

Climate change, the treeline, and bird communities in Labrador, Canada



Brian Starzomski ¹ & Keith Lewis ²

¹ School for Resource and Environmental Studies
Dalhousie University

² Departments of Biology and Geography
Memorial University

Problem:

Climate changes are causing changes in biotic components of ecosystems, though we seldom understand what the processes are

Problem:

Climate changes are causing changes in biotic components of ecosystems, though we seldom understand what the processes are



Problem:

Climate changes are causing changes in biotic components of ecosystems, though we seldom understand what the processes are



Problem:

Climate changes are causing changes in biotic components of ecosystems, though we seldom understand what the processes are



Question:

How does habitat control bird populations and communities in the Mealy Mountains, Labrador?



Methods & Design:

With bird species across the treeline

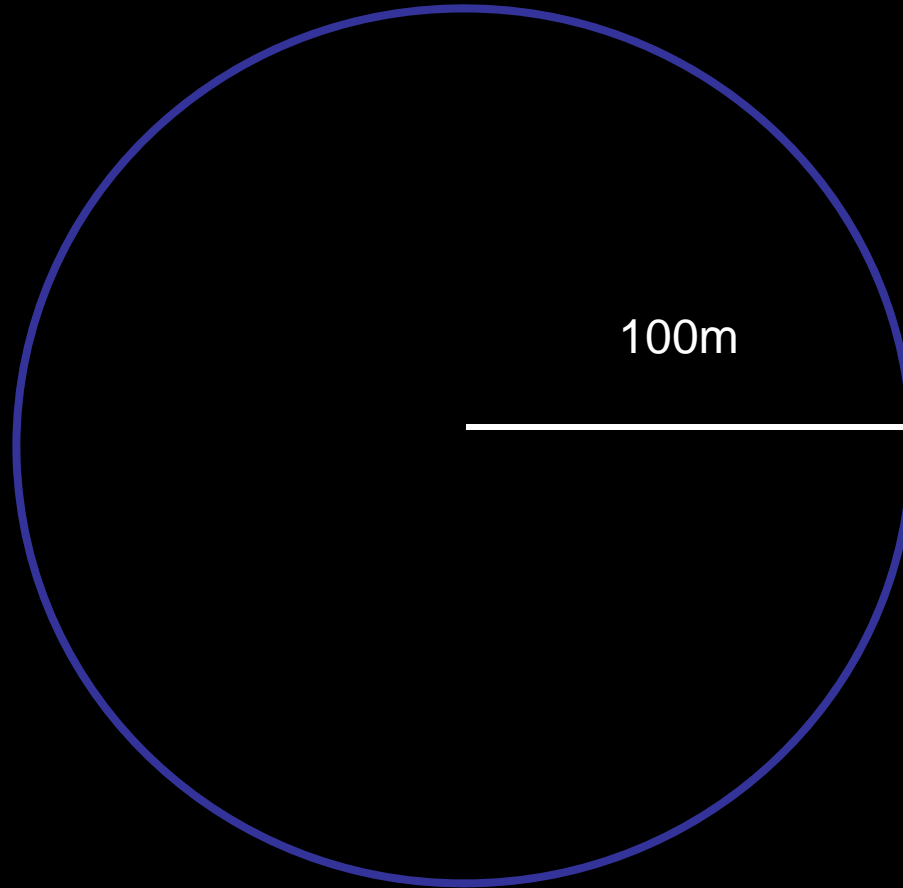


Methods & Design:

