

Biodiversity Monitoring in Kruger

How reliable are habitat surrogates?

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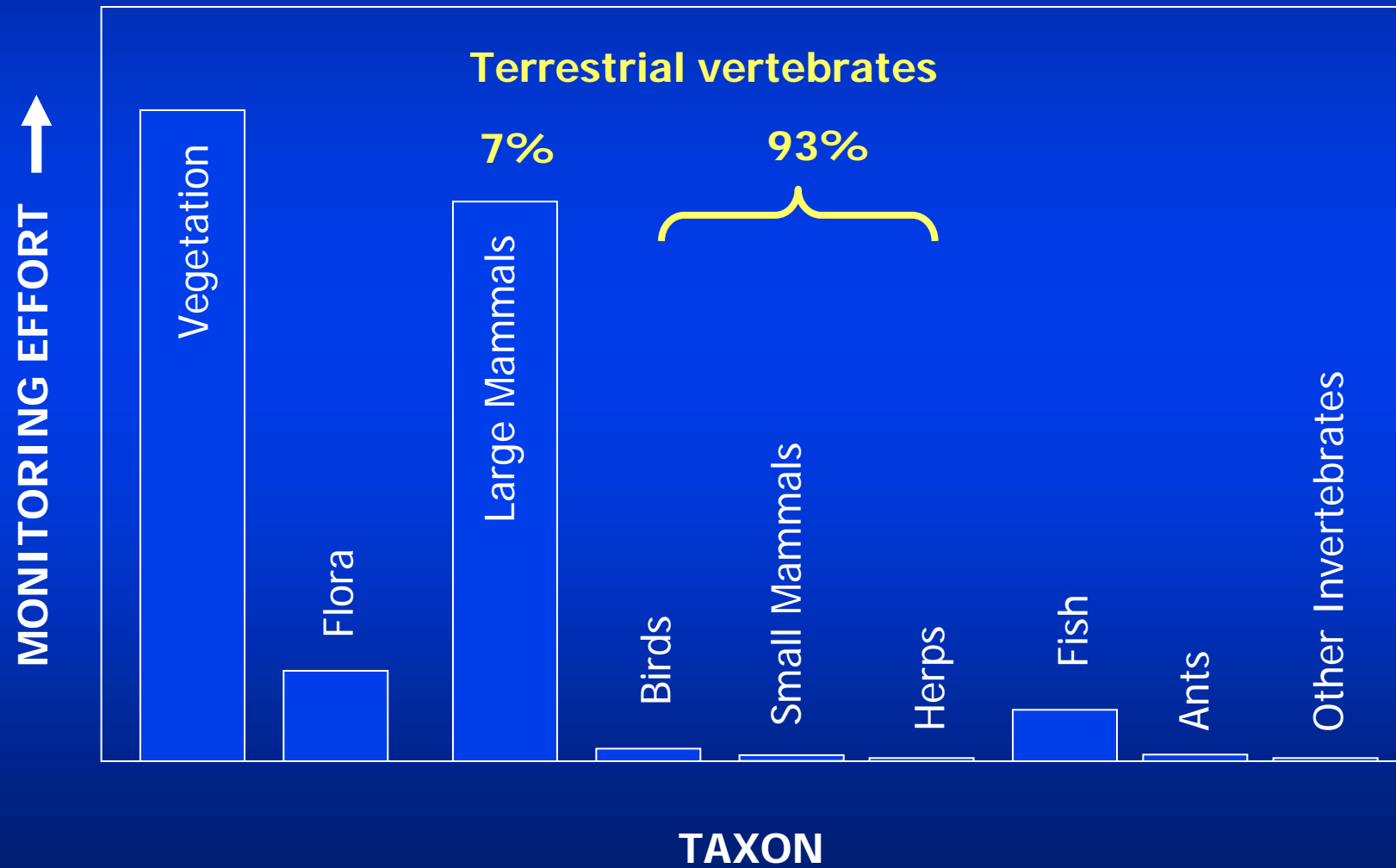
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SANParks, Kruger NP

Biodiversity in Kruger



Biological monitoring in Kruger



Kruger's formal responsibilities for biodiversity

- **Core plank of Kruger's Mission is:**
“to maintain biodiversity in all its natural facets and fluxes”
- **Kruger required to produce an annual ‘State of Biodiversity Report’**

Faunal monitoring in Kruger

OLD



NEW



- No direct TPCs for faunal biodiversity *per se*
- Currently accommodated through TPCs relating to vegetation and habitat

How reliable is habitat as a surrogate for faunal biodiversity?

Usefulness of habitat surrogates

Faunal variation explained	Usefulness
<25%	Don't bother!
25-50%	Somewhat useful, but much direct monitoring needed
50-75%	Very useful, but some targeted direct monitoring needed
>75%	Holy grail!

**How well do habitat surrogates predict
spatial variation in (little) fauna?**



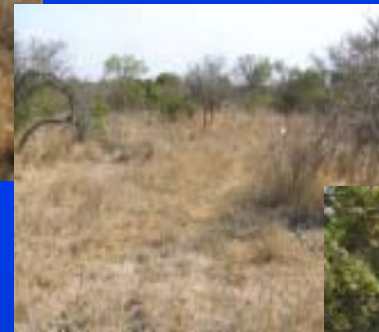
Kopje



Crest



Midslope



**Lower slope
(Sodic)**



Riparian





Faunal sampling

- Plot = 60 X 40 m
- Ants = 20 small pit traps
- Mammals / reptiles = 15-20 box traps (Deacon/Sherman)
- Reptiles / frogs / mammals = 6 pit traps with 10 m fences
- [Birds = 6 x rapid census in 2 ha plot; Deacon, next talk]

Compared with:

- Habitat surrogate assessment

Habitat Surrogates

HABITAT SURROGATES

TERMITE ACTIVITY

Turret-Deserted	Turret-Alive	Round-Deserted	Round-Alive
0	0	1	0

MULTI-STEMMED BRUSHWOOD

Bare	Sparse	Dense
0	0	6

TREES >15 CM

DEAD STANDING

Solid	Holes	FlakingBark	Hollow
0	1	1	1

DEAD PROSTRATE

Solid	Holes	FlakingBark	Rotten
2	1	2	0

ALIVE STANDING

Solid	Holes	FlakingBark	Hollow	PalmCrown
1	1	1	0	0

GRASS PATCH

Dense	Sparse	Shelter(1x1m)	AloesDeadLeaves
0	0	0	0

LITTER

Uniform(1x1m)	DeadWood-Grass	Dead Wood - No grass
0	5	0

AQUATIC HABITATS

PANS	NoVeg	Trees	Grass/Sedge	Mixed
0	#Name	0	0	0

VLEI	NoVeg	Trees	Grass/Sedge	Mixed
0	0	0	0	0

FLOWING WATER

Pools	Riffles/Rapids	OverhangVeg	Channel
0	0	0	0

NON-FLOWING WATER

Pools	OverhangVeg
0	0

NOTES

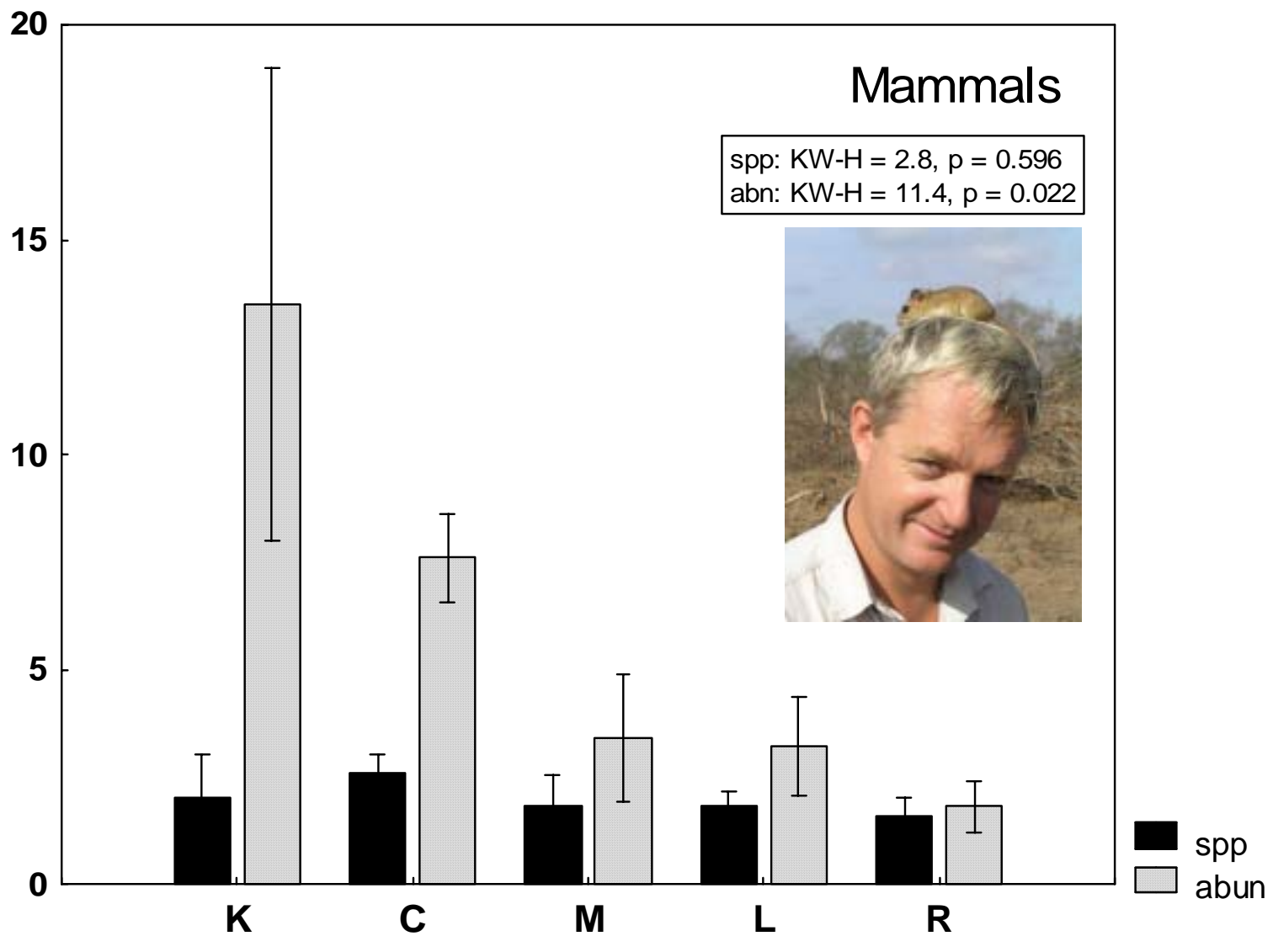
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23 variables

