FROM CONSERVATION SCIENCE TO CONSERVATION PRACTICE – PRACTICAL EXAMPLES FROM THE BLACK FOREST NATIONAL PA (GERMANY)

Seebach, den 02.05.2024

Jörn Buse, Nationalpark Schwarzwald

BLACK FOREST NATIONAL PARK

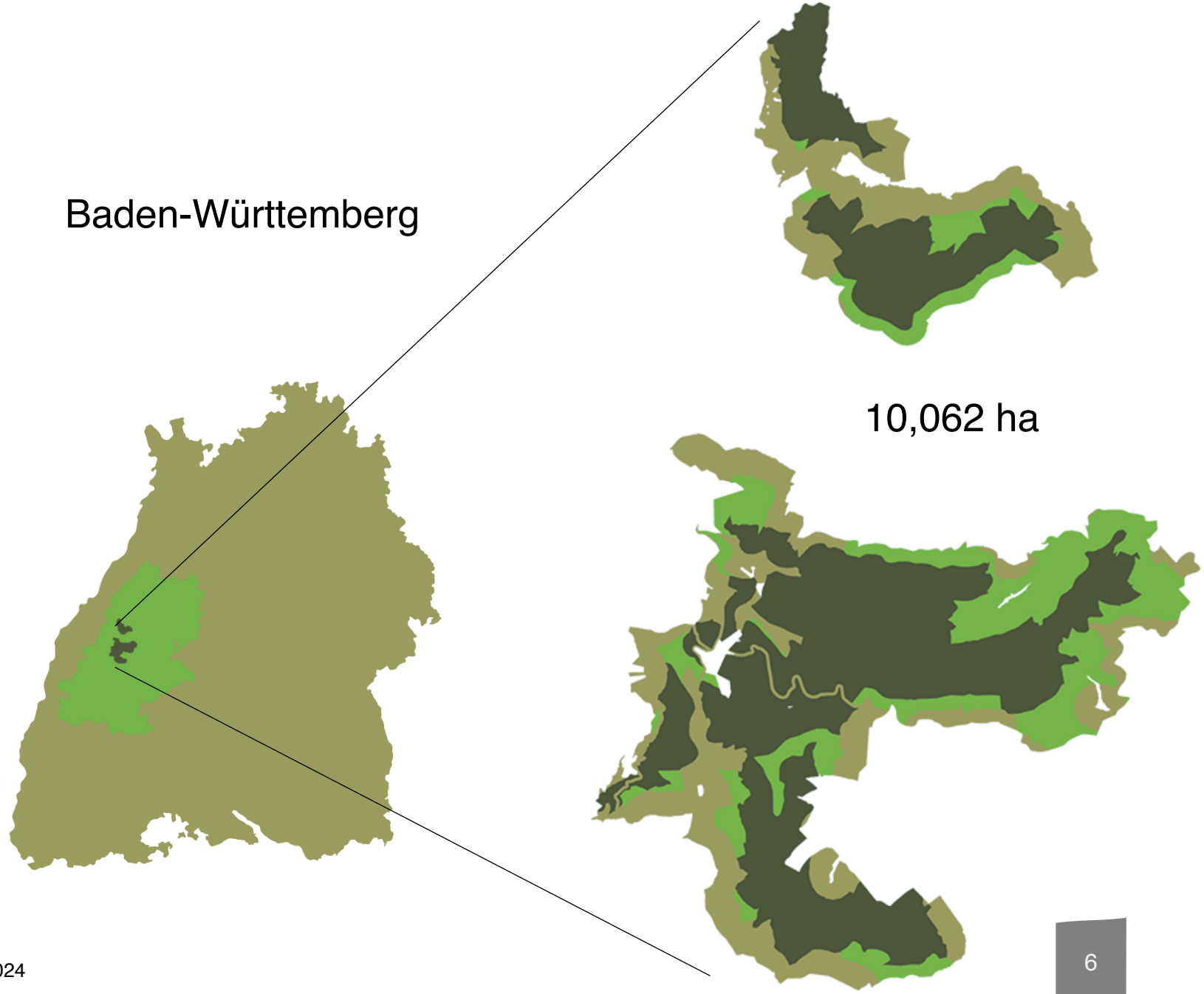
Huzenbach lake

Ochsenkopf (core zone)

BLACK FOREST NATIONAL PARK

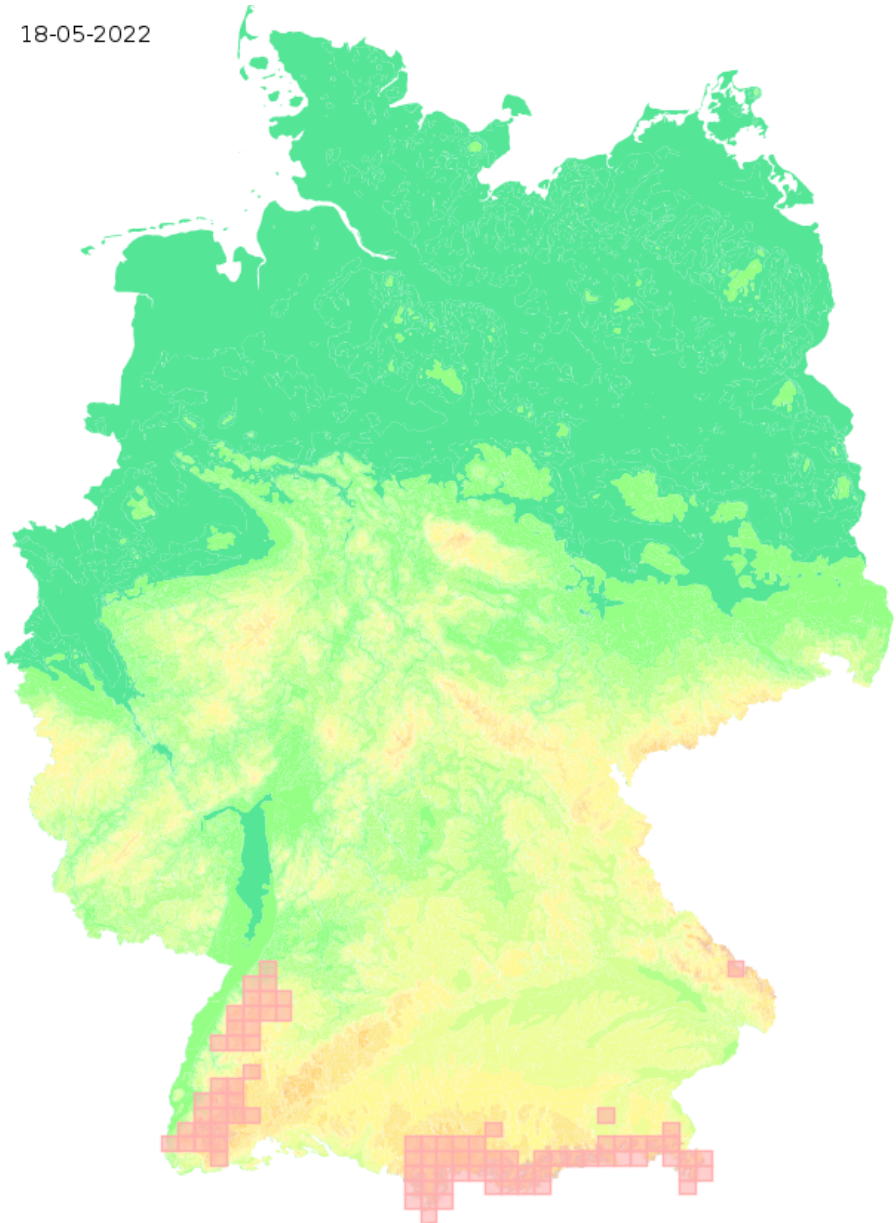
Germany

Baden-Württemberg



10,062 ha

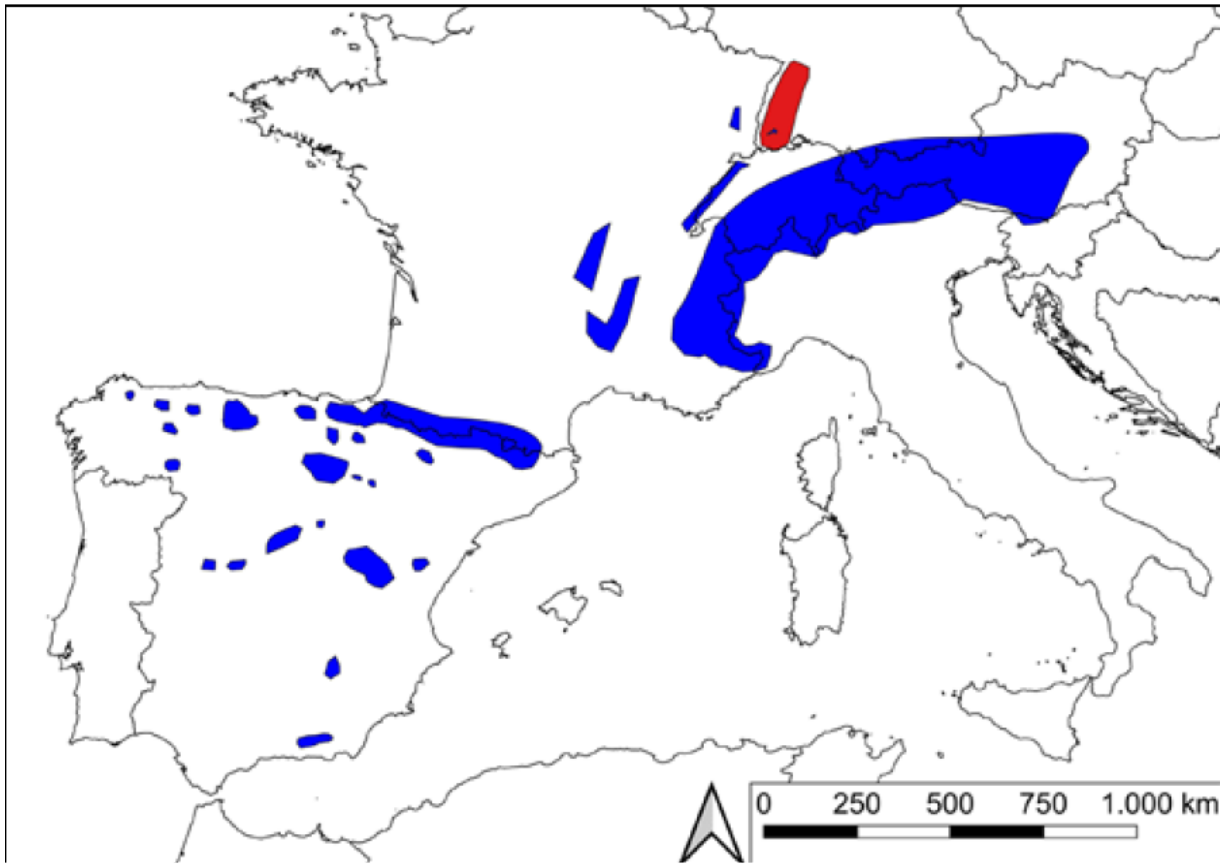
ALPINE GEBIRGSSCHRECKE (MIRAMELLA ALPINA)



