



SCAN ME



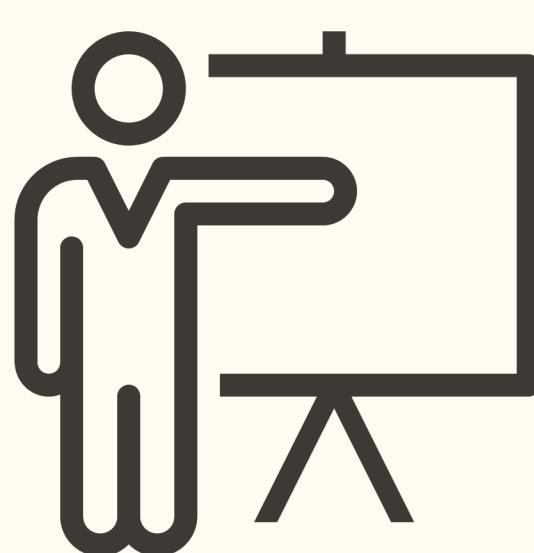
GROUP MEMBERS

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Woodlands and Waterways Ecowatch

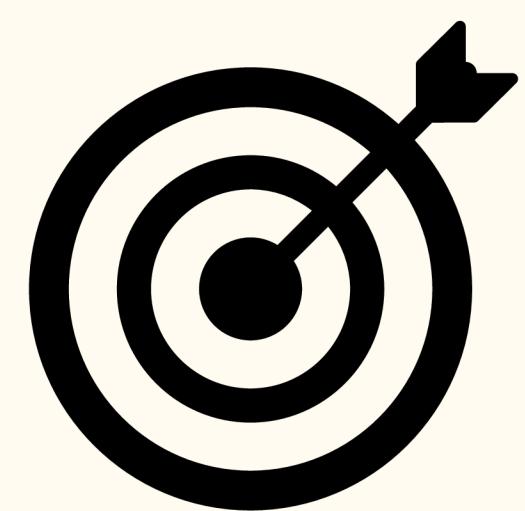
01. Introduction

This project analyzes five years of benthic macroinvertebrate data from Different County lakes in Ontario to evaluate ecosystem health and functional diversity by examining temporal changes in community composition, identifying key environmental drivers such as elevation, drawdown, and headwater status, correlating biological responses with water chemistry, and employing predictive models to forecast shifts in community dynamics, ultimately providing actionable insights for lake conservation and management.



02. Objective

- Assess changes in functional diversity across different sites and ecosystem health indices over time.
- Develop predictive models to understand the influence of site characteristics (elevation, drawdown, headwater status).
- Explore relationships between biological responses and water chemistry parameters.

