

Study Design

- To determine what lights bats prefer cameras will be set up in multiple locations, near LED lights, yellow (older lights), red lights and dark areas as a control along typical migration patterns.
- samples of types of bugs and amount of bugs will be measured at each light section during various times at night.
- we will set up three cameras for each light type (red, yellow, LED, no light) for a total of 12 cameras in each different locations (see figure 2).
- cameras will be located in **Frio Cave, Texas** and **Tuxtla Gutiérrez, Mexico** "Mexican freetail bat" (wiederholt et. al, 2013), **Copenhagen, Denmark** and **Kiel, Germany** "Soprano Bat" (Voight et. al, 2018), **London, England** and **Tangier, Morocco** "pipistrelles" (Voight et. al, 2018)
- this is an observational study aimed at collecting large amounts of data for statistical analysis through the use of replication

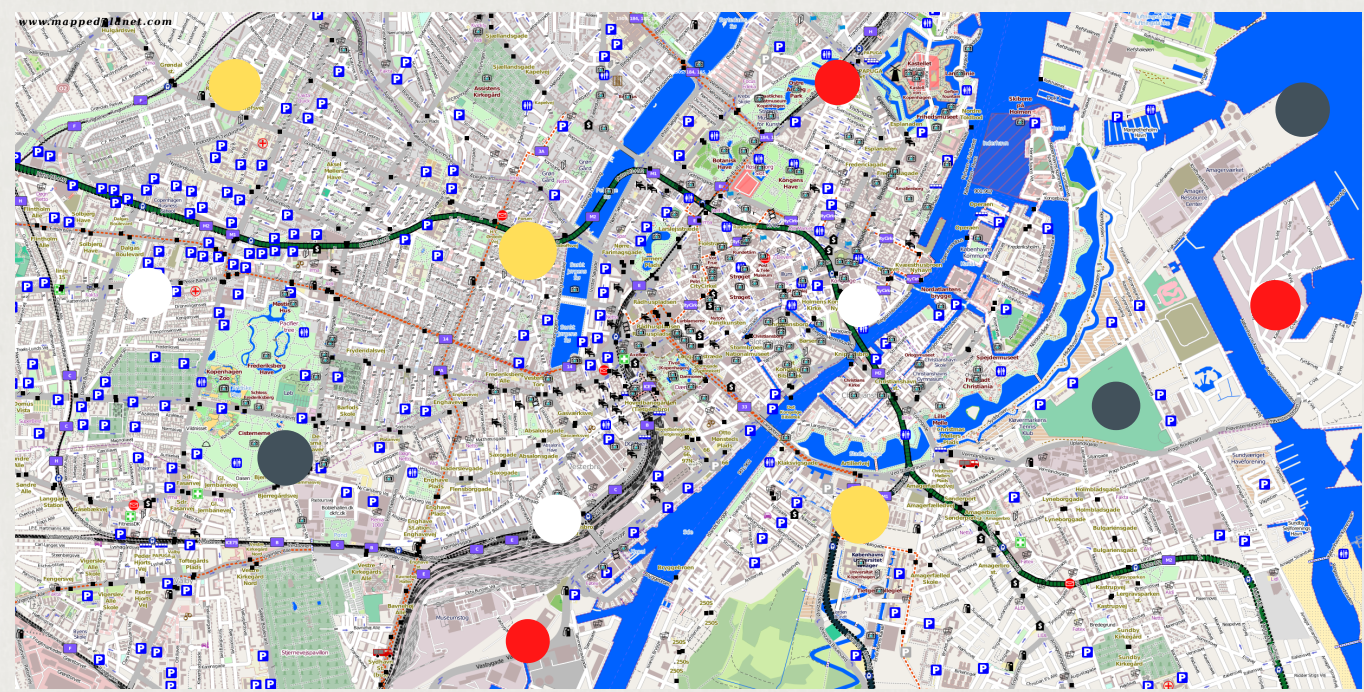
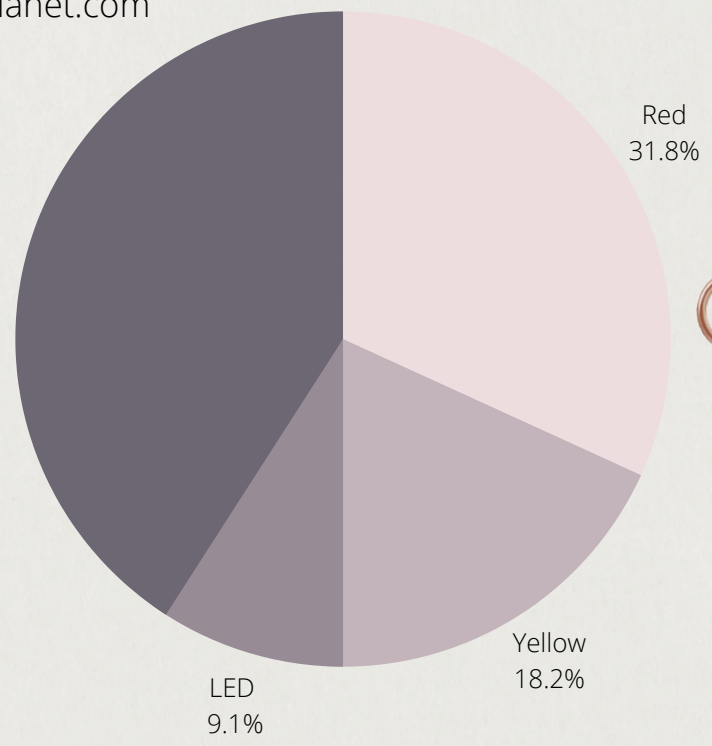


