Roztoczański Park Narodowy

Lasy Państwowe

Effect of stand conversion on forest stand structure in planted Scots pine forests

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8th Field-Map International and Educational Users' Conference, 8 - 10 June 2022, Kuks, Czech Republic

Project:
Assesment of the effects of forest stand conversion activities in the Roztocze National Park (RPN)

Period:
2021, data resulting from previous projects were also used

Funding:
Forest Fund, Polish State Forests

Lasy Państwowe

Contractor:
Foundation for Biodiversity Research, Wrocław, Poland

Author team:
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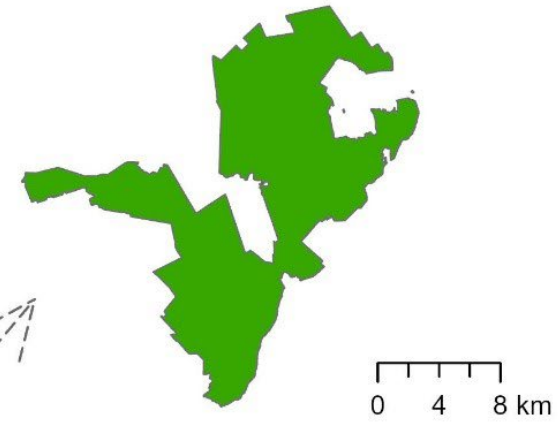
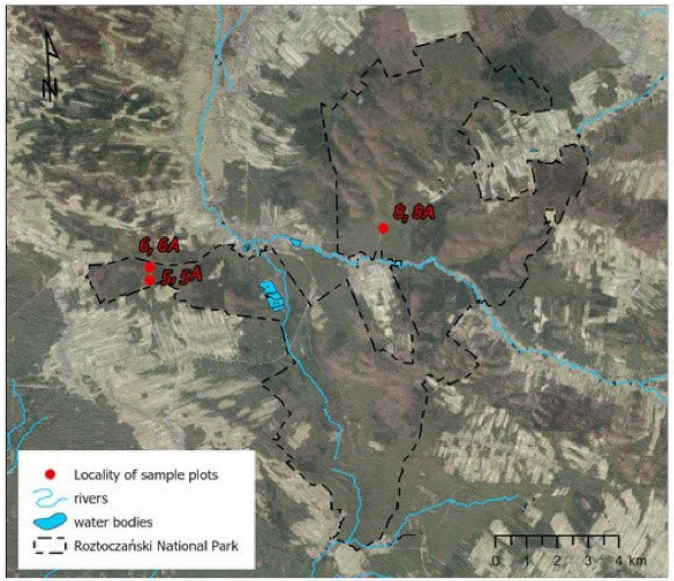
Scientific consultant: Jerzy Szwagrzyk

Roztocze National Park





Established in 1974

Total area: 84.83 km^2

Forest cover: 95.5%

Aims of stand conversion activities

1) Support regeneration of native tree species

2) Decrese regularity in tree distribution

In the long run: increase naturalness of forest ecosystems and support regional biodiversity.

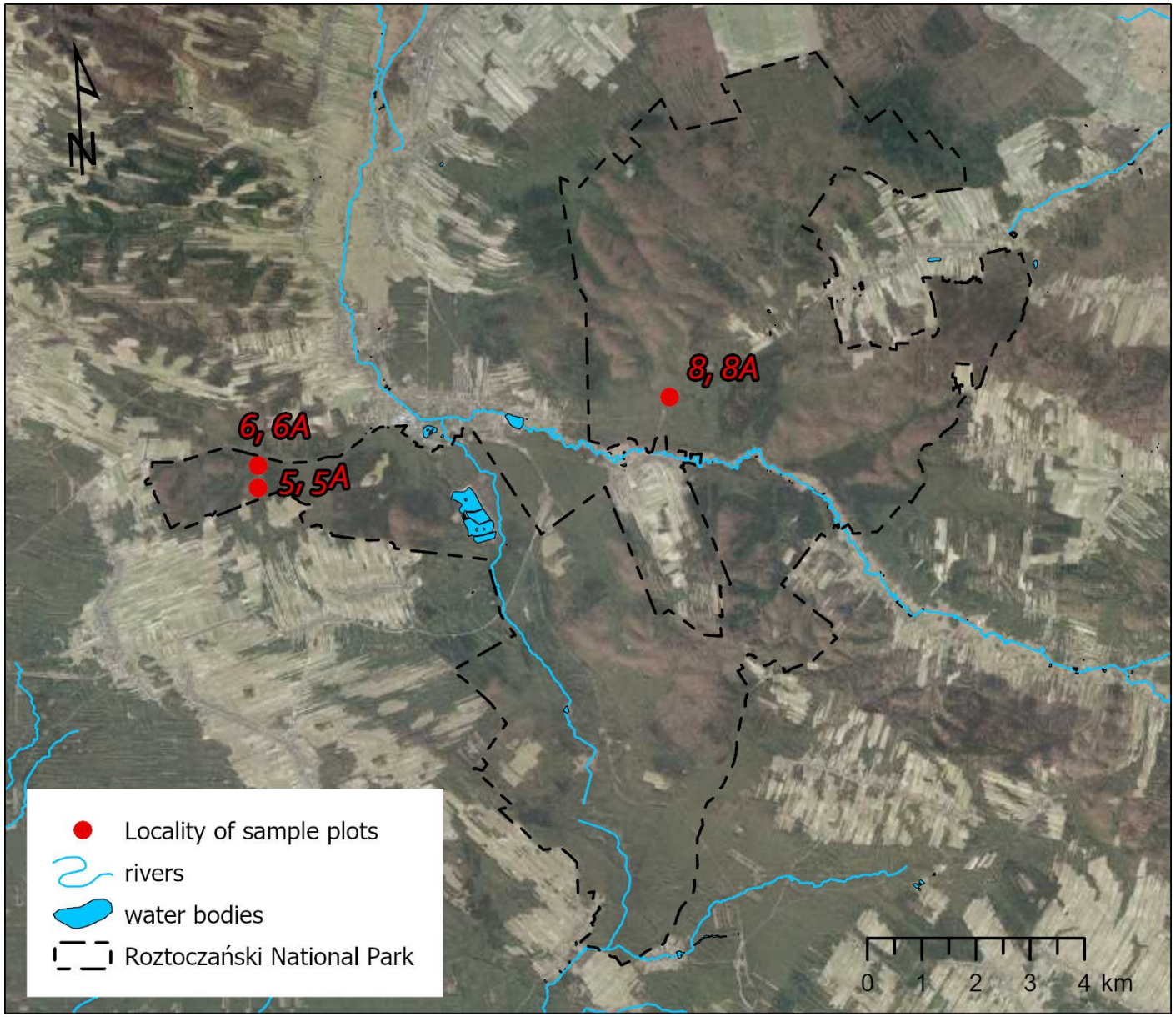
Project aims

Assesment of effectivness of stand conversion activities

at three dimensions:

- spatial distribution of trees
- natural regeneration
- diversity of herbacious vegetation

