

# Attitudes towards an endangered brown bear population outside its core area in central Italy



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# I'M GOING TO TALK ABOUT.....

Who is “Apennine brown bear”?

Why study attitudes towards Apennine brown bear, and why in peripheral areas? →  
MOTIVATIONS AND AIMS

Where? → STUDY AREAS

How? → METHODS

We observed → RESULTS

We suggest → CONCLUSIONS



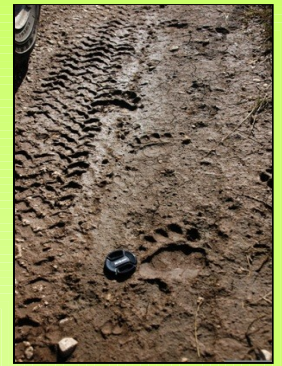
...work in  
progress!

Who is “Apennine brown bear”?



# Apennine brown bear

## *Ursus arctos marsicanus*



- Subspecies of brown bear **endemic** to central Italy
- Very small population (37 – 52 in the core area, Gervasi et al., submitted)
- Very high density in a single protected area and surrounds (core area)



***extremely high risk of extinction!***

strict legal protection



**BUT.....some “occasional” individuals out of the core area!**

# Why study attitudes of local people outside the core area?

1. **Peripheral areas:** range expansion and population increase can lower the risk of extinction
2. **Peripheral areas:** suitable habitats (Falcucci, 2007; Falcucci et al., 2008; 2009)
3. Inside and outside the core area: **human-induced mortality** as the most important risk factor (Falcucci, 2007; Ciucci and Boitani, 2008)
4. **Human suitability:** a key factor to allow range expansion and population increase (Ciucci and Boitani, 2008; Falcucci et al., 2009)



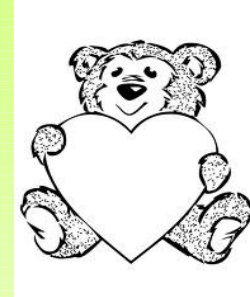
# Aim of the study

**Explore**

attitudes

basic knowledge

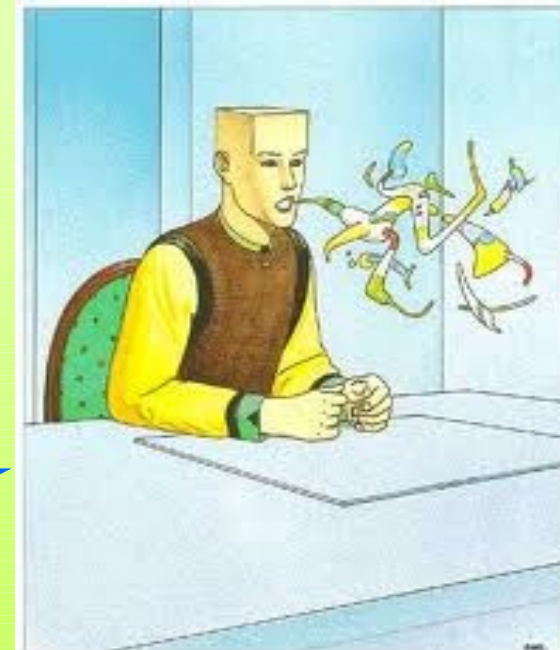
attitudes about future stabilization



in the general public

in two sample areas outside the core area

to identify the key points of future communication campaigns





# Study areas: two areas of the peripheral range

**SIMBRUINI**  
Regional park

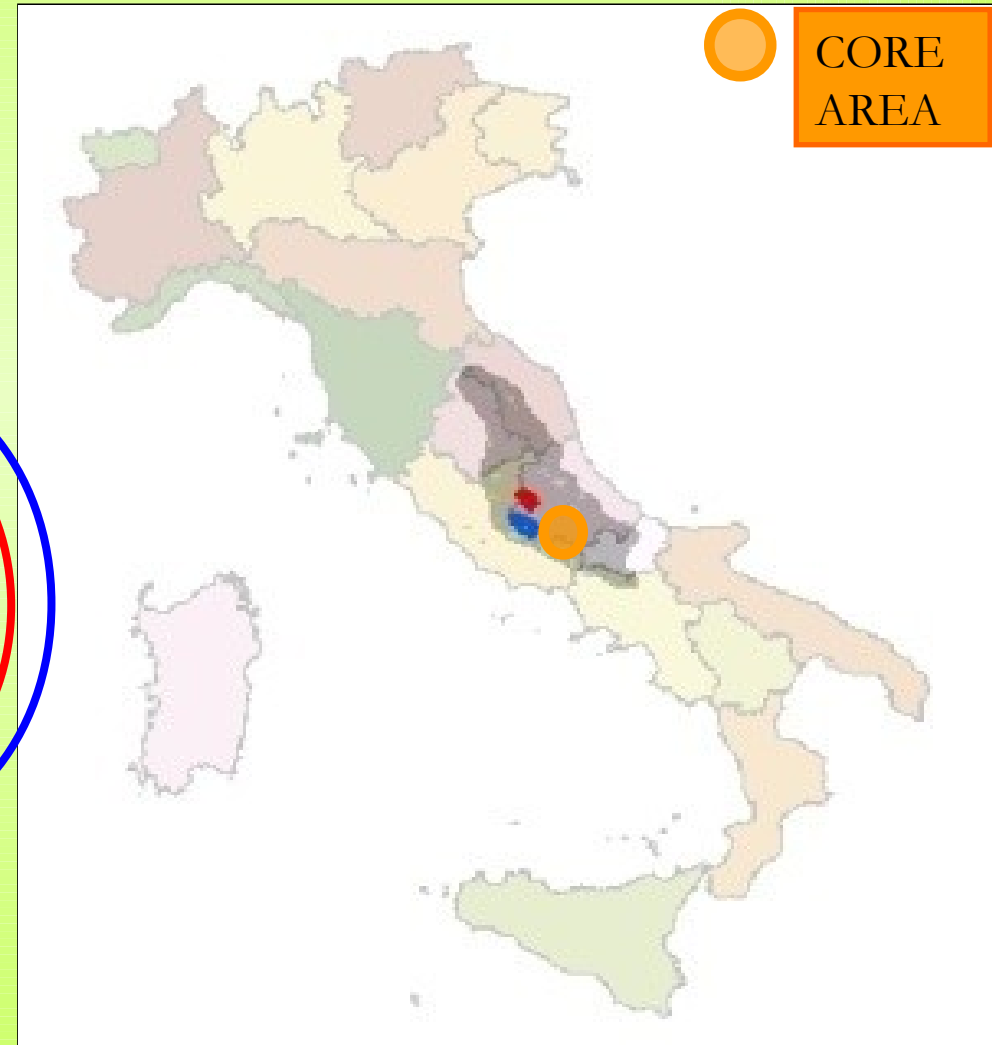
Extension:  
30 000 hectares  
(about 74 131 acres)

