

TEAM - IC24006

EY CHALLENGE: BIODIVERSITY STUDY

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Our Challenge: Developing a Species Distribution Model (SDM)

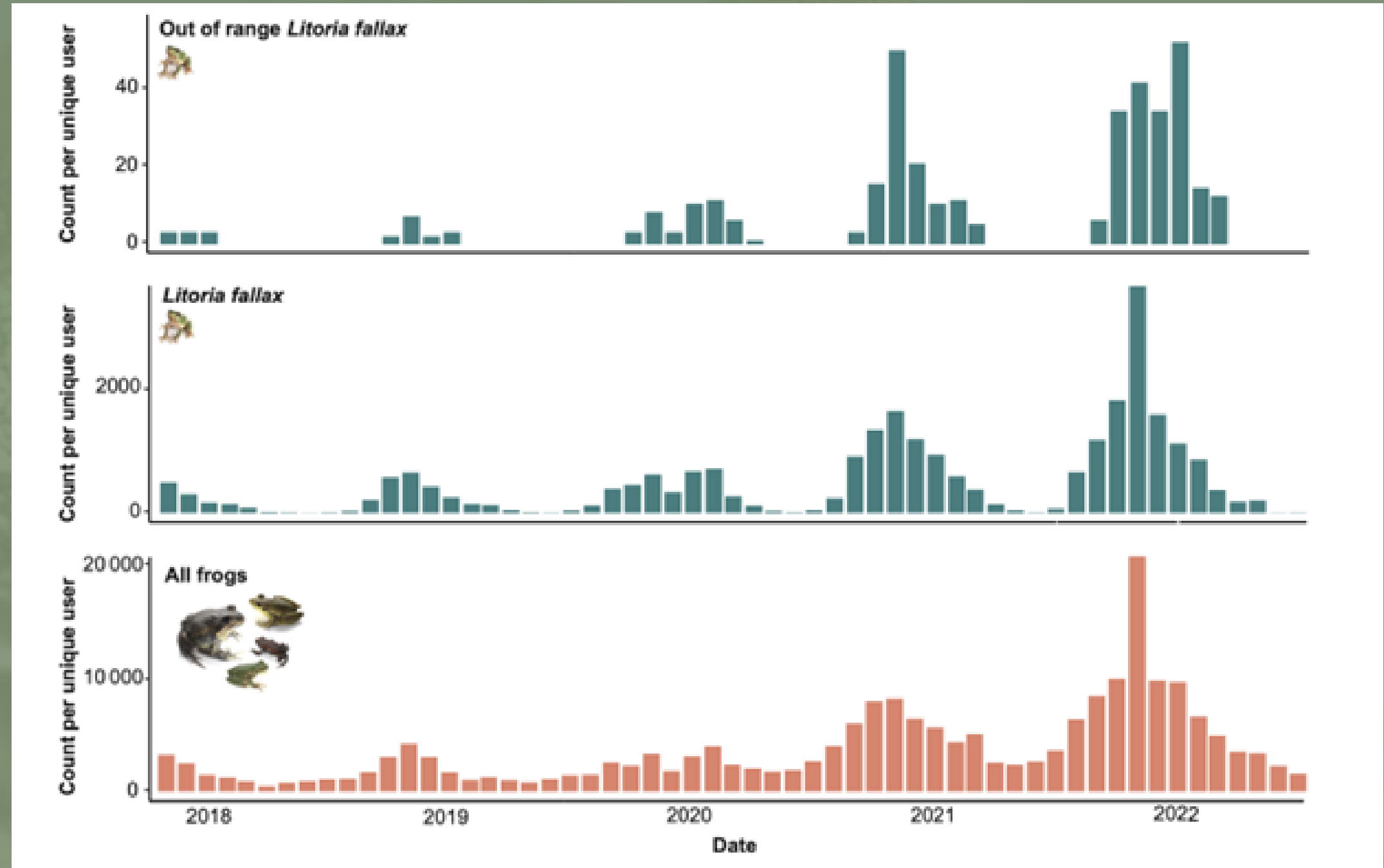
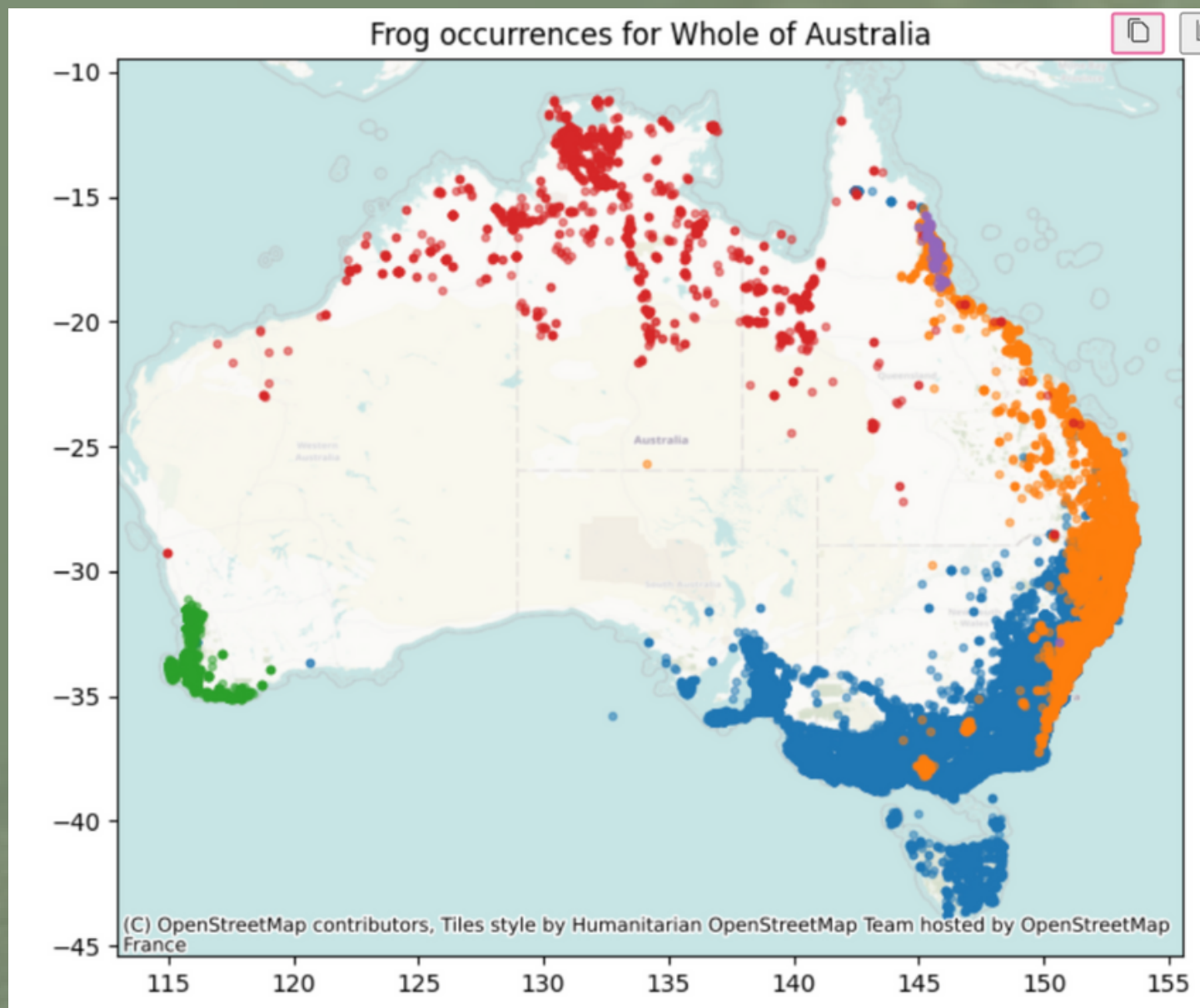
- **Our mission is to develop a tool that can forecast where *Litoria Fallax* frogs may live. By analyzing weather patterns and geographical data, we aim to construct a species distribution model that accurately predicts frog occurrences.**
- **We also aim to provide valuable insights into the factors influencing frog distribution, and eventually generate actionable insights to make a meaningful and positive impact.**

