



KENNESAW STATE
UNIVERSITY

Comparing Environmental Variables as Predictors of Mammalian Species Richness



Piercy Gierlak, Sarah Paschal, and Nicholas S. Green
Department of Ecology, Evolution, and Organismal Biology, Kennesaw State University

Contact:

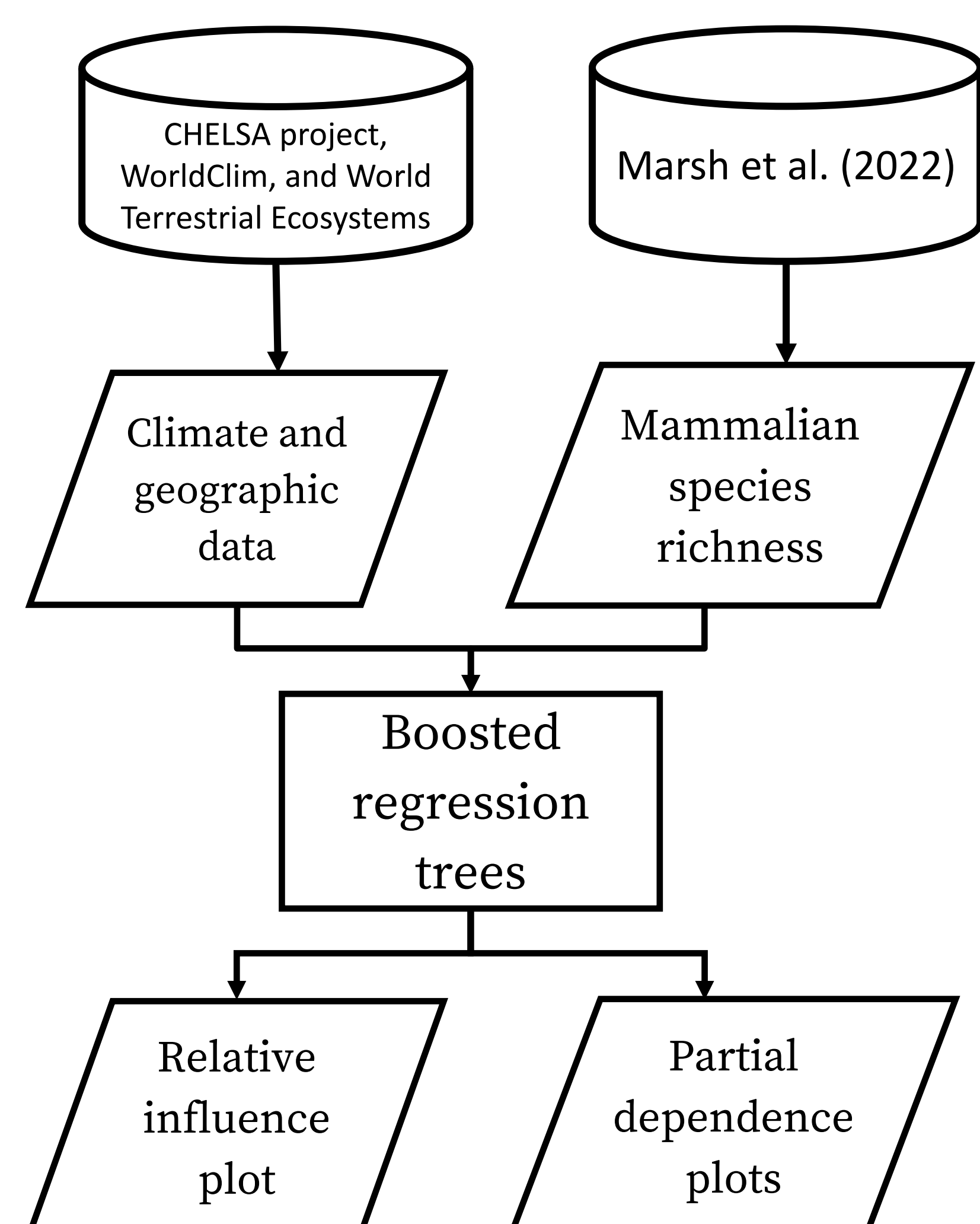
pgierlak@students.kennesaw.edu
spasch10@students.kennesaw.edu
ngreen62@kennesaw.edu



