Daily Activity Patterns of Avian Communities at Lancer Park

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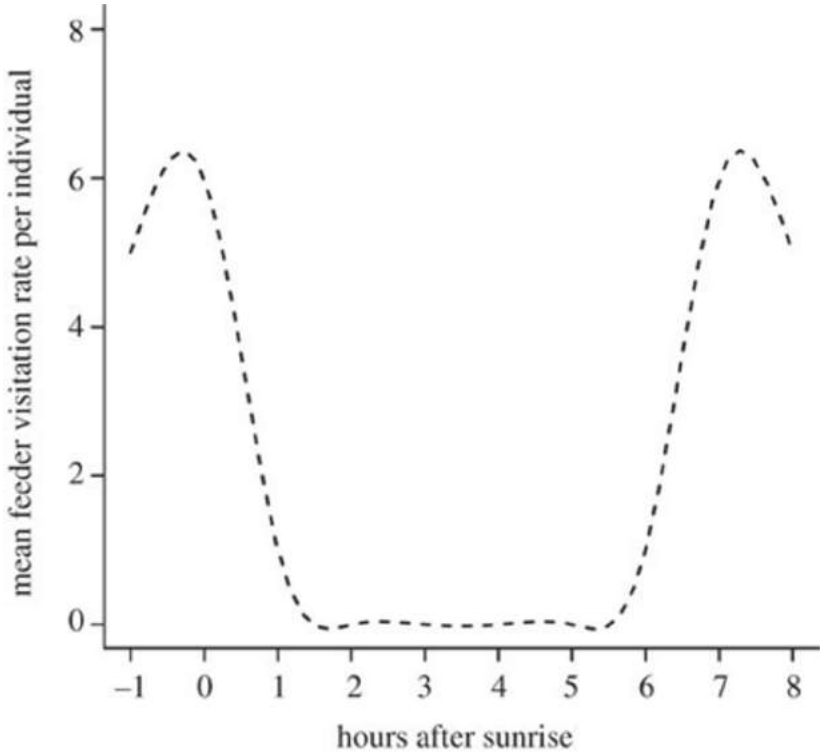
Biology 251: Introduction to Ecology and Evolution

Animal Behavior

- Animal behavior is influenced by biotic and abiotic parameters
- Biotic parameters include presence of competitors, predators, and parasites
- Abiotic parameters include,
  - Temperature
  - Humidity
  - Precipitation
  - Air Pressure
- Feeding patterns of birds are also influenced by these factors

Avian Feeding Patterns

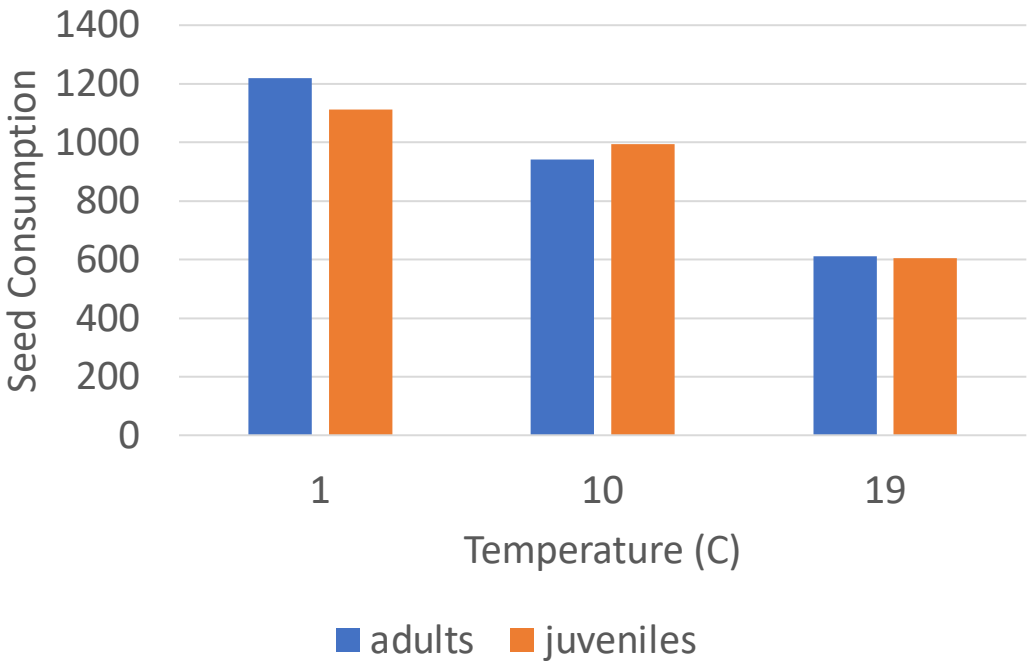
- Birds tend to use feeders predominantly following dawn and dusk (Gutzwiller, 1991)
- This may be due to birds being less at risk of predation during these times



Bonter, 2013

Avian Feeding Patterns

- Birds feed during times of lower temperatures and when winds are less severe
- These conditions occur often in the morning and evenings



(Caraco, 1990)

Research Question

- How will time of day and weather conditions affect the species richness and community structure of birds at the Lancer Park feeders?