Municipalities: 7

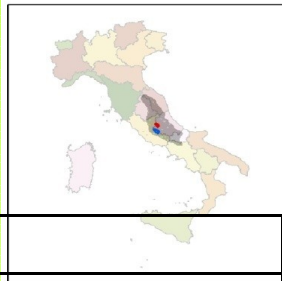
**DUCHESSA**  
Regional preserve +  
surroundings  
(unprotected)

*Altitude:  
800 – 2100  
meters  
a.s.l.*


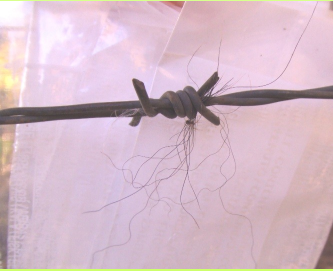
Extension: 16 300 hectares  
(about 40 278 acres)  
Municipalities: 4







# Similarities and differences

		% of land	
		DUCHESSA	SIMBRUINI
LAND USE	agricultural	22.3	2.5
	industrial + residential + infrastructure		
	woodlands + shrublands + dense grasslands + bare soil + rivers and creeks	77.7	97.5
HABITAT SUITABILITY (Falcucci et al., 2008; 2009)	unsuitable	56	40
	low suitability		
	medium suitability	44	60
	high suitability		
SIGNS OF BEAR PRESENCE		at least <b>two</b> documented signs/yr in the last 10 years	at least <b>one</b> documented sign/yr in the last 10 years
			

Where? → STUDY AREAS

...just to have an idea of our landscapes





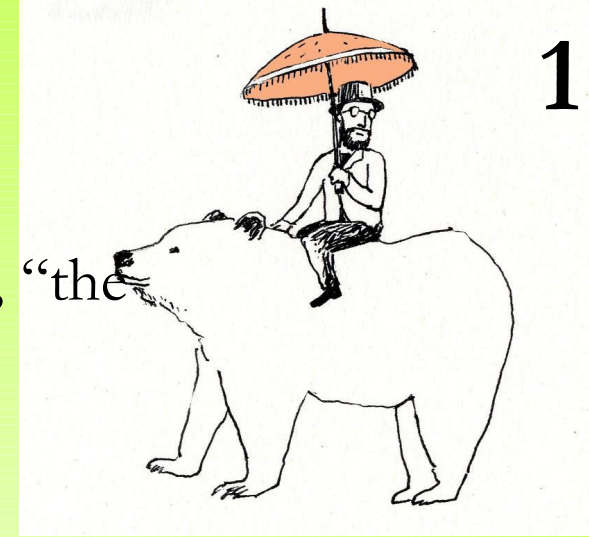
Where? → STUDY AREAS

...just to have an idea of our landscapes



# Methods

1



- **Face-to-face interviews**
  - **Simbruini:** 402 respondents (3.8% of residents, “the rule of 400”)
  - **Duchessa:** 310 respondents (5% of residents)
- **Closed-answer questions about:**
  - **general attitude,**
  - **knowledge** (presence, diet, legal protection)
  - **specific attitudes** (stable presence in the future, importance for future generation, bear as a touristic attraction, bear and equilibrium of nature, fear of bear, bear as a threats for human activities)
  - **bear conservation and public participation**
- **In total:**
  - **Simbruini:** 45 questions
  - **Duchessa:** 65 questions

**15 COMMON  
QUESTIONS**



# Methods

2

- **Exploration of raw data**

*(sometimes raw data give stronger message than sophisticated statistical analyses!)*



- **Statistical analysis (1)**

- for each variable, are there **significant differences** between Simbruini and Duchessa respondents? →

***Pearson  $\chi^2$***



# Methods

3



- **Statistical analysis (2)**

- what variables are **correlated** among each other?

- ***Log-linear model*** (goodness of fit test: likelihood ratio)



- presence
- possible future stabilization
- importance for future generations
- touristic attraction
- threat to livestock
- threat to beehives
- threat to agriculture
- bear as part of equilibrium of nature
- fear to see the bear in the wild
- encounter in the wild
- *hunter - cattle breeder - farmer*
- *age - sex*





# Methods

4

## Using uncorrelated variables:

- Statistical analysis (3)
  - *Logistic Regression* (method: ENTER; test of significance: Hosmer and Lemeshow test,  $\chi^2$ ) (Vaske, 2008)
    - ✓ **dependent** variable (dichotomous) → general attitude
    - ✓ **independent** variables (categorical) → *uncorrelated variables!*