Background

- Global patterns of mammalian species richness are shaped by climate, energy availability, and geographic constraints
- Environmental variables such as temperature, precipitation, growing season length (GSL), and net primary production (NPP) are commonly linked to biodiversity patterns
- The importance of these drivers may differ among taxonomic groups
- Rodents and bats comprise a large proportion of mammalian diversity and differ in key traits (e.g., dispersal ability, life history)
- We evaluated how climatic and geographic variables predict species richness for terrestrial mammals in total, rodents, and bats
- Hypothesis: NPP will be the most important predictor of richness, but secondary drivers will differ among groups

Methods



Results

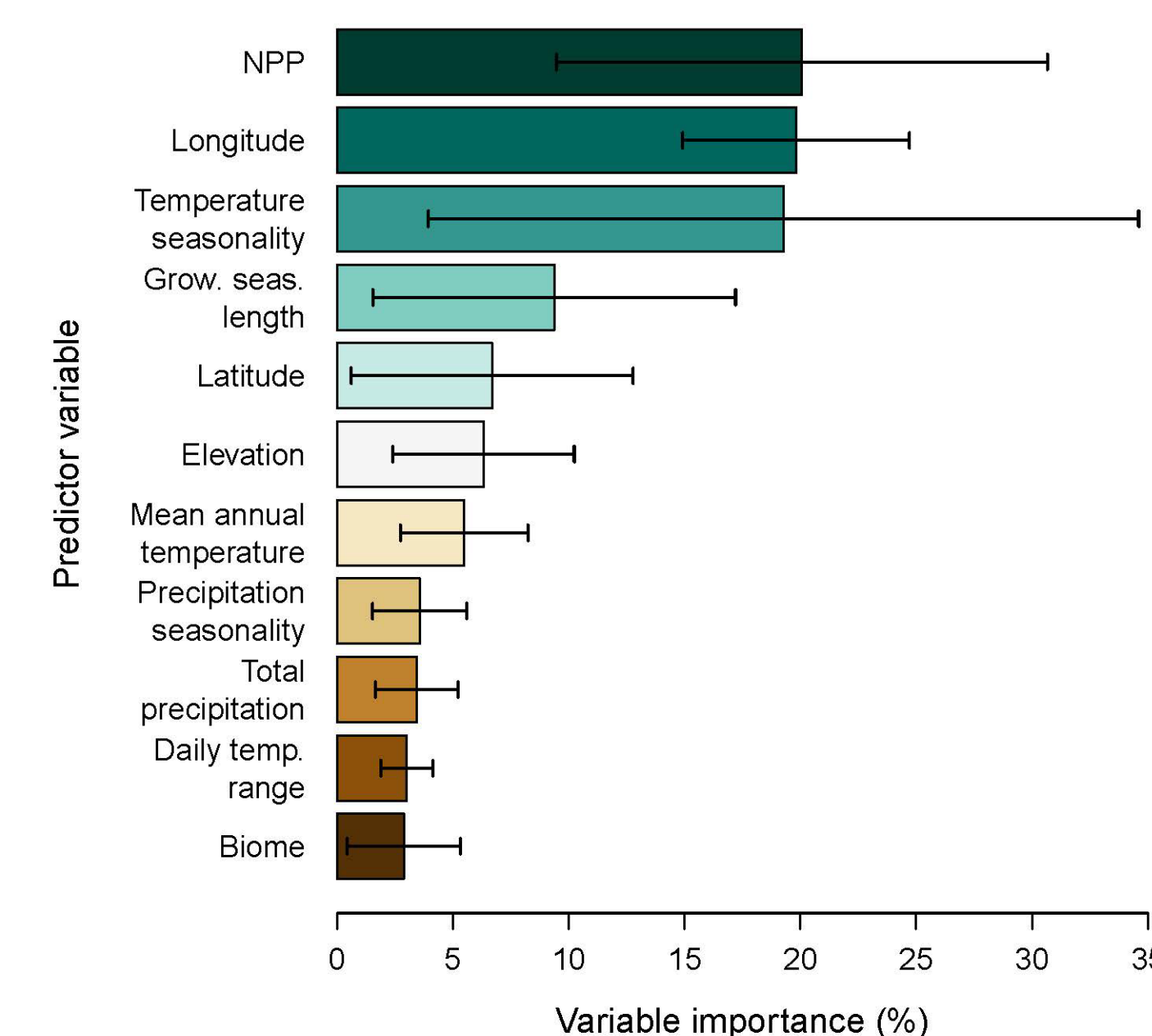
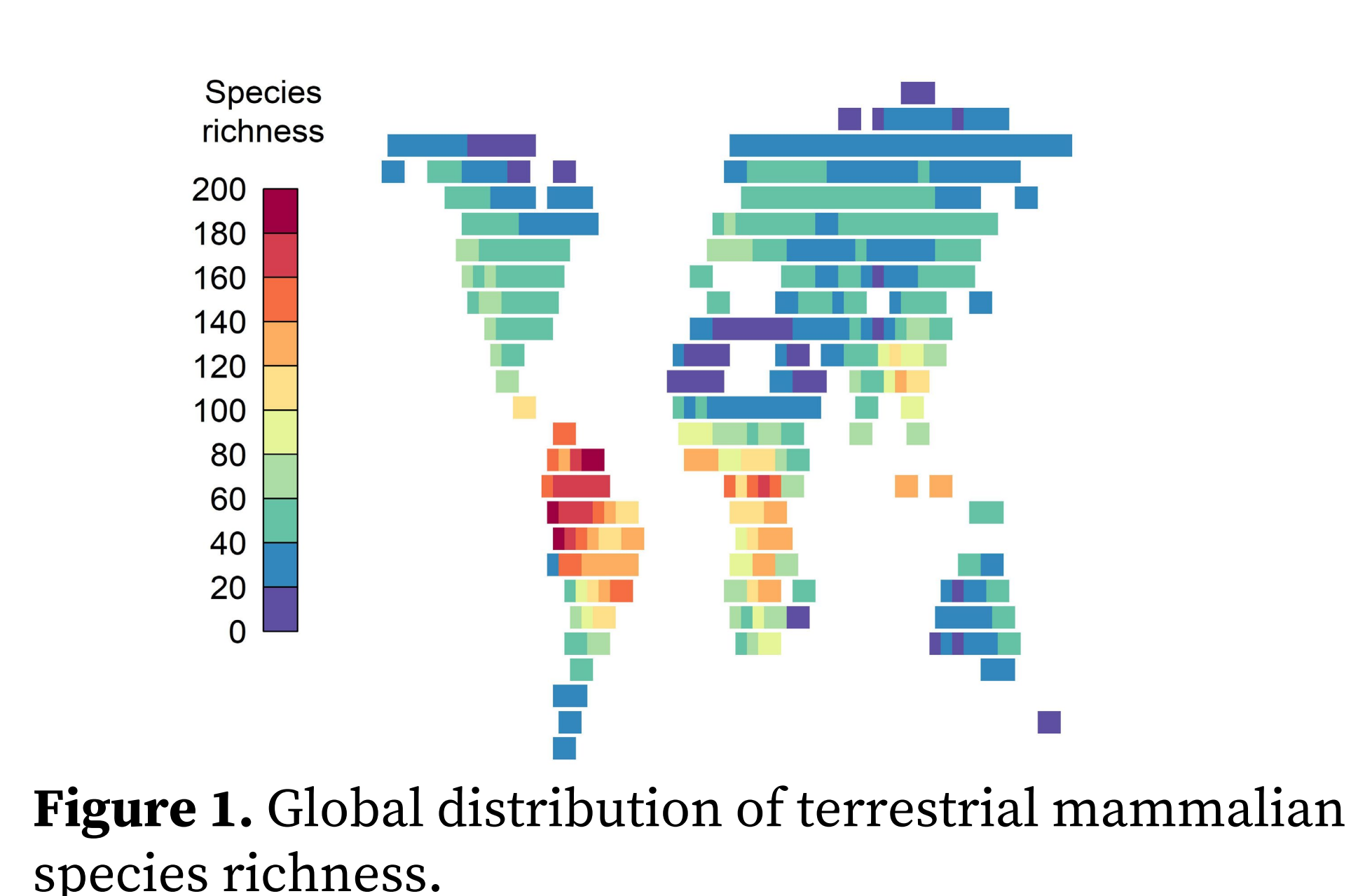


Figure 2. Across all orders, net primary productivity (NPP), longitude, and temperature seasonality were the most influential predictors of species richness.