Figure 2: The city of Cohagen demonstrating where lights will be monitored. Each color circle on the map corresponds with the light that is being observed. photo by mappedplanet.com



Figure 3: A bat flies past a street lamp, demonstrating that bats do interact in urban scapes. photo by phys.org



Prediction of Bats Favorability Towards Various Lights

Figure 4; This pie chart demonstrates how we believe how much bats will enteract with the lights.

Intended Analysis

The independent variable (color of light) is categorical and the response variable (the amount of bats visiting each light) is continuous. To study the statistics, ANOVA will be used to accommodate for the multiple categories and determine the best light option. This study focuses on the correlation of bats behavior and light sources. The use of multiple locations and various species allows our study to be strong and able to make inferences about the general bat population.

Expected Benefits

Bats are extremely important to ecosystem because they control bug populations and help with pollination. It is essential to preserve migration routes and accommodate nocturnal bats globally. Our study will help to learn more about the growing problem of light pollution from cities around the world.

Literature Cited: Bolliger, J, Hennet, T, Wermelinger, B, Bösch, R, Pazur, R, Blum, S, Haller, J, Obrist, MK. Effects of traffic-regulated street lighting on nocturnal insect abundance and bat activity. Basic and Applied Ecology 2020; 47: 44–56. Mizon, B. (2012). Light pollution: responses and remedies. Springer Science & Business Media. Stone, E. L., Jones, G., & Harris, S. (2012). Conserving energy at a cost to biodiversity? Impacts of LED lighting on bats. Global change biology, 18(8), 2458–2465. Voigt, C. C., Rehnig, K., Lindecke, O., & Petersons, G. (2018). Migratory bats are attracted by red light but not by warm-white light: Implications for the protection of nocturnal migrants. Ecology and evolution, 8(18), 9353–9361. Wiederholt, Ruscena & Cline, Jon & Cryan, Paul & Russell, Amy & Mccracken, Gary & Diffendorfer, Jay & Semmens, Darius & López-Hoffman, Laura & Medellín, Rodrigo & Cryan, P. (2013). Moving across the border: Modeling migratory bat populations. Ecosphere. 4. e114. 10.1890/ES13-00023.1. (Wiederholt et. al, 2013)