

CURRENT ONGOING FOREST MAPPING ACTIVITY IN SLOVENIAN OLD-GROWTH FORESTS

8th Field-Map international and educational users
conference
8 – 10 June, 2022



University of Ljubljana
Biotechnical Faculty

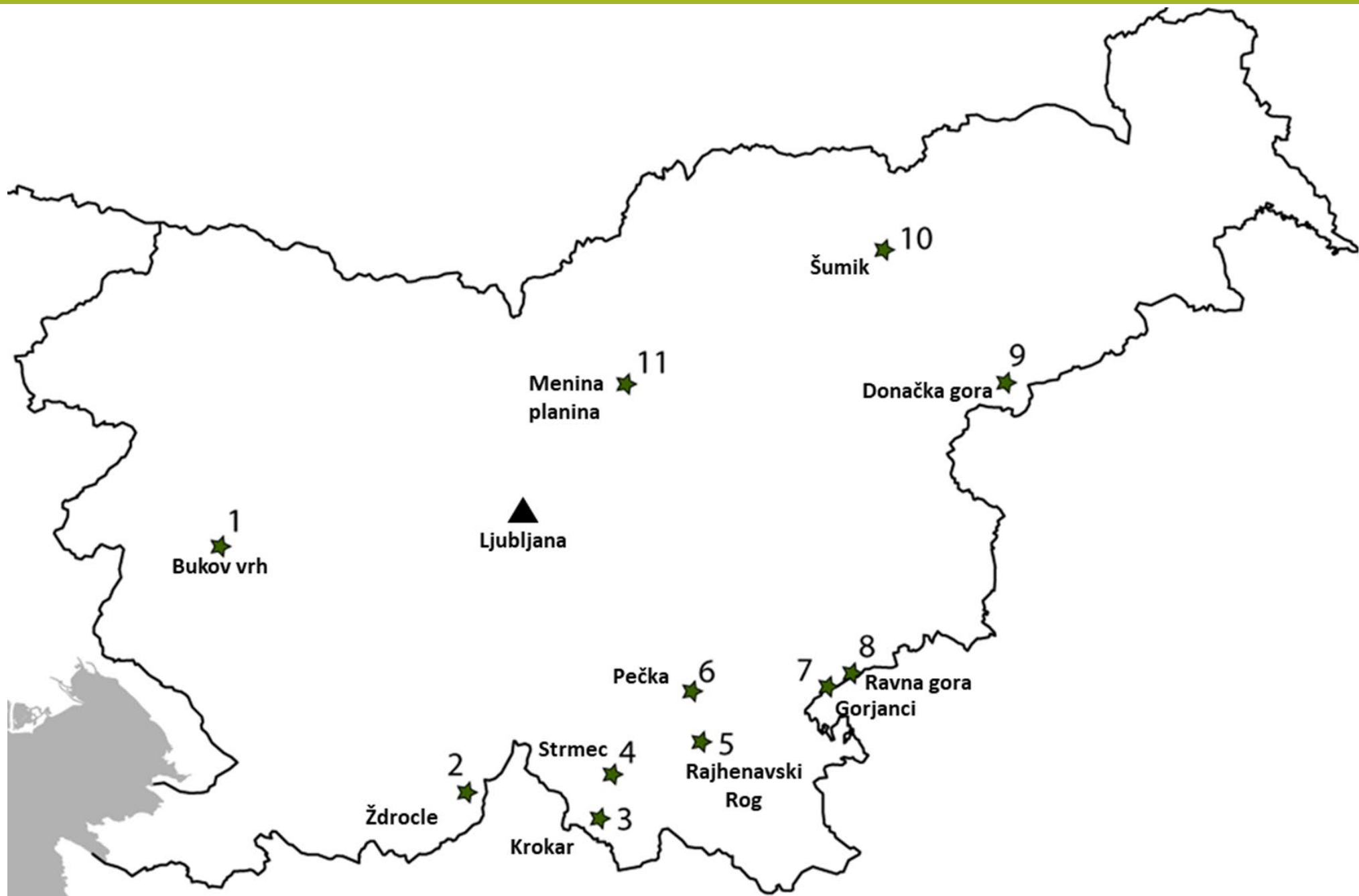
Blaž Fricelj & Tim Pirc

Permanent plot network in Slovenian old-growth forest remnants

- Established by prof. dr. Dušan Mlinšek
- 11 forest reserves
- 19 permanent research plots
- Multiple census observations (from 1980s)

N	Reserve	Size (ha)	Dominant tree species	Elevation (m)
1	Bukov vrh	8	<i>Fagus sylvatica</i>	1250-1314
2	Ždrocle	157	<i>Fagus sylvatica, Picea abies</i>	1300-1477
3	Krokar	75	<i>Fagus sylvatica, Abies alba</i>	750-1190
4	Strmec	16	<i>Abies alba, Fagus sylvatica</i>	820-940
5	Rajhenavski Rog	51	<i>Abies alba, Fagus sylvatica</i>	800-920
6	Pečka	60	<i>Abies alba, Fagus sylvatica</i>	795-910
7	Gorjanci – Trdinov vrh	23	<i>Fagus sylvatica</i>	990-1150
8	Ravna gora	16	<i>Fagus sylvatica</i>	890
9	Donačka gora	28	<i>Fagus sylvatica</i>	600-800
10	Šumik	20	<i>Fagus sylvatica, Abies alba, Picea abies</i>	800-1150
11	Menina planina	70	<i>Fagus sylvatica</i>	950-1460

