Hypothesis Project Proposal

Brandon Kim, Seoyeong Park, Kevin Yan, Eli Guan

Topic

Investigating the different variables that can affect the diversity (abundance and richness) of various species of mushrooms in certain areas in the U.S.

Precipitation, temperature, and fires

Hypothesis

Fires and climate will affect the abundance and diversity of various species of mushroom in their respective areas of growth in the U.S.

Predictions

Climate

1. Precipitation:

- Precipitation is positively correlated with abundance because mushroom are fungal fruiting bodies which require wet conditions.
- Precipitation is positively correlated with species diversity because more species can live in the moist conditions.

2. Temperature:

- Temperature correlation is based on location and the species respective to the locations.
- Temperature is negatively correlated with species diversity because most species will be less tolerant to high temperatures, so less diversity.

3. Fire

- Fire is positively correlated with abundance because after fires there will be increased bio availability of nutrients. Fungi are able to quickly exploit the nutrients and thrive.
- Fire is negatively correlated with species diversity because the conditions after the fire is only suited for specific species.

Data Sources

We will primarily use 1. https://github.com/MushroomObserver/mushroom-observer for species data 2. https://github.com/NOAAGov for climate-related data 3. https://www.sciencebase.gov/catalog/item/61aa537dd34eb622f699df81 for fire data.

The Mushroom Observer database includes multiple crowd-sourced observations from around the world on a plethora of species. We will be using the observation file primarily to look at abundance of species in specific locations in addition to their respective local weather data and other news. The dataset is updated every night (data is dumped straight onto the GitHub), but we do not plan on using data after 2020 due to the fire dataset restrictions.

The climate database includes temperature and precipitation for the U.S. and the data was retrieved using the government's weather stations.

The fire database includes fire data for various locations in the U.S. and the territories that was retrieved using observational, GPS, and satellite. Data from 40 publicly available datasets were merged to create a master dataset. Observations range from 1878 to 2021. Observations after 1949 are more accurate due to modern technology, so we will focus on analyzing data from 1949-2020.

We will be using the columns name_id, when, location_id, lat, long for Mushroom Observer. note: there are multiple csvs that reference the same location and name ids. We are using the observation.csv, names.csv, and locations.csv

We will be using the columns date, temperature_min, temperature_max, temperature_avg, and precipitation for the climate database.

We will be using the columns fire_date, acres_overlap, percent_overlap for the Combined wildfire data sets for the United States. We plan on using the USGS_Wildland_Fire_Merged_Dataset

References:

Mushroom observer. Mushroom Observer. (2023). https://mushroomobserver.org/

US Department of Commerce, N. (2022, March 3). Climate. https://www.weather.gov/wrh/Climate?wfo=abq

USGS. (2021, December 8). FRESC Science Data coordinator. ScienceBase. https://www.sciencebase.gov/catalog/item/61aa537dd34eb622f699df81