

Modeling Species' Ranges

https://cmerow.github.io/RDataScience/4_1_Wallace_SDMs.html

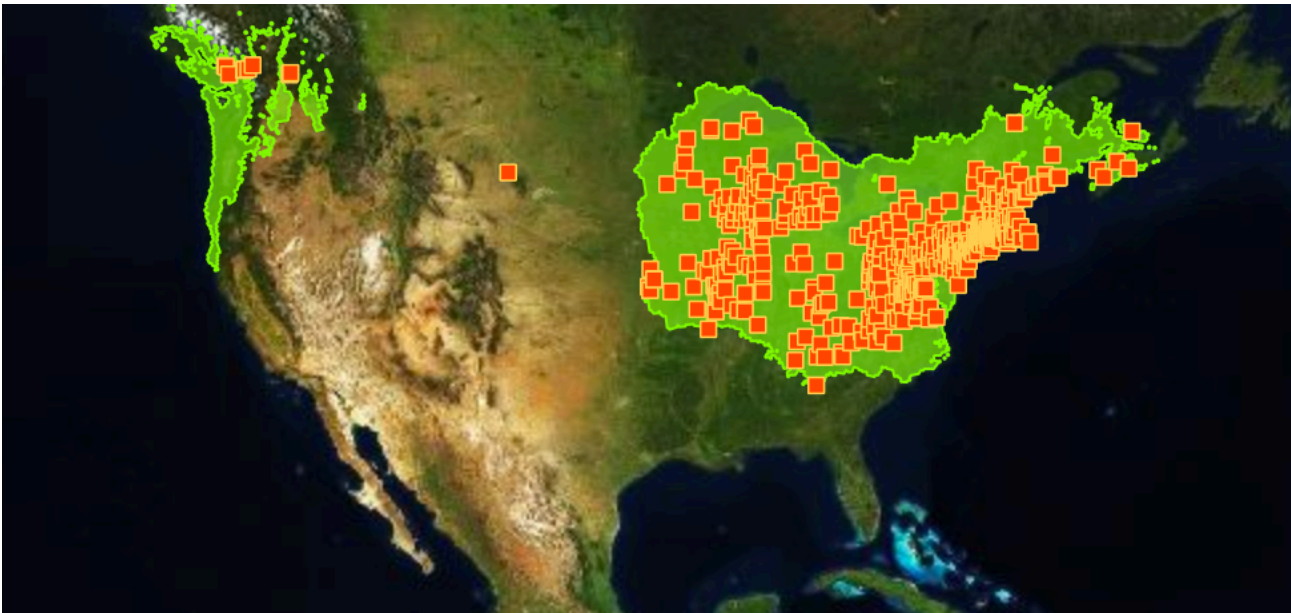
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Center for Biodiversity and Global Change

Ranges

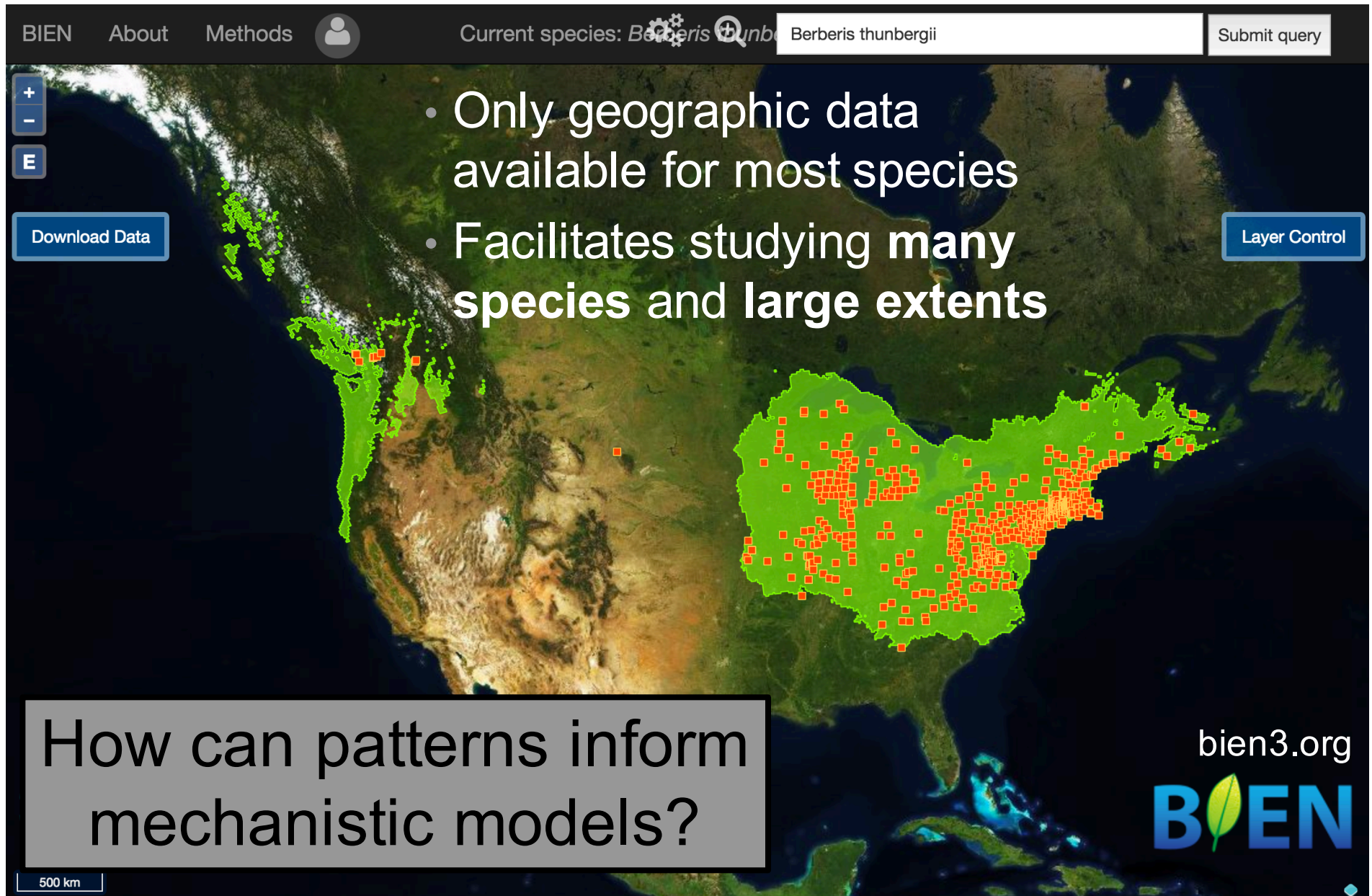
- Evaluate shifts
- Invasion risk
- Spatial planning
- Ecological processes
- Macroecological patterns