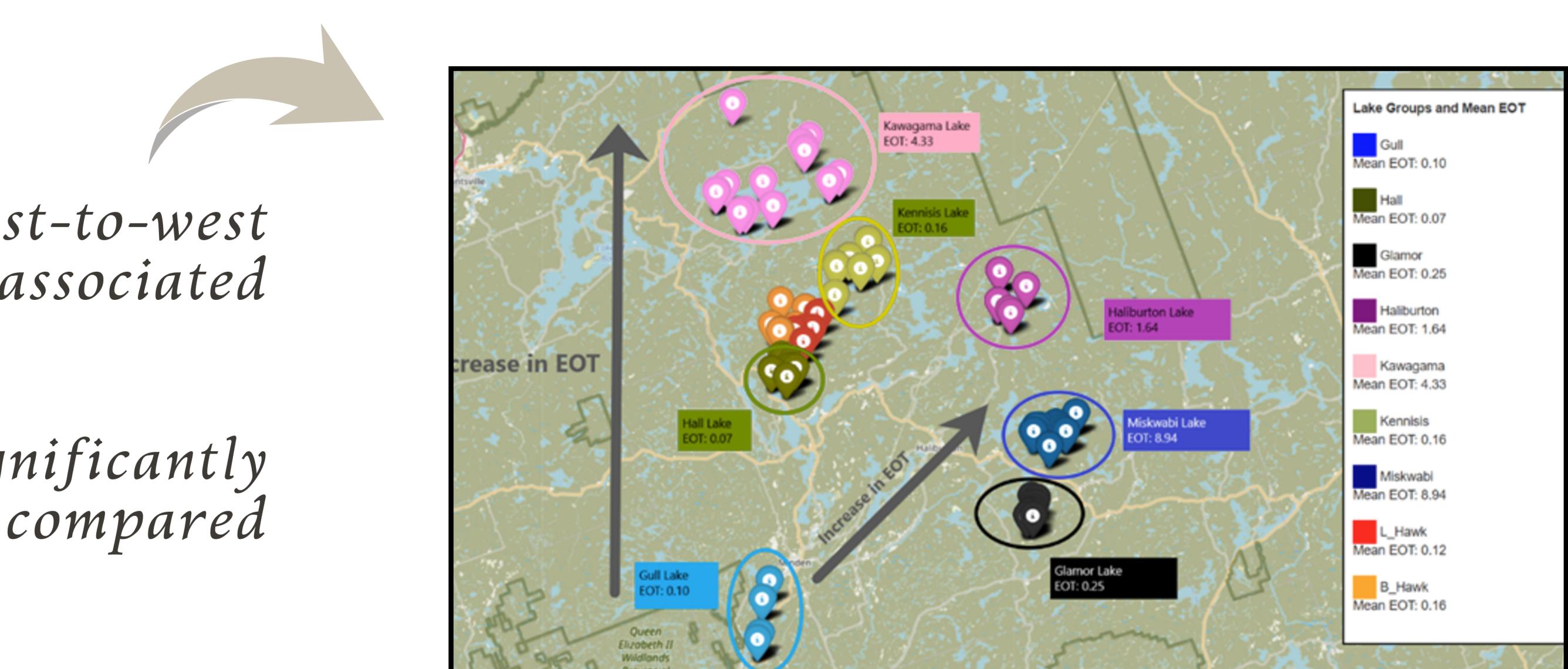
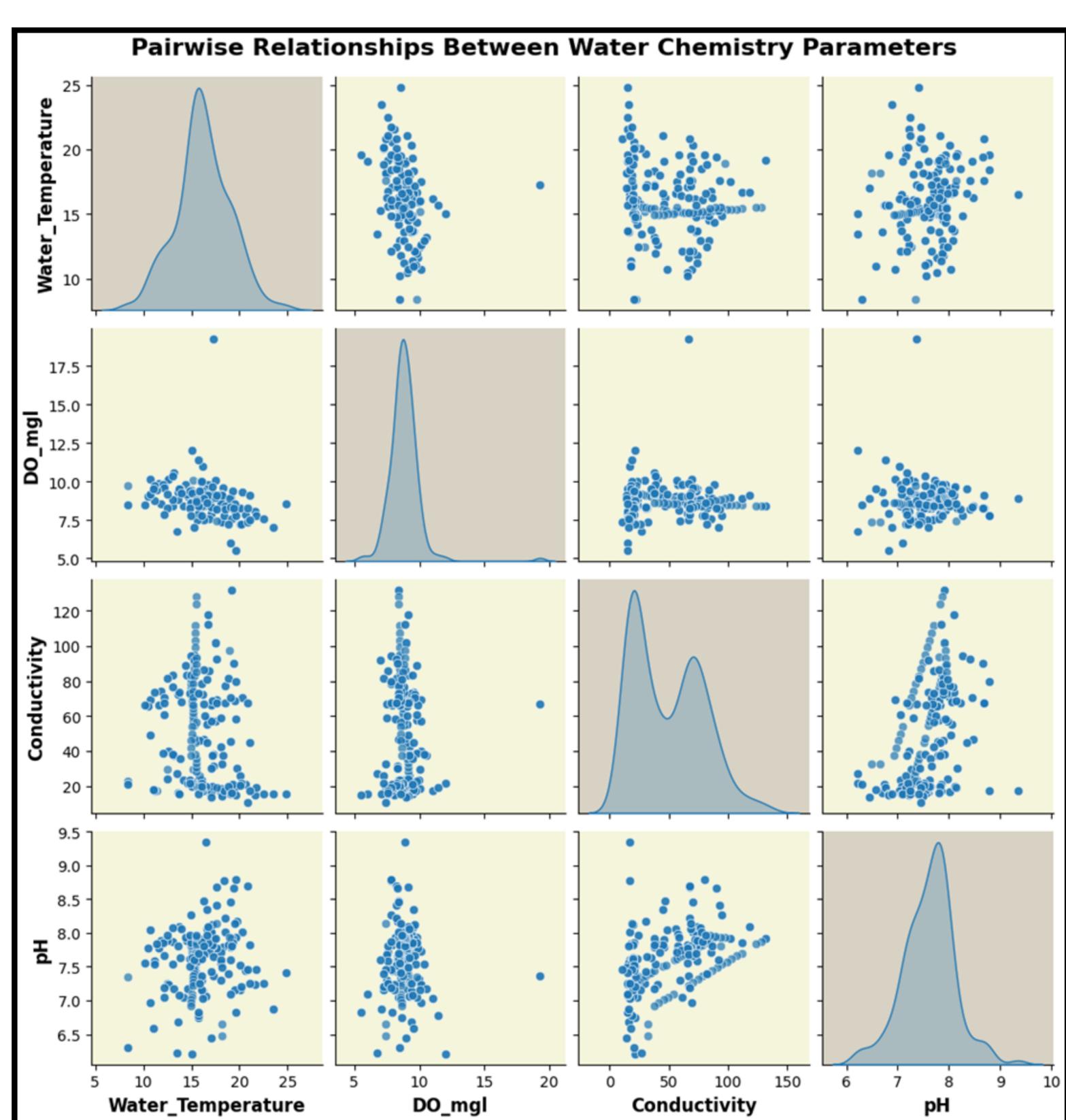