25 vertebrate species

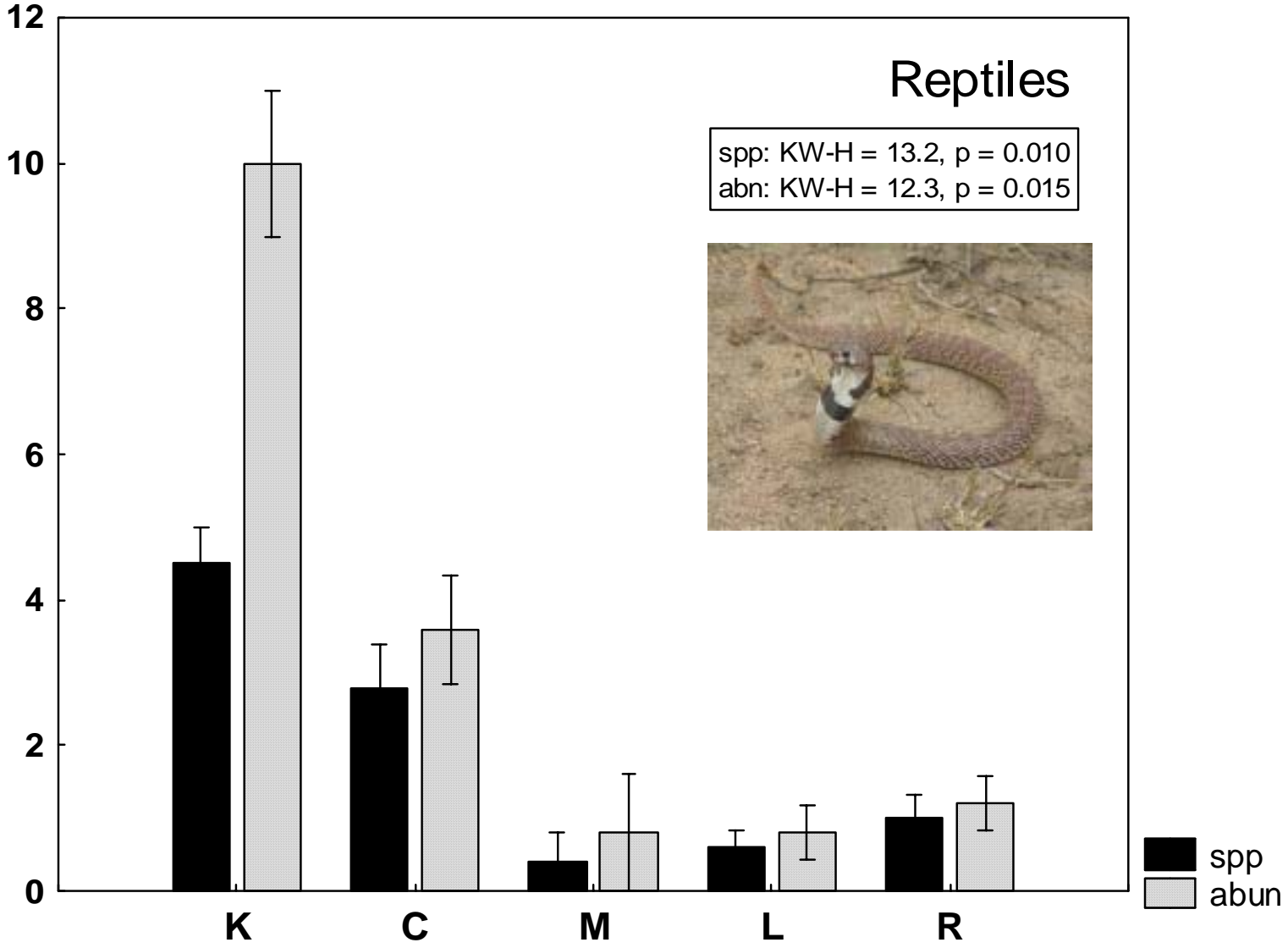
- 11 mammals
- 10 reptiles
- 4 frogs





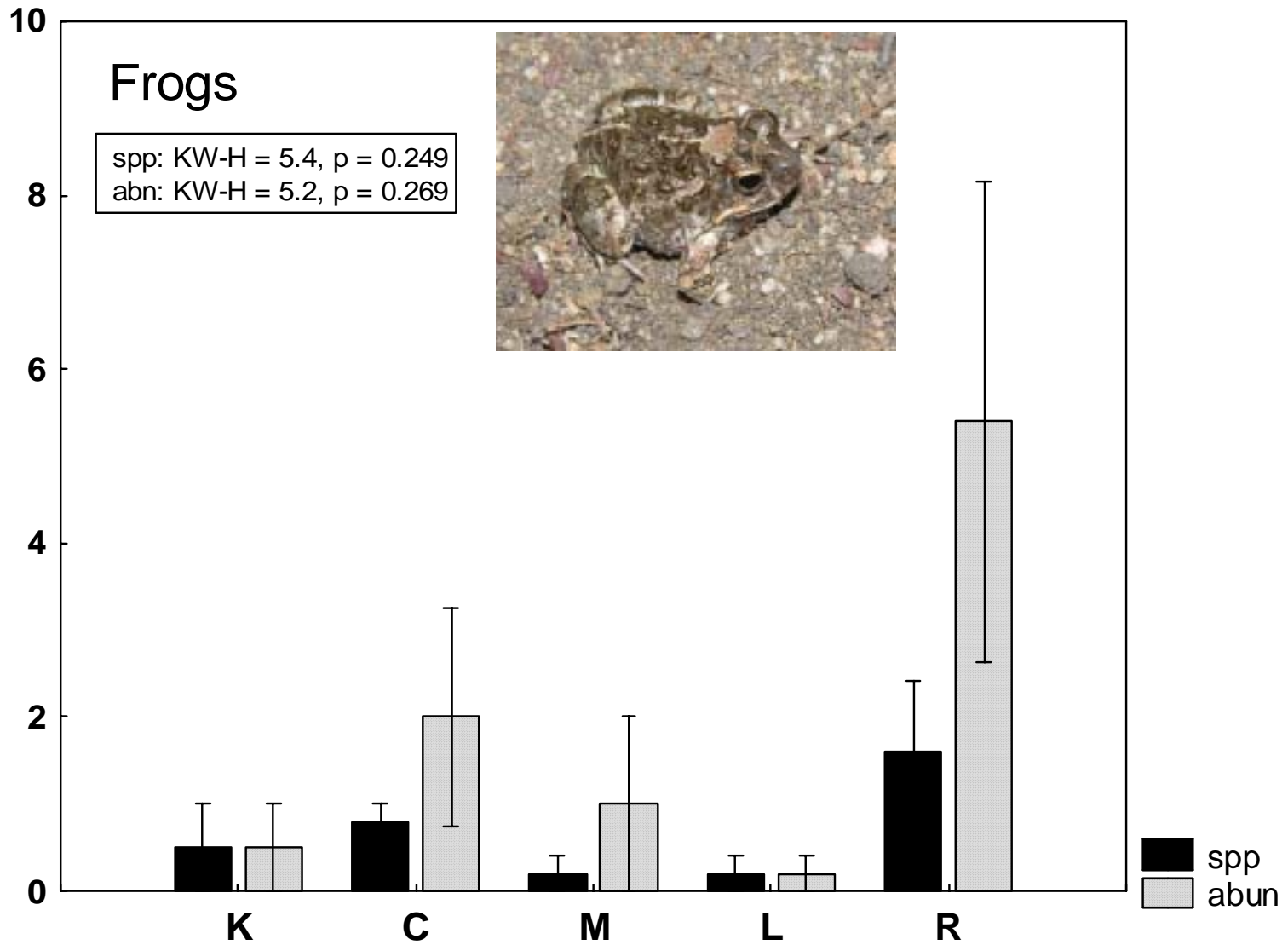
Reptiles

spp: KW-H = 13.2, p = 0.010
abn: KW-H = 12.3, p = 0.015