Invasive
Japanese barberry

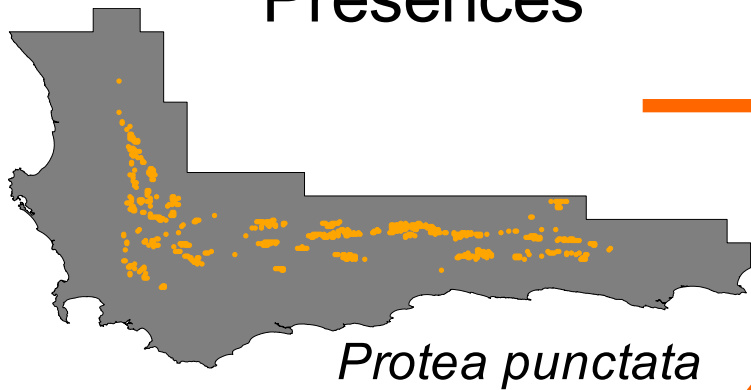


Occurrence patterns: starting point



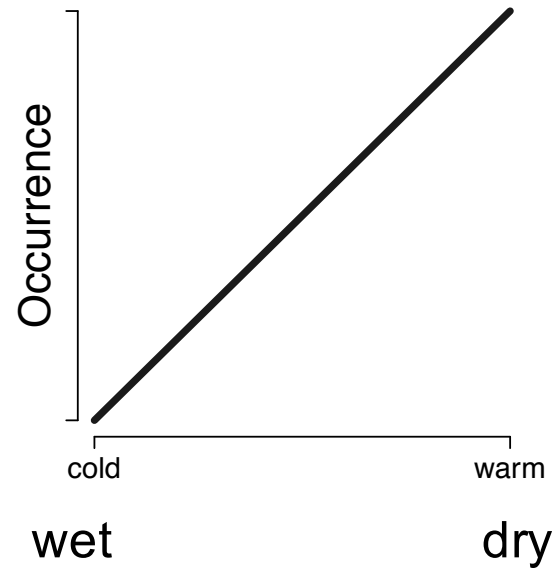
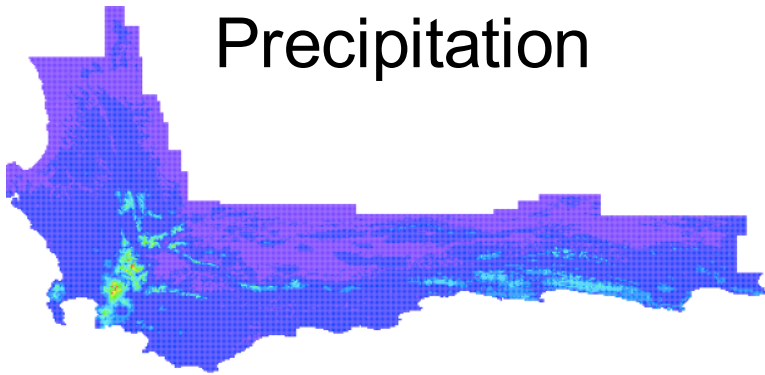
Occurrence