German red list: near threatened
Isolated outposts

CITRIL FINCH (CARDUELIS CITRINELLA)

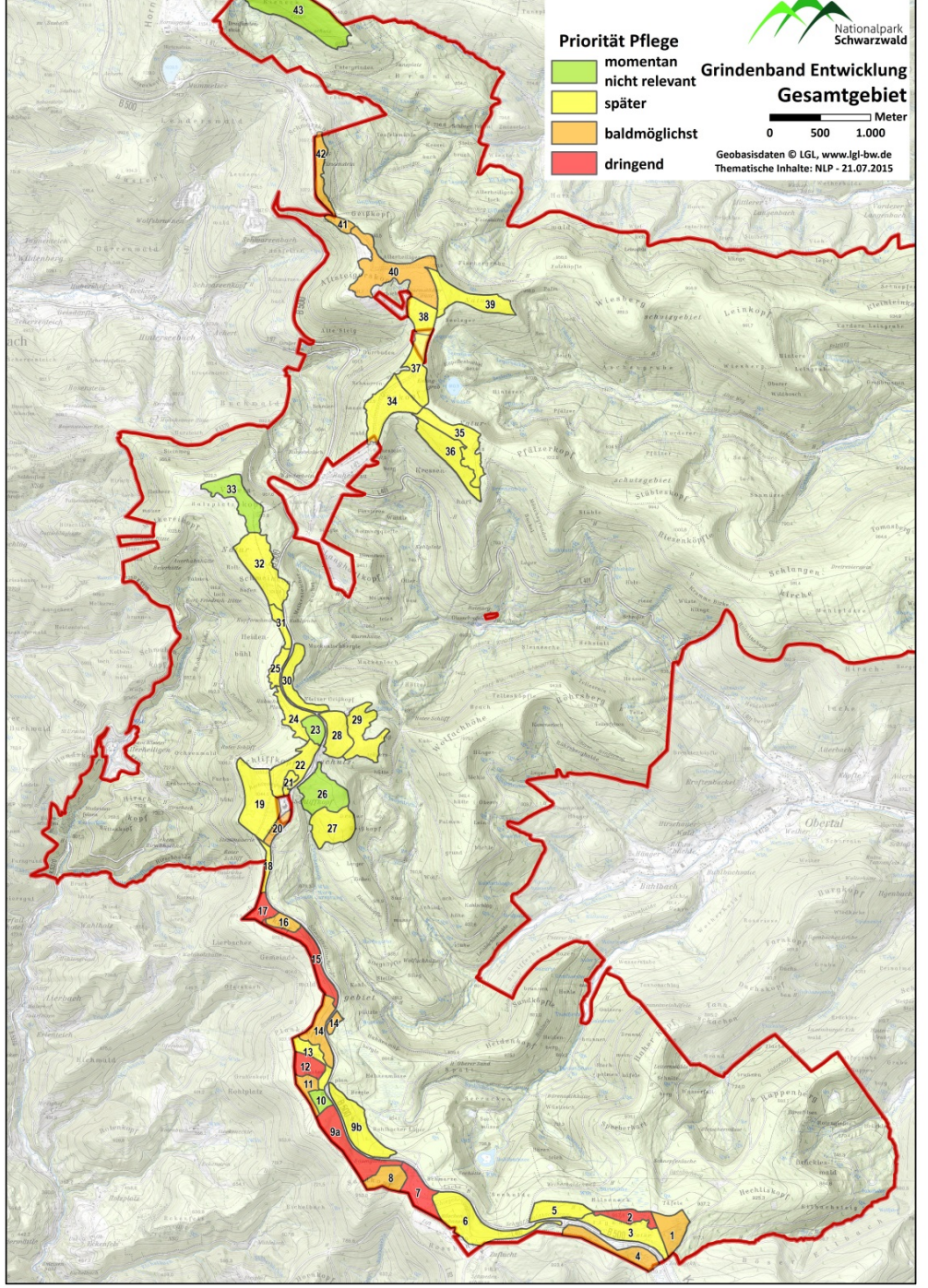
more than 97% population decline in the Black Forest since 1985



Handschuh et al. 2023

MONTANE HEATHLANDS

- intensive forest use
- summer pasture since 1500 AD
- formerly 2,000 ha [200 years ago]
- habitat for threatened species
- EU-wide protected habitat type
- Management zone in the National Park



Nationalpark Schwarzwald

Species richness

at one specific site:

???

GROUP	TAXA
Spiders	41
Beetles	197
Flies	1045
Bees & wasps	599
Moth & butterflies	208
Leafhoppers & bugs	161
others	65
	2316

Nationalpark Schwarzwald

Species richness

at one specific site:

> 2,300 taxa of insects and arachnids

KONIK HORSES

Fotos: Thomas Gamio

CATTLE

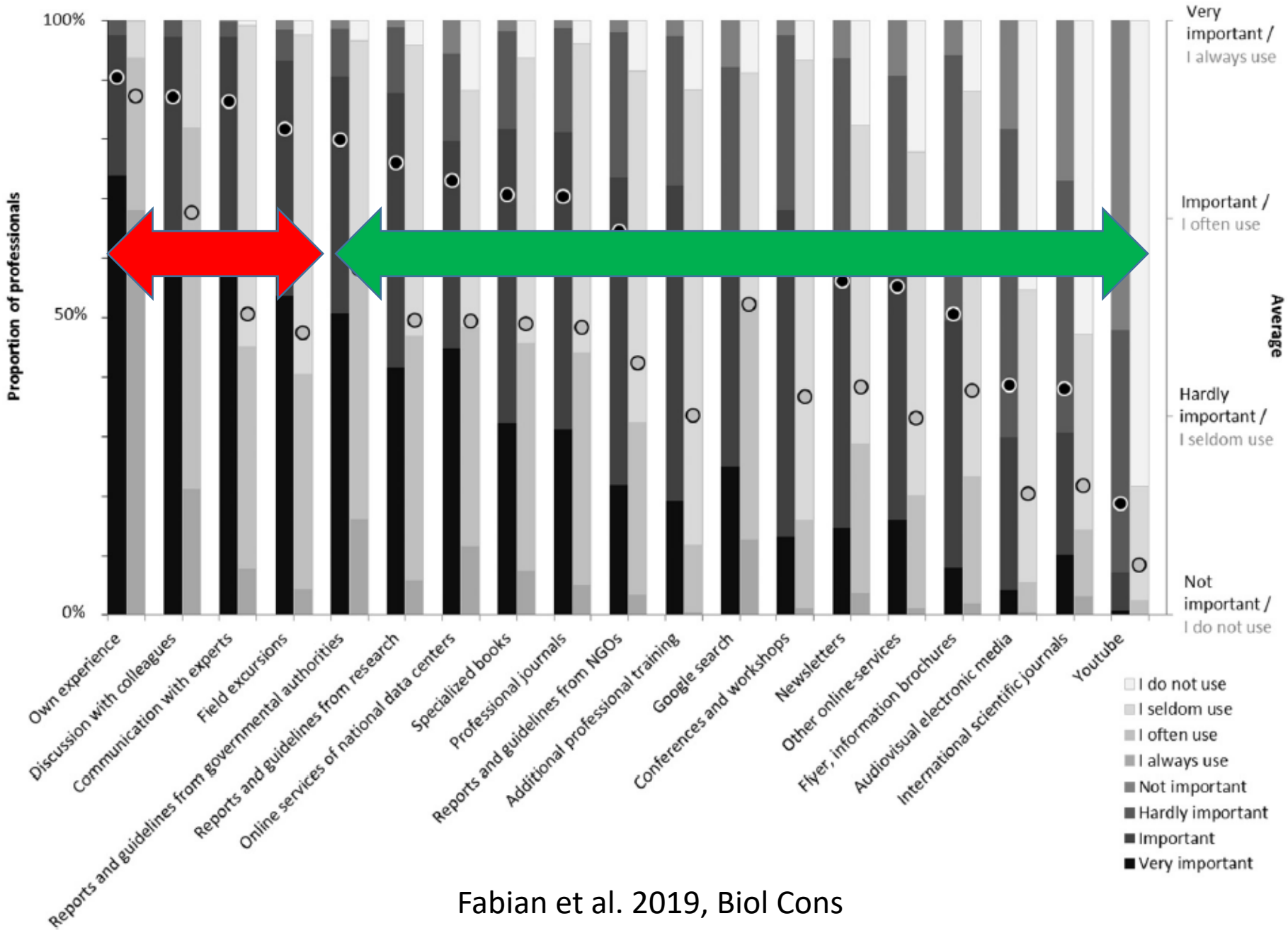
Fotos: J. Buse

SHEEP

Fotos: J. Buse

Restored heathland

Importance of information sources by conservation professionals



Experience-based
vs
evidence-based
information

Fabian et al. 2019, Biol Cons

Systematic conservation planning

1) Compile data on the biodiversity of the planned region

2) Identify conservation goals for the planning region

3) Review existing conservation areas

4) Select additional conservation areas

5) Implement conservation actions

6) Maintain the required values of conservation areas

Margules & Pressey 2000, Nature

Nature reserve (est. 1986)

Systematic conservation planning

1) Compile data on the biodiversity of the planned region

Species inventory LIFE project 2002-2003

2) Identify conservation goals for the planning region

3) Review existing conservation areas

National Park (est. 2014)

4) Select additional conservation areas

5) Implement conservation actions

Management?

