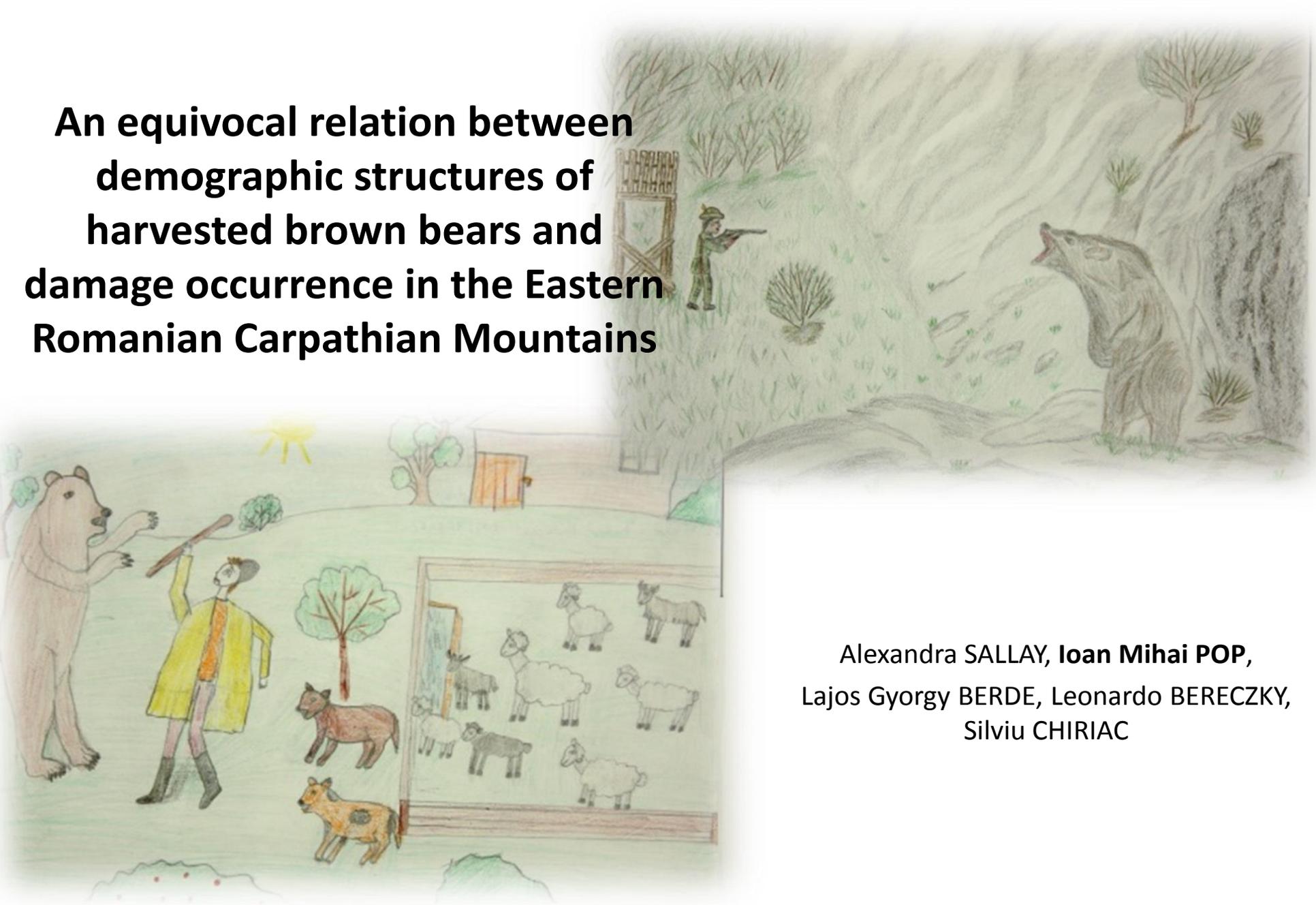


An equivocal relation between demographic structures of harvested brown bears and damage occurrence in the Eastern Romanian Carpathian Mountains