Presences

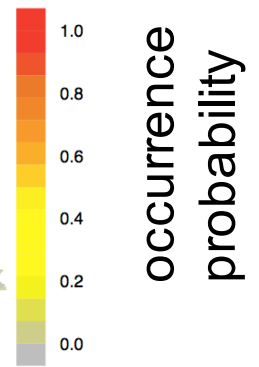
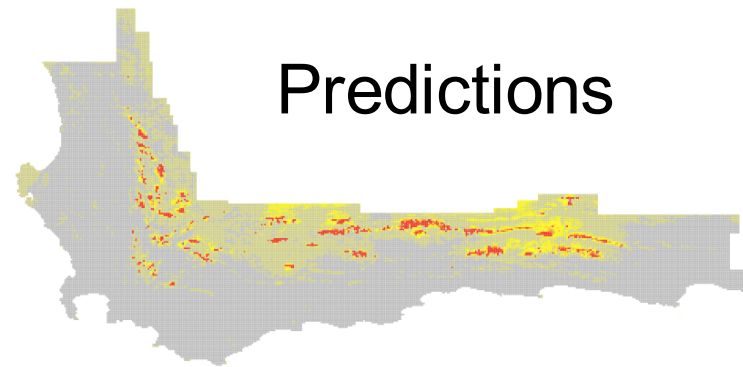


Protea punctata

Annual
Precipitation



Predictions



- Maxent Guide: Merow et al., 2013, *Ecography*
- Maxent v. Maxlike: Merow et al., 2014, *MEE*
- Complexity: Merow et al., 2014, *Ecography*
- Minxent: Merow et al., 2016, *GEB*
- Expert Maps: Merow et al., 2017, *GEB*

Analysis steps

1. Get occurrence data
2. Prep occurrences
3. Get environmental data
4. Prep environmental data
5. Partition occurrences
6. Model
7. Visualize
8. Map
9. Post-processing (e.g. Richness)

Obtain Occurrence Data

Modules Available:

- Query Database
- User-specified Occurrences

Module: Query Database

via **spocc** package: Interface to Species Occurrence Data Sources

Choose Database:

- GBIF
- VertNet
- BISON

Enter species scientific name

format: Genus species

Search Database

Maximum number of occurrences:

50 3,000

Download database occurrence localities (.csv)

Download

spocc references

Developers: Scott Chamberlain, Karthik Ram, Ted Hart

[CRAN](#) | [documentation](#)

