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# Seasonal changes in spatial connectivity result in minor differences in predicted epidemic dynamics in a solitary carnivore S. Niamh Hart<sup>1\*</sup>, <u>Marie L.J. Gilbertson<sup>1,2\*</sup>, Kimberly VanderWaal<sup>1</sup>, Dave Onorato<sup>3</sup>,</u> Mark Cunningham<sup>4</sup>, Sue VandeWoude<sup>5</sup>, Meggan E. Craft<sup>1,6</sup>

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## How does seasonality affect disease transmission in Florida panthers?

- Seasonal variation in sociality, space use, etc. can have major impacts on disease transmission in wildlife<sup>1-3</sup>, but not always<sup>4</sup>.
- Florida panthers: highly endangered, affected by myriad infectious diseases,

# **Greater connectivity resulted in** larger simulated outbreaks...



demonstrate seasonal variation in movement<sup>5</sup>

#### **Study Questions**:

- 1. Are Florida panthers more spatially connected in dry seasons than wet seasons?
- 2. Do any seasonal differences in connectivity result in different predicted epidemic outcomes?

### Methods

#### **Panther networks**

- 11 years VHF telemetry (1996-2006)
- Avg 36 panthers per year (min pop size = 30-90)
- Dry and wet season networks  $\rightarrow$  22 networks
- Home range overlap (UDOI<sup>6</sup>) = network edge
- Social network analysis metrics to describe network connectivity
- Cluster-level bootstrap, Kruskal-Wallis rank sum tests to compare wet and dry seasons

### **Transmission simulations**

- Simulate networks based on observed networks
- Simulate transmission through networks: chain binomial (stochastic)  $\bullet$
- Pathogen agnostic: SI, SIR, SIS simulations (Table 1)  $\bullet$
- Compare outbreak duration, total number ever infected per outbreak, proportion of outbreaks that failed (i.e., only 1 infection)





*Figure 1:* Node strength (weighted by home range overlap) was higher in dry seasons (brown) than wet seasons (blue), even when accounting for home range size

**Conclusion:** Seasonal variation in spatial overlap and association patterns can alter

transmission dynamics but must be considered in the context of host social behavior.

### **Acknowledgments & References**

Acknowledgements: This research was supported by the National Science Foundation (DEB-1413925, 1654609, and 2030509). MLJG was supported by the Office of the Director, National Institutes of Health (NIH T32OD010993), the University of Minnesota Informatics Institute MnDRIVE program, and the Van Sloun Foundation. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health. Florida panther data collected by the Florida Fish and Wildlife Conservation Commission is fully supported by donations to the Florida Panther Research and Management Trust Fund via the registration of "Protect the Panther" license plates. We acknowledge the efforts of National Park Service staff in the collection of Florida panther data utilized in this study.

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