

Monitoring of browsing by ungulates in young pine, spruce and aspen stands in Latvia

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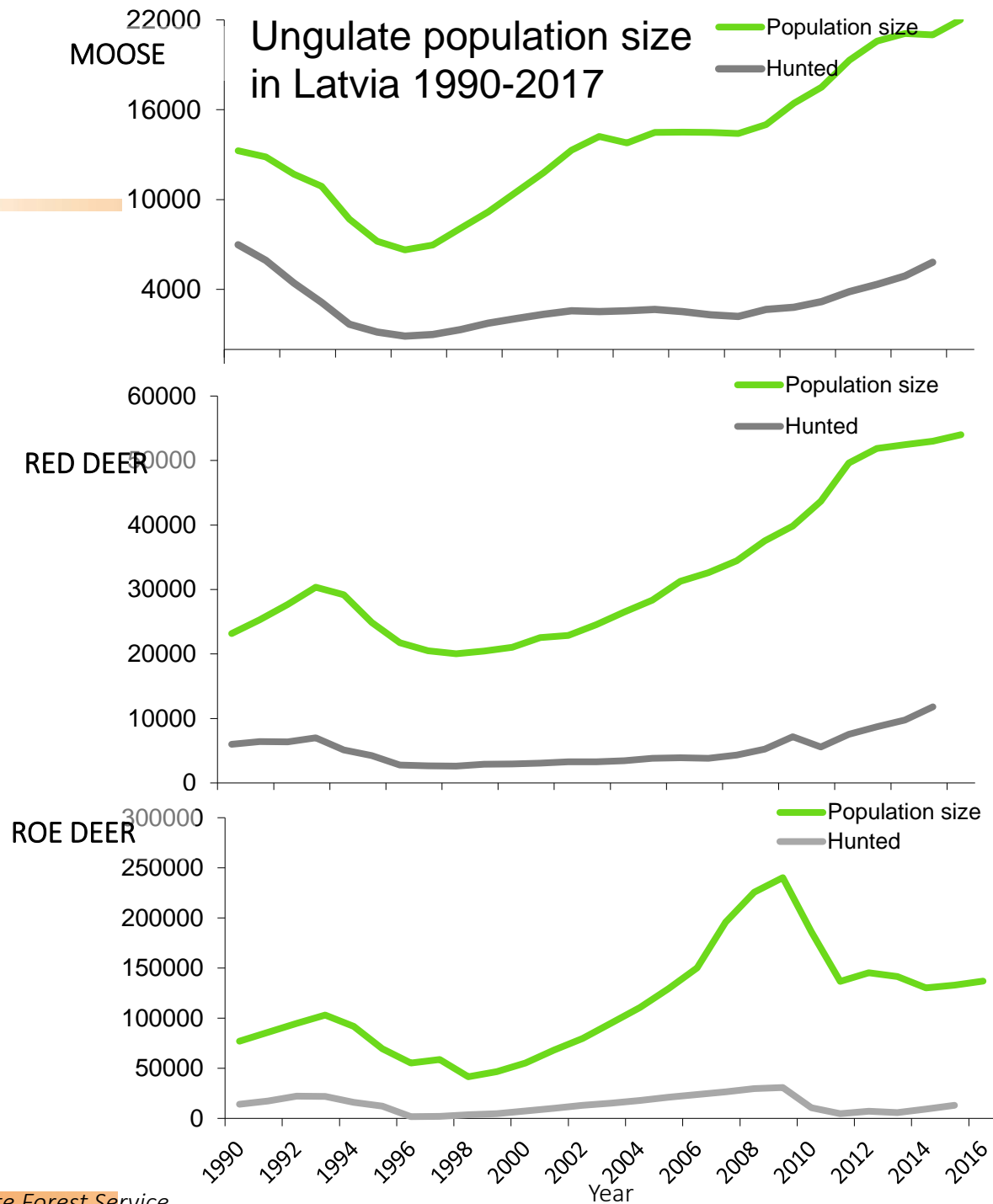
Coauthors: G.Bagrade, M.Lūkins, D.Pilāte, A.Ornicāns, J.Ozoliņš, J.Šuba