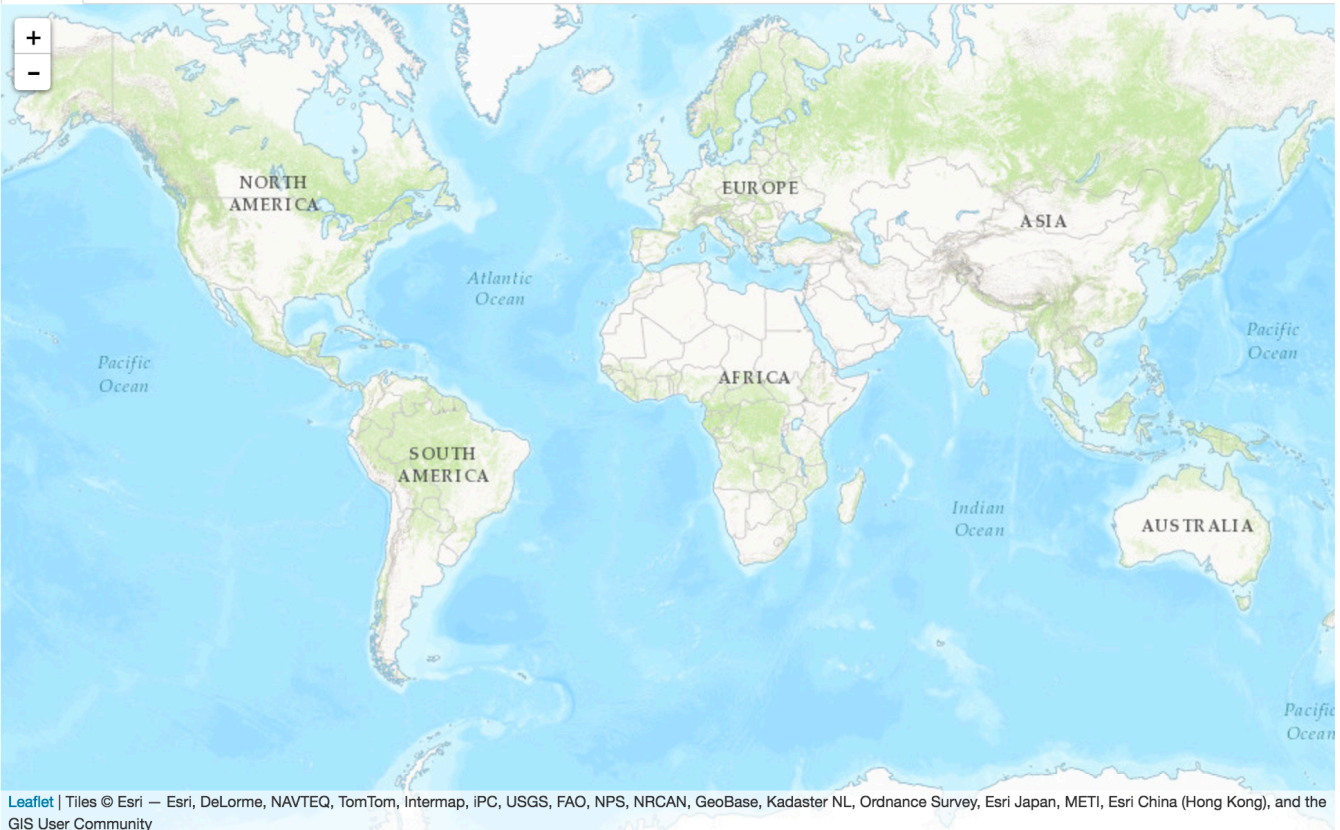
WELCOME TO WALLACE

Please find messages for the user in this log window.

Change Base Map

ESRI Topo

Map Occs Tbl Results Component Guidance Module Guidance



wallace is now on CRAN



2. Why range models are all kind of the same


- 
- Show densities
 - Show lots of curves approximating densities



3. Modeling Decisions



**MANY
MODELING
DECISIONS ARE
SUBJECTIVE**

- 
- Domain
 - Features
 - penalization



4. Research

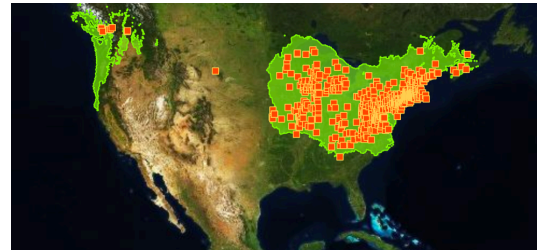
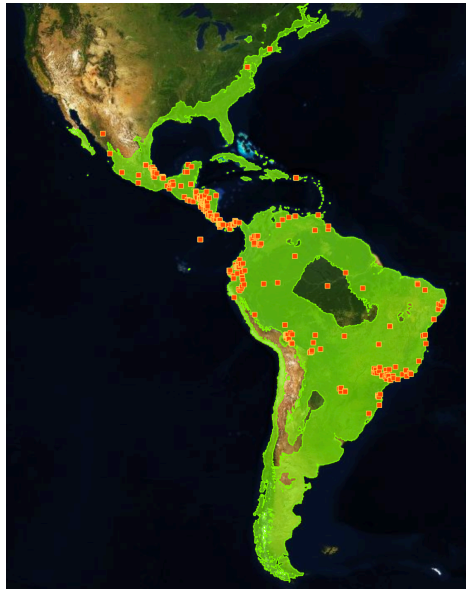
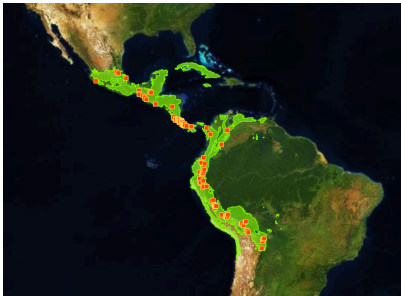
Why Wallace

- Visually explore
 - Better subjective decisions
- Built-in guidance
- Reproducible
- Flexible (more to come)
- Extensible
 - contribute to Wallace
 - Change your rmd code
- Template maker