Why Frogs Matter

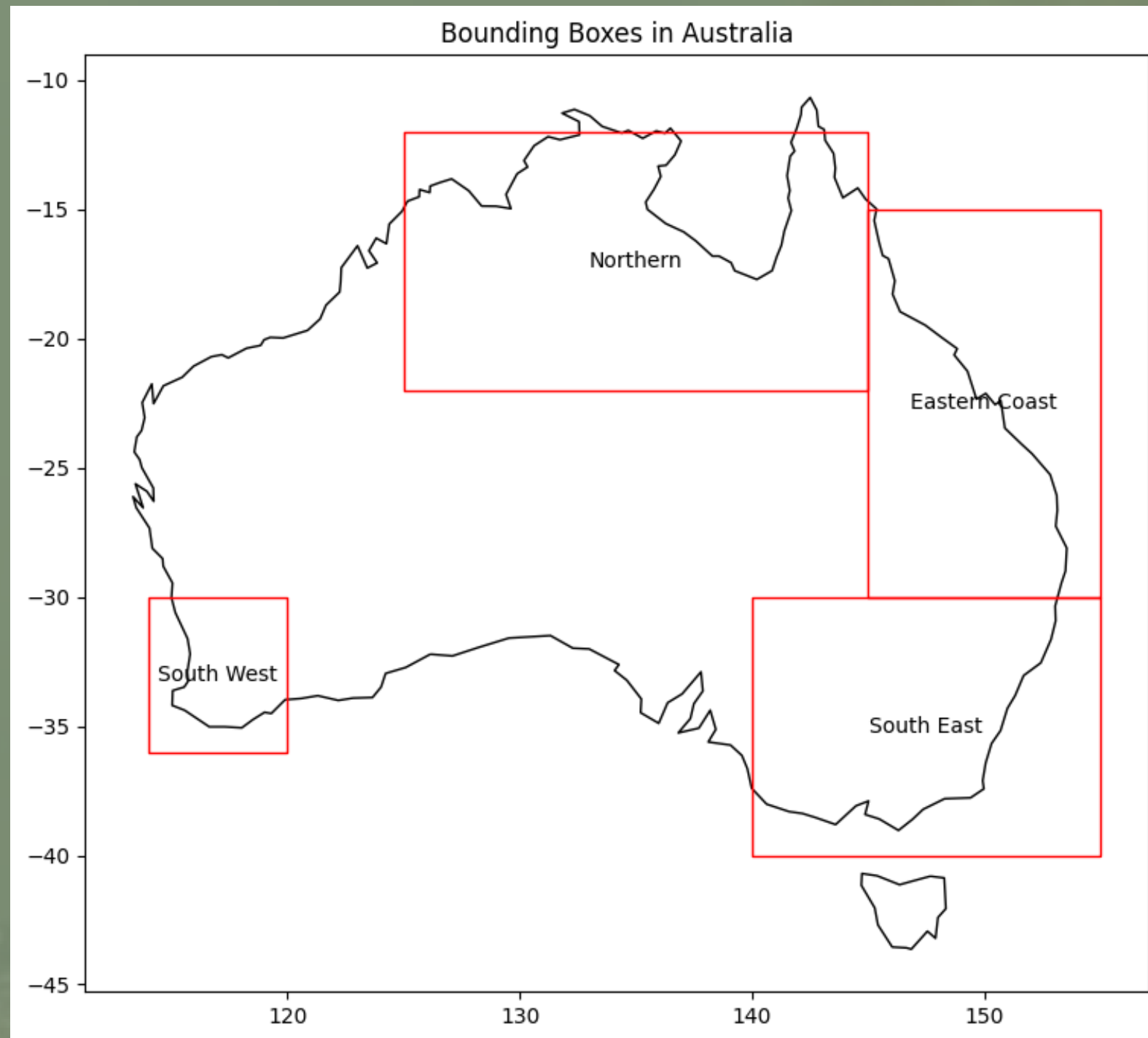
- **Frogs serve as indicator species in ecosystems.**
- **Protecting frog populations is essential for ecosystem health and sustainable living.**
- **They provide insights into environmental health and biodiversity.**