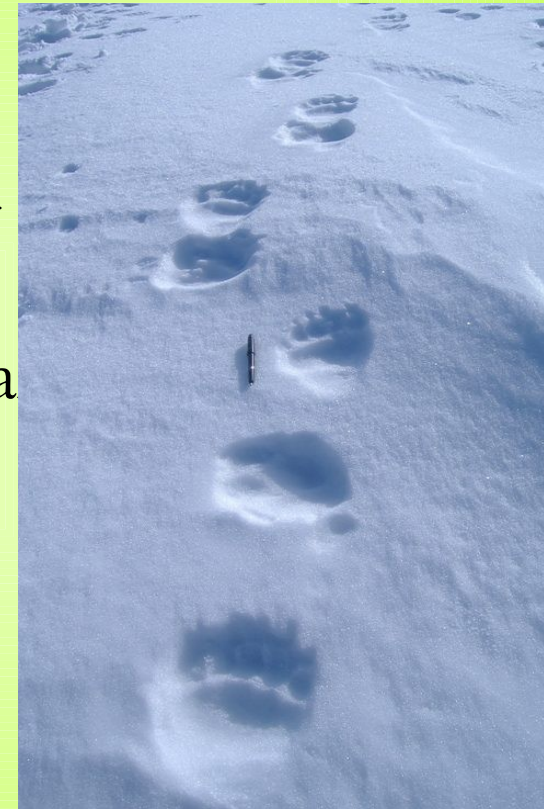


Photo:  
Archivio R.N.R.  
Montagne della Duchessa

## Using correlated variables:

- Potential for Conflict Index (PCI)  
(Manfredo et al., 2003)

