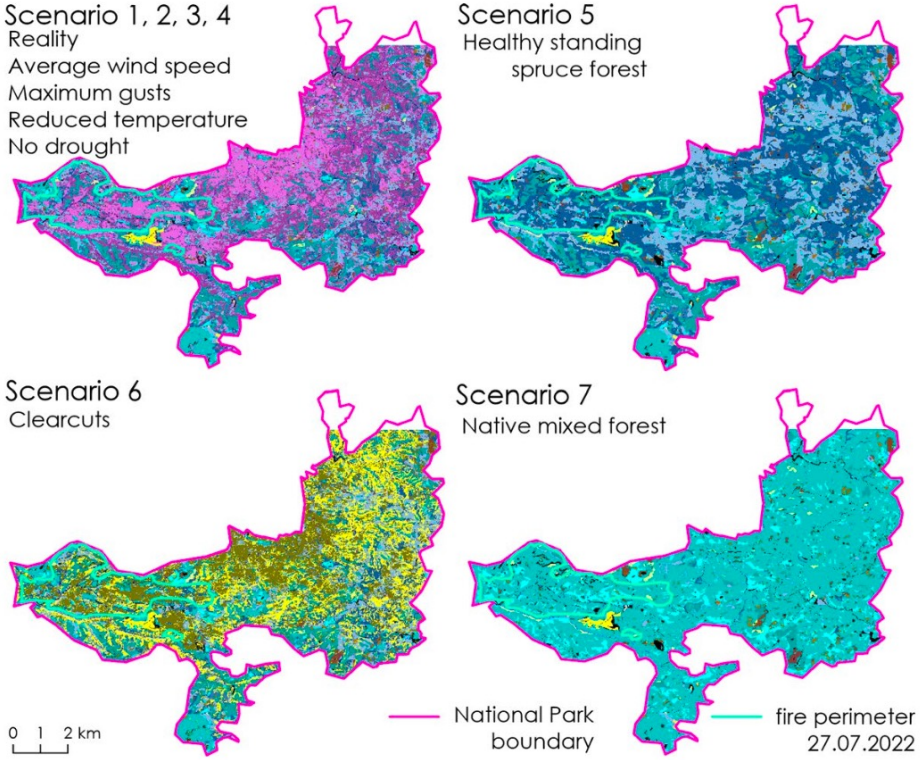


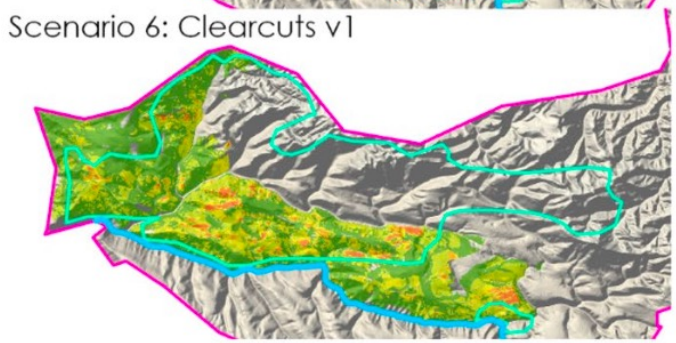
Kudláčková et al., 2023

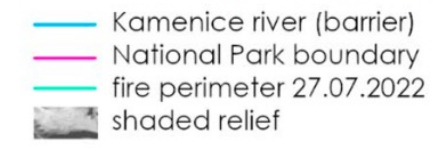
Using FARSITE – influence of vegetation (fuel)

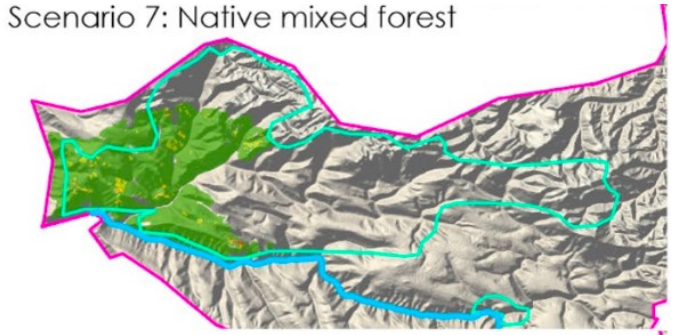
Bark beetle kill areas were substituted with a different fuel type – creating scenarios of ”what if”