6) Maintain the required values of conservation areas

Margules & Pressey 2000, Nature

Extent and location of areas

Fail or success?

Data on species presence and abundance

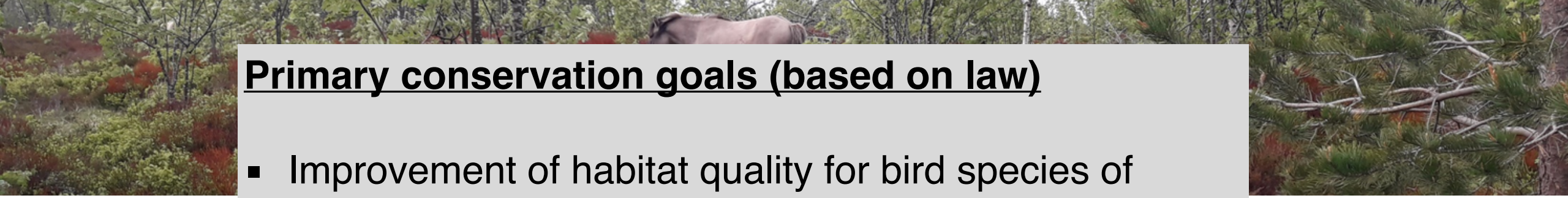
Monitoring

Conservation goals

Review of existing conservation measures

Conservation measures

Fail or success?



Primary conservation goals (based on law)

- Improvement of habitat quality for bird species of conservation concern (NATURA 2000)
- Maintenance and improvement of EU-wide protected habitat types (Montane heathlands)

Possible further goals

- Maintenance of species with specific responsibility (e.g. biogeographical outposts, threatened)
- Increase ecosystem resilience
- Maximize biological diversity (alpha, beta)

Data on s
presenc
abunda

Review of
conserv
measu

Conservation goals

MAIN GOALS FOR ECOLOGICAL MONITORING OF MONTANE HEATHLANDS

- **Species inventory**

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- Species inventory
- **Interactions between species and characterisation of community structures**

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- **Temporal and spatial changes: effects of land use and climate**

MAIN GOALS FOR ECOLOGICAL MONITORING OF MONTANE HEATHLANDS

- Species inventory
- Interactions between species and characterisation of community structures
- Temporal and spatial changes: effects of land use and climate
- **Management options and recommendations**

REPRESENTATIVE SET OF SAMPLING SITES

Selection criteria

- wet – dry conditions (soil map)
- 6 types of land use: cattle grazing, sheep grazing, horse grazing, mechanical measures, wood pasture, restored heathland

6 types of land use x each 6 replicates = 36 sampling sites

MONITORING MONTANE HEATHLANDS

Jörn Buse. Symposium Dynamic Nature, Copenhagen 02.05.2024

Invertebrates

arthropod biomass (2021)

ground beetles (2021)

epigeic spiders (2021)

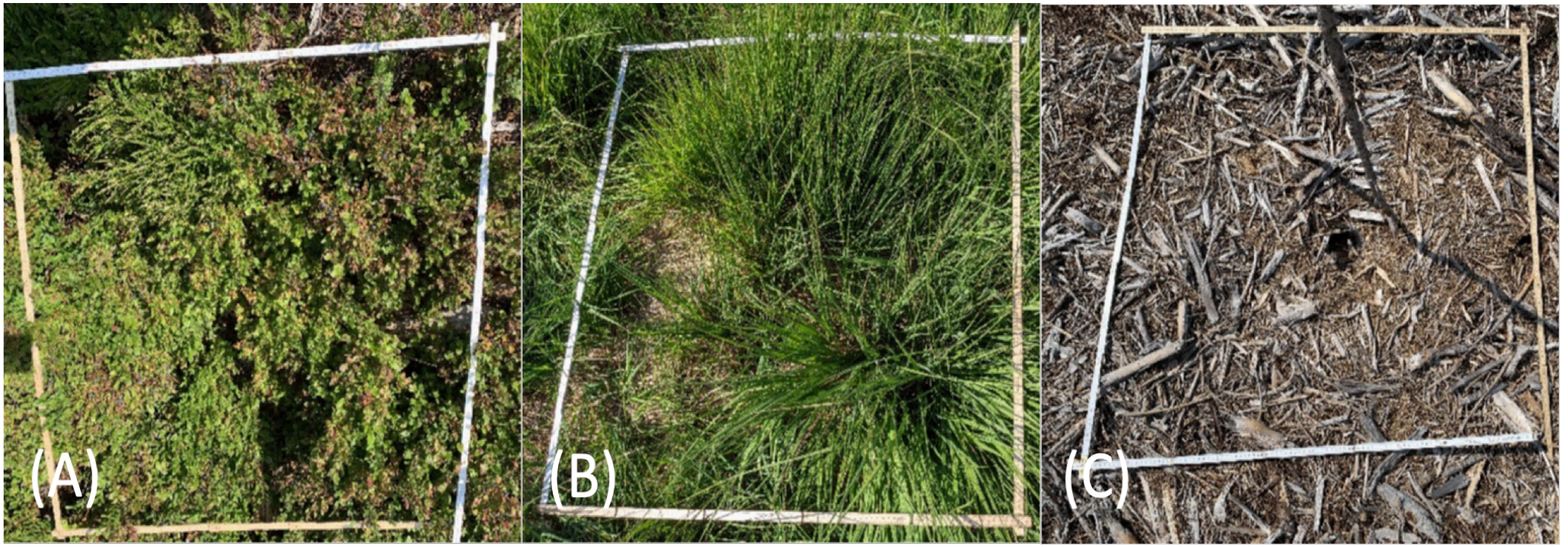
butterflies (2022)

leafhoppers (partly) (2019)

dung beetles (partly) (2018-2021)

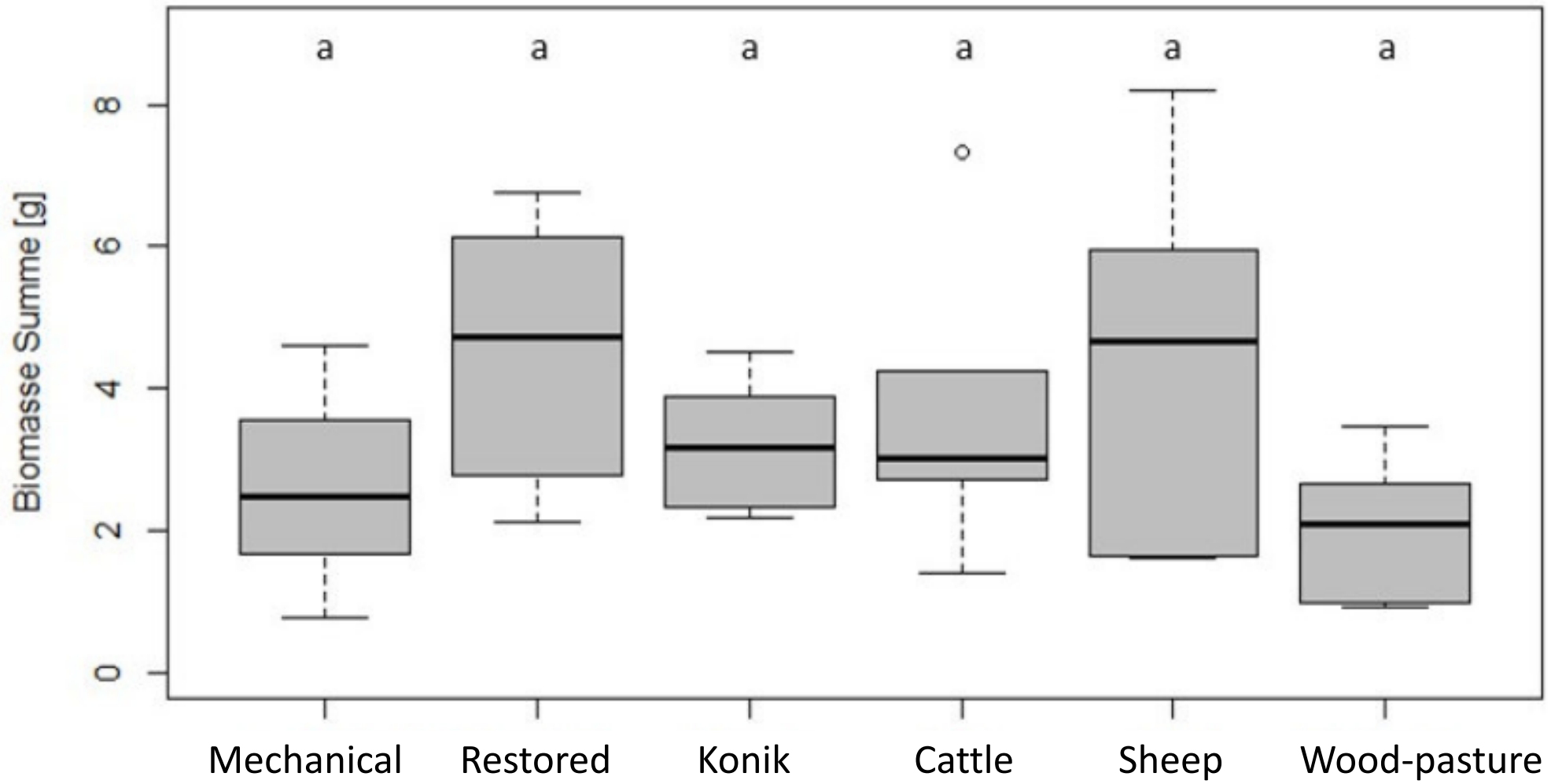
Vegetation structure (2022-23)