Study Area

- Observations were conducted at the bird feeders behind the EEC Building in Lancer Park

Previous Local Bird Observations

- There have been 245 bird species sighted in Prince Edward County, Virginia since the beginning of the ebird expedition (ebird).
- Birding trips to the EEC in the spring of 2018 recorded over 30 bird species in 4 separate trips

eBird

Methods

- Observing the feeding patterns of birds at three specific times of day; 7am, 12pm, and 5pm
- Observation period will be for 20 minutes following a 10 minutes buffer period after arrival
- Total of 8 days were observed over a three week period between March 12-27, 2019

Methods

- Binoculars and a camera were used to help identify bird species and record accurate counts
- Use of “Merlin” app to help identify bird species and field guides to record data

Methods

- Predictor Variables
  - Time of day
- Response Variables
  - Species Richness
  - Species Abundance

- Weather Predictor Variables
  1. Air Pressure
  2. Cloud Cover
  3. Temperature
  4. Humidity
  5. Precipitation
  6. Wind Speed

Methods

Statistical Analysis Tests

- One-Way ANOVA
  - Differences between feeding times (7am, 12pm, 5pm)

- Simple Linear Regression Analysis
  - Relationships between diversity and weather parameters

Methods

Shannon-Weiner H' Biodiversity Index

- Higher values indicate higher biodiversity levels
- Calculated using data about number of individuals and number of species present