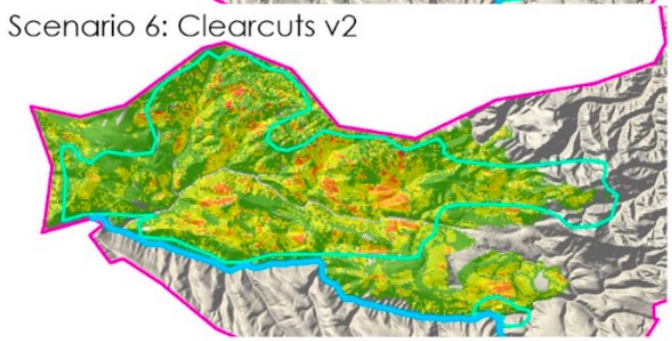


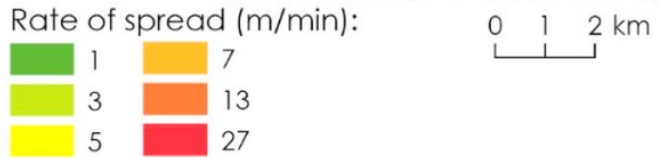






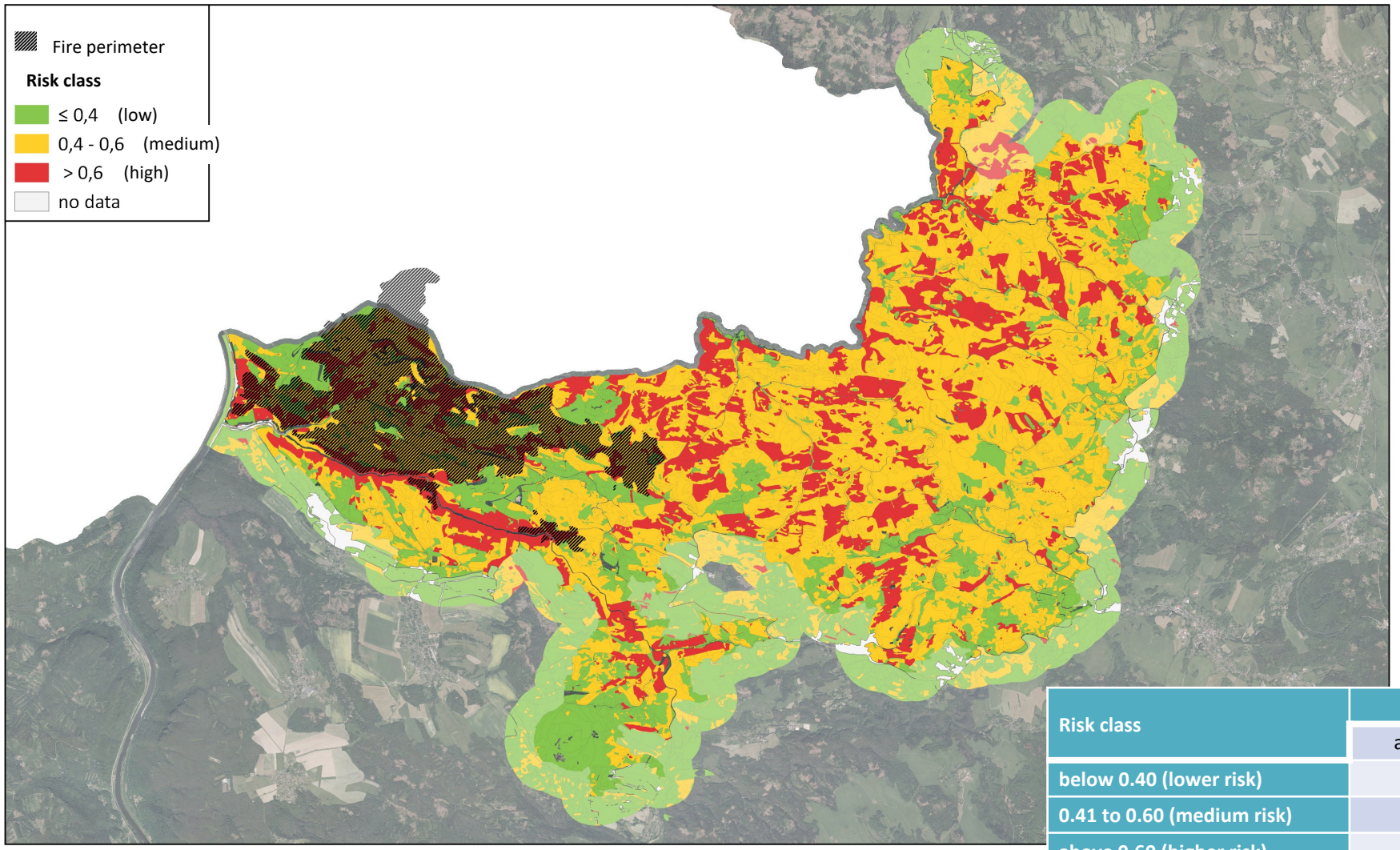






Kudláčková et al., 2023

Fire Risk Index – present conditions

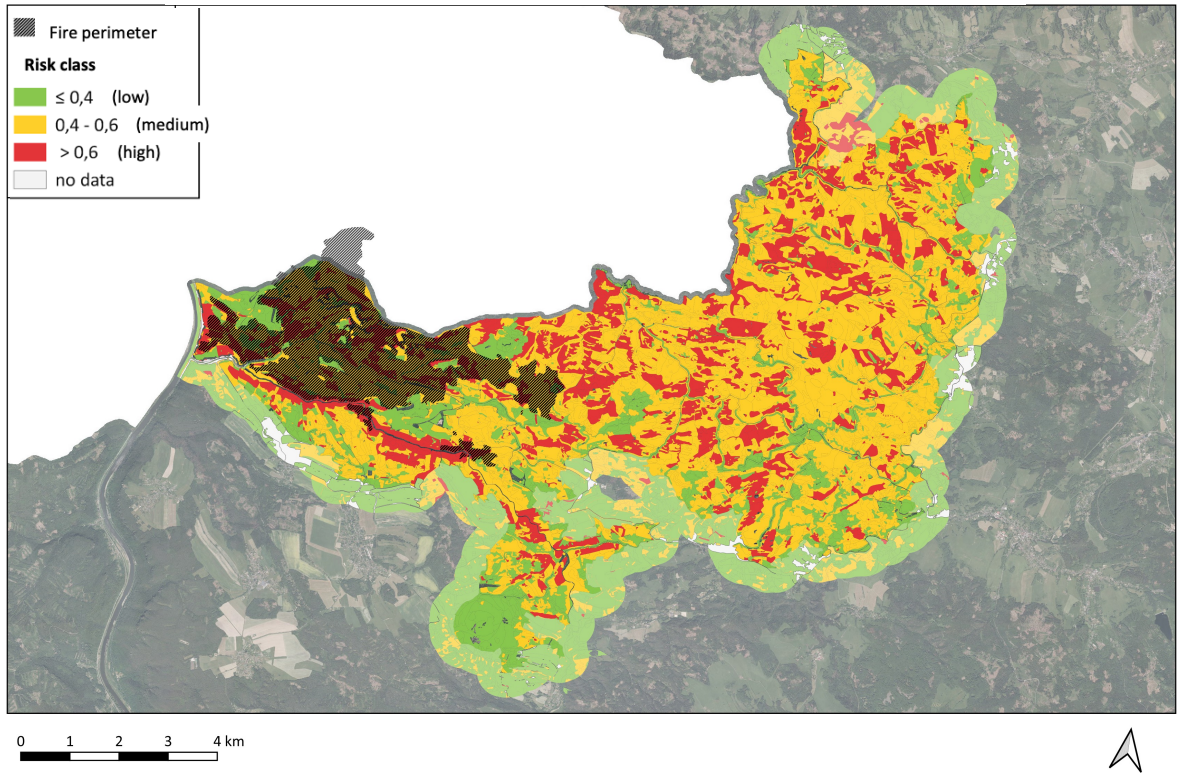


Risk class	NPČŠ		NPČŠ with 500 m buffer	
	area (ha)	percent of area	area (ha)	percent of area
below 0.40 (lower risk)	1 145.0	15 %	3 148.2	30 %
0.41 to 0.60 (medium risk)	4 073.9	53 %	4 611.3	45 %
above 0.60 (higher risk)	1 574.3	20 %	1 626.6	16 %
Fire perimeter 2022	962.7	12 %	962.7	9 %
Total	7 756.0	100 %	10 348.8	100 %

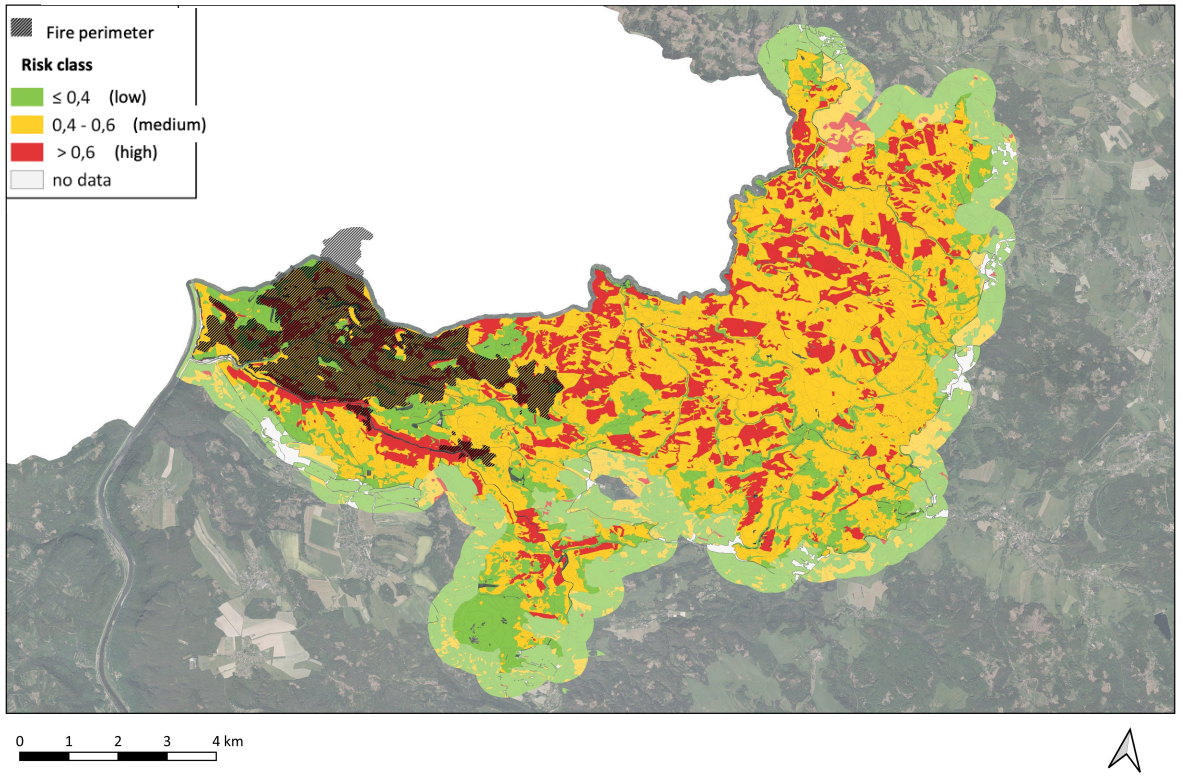
Fire Risk Index – after short term management

Short term implications of management (3-5 years)	Fire Risk Index below 0.40 (lower risk)	Fire Risk Index 0.41-0.60 (medium risk)	Fire Risk Index above 0.61 (higher risk)
	Percent of area in NP		
Present situation	17 %	60 %	23 %
Scenario 1 – planned fire protection logging and removal of dead trees around roads	19 %	58 %	22 %
Scenario 2 – planned fire protection logging, removal of dead trees around roads and in high management zones	19 %	60 %	21 %

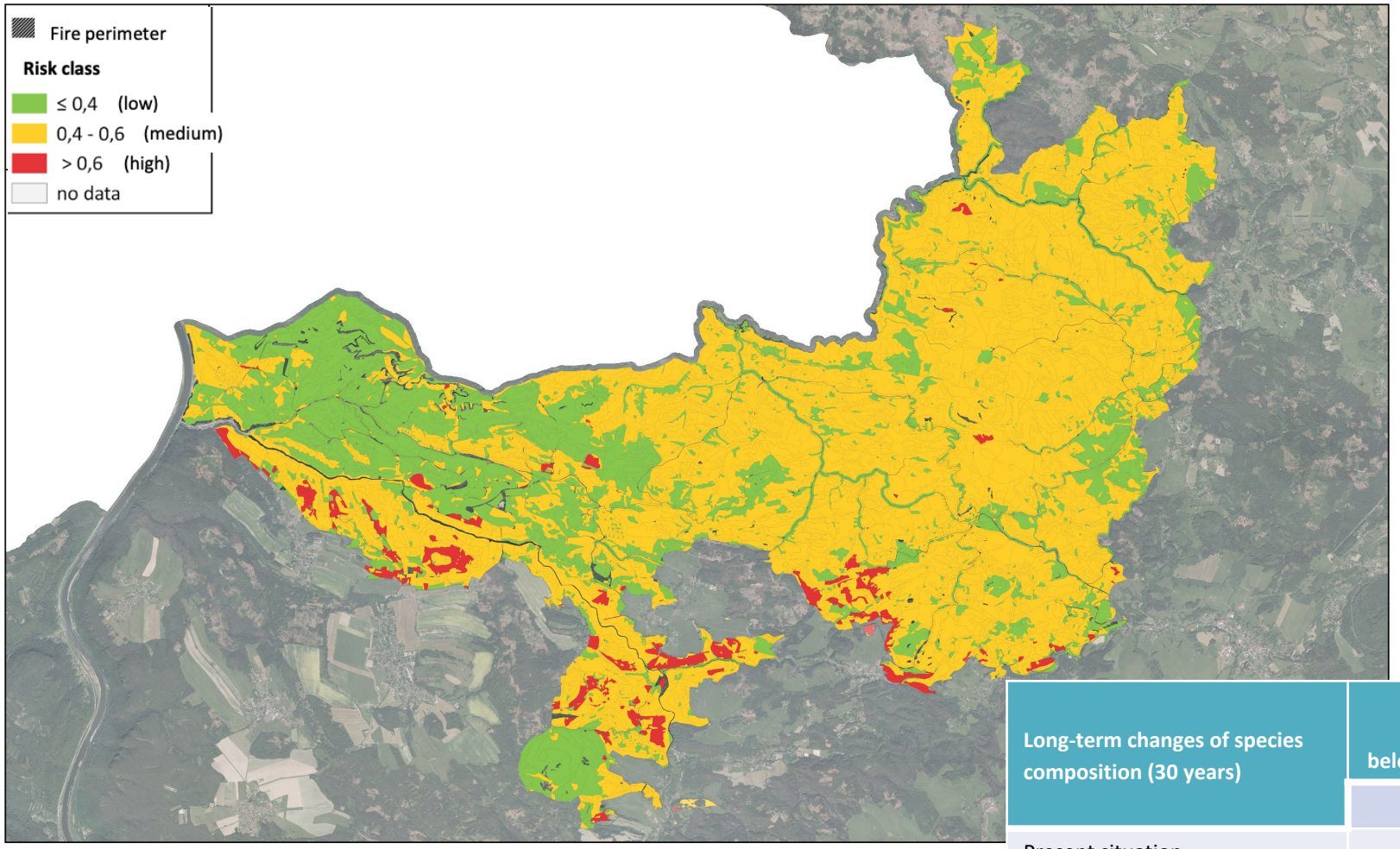
Scenario 1



Scenario 2



Fire Risk Index – projected situation in 30 years



In this scenario we consider:

- the current dead conifer stands growing in nutrient rich habitats will change to deciduous stands, a new generation of conifers will develop in poorer habitats
- in the zone of permanent care with active regeneration, we assume the change of dead stands to young deciduous stands
- the existing clearings and burned areas will be overgrown with successional trees
- dryer pine stands, which occur outside the azonal habitat, will change to conifers

Long-term changes of species composition (30 years)	Fire Risk Index below 0.40 (lower risk)	Fire Risk Index 0.41-0.60 (medium risk)	Fire Risk Index above 0.61 (higher risk)
	Percent of area in NP		
Present situation	17 %	60 %	23 %
Future situation (in 30 years)	28 %	69 %	3 %

More detailed information

Natural Hazards (2024) 120:3943–3977
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ORIGINAL PAPER

Using FlamMap to assess wildfire behavior in Bohemian Switzerland National Park

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Abstract
The 2022 summer fire in the Bohemian Switzerland National Park (BSNP) is the largest in the 30-year recorded history of the Czech Republic, with an affected area of over 1000 ha. The FlamMap fire modeling system was used to investigate the fire behavior in the BSNP and to evaluate scenarios under a range of fuel types, fuel moistures, and weather conditions. The model was used to simulate fire conditions, propagation, and extent. We focused on matching the observed fire perimeter and fire behavior characteristics. The fire occurred in a region of the BSNP heavily affected by Spruce bark beetle (*Ips typographus* L.) infestation; hence, most of the burned area encompassed dead spruce forest (*Picea abies* Karst.). The best FlamMap simulations of the observed fire behavior and progression were compared with several created scenarios exhibiting various input conditions. These scenarios included a fire in a healthy spruce forest, clearcuts, or different meteorological conditions. We could calibrate and use FlamMap to recreate the 2022 summer wildfire in the BSNP under the observed conditions. It was found that the fire would have likely spread to the observed final perimeter even if standing dead trees had been removed, albeit at a lower fire intensity and with a considerably shorter duration. Alternatively, if healthy standing vegetation with a closed canopy had been present, the wildfire perimeter would have reached approximately half the observed value. Similar results were obtained for both the non-native spruce forest and deciduous forest, which is a native alternative.

Keywords Wildfire · Czech Republic · Dead spruce fire · FlamMap · FARSITE · Modeling

1 Introduction

Due to its geographical location, climatic conditions and character of the landscape, the Czech Republic does not yet exhibit the same probability of extensive and frequent wildfires as other parts of the world (Mediterranean, USA, Africa, Australia or Siberia, e.g., Krawchuk et al. 2009; Bowman et al. 2013). However, climate change is causing more

Extended author information available on the last page of the article

3.2 Exploratory wildfire scenarios

3.2.1 Scenario 2: Average wind speed and maximum gusts

Scenarios 2A and 2B illustrate the effect of the wind speed on the final modeled extent of the fire (Figs. 7 and 8, respectively). A lower wind speed resulted in a simulated fire extent exhibiting poor agreement (a smaller extent) with the observed fire size (Fig. 8, scenario 2). This agrees with the finding that the Tokan meteorological station yields underestimated wind speeds. Additionally, as the station is not located in close proximity to the fire, the specific observed meteorological conditions could slightly differ from those at the fire burn site. Scenario 2A generated the smallest fire extent. Scenario 2B also showed a smaller mean fire extent than reality but a much larger extent than that observed under the average wind speed scenario.

Under scenario 2A, an average affected area of 319 ha was obtained. Compared to scenario 1, the difference reached 70% (740 ha). Scenario 2B yielded a larger area, on average 895 ha. The difference from the observed burnt area reached 16% (165 ha).

3.2.2 Scenario 3: Reduced temperature

Under reduced temperature scenario, the average fire extent was 1314 ha. The average perimeter under this scenario was 24% larger (255 ha) than the observed perimeter, representing a larger area than that simulated under scenario 1 (Fig. 8).

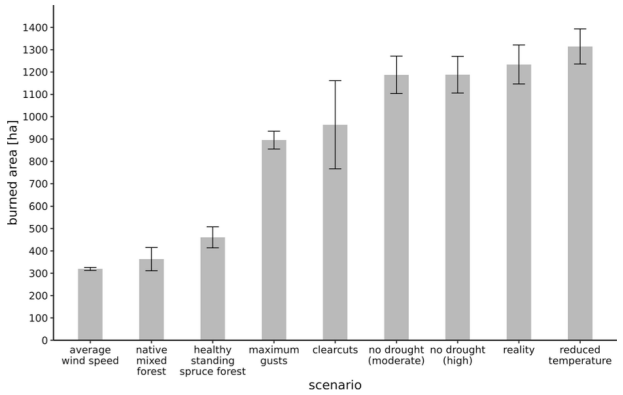


Fig. 7 Bar plot of the average burnt surface area under the individual scenarios. The error bars depict the 95% confidence interval

https://link.springer.com/article/10.1007/s11069-023-06361-8

National Park Šumava

Materials for USA visitors

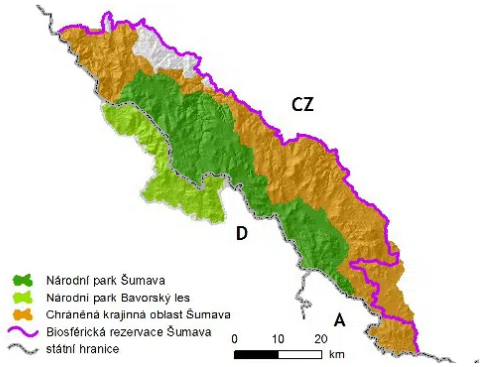
April 2024

Funding source: TransAdapt (Translace poznatků a transfer postupů pro adaptaci na klimatickou změnu do zemědělské a lesnické praxe a veřejné správy: co-creative přístup)

Outline:

- **Fire risk index map**
- **The risk of spreading wildfires with the FlamMap model**

Territory Administered by the Šumava NP



Protected Landscape Area

- Initially, the Šumava Protected Landscape Area was meant to be a national park, but this intent was not politically feasible at the time.
- It was established in 1963, at the time when a border zone and two military training areas were already present there.
- The Protected Landscape Area is especially aimed at protecting the landscape, its diversity, and natural qualities (i.e. also wilderness areas, if present).

National Park

- Wilderness should be protected within the territory of the National Park, and should cover the maximum area possible over the greater part of the park.

Both territories are open to public in the Czech part.

Admission to the PLA may only be prohibited in small-scale protected areas (like reserves), while the same holds true for tranquillity areas within the National Park.

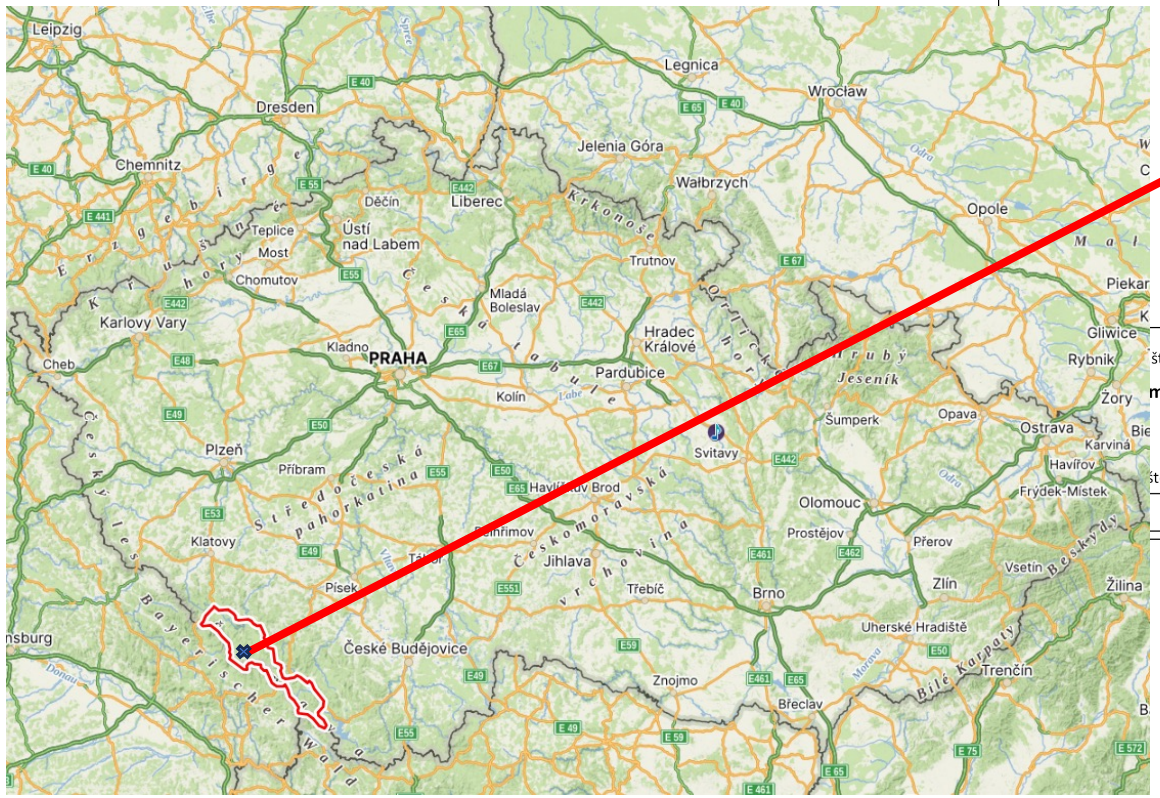
What is the Environmental Management Plan?