Birds (2022-2023)



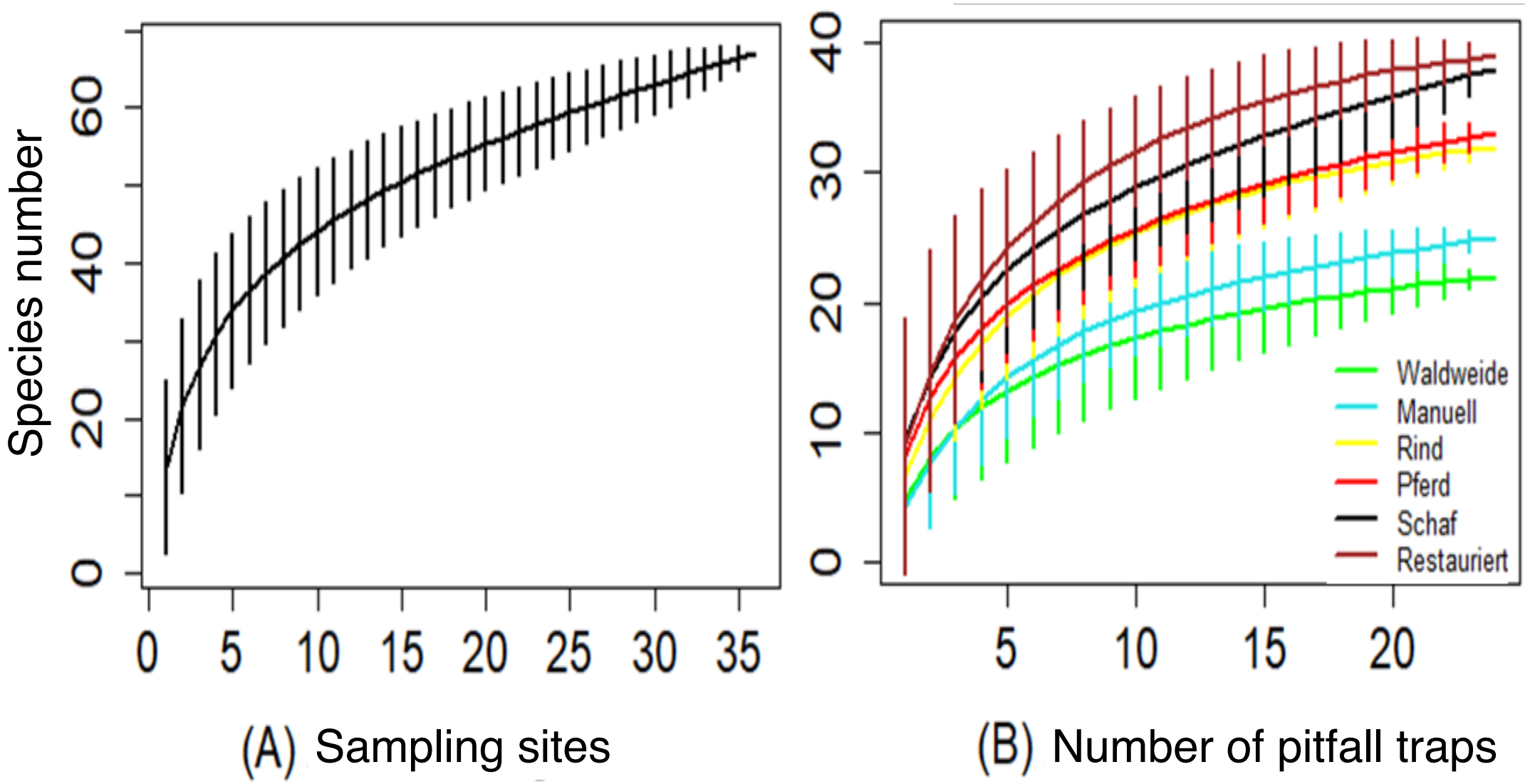
Shrub-dominated | Grass-dominated | bare soil / less vegetation

