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

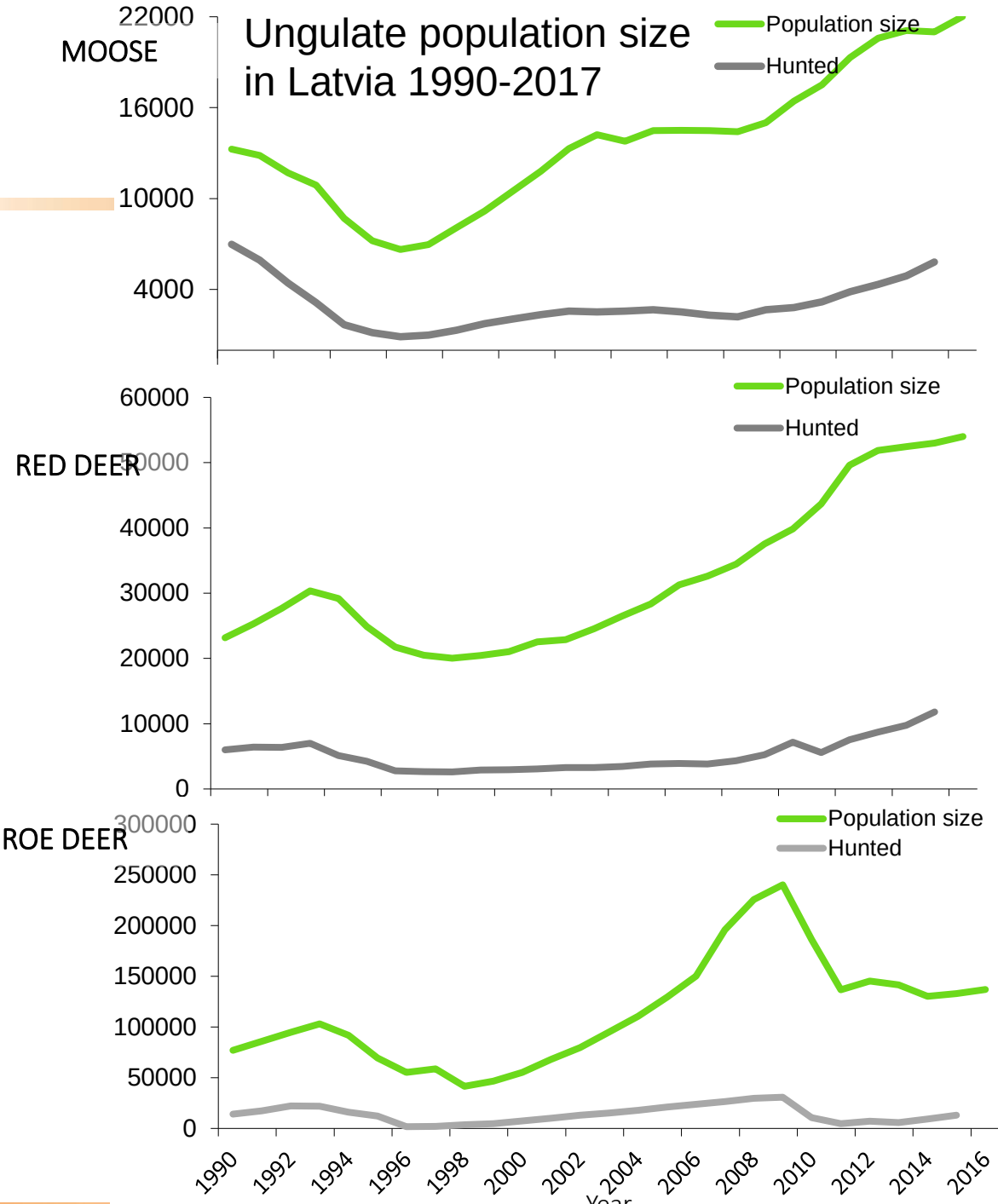
Corresponding author: Gundega Done

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

Research for Rural Development, 17.05.2018, Jelgava

Background

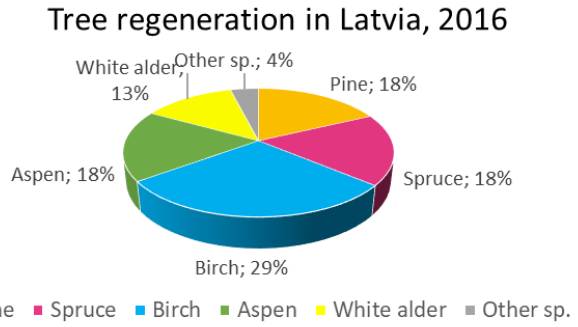
The increase of ungulate population size not only in Latvia but also elsewhere in Europe, Asia and North America is caused by changes in the intensity of hunting, milder winters, the increase of area of young forest stands, as well as reintroduction of different cervids (Côté et al. 2004; Miller et al.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