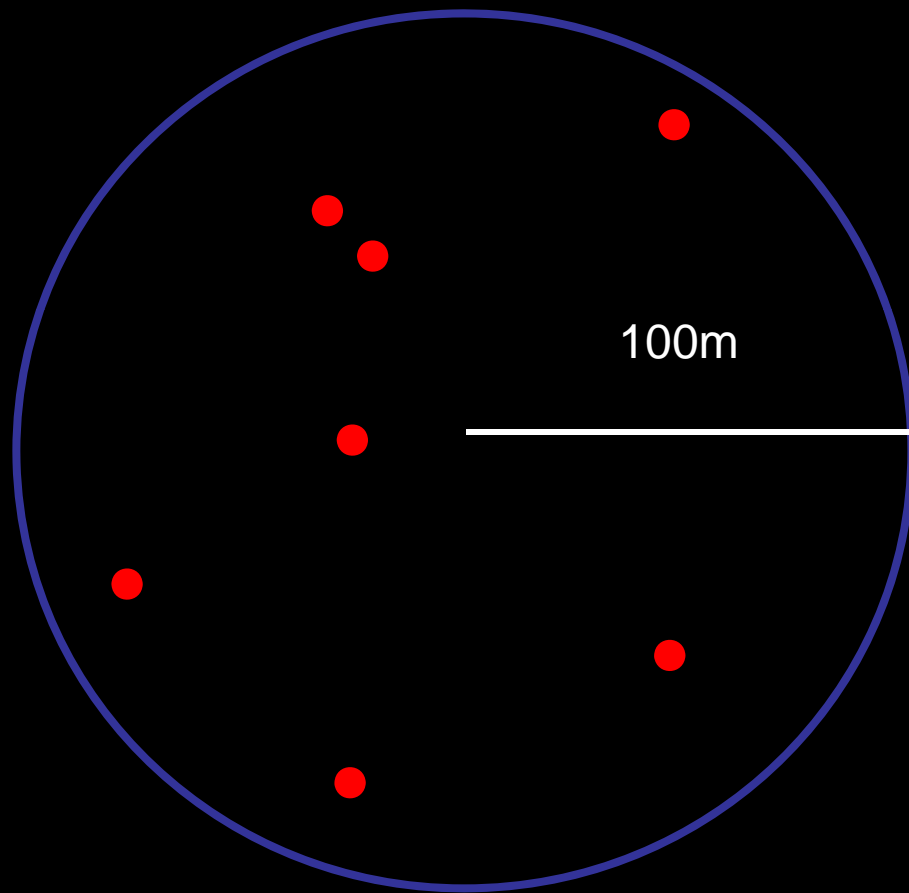
With bird species across the treeline

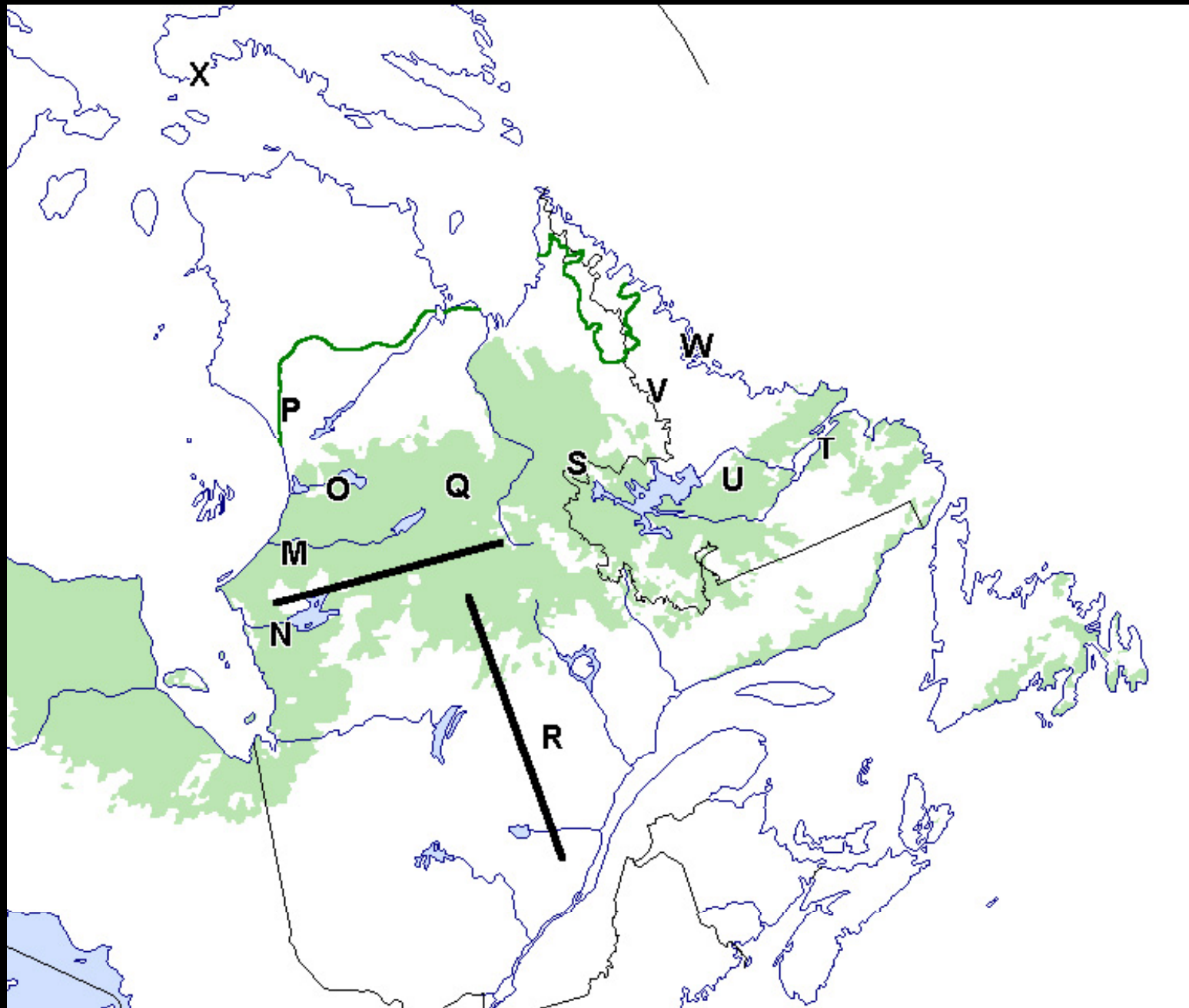


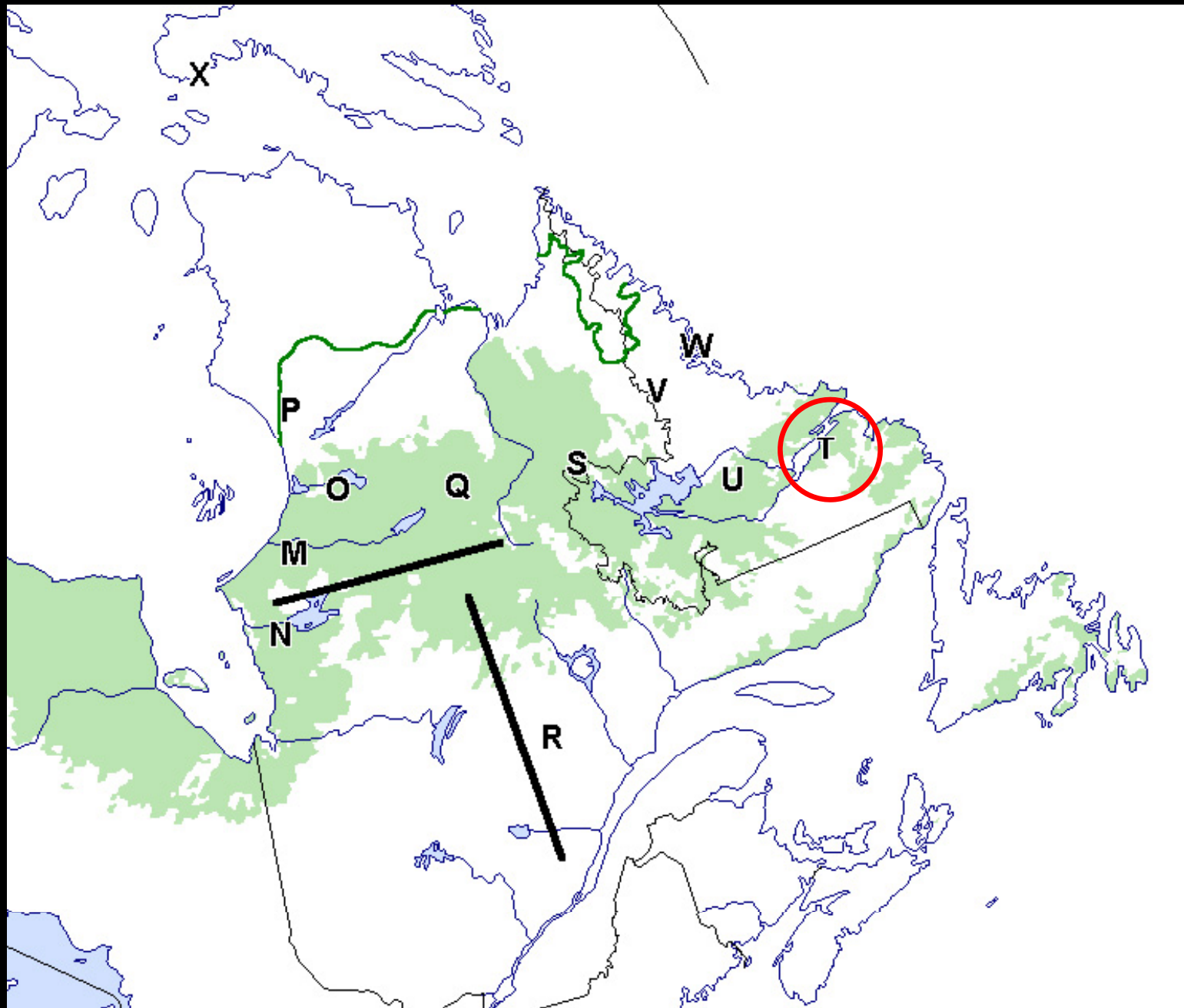
Point counts



Point counts







Bird – vegetation relationships

Hypotheses:

MacArthur
Physiognomy

Others
Floristics



Rotenberry
and
Wiens, 1981



Coarse Scale
Among Habitat

Fine Scale
Within Habitat

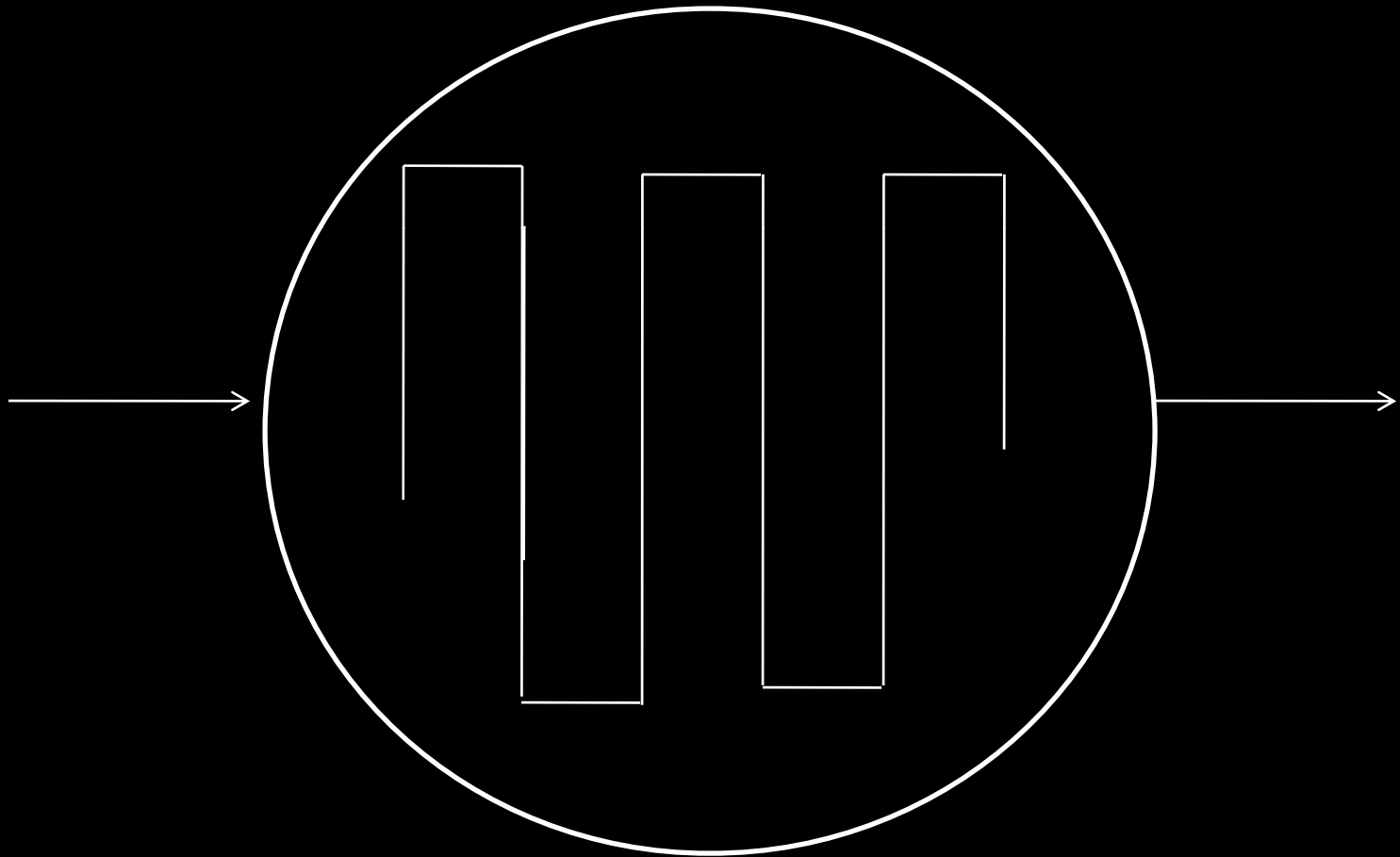
Objectives

Obj1: Do measures of avian diversity vary with vegetation richness and structure?

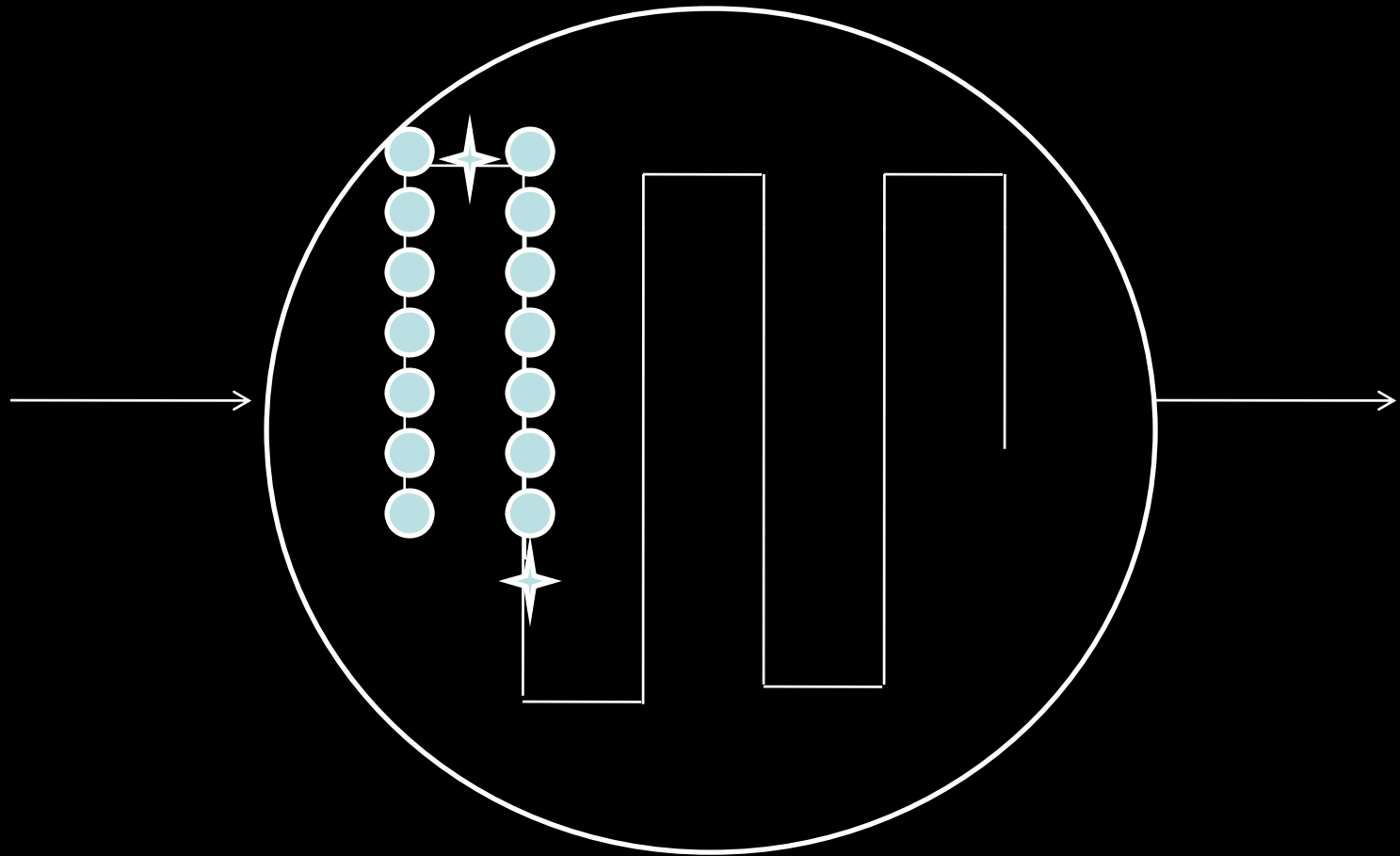
Obj2: How does elevation and habitat influence avian species composition?