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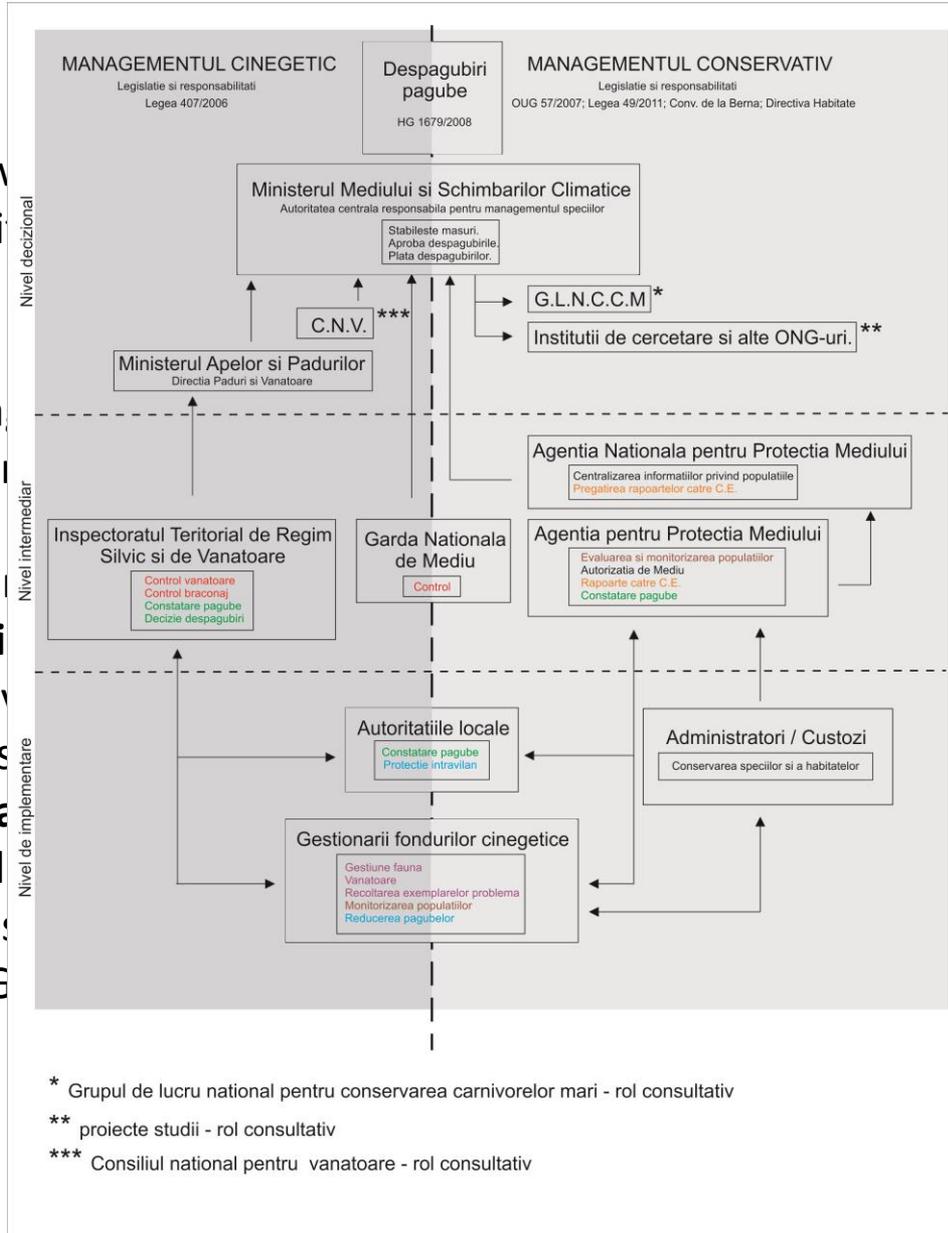
Bear management

Brown
Habitat

Management
presence

responsibility

- Mi
- En
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- Ma
- Ad
- Res
- NG



tion – since 1997, the European Union
d according to a **yearly revised quota**.

to 150 km²).

strategies)

ng

g)

e prevention)



