Measuring variation in migratory behavior using eBird data

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GLOBAL CHANGE CENTER AT VIRGINIA TECH

Irruptive/ Nomad

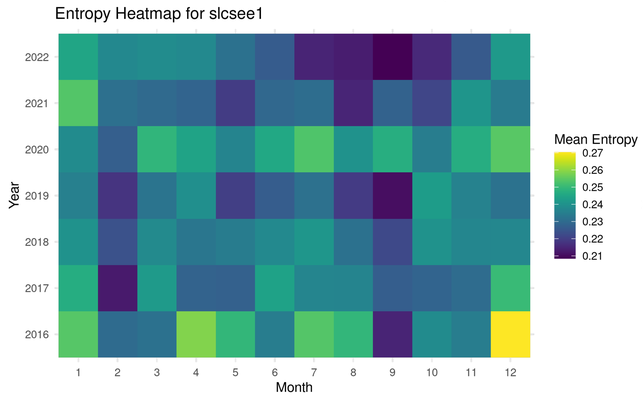
Slate-colored Seedeater

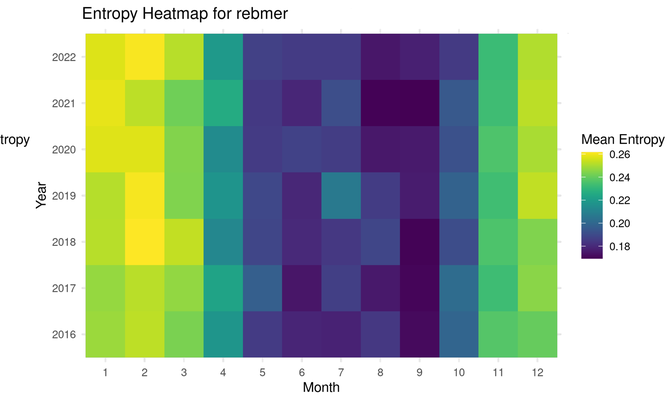
Migrant

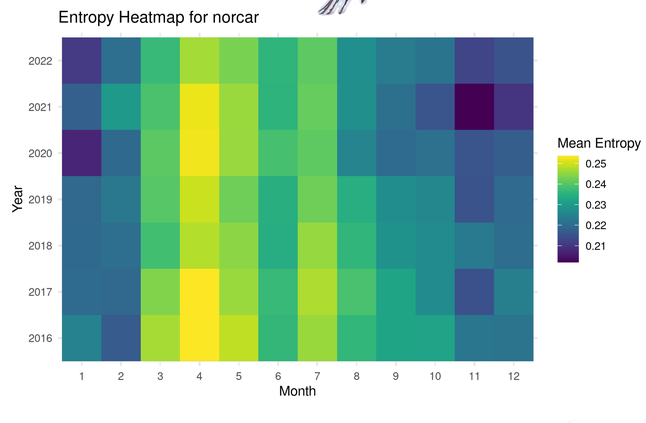
Red breasted Merganser

Resident

Northern Cardinal

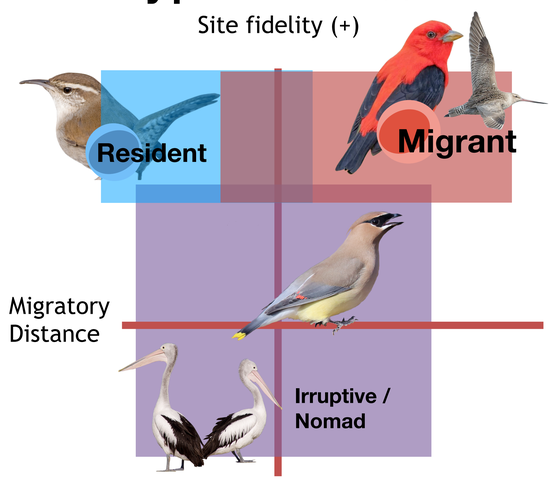




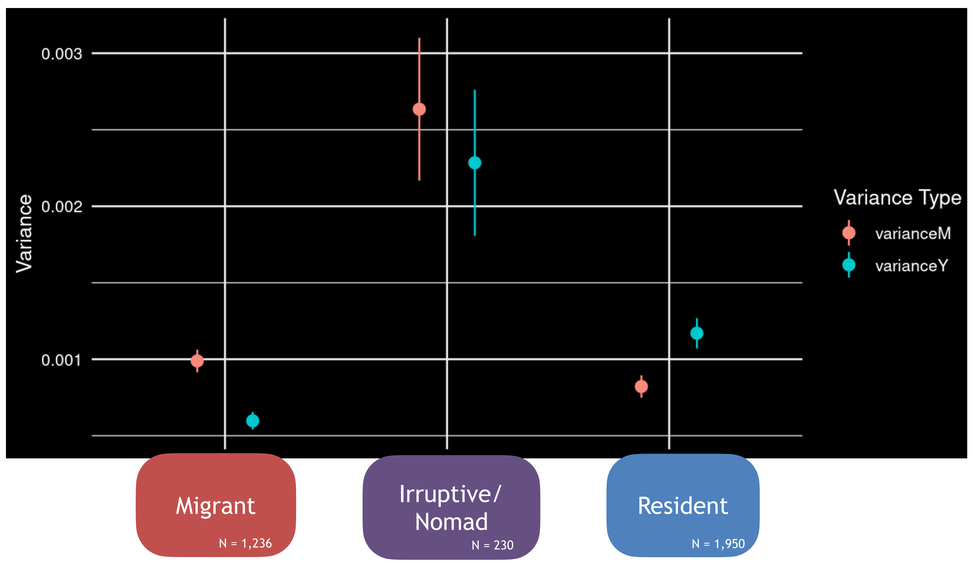


Site fidelity Hypothesis(1)

Site fidelity (+)



Resident and migratory birds show regular patterns of movement year-over-year



Variance in month-to-month & year-to-year entropy defines irruptive/nomadic birds

Next Steps

Investigate entropy and other life history and morphological traits within a phylogenetic framework

Phylogenetic signal ($\lambda = 0.28$, $p < 0.001$)

Is irregular movement an adaptive behavior in the context of climate change?

Plastic breeding strategies

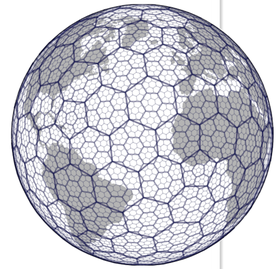
Traits for resource tracking

Most of these species are in poorly eBirded areas

eBird / geo data

All North American species (~1700)

36 km^2 cells (h3)



All observations 2016 -2022

Corrected for sampling effort

Shannon entropy

occurrence probabilities (p) calculated for each unique combination of cell, year, and month

Heatmap Entropy = -sum(p * log(p)) for each cell over a year

High entropy = relative unpredictable distribution of occurrence

Low entropy - predictable distribution

(1) A long winter for the Red Queen, Winger et al. 2019

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