# Results

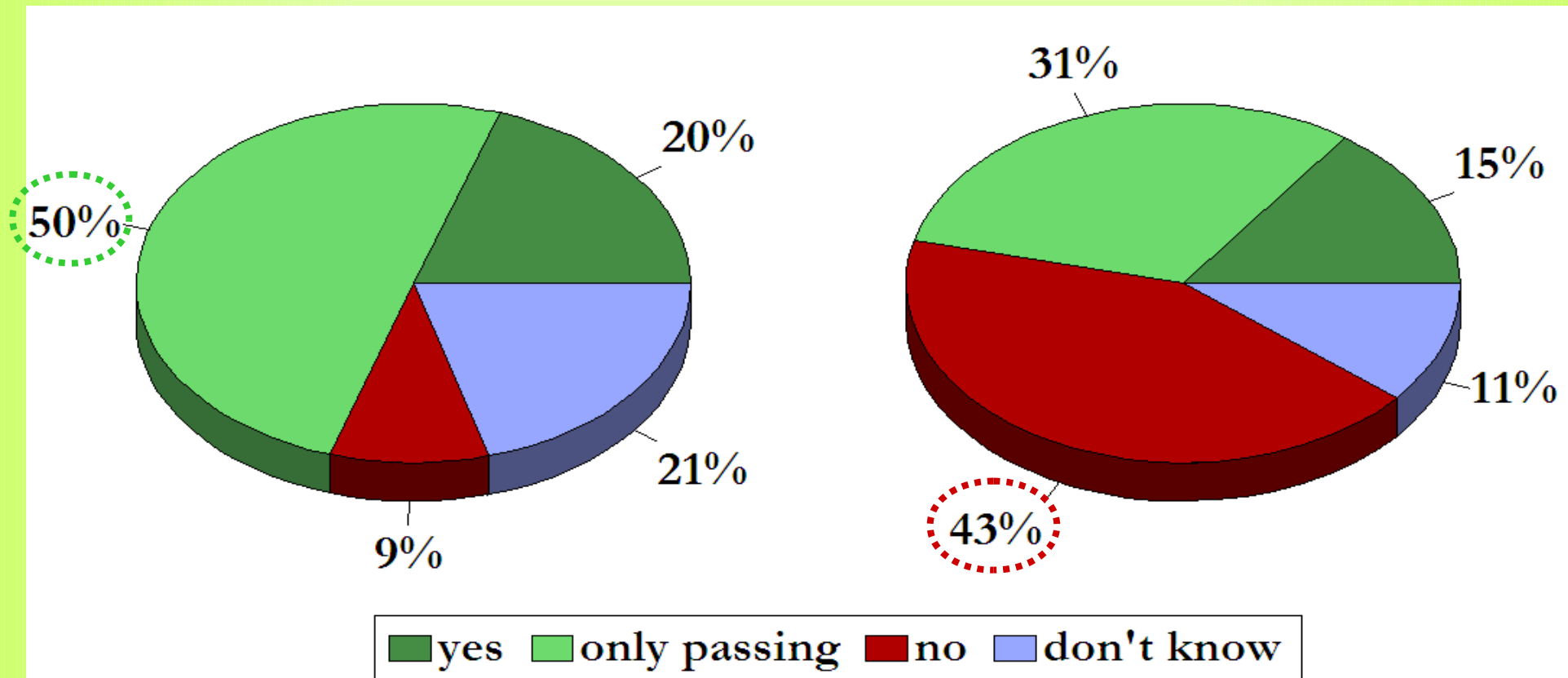
1

**PRESENCE:** do you think bears are present in your area?

**SIGNIFICANT DIFFERENCES** ( $\chi^2=100.155$ , d.f. = 3,  $p < 0.001$ )

Duchessa

Simbruini



# Results

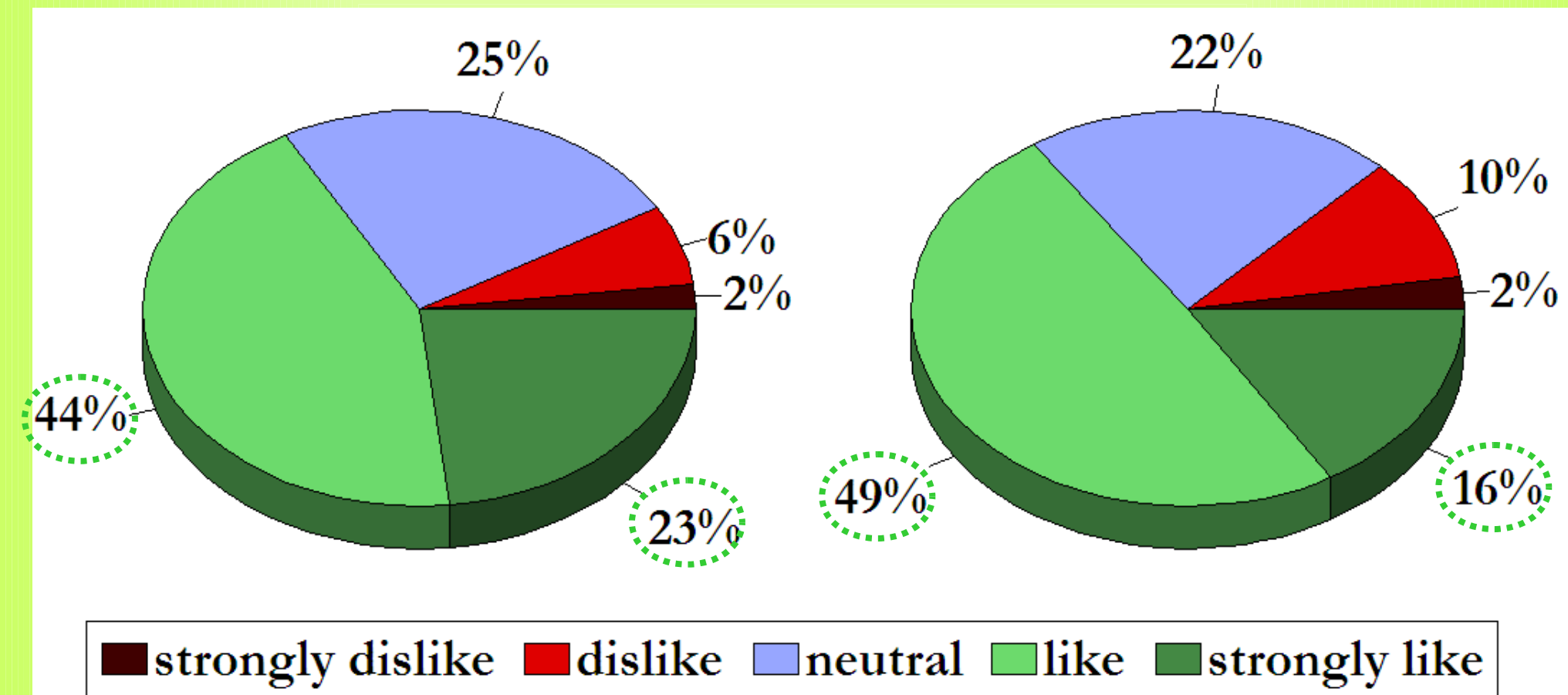
2

## GENERAL ATTITUDE towards bears

**NO SIGNIFICANT DIFFERENCES** ( $\chi^2=9.144$ , d.f. = 4,  $p > 0.001$ )

### Duchessa

### Simbruini



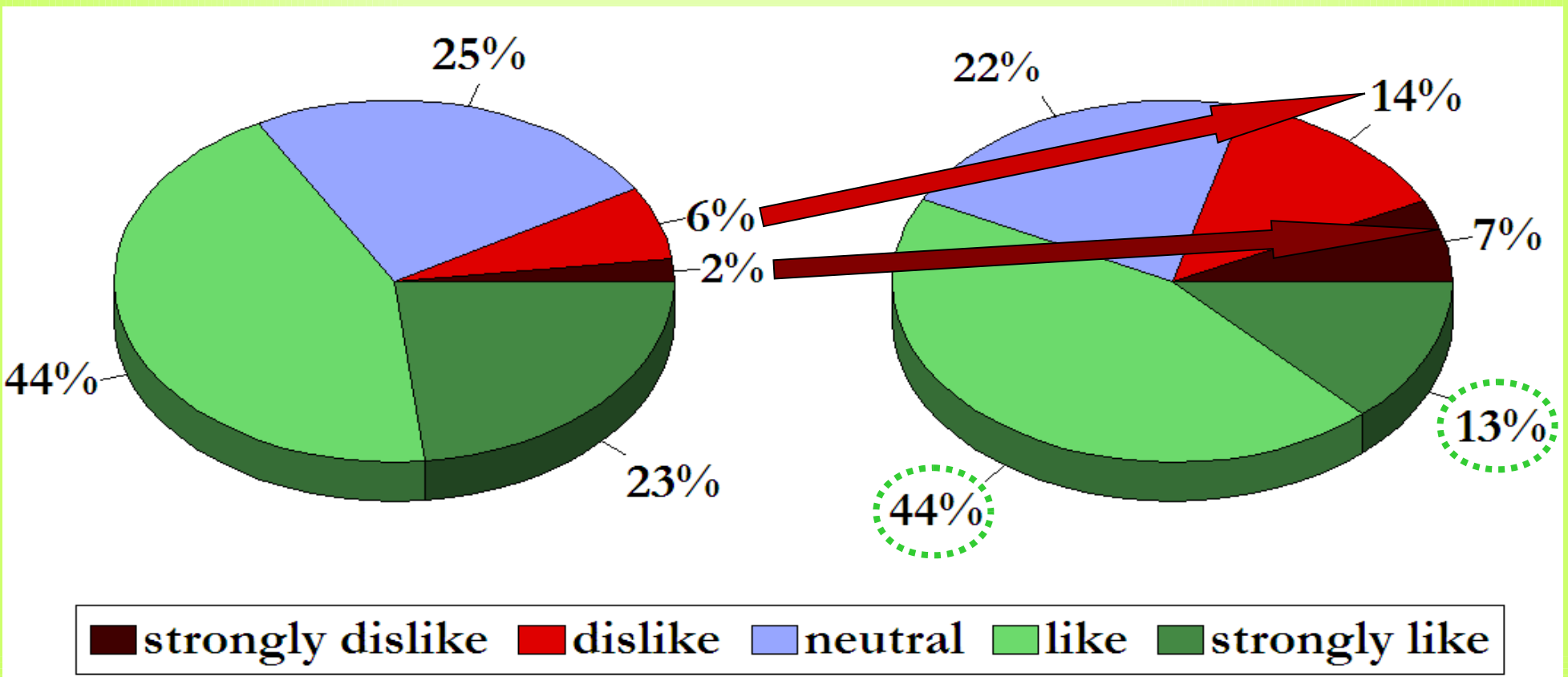
Duchessa

# Results

3a

GENERAL ATTITUDE                      versus                      FUTURE ATTITUDE  
(n = 305; whole sample)