Research for Rural Development, 17.05.2018, Jelgava



Background

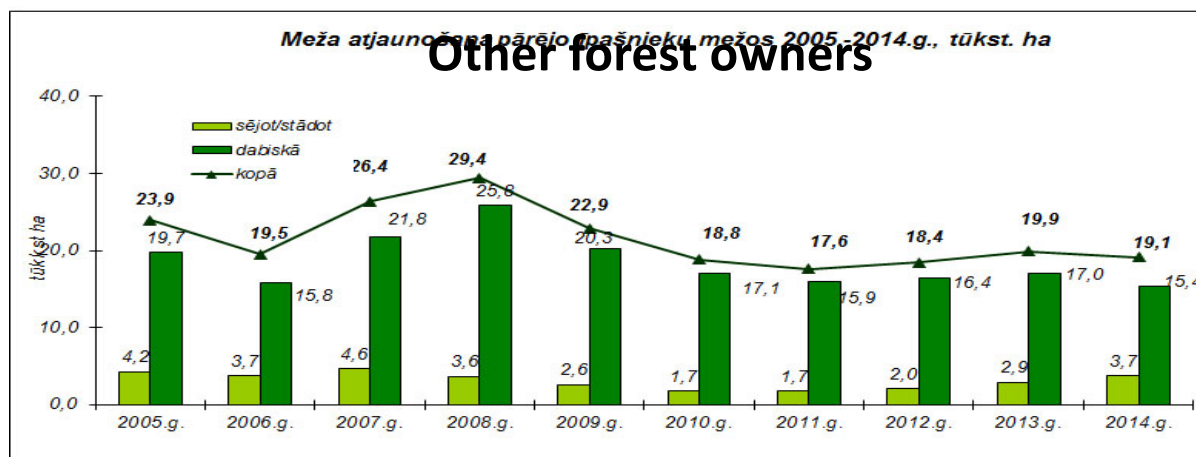
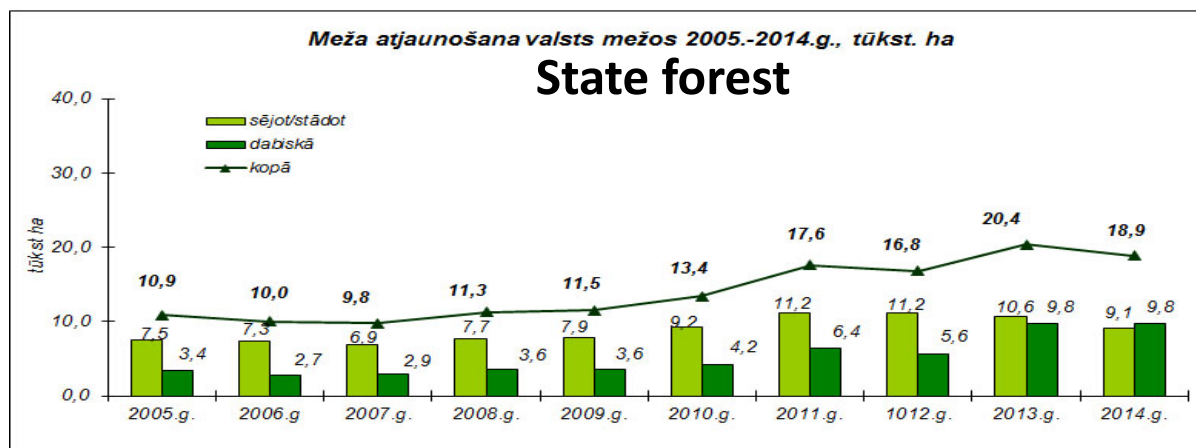
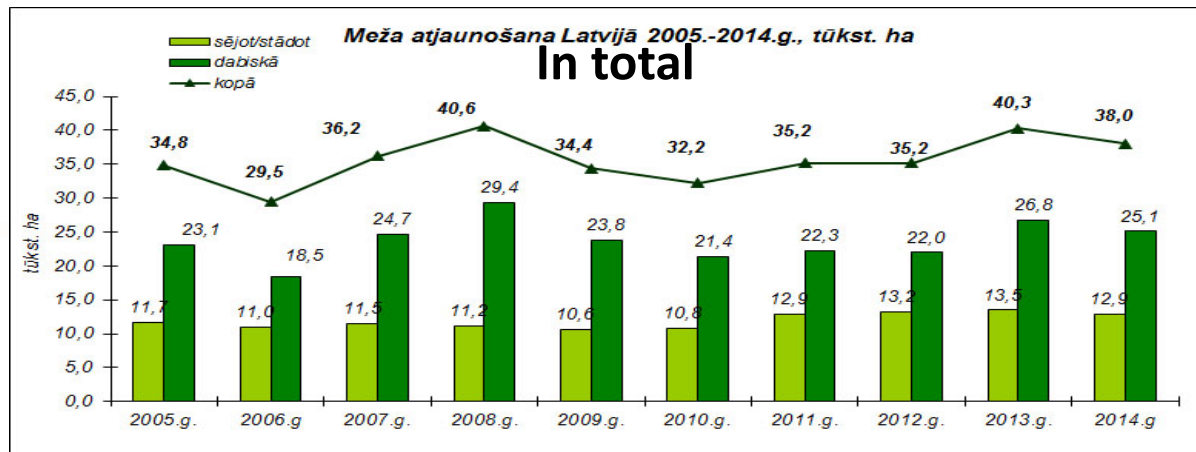
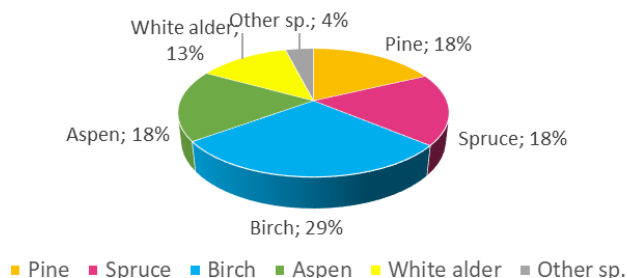
The increase of ungulate population size not only in Latvia but also elsewhere in Europe, Asia and North America is caused by changes in the intensity of hunting, milder winters, the increase of area of young forest stands, as well as reintroduction of different cervids (Côté et al. 2004; Miller et al. 2006; Beguin et al. 2016)



Background

Increase of forest regeneration by tree planting and seeding

Tree regeneration in Latvia, 2016



Background

To estimate the damage level made by ungulates to young pine, spruce and aspen stands, the monitoring of ungulate browsing was investigated in year 2014.

2014 – 150 stands

2015 – 300 stands

2016 – 450 stands

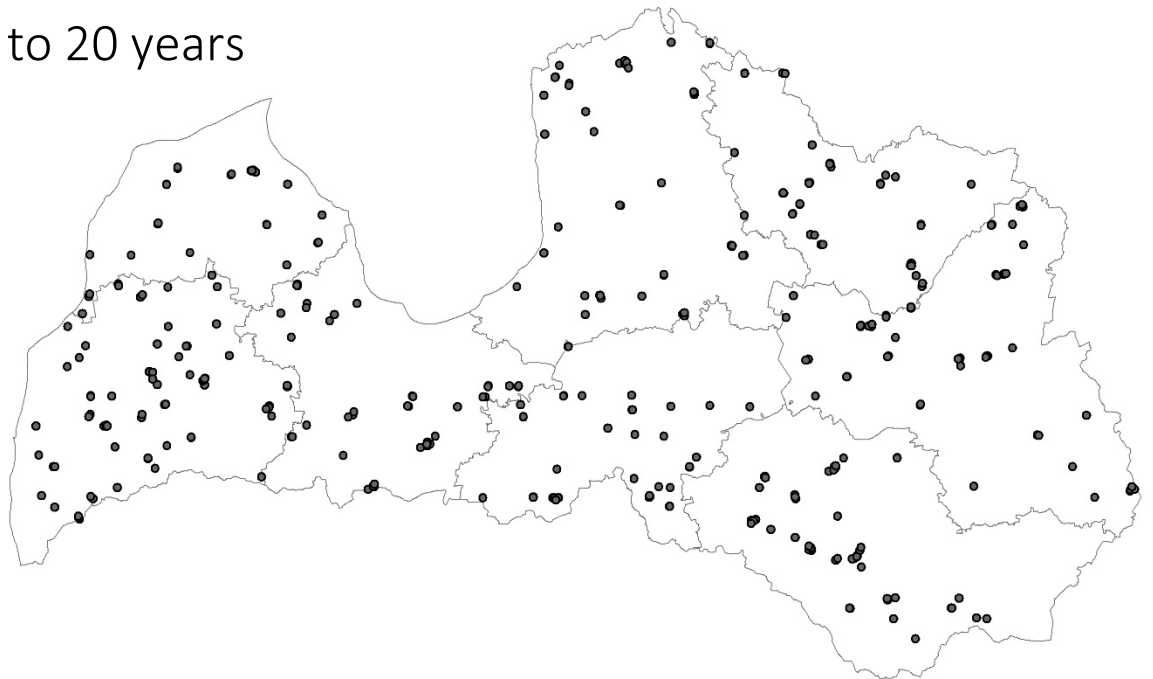
2017 – 600 stands

2018 – 600 stands



Materials

- “National forest inventory” subproject “Forest pest and disease monitoring”
- 600 sample plots
 - 200 Pine stands, up to 20 years
 - 200 Spruce stands, up to 40 years
 - 200 Aspen stands, up to 20 years

