Landscape Connectivity Workshop

Hosted by the Alberta Prairie Conservation Forum

October 30, 2025

Land Acknowledgment

“The Town of Okotoks acknowledges the original stewards of this land that we know and call Treaty 7 Territory, which includes the Blackfoot Confederacy First Nations the Kainai, Siksika and Piikani. The Stoney Nakoda First Nations, which includes the Bearspaw, Chiniki and Goodstoney, the Dene First Nation of Tsuut’ina and the Metis Nation of Alberta. We Vow to continue honouring and respecting the Indigenous Peoples Sacred and Traditional ways of life and will carry on this special relationship with the land so that generations to come can enjoy, use, and live off the land as their ancestors did. We honour and respect this space, the water, the animals, and all the beings who have a spirit and have been here long before us.”

Landscape Connectivity Workshop

Agenda

October 30, 2025

Part 1 – Morning Session

9:00 to 10:15 am

- Introductory Remarks
  - Alvin First Rider; Chair, Alberta Prairie Conservation Forum
- Introduction to Landscape Connectivity
  - Helene Wagner; University of Toronto

10:15 to 10:30 am – Refreshment Break

10:30 am to 12 pm

- Current Density Approach to Landscape Connectivity
  - Hossam Abdel Moniem; Alberta Ministry of Environment and Protected Areas; formerly University of Toronto
- Landscape Connectivity: a Provincial Biodiversity Indicator
  - David Roberts; Alberta Biodiversity Monitoring Institute
  - Hossam Abdel Moniem; Alberta Ministry of Environment and Protected Areas
- Species-specific applied conservation in the greater Calgary area and pronghorn highway mitigation in SE Alberta
  - Tracy Lee; Miistakis Institute
  - Ninon Meyer; University of Toronto
- Applied connectivity modelling on Kainai Reserve
  - Celia Hein; University of Toronto
  - Alvin First Rider, Blood Tribe Land Management