03. Analysis

A. Spatial Trends:

Observed north-to-south and east-to-west gradients in elevation and associated parameters.

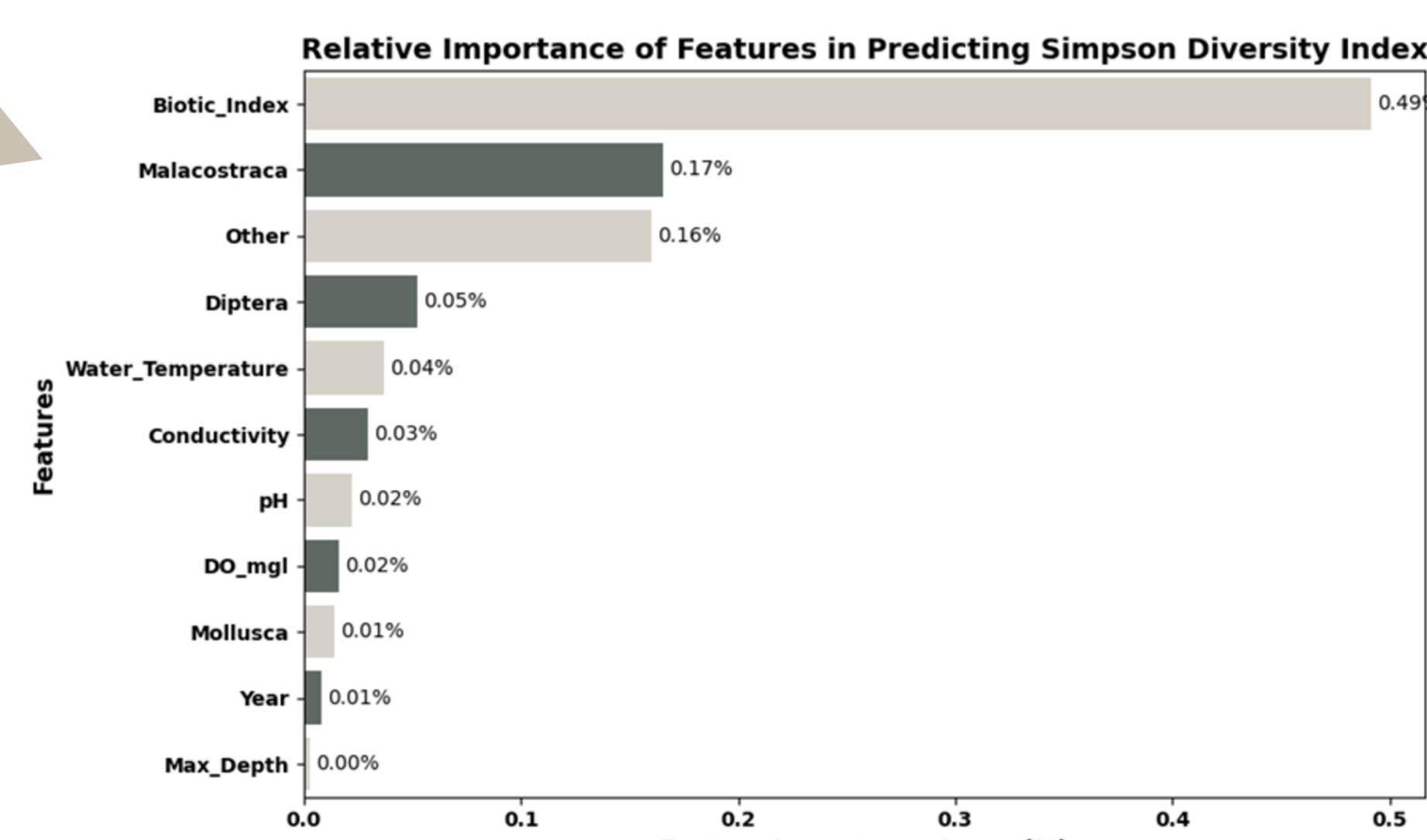
Example: Kawagama exhibits a significantly higher Elevation Over Time (EOT) compared to Gull and Hall.