<i>Reserve</i>	<i>N of plots</i>	<i>Dimension (m)</i>	<i>area (ha)</i>	<i>Measurement years</i>
<i>Bukov vrh</i>	1	15x314	0.471	1985, 2012, 2017, 2022
	2	15x135	0.2025	1985, 2012, 2017, 2022
<i>Ždrocle</i>	1	25 x 115	0.2875	1982, 2013, 2018
	2	140 x 25-40	0.451	1982, 2013, 2018
<i>Krokar</i>	1	275 x 40	1.1	1985, 2012, 2017, 2022
	2	100 x 40	0.4	1985, 2012, 2017, 2022
<i>Strmec</i>	1	100 x 50	0.5	2000, 2012, 2017, 2022
<i>Rajhenavski Rog</i>	1	215 x 40	0.86	1984, 1994, 2010, 2015, 2020
	2	200 x 40	0.8	1984, 1994, 2010, 2015, 2020
	3	50 x 50	0.25	1984, 1994, 2010, 2015, 2020
<i>Pečka</i>	1	415 x 50	2.075	1981, 1995, 1998, 2014, 2019
	2	80 x 50	0.4	1981, 1995, 1998, 2014, 2019
	3	85 x 50	0.425	1981, 1995, 1998, 2014, 2019
	4	10 x 25	0.025	1981, 1995, 1998, 2014, 2019
<i>Gorjanci - Trdinov vrh</i>	1	100 x 100	1	2012, 2017, 2022
<i>Ravna gora</i>	1	142 x 40	0.568	1983, 2012, 2017, 2022
	2	120 x 40	0.48	1983, 2012, 2017, 2022
<i>Donačka gora</i>	1	100 x 80	0.8	2011, 2016, 2021
<i>Šumik</i>	1	203 x 42	0.862	1978, 1998, 2012, 2017, 2022
<i>Menina planina</i>	1	319 x 25	0.8	1992, 2002, 2012, 2017, 2022





Pečka



Rajhenavski Rog



Ravna gora



Krokar



Krokar



Menina planina

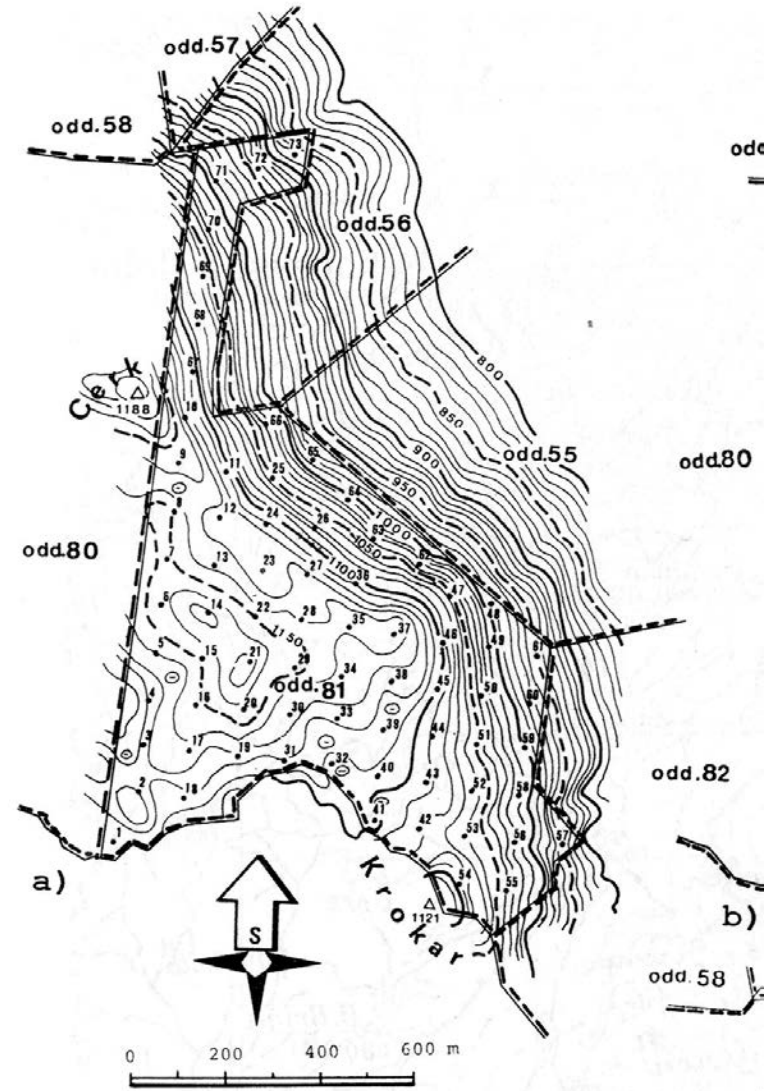
Method

- Plots established across a range of “development phases”
- All trees ≥ 5 cm d.b.h. tagged, measured (and mapped) at plot establishment
- Re-measurements include d.b.h, mortality and type of mortality (status, cod)
- New recruits that reach the d.b.h. threshold are tagged (and mapped)
- Goal is to measure at 5 year intervals