Emlen Points

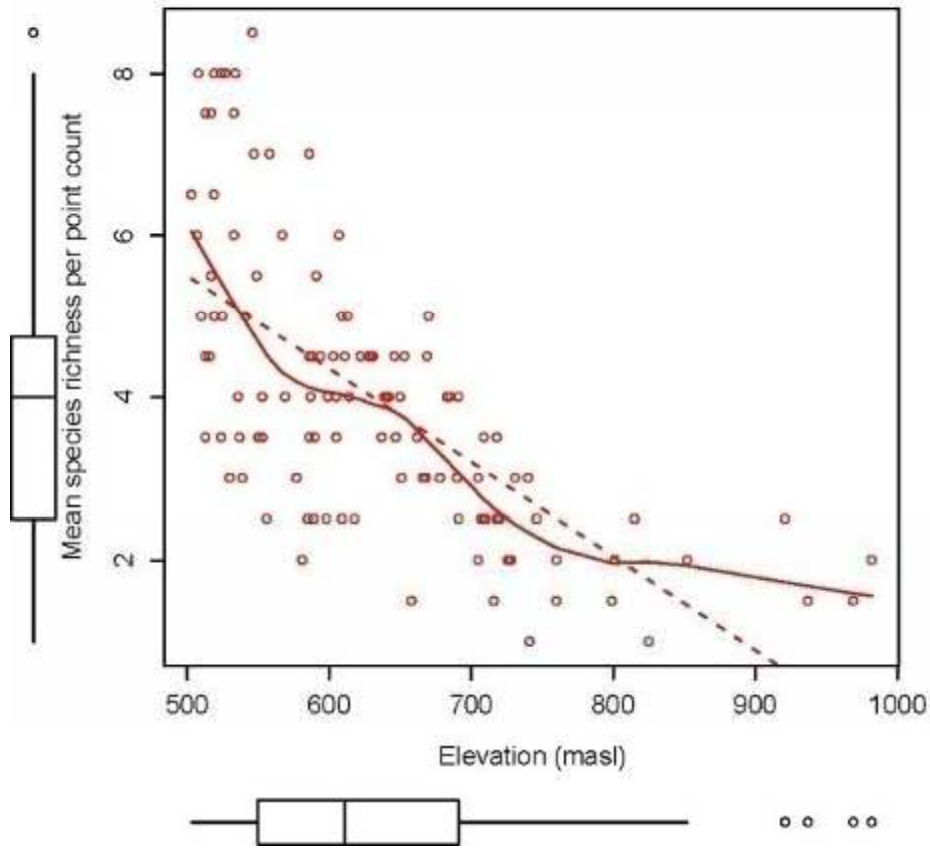


Emlen Points

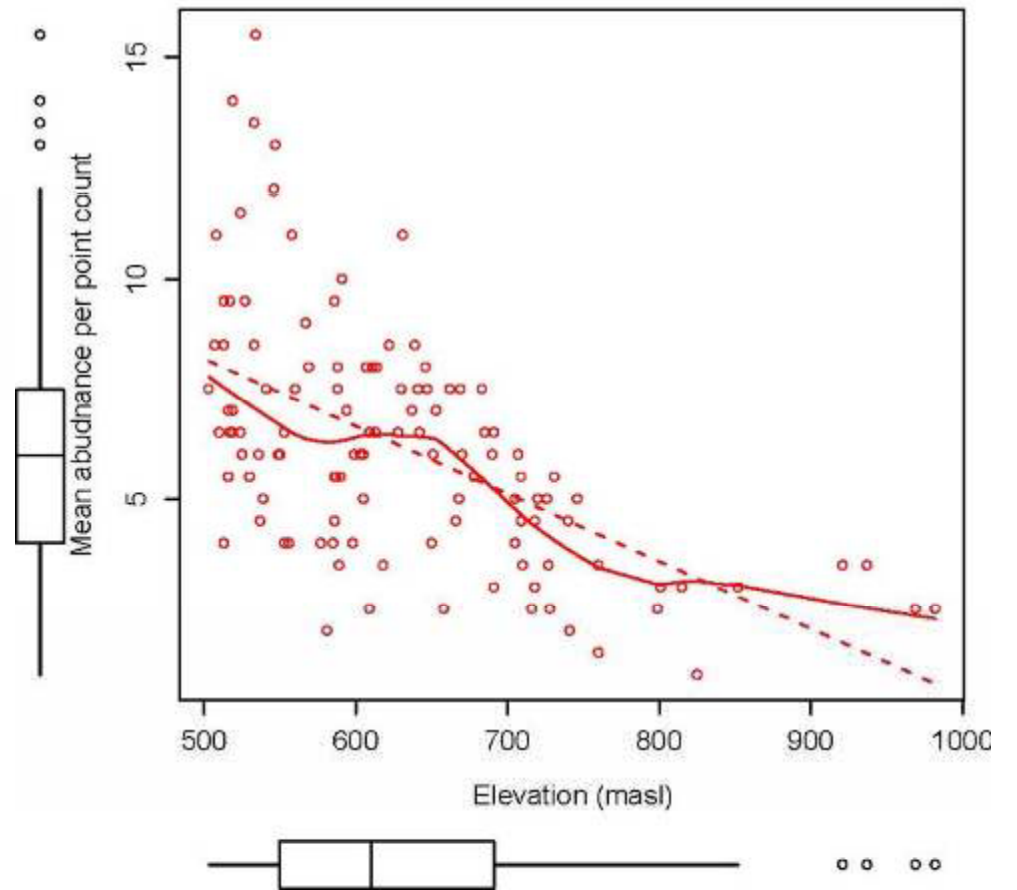


Results

