Relationship Between Influential Bird Species of the Avian MetaNetwork and IUCN Threat Status

Caroline Roche[1], Olive Graves[1], Vivian Smith[1, 2], Jenna Baljunas[1,3], Lucas Mansfield[1,3], Minyoung Lee[1,3], Kelly Kapsar[1,3,4], Phoebe L. Zarnetske[1,3,4]

1. Department of Integrative Biology, Michigan State University
2. Emerging Scholars Program, Michigan State University
3. Ecology, Evolution, and Behavior Program, Michigan State University
4. Institute for Biodiversity, Ecology, Evolution, and Macrosystems (IBEEM), Michigan State University

Introduction

- Global anthropogenic change is impacting interspecific interactions[1].
- Loss of influential species may impact entire networks[2].
- **Species with more interactions may be more vulnerable** due to functional redundancy within the network, or **species with more interactions may be less vulnerable** if they can rely on many other species to provide a function.
- Connecting threat status with network influence is essential to inform conservation.

Methods

1 Species and interactions from Avian MetaNetwork

Credit: Jenna Baljunas

Figure 1. Example of brood parasitism, one type of interaction recorded in the Avian MetaNetwork.

2 IUCN threat levels

Figure 2. International Union for Conservation of Nature (IUCN) status types for species.

3 Network including threat status

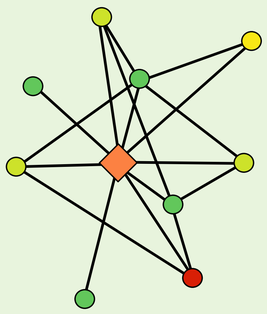

Figure 3. Example network. Each node (point) is a species colored by threat status. Each edge (line) is an interspecies interaction.

Threatened and non-threatened species **have similar influence** within their networks.

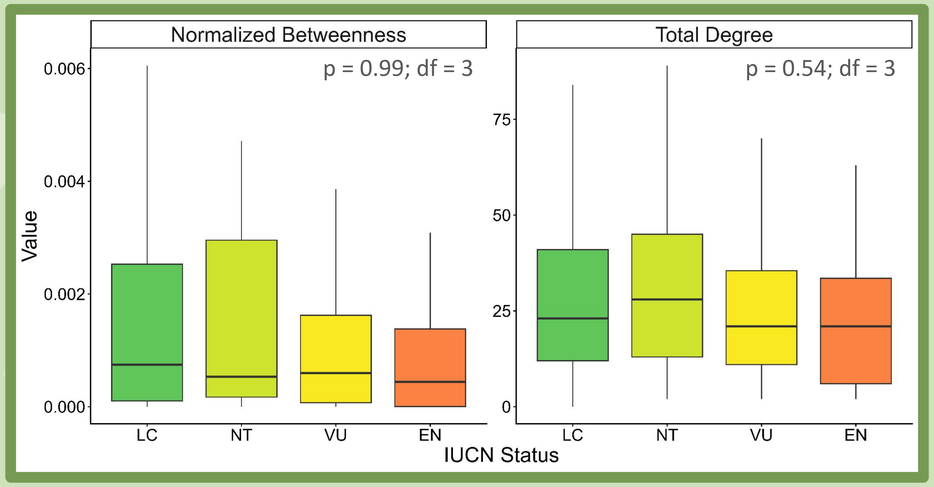

Figure 4. Normalized betweenness and total degree across threat statuses in the Avian MetaNetwork. Relationship was analyzed using a generalized linear mixed model (GLMM).

More **influential species are not more or less likely to be threatened.**

However, networks with **higher proportions of threatened species** are more **at risk**.