Lunch Break; 12 – 1 pm

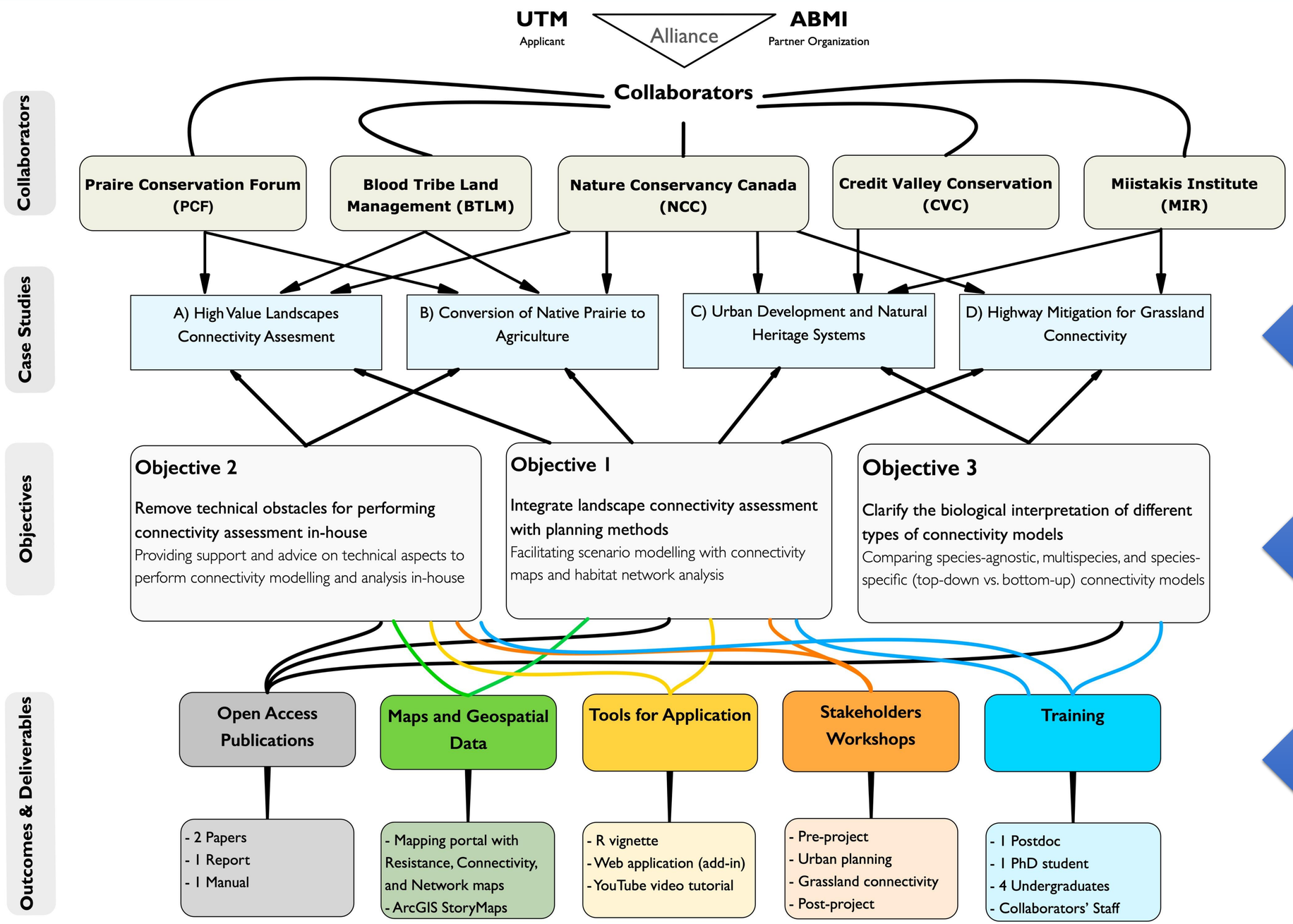
Introduction to Landscape Connectivity

- NSERC Alliance project
- Key principles
  - What is landscape connectivity?
  - Consider multiple spatial scales
  - How much biological realism?
- Modeling approaches
  - Perspective: multifunctional landscape vs. species at risk
  - Habitat network connectivity
  - Landscape permeability
- Validation of landscape connectivity models

Alliance project

Implementing landscape connectivity assessment for biodiversity management and land-use planning in Alberta

NSERC Alliance Grants



2- Relevant case-studies

1- Focused objectives

3- Practical deliverables

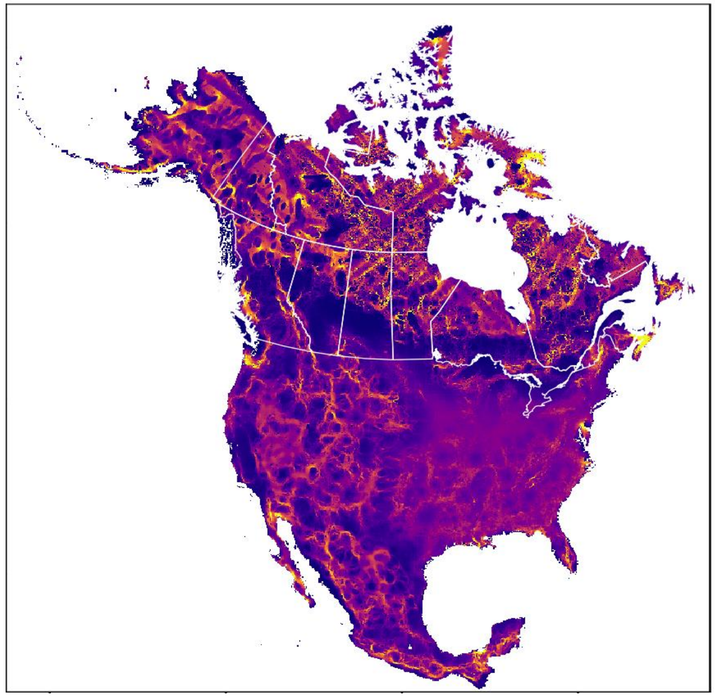
What is Landscape Connectivity, and Why Does it Matter?

*"The degree to which a **landscape facilitates** or **impedes** the **movement** of **individuals** (and their **genes**) among resources patches"*