Study objects



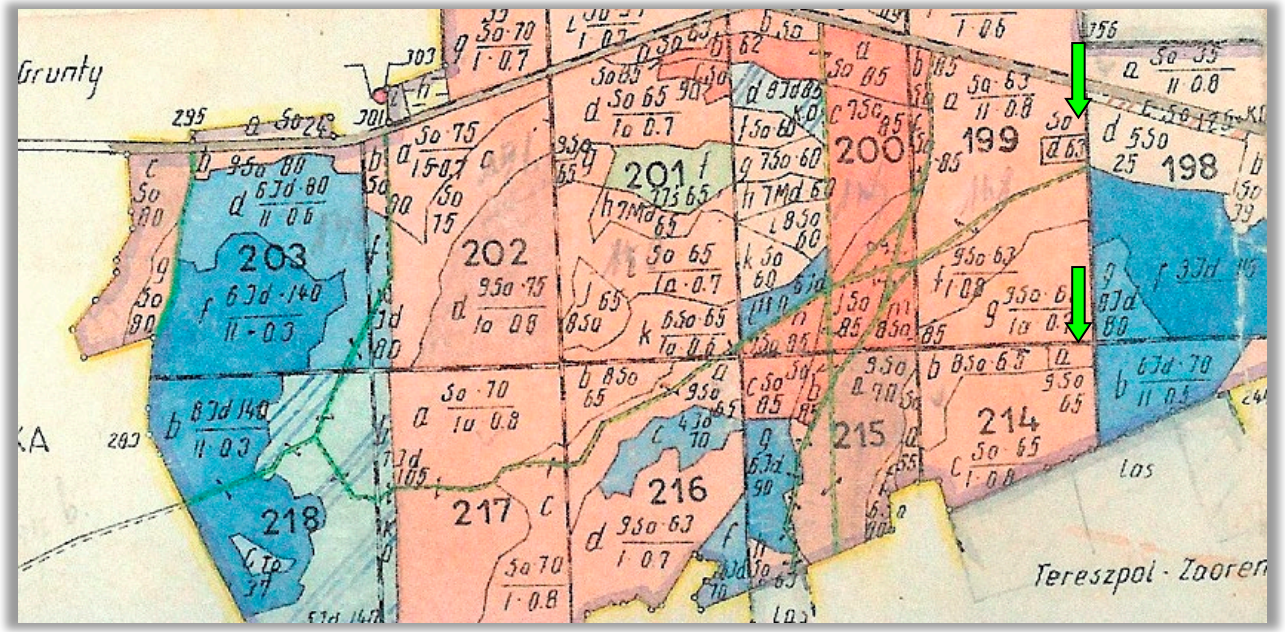
Three pairs of twin plots:

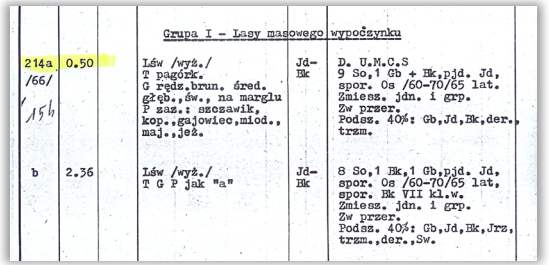
- plots subjected to stand conversion (5A, 6A, 8A)
- control plots – no management activities (5, 6, 8)

Plot area: 0.5 ha (50 x 100 m)

Control plots

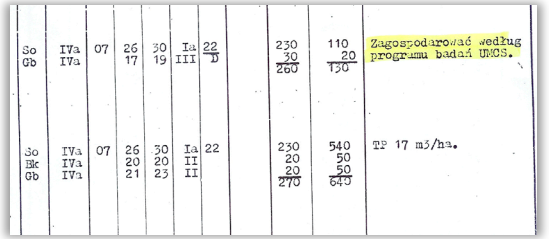
- Established in 1971 -1973 – prof. K. Izdebski
- Recovered in 1990s – dr. Z. Maciejewski
- Excluded from management activities for more than 50 yrs





Grupa I – Lasy masowego wypoczynku

214a /66/ /15h	0.50	Lśw /wyż./ T pagórk. G rędz.brun. śred. głęb.,św., na marglu F sas.i szczawik. kop.,gajowiec,miod., maj.,jeż.	Jd-Bk	D. U.M.C.S 9 So,1 Gb + Bk,pjd. Jd, spor. Os /60-70/65 lat. Zmiesz. jdn. i grp. Zw przer. Podsz. 40%: Gb,Jd,Bk,der., trzm.	
b	2.36	Lśw /wyż./ T G P jak "a"	Jd-Bk	8 So,1 Bk,1 Gb,pjd. Jd, spor. Os /60-70/65 lat, spor. Bk VII kl.w. Zmiesz. jdn. i grp. Zw przer. Podsz. 40%: Gb,Jd,Bk,Jrz, trzm.,der.,Sw.	



So Gb	IVa IVa	07	26 17	30 19	Ia III	22 b	230 30 260	110 20 130	Zagospodarować według programu badań UMCS.
So Bk Gb	IVa IVa IVa	07	26 20 21	30 20 23	Ia II II	22	230 20 20 270	540 50 50 640	TP 17 m3/ha.

Study plots

- Established in 2007 – dr. Z. Maciejewski & prof. J. Szwagrzyk
- Subjected to stand conversion activities

Plot 5 (control)

Plot 5A (conversion)

Field works

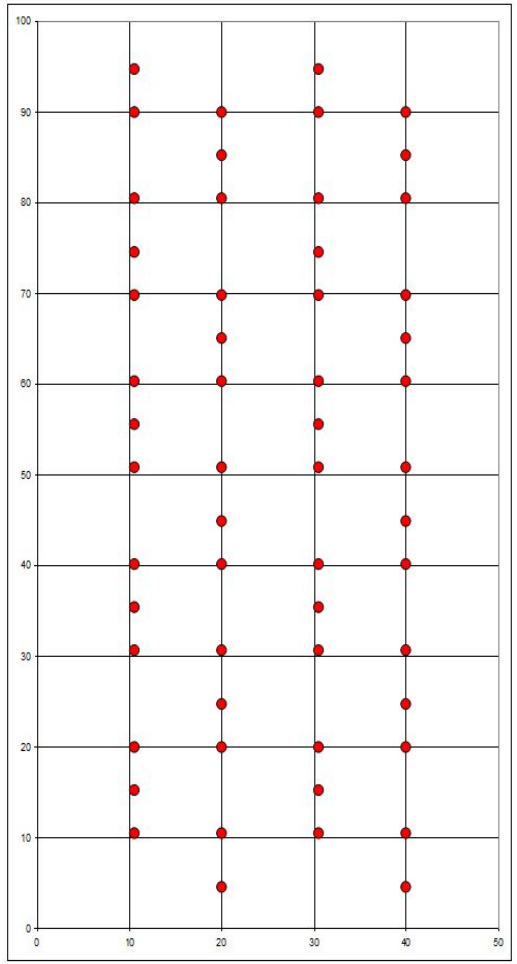
We used Field-Map to measure all live and dead trees with DBH >= 7 cm

