Potential Impacts of West Nile Virus on Ruffed Grouse Populations in the Upper Midwest

UROP Undergraduate Research Opportunities Program

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Introduction

- Based on harvest data, ruffed grouse (*Bonasa umbellus*) populations seem to have declined throughout the Great Lakes States of Minnesota, Wisconsin, and Michigan
- Population should be near the peak of their 10-year cycle (Carstensen and Roy 2018)
- Population declines could be due to the effects of West Nile Virus (Stauffer et al. 2018)
- West Nile Virus (WNV) first appeared in the Midwest around 2001-2002
- Is there evidence that WNV has caused a decline in ruffed grouse populations across MI, WI and MN?

Methods

- Data consists of ruffed grouse drumming counts (DPS: drums per stop) from 1982-2018 in 10 ecoregions of MN, WI, and MI (Fig. 1)
- 'Drumming' refers to the sound that male grouse produce when displaying in the spring to attract mates (see image at right)
- Data were analyzed using Bayesian methods with program JAGS, accessed through RStudio using package jagsUI

Results

- No relationship was found between introduction of WNV and a decline in ruffed grouse population
- All 10 populations exhibited 10-year cycles (Fig. 3)
- Potential synchrony modeled among populations across MN, WI, and MI (Fig. 2)

Figures

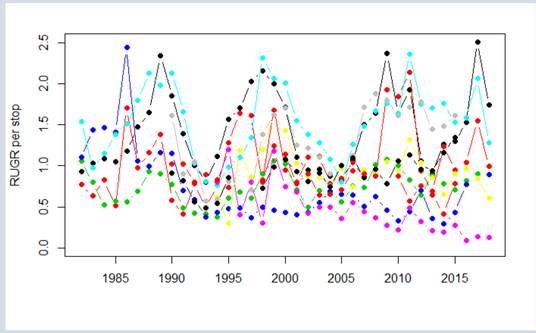

Fig 1. MN, WI, and MI DPS (Raw Data)

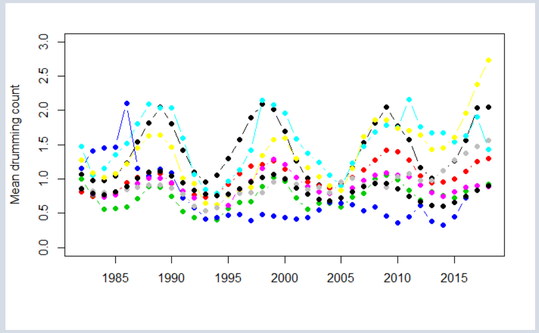

Fig. 2. MN, WI, and MI DPS (Cosine Fit)

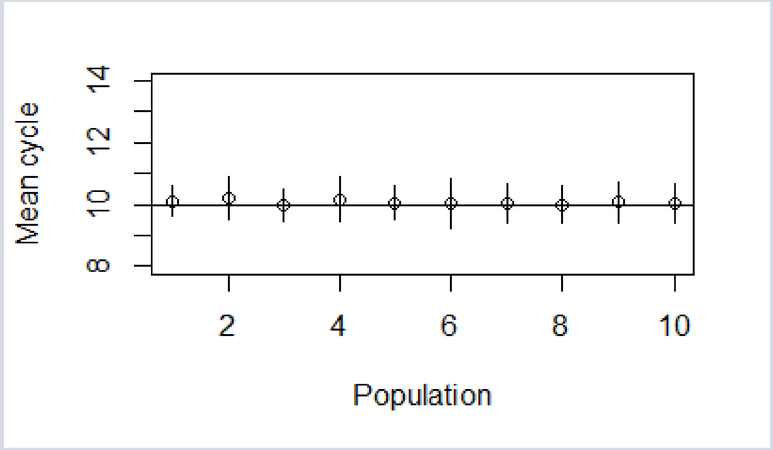

Fig. 3. Mean cycle length for each survey region (Bayesian cosine model)

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Summary

- My analysis found no discernable effect of WNV on ruffed grouse populations in the Midwest; populations seem to have increased
- All 10 populations exhibit precise 10-year cycles, with more northern populations within each state exhibiting greater amplitude
- Populations fluctuate in synchrony across all 3 states, but results from the most recent decade suggest this synchrony may be breaking down.
- Usage of drumming counts only accounts for male adult spring populations – further research using data from juvenile grouse could provide more insight
- MN and WI wildlife biologists conducted research on harvested ruffed grouse in the fall of 2018 and found evidence of WNV (Witecha 2019)

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