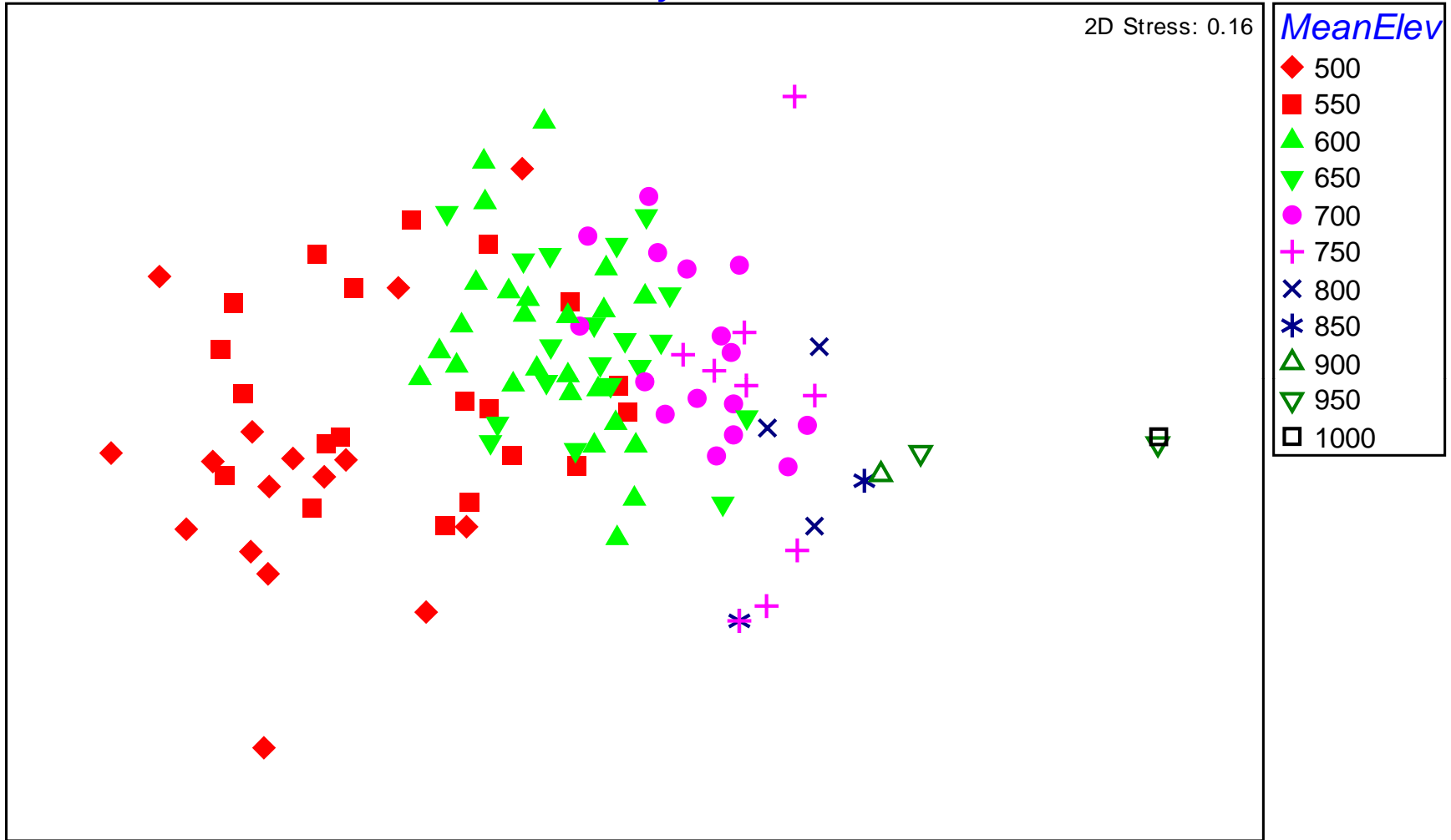
Richness



Abundance

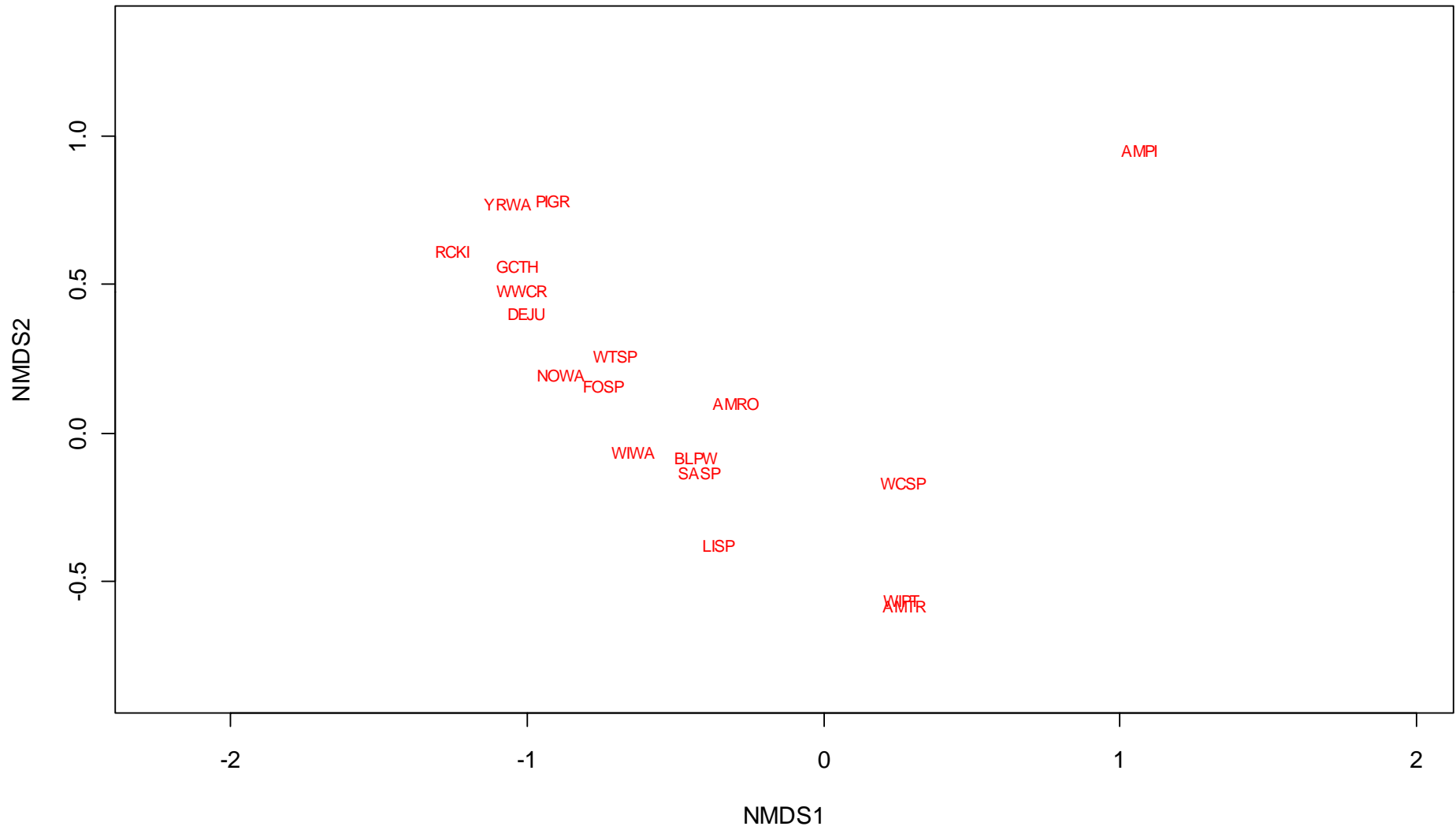


Mealy Birds 2008

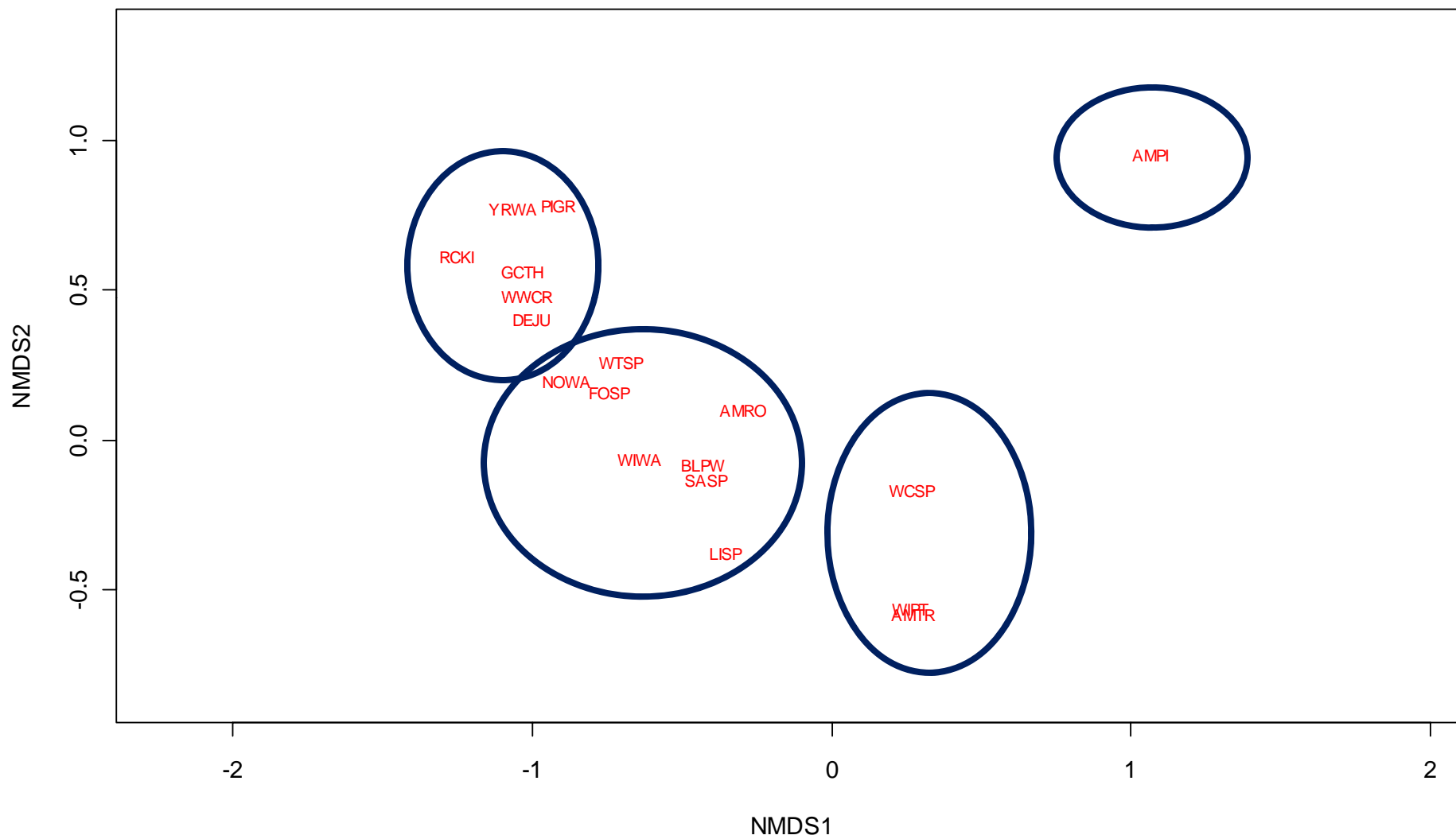