MONTANE HEATHLANDS – EFFECTS OF MANAGEMENT ON ARTHROPOD BIOMASS



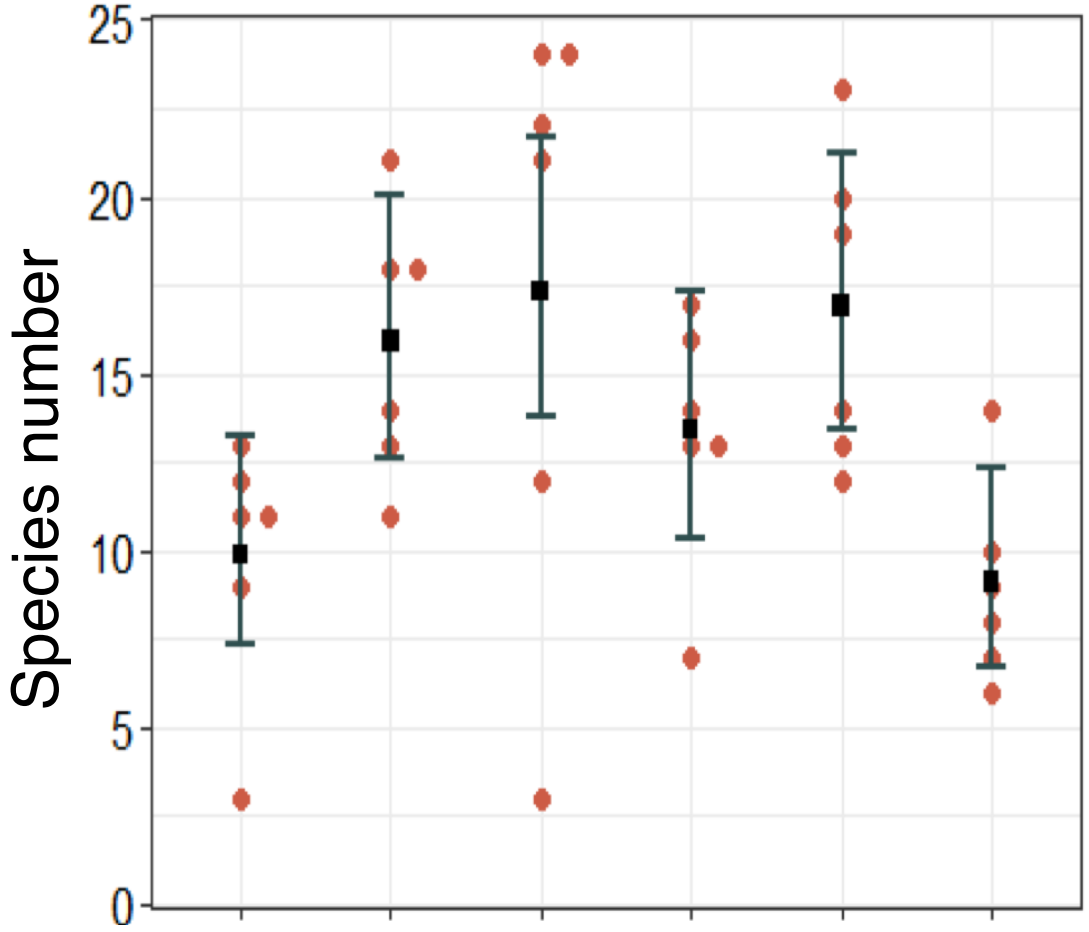
Master thesis K. Friederich

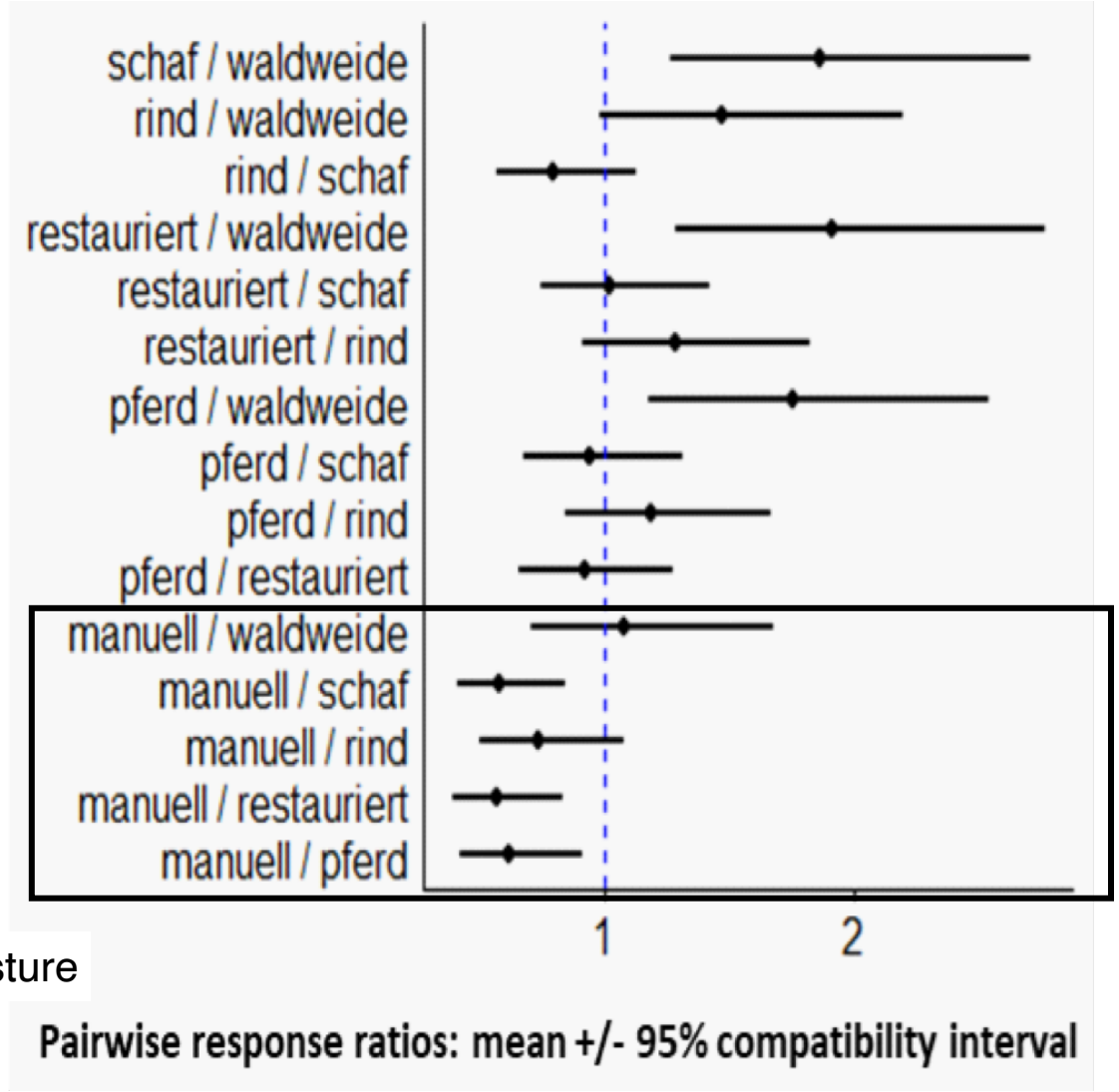
MONTANE HEATHLANDS – GROUND BEETLE SPECIES RICHNESS



Master thesis T. Kimmich

MONTANE HEATHLANDS – EFFECTS OF LAND USE ON GROUND BEETLES





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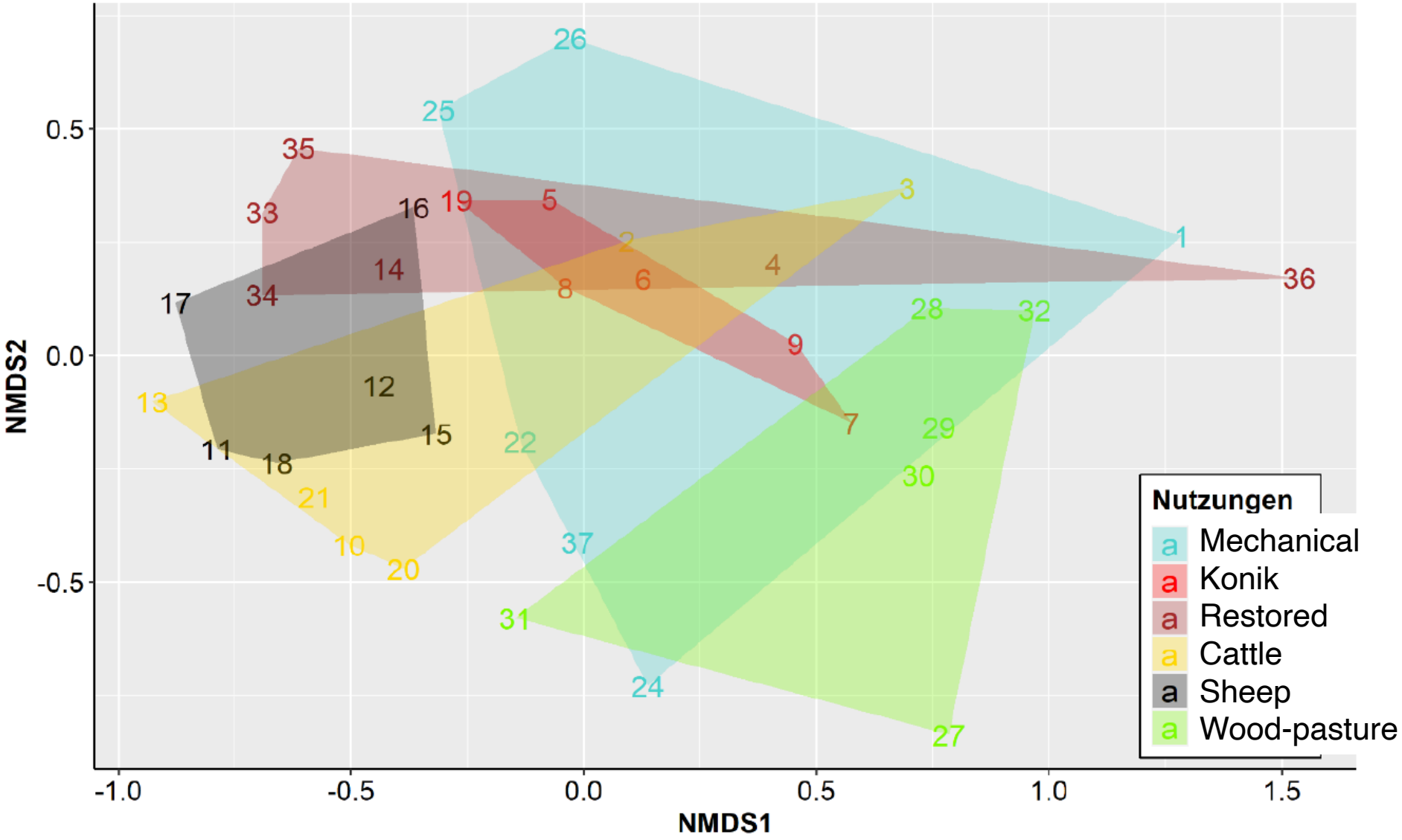
MONTANE HEATHLANDS – EFFECTS OF MANAGEMENT ON GROUND BEETLES



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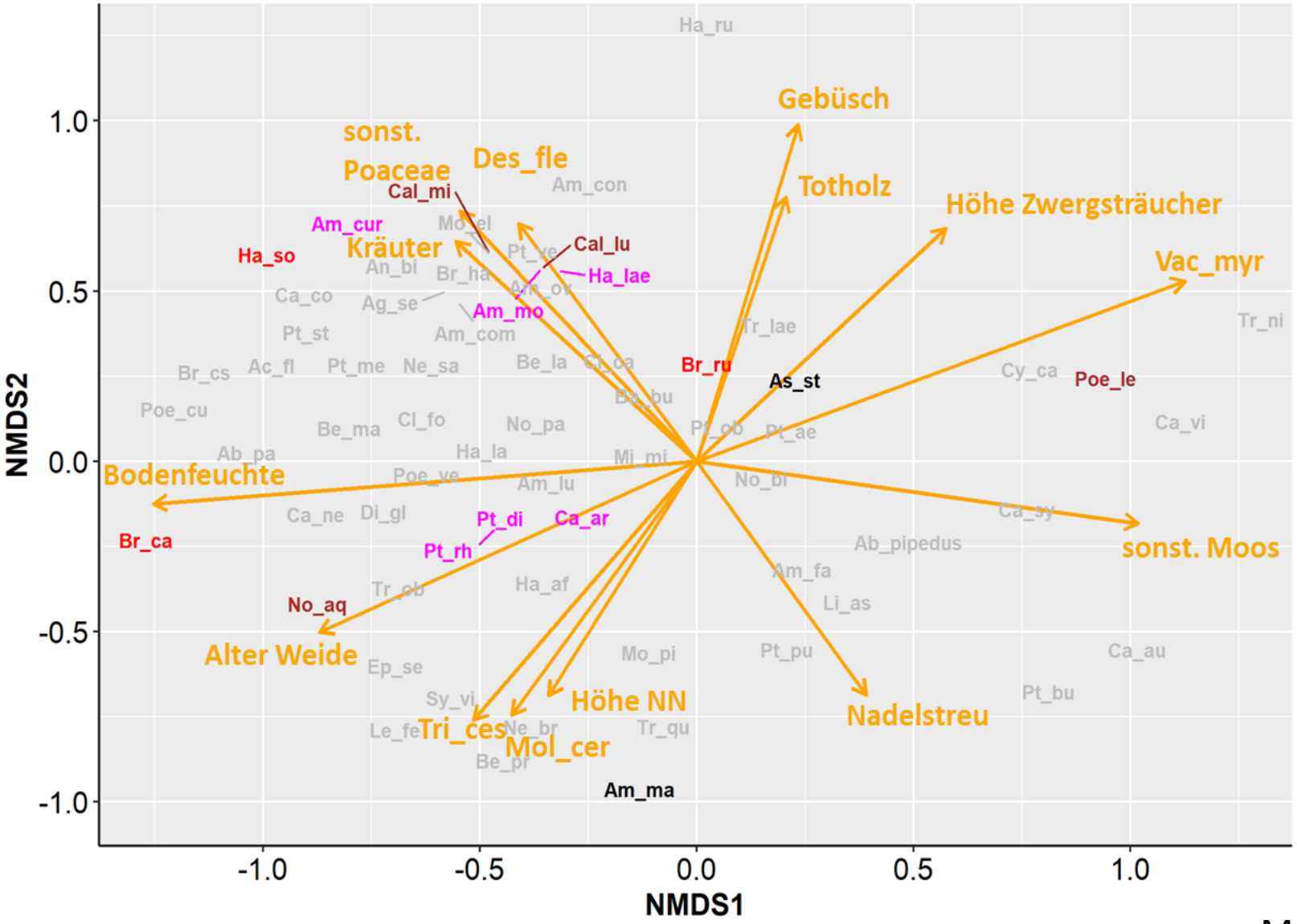
MONTANE HEATHLANDS – EFFECTS ON RED-LISTED SPECIES