**SIGNIFICANT DIFFERENCES** ( $\chi^2=286.424$ , d.f. = 16,  $p < 0.001$ )





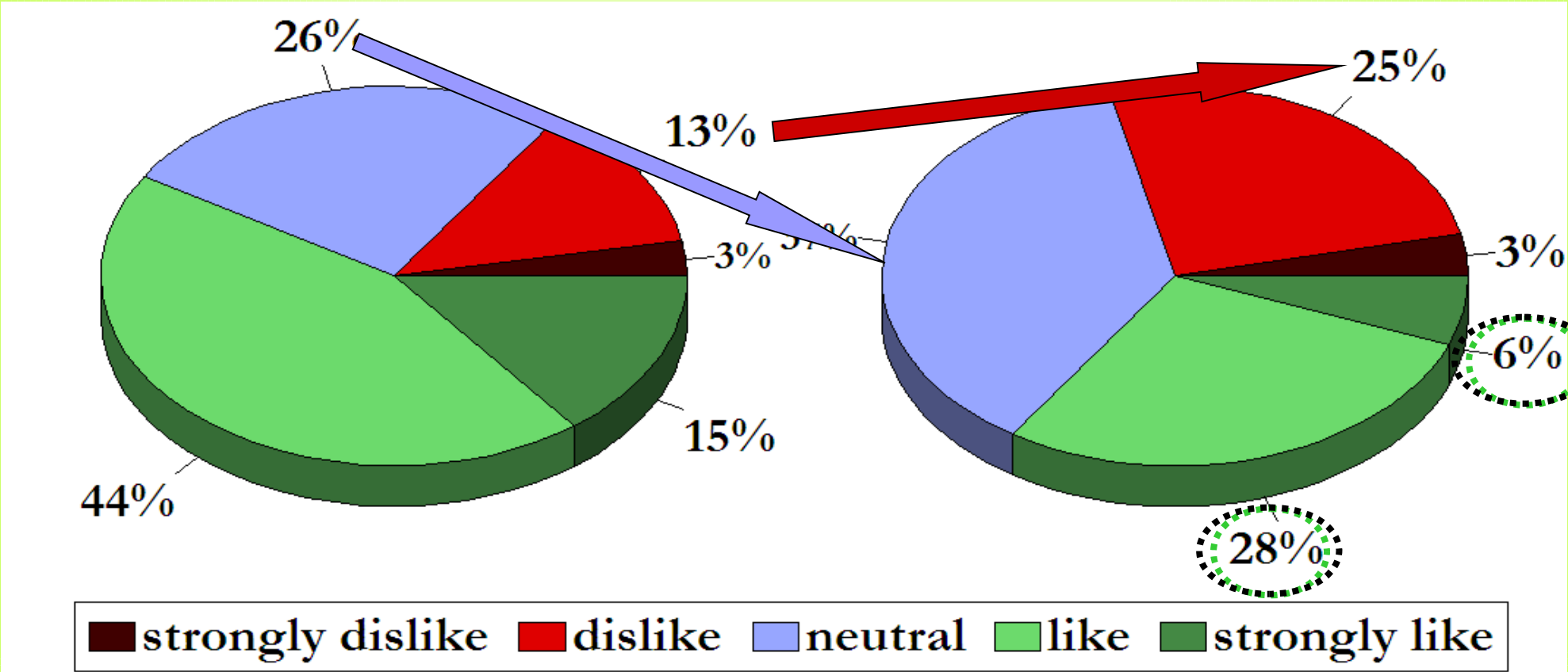
# Results

Simbruini

3b

GENERAL ATTITUDE                      versus                      FUTURE ATTITUDE  
(n= 172; only “no presence”)