B **EN** Botanical Information and Ecology Network

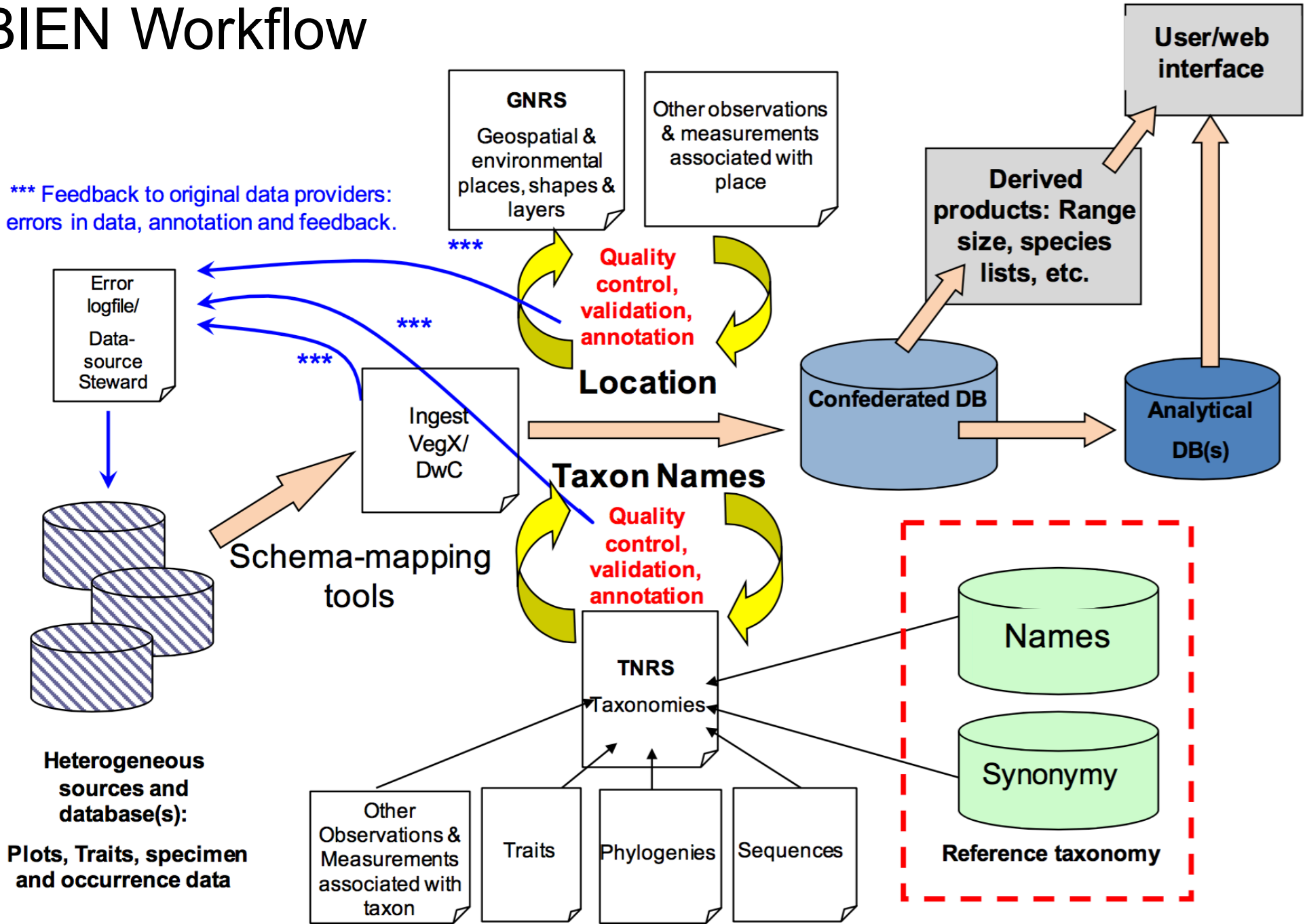


~200,000 species: Occurrence, Communities, Traits
All New World Plants, >22e6 records