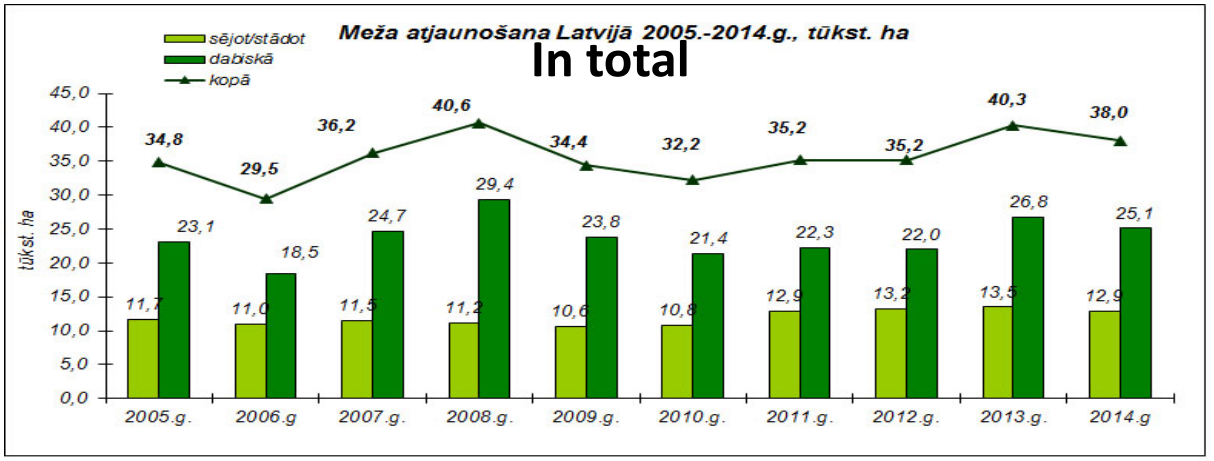


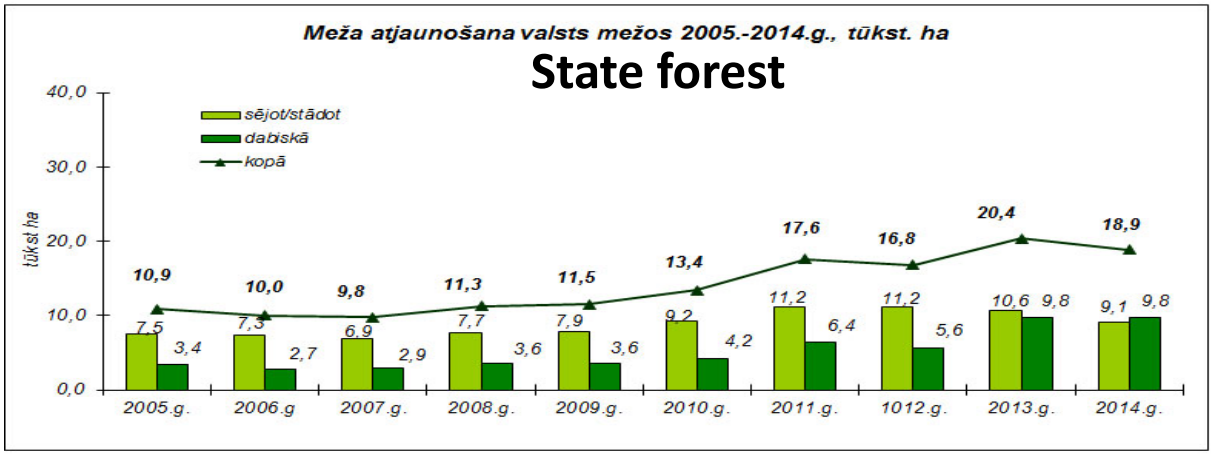
Data from State Forest Service

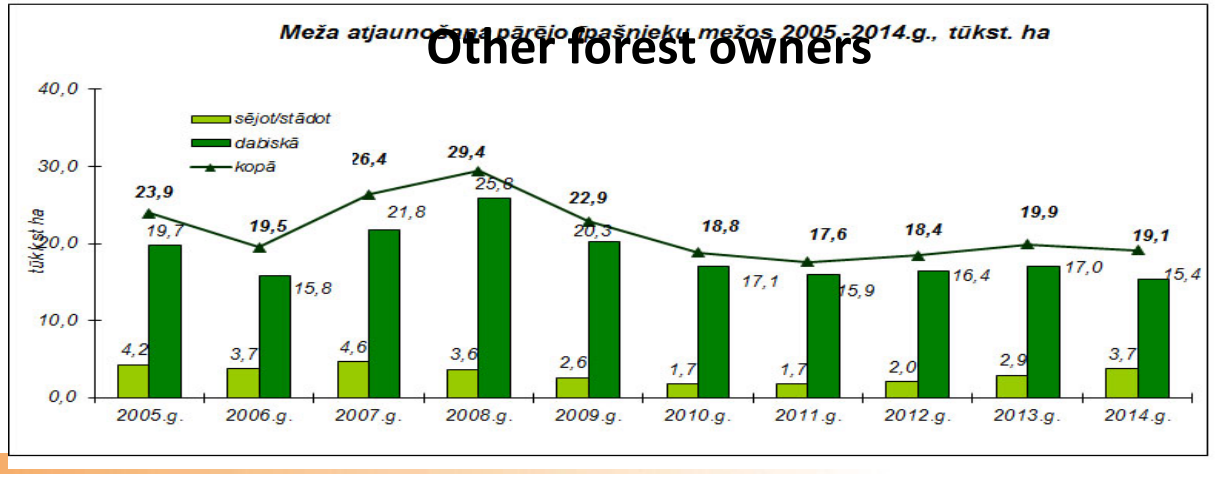
Background

Increase of forest regeneration by tree planting and seeding









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

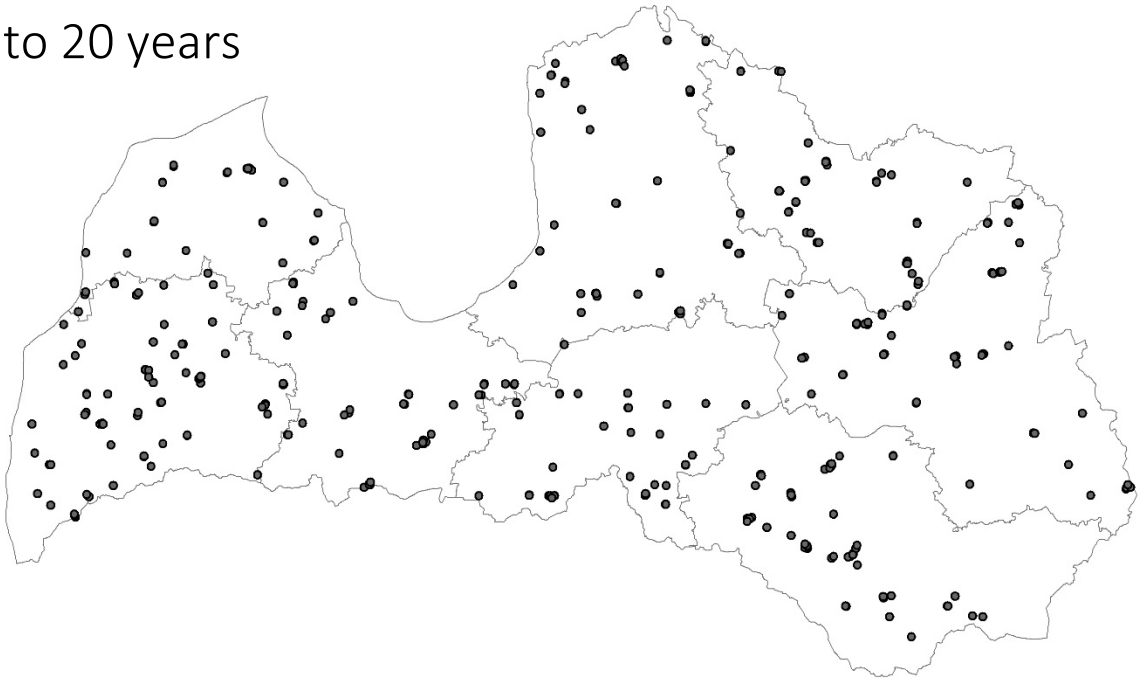
2016 – 450 stands

2017 – 600 stands

2018 – 600 stands

Materials

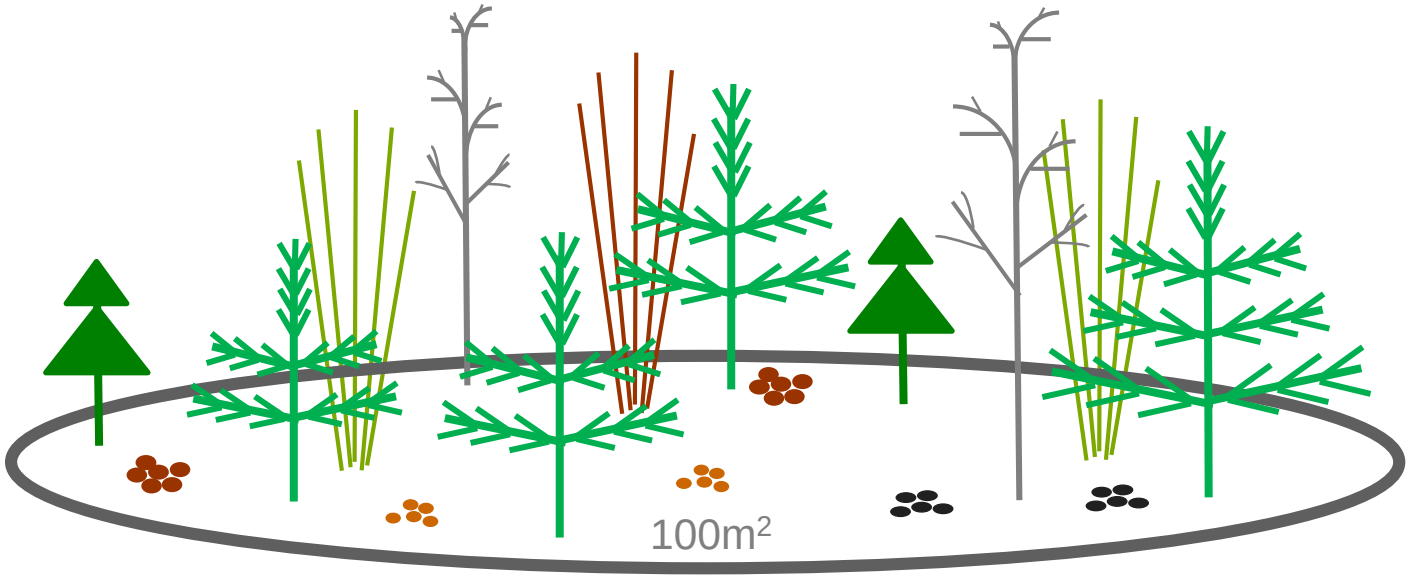
- “National forest inventory” subproject “Forest pest and disease monitoring”
- 600 sample plots