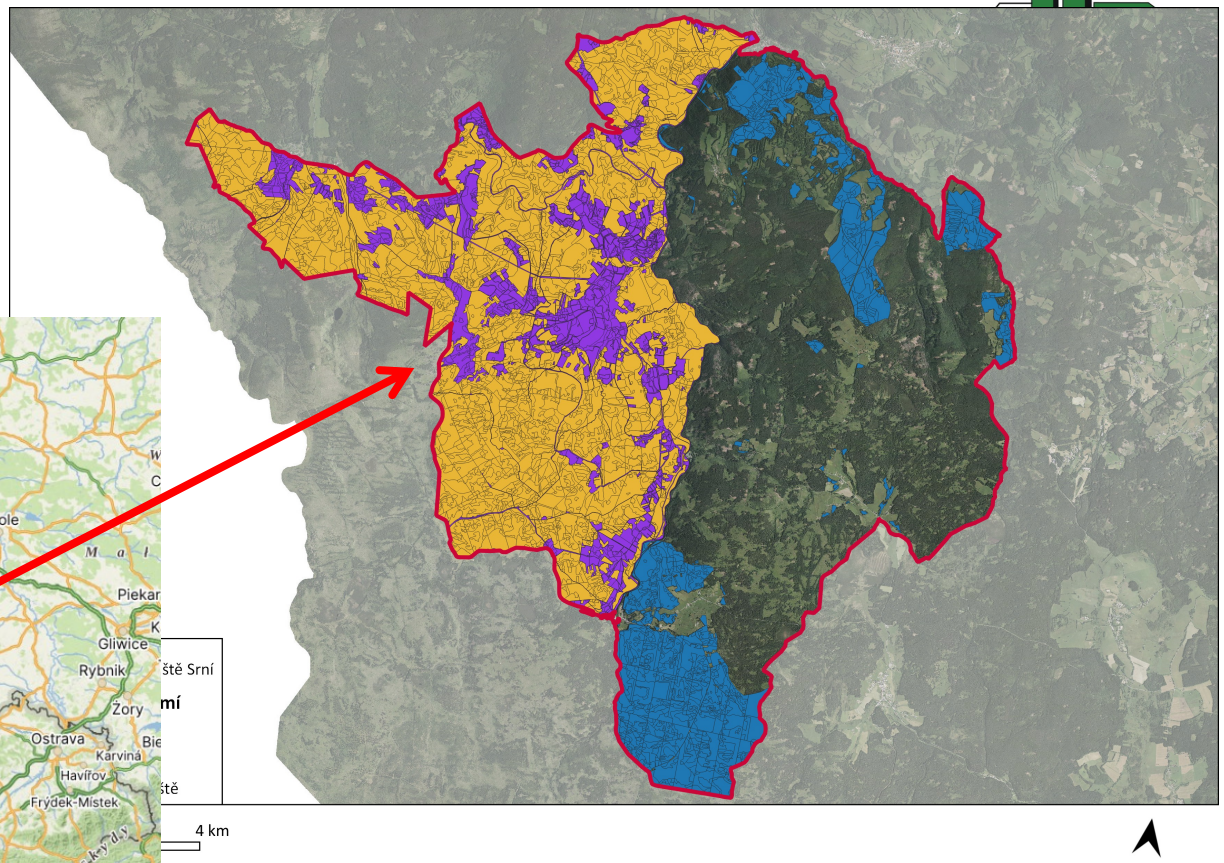
- This document specifies measures to conserve or improve the protection subject as regards adverse environmental effects.

What purpose does it serve?

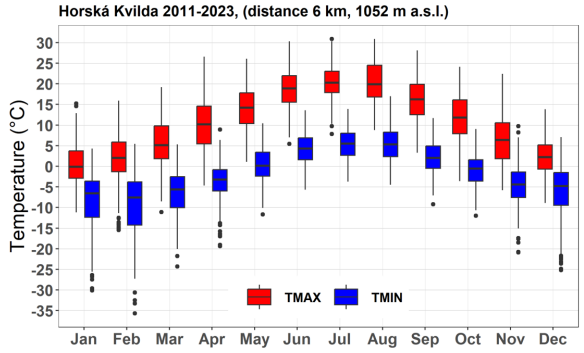
- It serves as a basis for other kinds of planning documents (such as zoning plans) and for decision-making by nature conservation authorities.

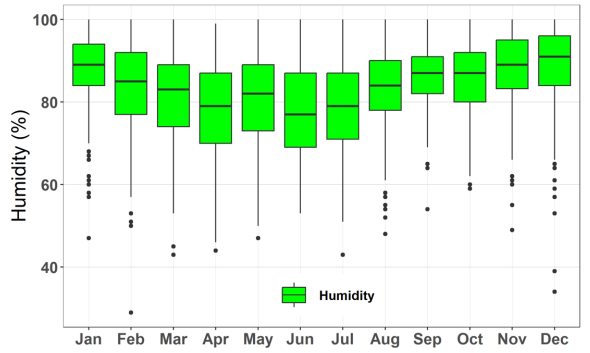
Šumava National Park

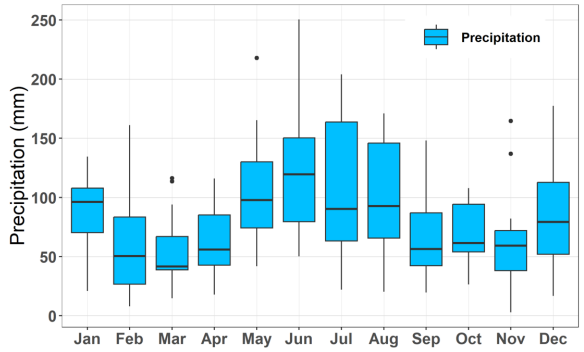


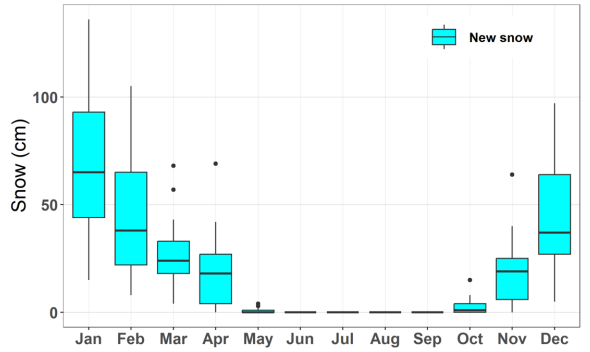


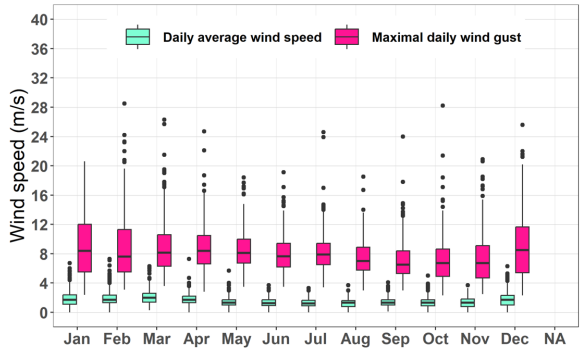
Climatic characteristics of the territorv