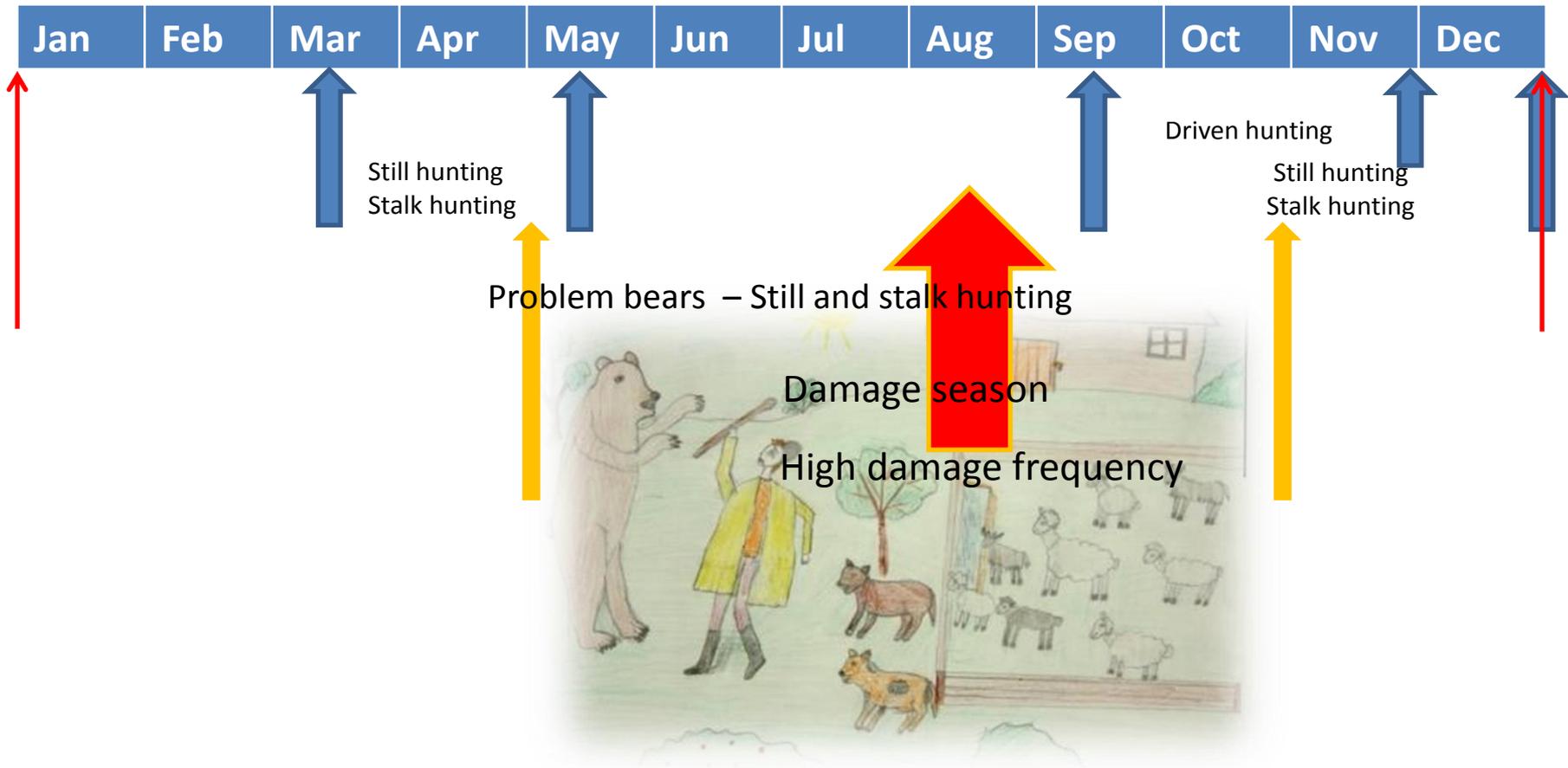
Bear hunting

- Maximum intervention number (quota) is established by the Ministry of Environment and Forests for **damage and human-conflict prevention**, species and habitat conservation
- Quota is approx. 5% from the estimated population (at national level about 350 bears/year)
- Two hunting seasons:



Damage

Hunting season vs. Damage season

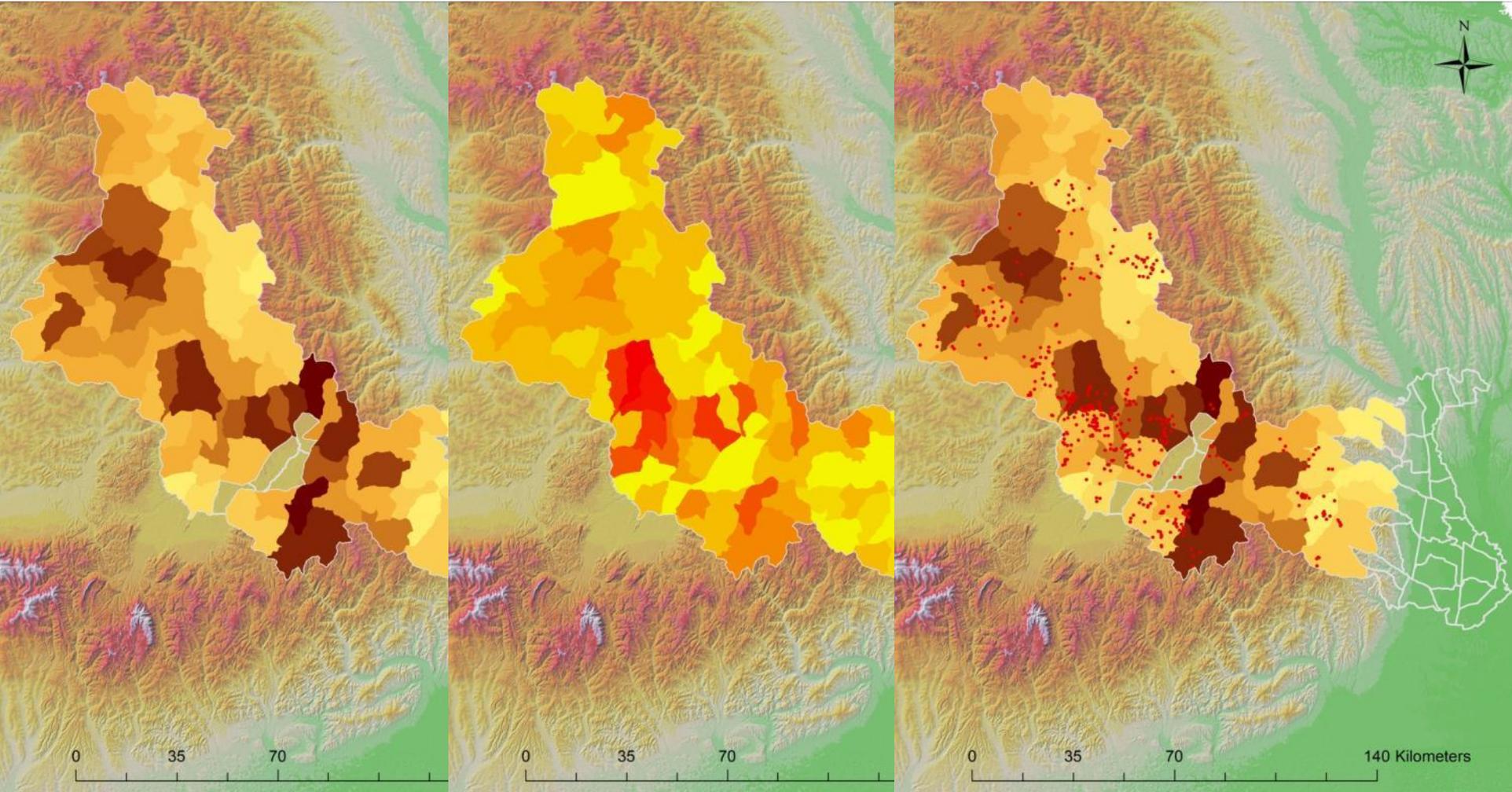


Study area- data for 2007-2011

approx. 1700 bears

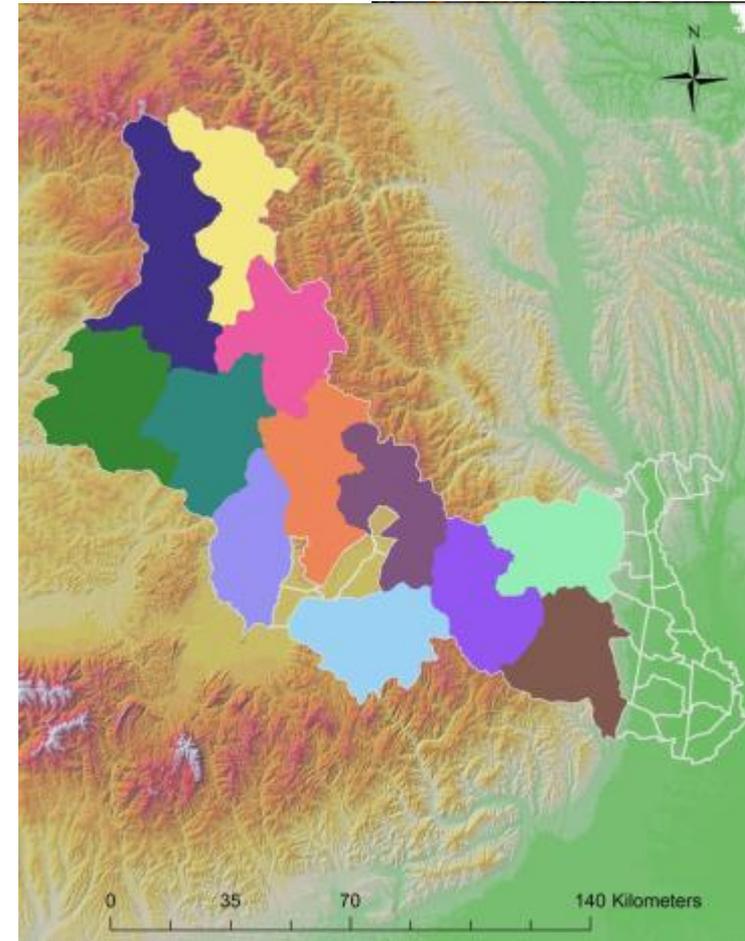
341 harvested bears

343 damage reports



Data and methods

- harvest location, harvest method, sex and age of harvested bear (visual estimation), CIC skull measurement
- **123 game units were grouped into 12 study areas**
- **two hunting periods per year**
- population density was calculated on the base of population estimation of each hunting unit and respective HU size