**SIGNIFICANT DIFFERENCES** ( $\chi^2=136.389$ , d.f. = 16,  $p < 0.001$ )



# Results

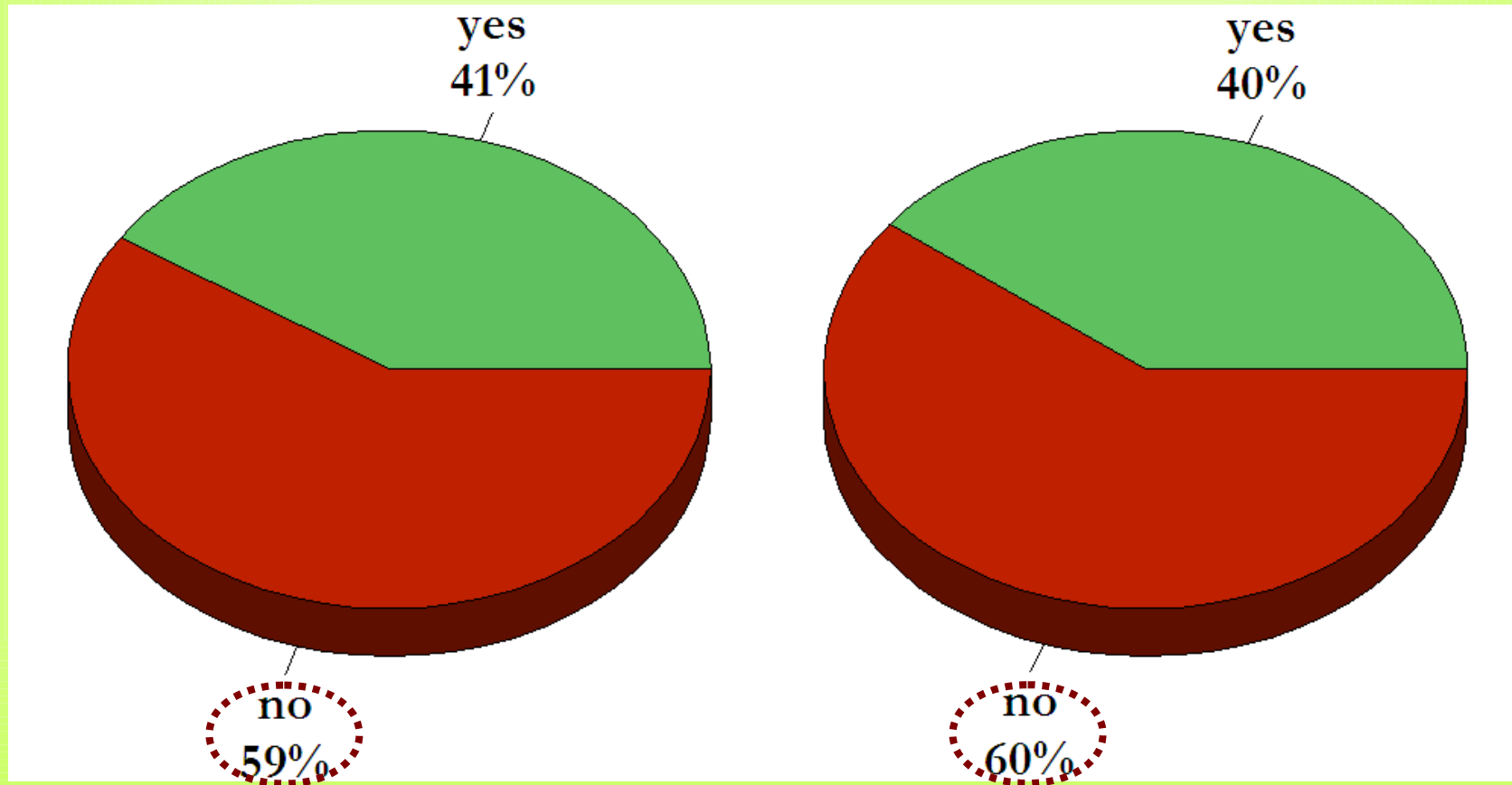
4

**STABILIZATION:** do you think is it possible that a population of bears will stabilize permanently in this area in the future?

**NO SIGNIFICANT DIFFERENCES** ( $\chi^2=0.492$ , d.f. = 1,  $p > 0.001$ )

Duchessa

Simbruini



# Results

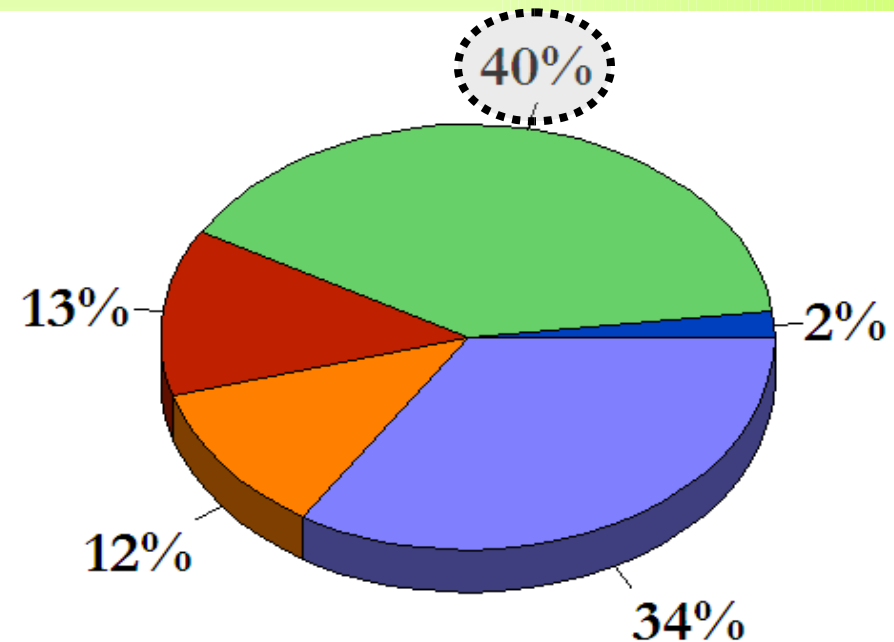
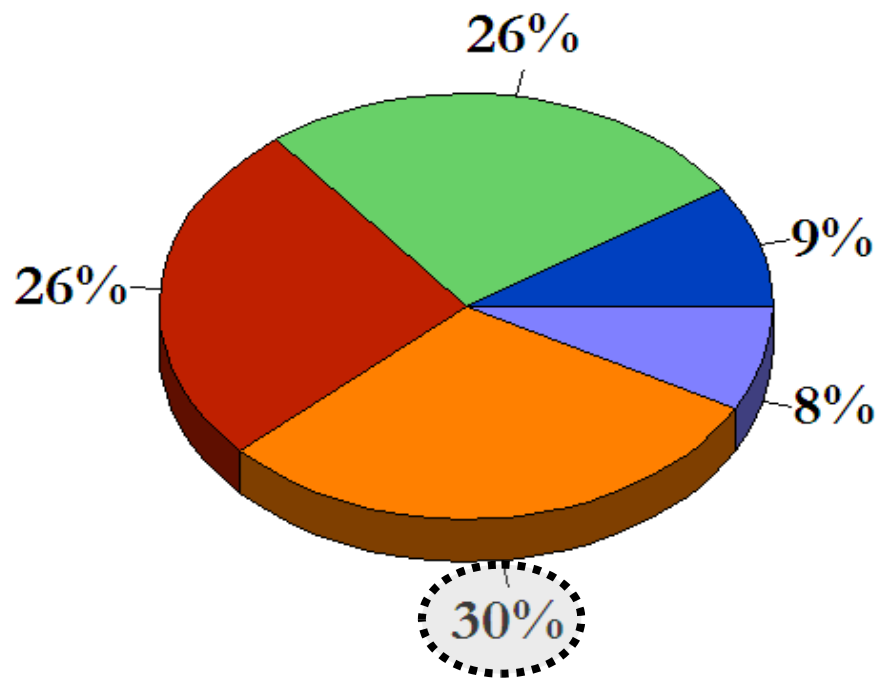
5

**CAUSES:** if you think the future stabilization is **impossible**, which are, in your opinion, the main **constrains**?