Analysis

- Seasonal Behavior
- Geographical Distribution
- Breeding Season Peak



Spatial Sampling

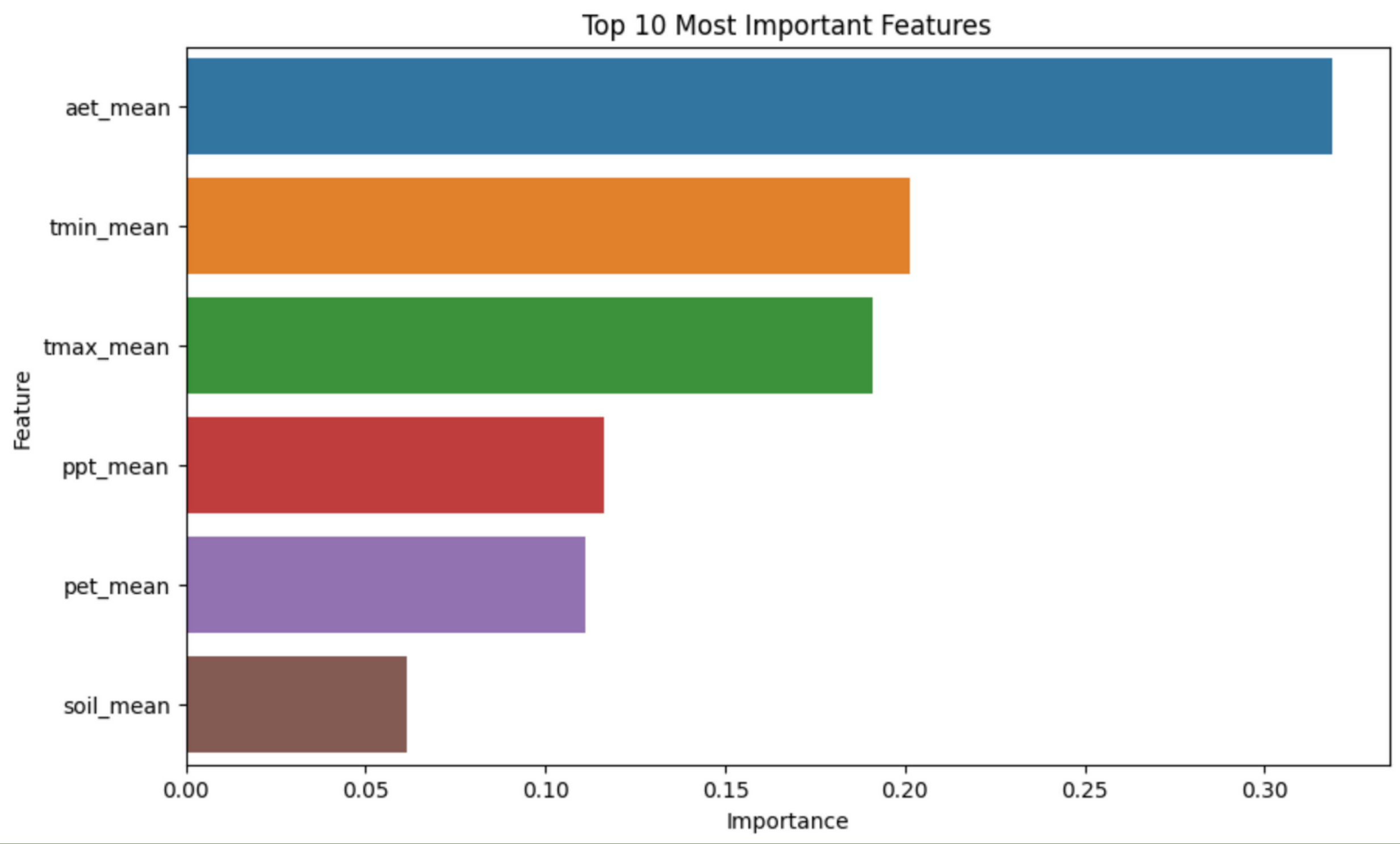


Sampling Bias

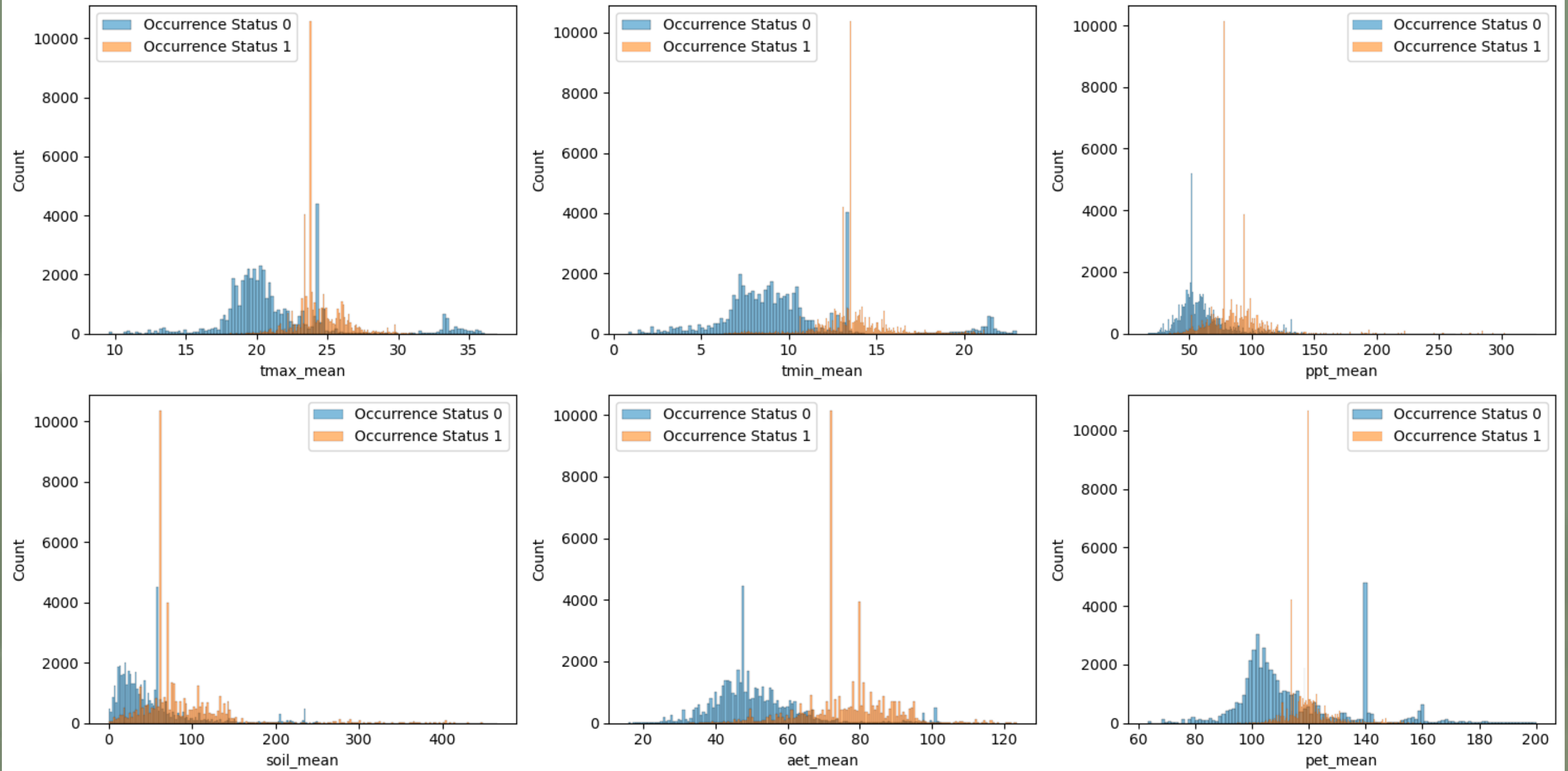
- **Removed occurrences of species other than *Litoria Fallax* if they were geographically close to the target species.**
- **KD-trees enabled efficient computation for finding the nearest neighbors.**

Feature Engineering

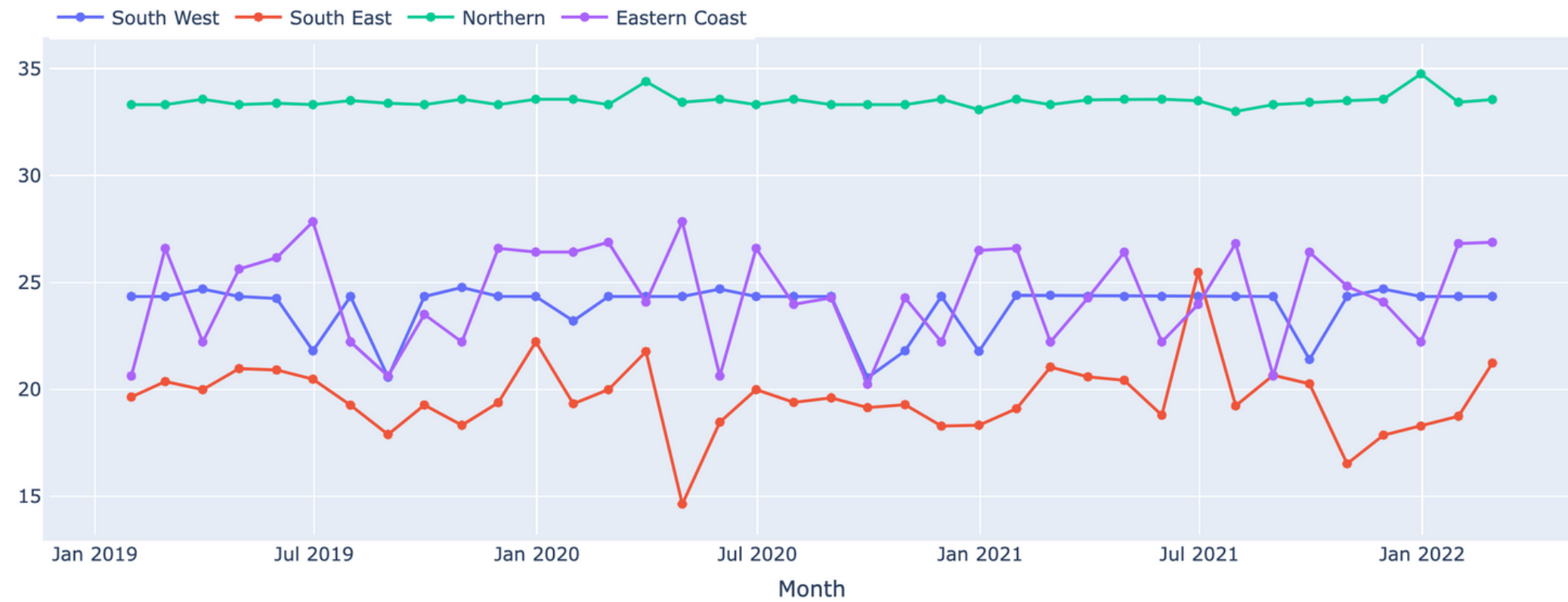
- **Extracted Additional Features: Actual Evapotranspiration (AET) and Potential Evapotranspiration (PET)**
- **Feature Standardization**
- **Handling Missing Values and outlier data**
- **Creation of Binned Variables: Binned variables were generated based on histograms analysis, facilitating a more granular understanding of feature distributions**
- **Exploration of Feature Correlation and Importance: The correlation between features was examined, and feature importance was studied to identify key predictors influencing the target variable**