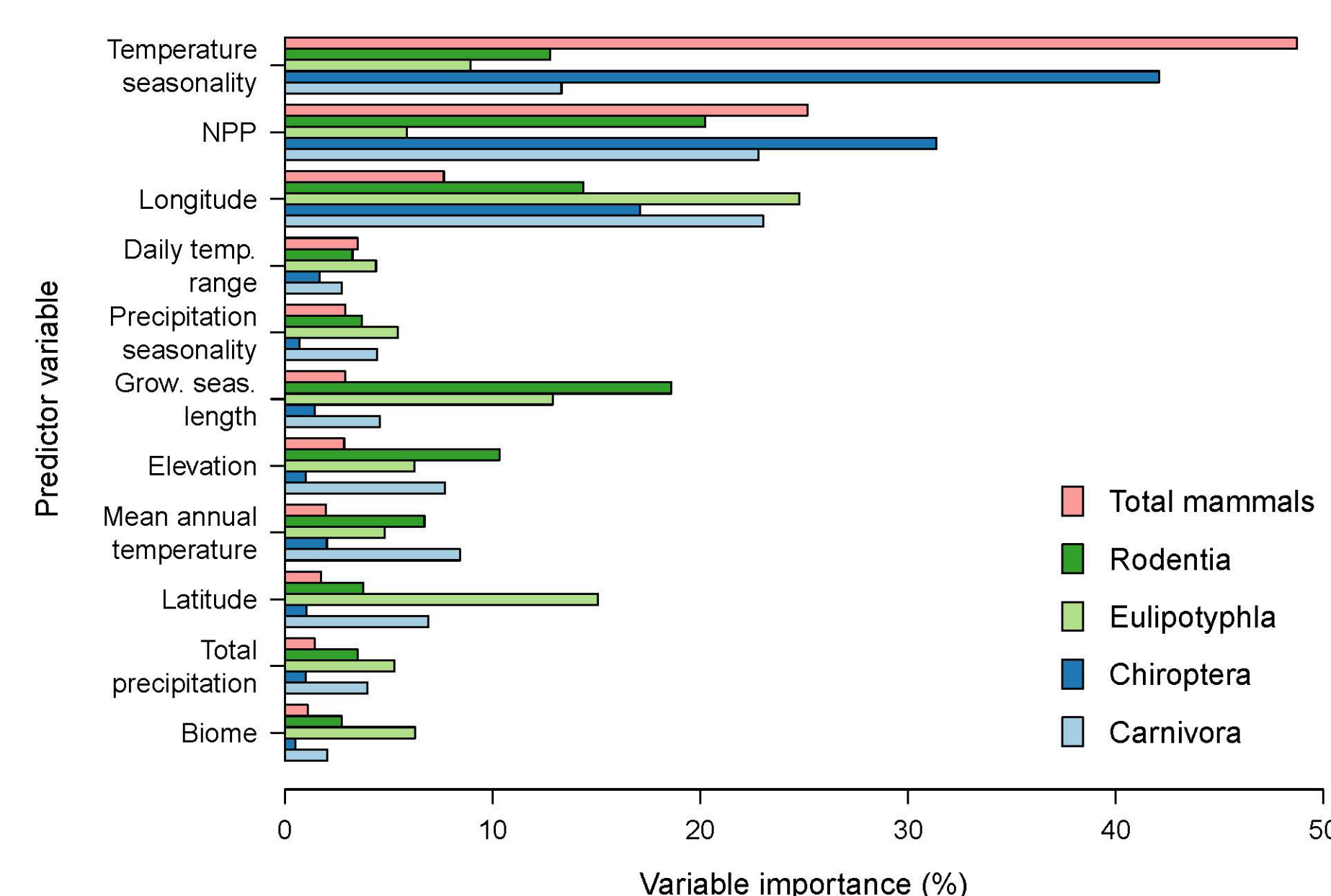
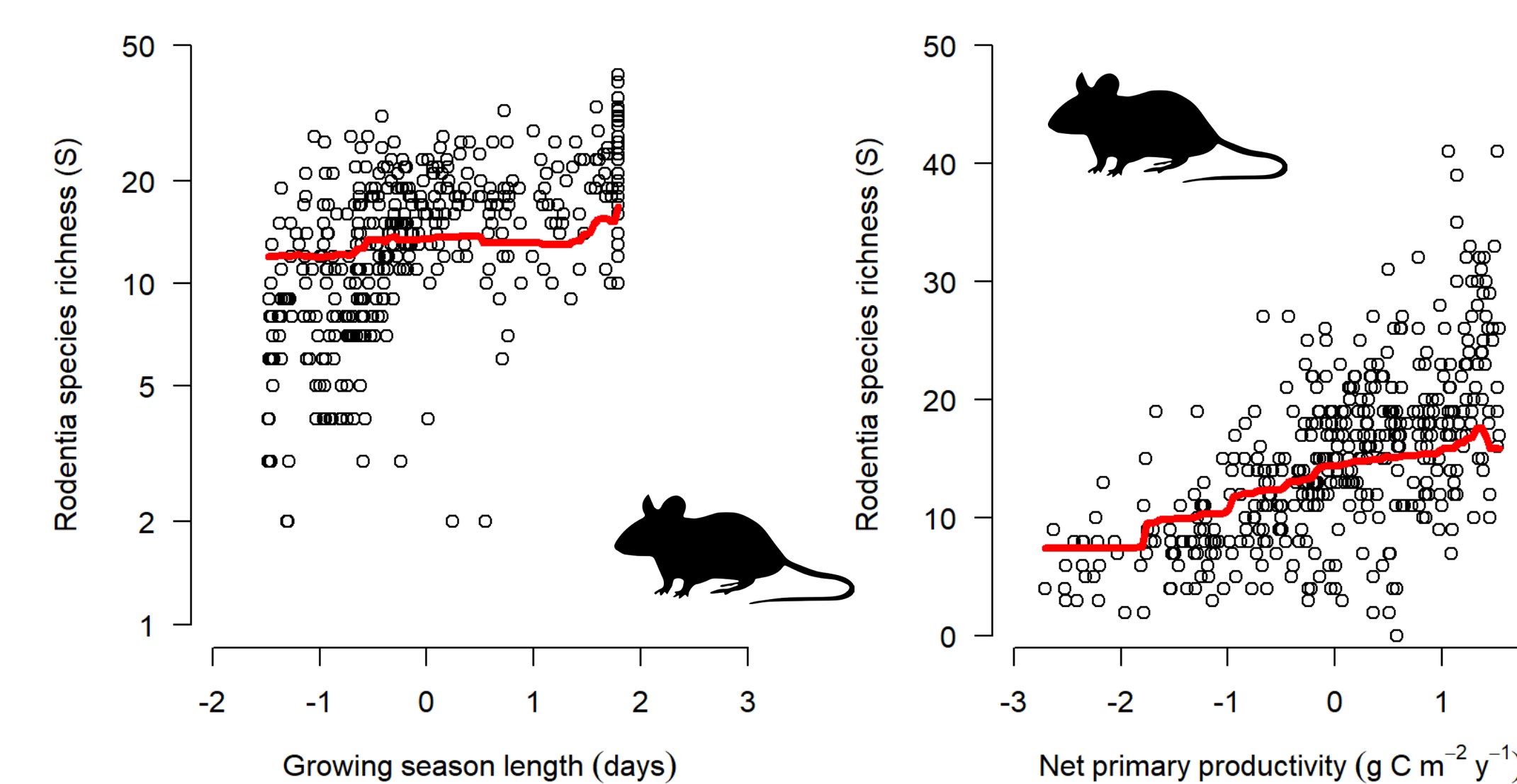
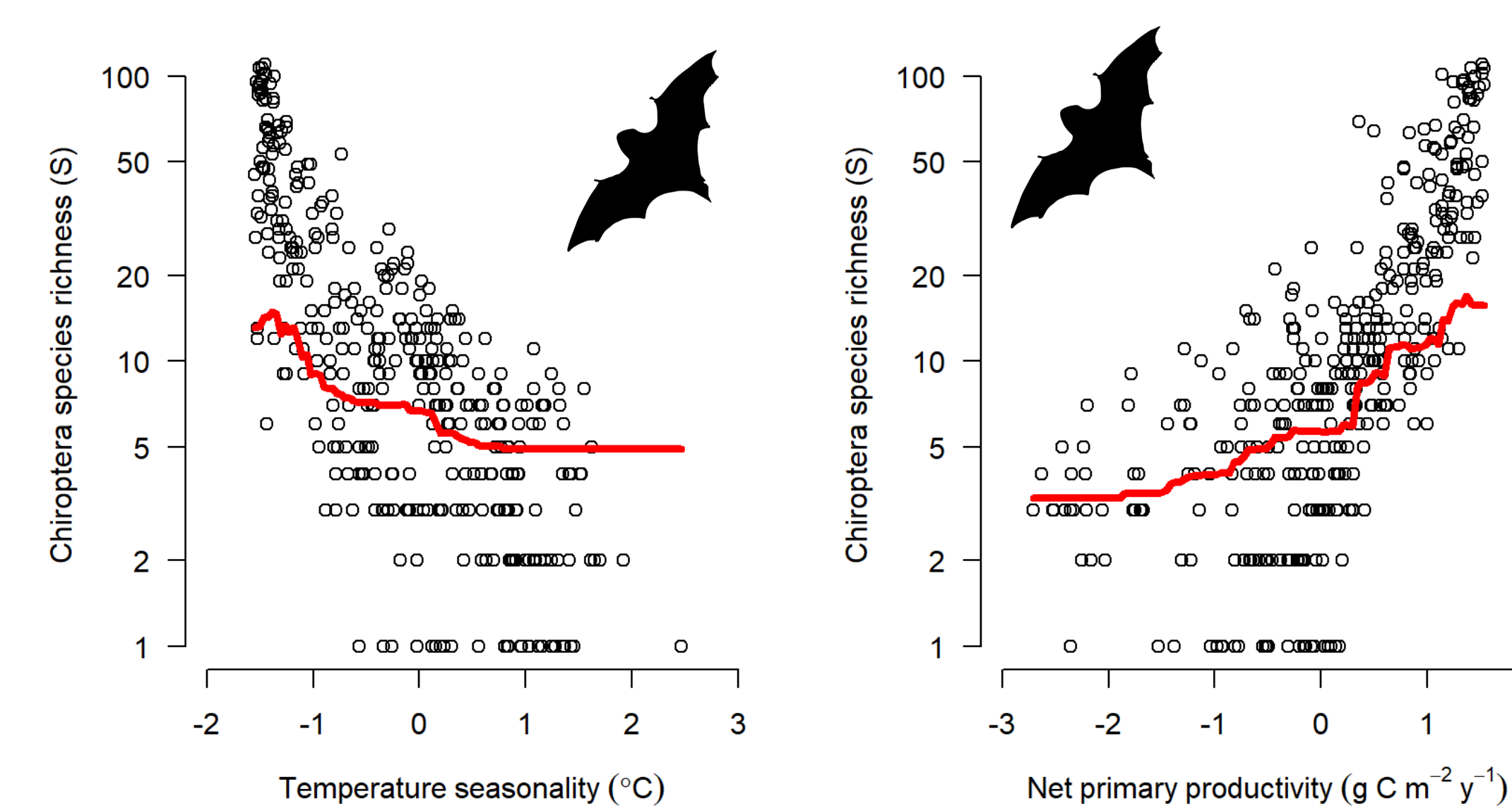
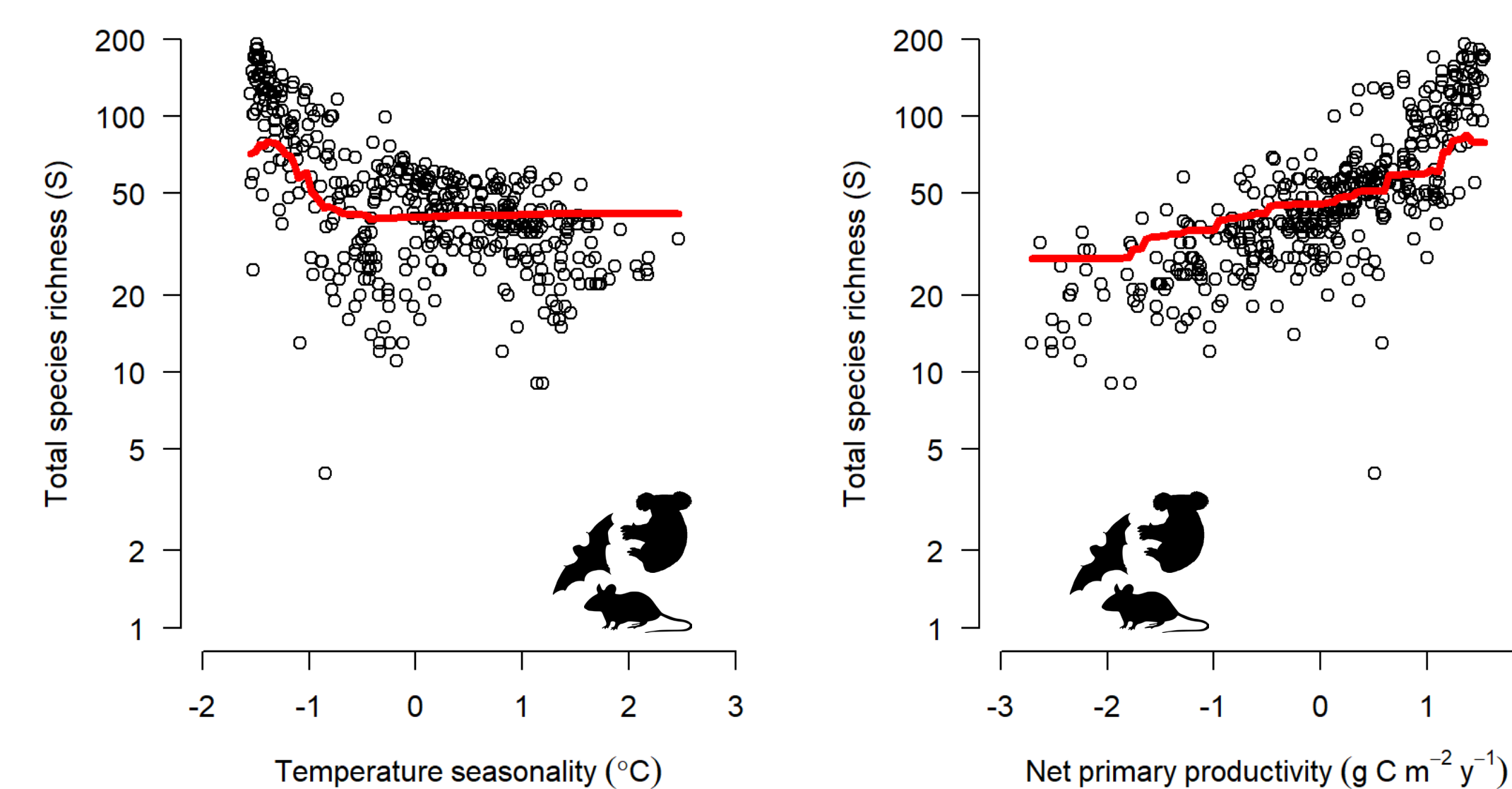


Figure 3. The relative influence of environmental predictors varied considerably among orders of mammals.



Discussion

- Temperature seasonality** and **net primary production (NPP)** were among the strongest predictors of mammalian species richness
- The most influential predictors differed among groups, indicating taxon-specific responses to environmental gradients
- Geographic variables (latitude and longitude) were important in some cases, likely reflecting broad-scale spatial patterns rather than direct mechanisms
- Lower model performance for total mammals and bats suggests that additional factors (e.g., historical or biogeographic processes) may influence richness patterns

Key Takeaways

- Overall, energy availability (NPP) and climate both play important roles, but their relative influence varies among taxa
- Rodents and bats had different key drivers (growing season length vs. temperature seasonality), suggesting ecological differences in how richness is structured
- Identifying the environmental drivers of species richness can improve predictions of how biodiversity may respond to future environmental changes

Data Sources

- Fick & Hijmans 2017, International Journal of Climatology 37 (12): 4302-4315.
- Karger et al. 2017a, Scientific Data. 4 170122.
- Karger et al. 2017b, Dryad Digital Repository.
- Marsh et al. 2022, Journal of Biogeography 49 (5): 979-992.
- Sayre et al. 2020, USGS Data Release.