  - 200 Pine stands, up to 20 years
  - 200 Spruce stands, up to 40 years
  - 200 Aspen stands, up to 20 years



Materials

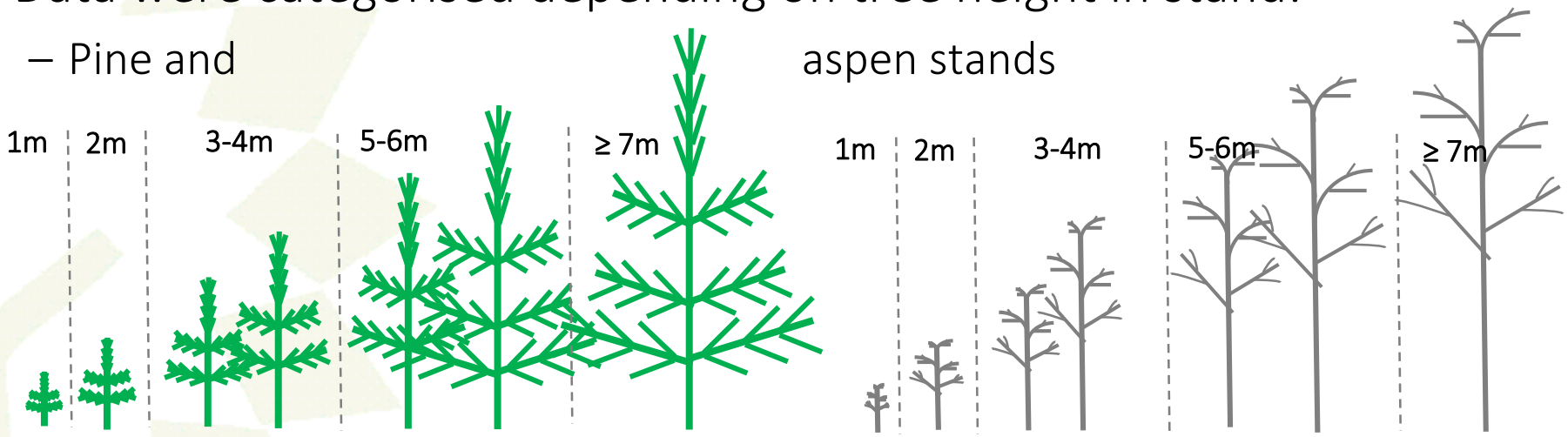
- In each stand, depending on stand size, circle sample plots (100m^2) (SP) were established (min 4SP/stand)
- The intensity of fresh browsing damage was recorded for all trees per sample plot :
  - undamaged
  - lightly damaged (only few side branches are browsed)
  - severely damaged (50-80% of stem 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