- Position
- Species
- Condition
- DBH

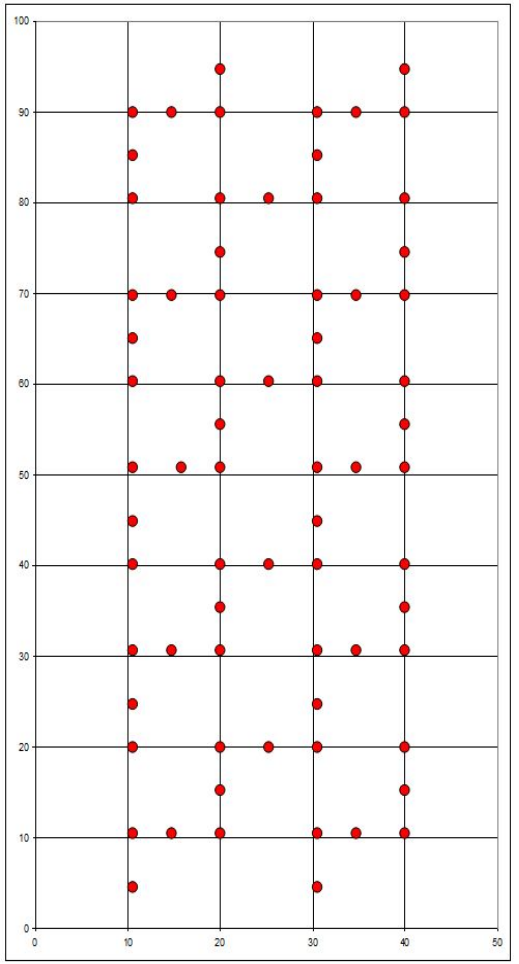
Field works

Herbaceous vegetation was analysed on 0.5 m^2 circle plots (364 in total)

- Species composition and percentge cover
- Number of seedlings



poor conferous stands



mesophilous stands

Field works

Field works

Natural regeneration was analysed on 0.5 m^2 circle plots (364 in total)

- Number of seedlings, short sapling (< 0,5 m) and tall saplings (h > 0,5 m; dbh < 7 cm)

Results

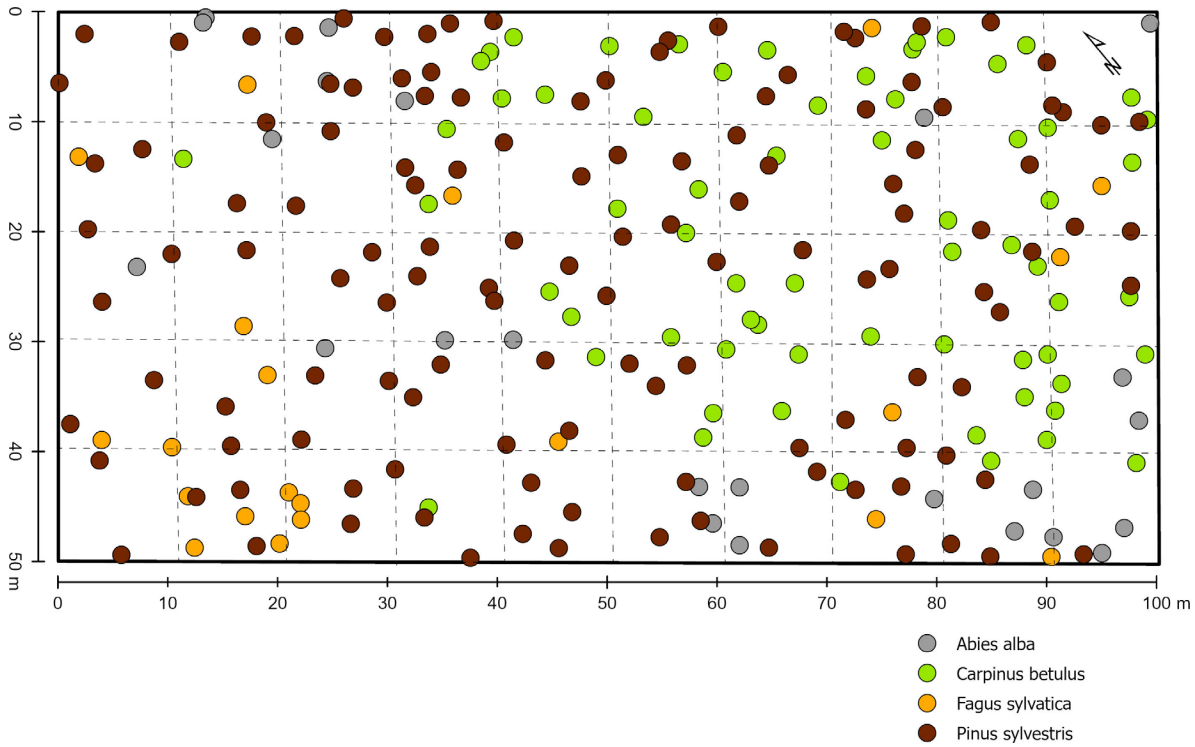
	Research plots					
	5	**5A**	**6**	**6A**	**8**	**8A**
Live tree density [N/ha]						
All species	442	188	1206	924	728	466
Pinus sylvestris	232	76	348	322	386	242
Picea abies	--	--	120	34	42	2
Abies alba	38	16	618	448	8	2
Fagus sylvatica	42	86	116	120	238	164
Carpinus betulus	130	10	--	--	--	--
Quercus robur	--	--	4	--	--	8
Quercus petrea	--	--	--	--	46	44

	Research plots					
	5	**5A**	**6**	**6A**	**8**	**8A**
Basal area [m^2/ha]						
All species	58.4	35.5	45.9	42.9	51.3	34.4
Pinus sylvestris	35.7	12.2	35.6	35.2	44.3	29.2
Picea abies	--	--	1.4	0.4	0.4	0
Abies alba	4.6	1.6	6.8	5.6	0.2	0
Fagus sylvatica	9.1	20.7	2.1	1.7	5.5	3.2
Carpinus betulus	8.9	0.9	--	--	--	--
Quercus robur	--	--	--	--	0.7	1.1

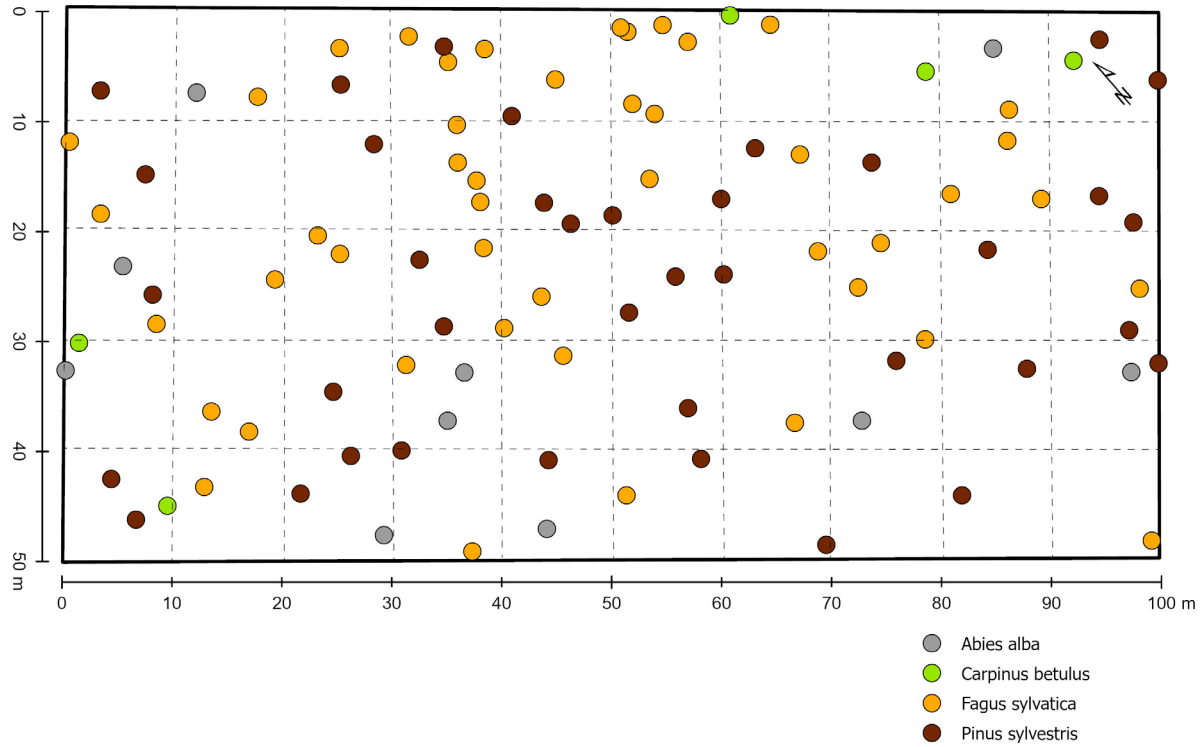
	Research plots					
	5	**5A**	**6**	**6A**	**8**	**8A**
Mean DBH [cm]						
All species	38.9	46.9	18.6	20.6	26.9	27.5
Pinus sylvestris	43.5	44.9	35.6	36.9	37.5	38.6
Picea abies	--	--	11.3	11.1	10.8	13.5
Abies alba	35.4	31	11.3	12.1	18.3	16.4
Fagus sylvatica	47.1	53.1	13.5	11.5	15.9	14.5
Carpinus betulus	28.9	34	--	--	--	--
Quercus robur	--	--	8	--	--	33.9

