Biodiversity Measures on the Michigan Technological University Campus

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LO5

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**Introduction**

Evolution is one of the most important concepts in biology since it is the main driving force of species adapting to different environments over time and is also critical in understanding human-disease interactions (Gluckman et al., 2011) . Biodiversity can be thought as the variety of genes, species, and environmental factors that take place and change the biosphere throughout time (Purvis & Hector, 2000). This diverse pool provides the material that maintains evolutionary mechanisms and is necessary to understanding resource utilization and the natural evolutionary history (Mergeay & Santamaria, 2012).

The hypothesis that we tested was whether observed biodiversity would be different in areas along the water, where drinking water is plentiful, or on campus, where there are plenty of habitats but lots of human interference. This was compared to the null hypothesis that observed differences would be negligible.

**Methods**

The site along water that we chose was near the Great Lakes Research Center. Our observation area included a section of short grass and a section of tall grass that both ran parallel to a rocky shore, along with an area of water bounded by the docks on the east side of the center. For an on-campus site, we observed a section of grass with multiple maple trees near the Minerals and Materials Engineering Building and Dillman Hall. In order to collect data, we logged every unique mammal and bird that came within the boundaries of our area for 30 minutes, once a week for 2 total weeks.

To measure biodiversity, we used 3 common indices.

1. Species Richness: the number of different species noted in one given observation area.
2. Dominance: the proportion of the number of organisms in the most abundant group to the total number of organisms observed.
3. Shannon’s Diversity Index: where is the proportion of the number of organisms in one group to the total number of organisms observed.

**Results**

We found the Minerals and Materials Engineering Building and Dillman Hall to have higher mean biodiversity indices compared to the Great Lakes Research Center, as shown in Figure 1. From Table 1, birds were the most common animal observed, with 2 different species making up 67% of our data. The only mammals that we observed were chipmunks, making up the remaining 33% of our data.

Figure 1

Table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Date | 9/23/2021 | 9/23/2021 | 9/30/2021 | 9/30/2021 |
| Start Time | **1:00:00 PM** | **1:30:00 PM** | **12:15:00 PM** | **12:45:00 PM** |
| Site Name | **GLRC** | **Grass outside of the MMEB and Dillman** | **GLRC** | **Grass outside the MMEB and Dillman** |
| Site Type | **along water** | **campus** | **along water** | **campus** |
| Weather | **Sunny** | **Sunny** | **Sunny** | **Sunny** |
| Wind | **Very Windy** | **Very Windy** | **No Wind** | **No Wind** |
| Temperature | **17.8** | **17.8** | **24.4** | **24.4** |
| #Animals | **1** | **2** | **0** | **6** |
| #Birds | **1** | **0** | **0** | **5** |
| #Mammals | **0** | **2** | **0** | **1** |
| #Types of Animals | **1** | **1** | **0** | **2** |
| #Types of Birds | **1** | **0** | **0** | **1** |
| #Types of Mammals | **0** | **1** | **0** | **1** |
| Humans | **1** | **0.5** | **0.1** | **0.5** |
| Richness: | **1** | **2** | **0** | **6** |
| Dominance: | **1** | **1** | **0** | **0.833333333** |
| Shannon's Diversity Index: | **0.00** | **0.00** | **0.00** | **0.45** |

**Discussion**

Using the results that we have, the MMEB & Dillman site and the GLRC do not have statistically significant differences in biodiversity indices (. However, given the low sample size of observations due to time constraints and the size of our sites, it’s difficult to draw any conclusions regarding the comparative biodiversity. The MMEB and Dillman site had the highest richness, dominance, and Shannon’s diversity indices, but we only observed 1 singular animal at the GLRC which clearly skewed the results. More observations with greater than 30-minute intervals are needed to receive accurate data.

References

Mergeay, J., & Santamaria, L. (2012). Evolution and Biodiversity: the evolutionary basis of biodiversity and its potential for adaptation to global change. *Evolutionary applications*, *5*(2), 103–106. <https://doi.org/10.1111/j.1752-4571.2011.00232.x>

Gluckman, P. D., Low, F. M., Buklijas, T., Hanson, M. A., & Beedle, A. S. (2011). How evolutionary principles improve the understanding of human health and disease. *Evolutionary applications*, *4*(2), 249–263. <https://doi.org/10.1111/j.1752-4571.2010.00164.x>

Purvis, A., & Hector, A. (2000). Getting the measure of biodiversity. *Nature*, *405*(6783), 212–219. <https://doi.org/10.1038/35012221>