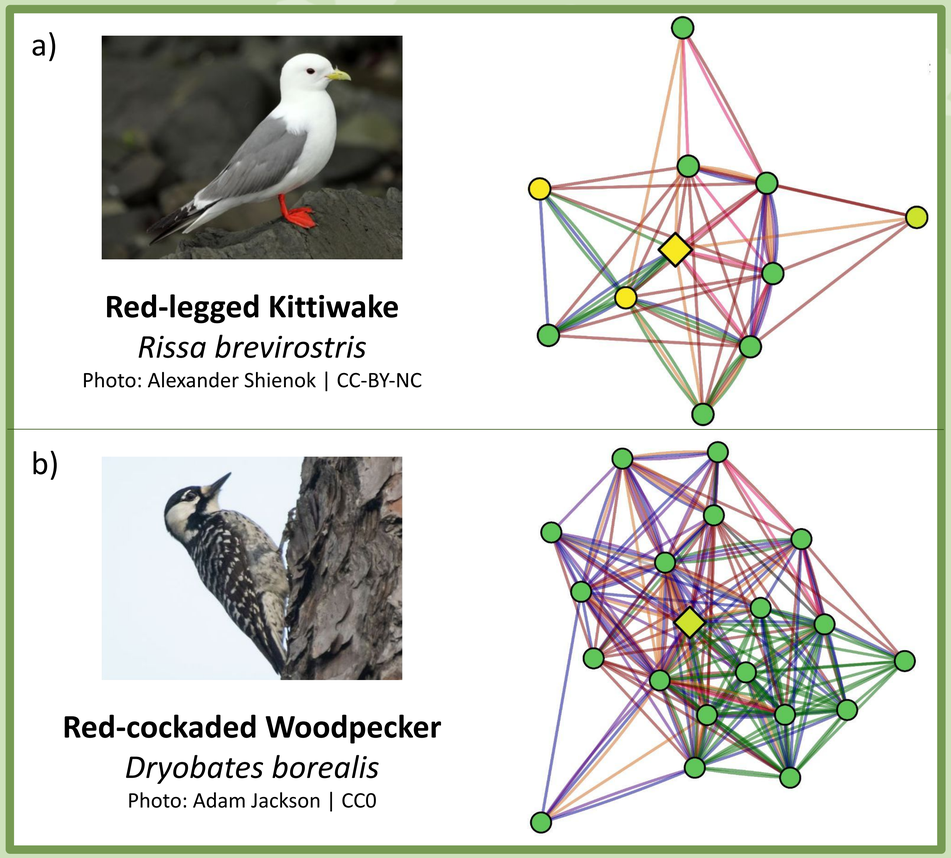

Figure 5. Example network modules with (a) Red-legged Kittiwake (*Rissa brevirostris*; near threatened) and (b) Red-cockaded Woodpecker (*Dryobates borealis*; vulnerable) as focal species.

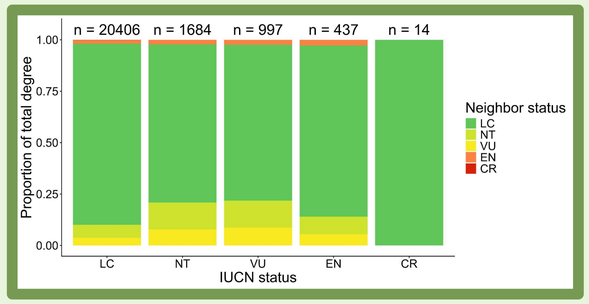

Figure 6. Proportion of total degree attributed to interactions from neighbors of each status type by IUCN status.

Discussion

- The number of species in each threat status differs, but the **proportion of interactions with each status is similar.**
- Threat status is spread among network modules, so **each status type is connected to other status types.**
- If different statuses are equally connected in the network, the **reduction or loss of threatened species has widespread effects.**

Future Research

- The Avian MetaNetwork is being expanded into Central and South America.
- Influence and threat status should be considered on a spatial scale.
- Investigate specific roles of threatened species and examine effects of network modules with focal species removed.

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References

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2. Zarnetske, P. L., Skelly, D. K., & Urban, M. C. (2012). Biotic multipliers of climate change. *Science*, *336*(6088), 1516–1518.