treid	plotid	spp	dbh 80	status 93	dbh 95	status 95	dbh 98	status 98	dbh 14	status 14	cause of death 14	ht class 14	dbh 19	status 19	cause of death 19		status	
1	pe2	Fasy	2,5	1	9	1	9	1	10,4	1		4		2	6		1	alive
2	pe2	Fasy	52,5	1	55	1	56	1		2	4						2	dead
3	pe2	Fasy	32,5	1	36	1	35	1		2	4							
4	pe2	Fasy	62,5	1	64	1	64	1		2	1							Cause of death (mode of mortality)
5	pe2	Fasy	62,5	1	66	1	67	1	70,6	1		1	72	1			1	snapped alive (tree was snapped while still alive, indicated by splintered break)
6	pe2	Fasy	62,5	1	67	1	67	1	70,7	1		1	72,3	1			2	standing dead snapped (tree snapped after standing dead, indicated by a coarse break)
7	pe2	Fasy	67,5	1	71	1	73	1	75,8	1		1	78,4	1			3	snapped unknown (too decayed to determine if snapped while live or dead)
8	pe2	Fasy	37,5	1	38	1	38	1	40,3	1		2	40,3	1			4	uprooted
9	pe2	Fasy	77,5	1	82	1	84	1	88,6	1		1	92,5	1			5	standing dead
10	pe2	Fasy	42,5	1	51	1	51	1	56,7	1		1	58,8	1			6	snapped or uprooted by another tree
11	pe2	Abal	17,5	1	23	1	24	1	28,6	1		3	29,6	1				
12	pe2	Abal	12,5	2														
13	pe2	Abal	17,5	1	16	1	16	1	19,3	1		4	19,8	1				
14	pe2	Fasy	47,5	1	56	1	57	1	59,6	1		1	60,5	1				
15	pe2	Abal	122,5	2														
16	pe2	Fasy	37,5	1	37	1	38	1	39,9	1		2		2	5			
17	pe2	Abal	17,5	1	22	1	22	1	24,8	1		3	26,1	1				
18	pe2	Fasy	52,5	1	56	1	58	1	61,3	1		1	62,6	1				
19	pe2	Fasy	37,5	1	42	1	42	1	45,7	1		1	48	1				
20	pe2	Abal	7,5	1	12	1	12	1	15,8	1		4	17,2	1				
21	pe2	Fasy	62,5	1	73	1	74	1	79,2	1		1	82	1				
22	pe2	Abal	17,5	1	23	1	24	1	28,8	1		3	28,3	2				
23	pe2	Fasy	27,5	1	31	1	32	1	36,5	1		2	36,5	2	1			
24	pe2	Fasy	42,5	1	50	1	52	1	59,6	1		1	64	1				
25	pe2	Abal	52,5	1	55	1	54	1	57	1		1		2	4			
26	pe2	Abal	67,5	2														
27	pe2	Fasy	47,5	1	54	1	44	1	61	1		1	62,6	1				
28	pe2	Fasy	37,5	1	41	1	40	1	41,8	1		2	42,4	1				
29	pe2	Fasy	47,5	1	55	1	56	1	59,7	1		1	61,1	1				
30	pe2	Fasy	52,5	1	56	1	56	1	58,8	1		1	59,1	1				
31	pe2	Fasy	27,5	1	31	1	31	1		2	2							