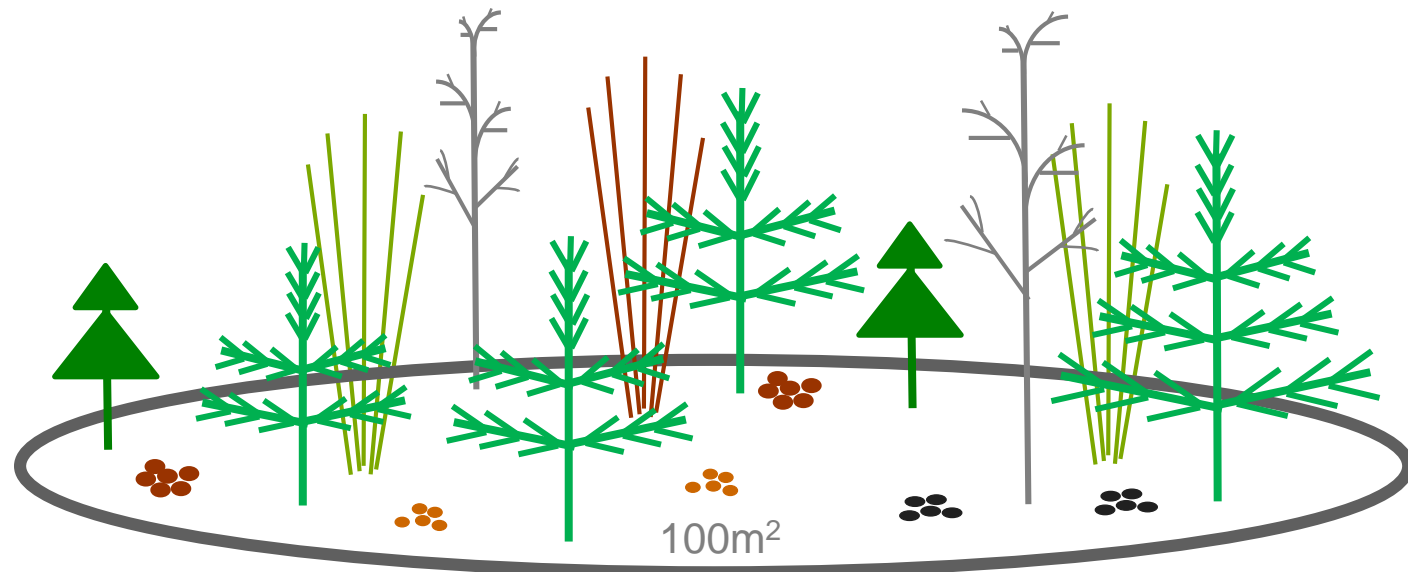


Materials



- In each stand, depending on stand size, circle sample plots (100m²) (SP) were established (min 4SP/stand)
- The intensity of fresh browsing damage was recorded for all trees per sample plot :
 - **undamaged**
 - **lightly damaged** (only few side branches are browsed)
 - severely **damaged** (50-80% of stem circumference are with stripped bark; more than 50% of side branches are browsed)
 - **destroyed** (broken top branch; stripped bark more than 80% from stem circumference)
 - tree is **dead because of previous damages**

- The No of pellet groups/SP left by moose, red deer and roe deer were counted

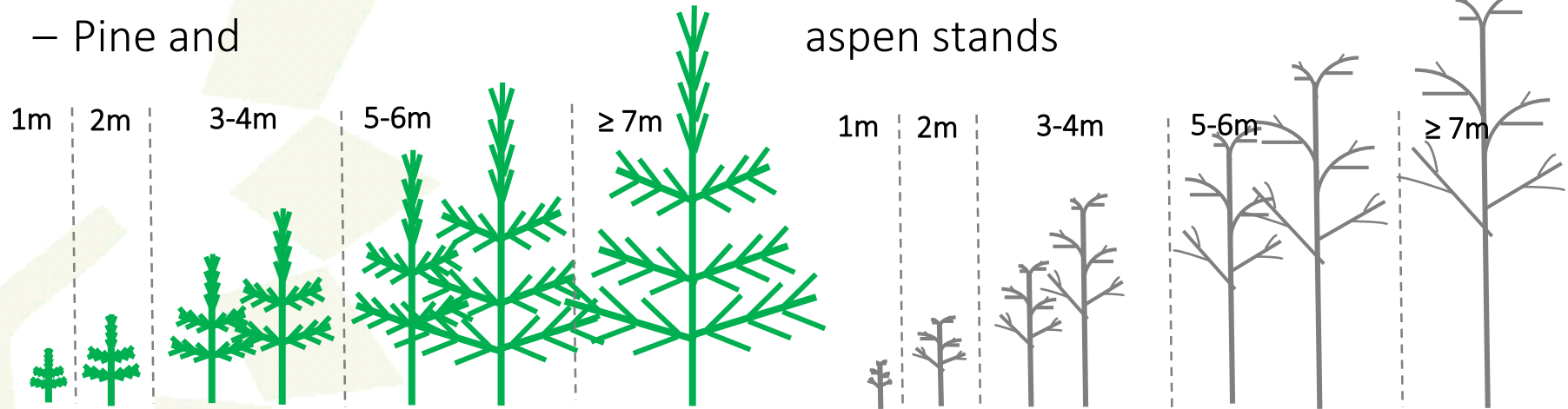


Methods

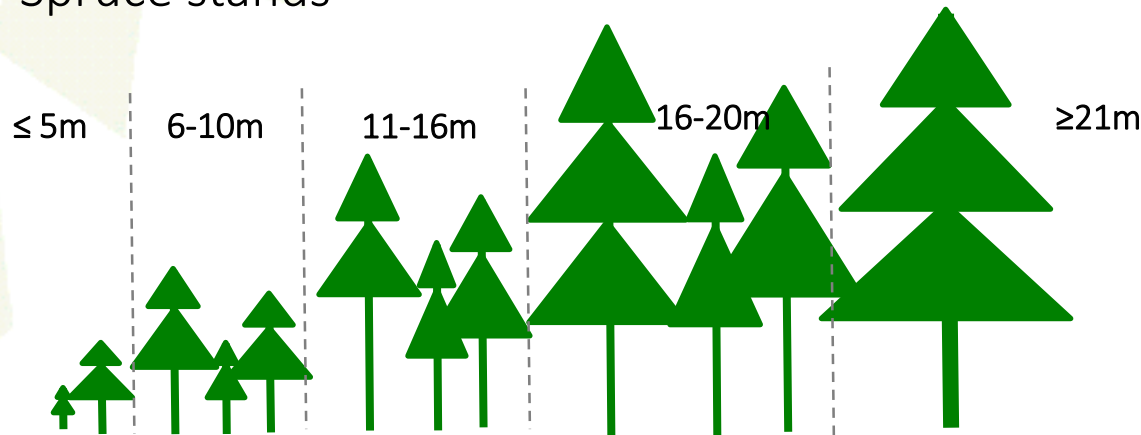
- Data were categorised depending on tree height in stand:

– Pine and

aspen stands



- Spruce stands



- An average damage level (%) and ungulate fecal pellet group number per 1ha (FPG/ha) were calculated in each stand height group