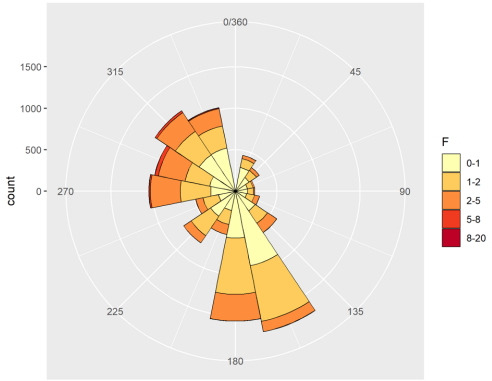












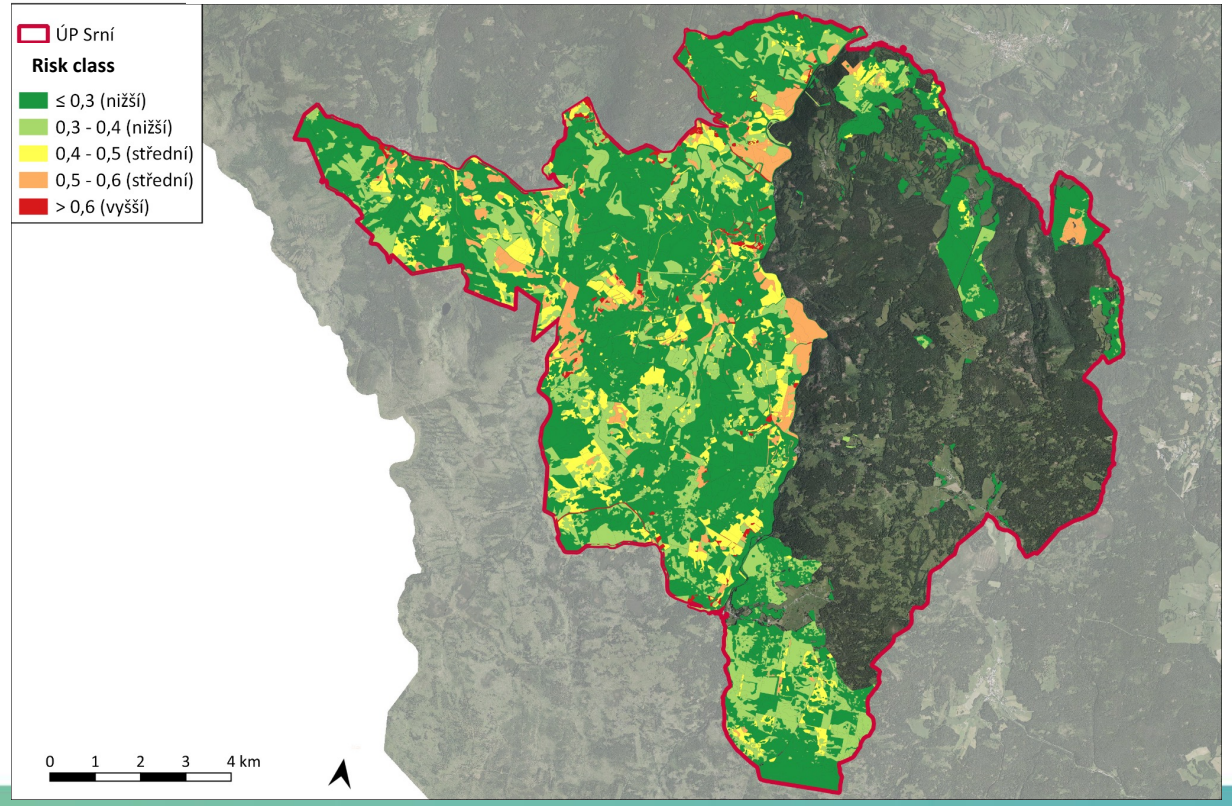
Fire risk analysis

Forest ecosystems

$$FRI = (R_S + (R_{Ts} + R_{Gp} + R_{Cc})/3 + R_{Dt})/3$$

FRI - Total Fire risk index
R_S - Site risk
R_{Ts} - Risk of tree species
R_{Gp} - Risk of growth phase
R_{Cc} - Risk of canopy coverage
R_{Dt} - Dead trees share risk

FRI map for forest and non-forest ecosystems



Fire risk analysis

Forest and non-forest ecosystems

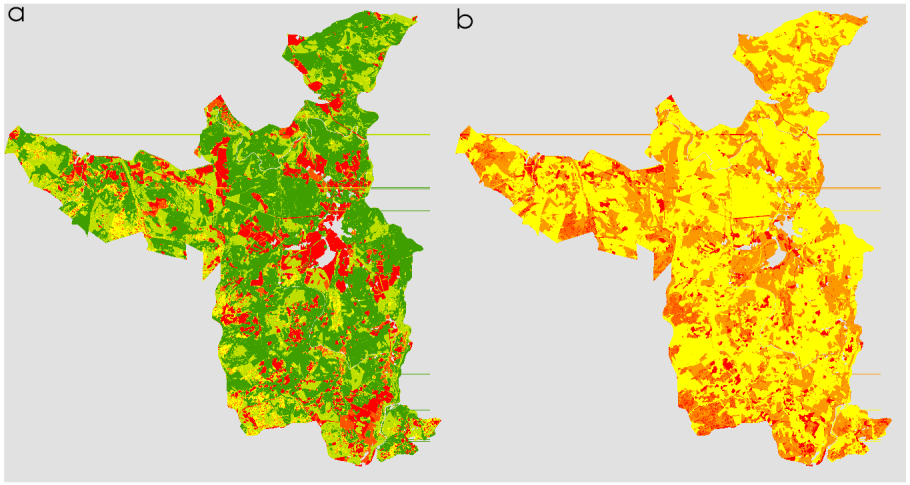
Class of risk	Area (ha)	Share
≤ 0.30 (low risk)	5 353	61.4 %
0.31 - 0.40 (low risk)	1 943	22.3 %
0.41 - 0.50 (intermediate risk)	814	9.3 %
0.51 - 0.60 (intermediate risk)	538	6.2 %
>0.60 (high risk)	75	0.9 %
Total	8 724	100.0 %

Humid and high elevation sites → most area at low risk class

FlamMap - outputs

Fire behavior in Flammap with constant wind speed 37 km/h and direction 245°

Layers: fuel model, slope, aspect, DEM, canopy cover, stand height, crown base height, crown bulk density
Data Source: lidar, data from remote sensing
Grid: 5x5m



Rate of spread:
- 0, no data
- 0,1–1,0
- 1,1–3,0
- 3,1–5,0
- 5,1–7,0
- 7,1–13,0
- 13,1–65,0

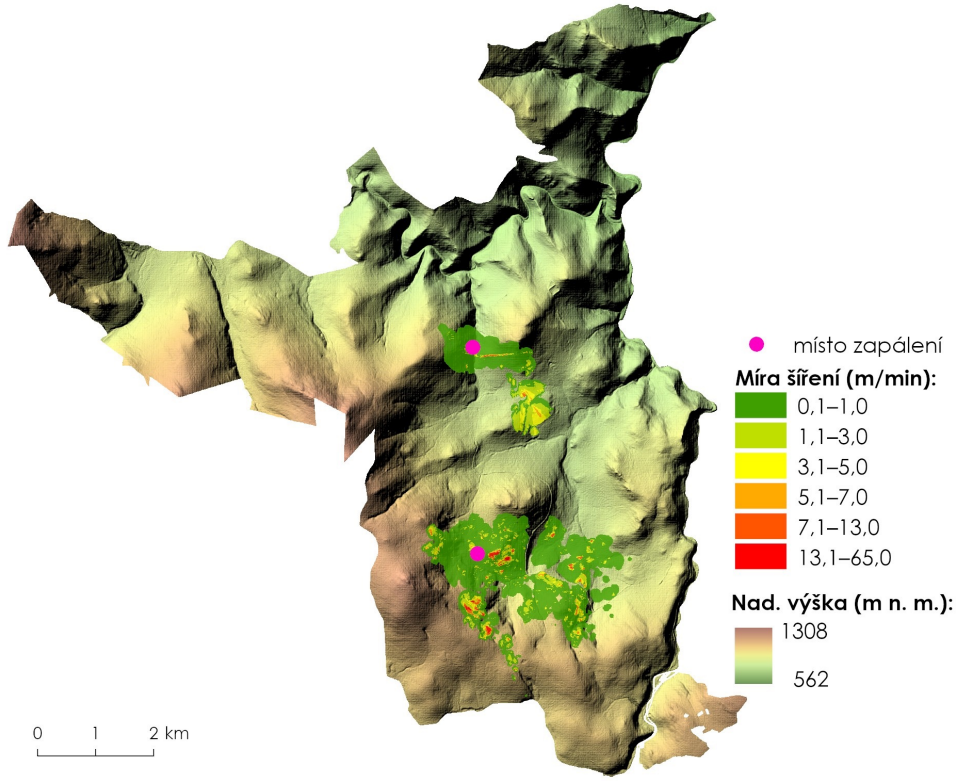
Flame lenght:
- 0, no data
- 1
- 2
- 3
- 6

Crown fire activity:
- no data, no spread
- surface fire
- passive crown fire (torching)
- active crown fire

Fireline intensity:
- 0–25,0
- 25,1–50,0
- 50,1–100,0
- 100,1–250,0
- 250,1–500,0
- 500,1–1000,0
- 1000,1–2500,0
- 2500,1–5000,0
- 5000,1–10000,0
- 10000,1–25000,0
- 25000,1–50000,0

location of ignition points in the area of interest

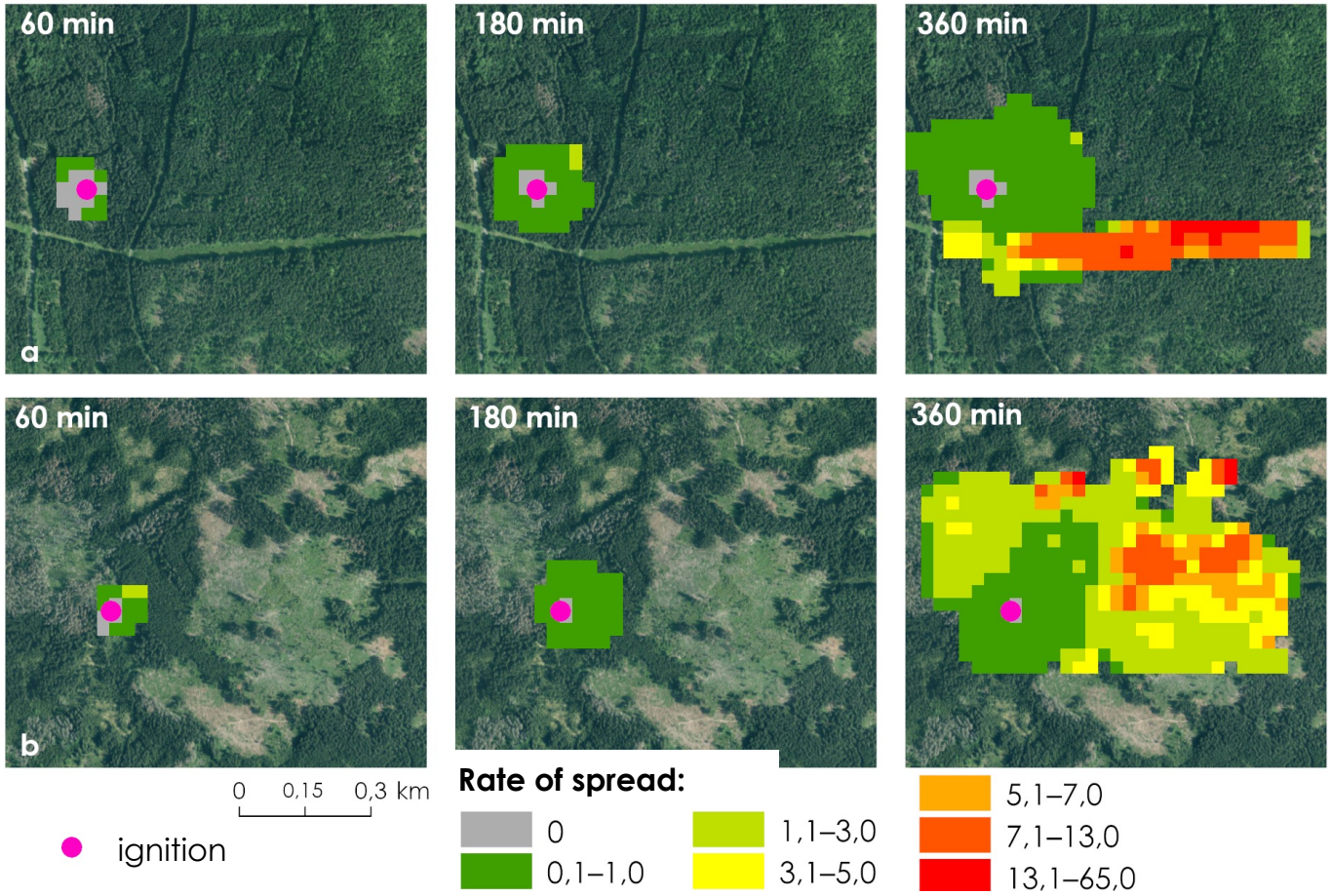
- Northern point – Spaleny vrch
- Southern point – Kostelní vrch