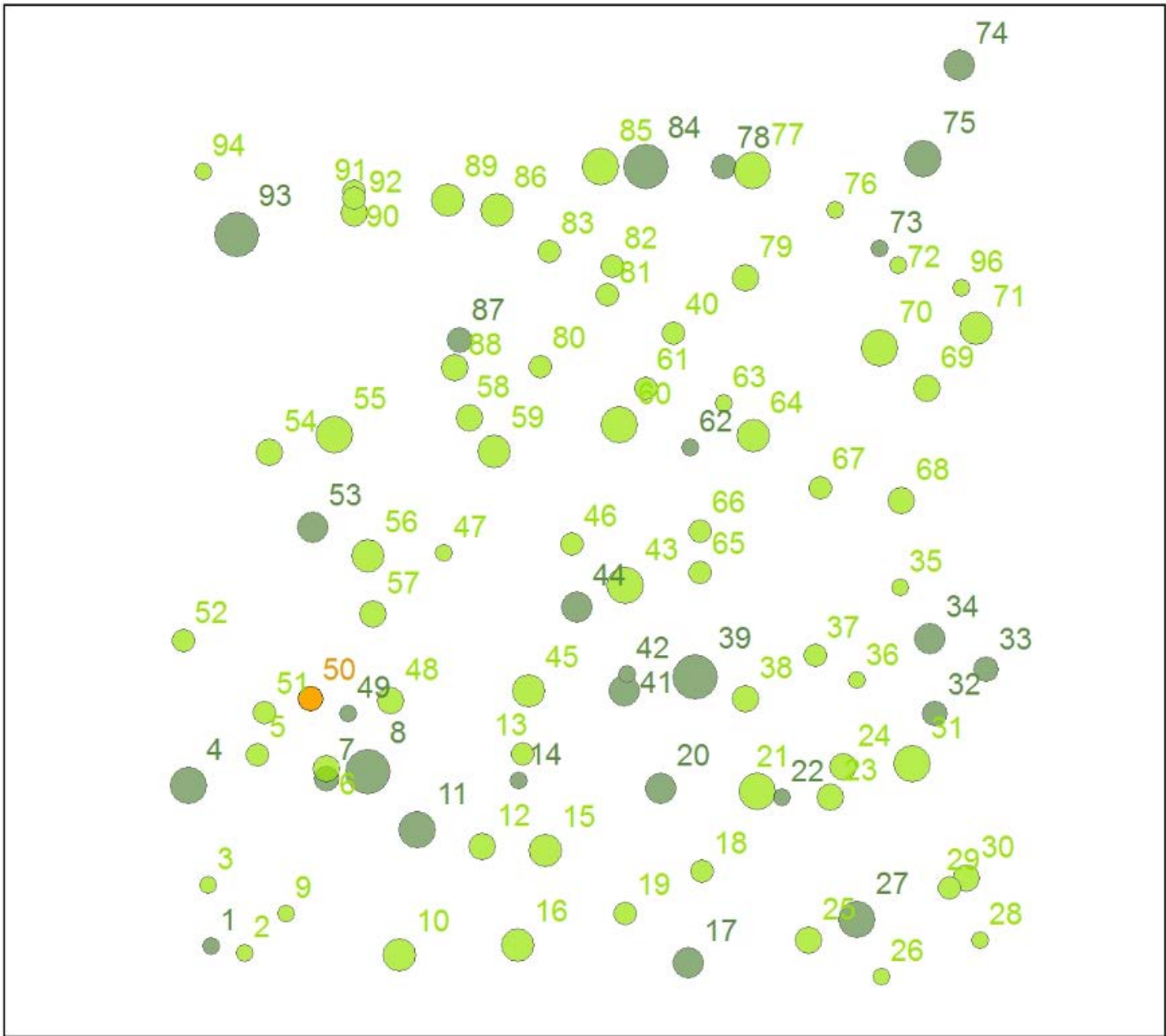
Re-measurements



Krokars reserve



Tagged trees



Map made of local XY coordinates

Additional researches

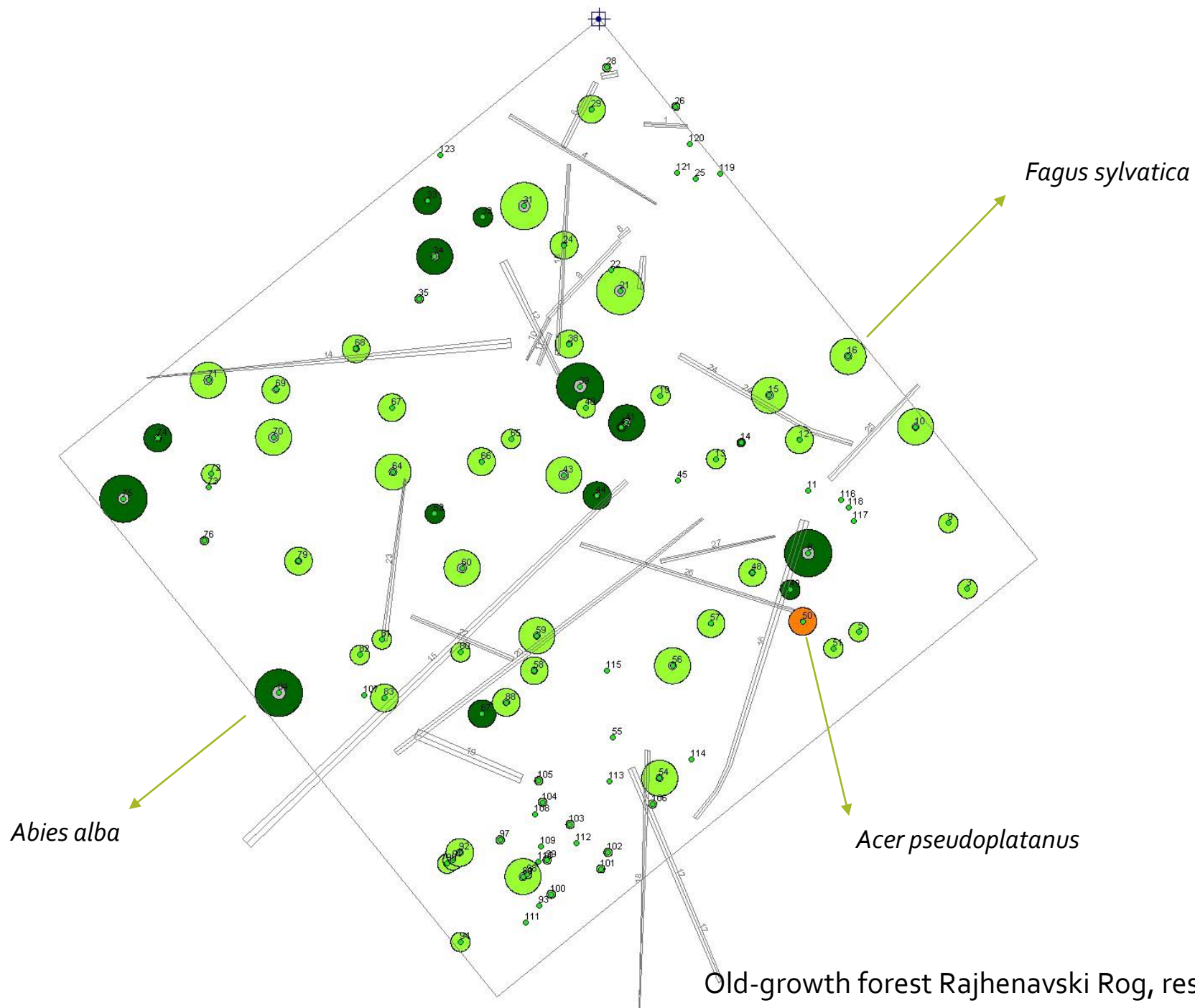
- Various one-off studies, nothing systematic
- Bachelor's, Master's and PhD theses (deadwood, forest structure)
- Projects (early demography, regeneration, mortality, climate change...)