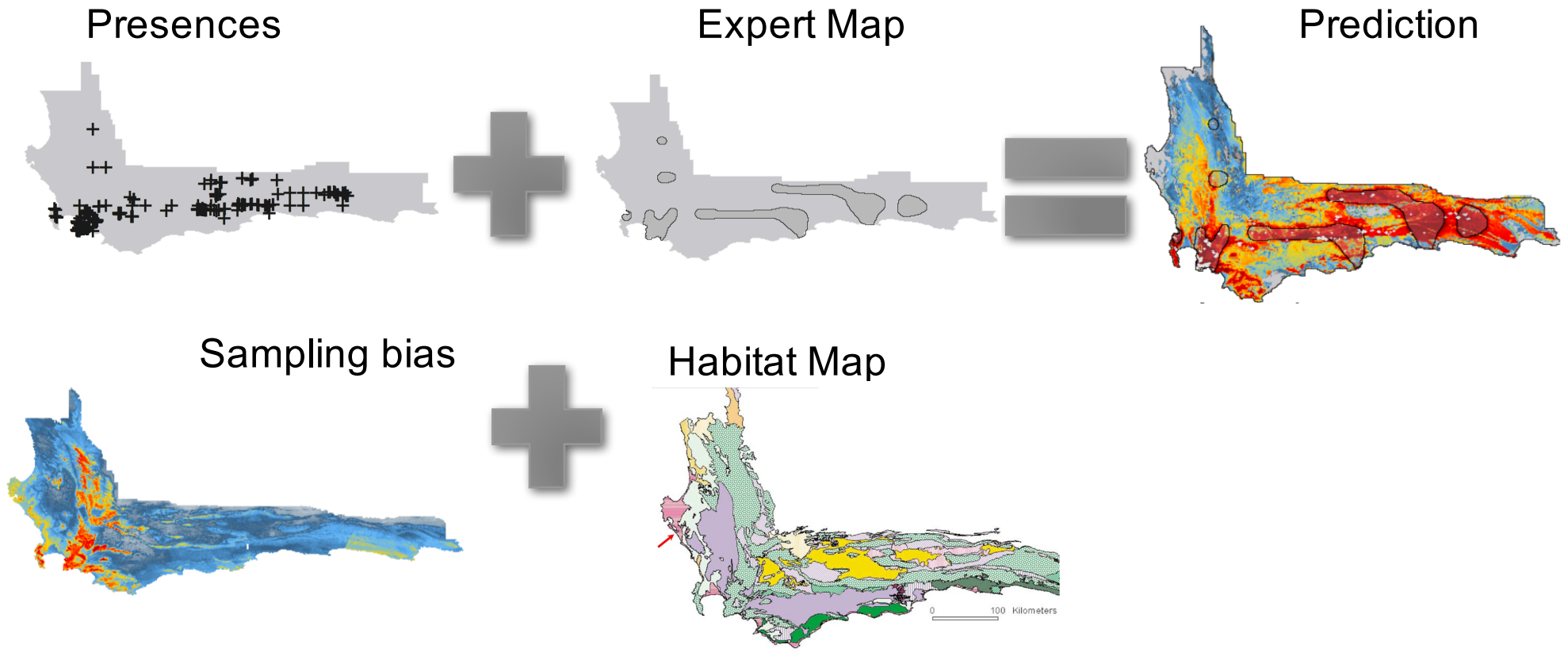


BIEN Workflow

*** Feedback to original data providers: errors in data, annotation and feedback.

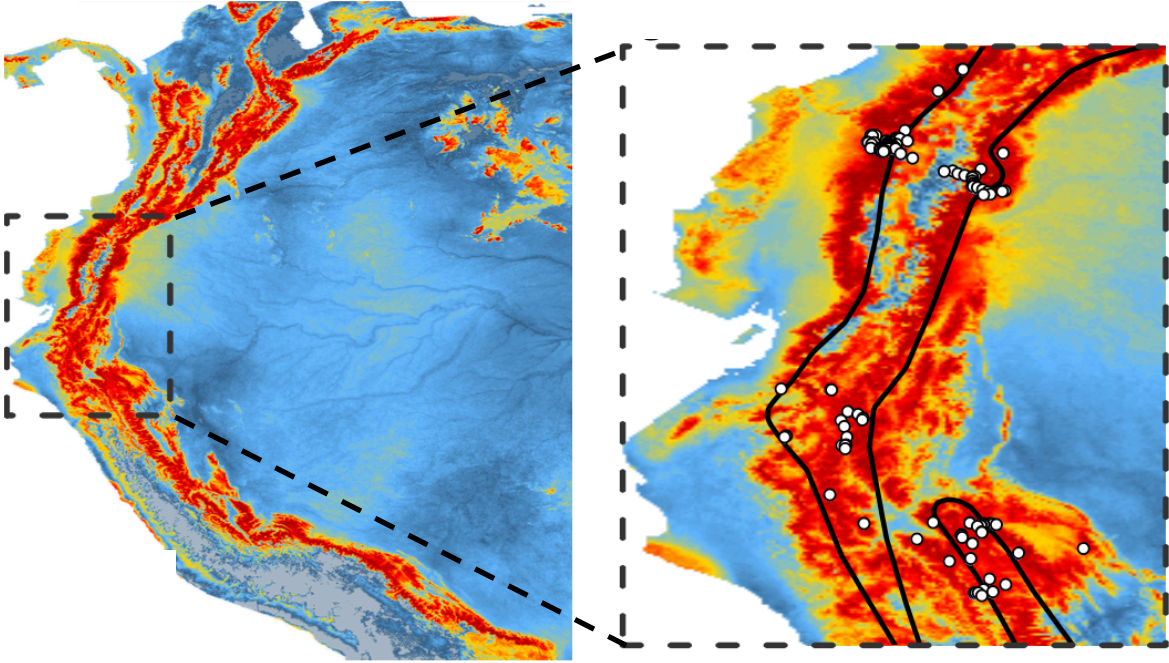


New Models: Minxent

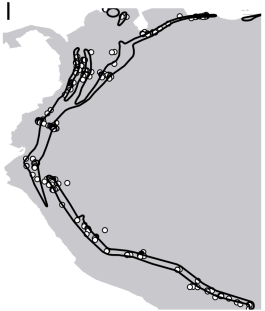


Expert Maps

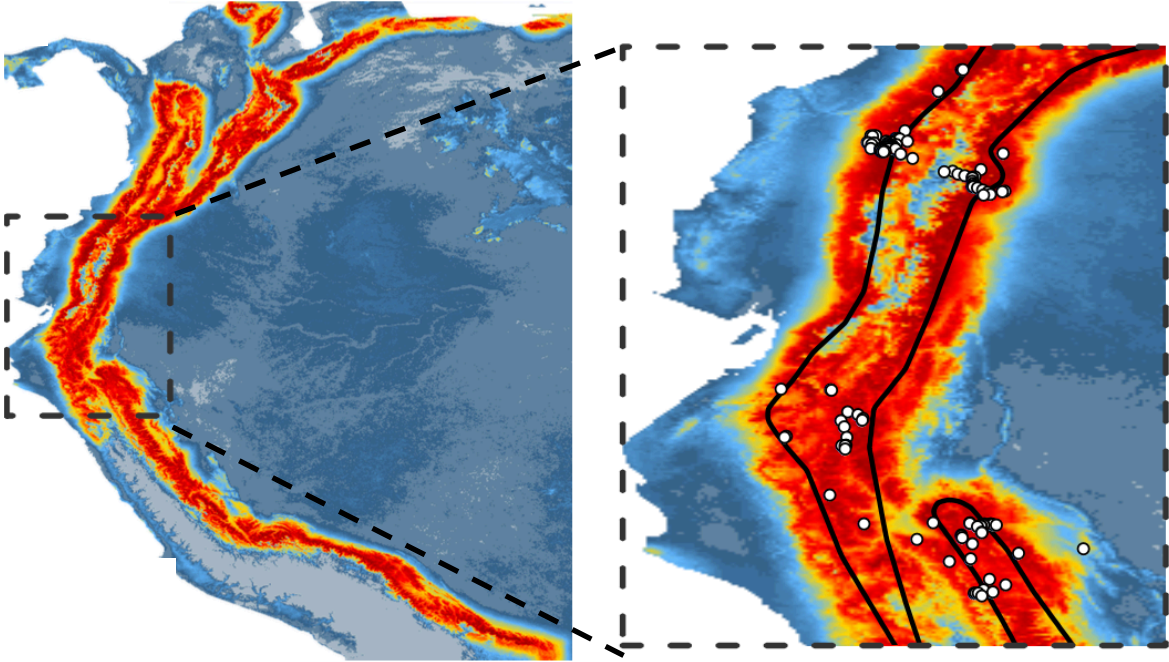
Typical