	Research plots					
	5	**5A**	**6**	**6A**	**8**	**8A**
Maximum DBH [cm]						
All species	103.1	90.4	51.8	53	59.6	61.7
Pinus sylvestris	65.1	59.1	51.8	53	59.6	61.7
Picea abies	--	--	35.8	19.2	29.2	13.5
Abies alba	68.1	75.1	28.1	25	24.5	16.4
Fagus sylvatica	103.1	90.4	36	44.1	34.8	35.6
Carpinus betulus	49.5	40.9	--	--	--	--
Quercus robur	--	--	8.6	--	--	44.3

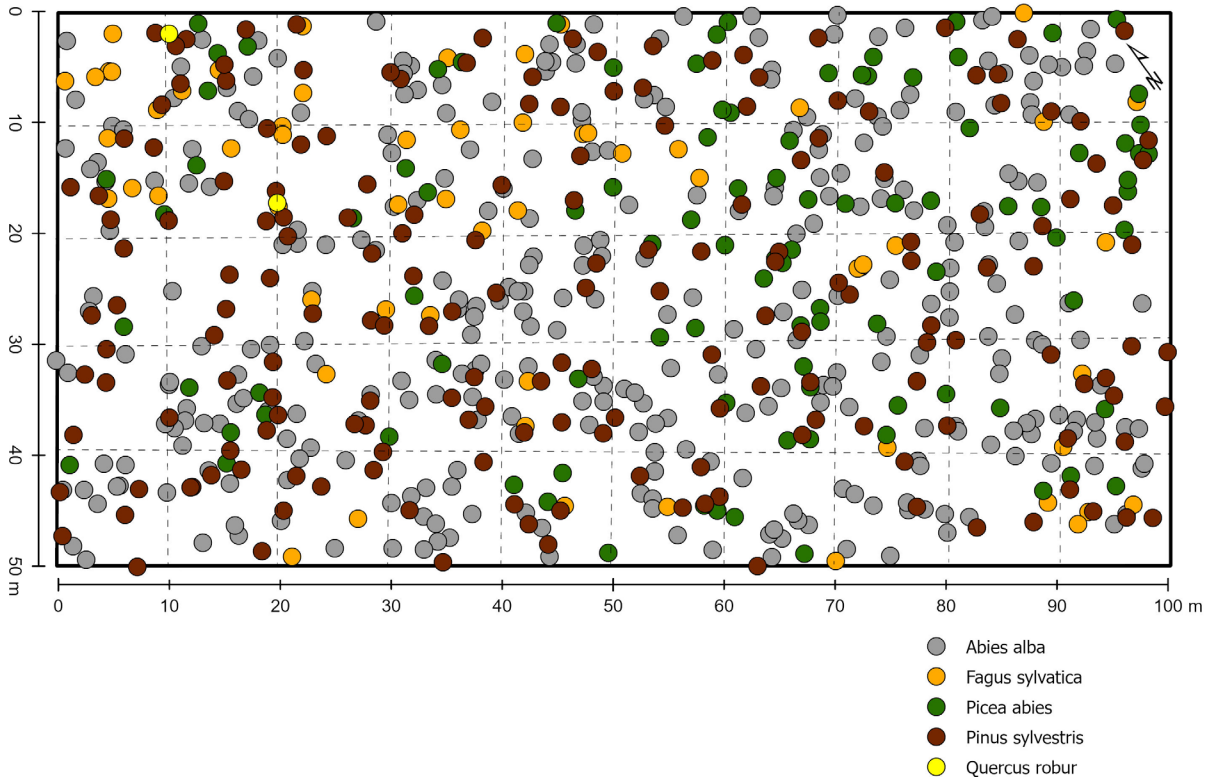
Powierzchnia badawcza 5



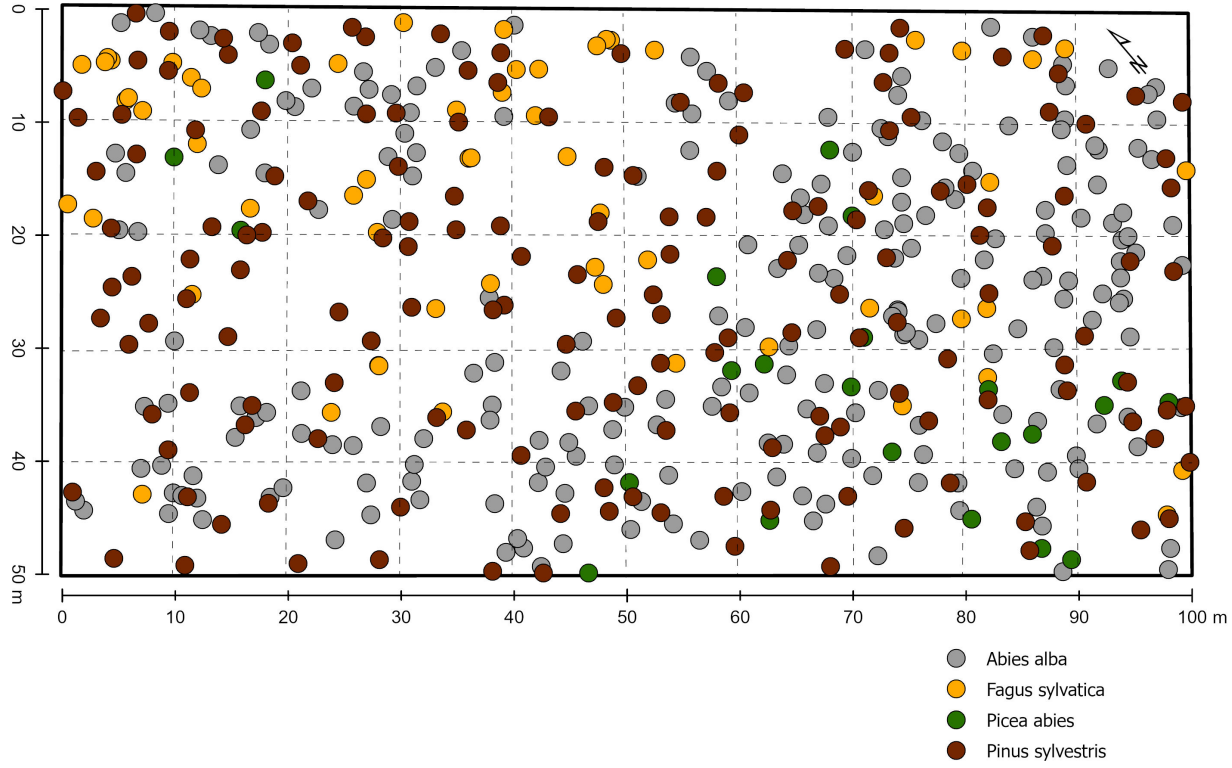
Powierzchnia badawcza 5A



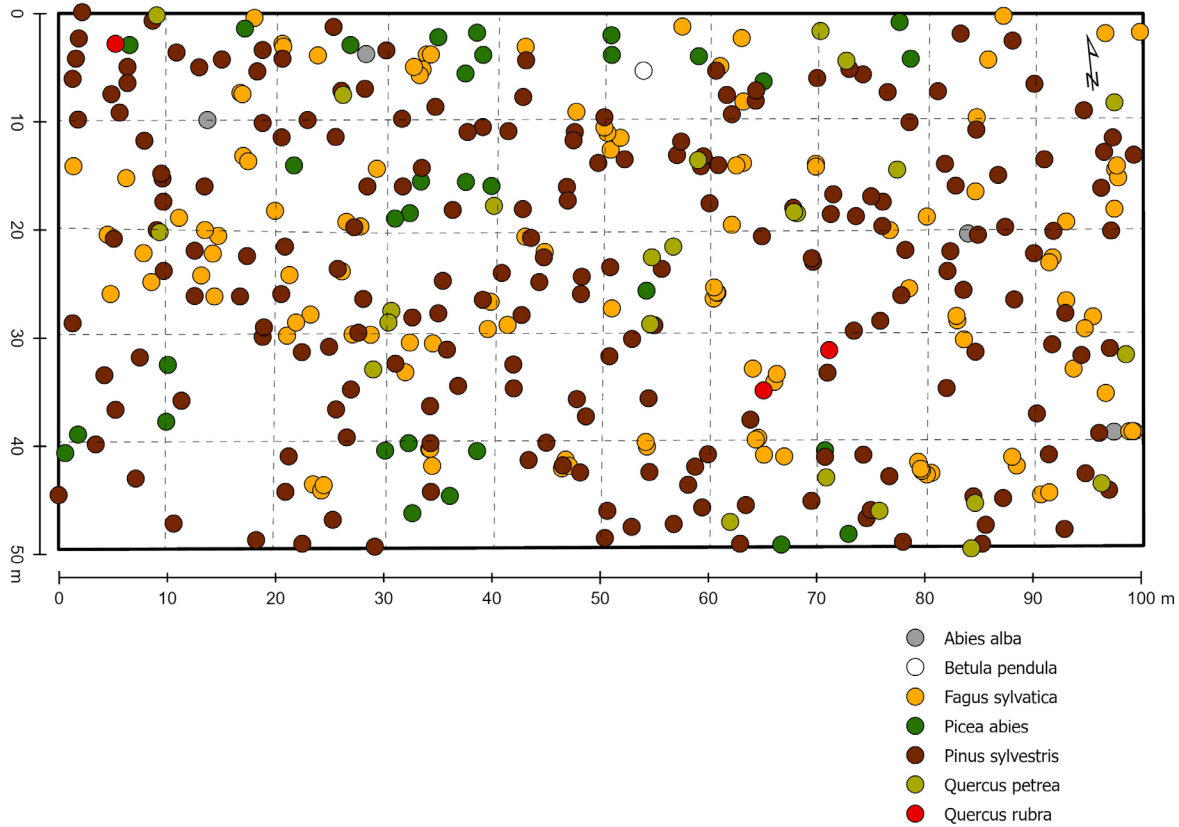
Powierzchnia badawcza 6



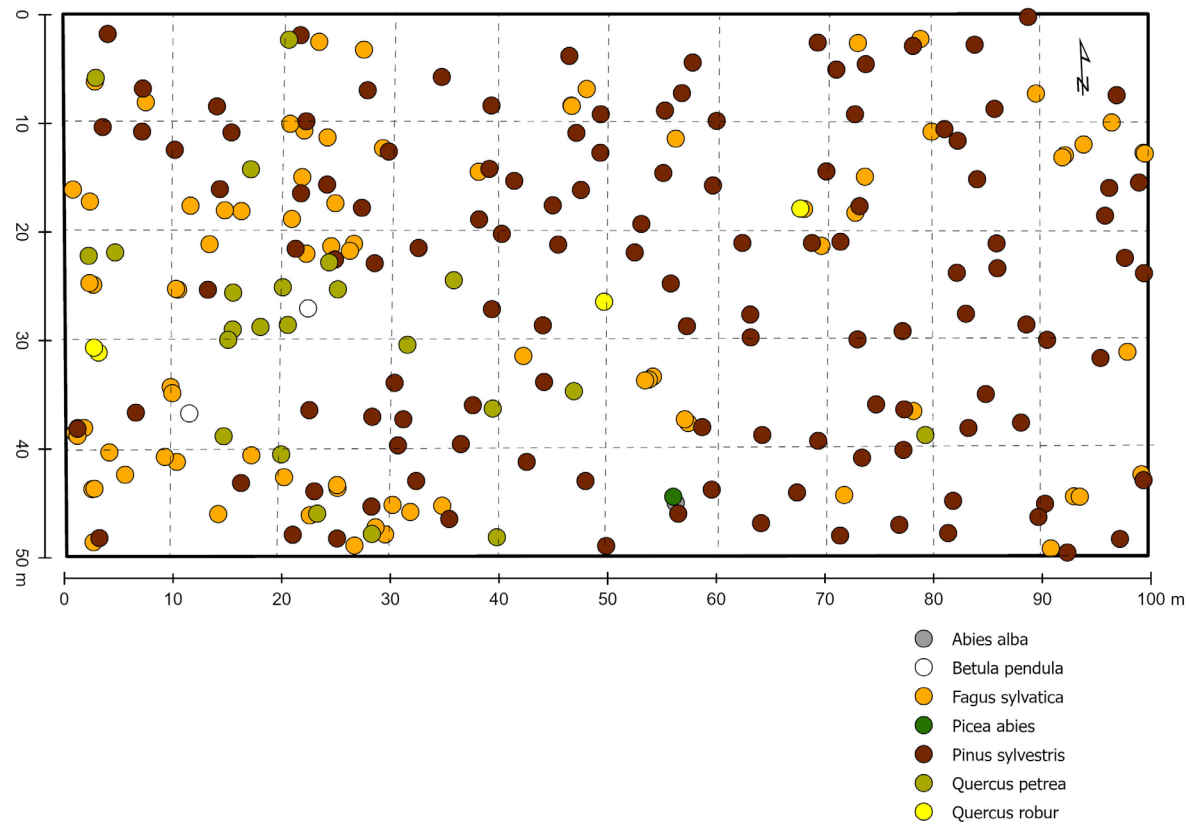
Powierzchnia badawcza 6A



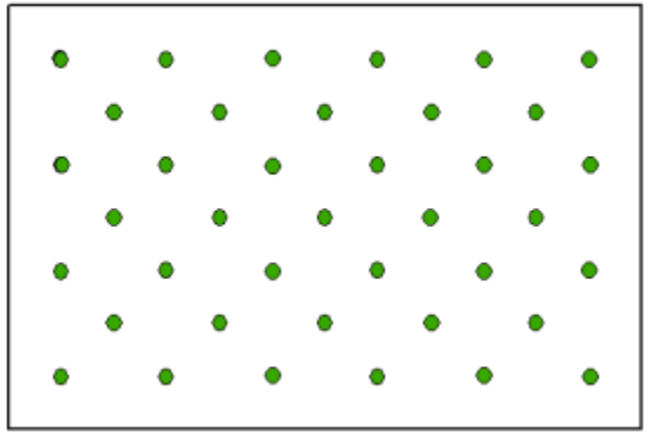