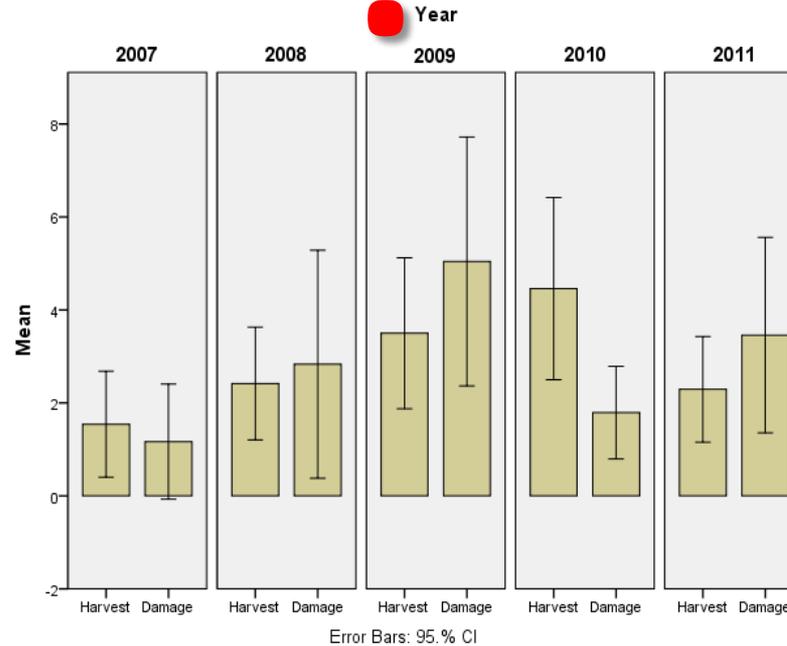


Hypotheses

- a higher population size generates more damage
- a higher hunter take minimizes population size and damage occurrence
- a seasonal impact of hunting on damage occurrence
- evidence of selective hunting according to damage related aspects

Results - Hunting vs Damage

Control variable	Grouping		n	df	r	P	SE	95% lCI	95% uCI	
		Population density	Damage occurrence	120		0.121	0.187	0.065	- 0.015	0.248
			Hunter take	120		0.267	0.003	0.070	0.133	0.411
	2011	Population density	Hunter take	24		0.445	0.029	0.172	0.109	0.747
		Hunter take	Damage occurrence	120		0.088	0.338	0.075	- 0.047	0.242
Population density	H	D			117	0.058	0.529	0.080	- 0.083	0.221
	Spring	H	D	60		0.076	0.565	0.114	- 0.138	0.302
	Autumn	H	D	60		0.302	0.019	0.119	0.080	0.546



Results-harvest analyses

Do the **gender, age and hunting method** have an effect on the number of harvested bears?

Removal was strongly male-biased (84%)

65% of harvested bears more than 8 years old

median age of 9 years

Univariate Analysis of Variance

Dependent variable: Log-transformed harvest frequency

- significant main effects of the gender, age class and hunting method (stalk, still, driven) on the number of harvested bears.

$F(1, 13) = 66.87, P < 0.001, \eta^2 = 0.84$

$F(5, 13) = 11.78, P < 0.001, \eta^2 = 0.82$

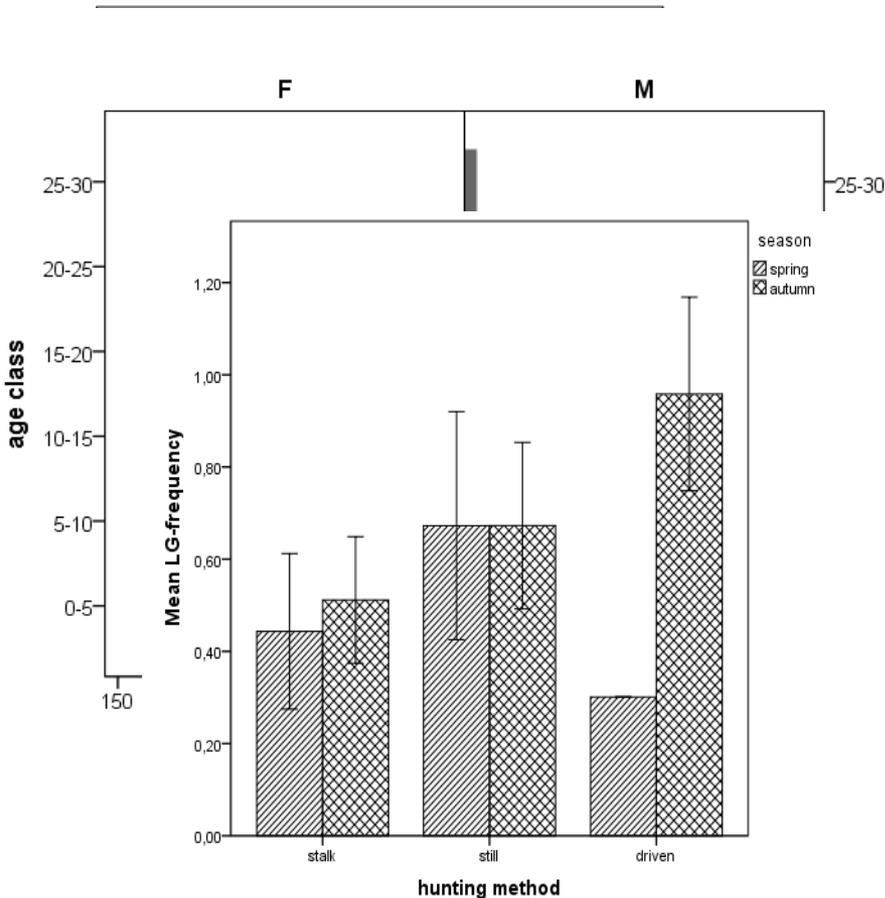
$F(2, 13) = 33.62, P < 0.001, \eta^2 = 0.84$

