

# REPRODUCIBILITY MINI PROJECT: ALBERTA TREES

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**Author Contributions:** RTP is writting this mini reproducibility project.

**Data Availability:** Two databases were downloaded from the Seasonal and annual dynamics of western Canadian boreal forest plant communities: a legacy dataset spanning four decades:<https://borealisdata.ca/dataset.xhtml?persistentId=doi:10.5683/SP3/PZCAVE>

## Conflict of Interest statement

No conflicts of interest

**Acknowledgements:** I thank George H. La Roi and colleagues, Amelia Hesketh, Jenna Loesberg, Ellen Bledsoe, Justine Karst, and Ellen Macdonald.

## Abstract

The goal of this manuscript is using reproducibility workflow in ecology and evolution. I used open access data, which is available in Boreales (see references below). This data was rescued by Hesketh et al., 2021. This mini project was created with the open-source software R, OSF and GitHub. A very simple question is stated: does species richness varies along the soil temperature? All the code used here is available in a public GitHub repository.

**Key-words:** reproducibility, diversity, species richness, soil temperature.

## Introduction

Global warming is predicted to significantly alter species physiology, biotic interactions and thus ecosystem functioning, as a consequence of coexisting species exhibiting a wide range of thermal sensitivities. The richness diversity of plants decreased with increasing soil temperature, driven by decreasing plant species richness (Robinson et al., 2018). Species richness and its relationship with temperature has been assessed along altitudinal and horizontal gradients revealing significant linear relationships between species richness and altitude and climatic variables (Pickering et al., 2008).

Here, in this manuscript, I used a very simple linear model to explore the relationship between vascular diversity and soil temperature from the Seasonal Dynamics (SEADYN) and later Annual Dynamics (ANNDYN) research project. The primary purpose of this project was to document seasonal changes in the vegetative composition during the snow-free season (May through October) and longer-term changes in vegetation and forest mensuration for boreal forest stands in Alberta, Canada dominated by *Pinus banksiana* (Lamb.) (Hesketh et al., 2021).

## Methods

This mini reproducibility project was built using rescued data by Amelia Hesketh, Jenna Loesberg, Ellen Bledsoe, Justine Karst, and Ellen Macdonald in 2021 from an Alberta legacy dataset spanning four decades (1980-2015). We use two different datasets: 1) Hondo Vascular Cover (1980-2015) and 2) Hondo Soil Temperature (1980-2010). These datasets are available in Borealis at <https://borealisdata.ca/dataset.xhtml?persistentId=doi:10.5683/SP3/PZCAVE>

A very simple model is explored in this reproducible project: Does species richness varies along the soil temperature? For this purpose i only use 2010 data and the following linear model approach:

$$SR = ST + e$$

where  $SR$  denotes the species richness,  $ST$  is the soil temperature in Celsius, and  $e$  is the error.

This mini project was created with the open-source software R. Packages used were `dataverse`, `tibble`, `dplyr`, `ggplot2`, and `mgcv`. Statistical analyses were carried out in R 3.5.0 (R Core Team 2017). All code used in this manuscript is available on GitHub [https://github.com/CIEE-Living-Data-Project/Rolando\\_Trejo\\_Reproducibility\\_LDP\\_2022](https://github.com/CIEE-Living-Data-Project/Rolando_Trejo_Reproducibility_LDP_2022).