ANOSIM: R = 0.447, p << 0.001

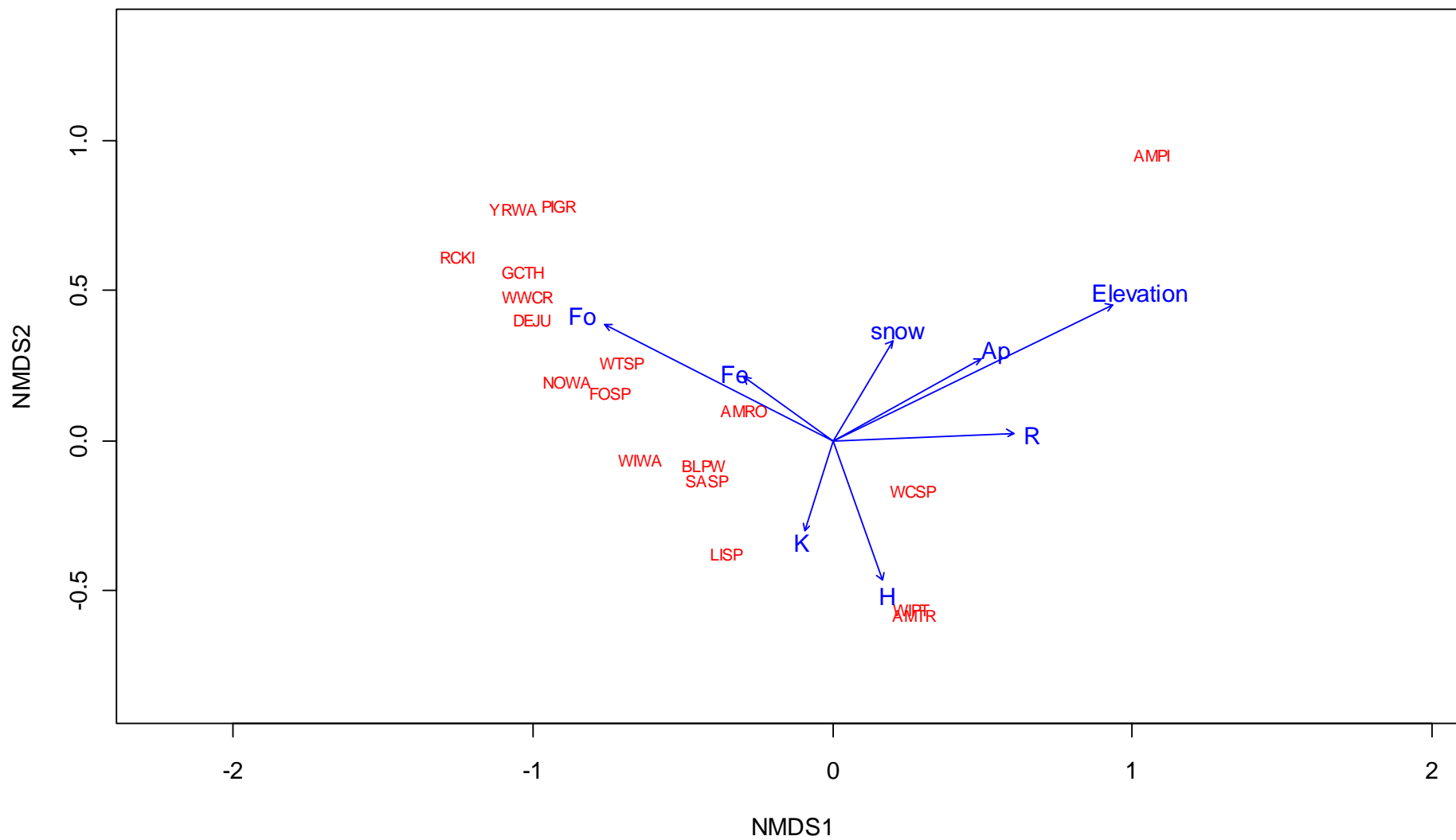
NMDS: Avian community and habitat vectors