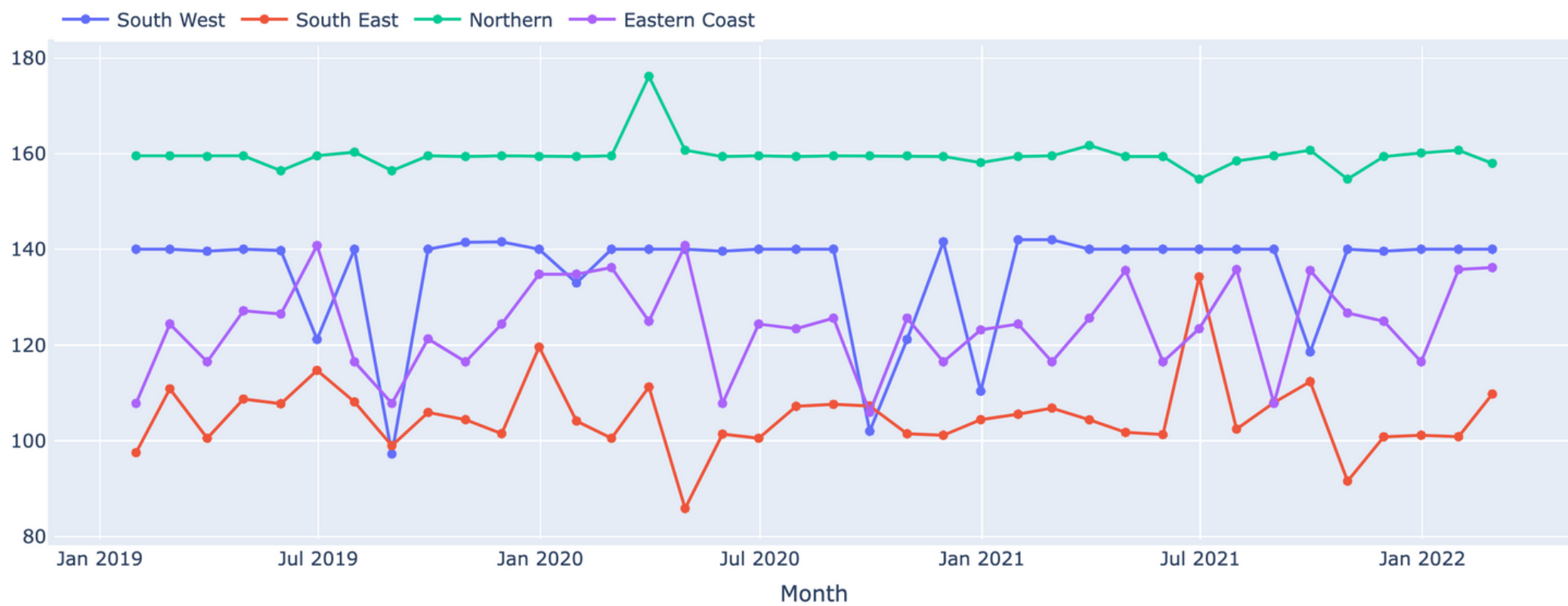
Frequency distribution of TerraClimate variables by Occurrence Status



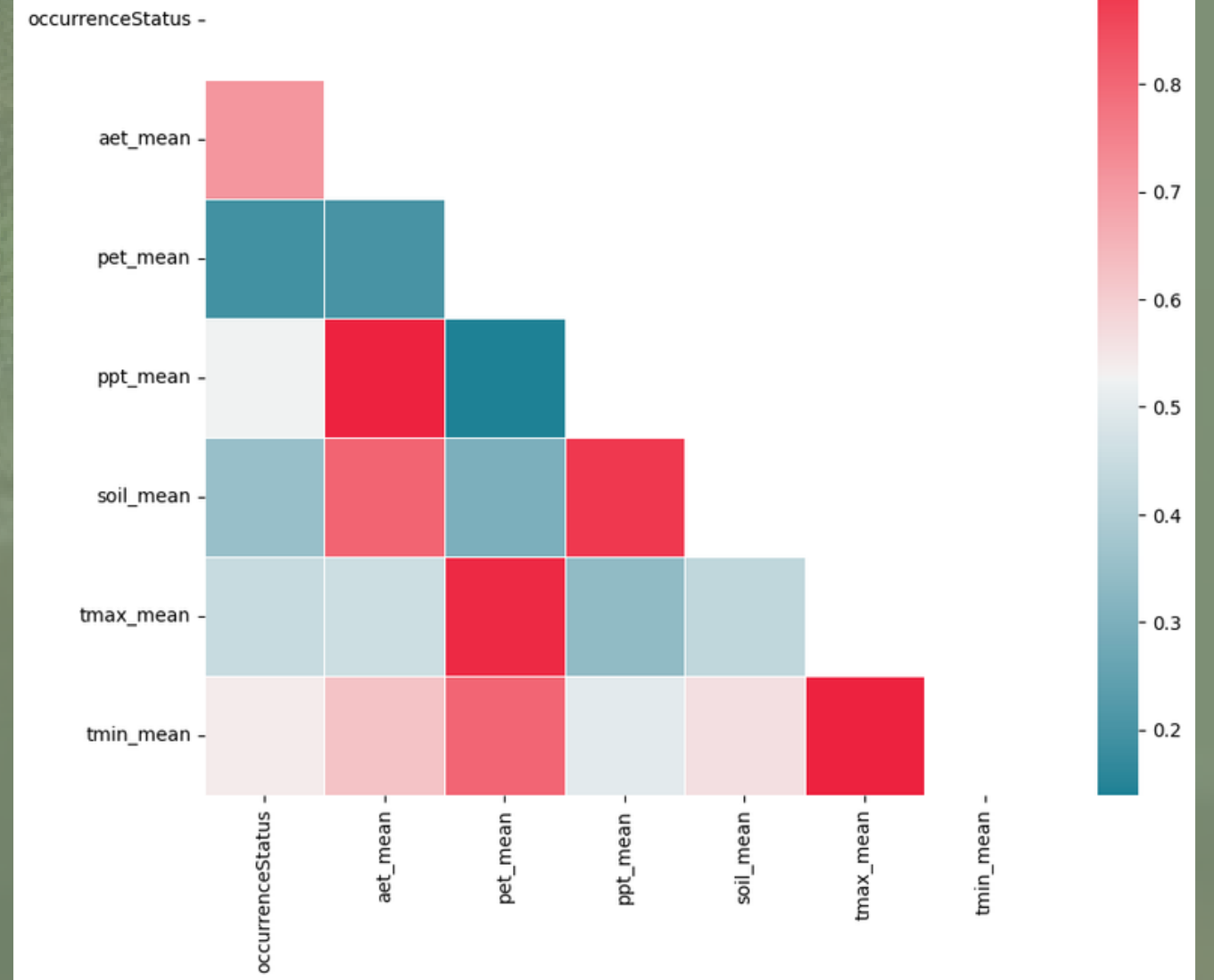
Monthly Median Values of Tmax_mean Over Time (Post-2019)



