Question of Interest

A multitude of factors influences the migration patterns of birds, but how are changing climates affecting these migration patterns of coastal birds? I aim to answer this question by looking at migration data of the Marbled Godwit, a prevalent migratory bird on the Alaskan and western coasts. I want to look at the relationship between the temperature and timing of when these birds start migrating in the fall and spring seasons.

Dataset

The dataset that I will use is called "Migratory Timing and Site Use of Marbled Godwits Breeding in Alaska, 2008-2015" (https://alaska.usgs.gov/products/data.php?dataid=227), as well as NCDC's Climate Data Online (https://www.ncei.noaa.gov/cdo-web/) to analyze the temporal patterns when it comes to migration. The migratory bird's dataset includes columns that include data about the location the birds migrate, where they migrate to, and the time of each event, allowing me to analyze their yearly patterns. The climate dataset will allow me to add an additional column, temperature, allowing me to analyze the effects when it comes to migration times.

Methods

The method that I will be using is a Gaussian Mixture Model with expectation maximization to analyze the patterns in the dataset. I will first add the temperature column to each row, documenting the temperature it was when the bird left, as well as the average temperature for the week/month depending on the patterns seen. The features I will be focusing on are data left, arrival time, flight duration, and if the location was their final destination. I will cluster my data

based on temperature, seeing the migration patterns based off of this feature, and apply

expectation-maximization to predict at what temperature the birds migrate at. If there is a

significant relationship, then I can prove that these birds will be affected by factors such as

climate change.