Difference in Bird Species' Richness and Diversity between Low, Medium, and High Canopy Height in the Forest, Ravine, Marsh, Bog, and Pond Microhabitats on Bainbridge Island, WA, USA

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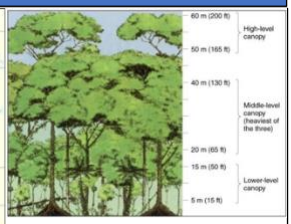
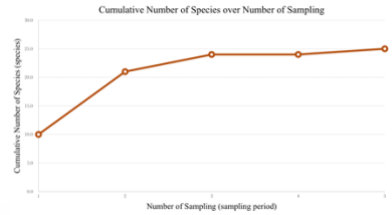
Introduction



This field research focuses on difference in bird species' richness and diversity across different niches.

Methodology

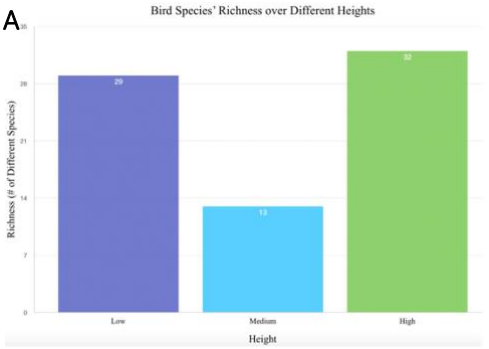


Scan sampling technique and point intercept method along a transect were used for measurement. Qualitative and quantitative data on weather condition, visibility, human disturbance, humidity, temperature, canopy coverage, and wind were also measured.

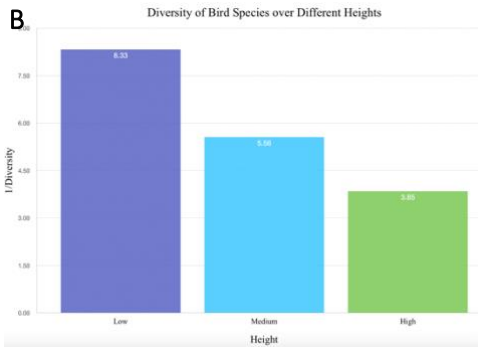
$$D = \frac{\sum n\,(n-1)}{N\,(N-1)}$$

Results

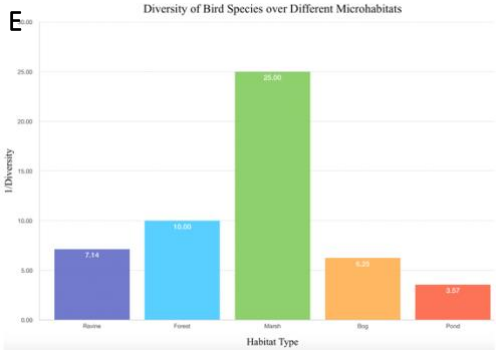
A



B



E

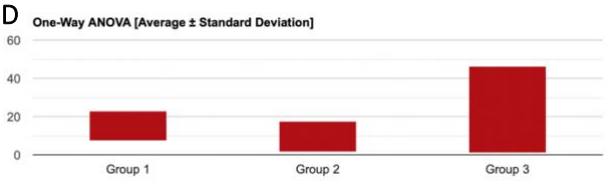


C

Total Quantities of Birds and Diversity in Different Heights

Height	Total Occurrence						Simpson's Diversity	1 / Simpson's Diversity
	7/1 (Dawn)	7/1 (Dusk)	7/2 (Dawn)	7/2 (Dusk)	7/3 (Dawn)	Total		
Low	5	18	11	16	26	76	0.12	8.33
Medium	7	12	6	22	1	48	0.18	5.56
High	9	39	4	10	56	118	0.26	3.85
Total	21 (± 3)	69 (± 6)	21 (± 5)	48 (± 2)	83 (± 14)	242 (± 30)		

D



F

Date	Habitat	Time (start/end)	Height	Quantitative				Qualitative	
				Humidity (%RH) (± 0.1)	Temperature (°C) (± 0.1)	Canopy Coverage (%) (± 0.01)	Wind (m/s) (± 0.1)	Weather / visibility	Human Disturbance
7/1	Ravine	6:30-6:50am	Low	/	/	/	/	Clear, sunny	construction
		6:50-7:10am	Medium	74.3	18.2	43.75	0.0		
		7:10-7:30am	High	/	/	/	/		
	Forest	8:00-8:20pm	Low	63.0	24.7	85.04	0.0	Cloudy	airplanes
		8:20-8:40pm	Medium	65.2	22.7	48.55	0.0		
		8:40-9:00pm	High	62.0	19.1	0.37	0.0		
7/2	Marsh	6:30-6:50am	Low	70.0	16.4	1.49	0.0	Cloudy	construction airplanes
		6:50-7:10am	Medium	/	/	/	/		
		7:10-7:30am	High	/	/	/	/		
	Bog	8:00-8:20pm	Low	81.3	17.2	1.87	0.0	Rainy (sound)	human talking, airplanes
		8:20-8:40pm	Medium	/	/	/	/		
		8:40-9:00pm	High	/	/	/	/		
7/3	Pond	6:30-6:50am	Low	87.3	16.8	0.21	0.0	Cloudy	airplanes
		6:50-7:10am	Medium	/	/	/	/		
		7:10-7:30am	High	/	/	/	/		

Discussion

- Difficulty to record the exact quantities of bird when many individuals of a same species appeared at the same moment.
- There was also the possibility of double counting since most of the birds were in constant motion. Some small birds flying faraway were hard to identify when no sound was made.
- Many of the variables including weather, time, and human disturbance could not be controlled

Conclusion

- Low and high canopy heights had a higher level of richness comparing to the medium canopy height.
- High canopy was the least diverse due to its low evenness. An easier access to nutrients and minerals contributed to the greater species diversity in the low canopy height.
- Comparing microhabitats that had the same richness like the bog and the pond, pond had much lower diversity than bog because it had very low level of evenness.
- The unique characteristic of marsh, which consisted of having a large open space where resources and hiding place were abundant plus the proximity to the ground, resulted in its much greater level of diversity comparing to the other four microhabitats.

References

1) Chettri, Nakul, et al. "The Relationship between Bird Communities and Habitat." *Mountain Research and Development*, vol. 25, no. 3, Aug. 2005, pp. 235-43

2) Huang, Qiongyu, et al. "The Influence of Vegetation Height Heterogeneity on Forest and Woodland Bird Species Richness across the United States." *PLOS*, 7 Aug. 2014.

3) Roll, Uri, et al. "Linking Vertebrate Species Richness to Tree Canopy Height on a Global Scale." *Global Ecology and Biogeography*, 2015, pp. 814-25