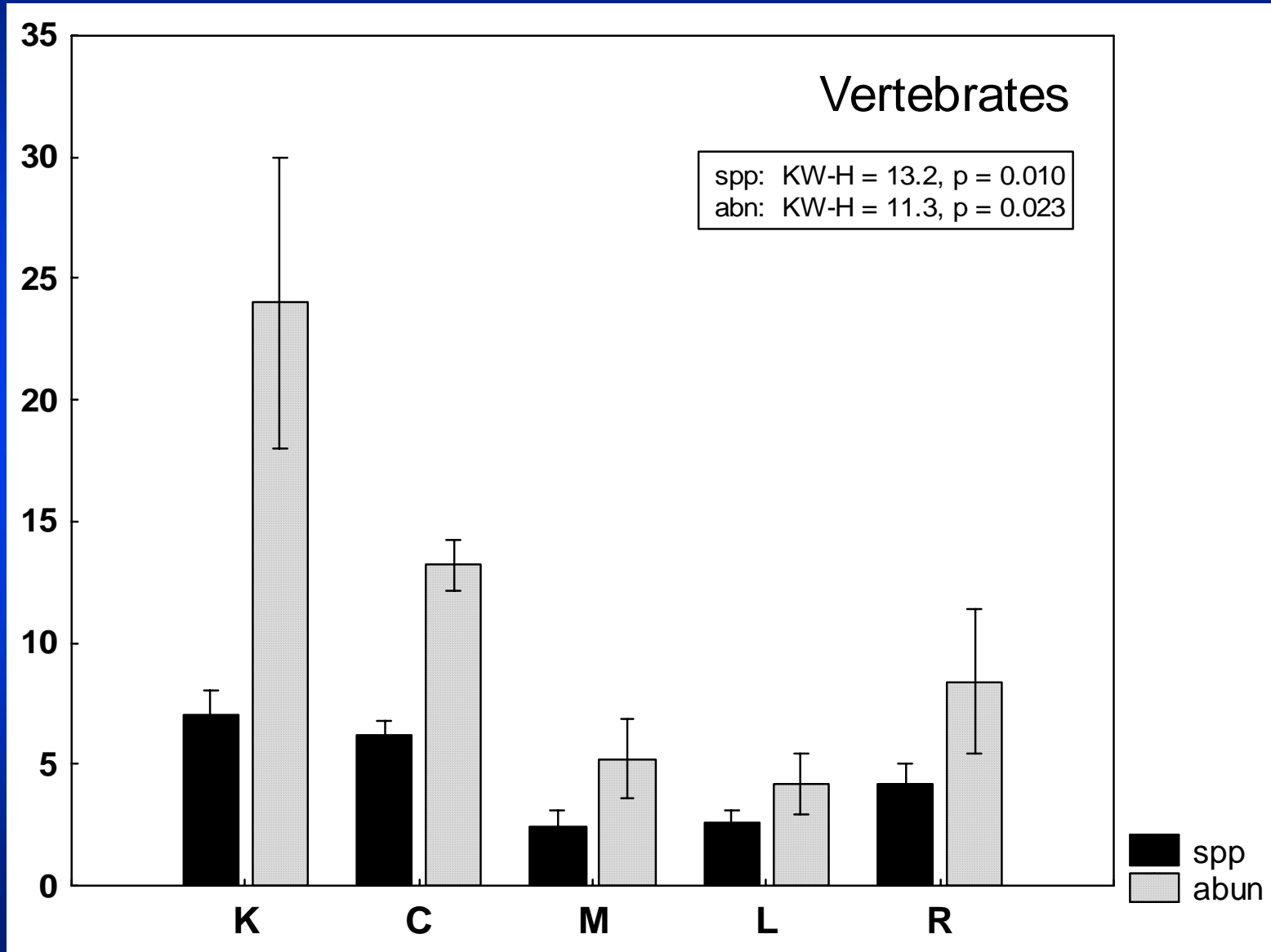


Frogs

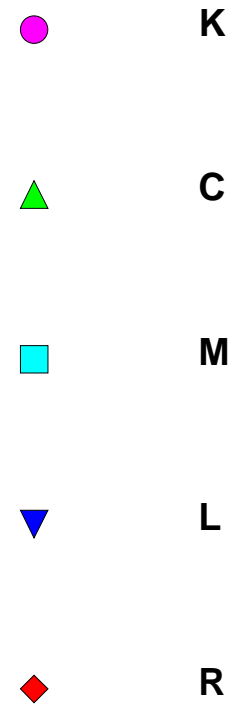
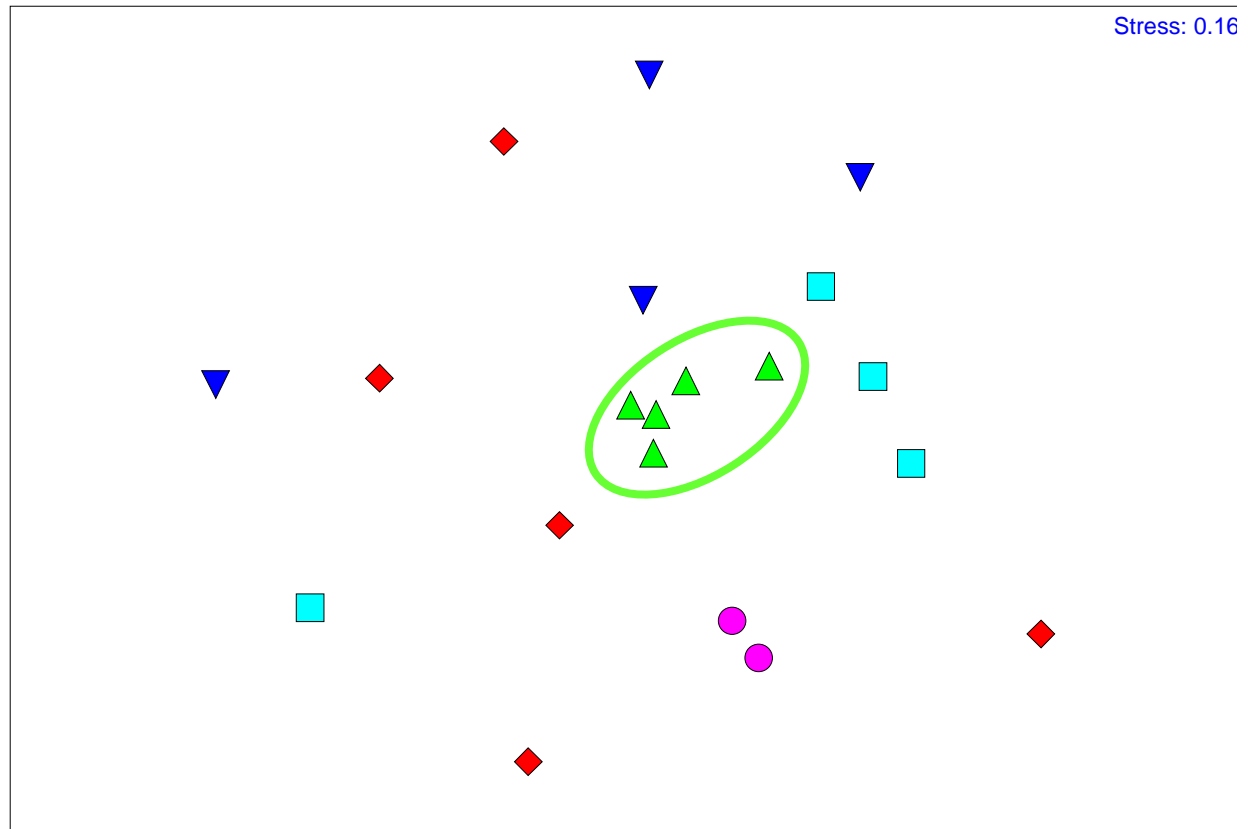
spp: KW-H = 5.4, $p = 0.249$
abn: KW-H = 5.2, $p = 0.269$