- significant interaction between the gender and age on the number of harvested bears

$F(4, 13) = 3.33, P 0.05, \eta^2 = .51$

- The Bonferroni post hoc test :

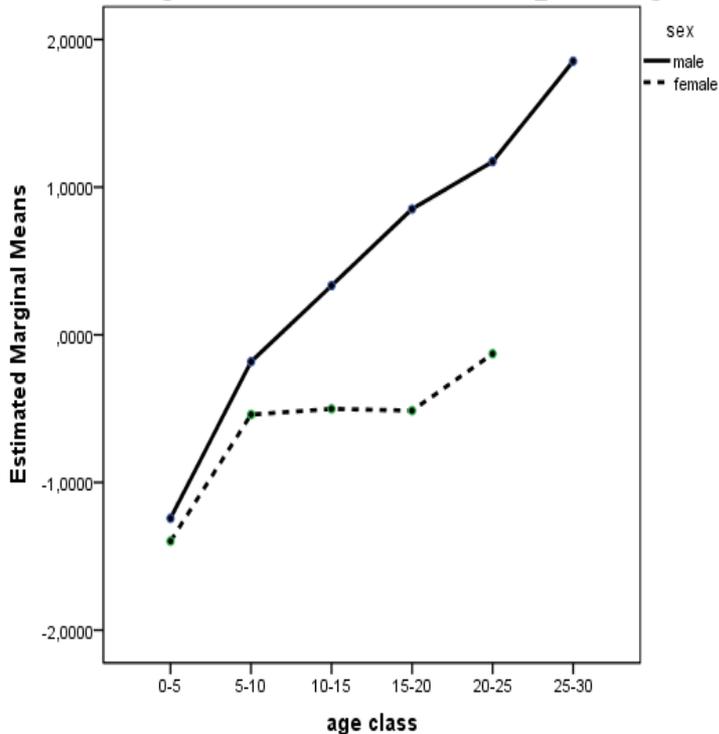
Driven ($M = 10.73, SD = 10.15$) is sign. different from still ($M = 5.74, SD = 6.95$) and stalk ($M = 3.45, SD = 3.11$).



Results-harvest analyses

Is the **CIC skull** well reflected by the sex and the age of harvested bears?

Estimated Marginal Means of Normal Score of CIC_skull using Blom's Formula



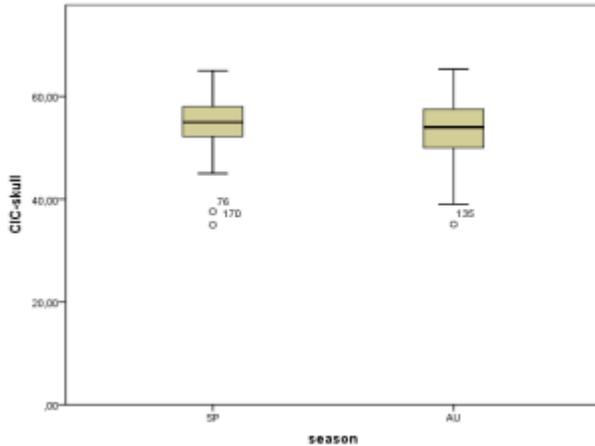
Univariate Analysis of Variance

Dependent variable: Normal Score of CIC_skull using Blom's Formula

- There was a significant main effect of the gender on the skull size, $F(1, 302) = 36.38$, $p < 0.001$, $\eta^2 = 0.11$.
Males ($M = 54.12$, $SD = 5.20$), min. 35.00 – max. 65.30
Females ($M = 50.43$, $SD = 3.76$), min. 41.00 – max. 60.70
- There was a significant interaction between the gender and the age class on the size of the skull, $F(4, 302) = 3.32$, $p < 0.05$, $\eta^2 = 0.04$.
- Age class had a significant effect on skull size, $F(5, 302) = 18.67$, $p < .001$, $\eta^2 = 0.27$.