FlamMap - outputs

Fire behavior in Flammap with constant wind speed 37 km/h and direction 245° for three time periods (1, 3, 6 hours)

- area near Spaleny vrch(a)
- area near Kostelni vrch (b)

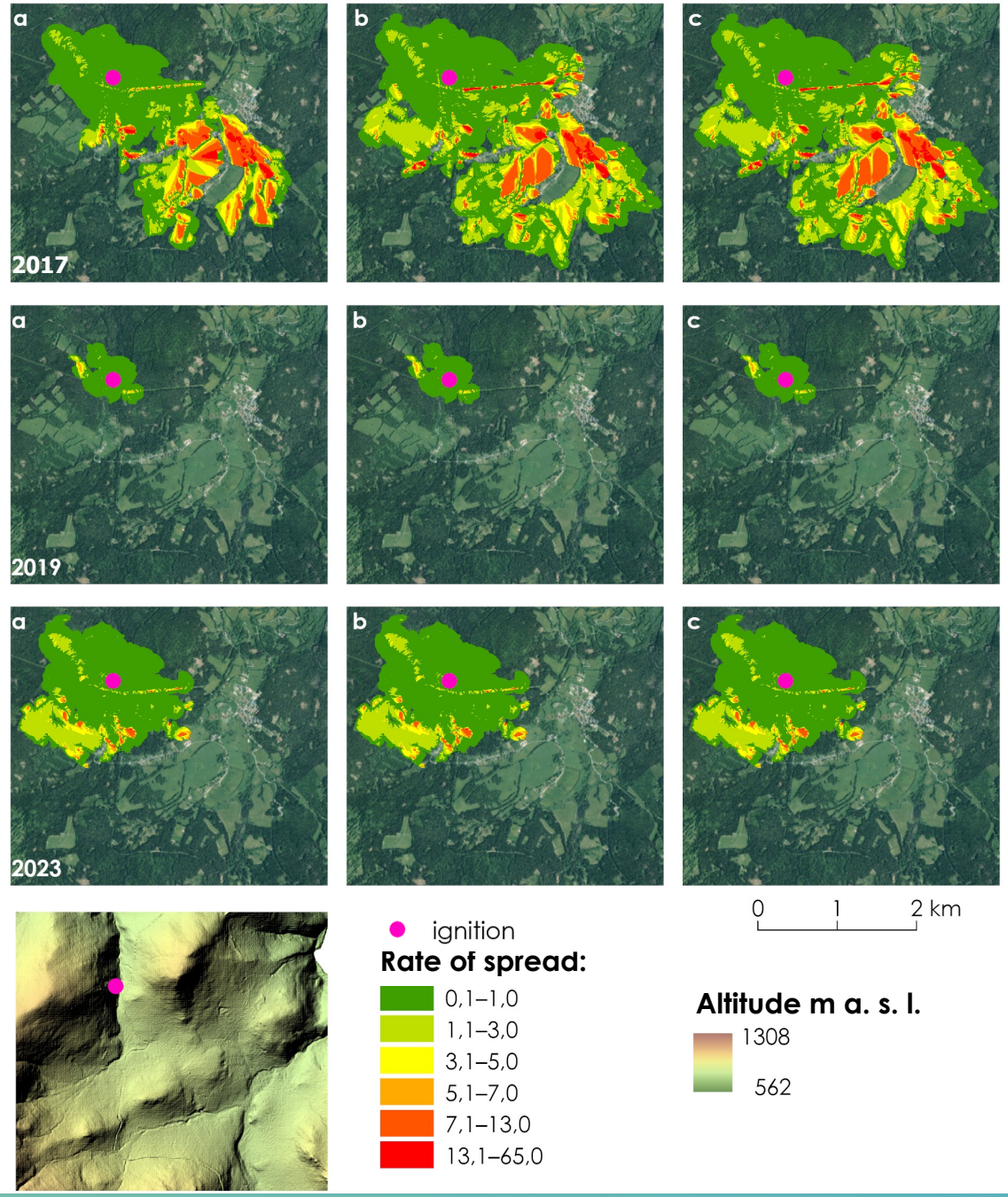


Rate of spread near the Spaleny vrch for three time periods

11–13/06/2017,
23–25/06/2019,
8–10/07/2023

for different spotting intensities
(a - 0, b – 0.05, c – 0.1)
in the FARSITE model.

Active fire spread has been set to 8am-10pm

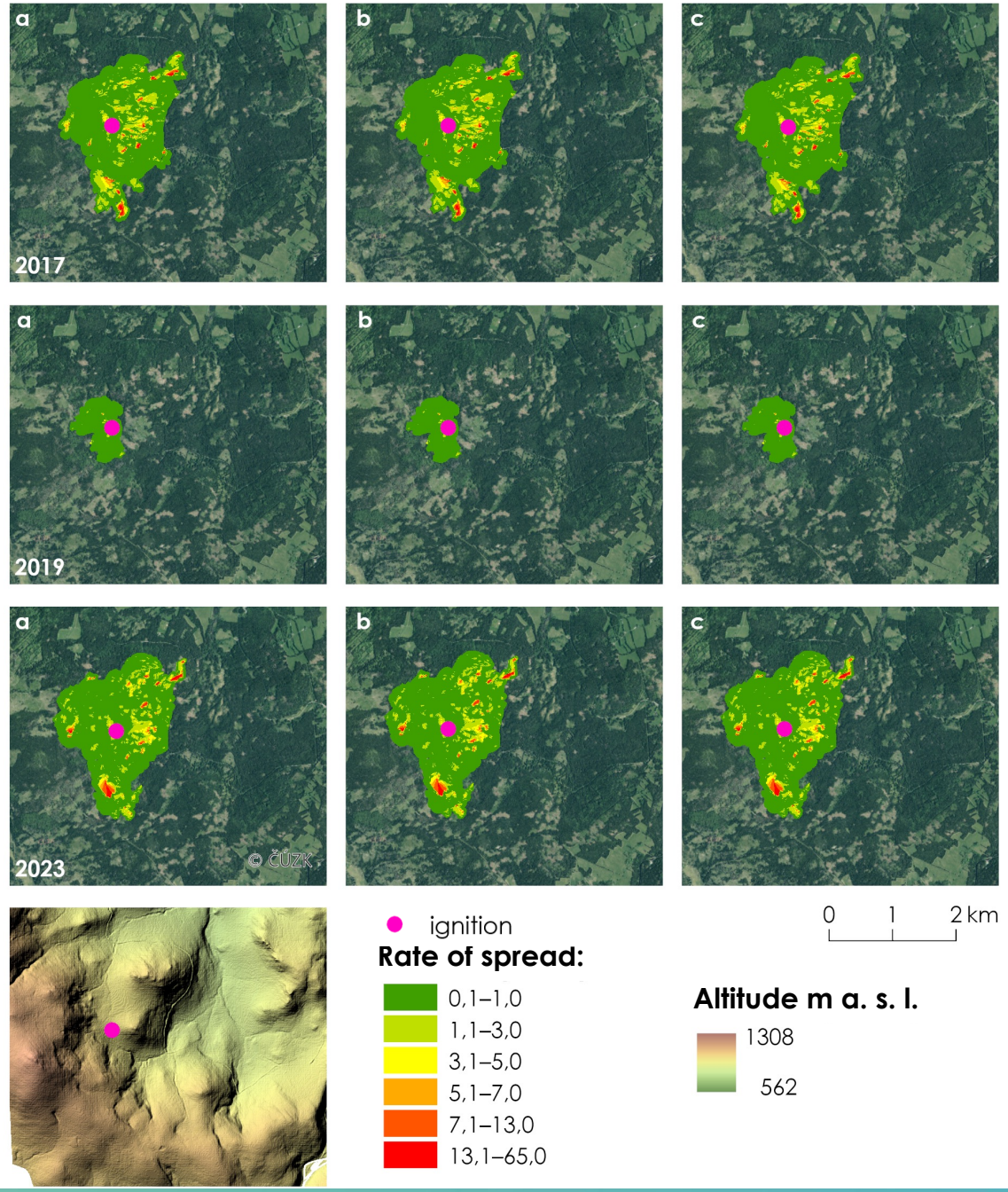


Rate of spread near the Kostelni vrch
for three time periods

11–13/06/2017,
23–25/06/2019,
8–10/07/2023

for different spotting intensities
(a - 0, b – 0.05, c – 0.1)
in the FARSITE model.