Vertebrate richness and abundance



Vertebrate species composition



- ANOSIM $R=0.32$ $P=0.001$

Ants in traps

101 species from 30 genera
13-32 species/plot



Tetramorium 14 spp

Monomorium 13 spp

Camponotus 10 spp

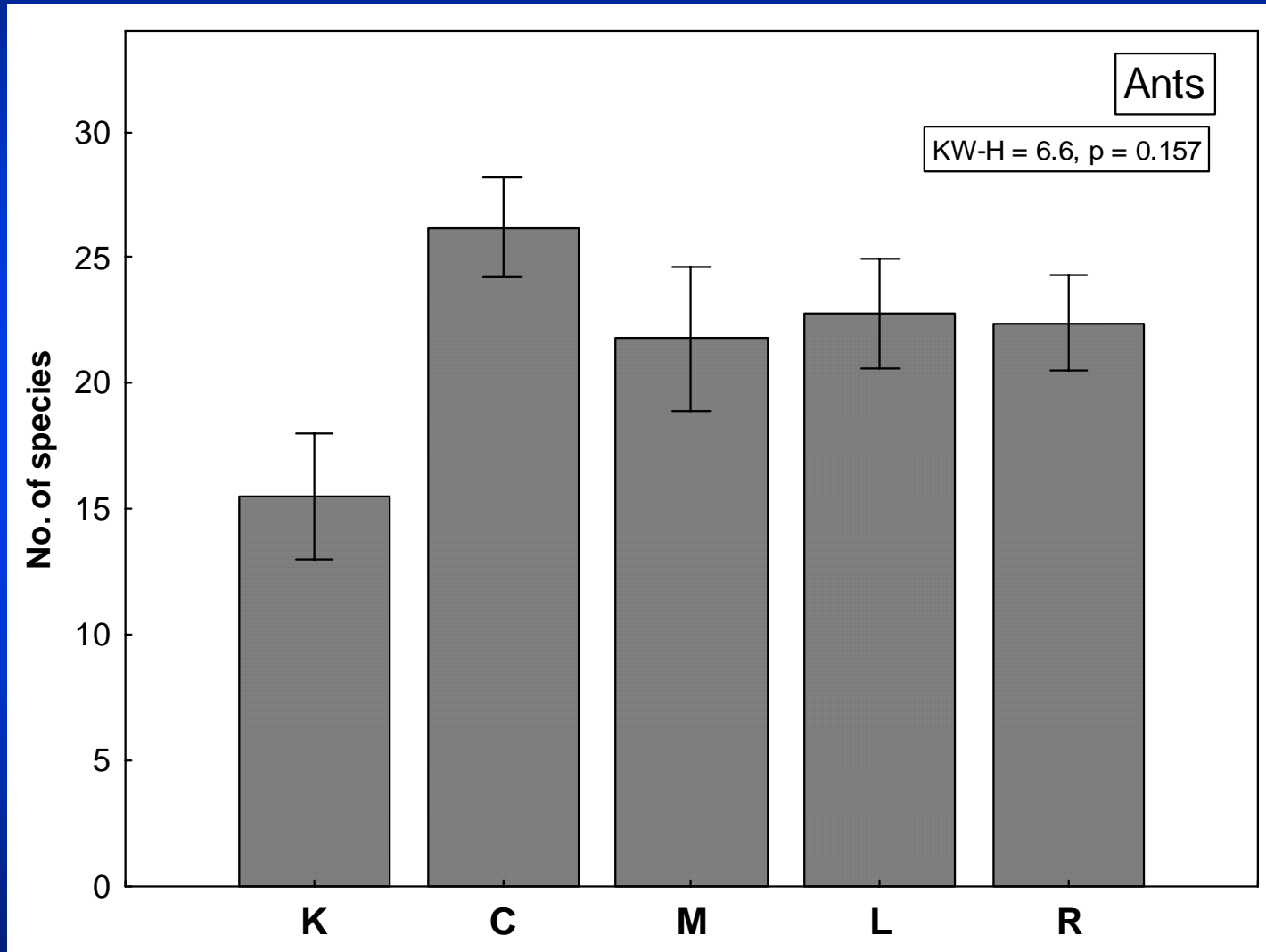
Pheidole 9 spp

CreMATogaster 7 spp

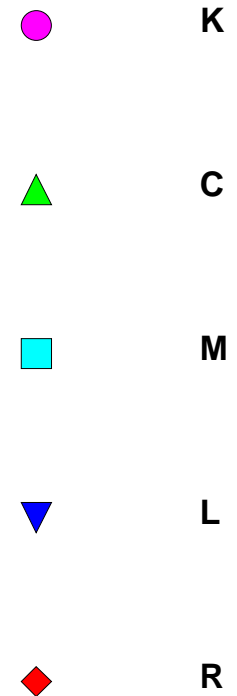
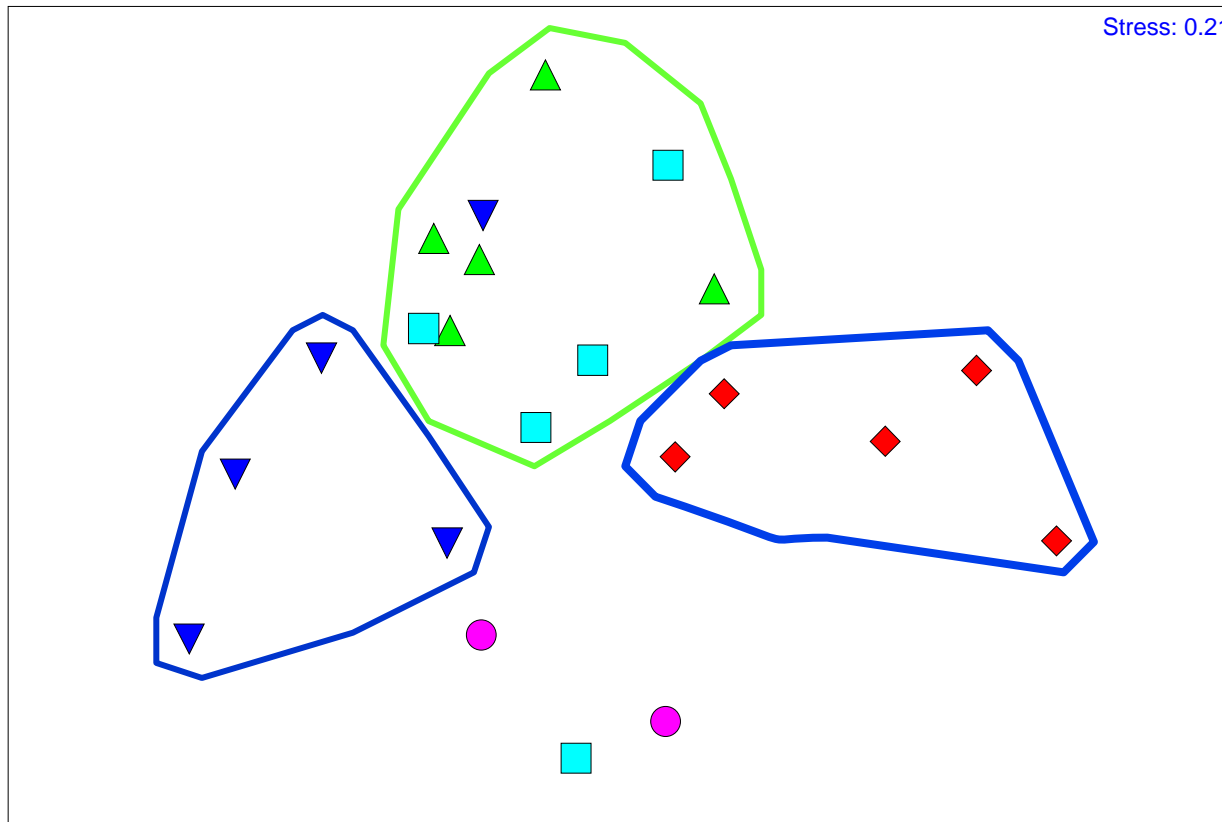
Lepisiota 6 spp