Methods



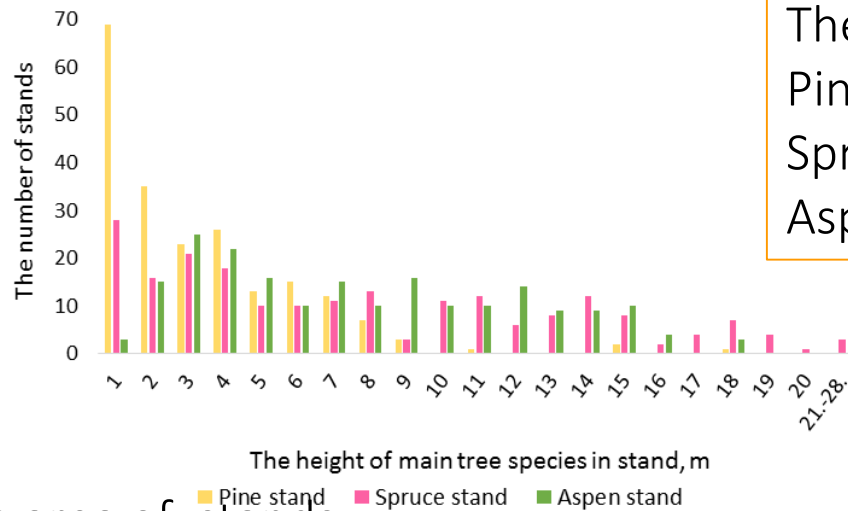
- Correlation between proportion of damaged trees and ungulate FPG/ha in stand
- Regression analysis and correlation between proportion of damaged trees in 2016 and 2017 in stands that were monitored for 2 years

Results



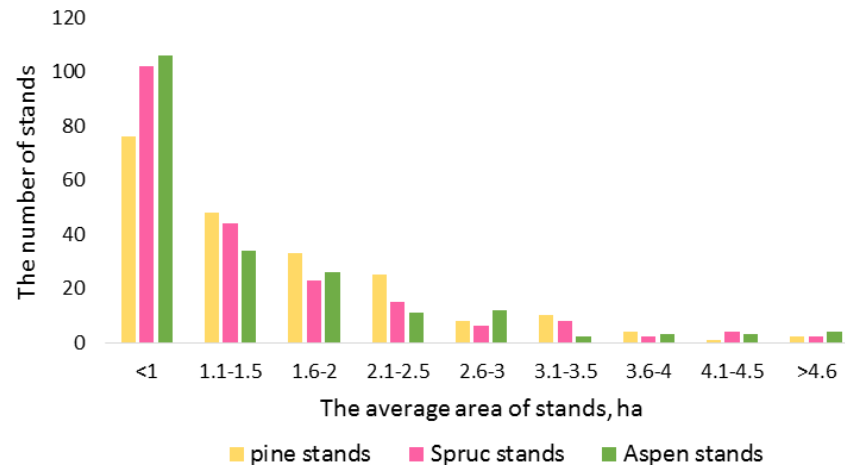
General information

- The number of stands in each height group



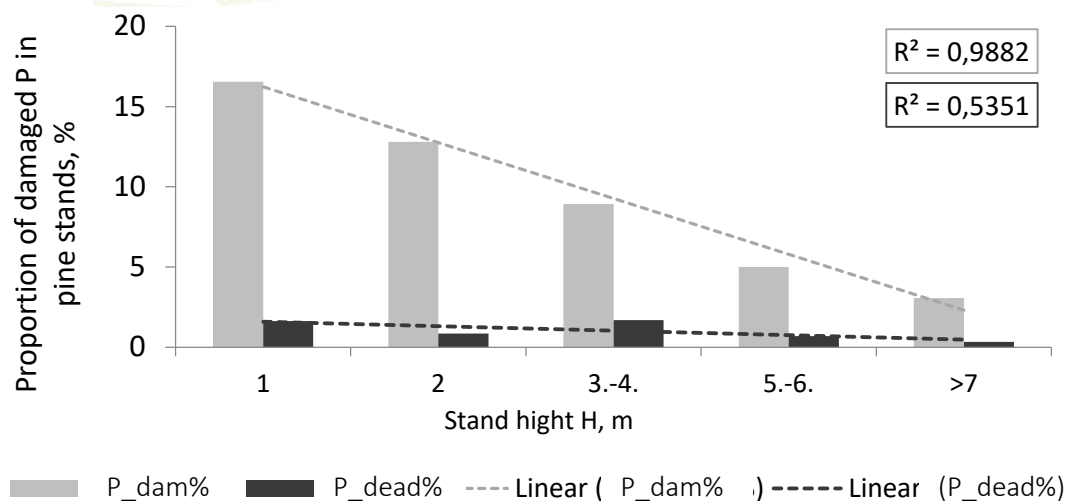
The number of sample plots:
Pine stands - 1567
Spruce stands - 1395
Aspen stands - 1355