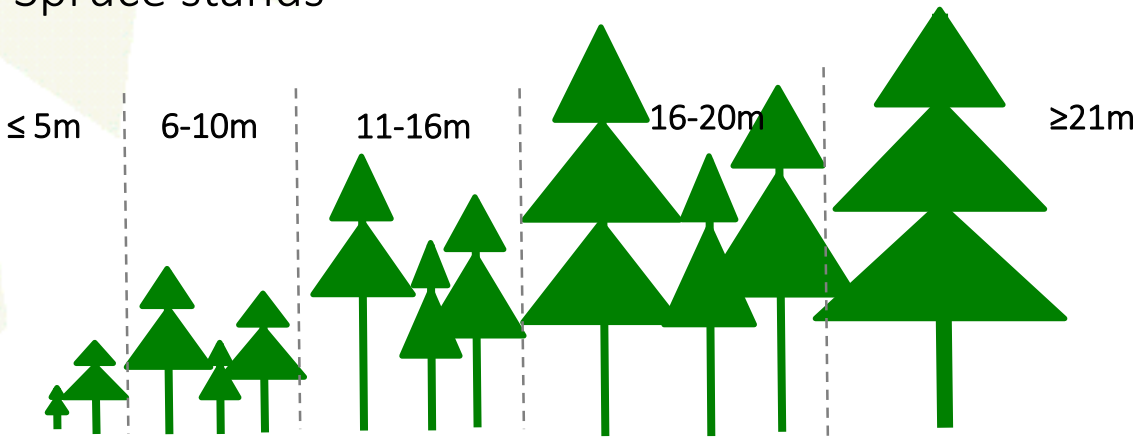


Methods

- 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

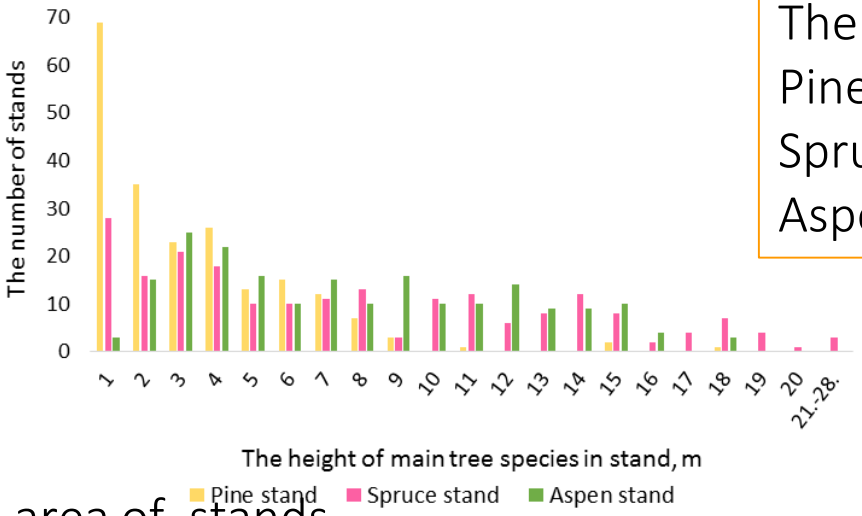
Methods

- 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

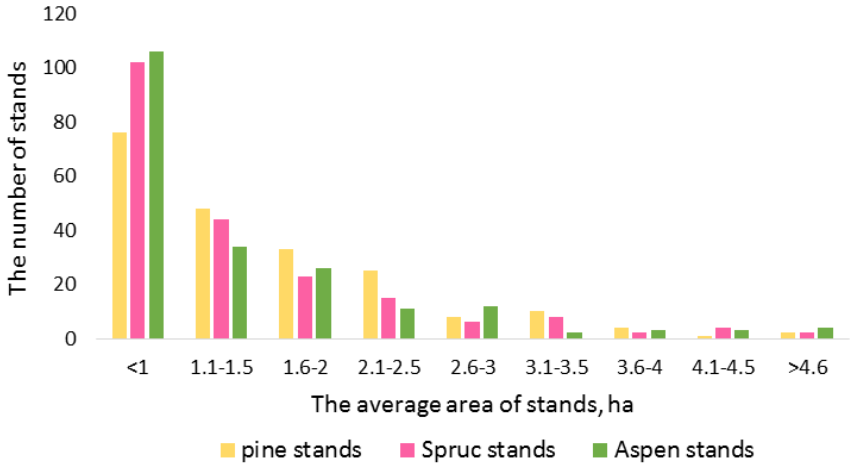
General information

- The number of stands in each height group



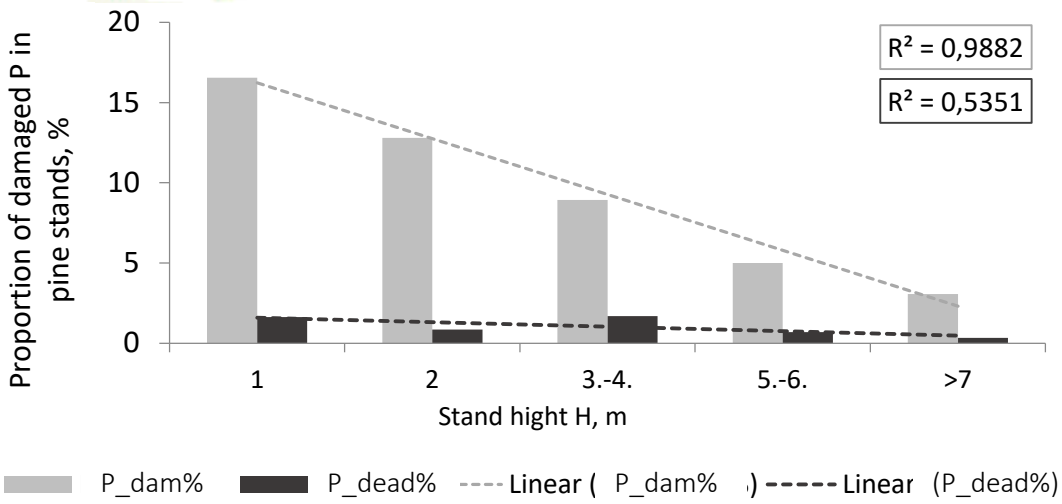
The number of sample plots:
Pine stands - 1567
Spruce stands - 1395
Aspen stands - 1355