Active fire spread has been set to 8am-10pm



Meteorological characteristics for a 3-day fire simulation in 2017

				stanice Kašperské hory						stanice Churáňov					
rok	měsíc	den	hodina	teplota (° C)	relativní vlhkost (%)	srážky (mm)	rychlost větru (km/h)	směr větru (°)	oblačnost	teplota (° C)	relativní vlhkost (%)	srážky (mm)	rychlost větru (km/h)	směr větru (°)	oblačnost
2017	6	11	100	9	83	0	14	163	50	8	79	0	6	210	50
2017	6	11	200	8	85	0	14	169	50	7	83	0	7	217	50
2017	6	11	300	7	87	0	13	169	50	7	81	0	10	205	50
2017	6	11	400	7	88	0	14	158	100	7	81	0	9	208	100
2017	6	11	500	7	87	0	14	163	50	9	75	0	10	210	50
2017	6	11	600	10	79	0	12	163	0	12	65	0	7	203	0
2017	6	11	700	15	63	0	9	152	0	14	58	0	13	310	0
2017	6	11	800	18	47	0	4	34	0	15	54	0	14	30	0
2017	6	11	900	18	45	0	7	321	0	16	50	0	15	32	0
2017	6	11	1000	20	41	0	9	321	0	17	48	0	18	31	0
2017	6	11	1100	21	39	0	14	287	0	18	47	0	23	54	0
2017	6	11	1200	22	38	0	13	28	0	19	46	0	23	90	0
2017	6	11	1300	23	36	0	14	62	0	19	49	0	22	71	0
2017	6	11	1400	24	39	0	15	68	0	20	47	0	21	30	0
2017	6	11	1500	24	40	0	15	28	0	20	49	0	22	50	0
2017	6	11	1600	24	40	0	15	62	0	20	48	0	20	25	0
2017	6	11	1700	24	43	0	16	28	0	21	49	0	19	72	0
2017	6	11	1800	23	46	0	16	338	0	20	53	0	15	42	0
2017	6	11	1900	22	46	0	11	51	0	19	55	0	15	40	0
2017	6	11	2000	20	51	0	10	141	20	17	61	0	10	141	20
2017	6	11	2100	17	62	0	12	169	100	15	68	0	14	208	100
2017	6	11	2200	16	66	0	13	163	50	14	69	0	14	203	50
2017	6	11	2300	15	70	0	13	163	50	14	72	0	17	207	50
2017	6	12	0	15	70	0	13	174	50	14	70	0	19	213	50
2017	6	12	100	15	68	0	13	146	50	14	70	0	23	239	50
2017	6	12	200	18	50	0	11	84	50	15	62	0	25	208	50
2017	6	12	300	19	42	0	23	242	50	15	57	0	34	233	50
2017	6	12	400	19	35	0	24	191	100	15	43	0	39	222	100
2017	6	12	500	20	39	0	17	180	100	15	53	0	23	244	100
2017	6	12	600	19	44	0	19	180	70	17	55	0	35	245	70
2017	6	12	700	22	44	0	12	248	20	18	53	0	37	245	20
2017	6	12	800	21	49	0	19	225	90	18	60	0	48	267	90
2017	6	12	900	23	45	0	36	298	40	20	55	0	53	284	40
2017	6	12	1000	21	60	0	28	293	40	20	61	0	45	273	40
2017	6	12	1100	22	59	0	29	298	50	18	69	0	49	237	50
2017	6	12	1200	22	52	0	23	303	90	18	71	0	44	257	90
2017	6	12	1300	23	54	0	31	270	70	20	63	0	50	239	70
2017	6	12	1400	24	54	0	37	253	20	20	61	0	57	269	20
2017	6	12	1500	23	47	0	36	287	90	19	66	0	51	272	90
2017	6	12	1600	23	48	0	40	304	30	20	52	0	67	302	30
2017	6	12	1700	22	49	0	43	264	40	20	51	0	62	262	40
2017	6	12	1800	22	42	0	41	276	20	19	47	0	57	270	20
2017	6	12	1900	20	42	0	36	315	0	17	44	0	53	256	0
2017	6	12	2000	17	50	0	28	270	70	15	52	0	40	294	70
2017	6	12	2100	17	54	0	25	276	100	14	62	0	37	292	100
2017	6	12	2200	16	52	0	27	338	50	13	62	0	33	272	50
2017	6	12	2300	15	48	0	25	293	50	13	56	0	40	280	50
2017	6	13	0	14	51	0	11	203	50	12	55	0	37	303	50
2017	6	13	100	12	56	0	11	169	50	10	63	0	29	270	50
2017	6	13	200	11	60	0	7	169	50	9	68	0	23	245	50
2017	6	13	300	10	66	0	6	163	50	9	71	0	14	309	50
2017	6	13	400	9	72	0	13	141	100	8	75	0	12	206	100
2017	6	13	500	9	75	0	9	180	50	7	79	0	9	216	50
2017	6	13	600	11	68	0	9	163	0	11	68	0	10	259	0
2017	6	13	700	14	56	0	5	338	0	12	63	0	21	311	0
2017	6	13	800	16	55	0	7	17	0	13	61	0	26	261	0
2017	6	13	900	17	54	0	15	332	0	14	55	0	28	16	0
2017	6	13	1000	18	46	0	23	304	0	15	55	0	27	251	0
2017	6	13	1100	19	46	0	27	309	0	16	47	0	28	321	0
2017	6	13	1200	20	42	0	30	259	0	17	45	0	29	270	0
2017	6	13	1300	21	44	0	27	343	0	17	43	0	33	267	0
2017	6	13	1400	21	39	0	28	343	0	18	44	0	34	269	0
2017	6	13	1500	22	39	0	30	315	0	19	45	0	31	309	0
2017	6	13	1600	21	43	0	32	321	10	19	45	0	29	306	10
2017	6	13	1700	20	40	0	30	332	0	17	48	0	29	281	0
2017	6	13	1800	20	41	0	29	343	10	16	48	0	29	12	10
2017	6	13	1900	18	48	0	27	354	0	15	53	0	34	326	0
2017	6	13	2000	16	54	0	21	343	20	13	65	0	27	351	20