NMDS: Avian community and habitat vectors



NMDS: Avian community and habitat vectors





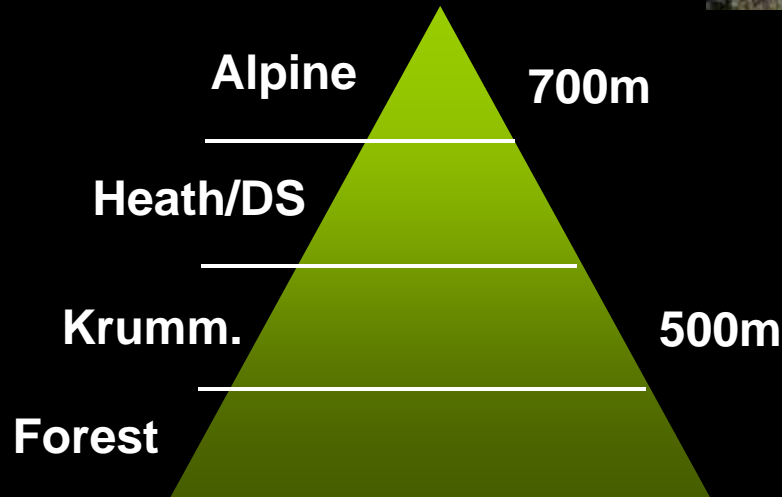
Alpine

- Rock Ptarmigan
- American Pipit
- Horned Lark



Krummholz

- American Robin
- Fox Sparrow
- Blackpoll Warbler



Heath/Deciduous Shrub

- White-crowned Sparrow
- Willow Ptarmigan
- American Tree Sparrow



Forest

- Dark-eyed Junco
- Ruby-crowned Kinglet
- Yellow-rumped Warbler

Rotenberry's Hypothesis

Habitat Type

Outcome

Alpine

Reject – Physiognomy

Deciduous shrub

Support - Floristics

Krummholz

No influence

Forest

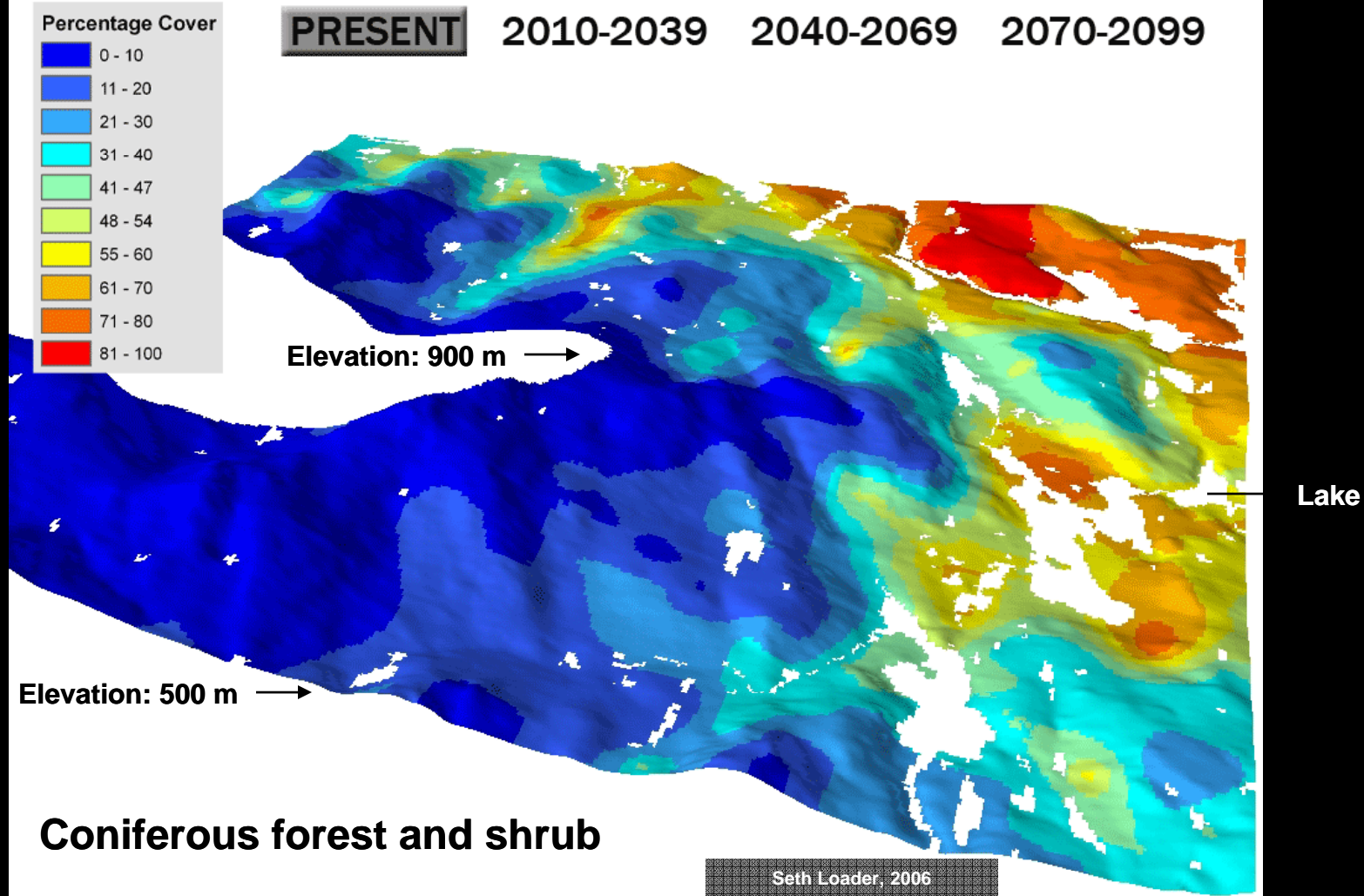
Support - Floristics

The future

- **Climate change**
- **Treeline advance**
- **Loss of alpine habitat**
- **Loss of alpine affined birds and their southernmost outposts**