- The average area of stands

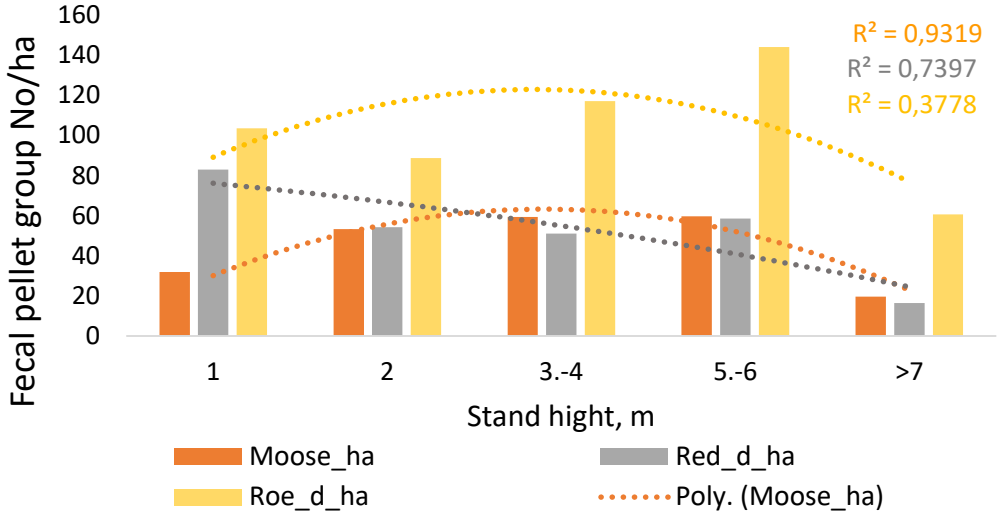


Pine stands

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*

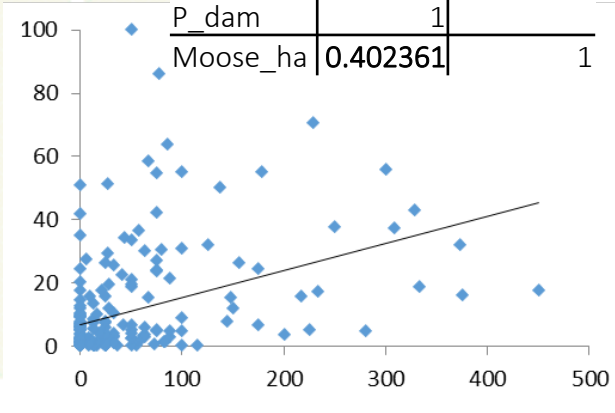


Fecal pellet group number per ha in **pine stands**

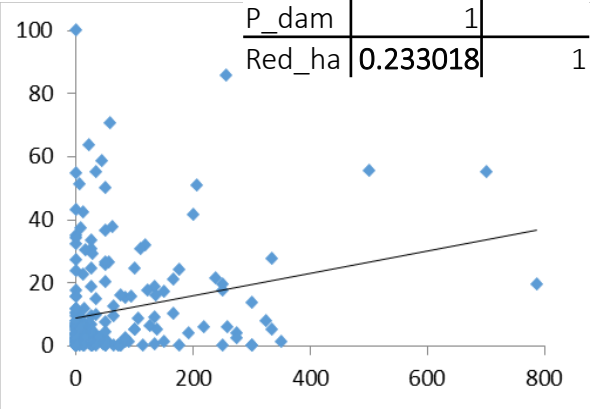


Correlation between proportion of damaged pine and moose, red deer and roe deer FPG/ha

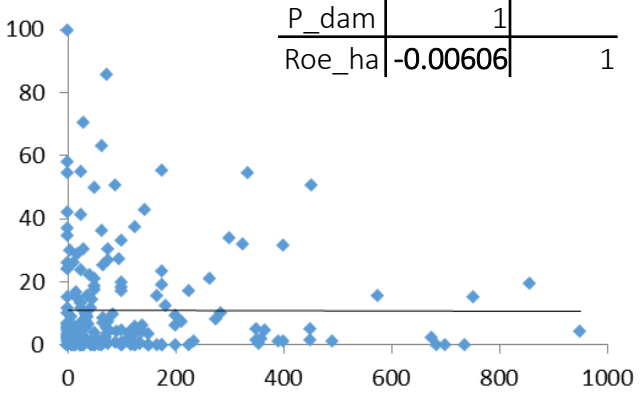
	P_dam	Moose_ha
P_dam	1	
Moose_ha	0.402361	1



	P_dam	Red_ha
P_dam	1	
Red_ha	0.233018	1

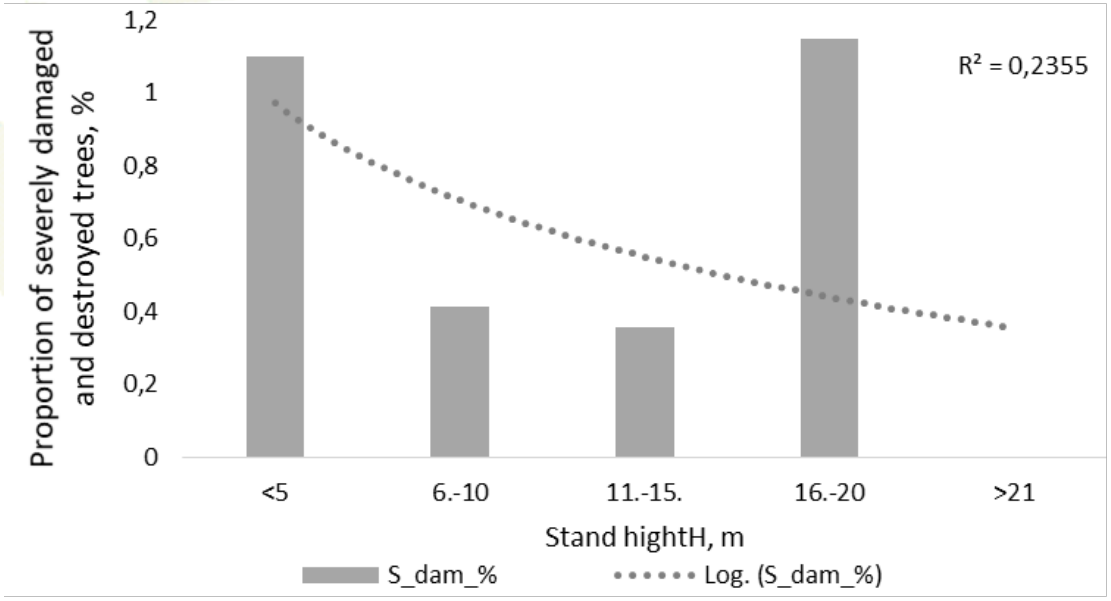


	P_dam	Roe_ha
P_dam	1	
Roe_ha	-0.00606	1

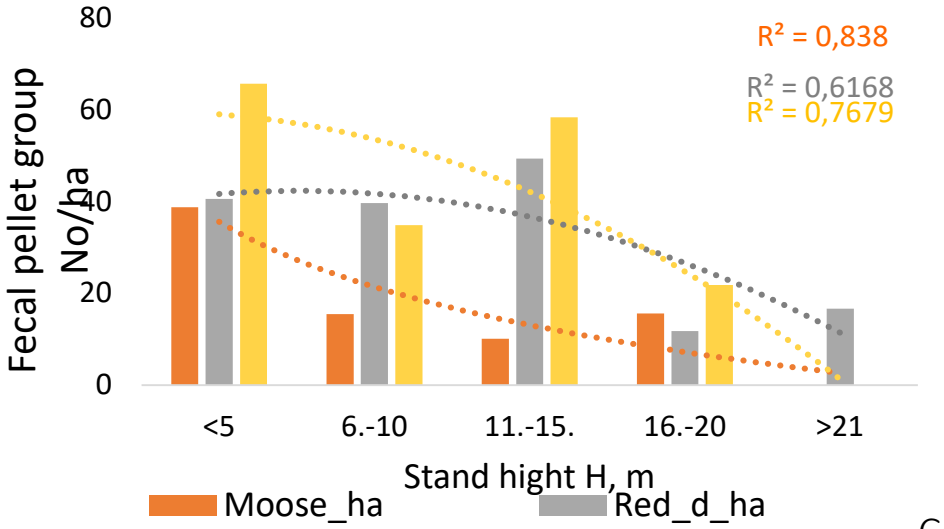


Spruce stands

Damage level	Proportion of trees, %		
	Pine	**Spruce**	*Aspen*
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