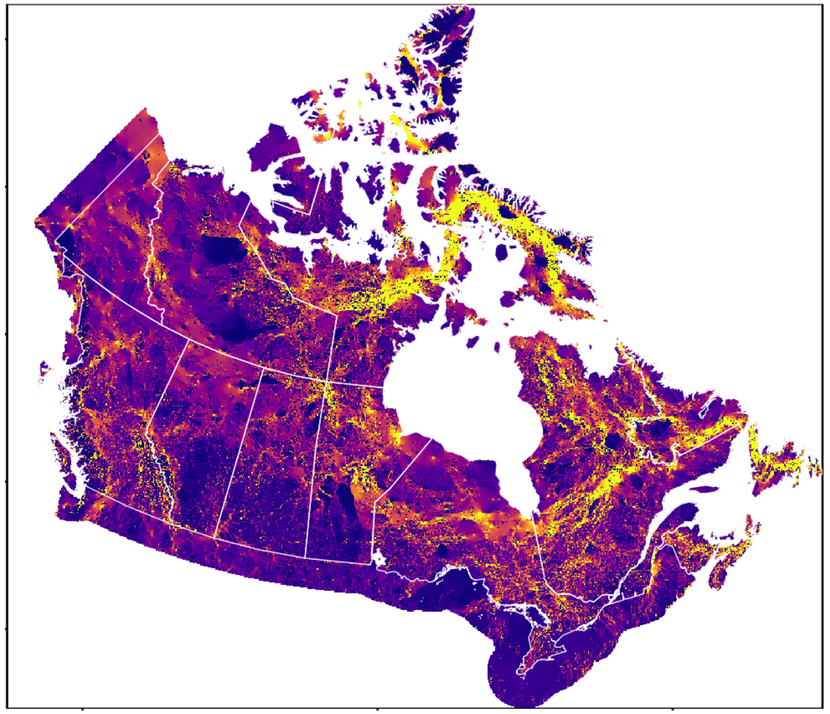
Taylor et al. 1993. *Oikos*

Connectivity at different Spatial Scales: Ecological Flow

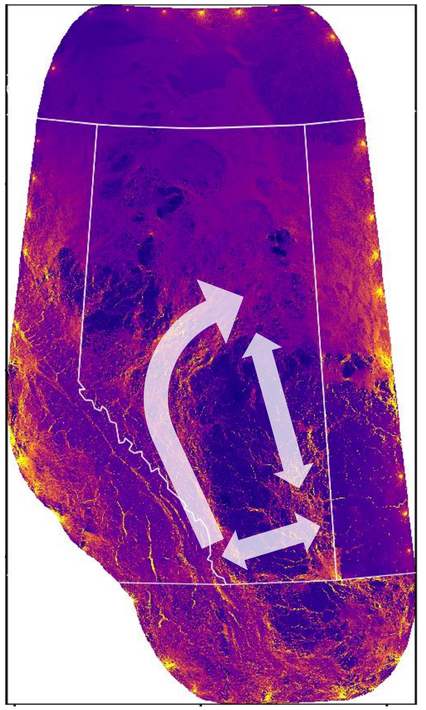
Belote et al. (2022), Landscape Ecology:
- North America
- 1 km resolution



Pither et al. (2023), PLOS One:
- Canada
- 300 m resolution



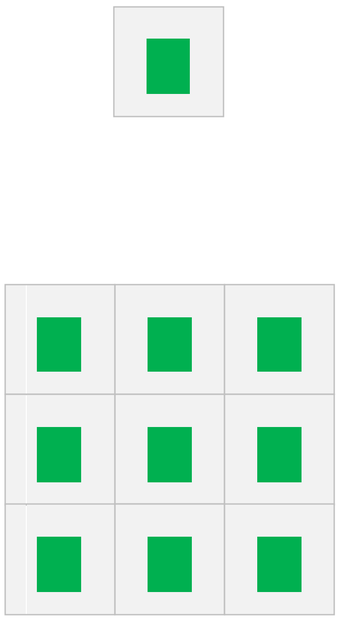
Marrec et al. (2020), Scientific Reports:
- Alberta
- 100 m resolution



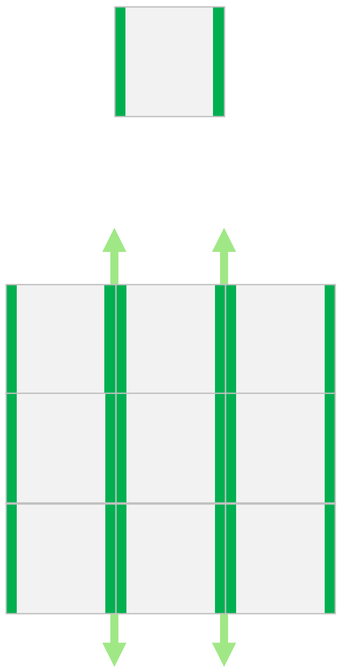
Consider Municipality in its Larger Spatial Context