Meteorological characteristics for a 3-day fire simulation in 2019

rok	měsíc	den	hodina	stanice Kašperské hory						stanice Churáňov					
				teplota (° C)	relativní vlhkost (%)	srážky (mm)	rychlost větru (km/h)	směr větru (°)	oblačnost	teplota (° C)	relativní vlhkost (%)	srážky (mm)	rychlost větru (km/h)	směr větru (°)	oblačnost
2019	6	23	100	15	99	0.1	10	84	50	13	99	0	24	38	50
2019	6	23	200	15	99	0	13	90	50	13	98	0	24	32	50
2019	6	23	300	15	98	0.7	15	118	50	13	98	0	24	24	50
2019	6	23	400	14	99	0.2	15	34	100	12	98	0	23	29	100
2019	6	23	500	14	99	0	14	96	100	12	99	0	17	22	100
2019	6	23	600	14	98	0	14	23	100	12	98	0.1	20	49	100
2019	6	23	700	14	99	0	10	34	100	12	98	1.2	16	46	100
2019	6	23	800	14	99	0	13	28	100	12	97	0	18	25	100
2019	6	23	900	14	96	0	13	39	100	12	99	0	18	32	100
2019	6	23	1000	14	95	0	10	73	100	12	99	0	15	74	100
2019	6	23	1100	15	96	0	12	34	100	13	100	0	19	12	100
2019	6	23	1200	16	92	0	16	45	100	14	98	0	22	50	100
2019	6	23	1300	18	82	0	14	90	100	13	98	0.1	23	56	100
2019	6	23	1400	17	87	0	19	90	100	14	99	0	27	76	100
2019	6	23	1500	18	84	0	15	124	100	14	98	0	24	32	100
2019	6	23	1600	18	82	0	18	146	100	14	98	0	23	73	100
2019	6	23	1700	19	75	0	15	129	90	15	91	0	19	46	90
2019	6	23	1800	19	76	0	9	96	90	16	90	0	14	38	90
2019	6	23	1900	18	87	0	14	338	100	15	97	0	21	21	100
2019	6	23	2000	17	92	0	4	0	100	14	97	0	19	49	100
2019	6	23	2100	17	96	0.1	6	197	100	14	94	0.2	13	87	100
2019	6	23	2200	16	97	0	5	231	50	14	96	0	18	52	50
2019	6	23	2300	15	98	0	10	197	50	14	95	0	16	79	50
2019	6	24	0	14	99	0	9	236	50	13	91	0	18	56	50
2019	6	24	100	14	100	0	7	242	50	12	92	0	14	72	50
2019	6	24	200	13	100	0	7	231	50	12	90	0	12	137	50
2019	6	24	300	12	99	0	10	304	50	11	94	0	15	152	50
2019	6	24	400	12	99	0.1	7	231	100	12	86	0	15	151	100
2019	6	24	500	12	99	0	10	236	50	12	84	0	13	106	50
2019	6	24	600	13	96	0	7	197	0	14	78	0	13	111	0
2019	6	24	700	15	88	0	4	0	0	15	77	0	14	69	0
2019	6	24	800	17	84	0.1	10	28	0	16	77	0	17	65	0
2019	6	24	900	20	80	0	10	39	0	17	69	0	23	59	0
2019	6	24	1000	21	53	0	20	107	10	17	67	0	25	45	10
2019	6	24	1100	22	50	0	21	219	10	18	63	0	30	46	10
2019	6	24	1200	22	50	0	30	231	0	19	62	0	29	62	0
2019	6	24	1300	23	48	0	28	214	20	19	61	0	27	115	20
2019	6	24	1400	24	51	0	27	219	50	20	63	0	23	35	50
2019	6	24	1500	24	49	0	23	169	40	20	59	0	22	31	40
2019	6	24	1600	24	50	0	22	191	50	19	63	0	21	74	50
2019	6	24	1700	24	51	0	20	203	10	21	57	0	23	67	10
2019	6	24	1800	24	50	0	21	214	0	20	60	0	20	62	0
2019	6	24	1900	23	54	0	18	152	0	19	62	0	18	46	0
2019	6	24	2000	22	57	0	20	191	10	18	70	0	17	89	10
2019	6	24	2100	19	69	0	18	225	100	16	78	0	18	142	100
2019	6	24	2200	17	80	0	14	231	50	16	79	0	20	139	50
2019	6	24	2300	17	76	0	10	231	50	15	80	0	22	142	50
2019	6	25	0	16	83	0	11	208	50	15	76	0	20	148	50
2019	6	25	100	15	87	0	10	225	50	15	78	0	20	151	50
2019	6	25	200	14	88	0	9	248	50	14	82	0	22	103	50
2019	6	25	300	14	91	0	9	242	50	14	85	0	20	130	50
2019	6	25	400	14	89	0	9	231	100	14	77	0	21	134	100
2019	6	25	500	13	93	0	9	208	50	15	74	0	23	113	50
2019	6	25	600	17	74	0	16	203	0	16	73	0	17	98	0
2019	6	25	700	18	76	0	17	281	0	18	70	0	19	110	0
2019	6	25	800	19	73	0	11	39	0	19	69	0	18	100	0
2019	6	25	900	21	71	0	12	34	0	19	71	0	15	89	0
2019	6	25	1000	24	64	0	12	51	0	20	69	0	18	76	0
2019	6	25	1100	26	54	0	18	169	0	22	71	0	22	82	0
2019	6	25	1200	26	55	0	20	174	0	22	73	0	18	46	0
2019	6	25	1300	27	53	0	20	197	0	24	64	0	22	98	0
2019	6	25	1400	28	53	0	22	208	0	24	61	0	26	56	0
2019	6	25	1500	29	50	0	23	248	0	25	62	0	23	49	0
2019	6	25	1600	28	52	0	20	197	10	25	60	0	22	63	10
2019	6	25	1700	27	55	0	21	158	0	24	64	0	17	50	0
2019	6	25	1800	27	56	0	17	141	30	23	66	0	17	72	30
2019	6	25	1900	26	59	0	19	208	0	23	68	0	12	70	0
2019	6	25	2000	24	66	0	19	203	30	22	73	0	10	125	30
2019	6	25	2100	23	74	0	15	208	100	19	81	0	12	212	100
2019	6	25	2200	20	84	0	10	236	50	18	85	0	14	216	50
2019	6	25	2300	19	85	0	13	236	50	18	81	0	14	196	50
2019	6	26	0	19	84	0	11	225	50	17	88	0	13	210	50

Meteorological characteristics for a 3-day fire simulation in 2023

rok	měsíc	den	hodina	stanice Kašperské hory						stanice Churáňov					
				teplota (° C)	relativní vlhkost (%)	srážky (mm)	rychlost větru (km/h)	směr větru (°)	oblačnost	teplota (° C)	relativní vlhkost (%)	srážky (mm)	rychlost větru (km/h)	směr větru (°)	oblačnost
2023	7	8	100	13	68	0	7	180	50	14	63	0	17	145	50
2023	7	8	200	14	66	0	9	141	50	14	61	0	20	166	50
2023	7	8	300	13	71	0	8	141	50	13	60	0	20	169	50
2023	7	8	400	13	69	0	6	158	100	13	56	0	22	165	100
2023	7	8	500	13	66	0	9	158	80	14	53	0	25	151	80
2023	7	8	600	15	62	0	7	146	0	16	48	0	23	150	0
2023	7	8	700	16	59	0	4	326	0	18	41	0	23	67	0
2023	7	8	800	21	37	0	20	129	0	19	43	0	29	101	0
2023	7	8	900	22	36	0	23	135	10	20	45	0	24	33	10
2023	7	8	1000	23	36	0	25	129	0	21	43	0	25	30	0
2023	7	8	1100	24	37	0	20	124	0	20	42	0	26	24	0
2023	7	8	1200	24	31	0	22	146	0	20	42	0	24	45	0
2023	7	8	1300	25	30	0	20	73	20	20	39	0	22	41	20
2023	7	8	1400	26	28	0	19	141	20	23	36	0	23	29	20
2023	7	8	1500	27	30	0	16	276	0	23	34	0	20	68	0
2023	7	8	1600	26	30	0	19	84	0	23	33	0	20	42	0
2023	7	8	1700	26	29	0	16	68	0	23	35	0	22	36	0
2023	7	8	1800	24	31	0	16	11	0	22	36	0	16	15	0
2023	7	8	1900	24	33	0	9	101	80	20	39	0	15	88	80
2023	7	8	2000	21	48	0	7	174	50	19	40	0	8	82	50
2023	7	8	2100	20	46	0	9	146	100	18	40	0	12	142	100
2023	7	8	2200	18	47	0	9	197	50	18	40	0	13	151	50
2023	7	8	2300	18	47	0	8	169	50	16	49	0	7	188	50
2023	7	9	0	16	56	0	10	174	50	16	52	0	8	201	50
2023	7	9	100	15	60	0	11	191	50	15	54	0	9	208	50
2023	7	9	200	14	64	0	13	169	50	16	53	0	7	223	50
2023	7	9	300	13	68	0	13	152	50	15	53	0	6	229	50
2023	7	9	400	13	68	0	14	180	100	15	53	0	8	197	100
2023	7	9	500	14	65	0	13	169	80	15	50	0	9	213	80
2023	7	9	600	15	64	0	11	141	10	17	48	0	9	234	10
2023	7	9	700	19	56	0	10	135	0	21	35	0	13	295	0
2023	7	9	800	23	40	0	7	152	0	22	35	0	15	310	0
2023	7	9	900	25	31	0	7	354	0	23	30	0	18	5	0
2023	7	9	1000	27	33	0	14	338	0	23	30	0	17	268	0
2023	7	9	1100	28	29	0	20	23	0	24	33	0	21	14	0
2023	7	9	1200	28	32	0	22	298	10	25	32	0	19	287	10
2023	7	9	1300	28	26	0	23	293	10	25	30	0	20	277	10
2023	7	9	1400	29	23	0	17	360	20	26	30	0	23	277	20
2023	7	9	1500	30	23	0	16	338	10	25	27	0	22	341	10
2023	7	9	1600	30	26	0	18	270	50	24	29	0	15	32	50
2023	7	9	1700	29	24	0	17	338	20	26	27	0	15	239	20
2023	7	9	1800	28	26	0	13	354	0	25	28	0	17	339	0
2023	7	9	1900	27	30	0	8	11	0	24	32	0	8	43	0
2023	7	9	2000	24	40	0	7	169	60	20	43	0	9	228	60
2023	7	9	2100	22	42	0	9	180	100	18	53	0	14	223	100
2023	7	9	2200	20	48	0	10	129	50	18	48	0	14	201	50
2023	7	9	2300	19	51	0	12	158	50	18	45	0	13	200	50
2023	7	10	0	19	50	0	11	146	50	17	49	0	12	243	50
2023	7	10	100	18	52	0	13	174	50	17	45	0	11	210	50
2023	7	10	200	18	50	0	11	135	50	17	46	0	11	214	50
2023	7	10	300	18	48	0	11	174	50	16	52	0	14	216	50
2023	7	10	400	20	40	0	9	141	100	16	51	0	16	232	100
2023	7	10	500	21	40	0	11	169	100	16	54	0	16	220	100
2023	7	10	600	23	35	0	9	152	20	19	49	0	18	231	20
2023	7	10	700	25	34	0	11	129	0	22	42	0	22	232	0
2023	7	10	800	27	31	0	19	264	10	24	38	0	27	224	10
2023	7	10	900	27	29	0	23	197	10	24	35	0	30	224	10
2023	7	10	1000	28	27	0	29	169	40	24	33	0	31	234	40
2023	7	10	1100	25	37	0	27	158	80	22	42	0	36	236	80
2023	7	10	1200	25	40	0	31	191	100	21	49	0	40	243	100
2023	7	10	1300	27	34	0	36	293	50	23	43	0	44	253	50
2023	7	10	1400	28	36	0	33	264	0	25	42	0	49	263	0
2023	7	10	1500	29	35	0	30	259	20	24	42	0	45	244	20
2023	7	10	1600	26	45	0	26	186	70	22	55	0	41	241	70
2023	7	10	1700	25	52	0	30	287	70	22	59	0	35	241	70
2023	7	10	1800	22	73	0.7	22	158	100	17	95	4.5	22	206	100
2023	7	10	1900	21	75	0	9	135	10	17	91	0	24	242	10
2023	7	10	2000	20	83	0	6	163	100	17	87	0	18	256	100
2023	7	10	2100	18	91	0	8	163	100	17	81	0	12	274	100
2023	7	10	2200	17	91	0	12	174	50	15	86	0	9	239	50
2023	7	10	2300	16	92	0	13	180	50	16	87	0	11	23	50
2023	7	11	0	16	93	0	14	135	50	16	91	0	11	66	50