Ant species richness

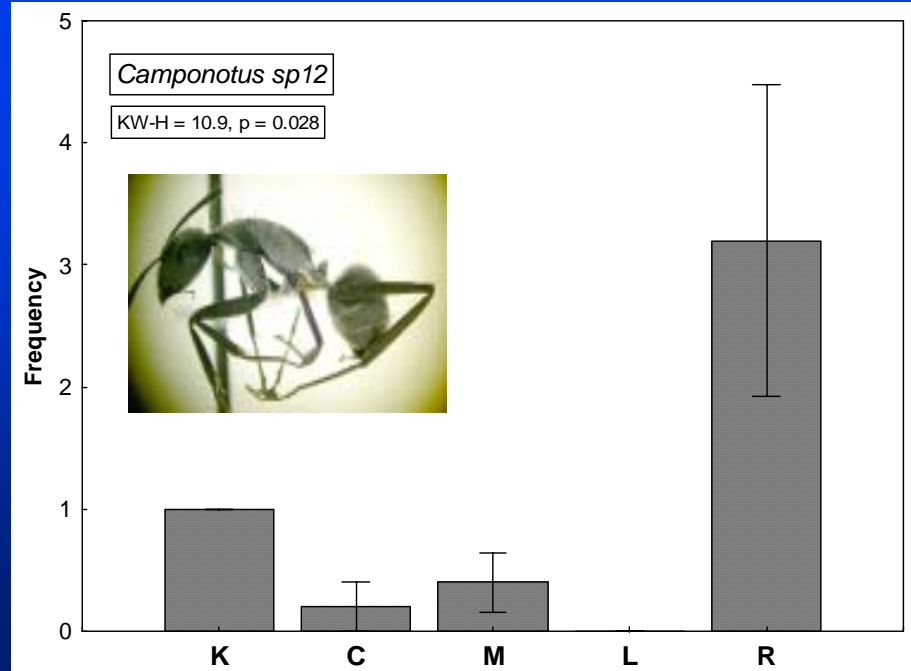
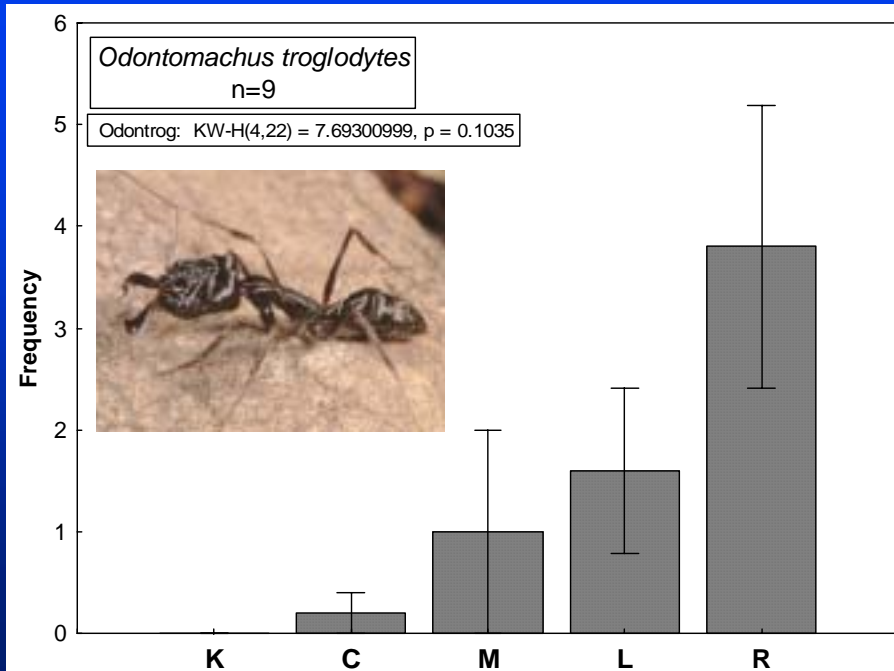
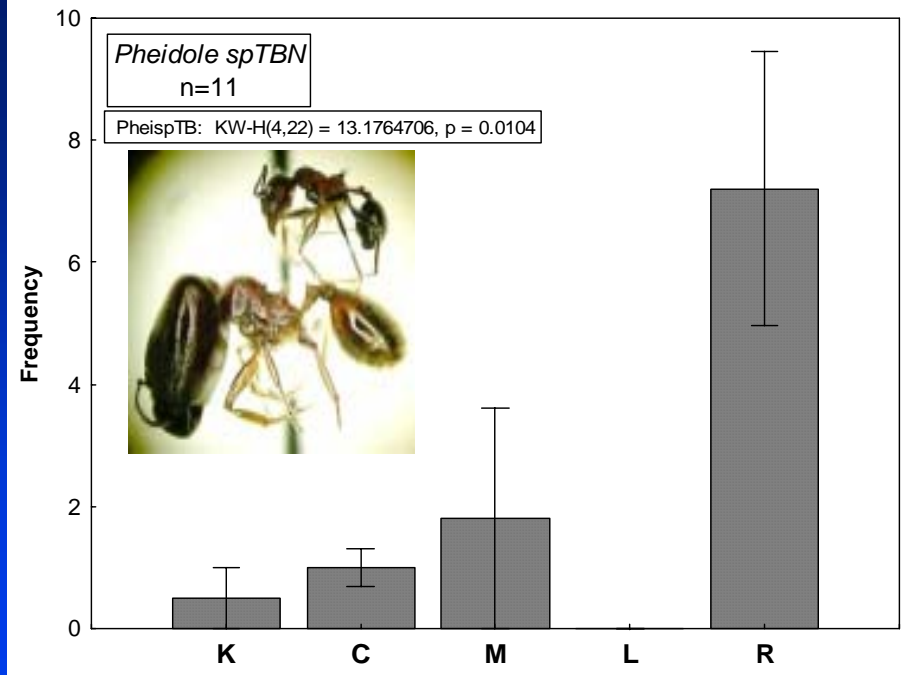