Monthly Median Values of Pet_mean Over Time (Post-2019)

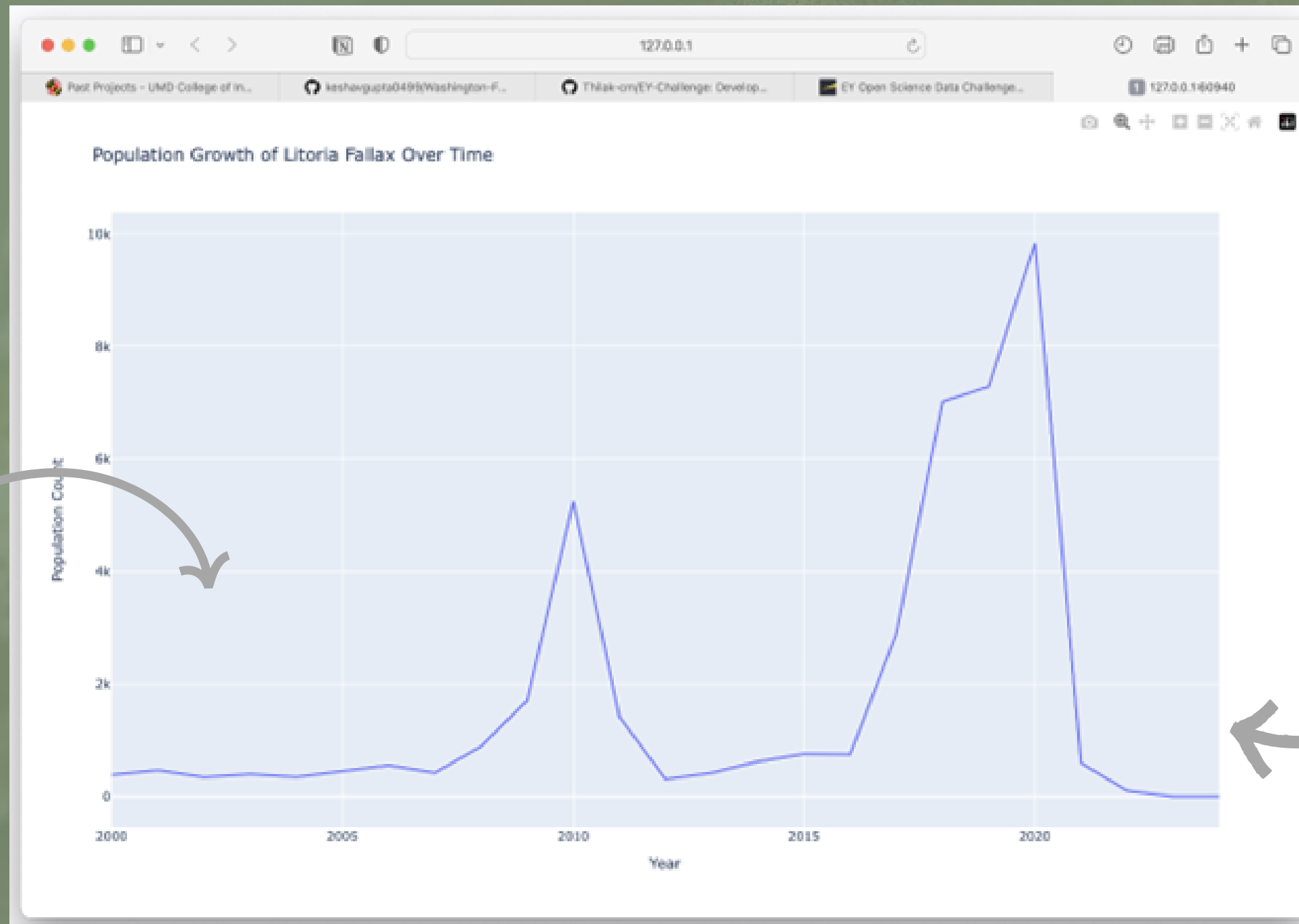


Correlation Matrix



Why the dips in population?