Powierzchnia badawcza 8



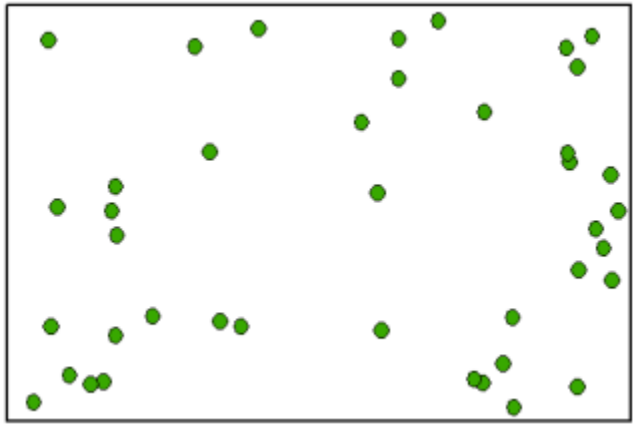
Powierzchnia badawcza 8A



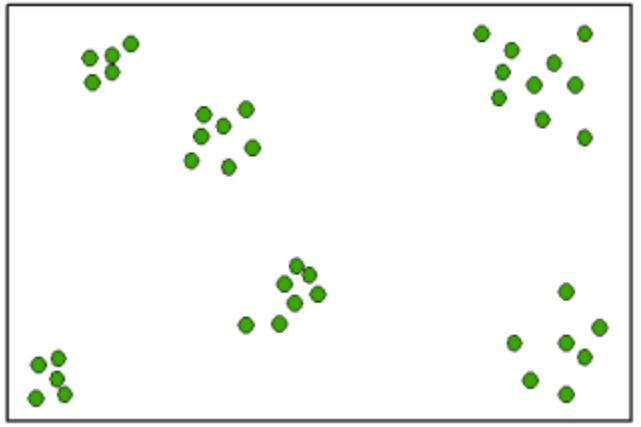
regular

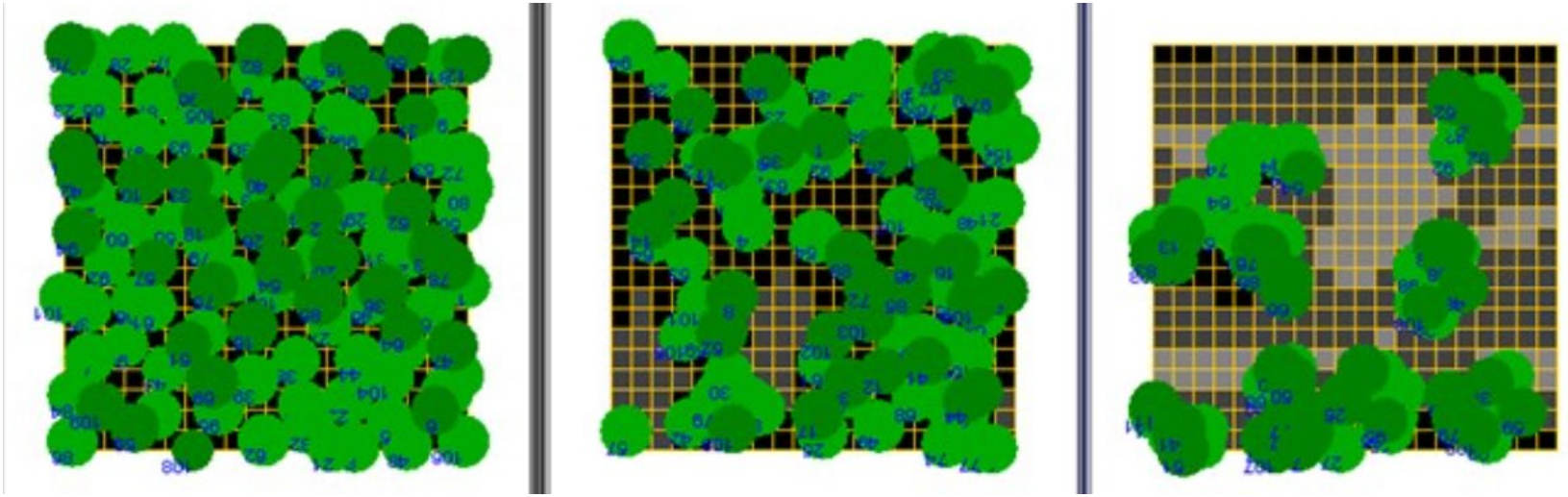


random

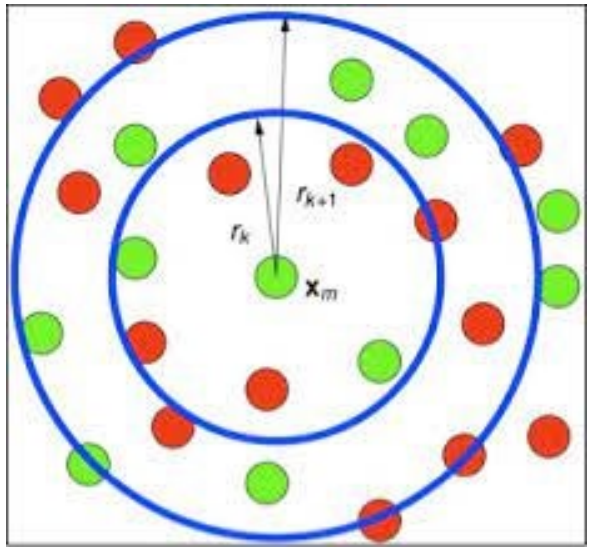


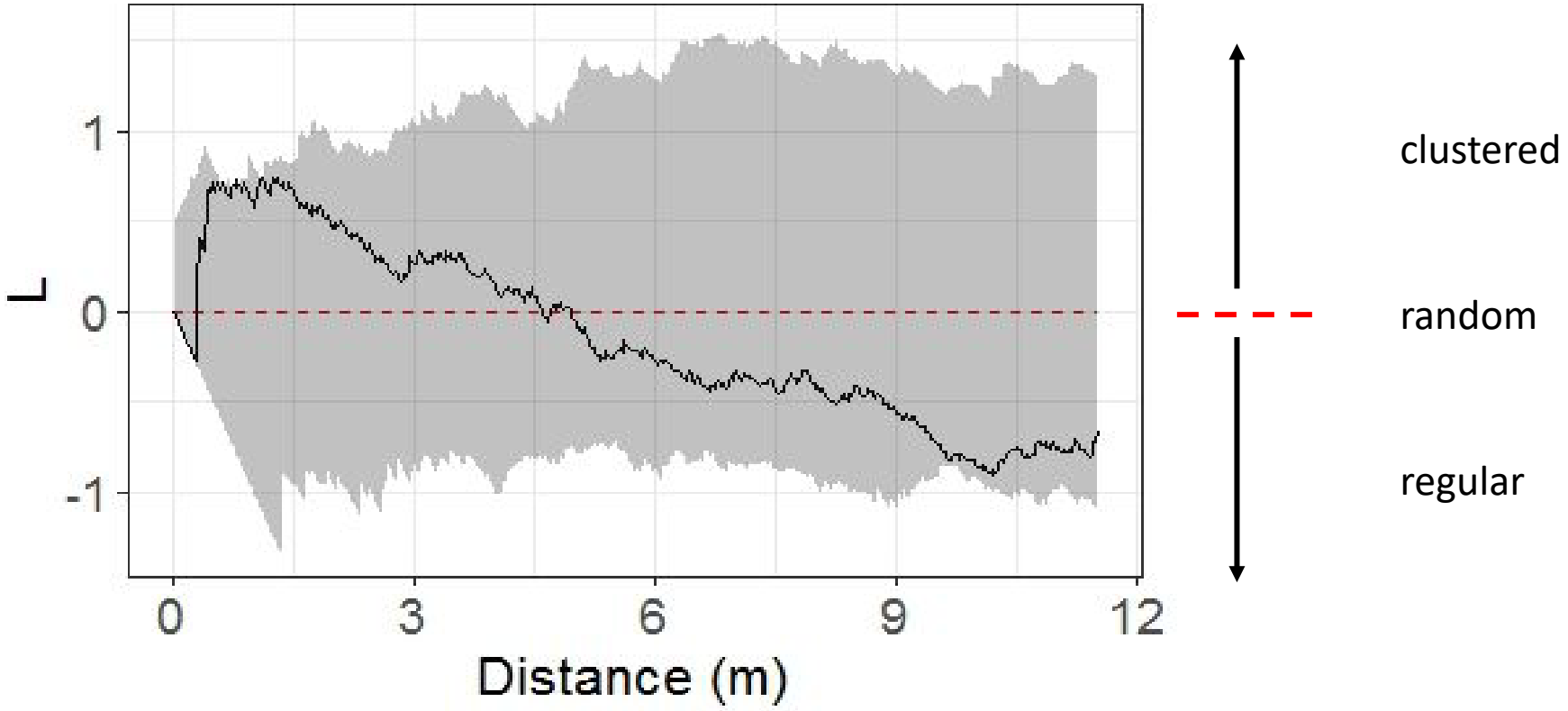
clustered