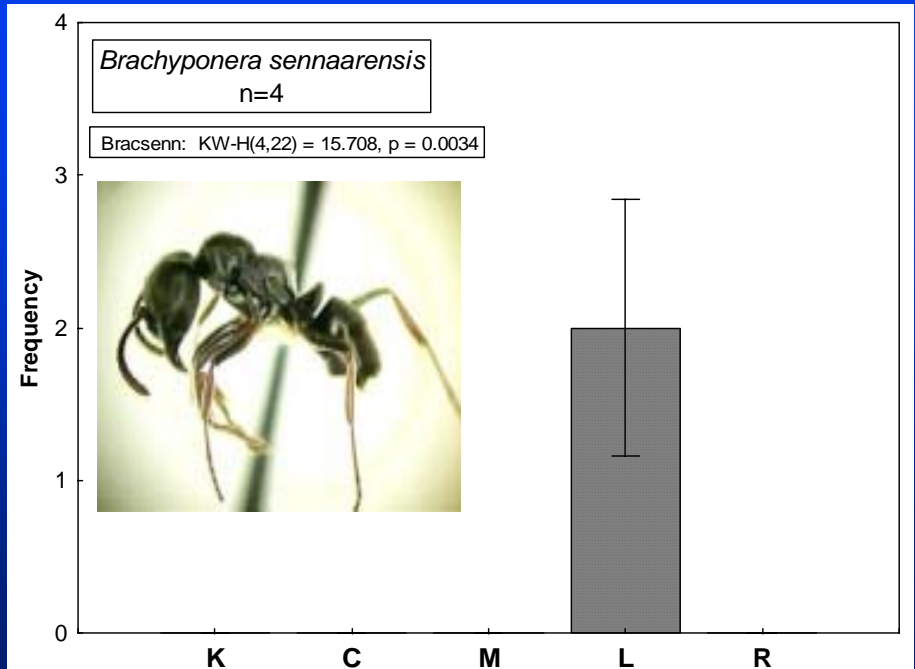
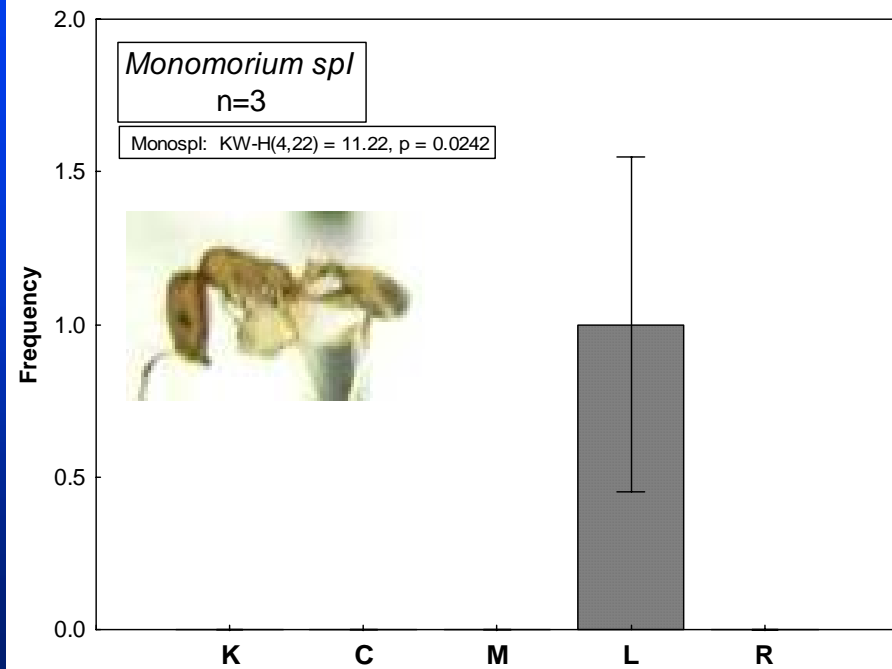
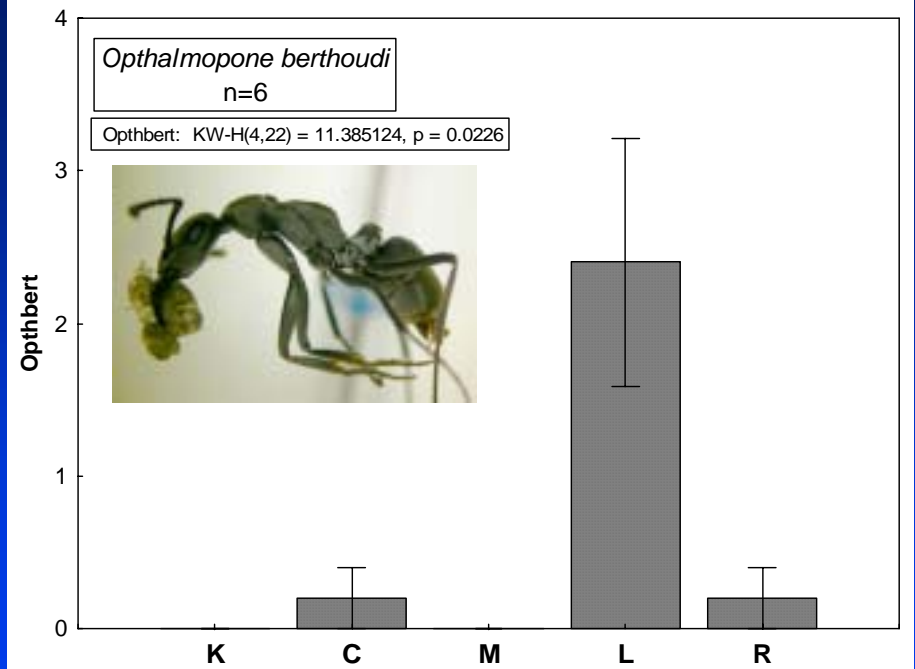
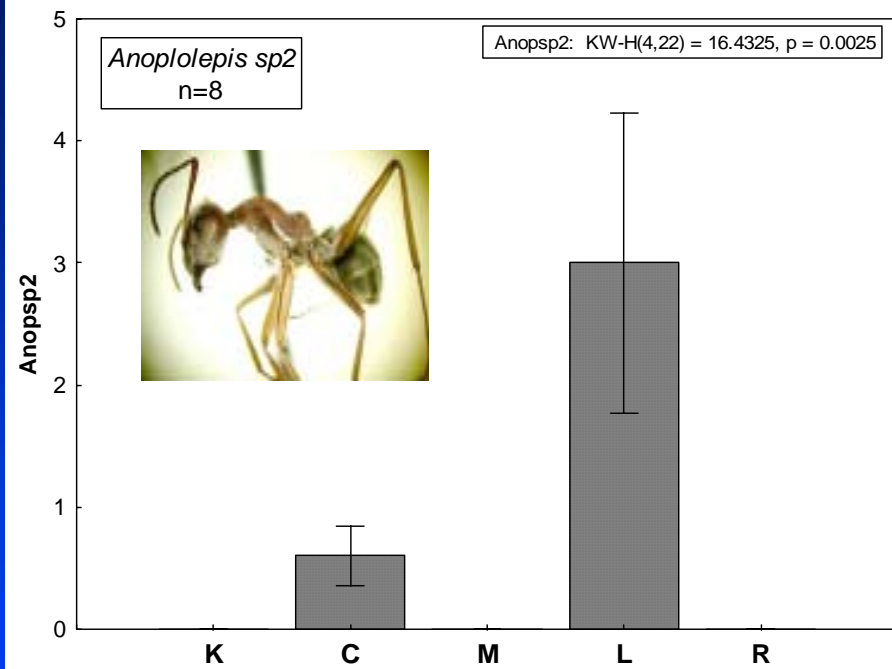
Ant species composition