RL BW

a	2
a	3
a	V
a	neu
a	*

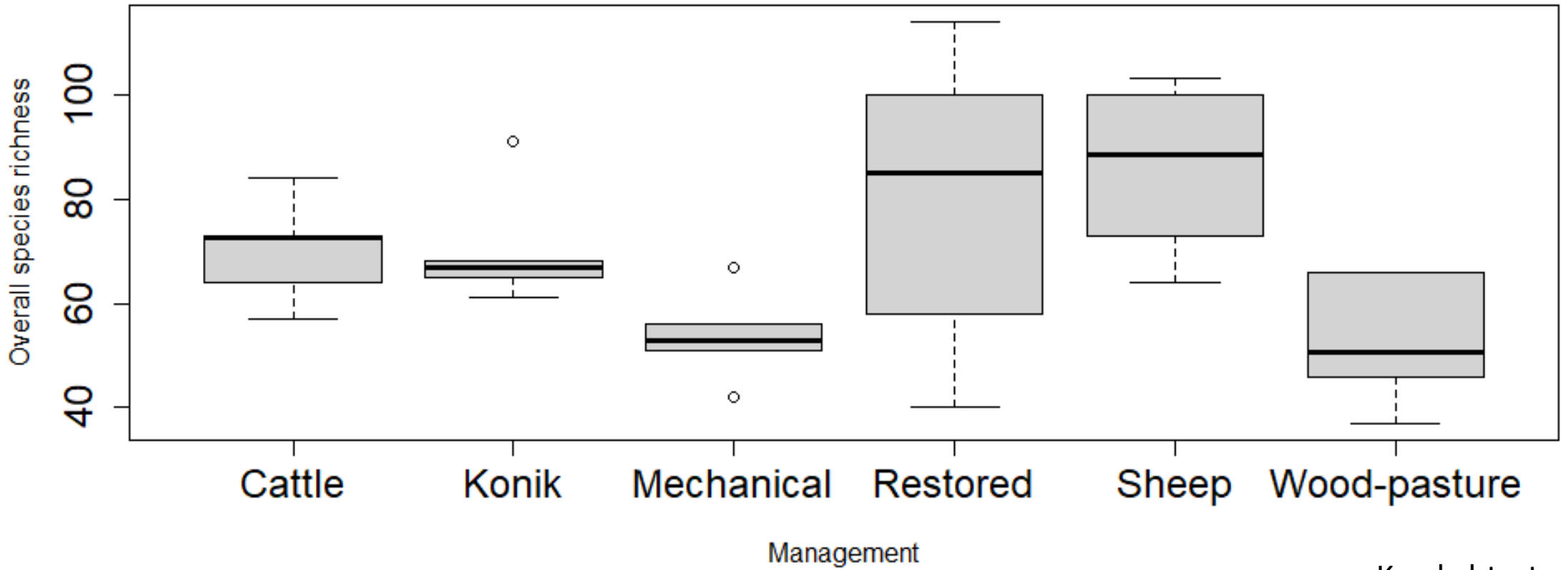
+ herb cover
+ grass cover
+ soil humidity

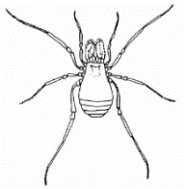
- moss cover
- shrub height
- litter layer height

Bradycellus caucasicus

Master thesis T. Kimmich

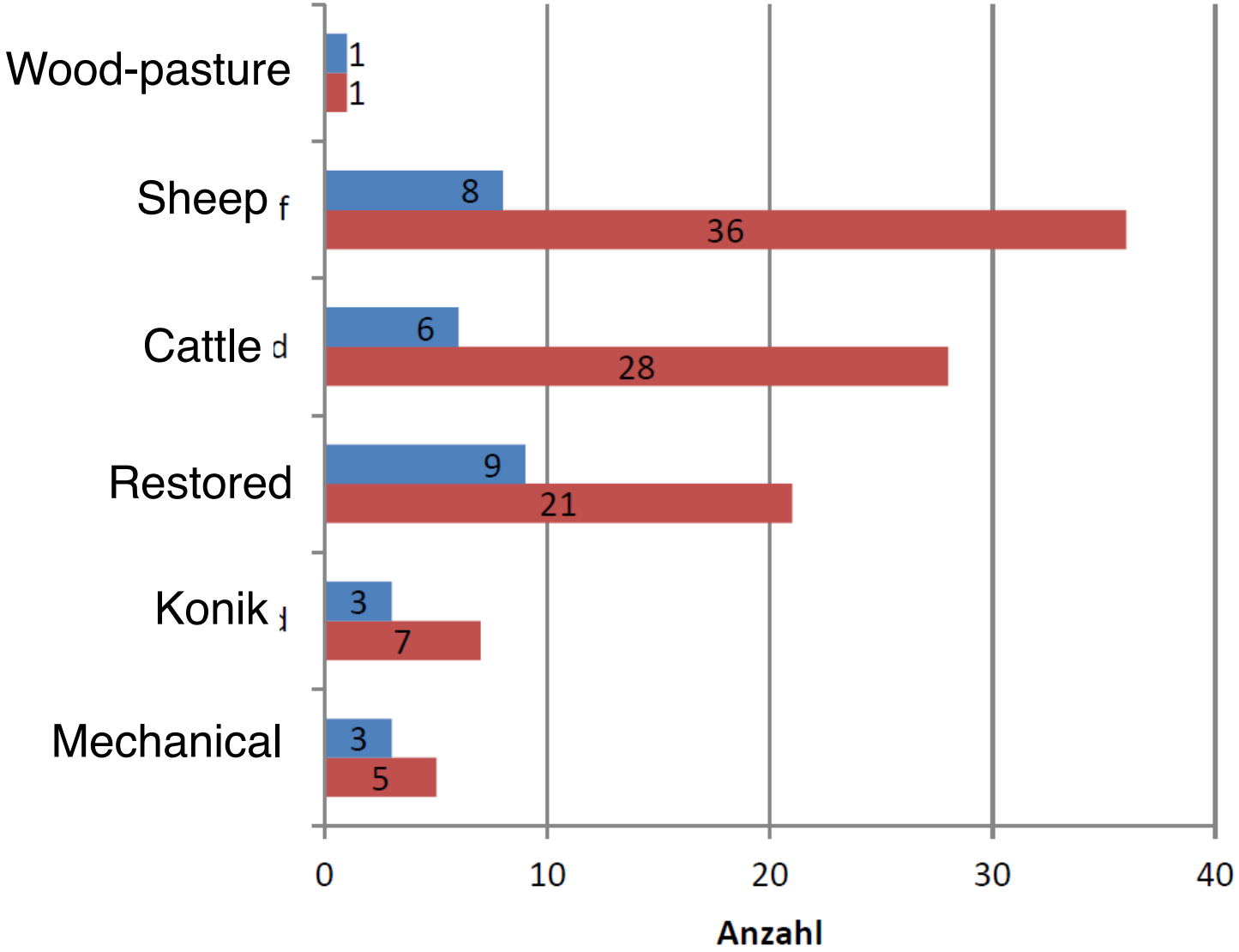
MONTANE HEATHLANDS – EFFECTS OF MANAGEMENT ON OVERALL RICHNESS (408 TAXA)

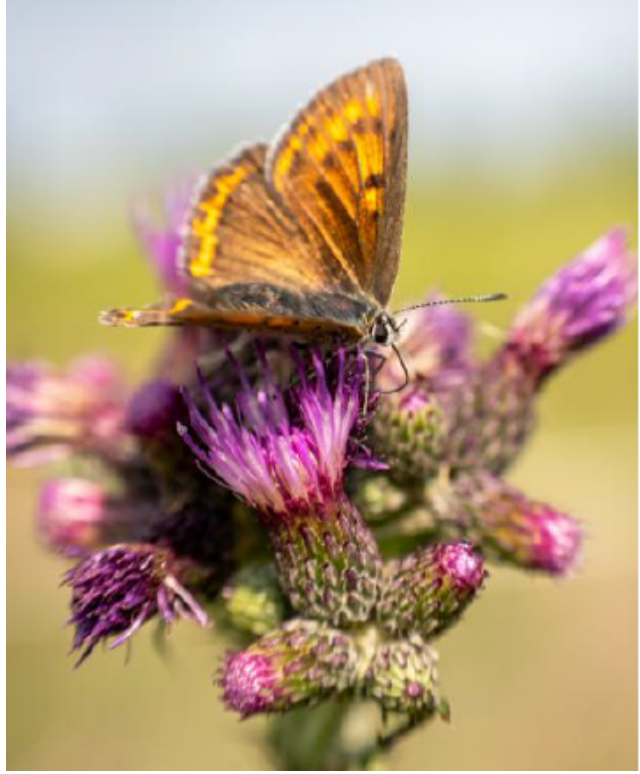




Kruskal-test p = 0.006

MONTANE HEATHLANDS – EFFECTS OF MANAGEMENT ON THREATENED BUTTERFLIES





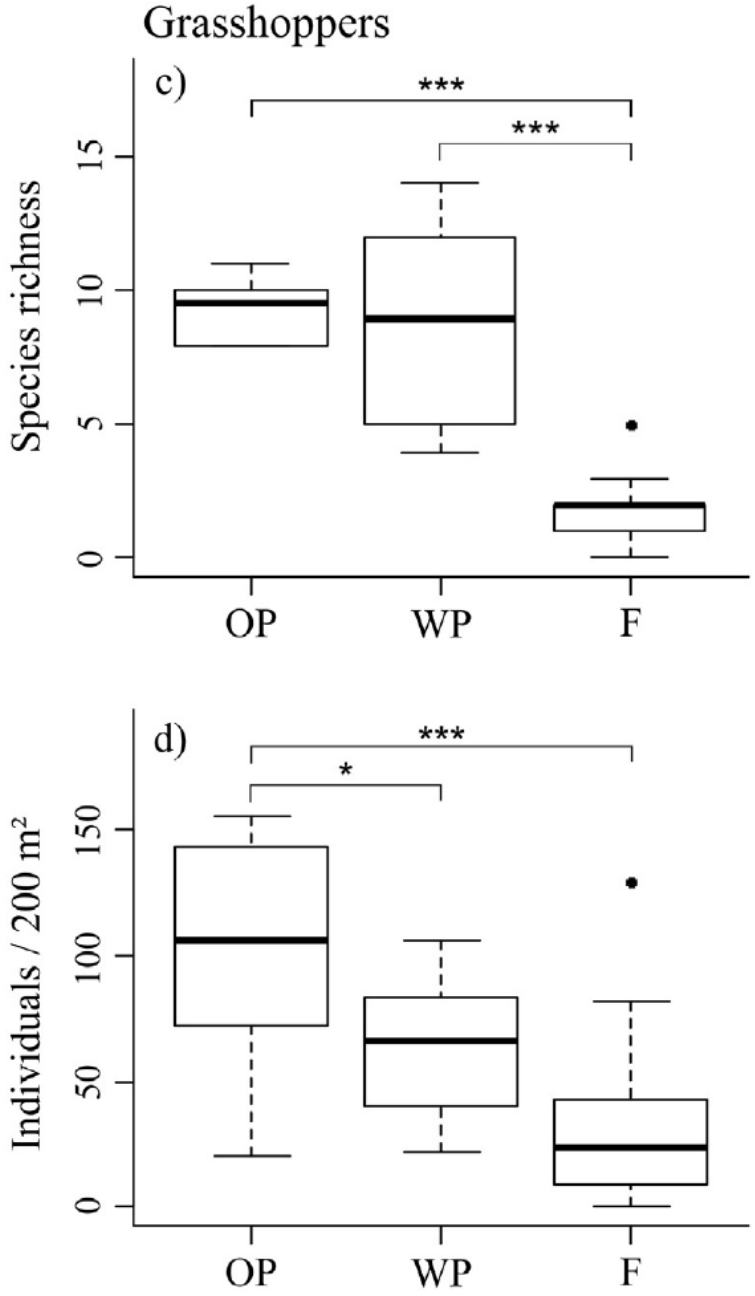
Purple-shot copper (*Lycaena alciphron*)