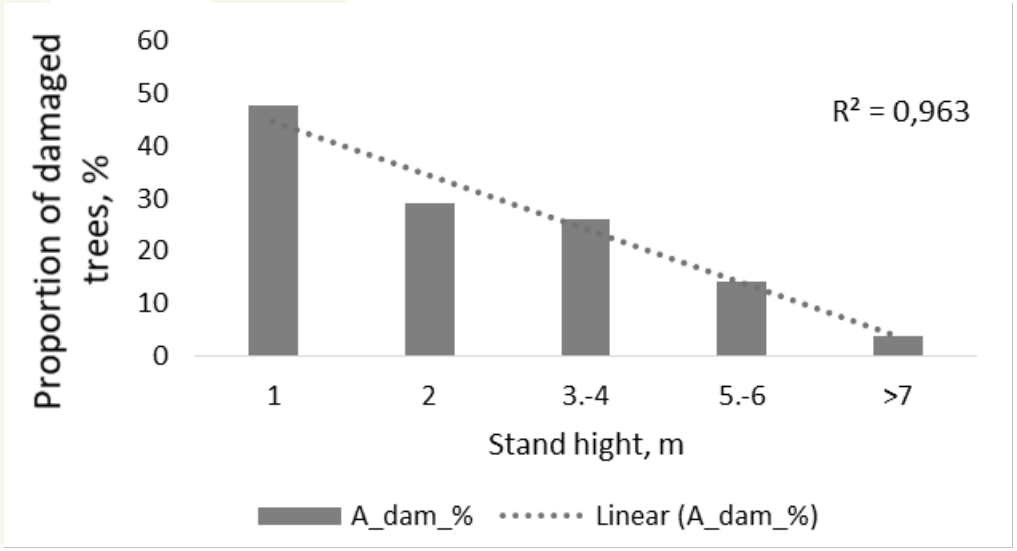
	Moose_ha_2017	Spruce_dam_2017
Moose_ha_2017	1	
Spruce_dam_2017	-0.06934	1

	Red_ha_2017	Spruce_dam_2017
Red_ha_2017	1	
Spruce_dam_2017	-0.06174	1

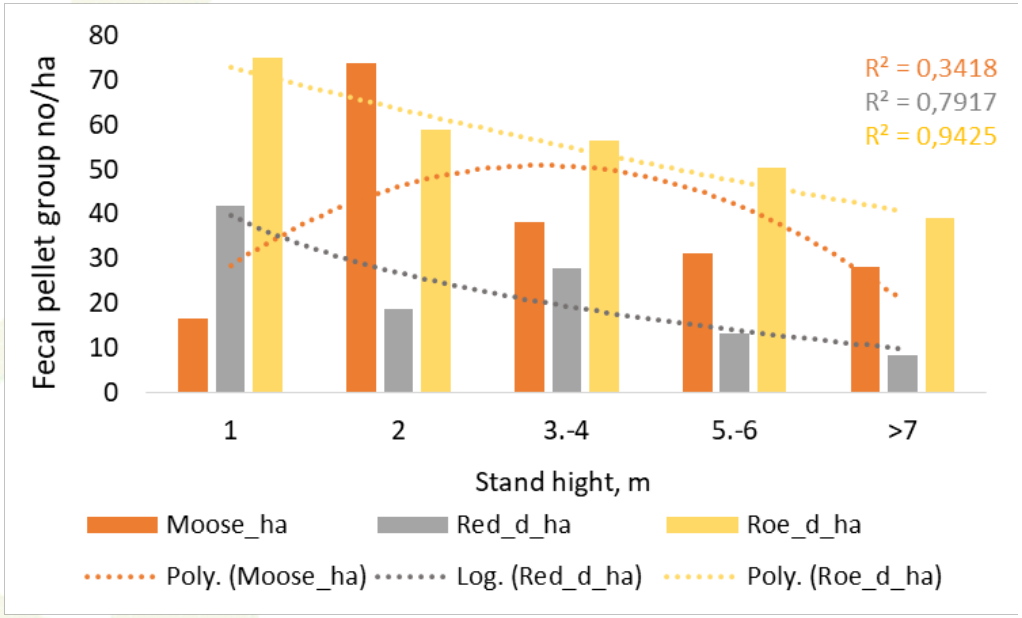
	Roe_ha_2017	Spruce_dam_2017
Roe_ha_2017	1	
Spruce_dam_2017	-0.04836	1

Aspen stands

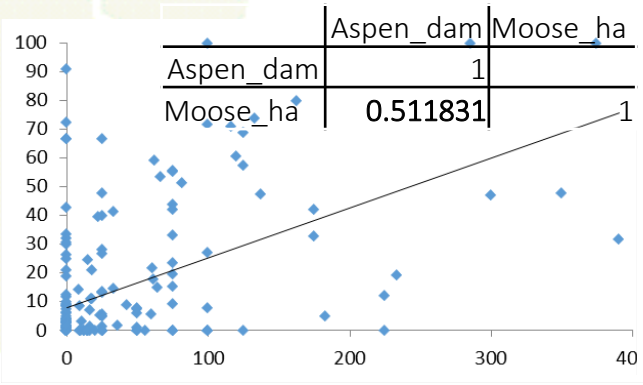
Damage level	Proportion of trees, %		
	Pine	*Spruce*	**Aspen**
Undamaged and lightly damaged	*60*	*98.6*	**84.16**
Severely damaged	*13*	*0.4*	**9.3**
Destroyed	*24*	*0.7*	**4.8**
Dead because of previous damages	*3*	*0.3*	**1.74**

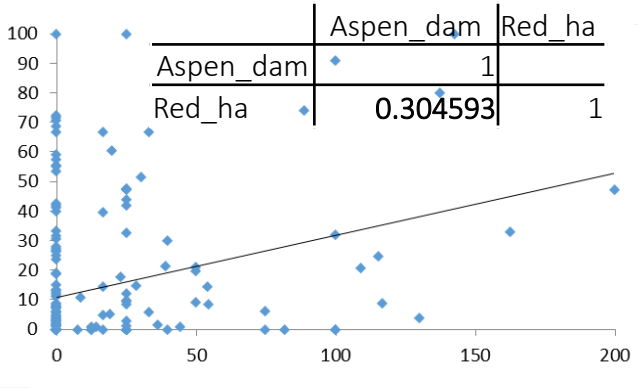


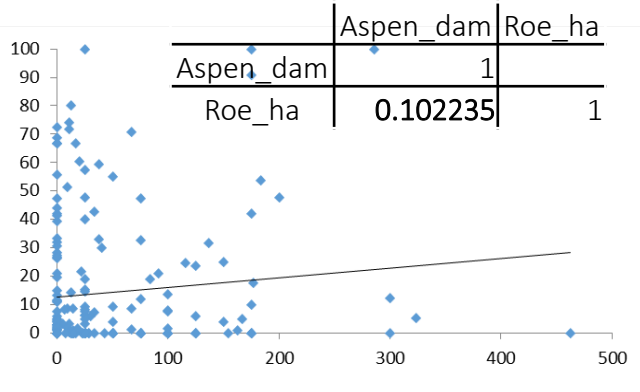
Fecal pellet group number per ha in **aspen stands**