Mapping with Field-Map

- Started in 2021
- Mapping of all trees, snags and deadwood on permanent research plots
- “Synchronization” with research plot database for trees (tree id, species, dbh, status, cod)+adding the recruits – Importing data from calliper
- Deadwood mapping and assessment of species, decay-class and mode of death
- Snags measurement with stem profiler



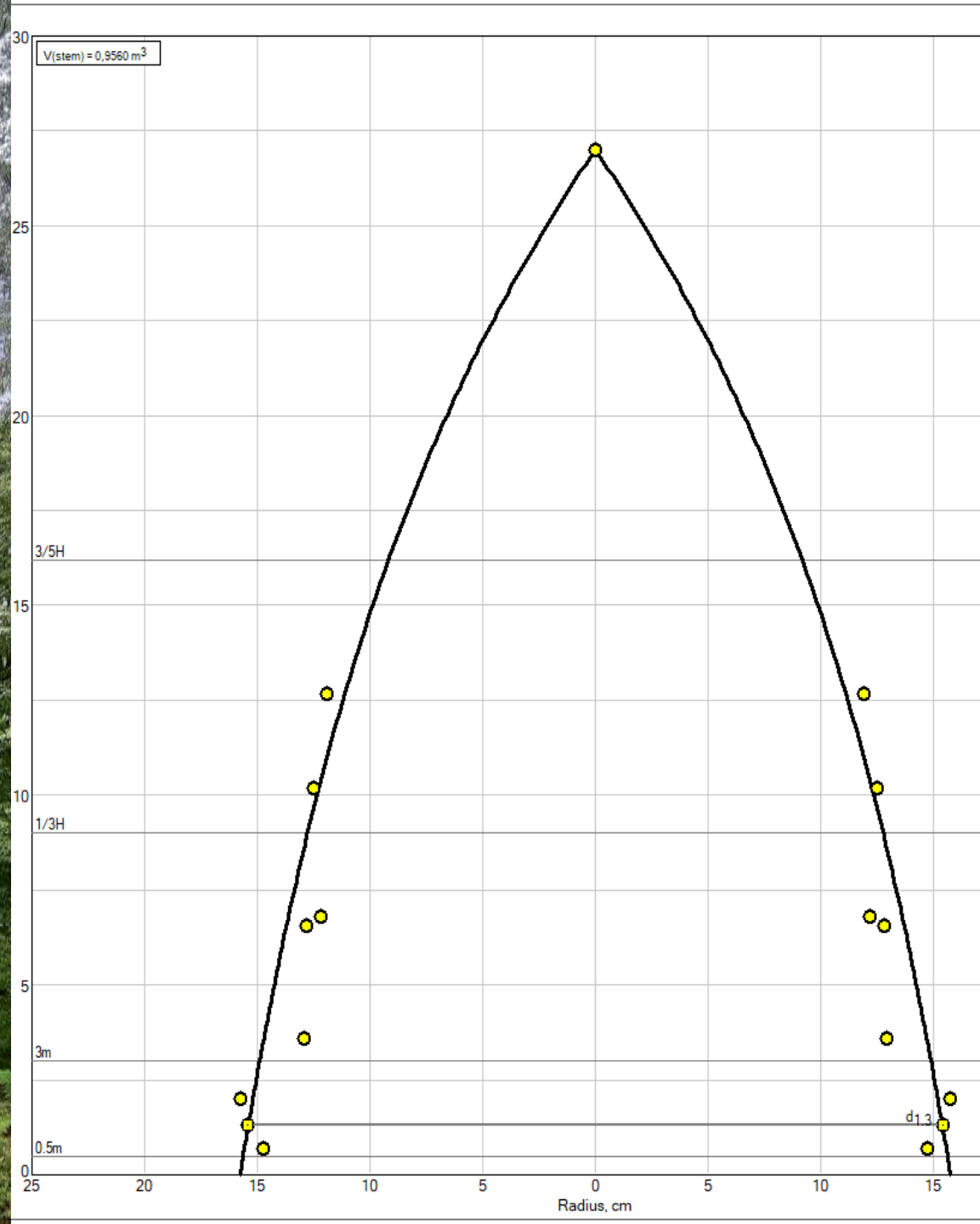




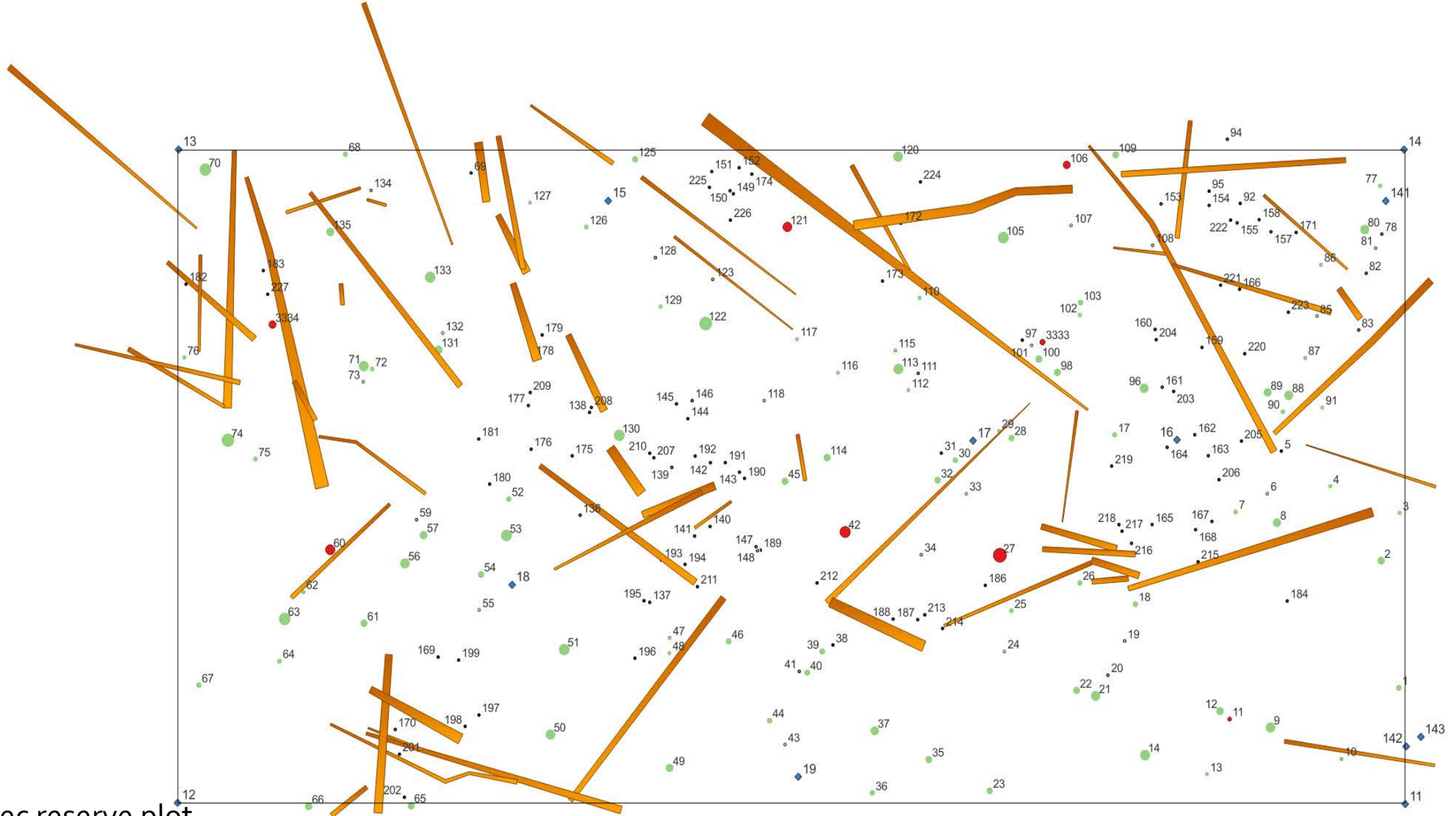
Old-growth forest Rajhenavski Rog, research plot 3 (Field-Map)



Stem profile of snags for deadwood volume calculation



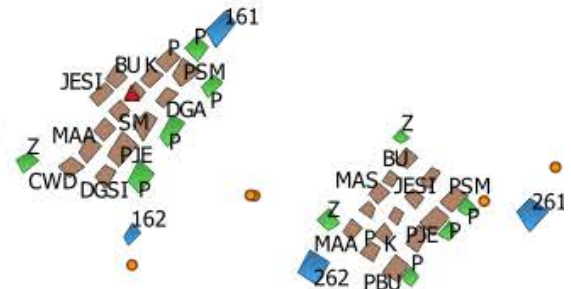
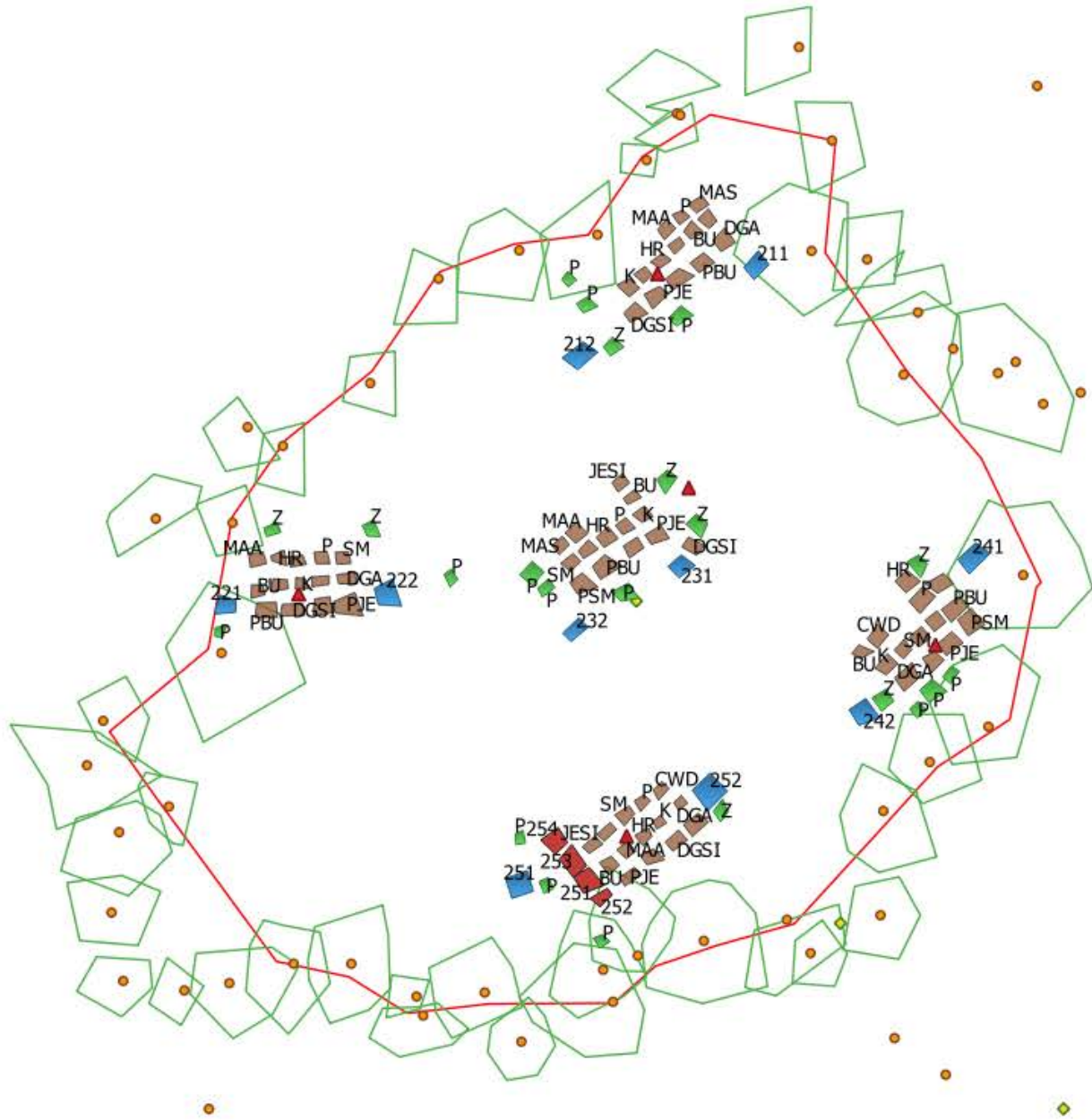
Strmec plot