**SIGNIFICANT DIFFERENCES** ( $\chi^2 = 32,120$ , d.f. = 4,  $p < 0.001$ )

Duchessa

Simbruini



■ No space ■ Habitat not suitable ■ Poaching ■ Human presence ■ Other

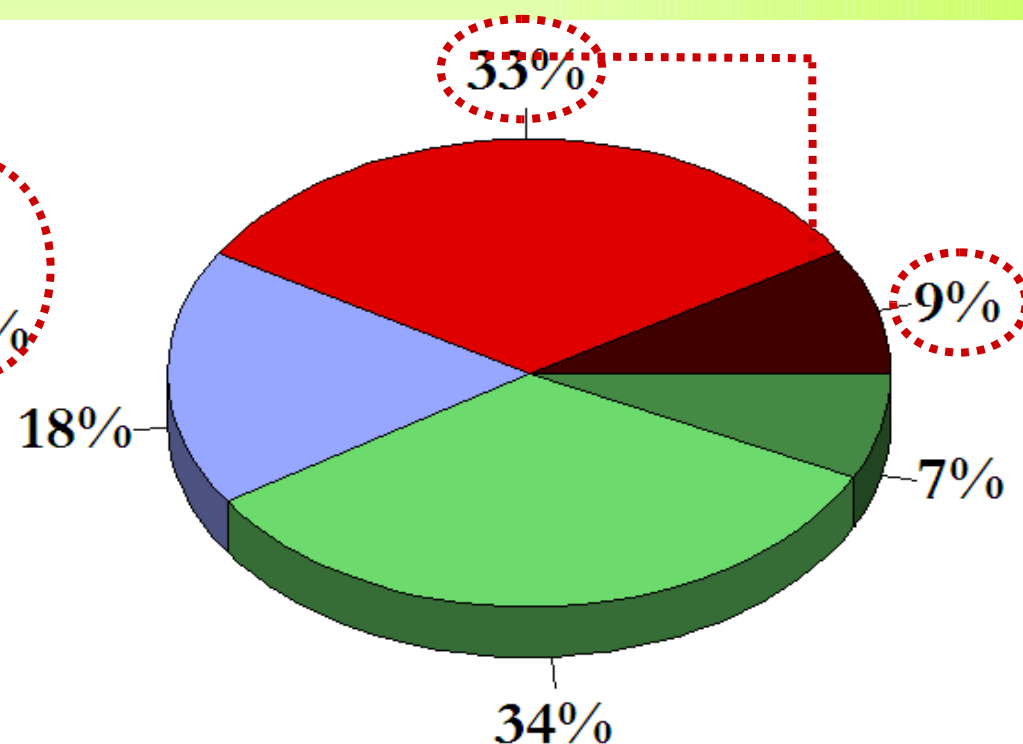
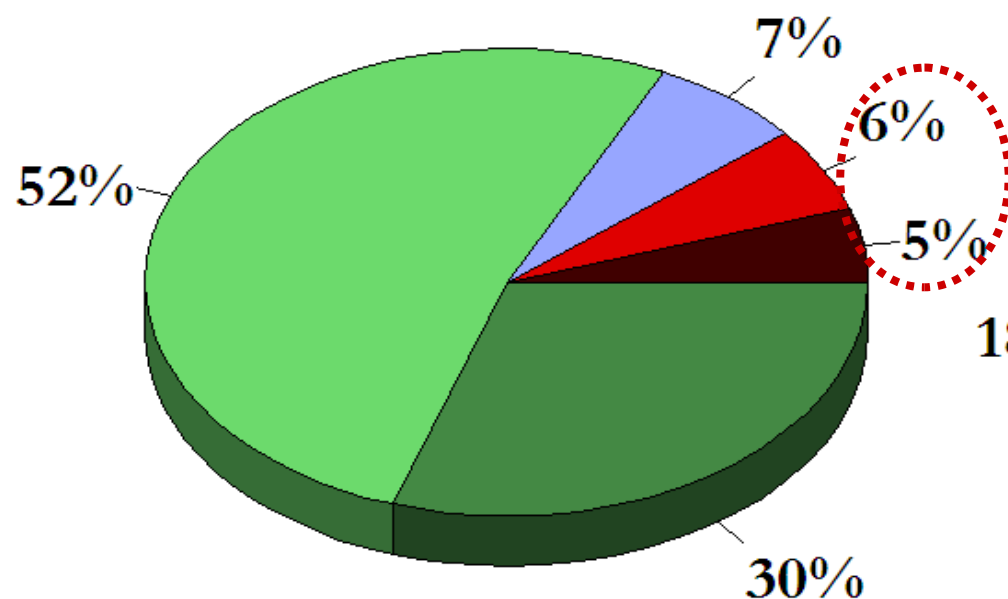
# Results