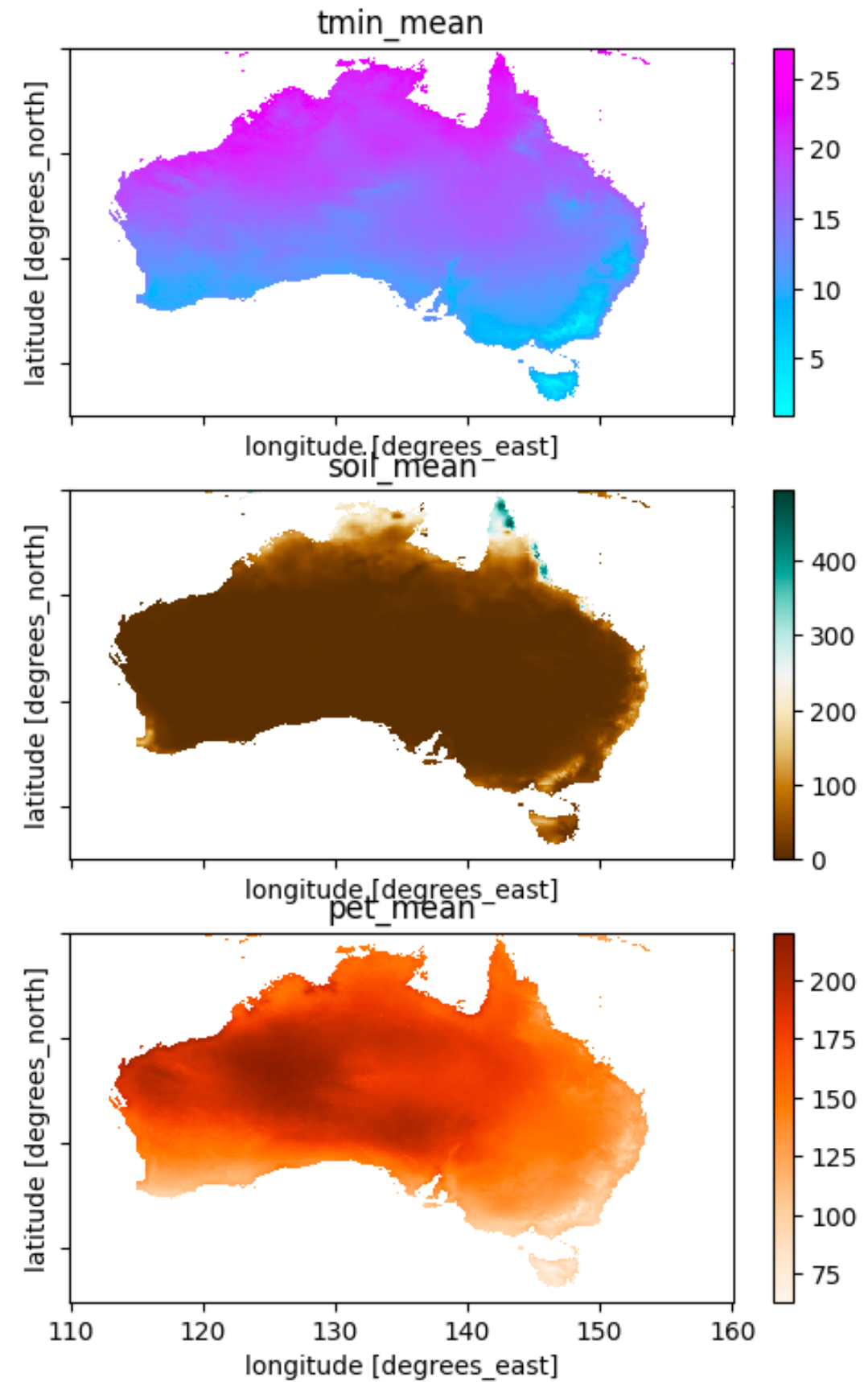
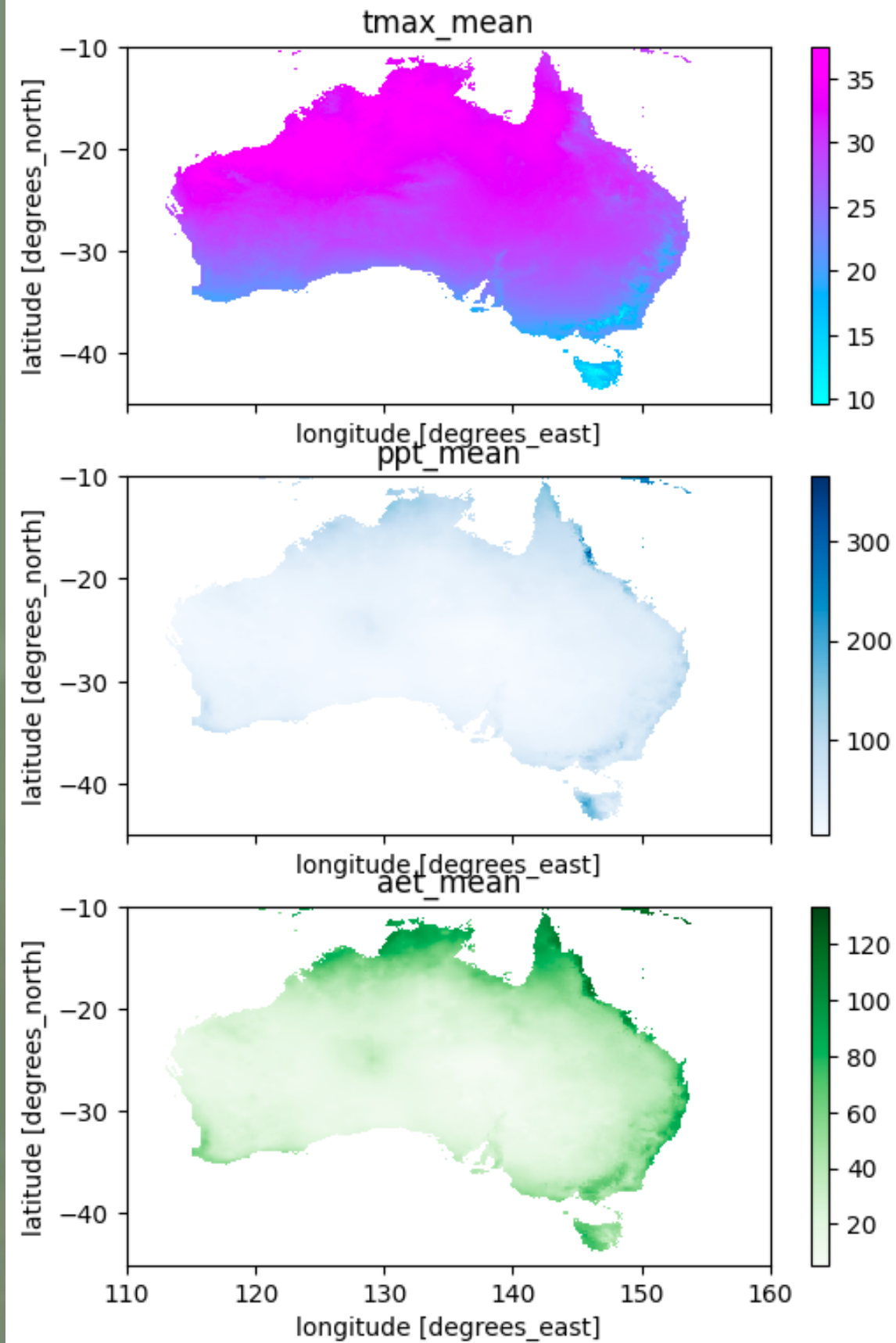
Climate change and
habitat loss