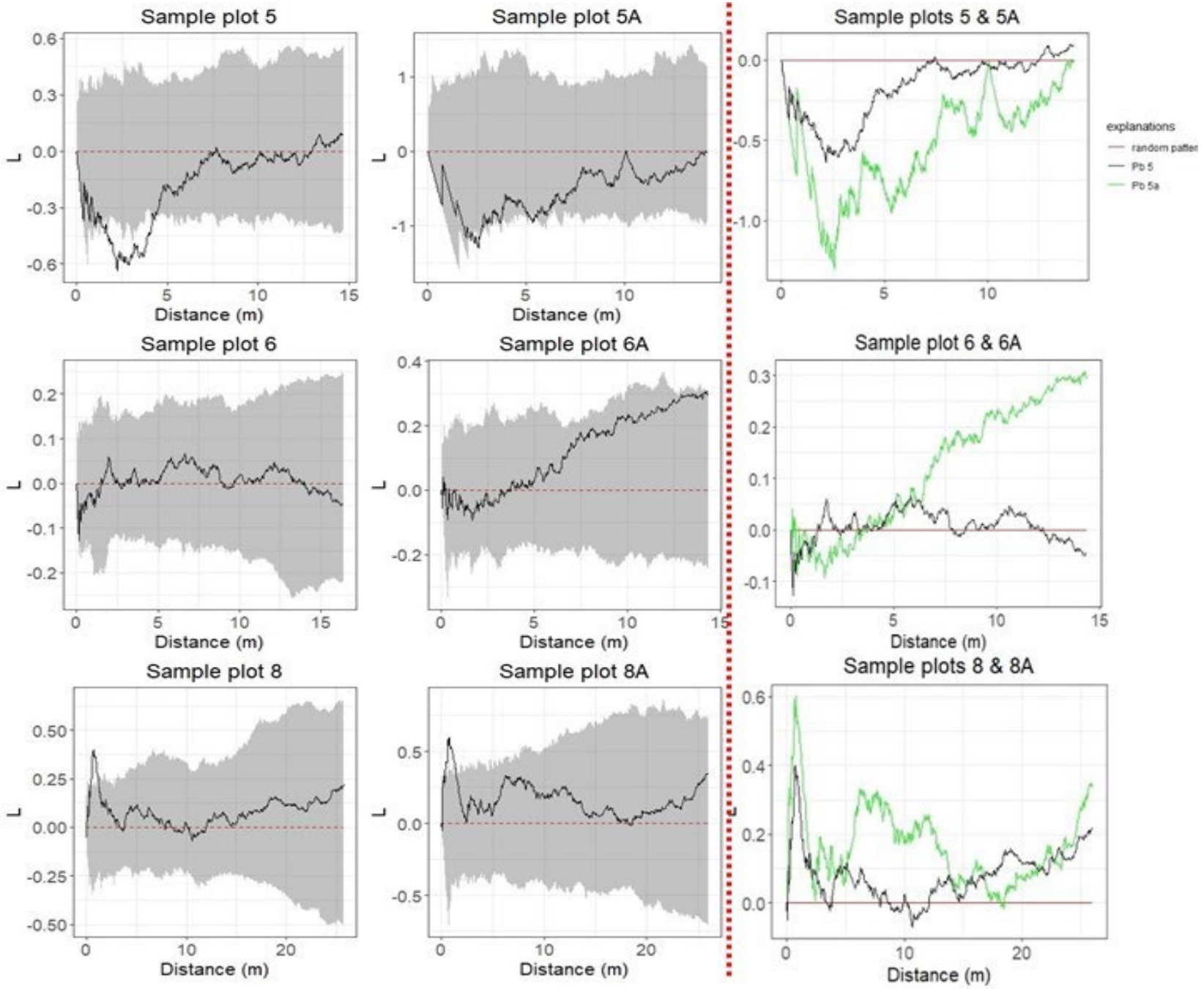


Ripley's L function

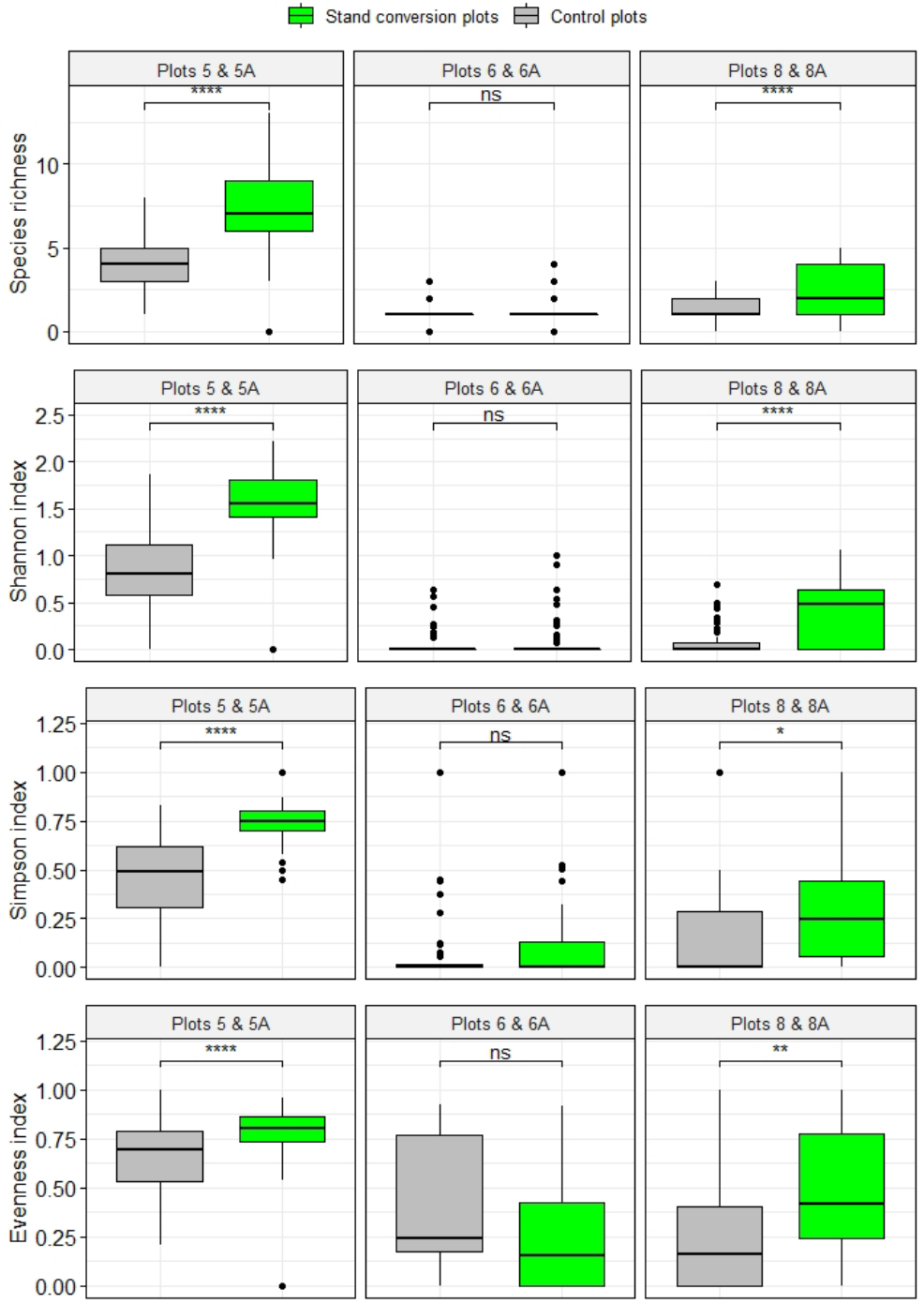




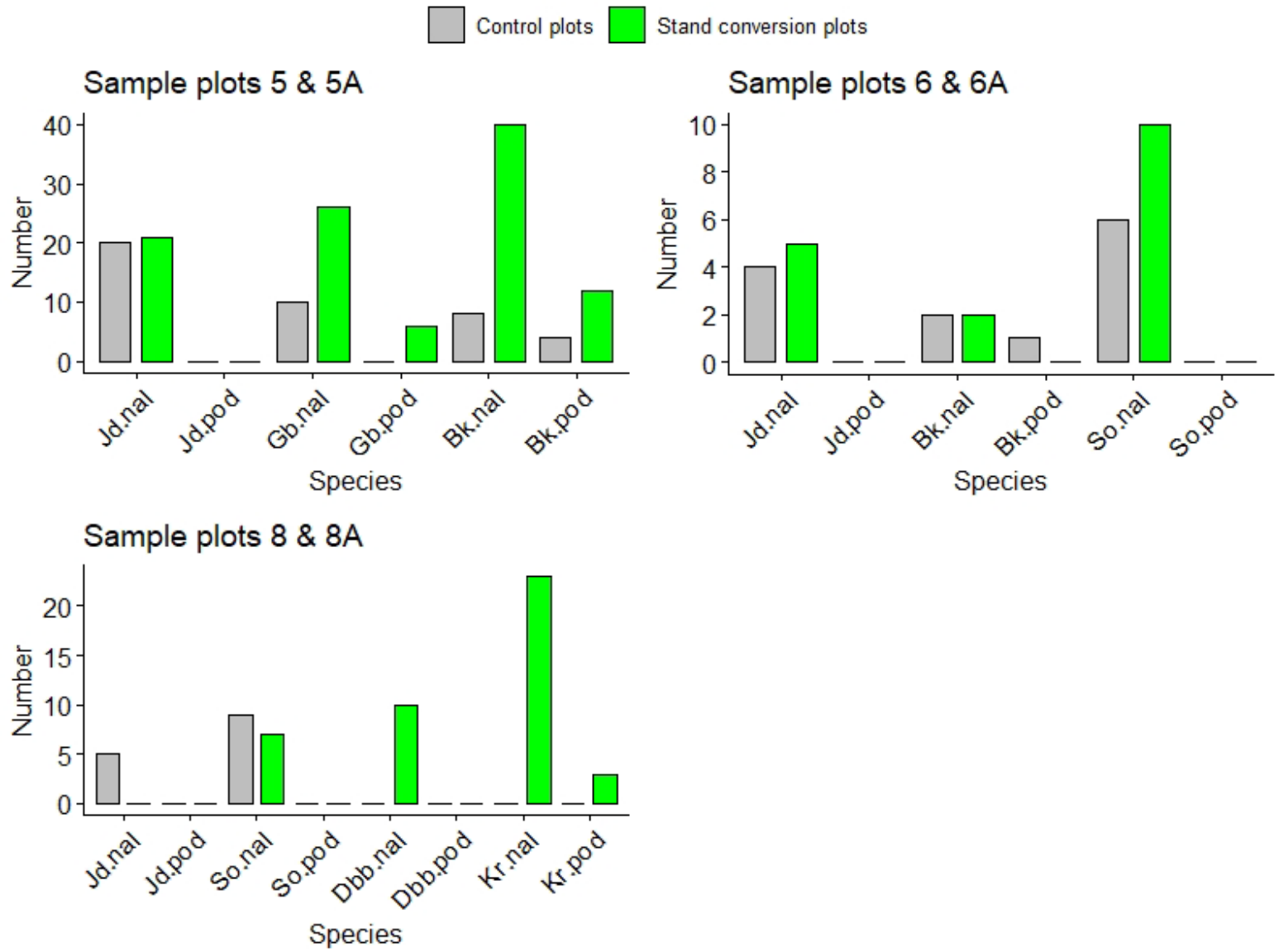
Spatial distribution of trees



Diversity of herbaceous vegetation



Forest regeneration



Conclusions

1. We found confirmation for positive effects of stand conversion on former Scots pine plantations.

2. Effect of stand conversion is subtle due to low intensity of management activities

3. In orther to decrease regularity of trees, furter management practices could be preceded by simulations of tree distribution patterns using geostatistical tools (Ripley’s function, g funcion or others)

Thank you for listening