Example: strategies for selecting 20% of the area as natural habitat

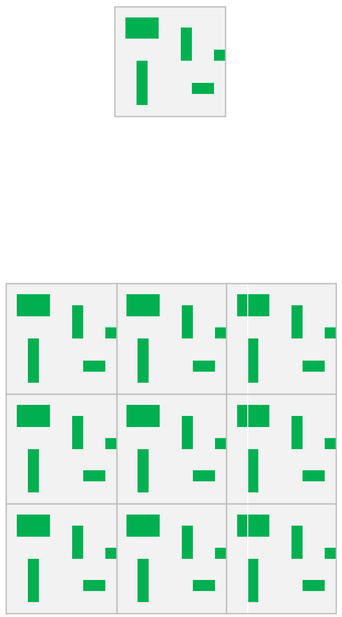
A:
Large area



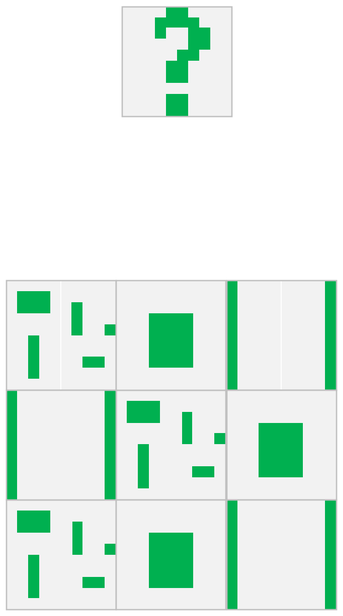
B:
Margins



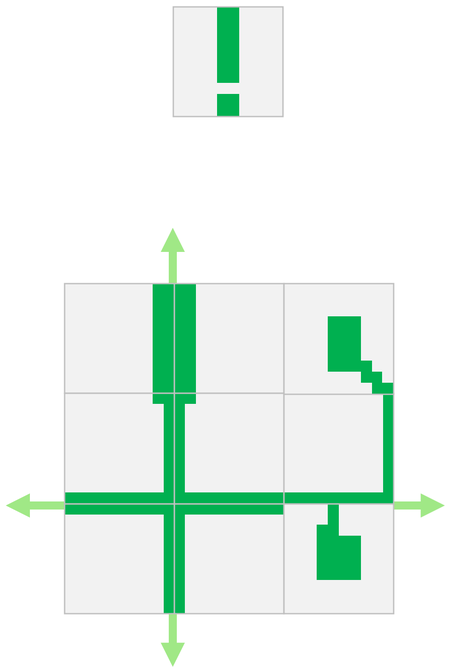
C:
Convenience



D:
Independent



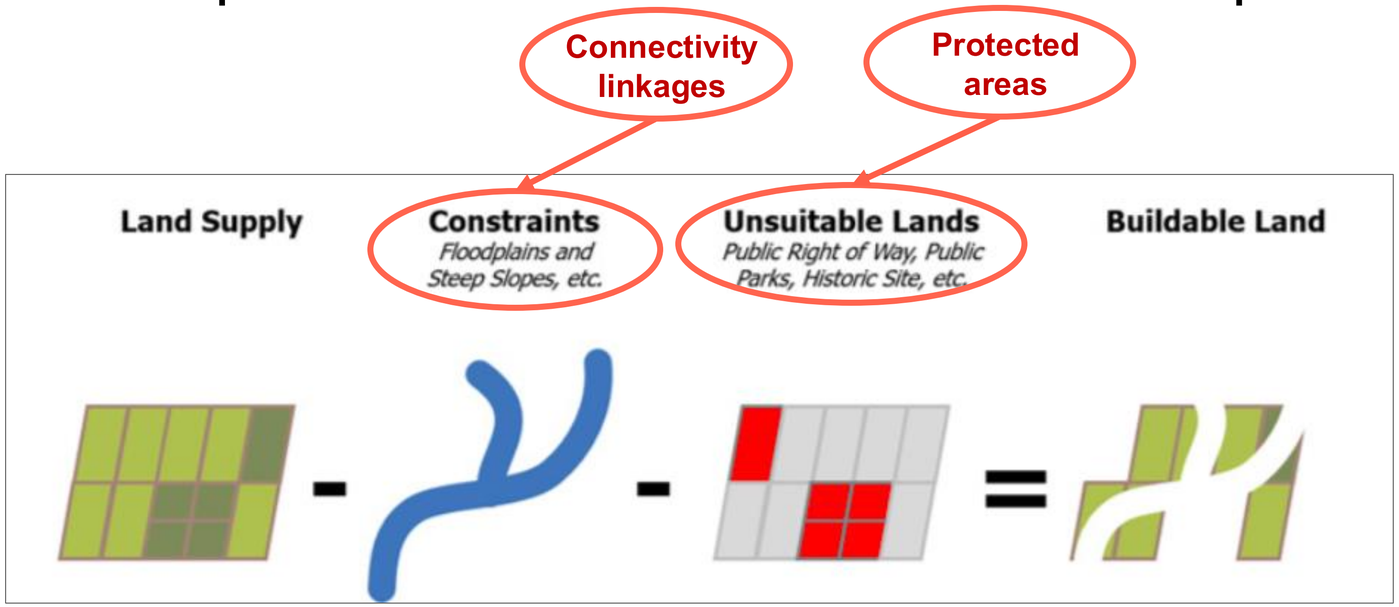
E:
Coordinated

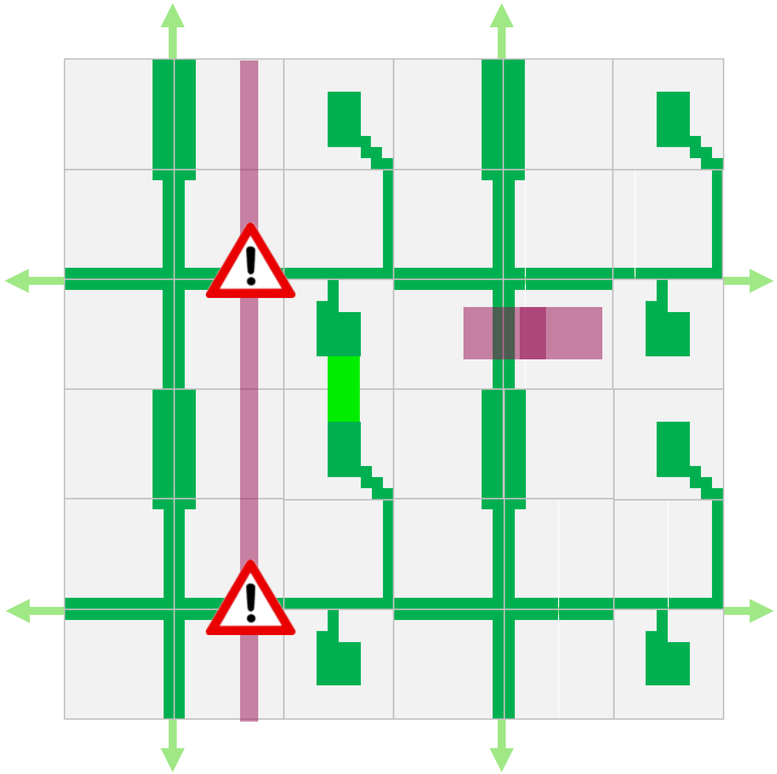


Applications in Municipal Planning

Examples of applications:

- Identify where to invest in highway mitigation
- Identify key areas for expanding network
- Compare alternative scenarios of development





e.g., Calgary Metropolitan Region Growth Plan

How Much Biological Realism?

Species-agnostic models

- The more natural, the higher the quality
- The less natural, the less permeable (higher resistance)
- Intermediate dispersal distances are most sensitive

Habitat

Landscape permeability

Movement behaviour

Species-specific models

- Habitat requirements, quality, minimum patch size
- Energetic cost, mortality, avoidance
- Dispersal ability, decision making