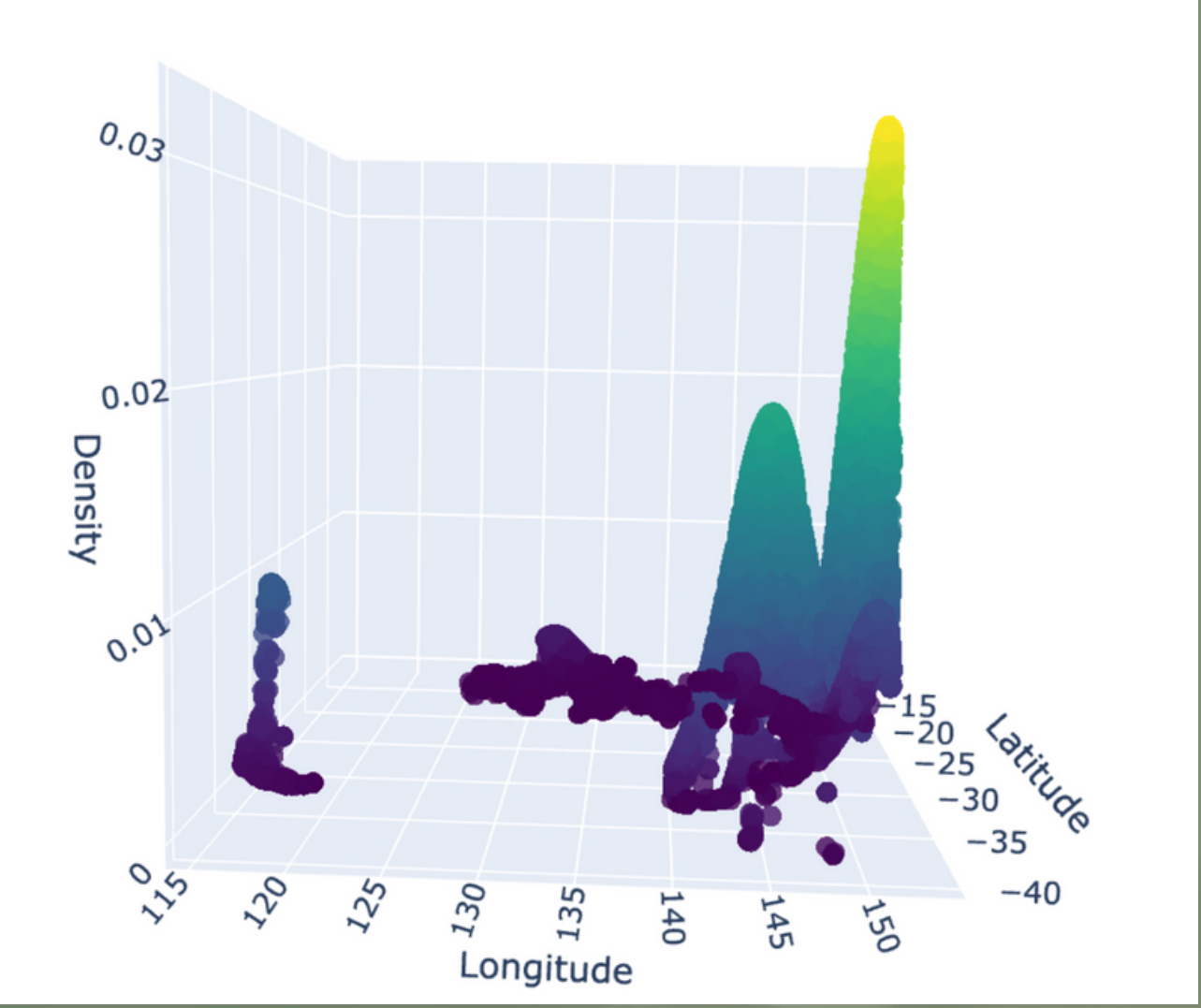
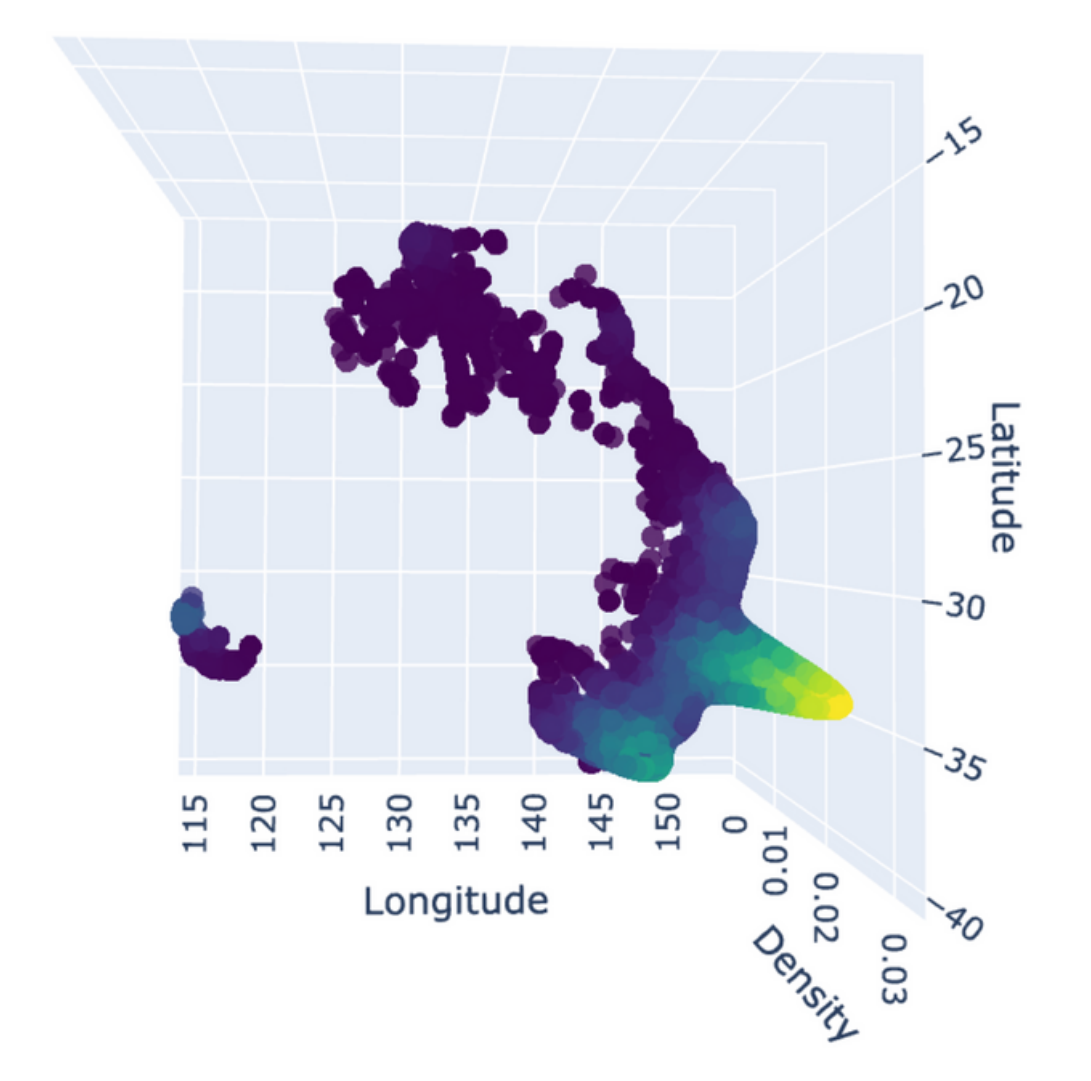
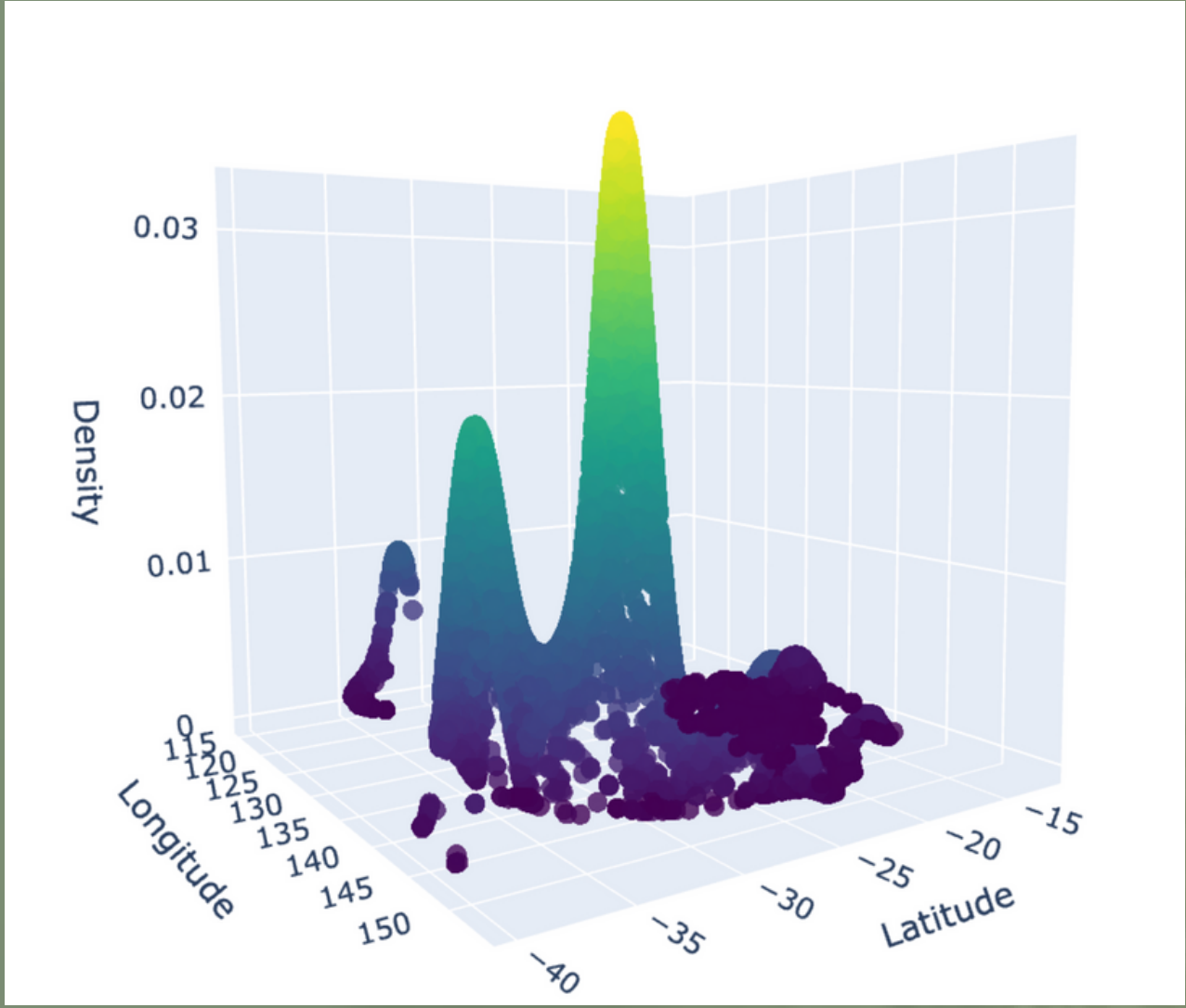