Maxent
model



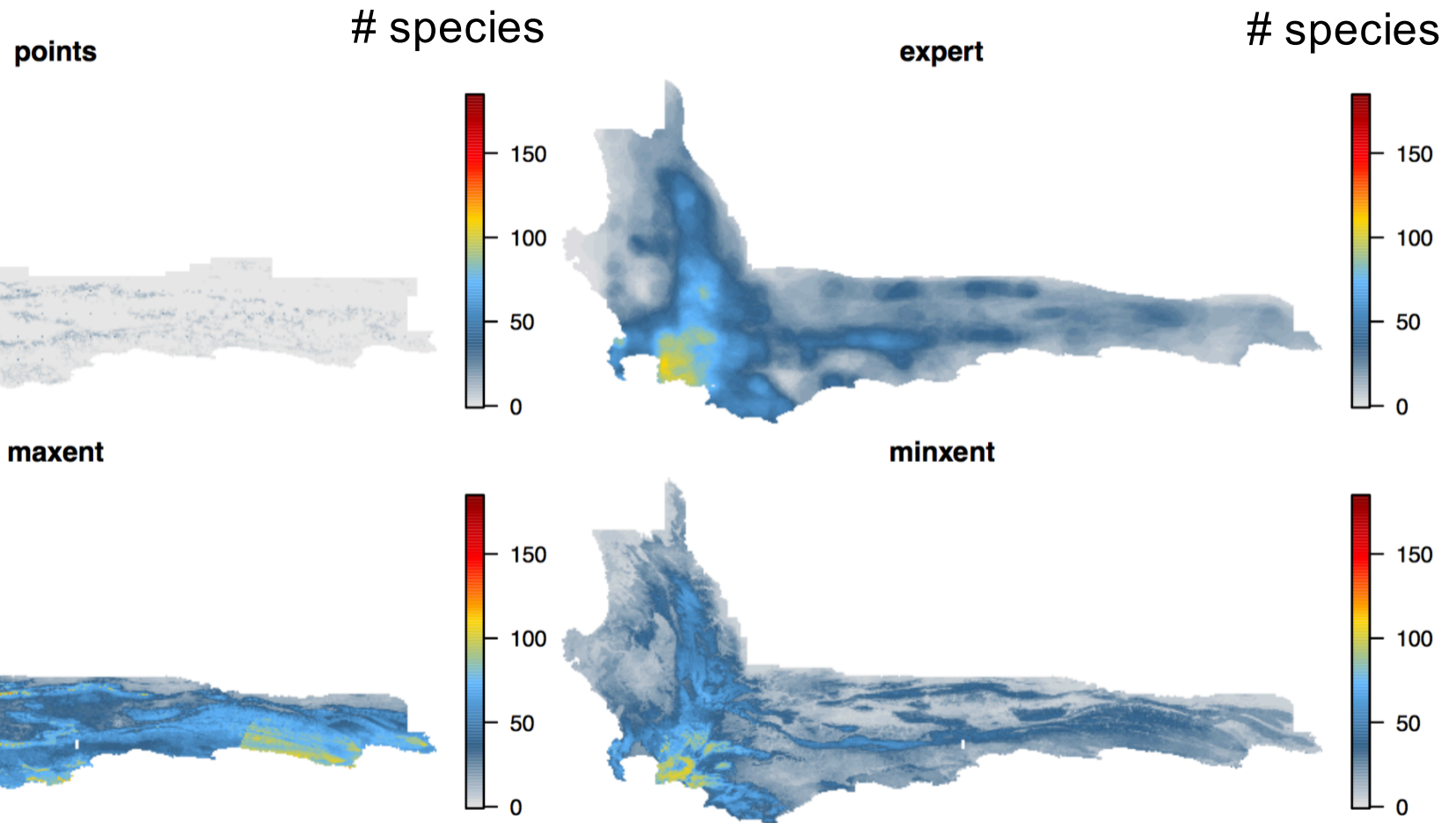
Expert Map



Adding
an
expert
map

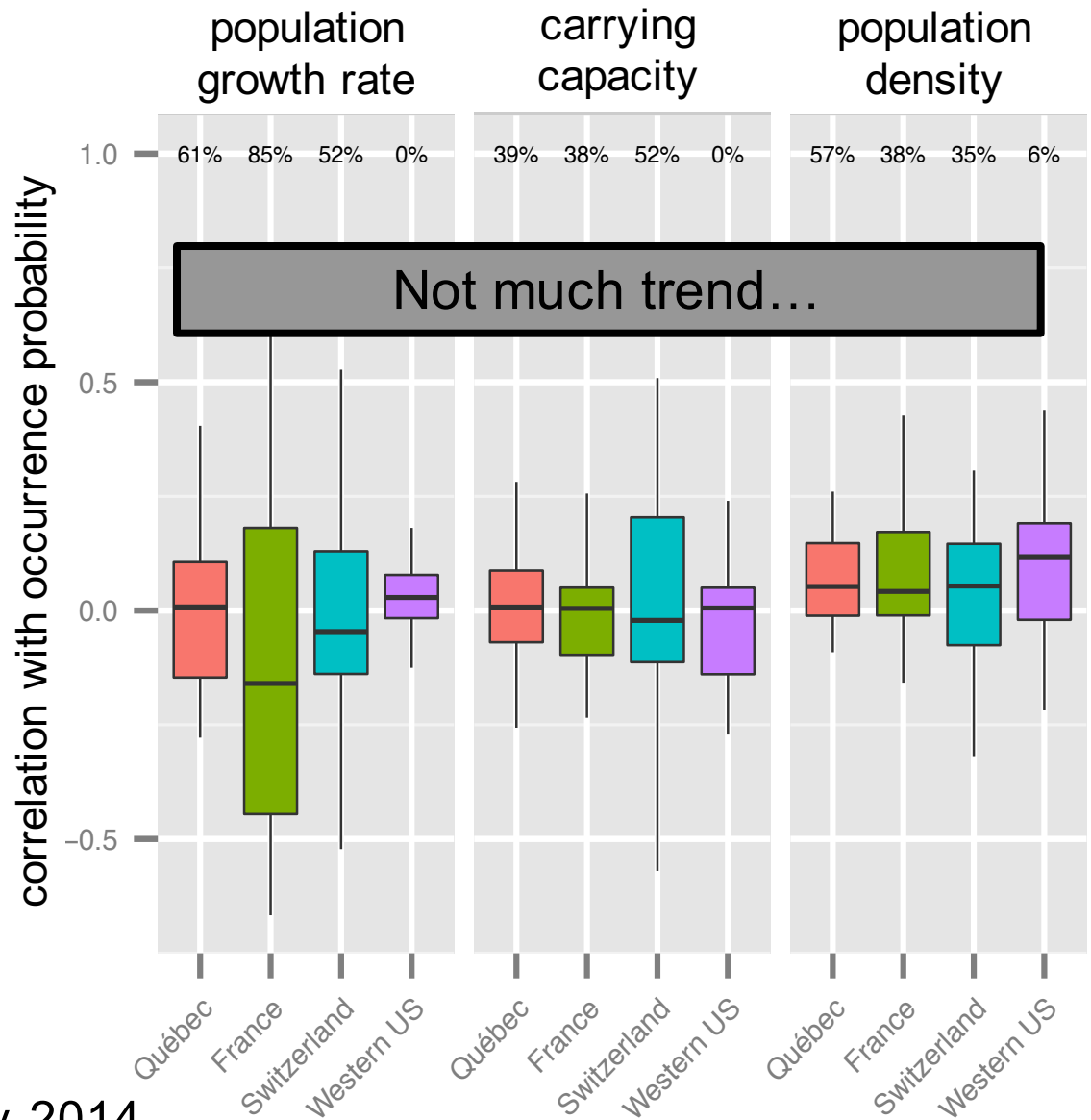


What does this imply for diversity?



Occurrence \cong demography?

- 108 tree species
- Quebec, W. USA, France, Switzerland
- Plot basal area \cong population size



A landscape photograph showing a wide, open field with sparse, low-lying vegetation. The ground is light-colored and appears sandy or silty. In the background, there are several mountain ranges under a bright blue sky with scattered white clouds. The overall scene suggests a post-fire or a semi-arid environment.

Questions?