ANOSIM: $R=0.51$, $P<0.0001$

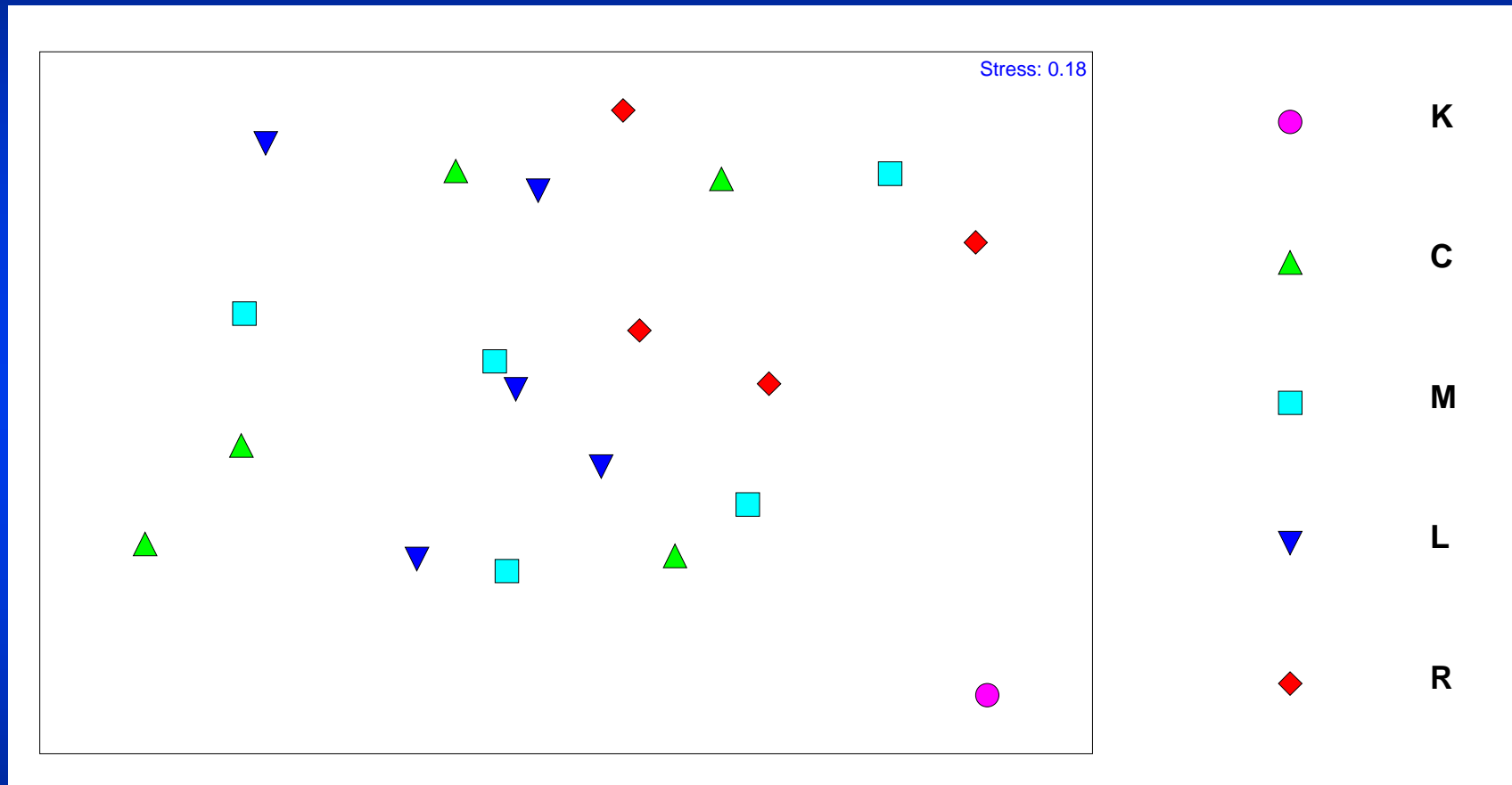
Riparian species





**How well do habitat surrogates predict
spatial variation in (little) fauna?**

Habitat surrogates in relation to landscape position



- ANOSIM R=0.04 P=0.307

Reliability of habitat surrogates

0%

25%

50%

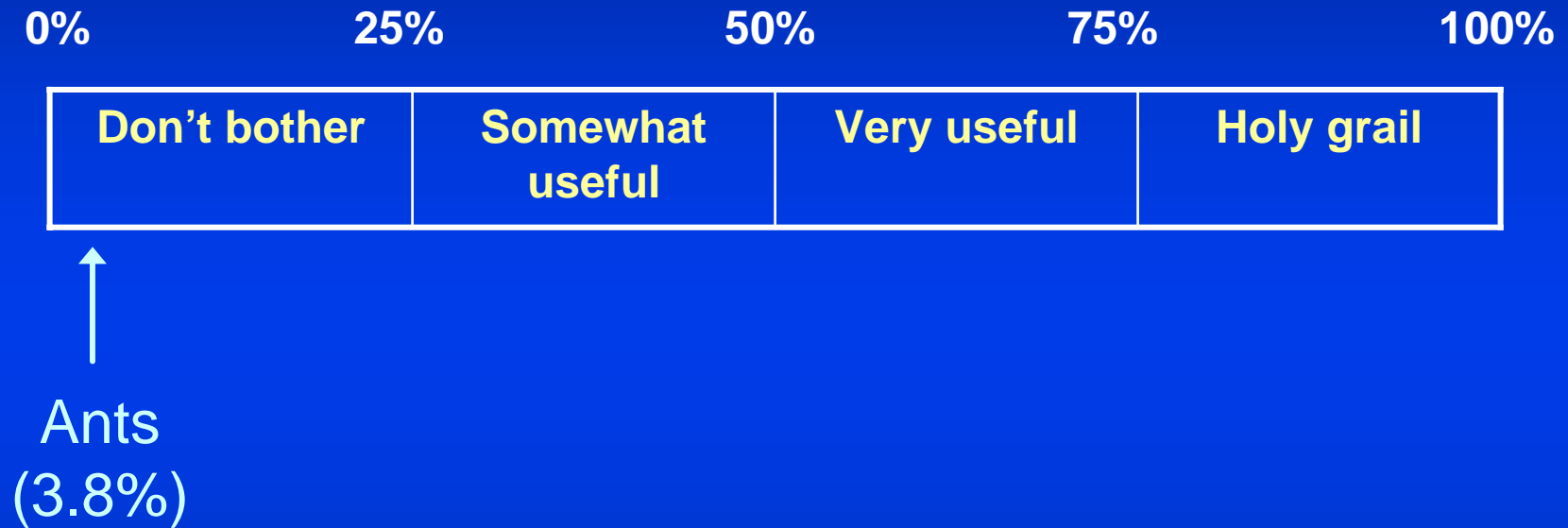
75%

100%

Don't bother	Somewhat useful	Very useful	Holy grail
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Mantel test

Reliability of habitat surrogates



Reliability of habitat surrogates

0% 25% 50% 75% 100%



Vertebrates
(0.1%)

**Fundamental problem facing habitat surrogates:
different taxa perceive 'habitat' so differently**

Vertebrates vs ants: $R^2 = 0.174$

Impossible for a single set of habitat surrogates to
perform well for both taxa

Conclusions

1. Habitat surrogates proved unreliable for small mammals, reptiles, amphibians and ants

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Conclusions

1. Habitat surrogates proved unreliable for small mammals, reptiles, amphibians and ants
2. Even if performed well for one taxon, would perform poorly for the other
3. Directly monitoring (little) fauna is actually not that difficult!

Conclusions

Is the poor performance of habitat surrogates really surprising – would you use soil and rainfall as surrogates for vegetation monitoring?

Acknowledgements

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