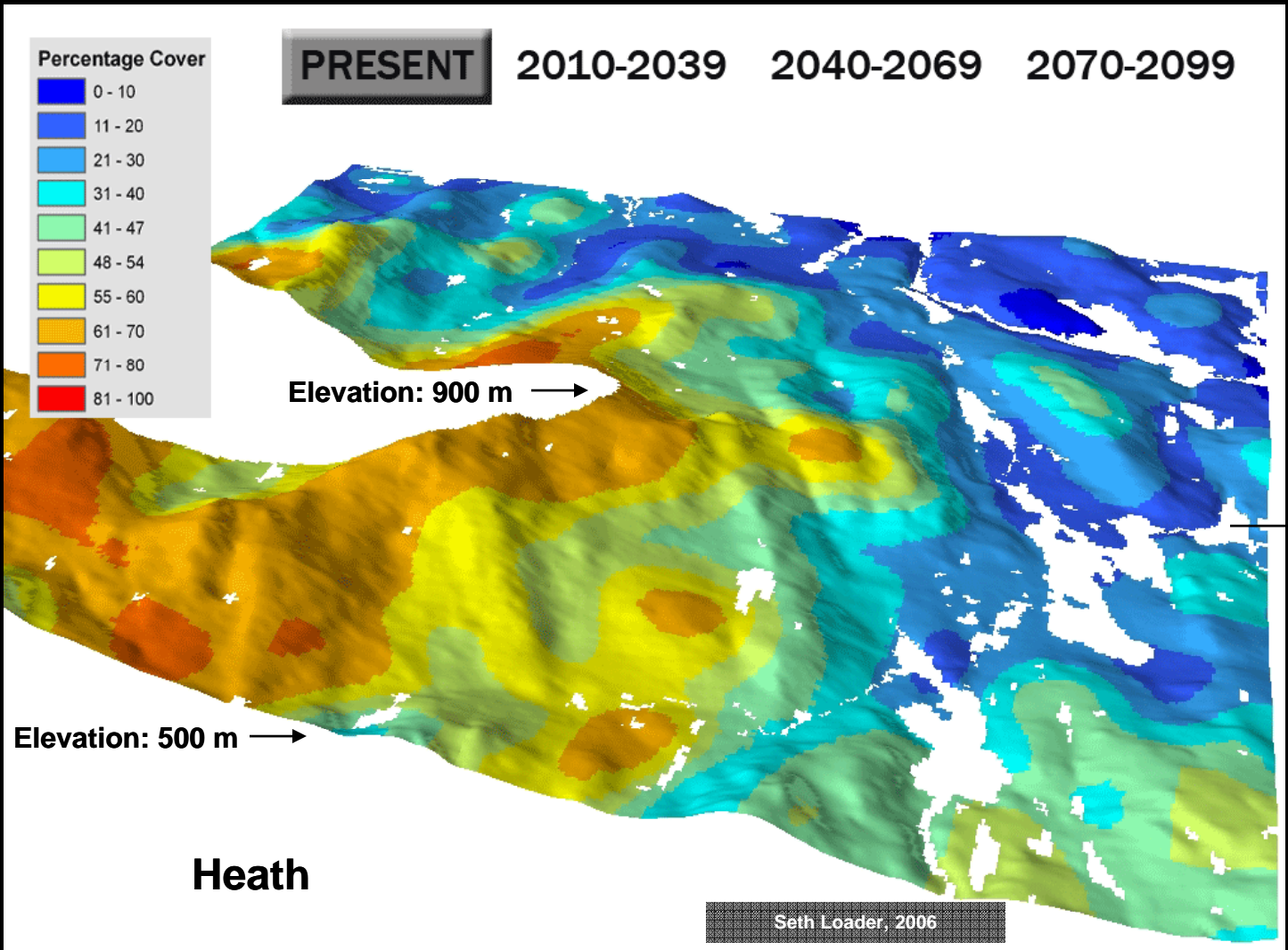
Central Mealy Mountains

Prediction for coniferous forest and shrub abundance (% cover)



This figure shows that given the climate change scenario high abundances of coniferous forest and shrub will cover a greater proportion of the study area.

Central Mealy mountains
Prediction for Heath abundance (% cover)



This figure shows that the density of Heath will decrease in the future.



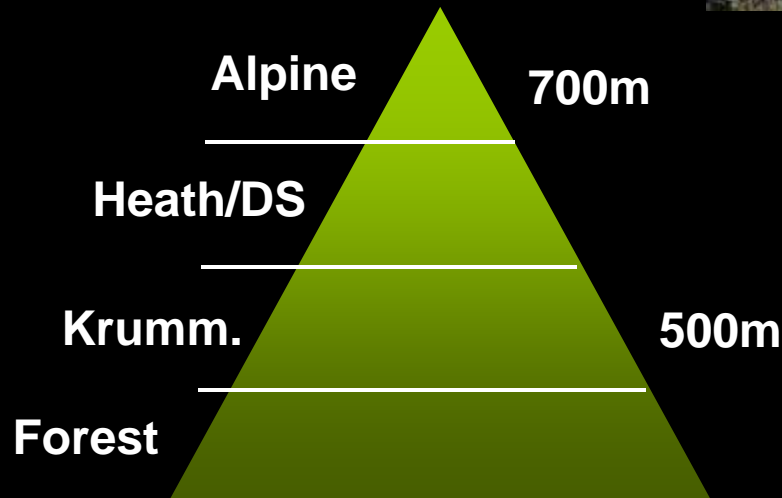
Alpine

- Rock Ptarmigan
- American Pipit
- Horned Lark



Krummholz

- American Robin
- Fox Sparrow
- Blackpoll Warbler



Heath/Deciduous Shrub

- White-crowned Sparrow
- Willow Ptarmigan
- American Tree Sparrow



Forest

- Dark-eyed Junco
- Ruby-crowned Kinglet
- Yellow-rumped Warbler

Conclusions

- **Strong relationship between birds and habitat**
- **There seem to be multiple bird communities**

With climate change:

- **Loss of alpine habitat**
- **Loss of alpine affined birds and their southernmost outputs**

Acknowledgements

- Luise Hermanutz
- LHRG group
- Aimée Pelletier
- Andrew Trant
- Karen Harper
- Dani DeFields
- Lis Oakham
- Stephanie Daley
- Julia Pelton