**TOURISTIC ATTRACTION:** the presence of bear in the area could **increase** tourism

**SIGNIFICANT DIFFERENCES** ( $\chi^2=143.115$ , d.f. = 4,  $p < 0.001$ )

Duchessa

Simbruini



Strongly disagree Disagree Neutral Agree Strongly agree



# Results

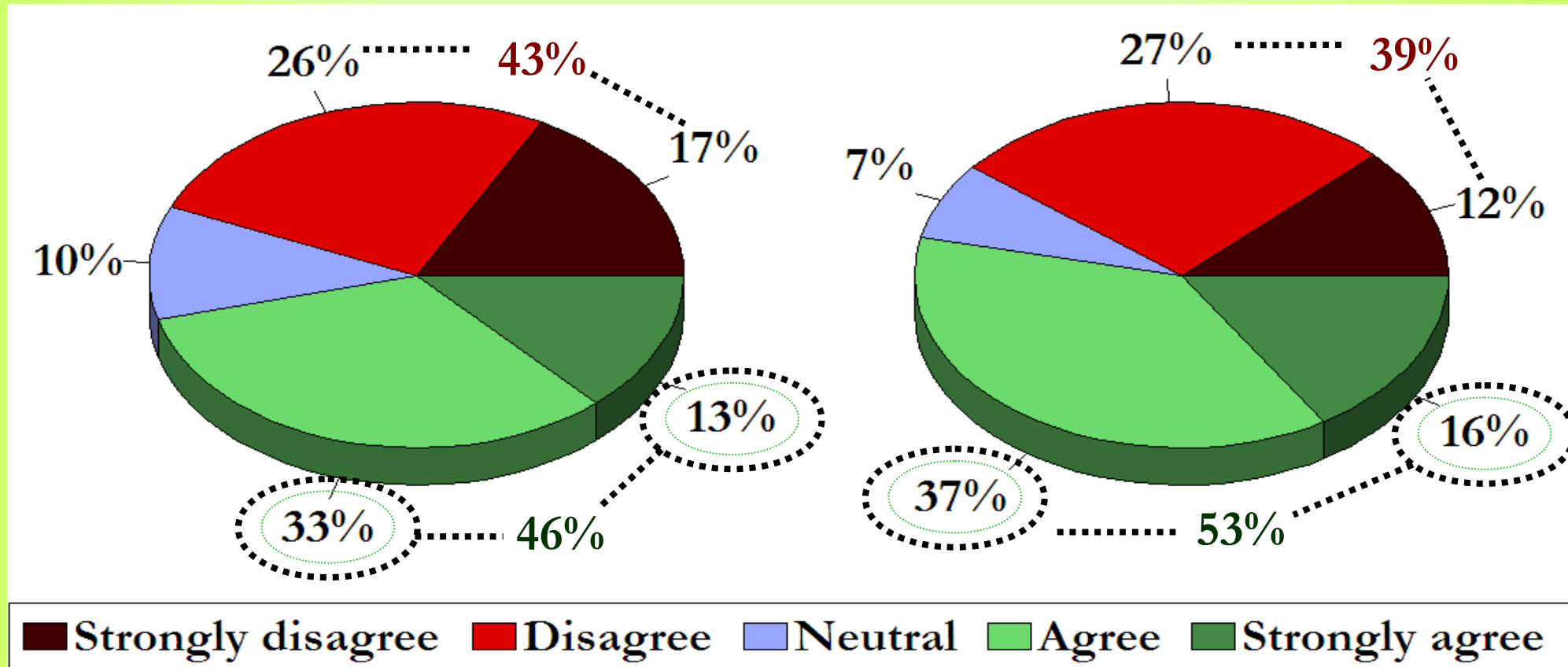
7

**FEAR:** I'm afraid to hike in the woods if bears are present

**NO SIGNIFICANT DIFFERENCES** ( $\chi^2=7.129$ , d.f. = 4,  $p > 0.001$ )

Duchessa

Simbruini



# Results

## LOG-LINEAR MODEL

8

Duchessa

Simbruini

*Uncorrelated variables:*

- presence
- impact on beehives
- bear as touristic attraction
- fear to encounter the bear in the wild
- encounter with the bear in the wild
- hunter
- cattle breeder
- farmer

*Uncorrelated variables:*

- impact on beehives
- bear as touristic attraction
- fear to encounter the bear in the wild
- cattle breeder
- farmer

# Results

## LOGISTIC REGRESSION – *dependent variable: attitude*

Duchessa

Simbruini

Independent variables:

PRESENCE OF BEAR (+)

THREAT TO HUMAN ACTIVITIES (-)

TOURISTIC ATTRACTION (+)

FEAR (-)

The model fits the data ( $\chi^2=3.301$ , d.f. = 8,  $p > 0.05$ )

Independent variables:

THREAT TO HUMAN ACTIVITIES\* (-)

TOURISTIC ATTRACTION\* (+)

FEAR (-)

The model fits the data ( $\chi^2=11.982$ , d.f. = 8,  $p > 0.05$ )

		Predicted		% correct
		Negative	Positive	
Observed	Negative	6	13	31.6
	Positive	0	152	100.0
	Overall percentage			92.4

		Predicted		% correct
		Negative	Positive	
Observed	Negative	15	15	50.0
	Positive	2	144	98.6
	Overall percentage			90.3

# Results

## POTENTIAL FOR CONFLICT INDEX

Duchessa



Simbruini

Action Support

Strongly Favor

2

1

Don't know

0

-1

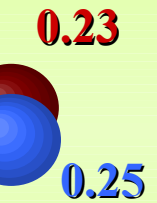
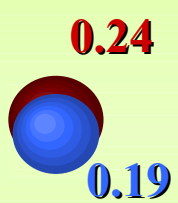
Strongly Oppose

-2

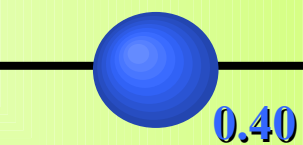
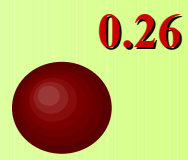
equilibrium of nature

importance for future generations

touristic attraction



0.25





# Conclusions

1. **Human suitability** → overall **high**  
both in Simbruini and in Duchessa
2. **Concerns** under the scenario of future  
stabilization
3. **Prejudices:** → fear  
threat to human activities
4. **Low awareness** of bear presence in Simbruini
5. **Economic value** of the bear: Duchessa
6. **Intrinsic value** of the bear: both Duchessa and Simbruini



*Luckily* **NO CRISIS → NO RUSH!**  
**COMUNICATION**  
**AND EDUCATION CAMPAIGNS**

# Attitudes towards an endangered brown bear population outside its core area in central Italy

We warmly thank:

- Park rangers and technicians of Duchessa Regional Preserve and Simbruini Regional Park, in particular Ilaria Guj, Stefano Donfrancesco, Gianpiero Di Clemente, Emanuela Peria, Silvia Scozzafava
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- Alessandro Giovannozzi Sermanni and Gabriele



1. Riserva Naturale  
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Sapienza (IT)



4. Memorial University of  
Newfoundland, St. John's  
(CA)



# Citations

Falcucci A., 2007. *Conservation of large carnivores in a human-dominated landscape: habitat model and potential distribution*. PhD thesis, University of Idaho, Moscow.

Falcucci, A., Maiorano, L., Boitani, L., 2007. Changes in land-use/land-cover patterns in Italy and their implications for biodiversity conservation. *Landsc. Ecol.* 22 (4), 617-631.

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Falcucci, A., Ciucci, P., Maiorano, L., Gentile, L., Boitani, L., 2009. Assessing habitat quality for conservation using an integrated occurrence-mortality model. *Journ. Appl. Ecol.* 46 (3), 600-609.