$$H = -\sum_{i=1}^{k} p_i \log p_i$$

Pi= Relative Proportion of Species i

Results: Species Reported

Blue Jay

Mourning Dove

Dark-Eyed Junco

Song Sparrow

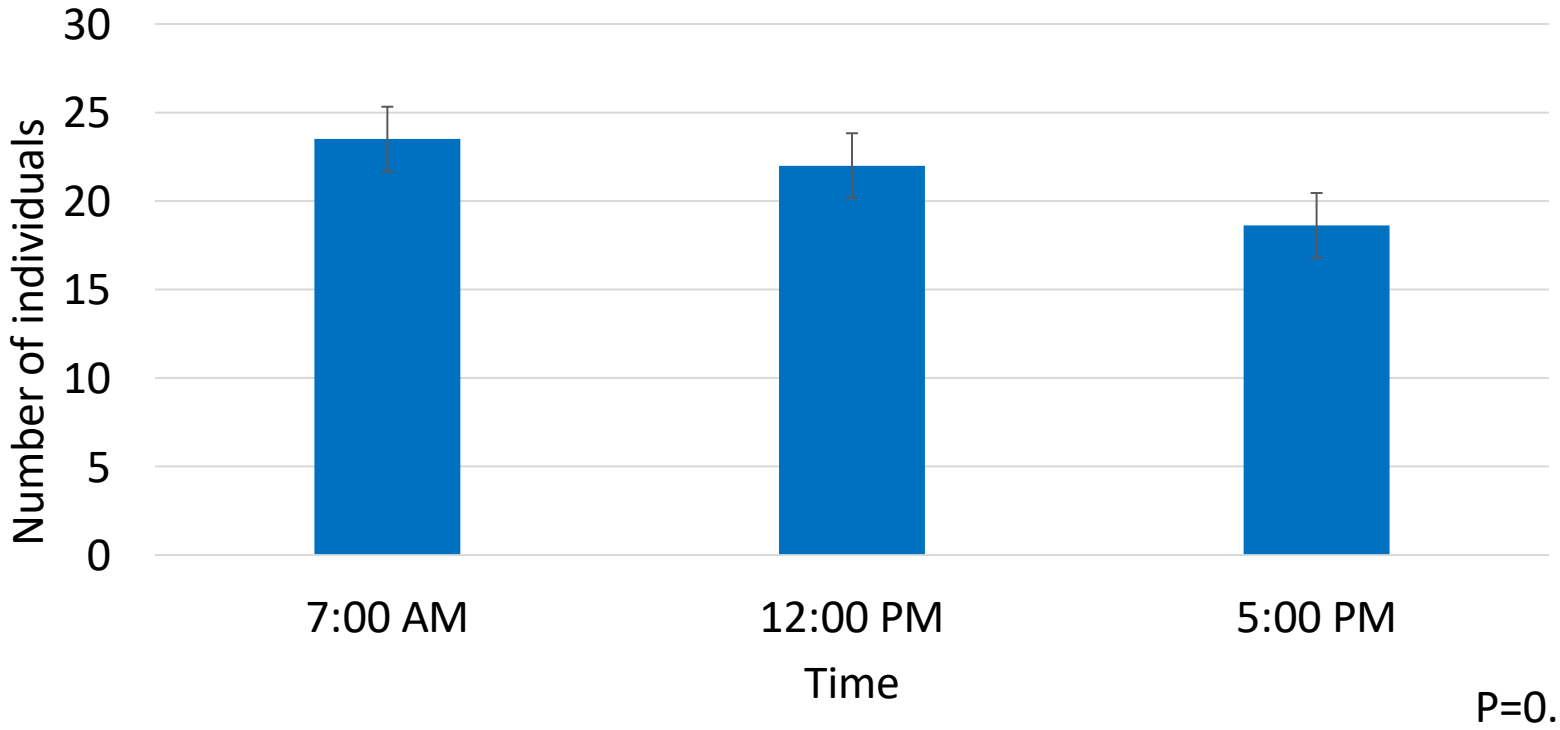
White-Throated Sparrow

Carolina Chickadee

Northern Cardinal

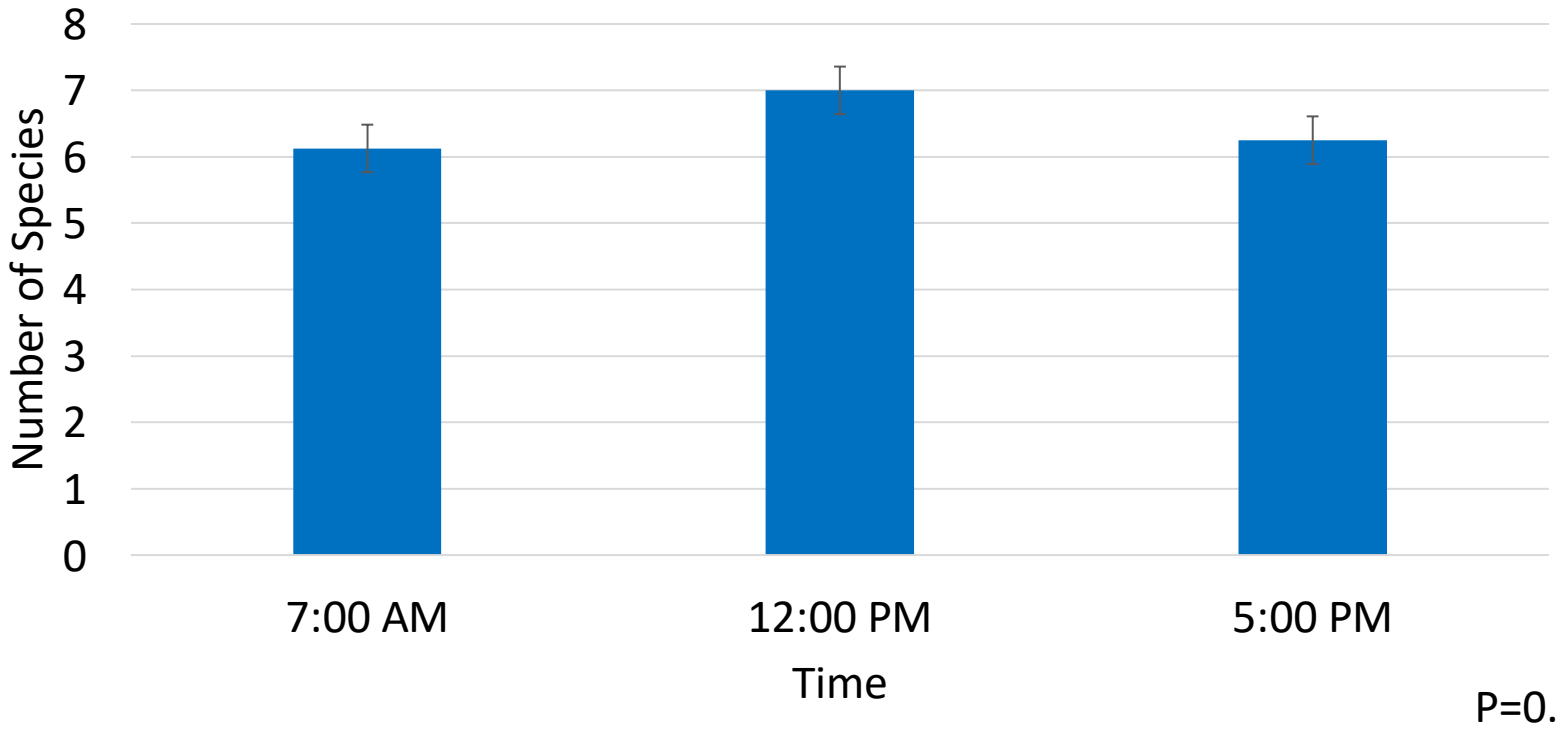
Eastern Towhee

Average Number of Individuals vs Time of Day



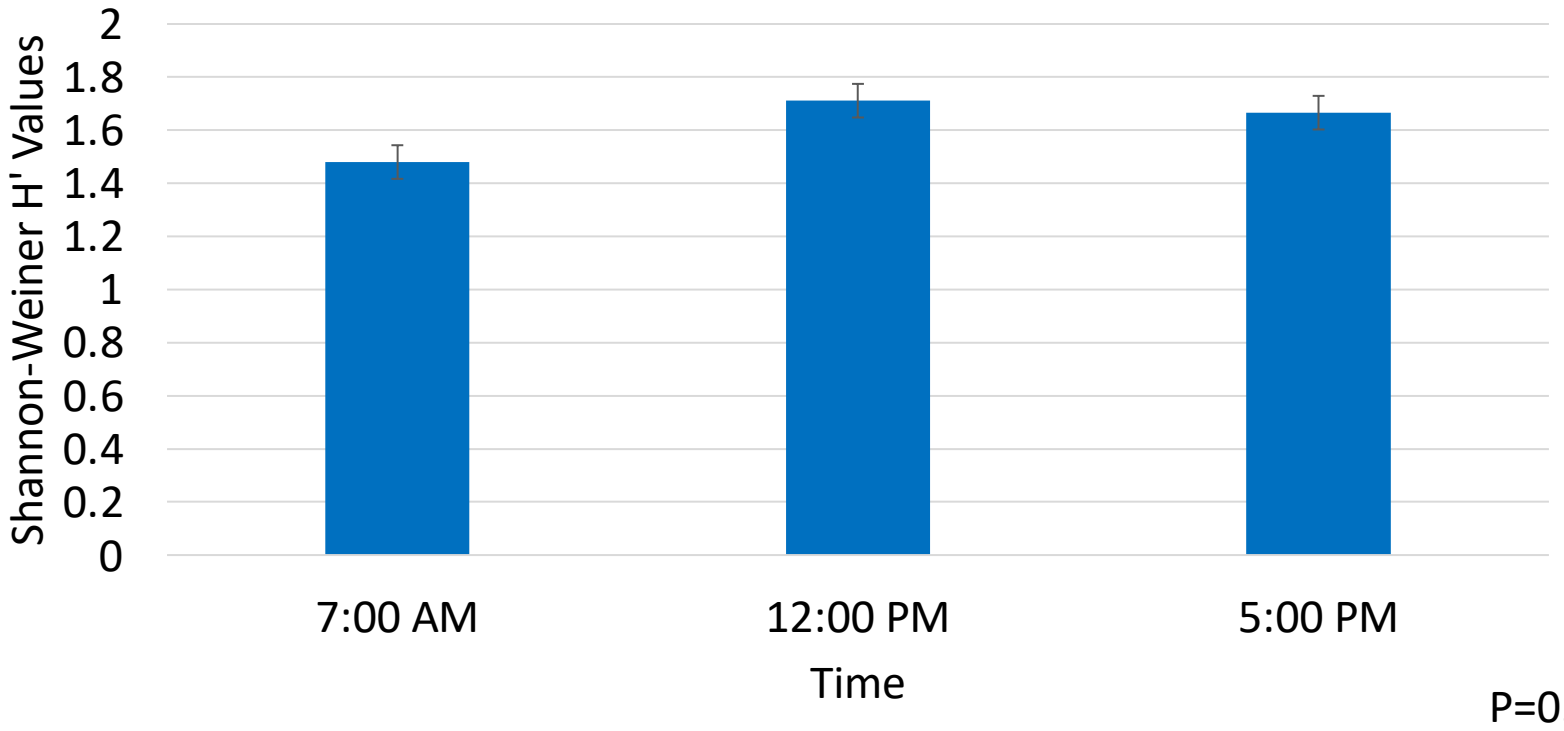
P=0.3153

Average Number of Species vs Time of Day