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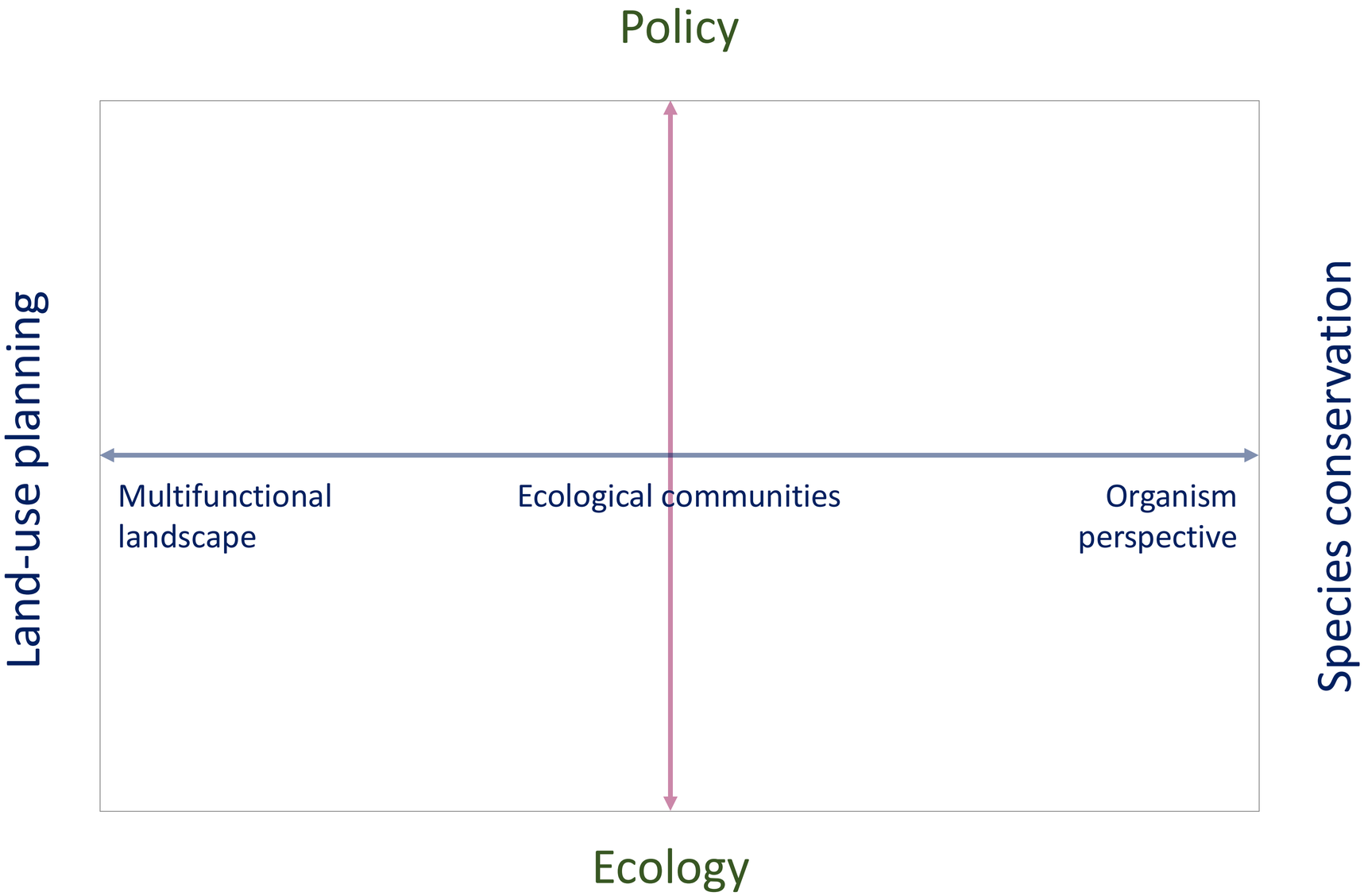
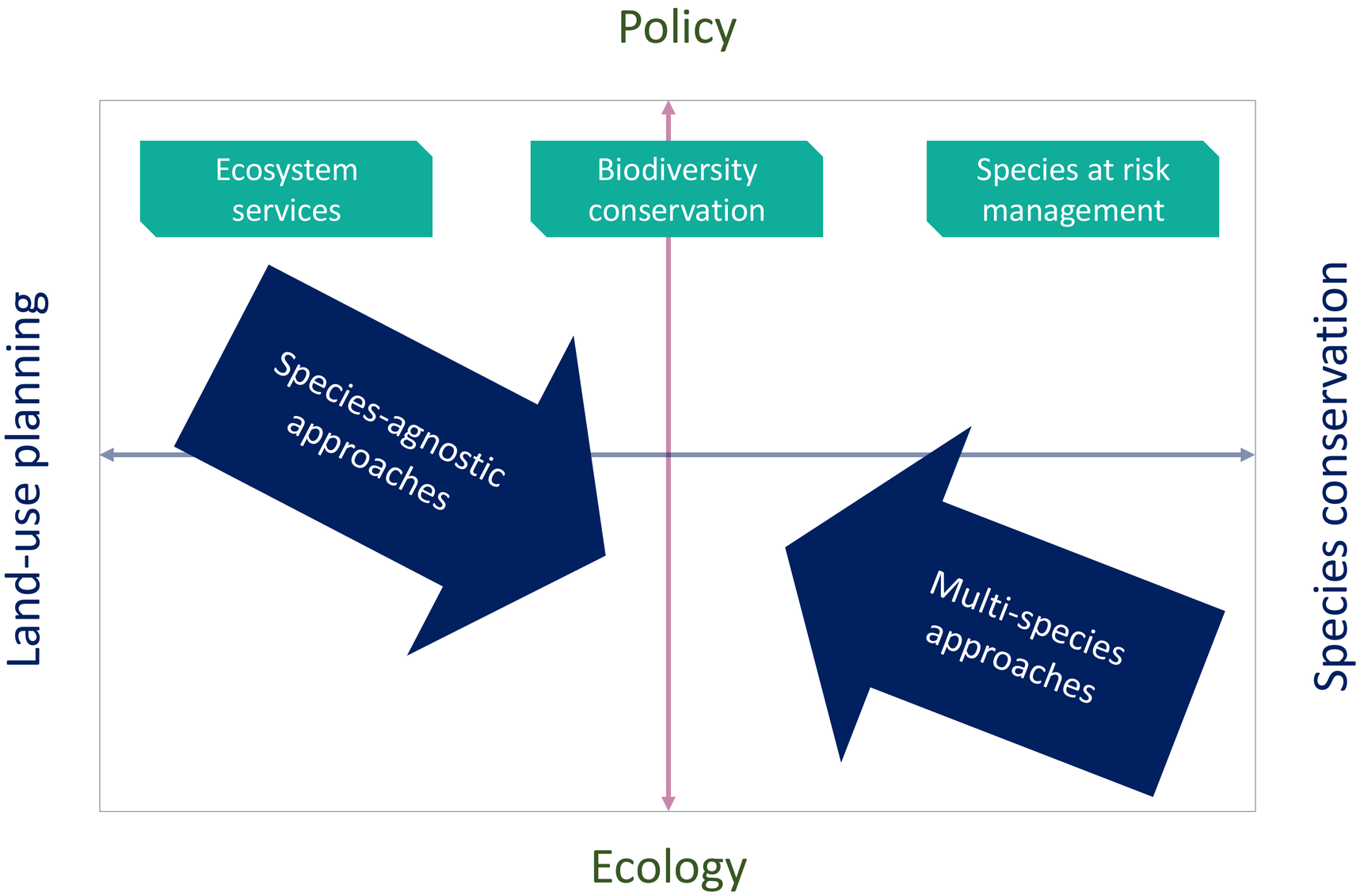
Perspectives on Landscape Connectivity