Bachelor thesis S. Habermann

WOOD-PASTURE AND GRASSHOPPERS

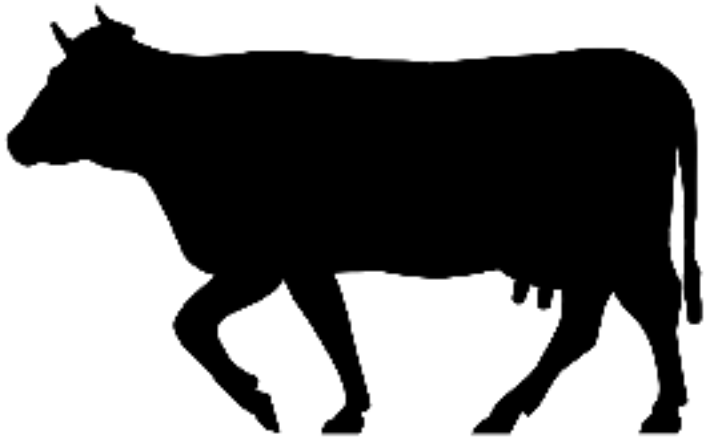
Wood-pasture bridges open habitat and forest

OP = open
WP = Wood-pasture
F = Forest



Rösch et al. 2019

LARGE HERBIVORES SUPPORT INSECT BIOMASS

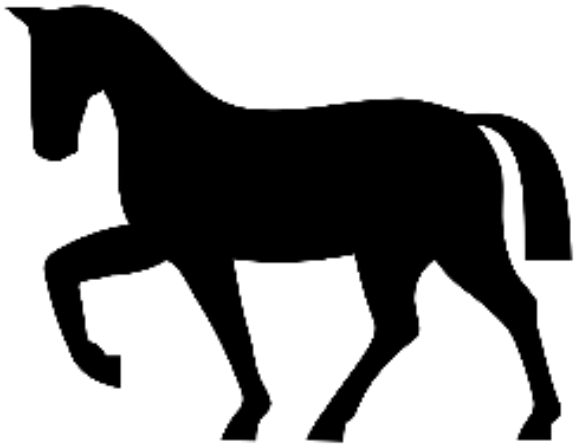


Laurence (1954);

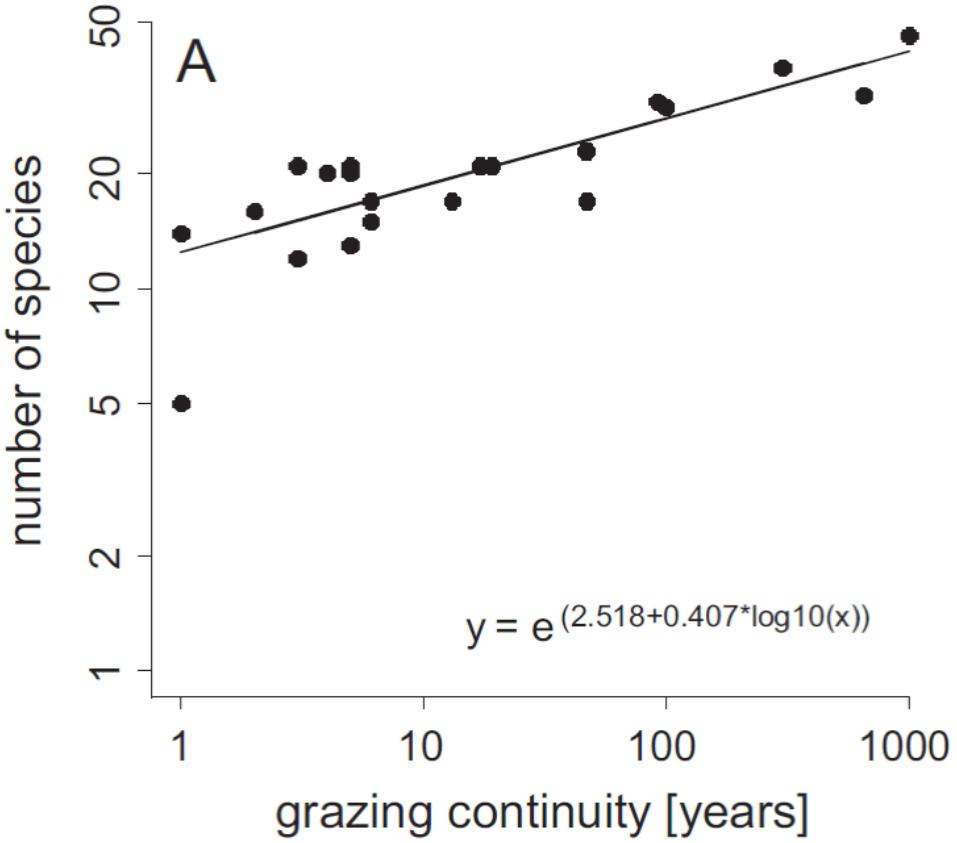
6 dung pats / d → 2190 pats/ year

1000 insects per dung pat

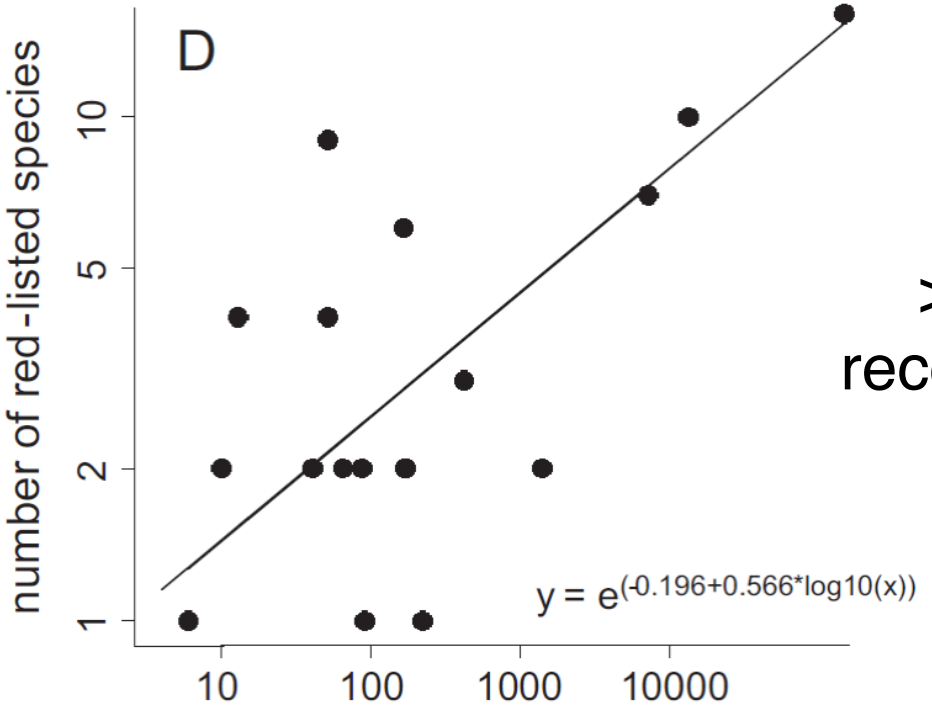
~ 2 Mio. insects / cattle / year = <u>100 kg</u>



9500 dung beetles in dung pat (Döberitzer Heide)
(Buse et al. in press)



Grazing continuity supports species richness

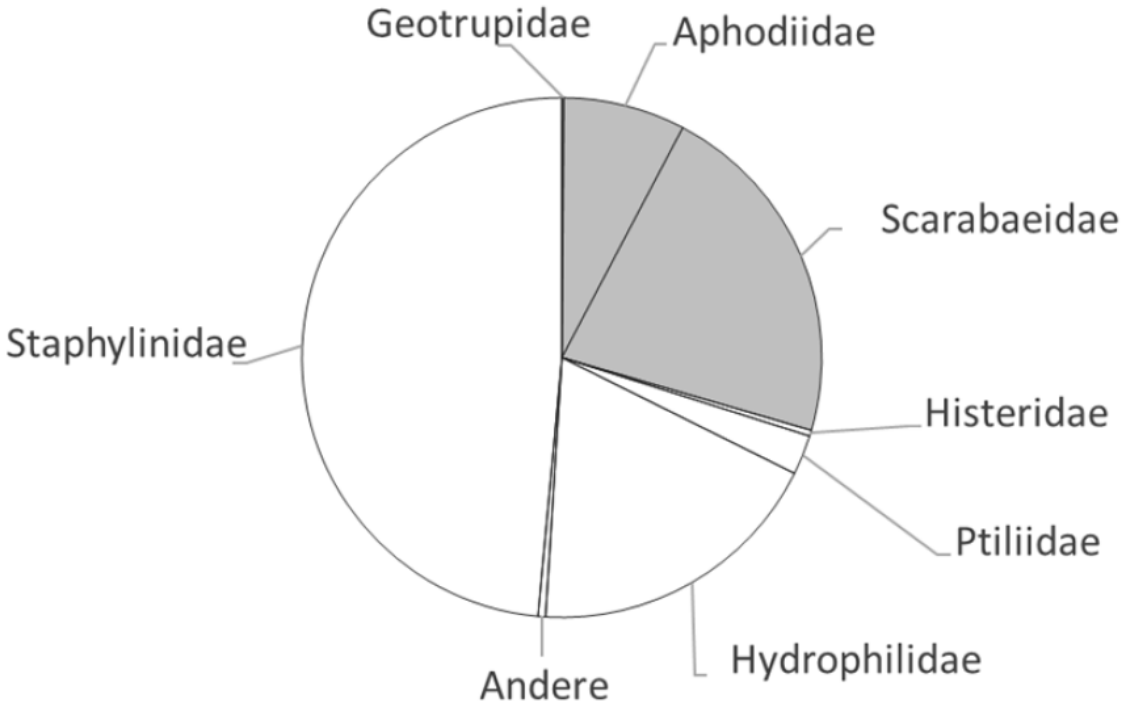


> 100 ha recommended

Large pastures promote threatened species

Buse et al. 2015, *Biol Cons*

KONIK GRAZING



Relative abundance of taxa (n = 40 dung pats)