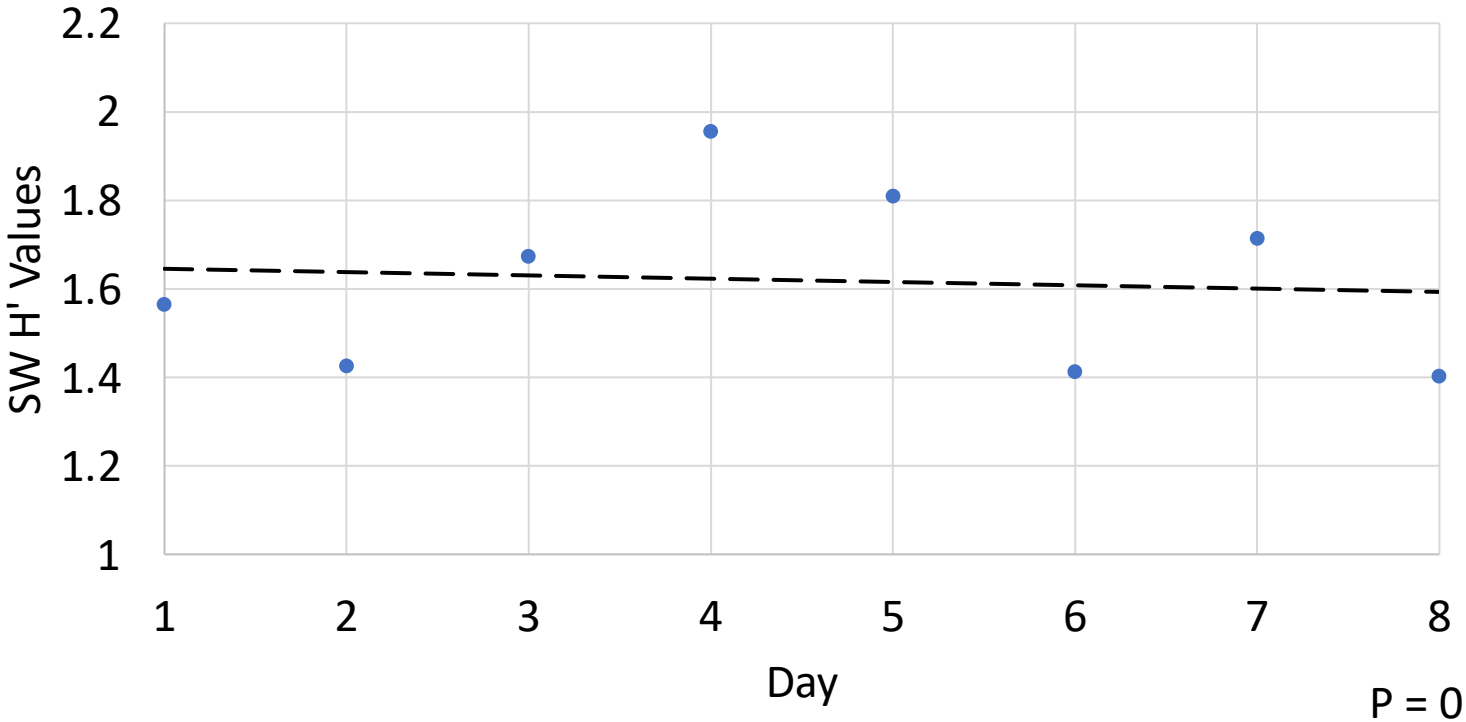
P=0.1546

Average Shannon-Weiner H' Values vs Time of Day



P=0.839

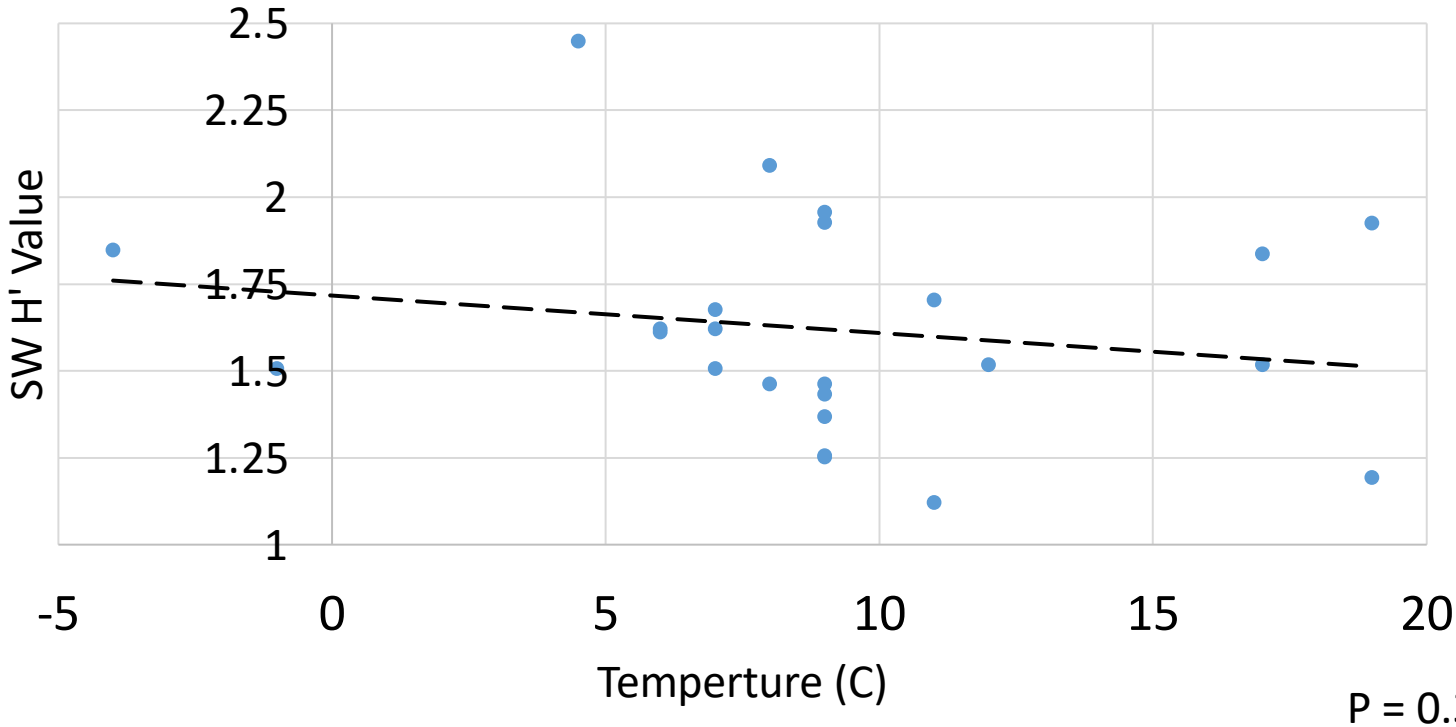
Shannon-Weiner H’ Values vs Date



P = 0.8331

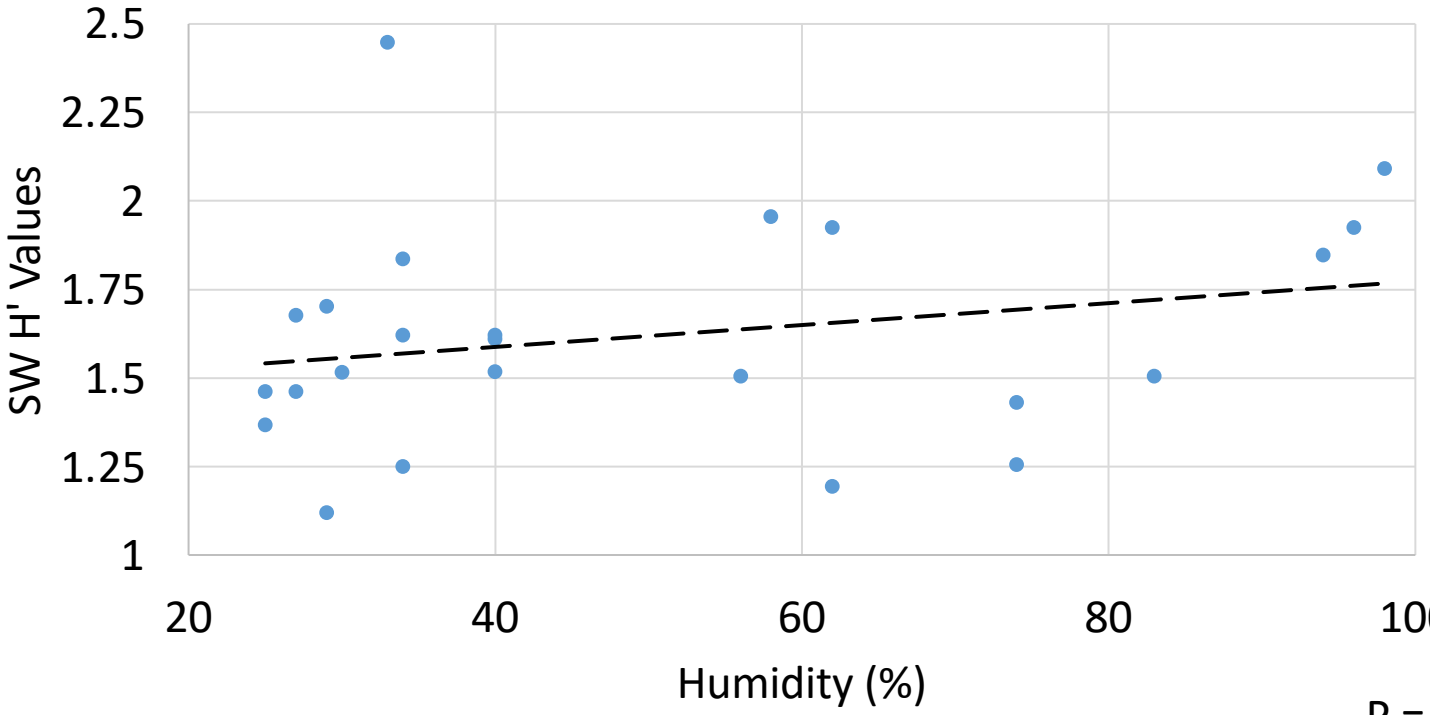
R = -0.1573

Shannon-Weiner H' Values vs Temperature



P = 0.3816
R = -0.03496

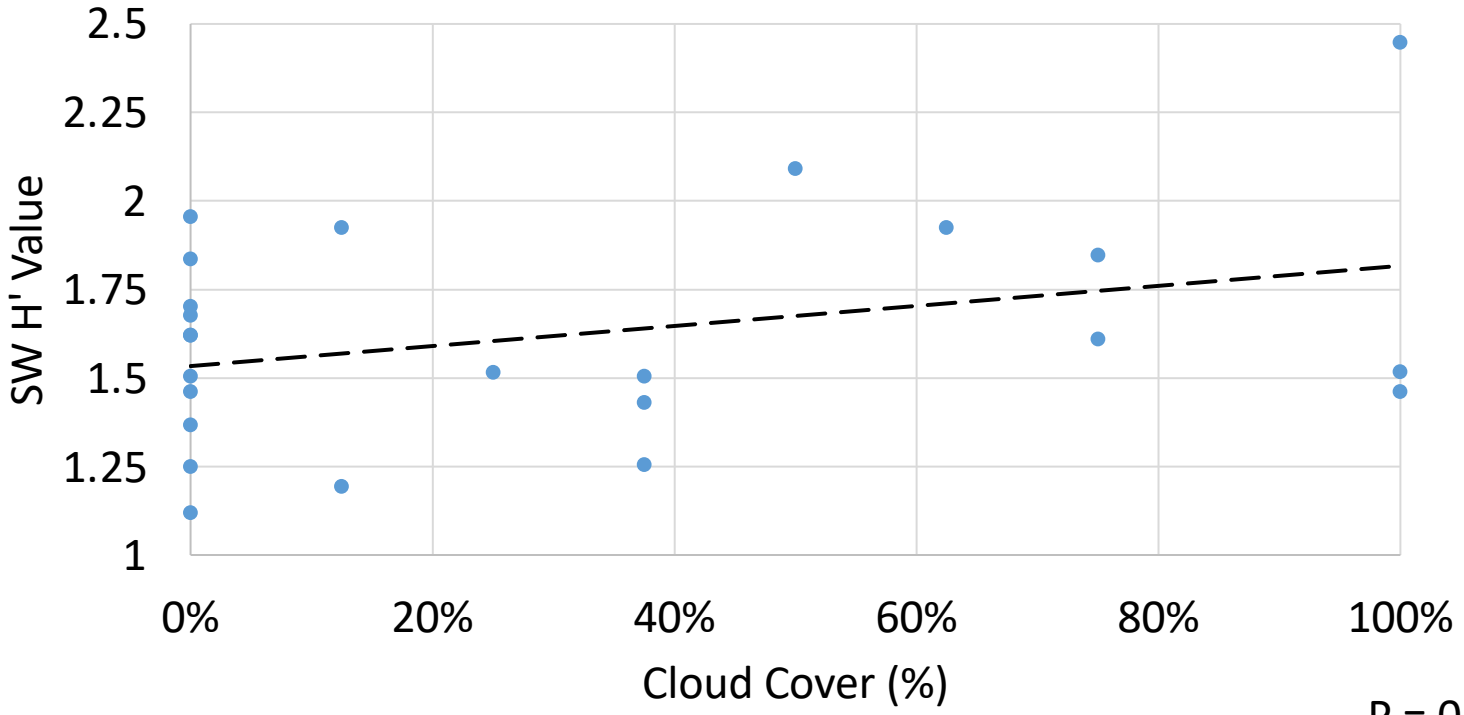
Shannon-Weiner H' Values vs Humidity



P = 0.248

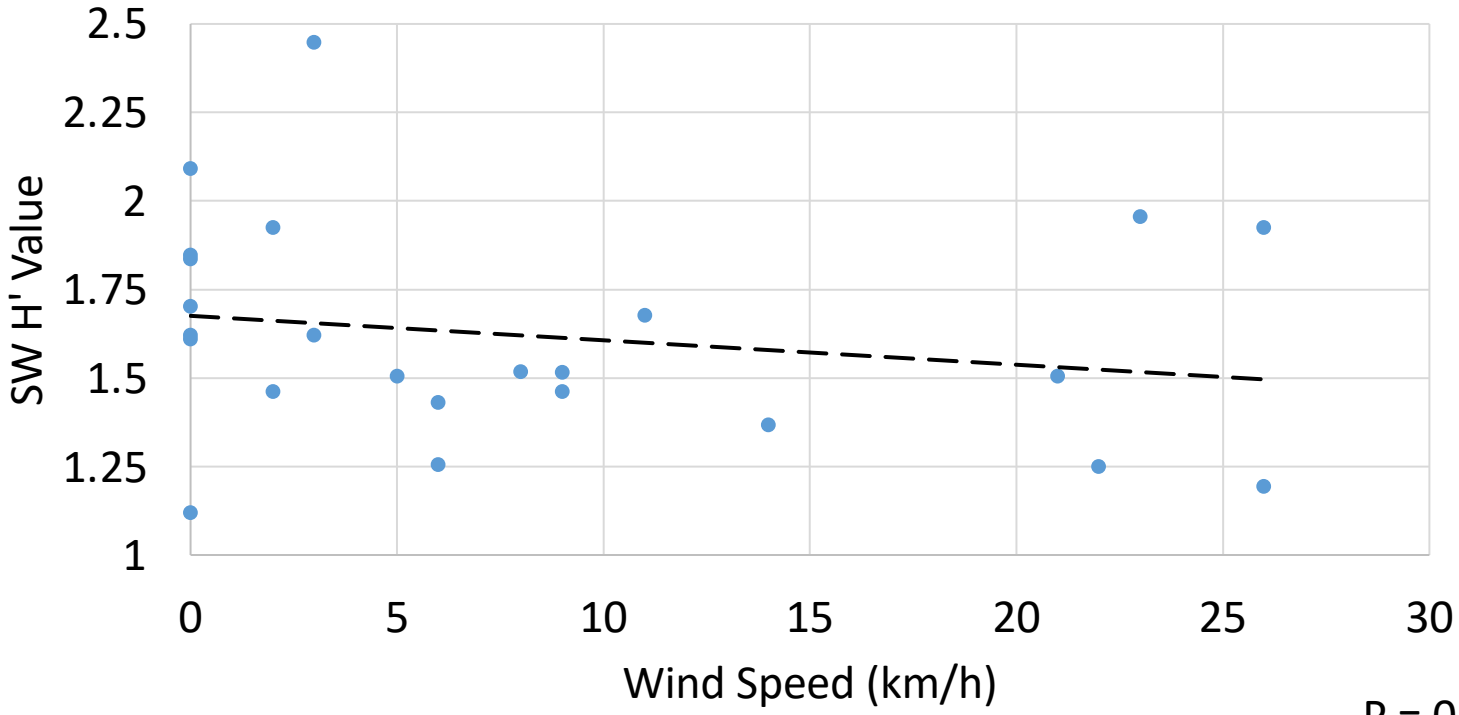
R = 0.06016

