Comparison of Species Richness and Functional Richness Between Barro Colorado Island and Pipeline Road

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Introduction

The UCSB-Smithsonian Scholars Program is a collaboration between UCSB and the Smithsonian National Zoo and Conservation Biology Institute. The program provides diverse undergraduate students data science training, early research opportunities, professional development, and access to a network of researchers, instructors, and peer-mentors.



Figure 1, 2023 ¡ERES! Cohort on Santa Cruz Island



Figure 2. 2023 STRI cohort and advisors/instructors in Panama.

Early Research Experience Summer (¡ERES!)

- 6-week data science course
- 4-day field workshop on Santa Cruz Island (SCI)
- Professional development workshops

Advanced Field Research Training

- 2-week field course at the Smithsonian Tropical Research Institute (STRI) in Panama
- Research job shadowing
- Ecotourism

This study serves as the practical application of field research techniques and data science skills acquired. Bioacoustics data was collected, manipulated, analyzed, and visualized by STRI Course Team, The Oropendolas.

Question

How do species richness and functional richness compare between Barro Colorado Island (BCI) in the Panama Canal and Pipeline Road in Gamboa, Panama?



Figure 3. Pictures taken by Dr. Ruth Bennett on Pipeline Road (Gamboa)

Techniques

Data Science

- R-Studio
- Tidyverse, mFD, phytools
- data munging, for loops, ggplot2
- BirdNET-Analyzer
- · Raspberry pi

Field Training

- Reconyx camera trap deployment
- AudioMoth bioacoustics recording
- Point counts
- Orienteering



Figure 4. Classroom learning (Gamboa)



Figure 5. Reconyx camera image (BCI)

Process

Deployed 12 AudioMoths at Pipeline road and BCI to record the dawn chorus.



Conducted point counts for visual confirmation.



Analyzed 24 recordings using BirdNET-Analyzer.



nts



Combined and manipulated data from AudioMoths with data from AVONET and Birds of Panama - Bird Life International



Figure 8. BCI and Pipeline bird counts



Figure 9. R code chunk to populate the binary matrix



Created data

visualizations with RStudio.

Results

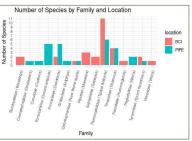


Figure 10. Species richness

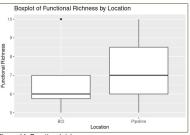


Figure 11. Functional richness

Conclusion

The UCSB-Smithsonian Scholars Program provided an immersive experience focused on biodiversity research, multi-disciplinary conservation strategies, data science in R, and mentorship. Results are not a true indicator of species richness or functional richness but a reflection of program learning outcomes.

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