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

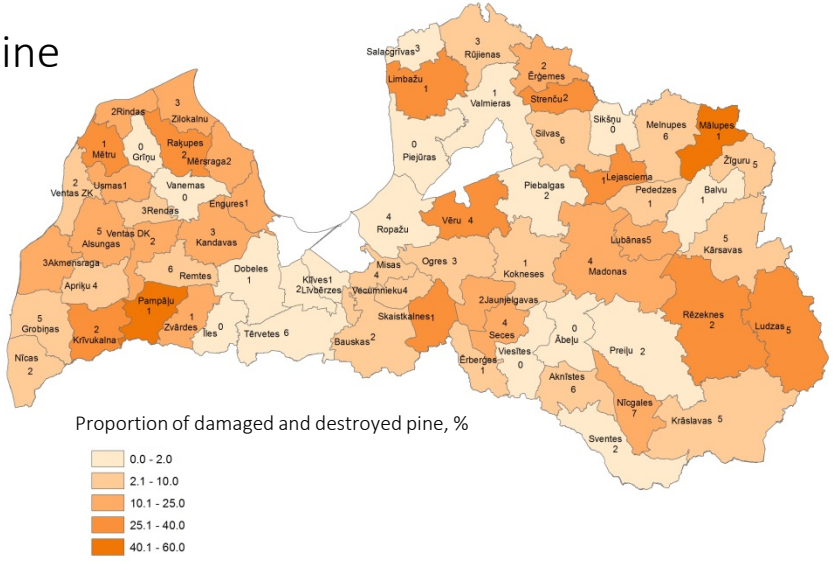




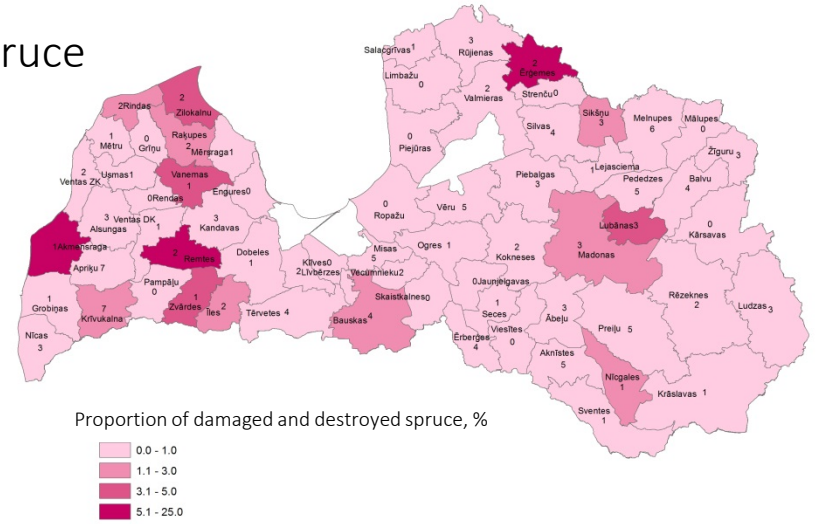


The average proportion of severely damaged and destroyed trees in pine, spruce and aspen stands, 2017