## Results

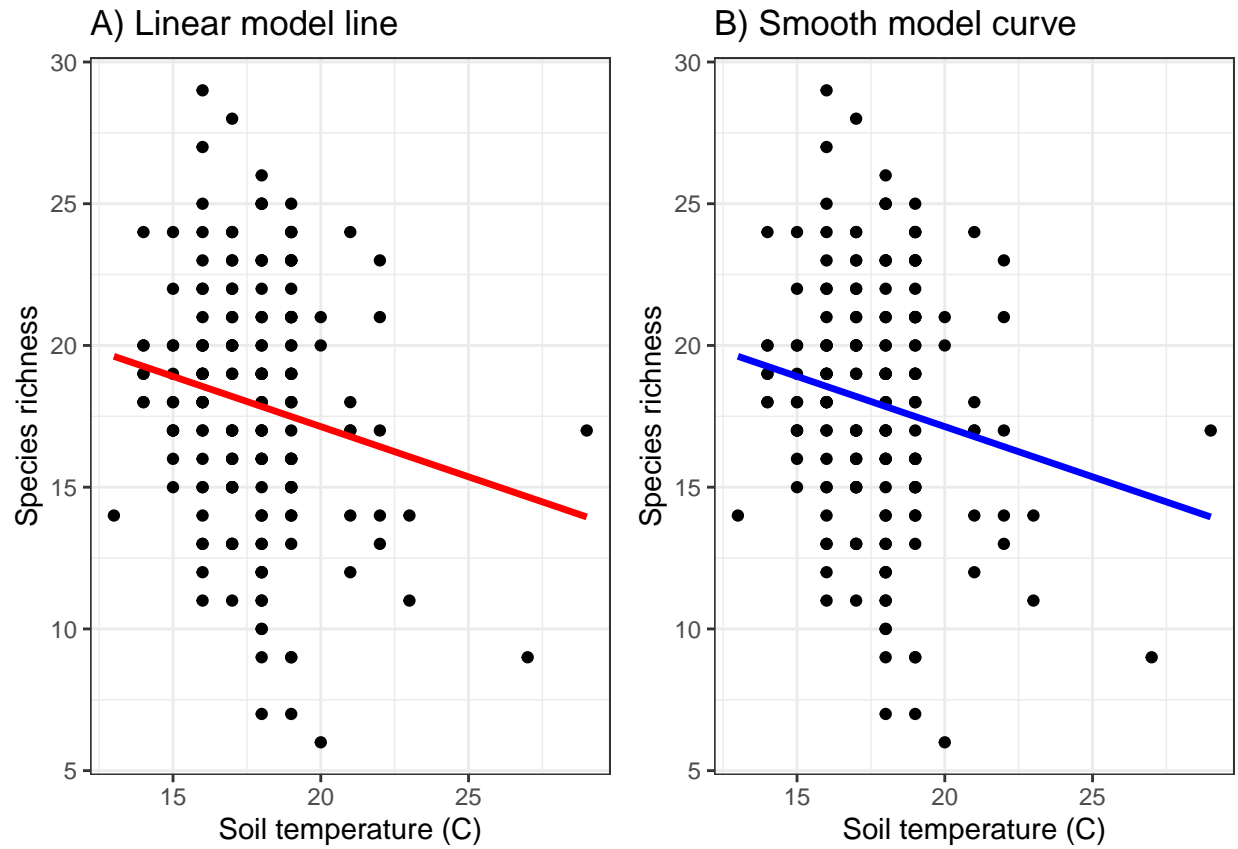
A higher species richness is linked to a lower soil temperature according to this simple linear model. We can also see that linearity is supported by these data (see Figure 1). However, this is just a model considering soil temperature as the only predictor. Other variables must be considered to search if it is a real observed trend. See more detail in the Living Data Tutorials

## Discussion

The code used here in this mini reproducibility project can be used as guide through the creation and management of a fully reproducible manuscript using RMarkdown and Rstudio.

## References

- Hesketh, A., Loesberg, J., Bledsoe, E., Karst, J., & Macdonald, E. (2021). Seasonal and annual dynamics of western Canadian boreal forest plant communities: A legacy dataset spanning four decades [Data set]. Scholars Portal Dataverse. <https://doi.org/10.5683/SP3/PZCAVE>
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- Robinson, S.I., McLaughlin, O.B., Maereinsdóttir, B., and O’Gorman, E.J. Soil temperature effects on the structure and diversity of plant and invertebrate communities in a natural warming experiment, *Journal of Animal Ecology*, 87(3):634-646 (2018).



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61 Figure 1. A) linear model approach and B) a non linear model approach. Linearity is respected.

## 62 **Tables**

63 There are not table to show.

## <sup>64</sup> **Appendices**

<sup>65</sup> There are not appendices to show.