Results-harvest analyses

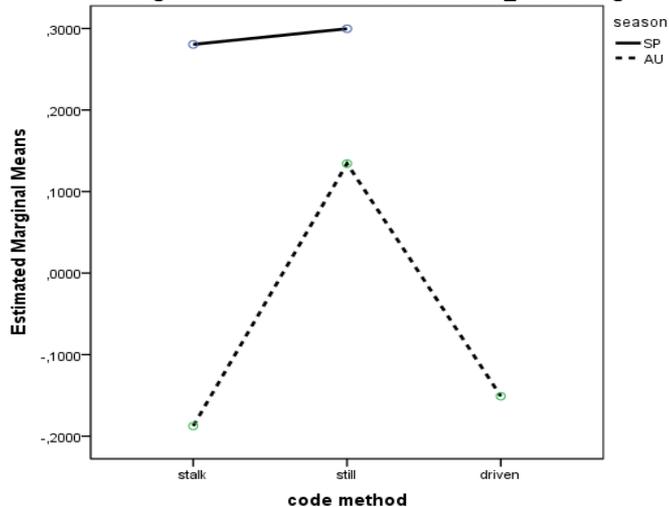
Do the **season** and the **hunting method** have an effect on the skull size of harvested bears?



Pairwise comparison of the hunting seasons (spring and autumn) showed a significant effect on the skull size ($p < 0.05$). SP (M = 54.55, SD = 4.80), AU (M = 52.90, SD = 5.28)

The Bonferroni post hoc test revealed no difference in skull sizes between stalk (M = 53.80, SD = 5.55) and still (M = 54.69, SD = 4.56), and between stalk and driven (M = 52.70, SD = 5.39), **but between still and driven** ($p < 0.05$).

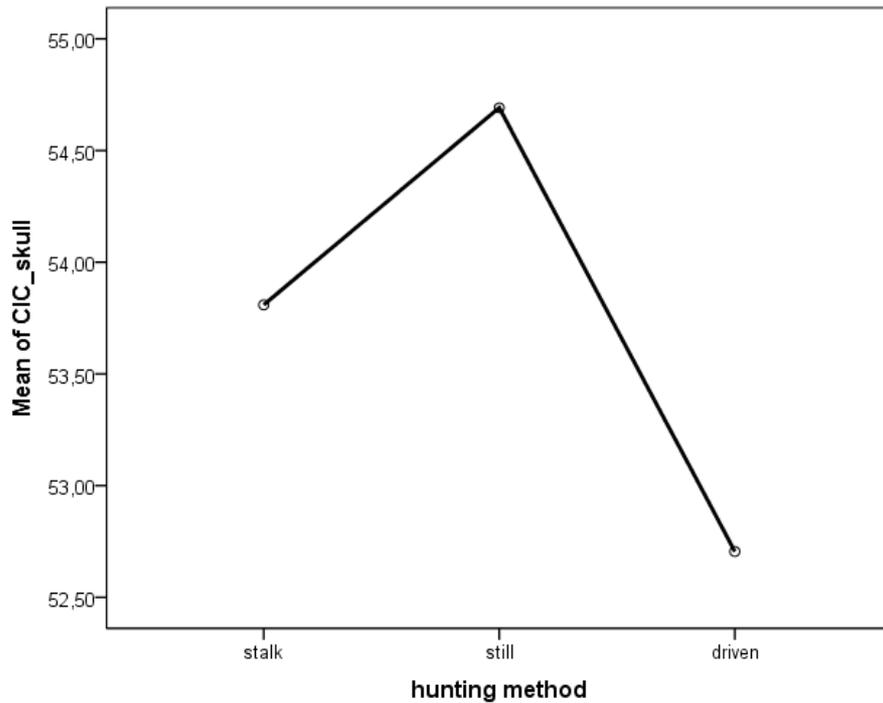
Estimated Marginal Means of Normal Score of CIC_skull using Blom's Formula