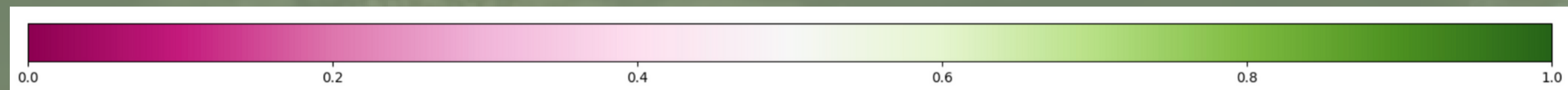
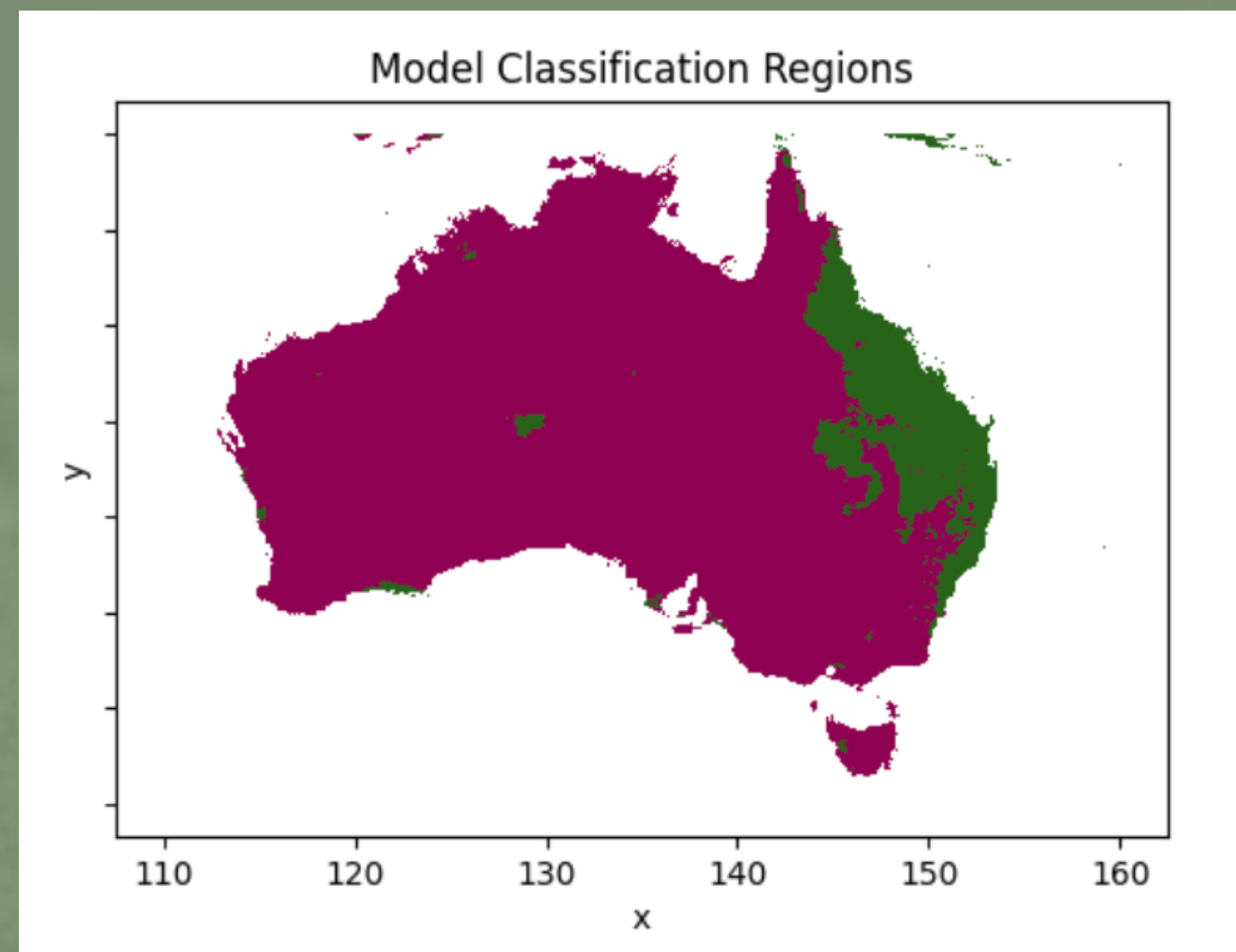
Amphibian chytrid fungus
outbreak

Spatial distribution of Terraclimate variables

Litoria Fallax







Findings

- **Presence of separated populace (Melbourne)**
- **Eastern dwarf frogs are named so for a reason**
- **We now have a classification model that should aid in understanding frog population in non-urban areas which is a big area of focus**

Model Evaluation

- **K-Fold cross-validation**
- **Random forest classifier with tuned hyperparameters**
- **F1 score and accuracy (submission score: 0.72)**

A close-up photograph of a green frog with large, dark eyes and a textured, bumpy skin. The frog is positioned in the upper half of the frame, looking towards the right. The background is a soft, out-of-focus green, suggesting a natural habitat. The overall image has a slightly desaturated, muted green color palette.

Thank you!