<u>Taxa in local dung</u>

25 dung beetle species (Geotrupidae, Scarabaeidae)
58 rove beetle species (Staphylinidae)
60 coprobiotic fungal species

Master thesis A.-K. Klotz 2020

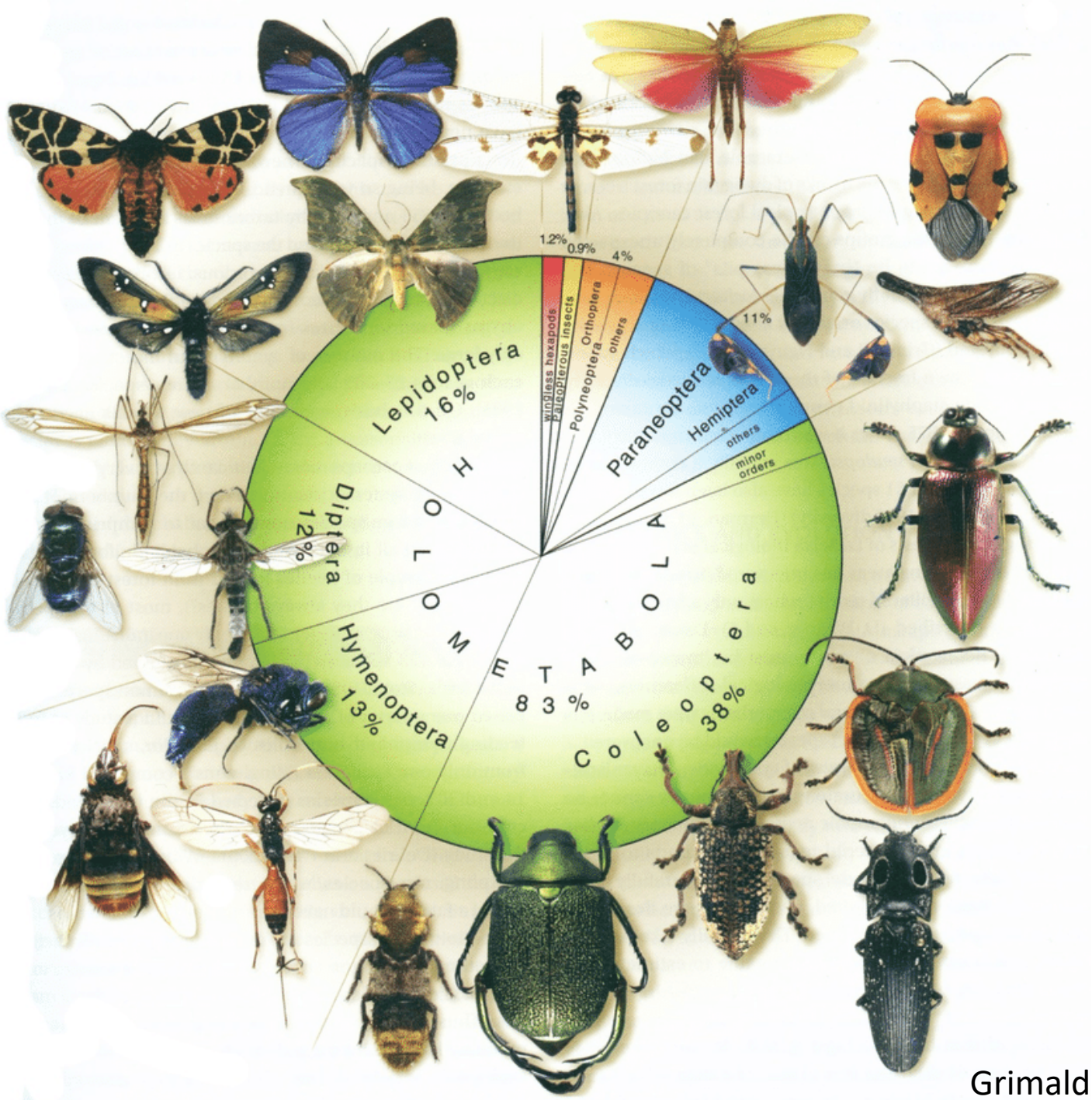
PRELIMINARY CONCLUSIONS FOR MANAGEMENT

- low-intensity grazing is effective – mechanical measures alone are not effective
- ecological restoration of heathland is possible
- specific conditions require specific solutions
- new areas – larger complexes
- monitoring data need to be analysed in more detail
- integration of species with responsibility (analysis in progress)

Nationalpark Schwarzwald

Thank you

BEETLES REPRESENT MORE THAN 25% OF ALL KNOWN SPECIES

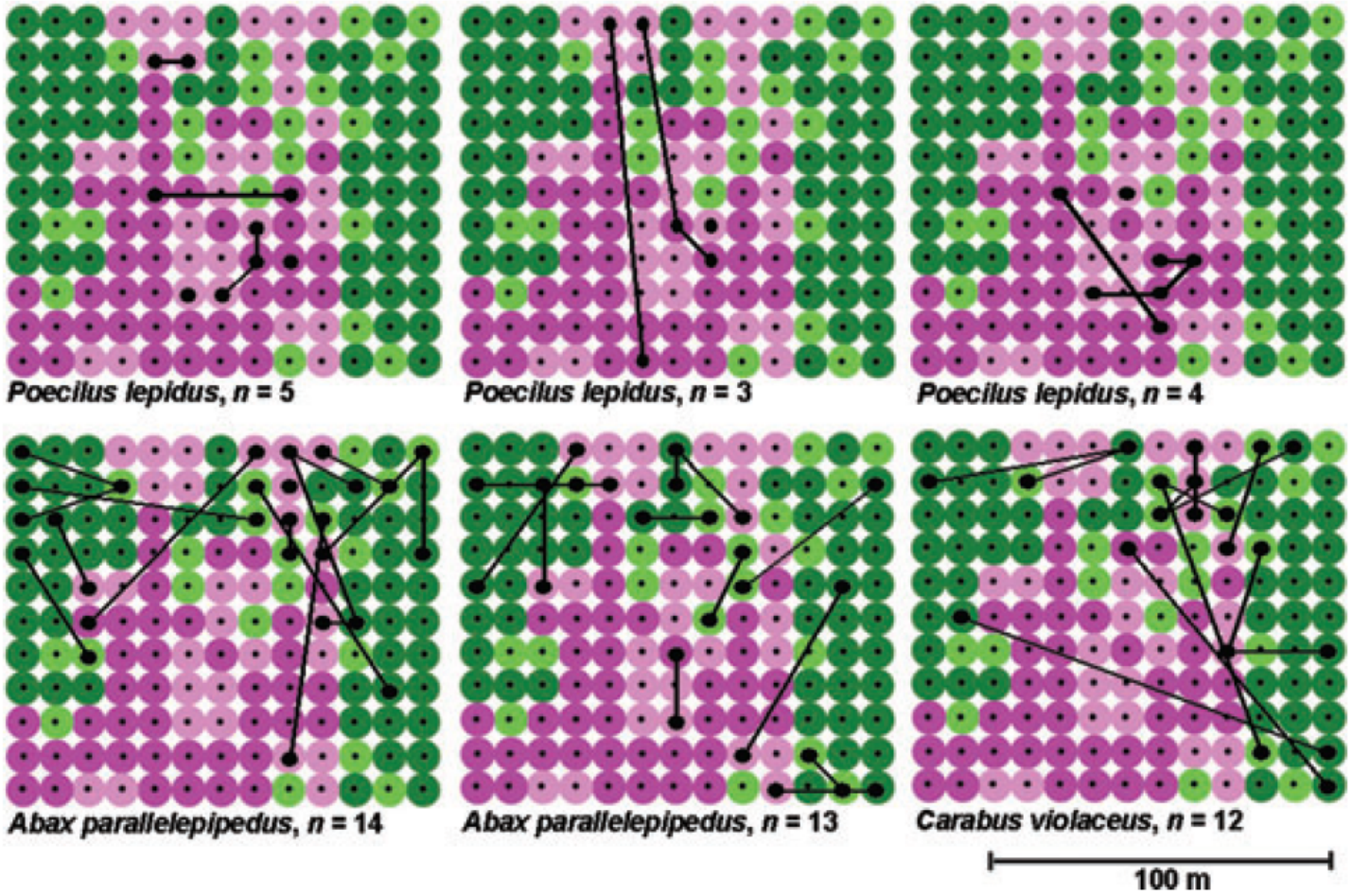


Grimaldi & Engel 2005

SEPARATION OF FOREST AND PASTURE – A SIGNIFICANT CONSERVATION PROBLEM

Isolation
and
habitat loss

SEMI-OPEN CORRIDORS AS A POSSIBLE SOLUTION



Stenotopic ground beetles are able to cross the corridor

Eggers et al. 2010