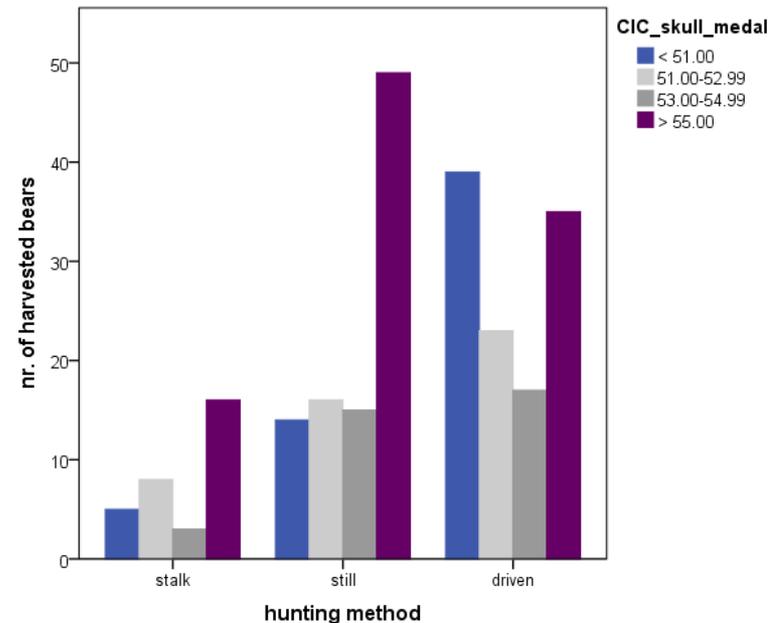
Hunting Period 2007-2011	Harvested Bears	% males	% females
Spring	130	94	6
Autumn	211	77	33
Total	341	83	17

Results-harvest analyses

Does the skull size differ in function of the hunting method?



According to the CIC Hunting Trophy Rating 42% of the male bear skulls obtained more than 55.00 points corresponding to a gold medal!



Conclusion

CIC skull: useful indicator for assessing the hunting results

Impact of season: larger skull sizes in spring, more individuals in autumn

Hunting is selective and orientated towards males and adult individuals with larger skull sizes



Trophy hunting



- 1. Strong negative impact on population structure and dynamic!**
- 2. Vicious circle: cubs acquiring nuisance behaviour from their mother**

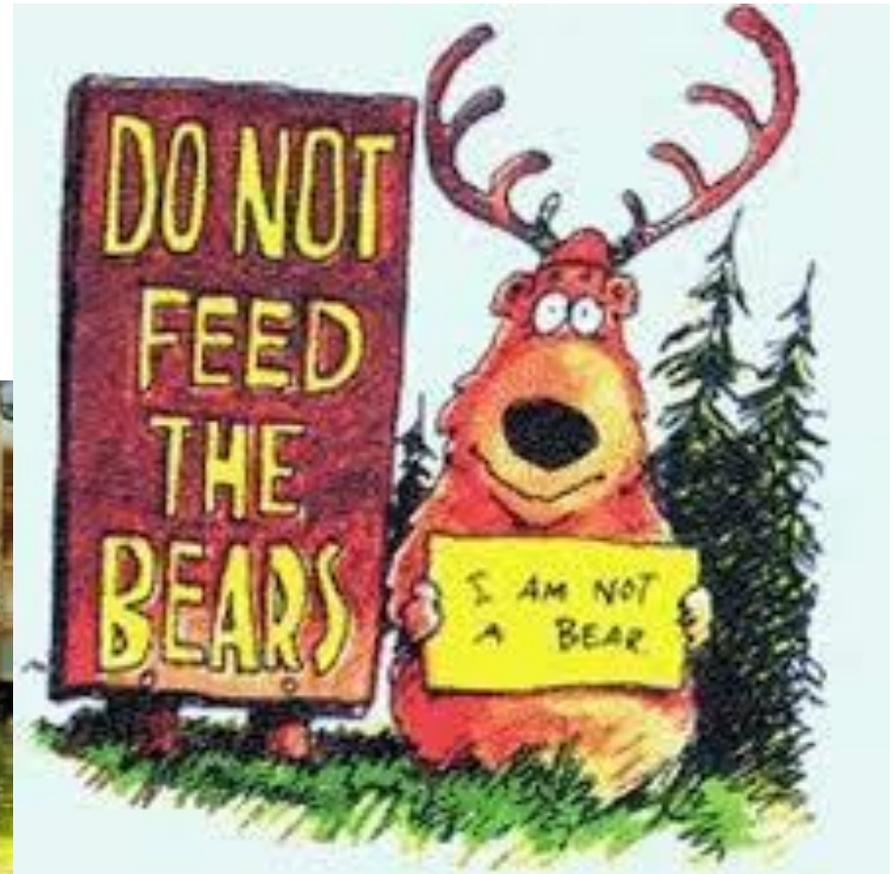
Conclusion

- ❑ a higher population size generates more damage
- ❑ a higher hunter take minimizes population size and damage occurrence
- ❑ a seasonal impact of hunting on damage occurrence
- ❑ selective hunting according to damage related aspects



- ✓ Population size is a factor with a small impact on damage occurrence and difficult to be changed in a short period within a planned human intervention.
- ✓ Damage occurrence seems to be depending mainly on human activity and presence of problem bears.
- ✓ Hunting could be a useful tool for damage prevention if it is planned and applied for this purpose (e.g. orientated towards problem individuals or sex-age-classes).

Do we want to make thinks differently?





Thank you for your attention!

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Drawing made by Adorjan Katalin, 12 years old - winner of the "Us and bears" drawing contest, LIFEURSUS Project