B. Water Chemistry and Biological Responses:

Key relationships between water temperature, dissolved oxygen, conductivity, and pH.

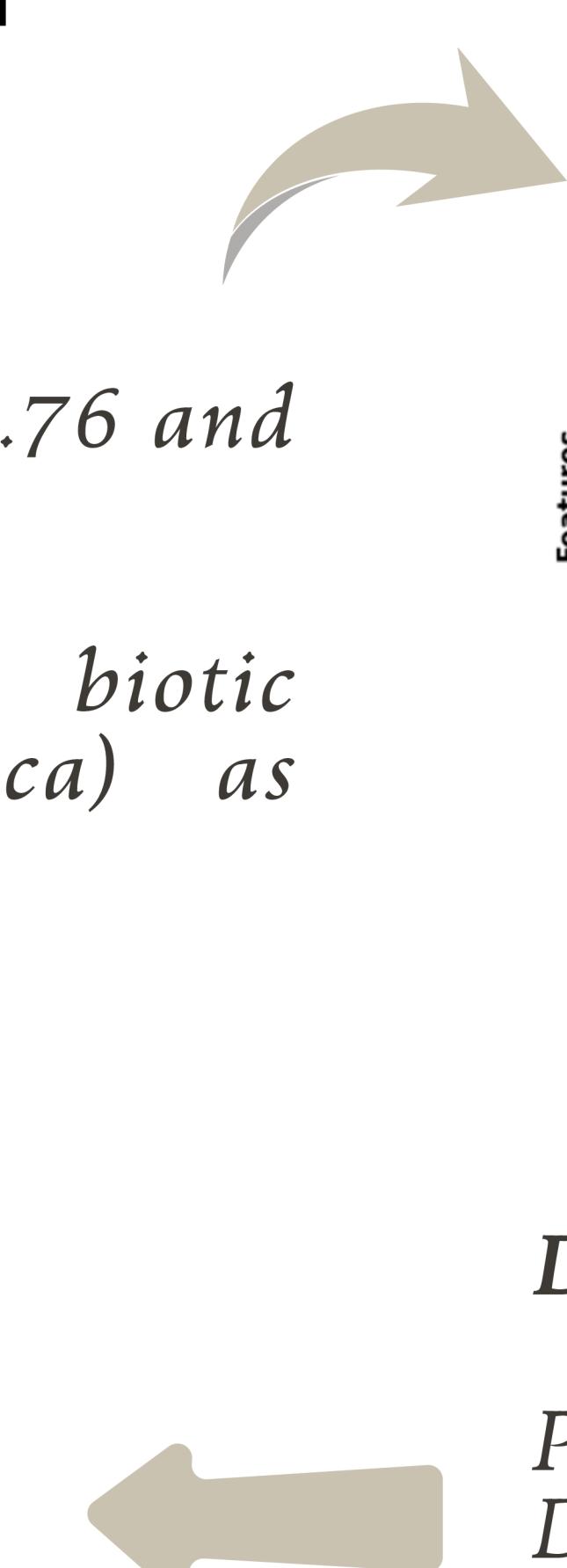
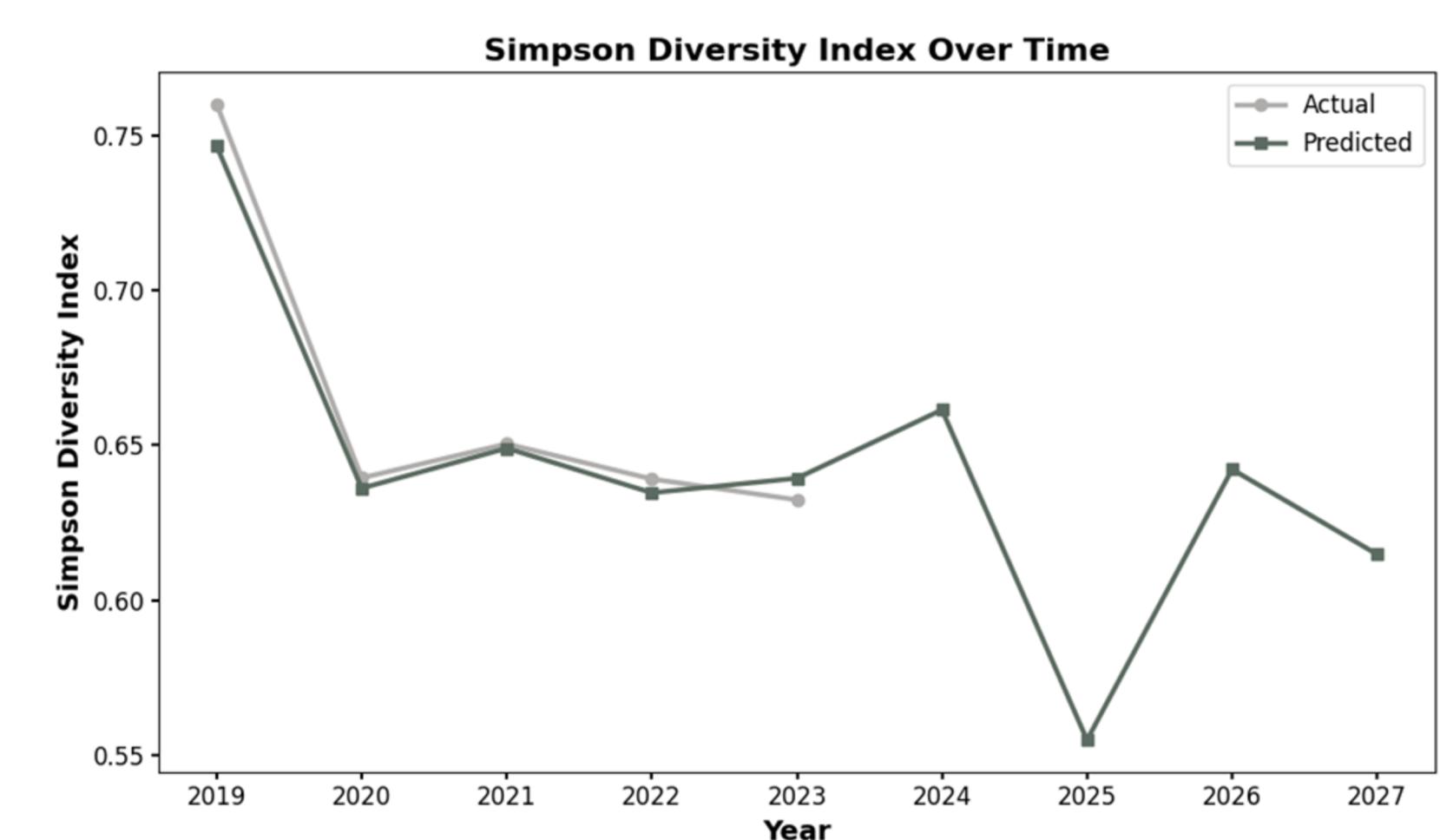
Example: Negative correlation between water temperature and dissolved oxygen.



C. Predictive Modeling:

Random Forest model achieved $R^2 = 0.76$ and Mean Absolute Error = 0.06.

Feature importance analysis shows biotic factors (Biotic Index, Malacostraca) as primary drivers of diversity.



D. Temporal Trends:

Predicted and actual trends in the Simpson Diversity Index (SDI) over time.

Observed a decline in SDI after 2024, highlighting potential ecological stressors.

04. Conclusion

The analysis revealed spatial and temporal changes in benthic macroinvertebrate communities, with biotic factors predicting biodiversity. Trends in the Simpson Diversity Index (SDI) show a decline, signaling ecological stressors like habitat degradation, pollution, or climate variability. This highlights the need for targeted conservation actions. Predictive models offer insights into future changes, enabling proactive ecosystem management and informed decision-making.



05 Future Directions

- Validate predictive models with additional datasets.
- Expand monitoring to include nutrient loading, invasive species, and climate factors.
- Develop actionable conservation strategies to mitigate biodiversity loss and enhance ecosystem resilience.

