

Climate Variability and the March of the Monarchs

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The eastern Monarch Butterfly (*Danaus plexippus*) population transits a large swath of area between central Mexico and southern Canada, twice yearly. This migration, an endangered phenomenon, causes the Monarchs to experience a variety of weather regimes, and systems. This study explores the variables that are most important in predicting the Monarch population in each successive step of the migration through population modeling. Multiple linear regressions were calculated using the population from the previous step of the migration, wind direction and speed from where the butterflies are came from, and precipitation from the area that they are currently in as predictors. Forward selection and leave-one-out cross validation were used to choose the relevant predictors in each step of the population, and ensure that the regression was not over-fit, respectively. We found that precipitation has opposing impacts on population depending on whether the population is traveling northward where the effect is positive, versus a population traveling southward for the winter where it has a negative effect. In addition, wind speed in Texas has a negative effect on Monarchs flying south to their overwintering sites likely because the Great Plains low-level jet opposes their motion. While these findings are exploratory, the potential to model Monarch populations in this step-wise way is present, and should be further explored as the network of observations and data is expanded.