- The average area of stands

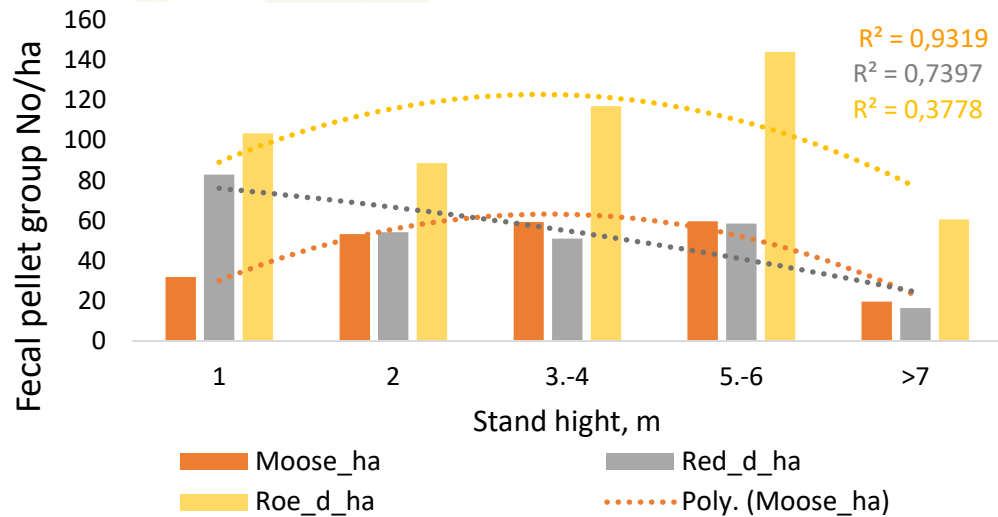


Pine stands

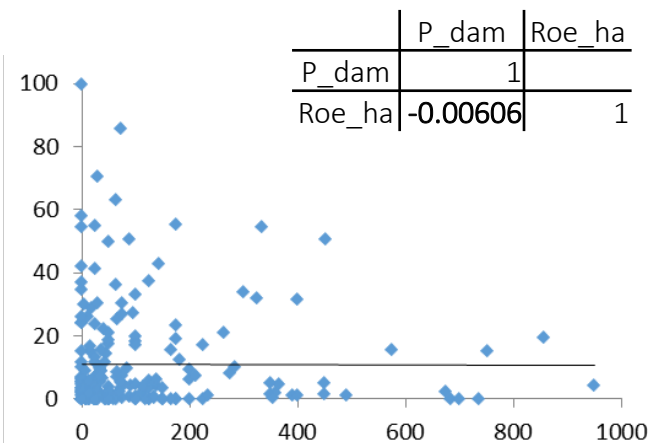
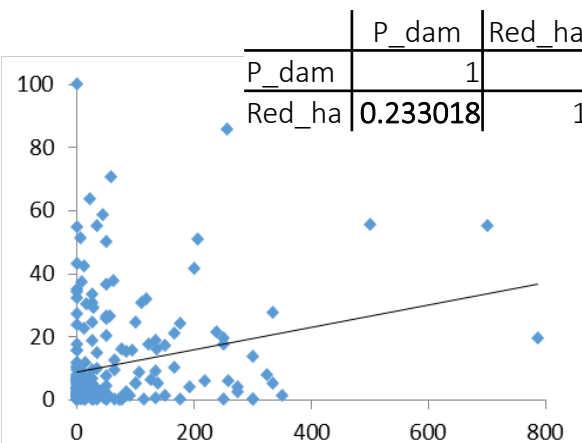
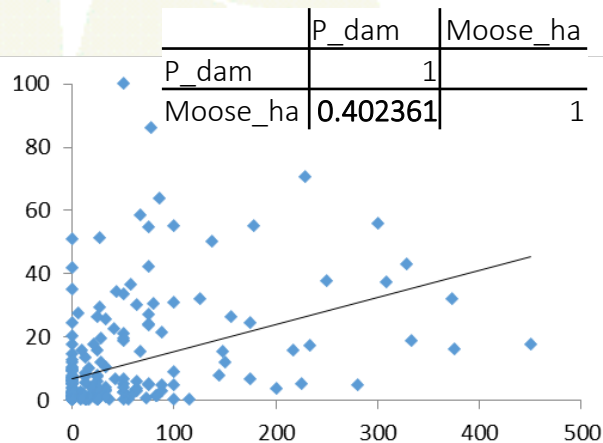
Damage level	Proportion of trees, %		
	Pine	Spruce	Aspen
Undamaged and lightly damaged	87.7	99	81
Severely damaged	5	0.2	16
Destroyed	6	0.7	3
Dead because of previous damages	1.3	0.1	0



Fecal pellet group number per ha in pine stands

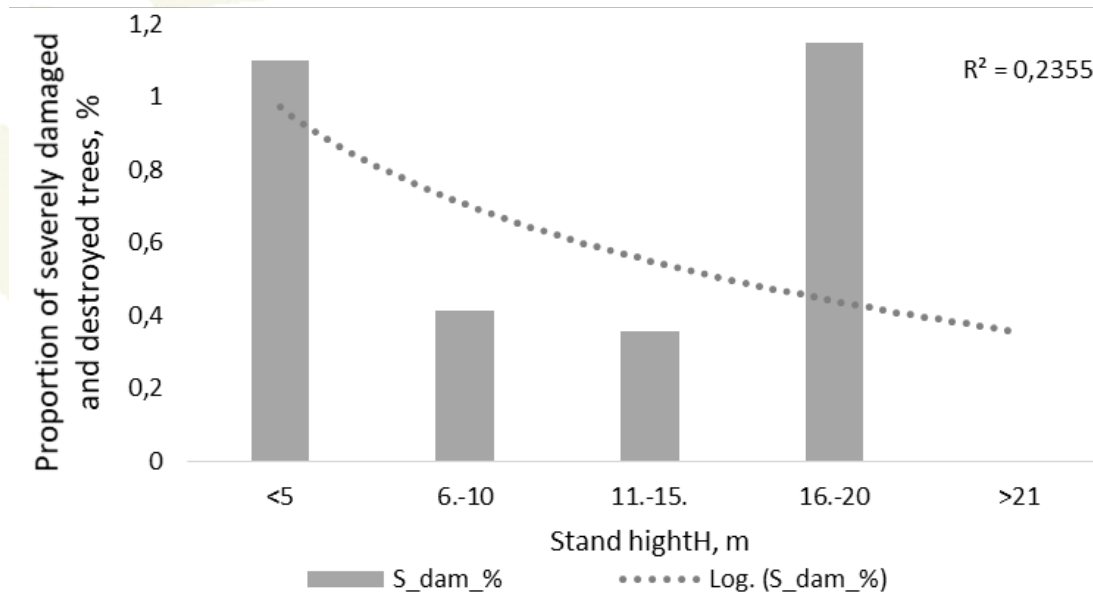


Correlation between proportion of damaged pine and moose, red deer and roe deer FPG/ha

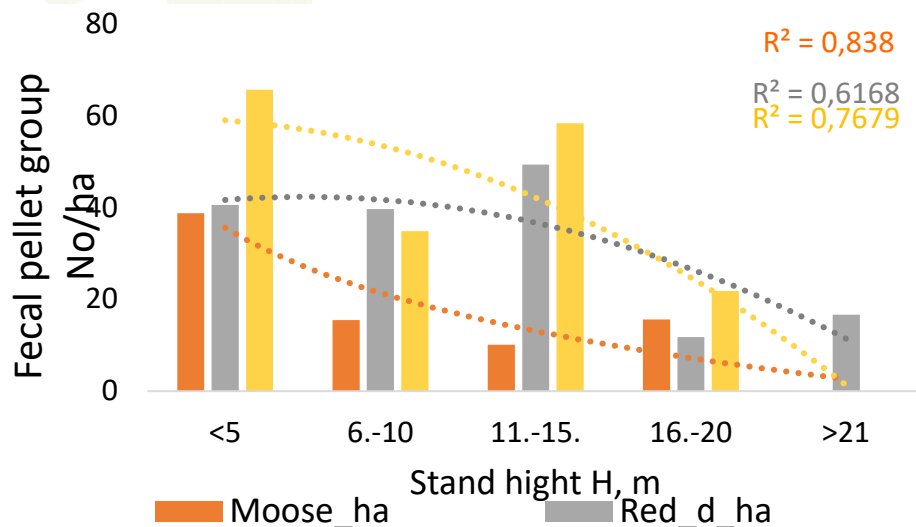


Spruce stands

Damage level	Proportion of trees, %		
	<i>Pine</i>	Spruce	<i>Aspen</i>
Undamaged and lightly damaged	85	98.99	88
Severely damaged	7	0.48	8.7
Destroyed	7	0.43	3
Dead because of previous damages	1	0.1	0.3