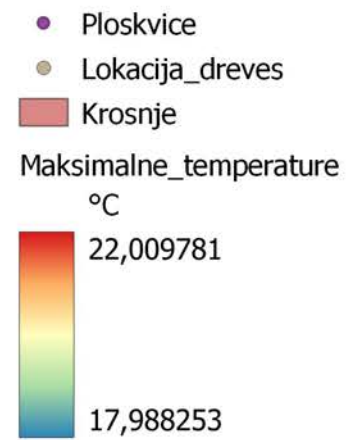
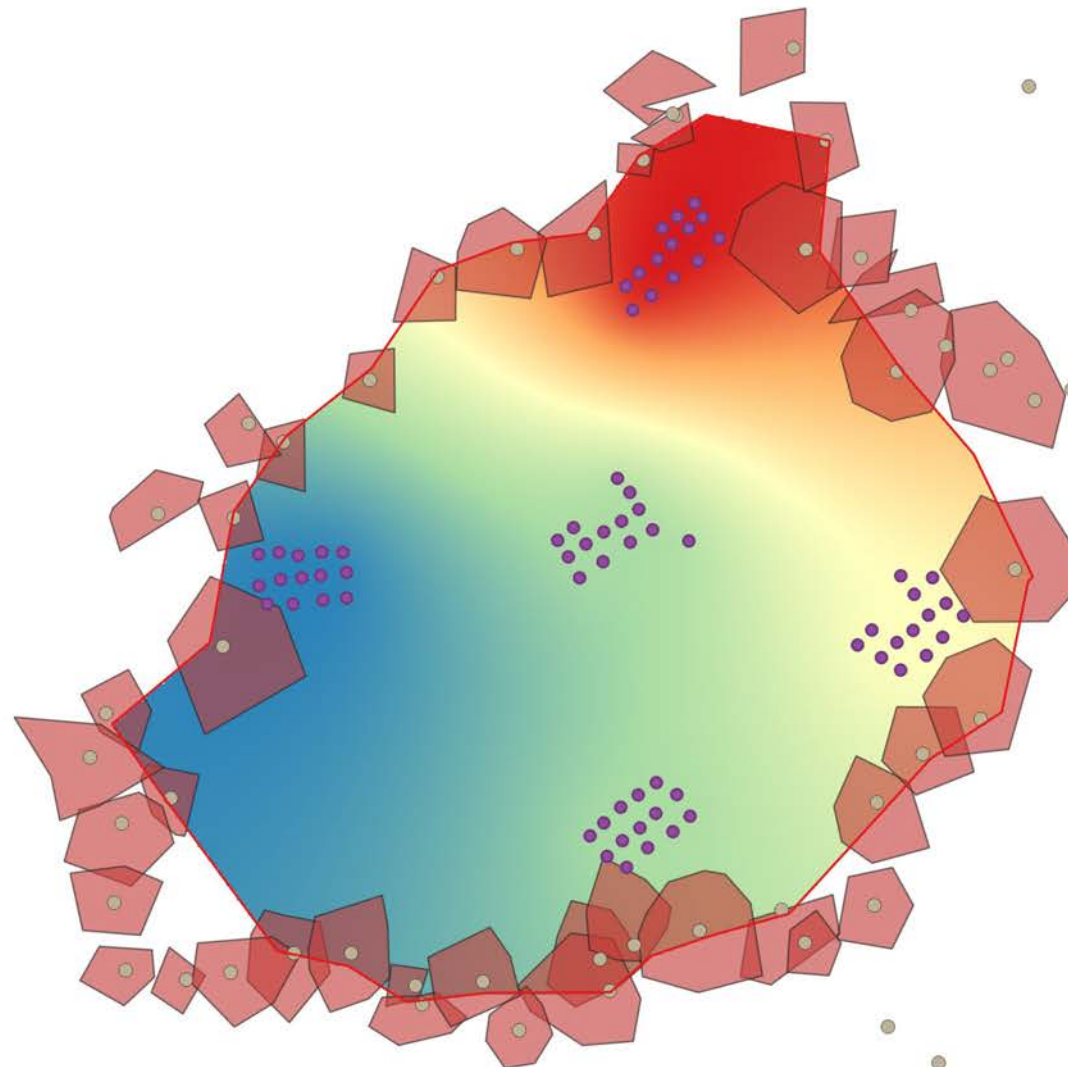