Shannon-Weiner H' Values vs Cloud Cover



P = 0.4866
R = 0.2973

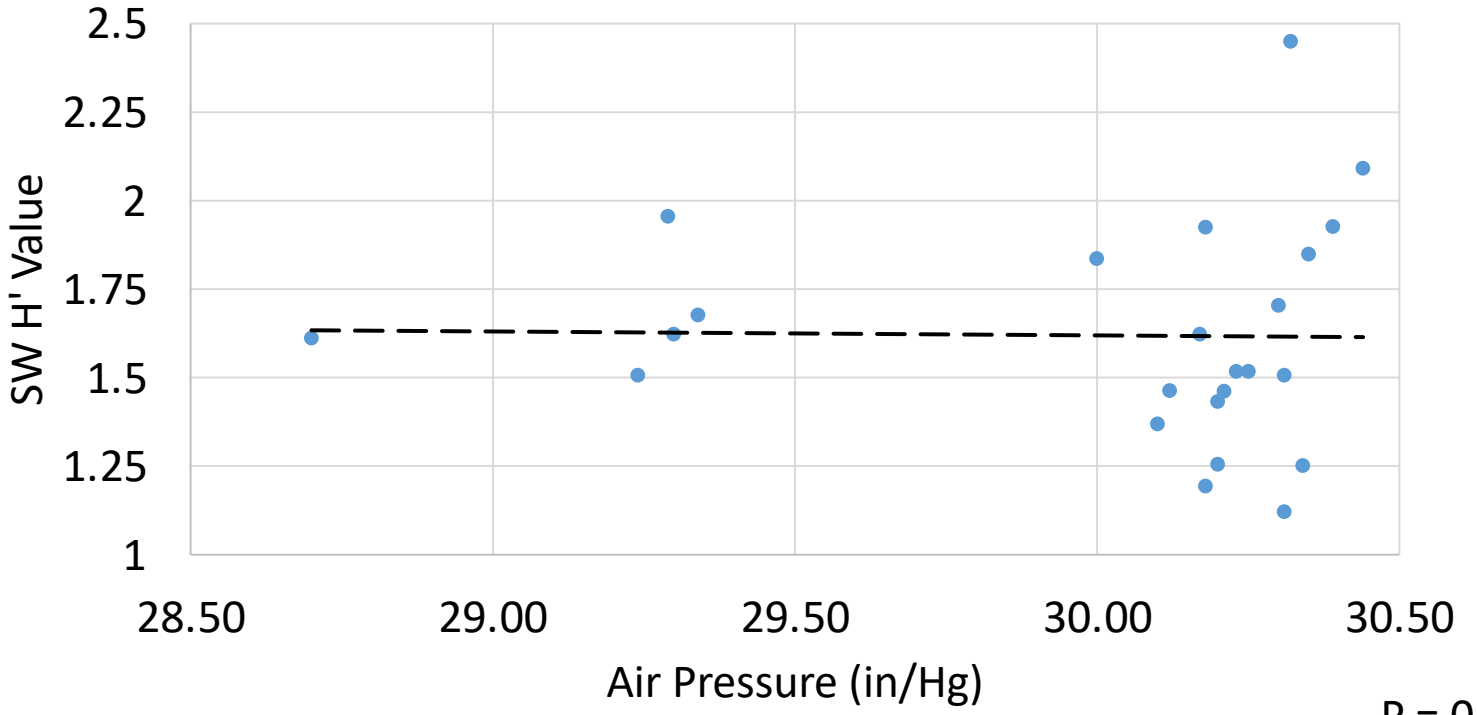
Shannon-Weiner H' Values vs Wind Speed



P = 0.3467

R = 0.04034

Shannon-Weiner H' Values vs Air Pressure



P = 0.9384
R = 0.0003

Summary

- Time of day does not seem to have a significant effect on the community structure or feeding activity
- Colder temperatures, high humidity, and high cloud cover led to more birds and species being present however no significant correlations
- Air pressure and wind speed showed no significant effect on the amount of birds or species present at the feeders

Discussion

- The lack of correlation between time of day and changes activity patterns, which was unexpected because of (Bonter, 2013), could be explained by a lack of predation and constant presence of food
- The lack of effect wind had on our observations may have been due to the sheltered nature of the feeders
- The feeders were especially sheltered from the prevailing north and westward winds

Discussion

- The lack of correlation between lower air pressure and higher feeding activity was surprising
- A study done by (Renaud, 2013) reported that when air pressure was lowered in their experiment, birds immediately began feeding
- Only five of our observations were during times of lower pressure (<29.50 in/Hg), providing a small sample size

Discussion

- Many of the days we observed were warm, calm, and sunny days with high pressure
- This caused a lack of variability in our weather data
- Activity was often present around the EEC as well, with other groups working or sports going on
- Several of our observations sessions were interrupted by other students, causing the birds to scatter

Acknowledgements

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US Climate Data: https://www.usclimatedata.com

Questions