Fecal pellet group number per ha in spruce stands



Correlation between proportion of damaged spruce and moose, red deer and roe deer FPG/ha

	Moose_ha_2017	Spruce_dam_2017
Moose_ha_2017	1	
Spruce_dam_2017	-0.06934	1

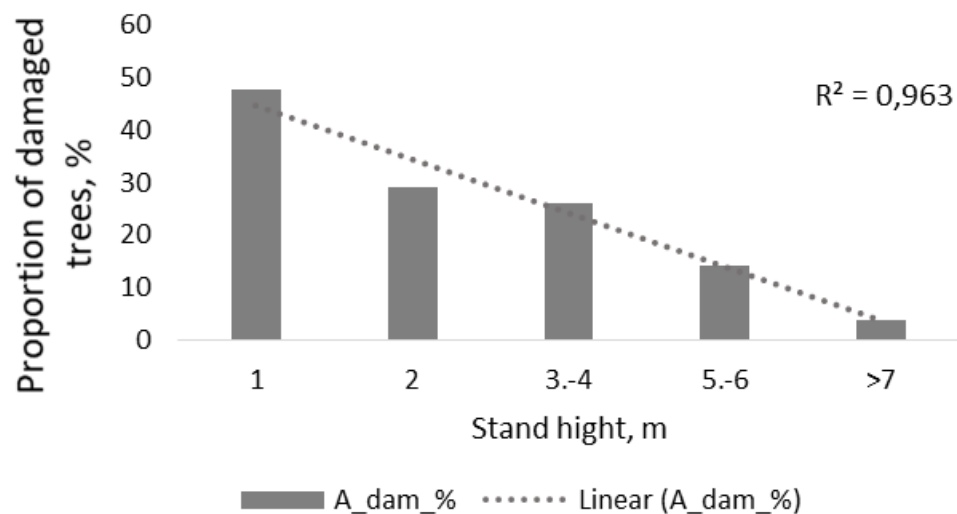
	Red_ha_2017	Spruce_dam_2017
Red_ha_2017	1	
Spruce_dam_2017	-0.06174	1

	Roe_ha_2017	Spruce_dam_2017
Roe_ha_2017	1	
Spruce_dam_2017	-0.04836	1

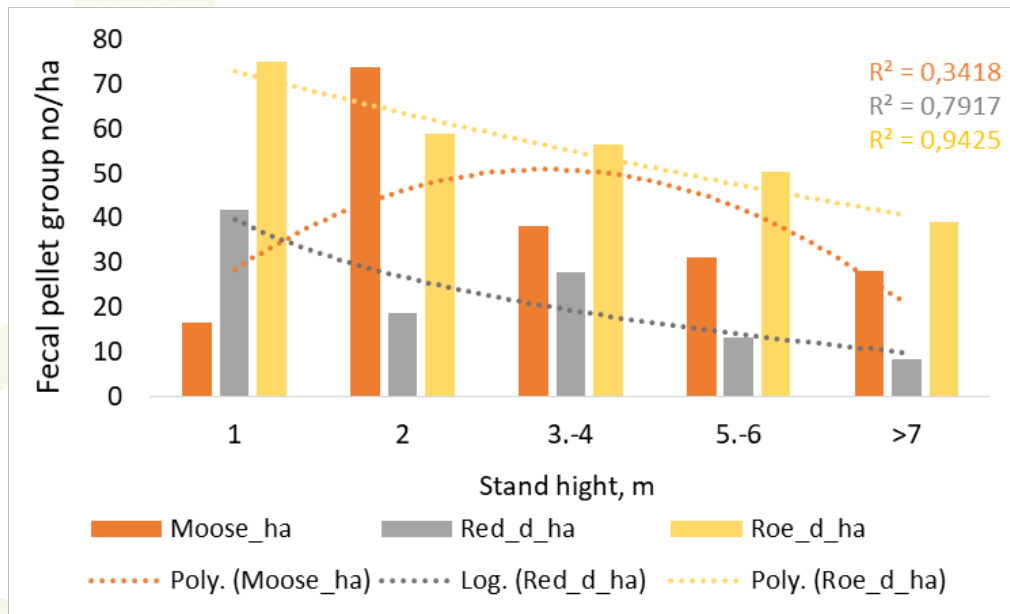


Aspen stands

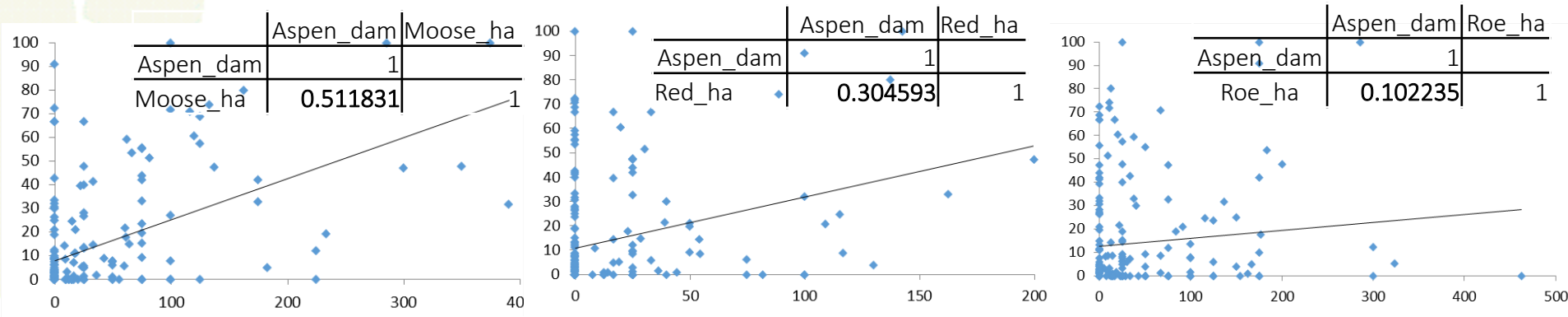
Damage level	Proportion of trees, %		
	<i>Pine</i>	<i>Spruce</i>	Aspen
Undamaged and lightly damaged	60	98.6	84.16
Severely damaged	13	0.4	9.3
Destroyed	24	0.7	4.8
Dead because of previous damages	3	0.3	1.74



Fecal pellet group number per ha in aspen stands

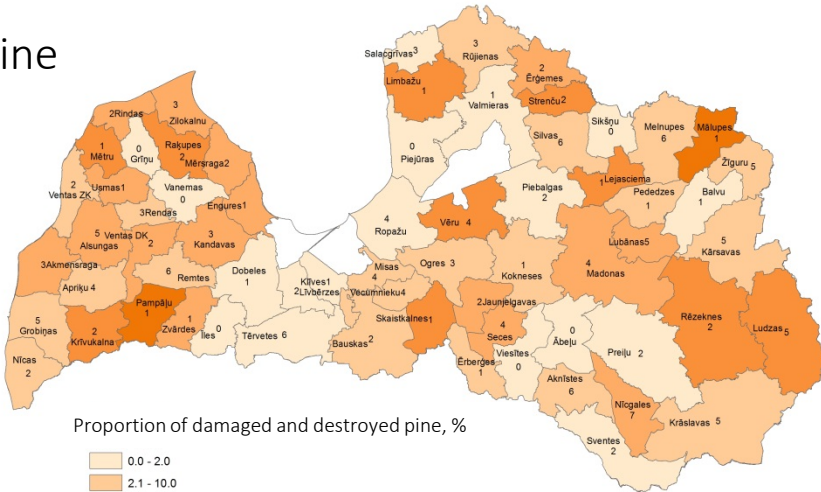


Correlation between proportion damaged aspen and moose, red deer and roe deer FPG/ha