Marrec et al. 2020

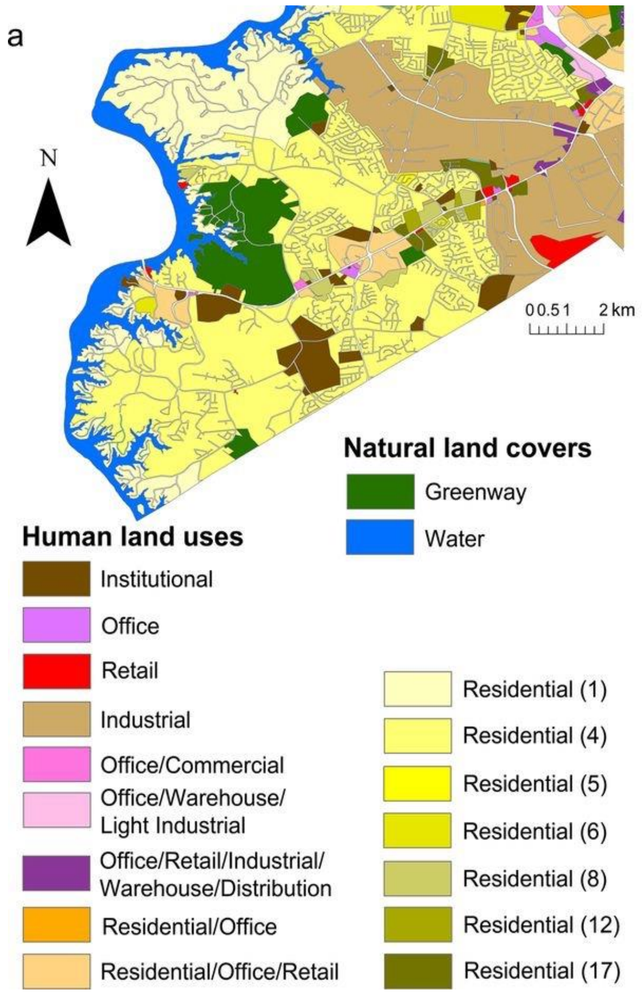
Perspectives on Landscape Connectivity

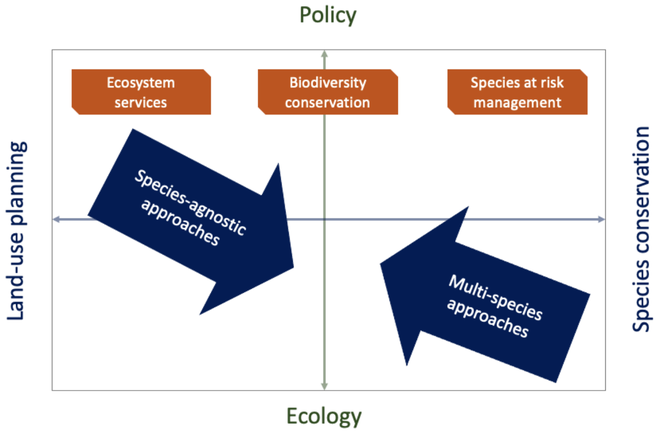


Marrec et al. 2020

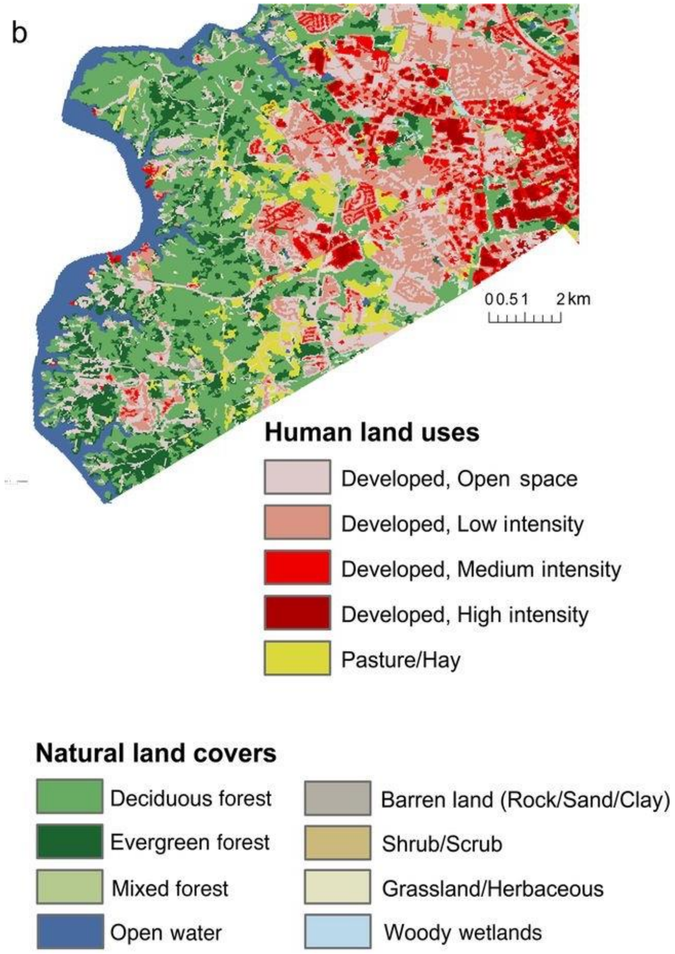
Perspectives on Landscape Connectivity

A landscape viewed by a municipal planner





The same landscape viewed by an ecologist

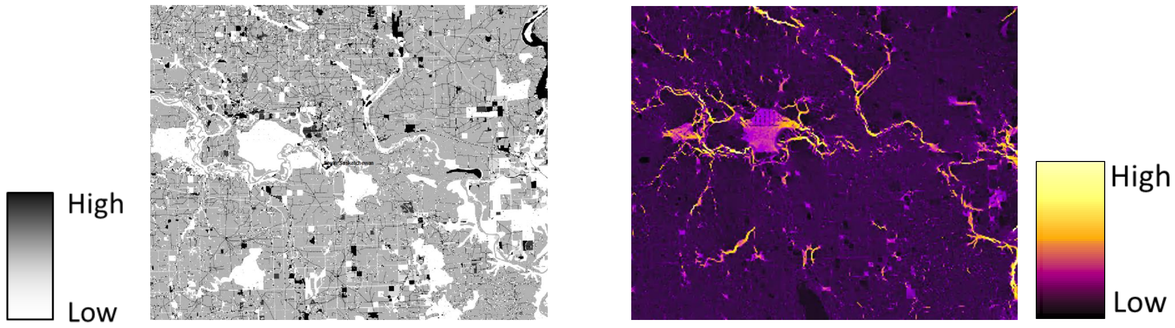


Mayer et al. 2016

Perspectives on Landscape Connectivity