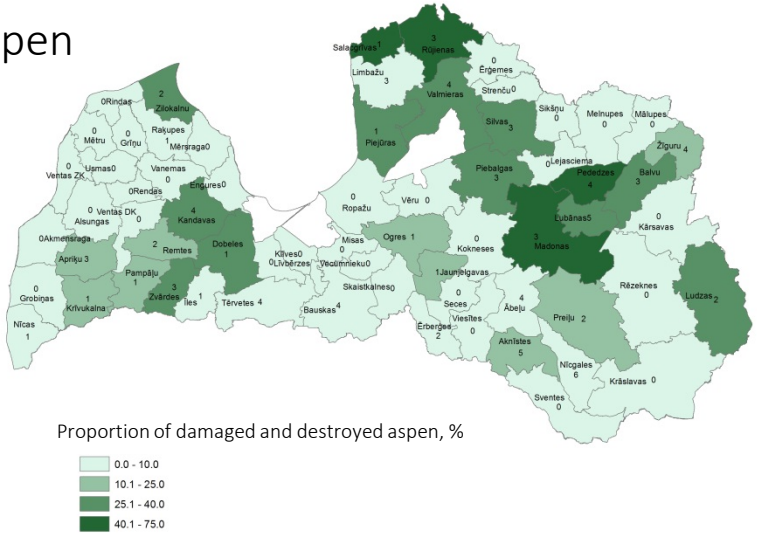
Pine



Spruce

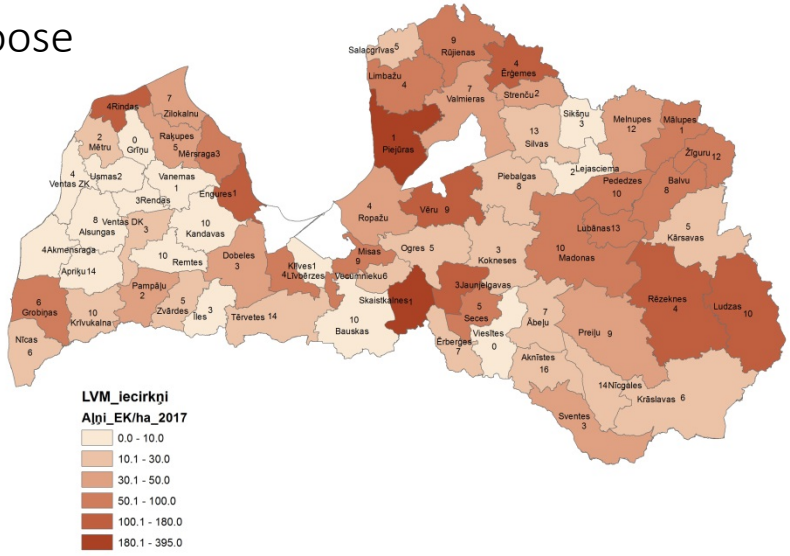


Aspen

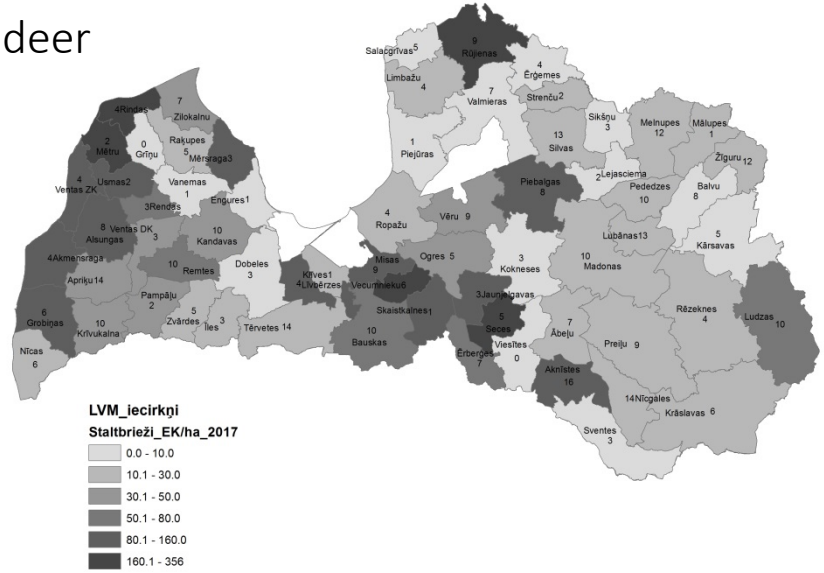


The average number of ungulate faecal pellet group per ha, 2017

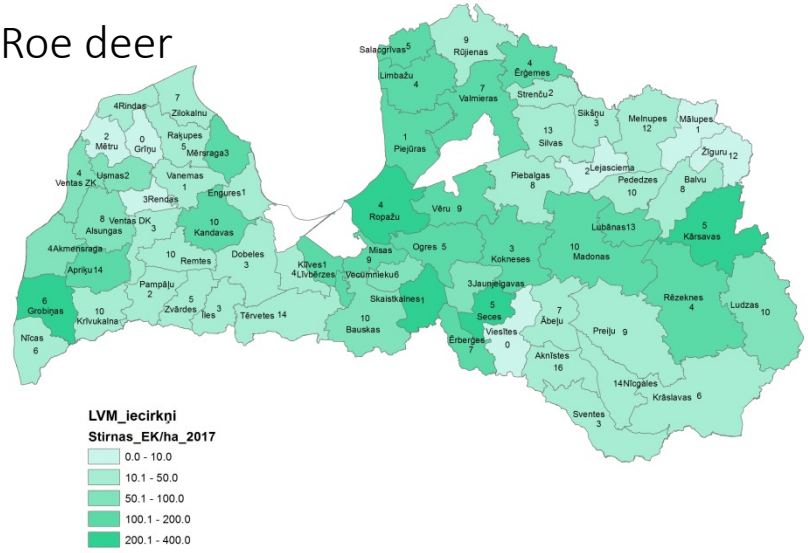
Moose



Red deer



Roe deer



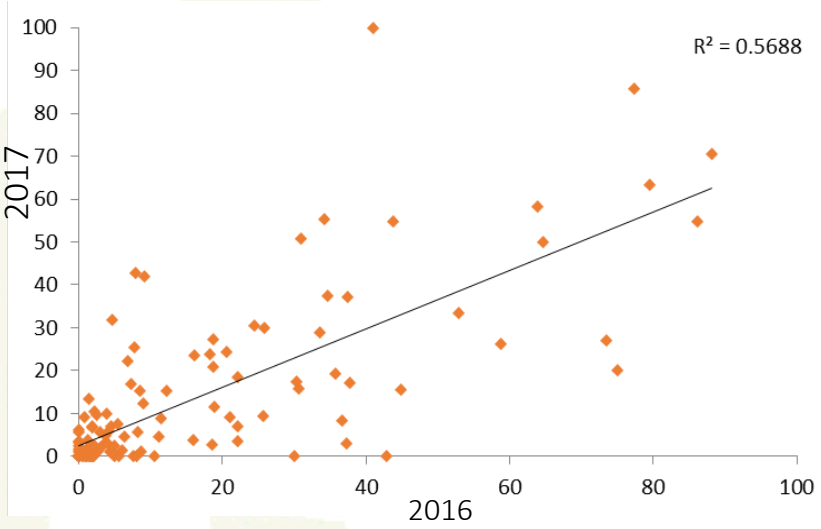
The proportion of damaged trees in pine, spruce and aspen stands in 2016 and 2017

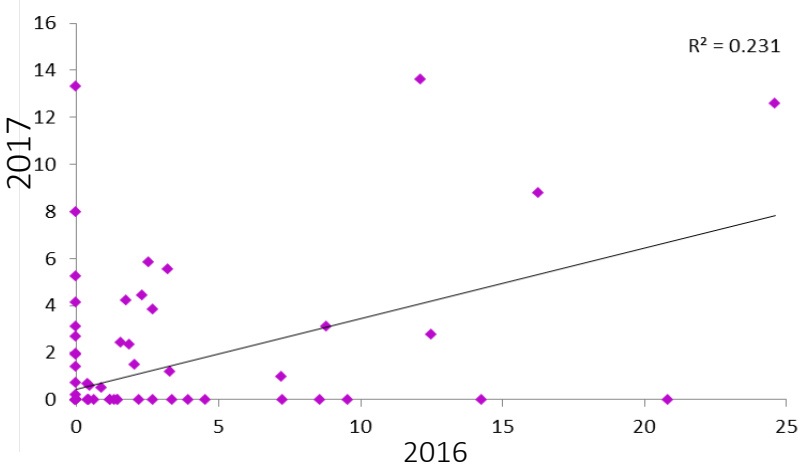
	Pine stands		Spruce stands		Aspen stands	
	2016	2017	*2016*	2017	*2016*	2017
Undamaged and lightly damaged, %	*85.1*	87.7	*97.8*	99.0	*84.5*	84.2
Severely damaged and destroyed, %	*13.3*	*11.0*	*1.8*	0.9	*14.1*	14.1
Moose FPG/ha	*45.7*	46.9	*21.4*	23.5	*23.5*	36.2
Red deer FPG/ha	*39.3*	61.1	*37.2*	40.7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

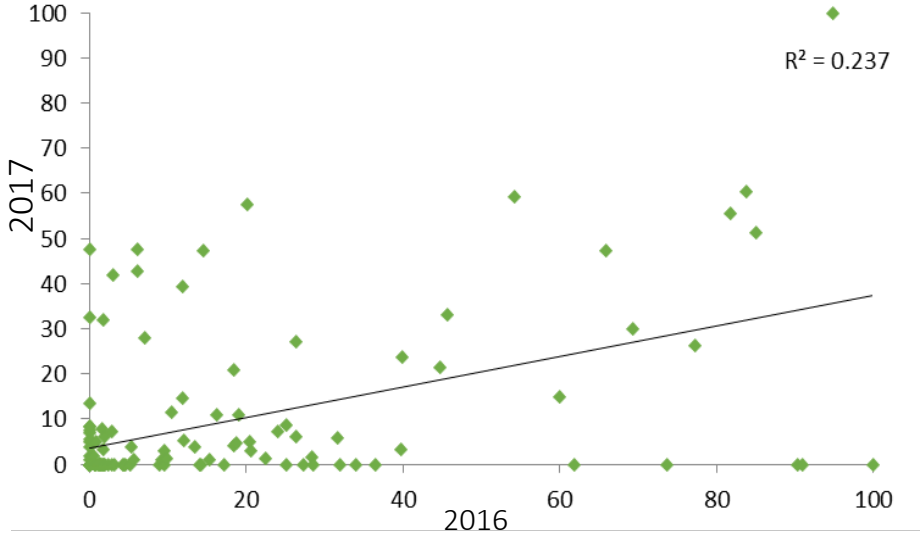
133 pine

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.