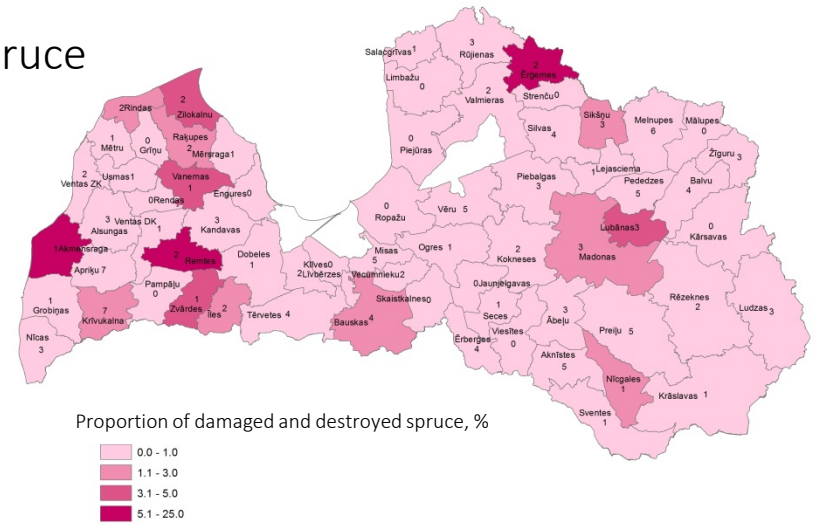


The average proportion of severely damaged and destroyed trees in pine, spruce and aspen stands, 2017