Strmec reserve plot

Mapping of gaps on Pahernik property

- Faculty research sites on high altitude on Pohorje (1400 m a.s.l.)
- 3 fenced and 3 unprotected
- Research on gap dynamics and artificial regeneration
- Crown effect on temperature and light conditions

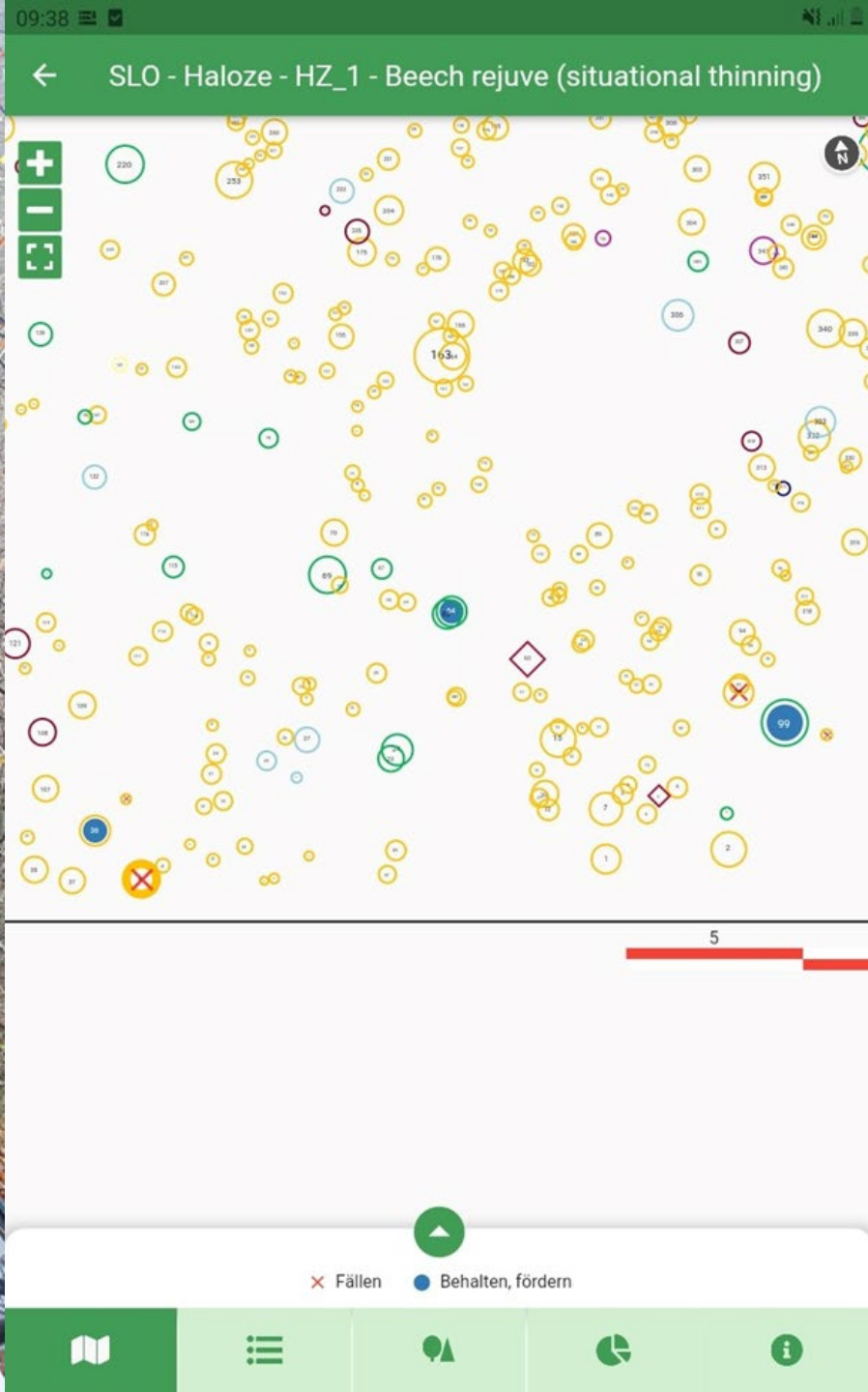




Mapping of research plot for MSC Mobile

- Workshop for foresters on crop tree situational thinning
- Establishing the plot with Field-Map to get coordinates for MSC Mobile
- Virtual tree selection – crop tree situational thinning vs selective thinning
- Selection on tablet computers using MSC Mobile (Martelage Sylvotheque)





Field-Map to MSC Mobile



THANK YOU FOR YOUR ATTENTION