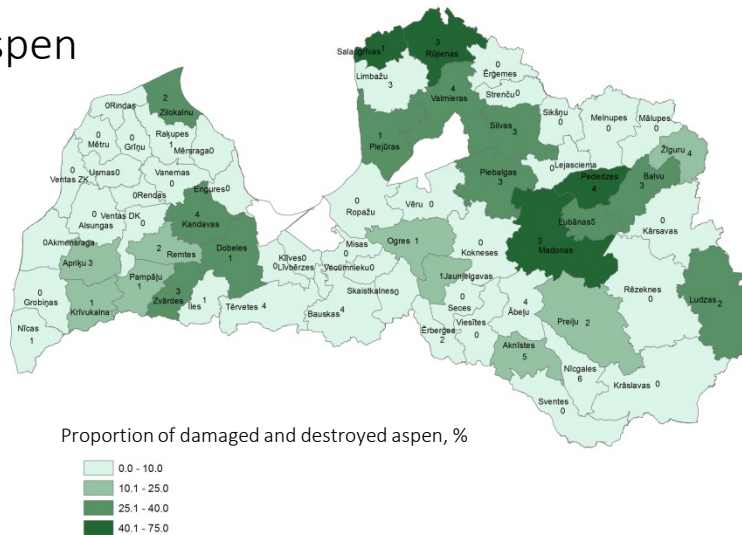
Pine



Spruce

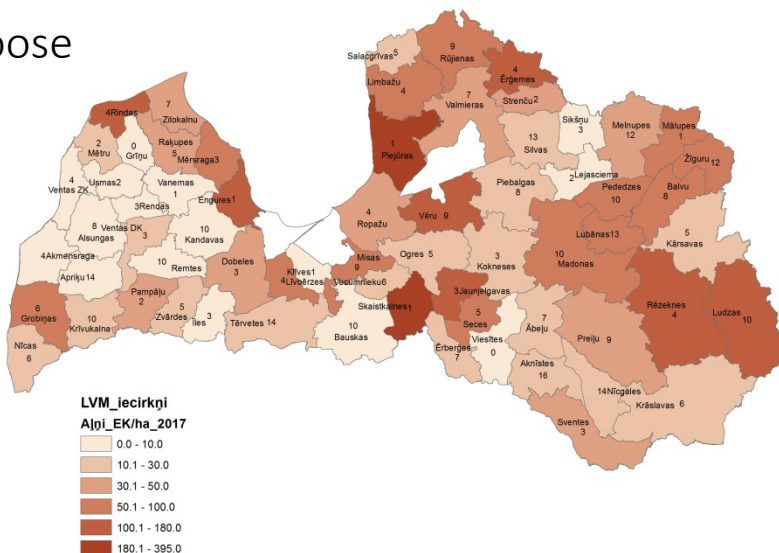


Aspen

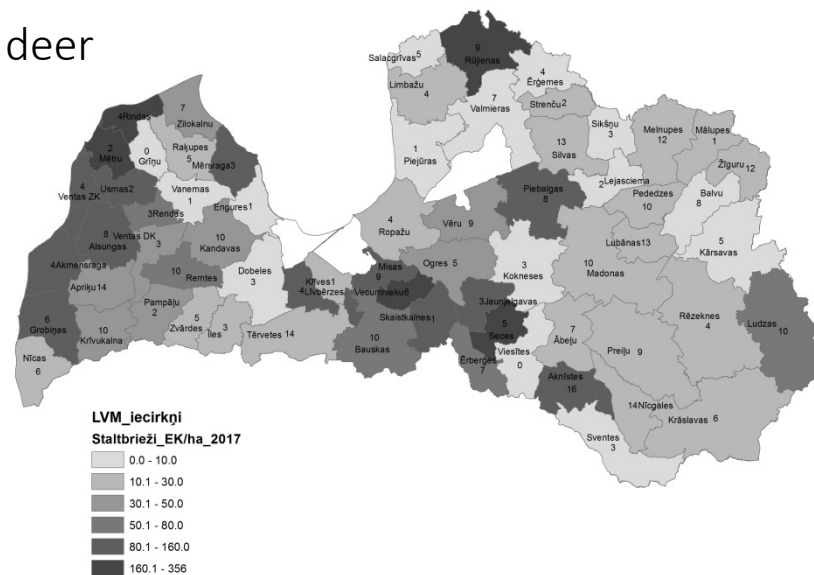


The average number of ungulate faecal pellet group per ha, 2017

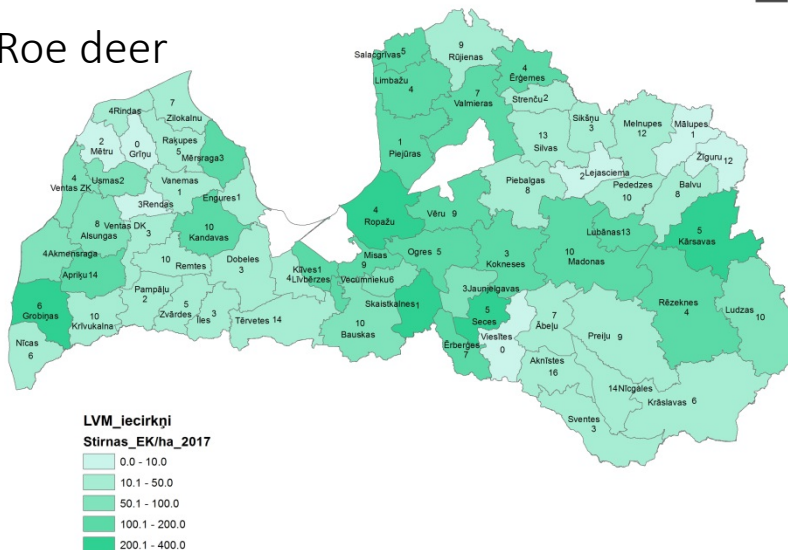
Moose



Red deer



Roe deer



The proportion of damaged trees in pine, spruce and aspen stands in 2016 and 2017



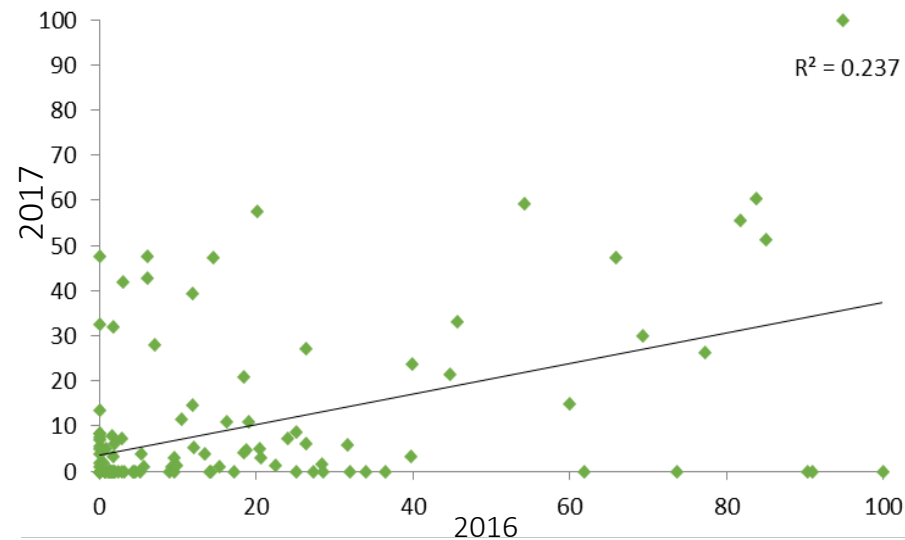
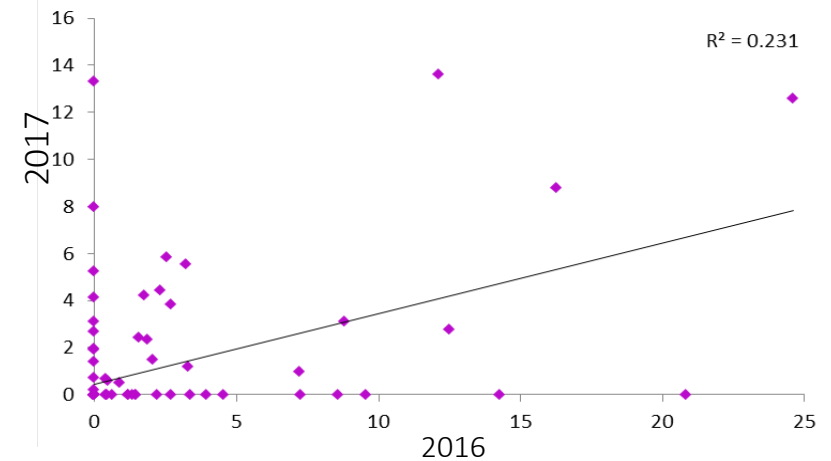
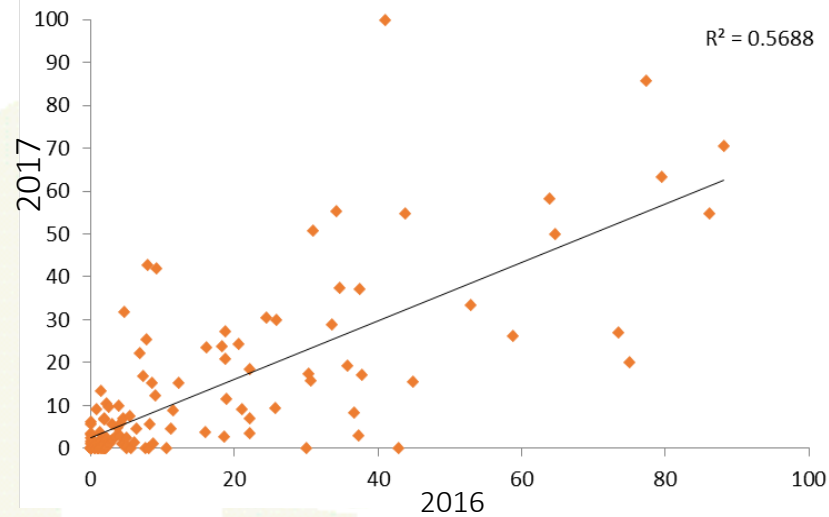
	Pine stands		Spruce stands		Aspen stands	
	2016	2017	2016	2017	2016	2017
Undamaged and lightly damaged, %	85.1	87.7	97.8	99.0	84.5	84.2
Severely damaged and destroyed, %	13.3	11.0	1.8	0.9	14.1	14.1
Moose FPG/ha	45.7	46.9	21.4	23.5	23.5	36.2
Red deer FPG/ha	39.3	61.1	37.2	40.7	13.4	15.6
Roe deer FPG/ha	64.6	108.4	36.3	56.1	32.0	44.7



133 pine

144 spruce stands have been monitored in year 2016 and 2017

146 aspen



Conclusions



- The proportion of damaged dominant tree species in pine and aspen stands decreases, while increases mean height of stand. For spruce stands the proportion of damaged dominant trees can increase again after stand reaches 16m.
- There are positive correlation between severely damaged and destroyed tree proportion and moose and red deer faecal pellet group number per hectare in pine and aspen stands.
- The average damaged tree proportion in pine and spruce stands have decreased, comparing years 2016 and 2017, while the damaged tree proportion in aspen stands are the same.
- There are positive correlation between damaged dominant tree proportion in years 2016 and 2017 – the stands, that have been damaged in 2016, have serious damages (but not bigger) also in 2017.