Landscape Permeability

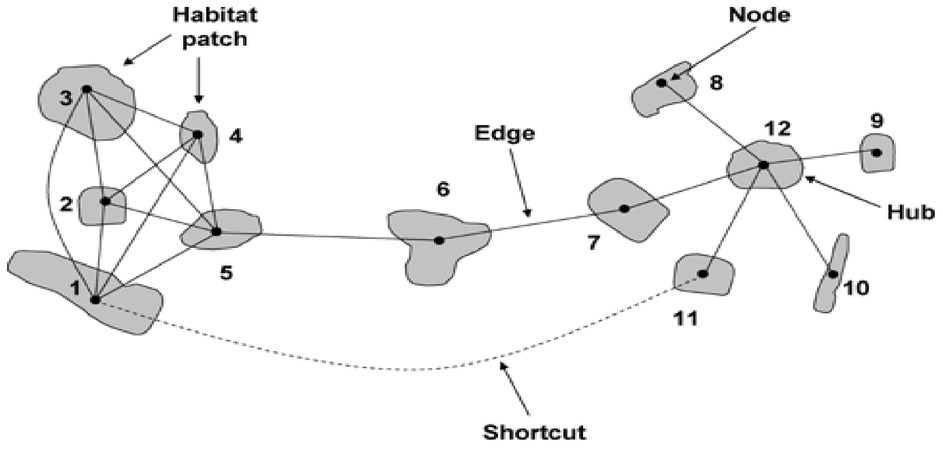
- Resistance values for land use/cover types
  - Least-cost paths: optimal path between two patches
  - Current density: all possible paths



→ Where are pathways of ecological flow?

Connectivity of a Habitat Network

- Predefined set of core areas (nodes)
- Linkages between nodes



→ How connected is the habitat?

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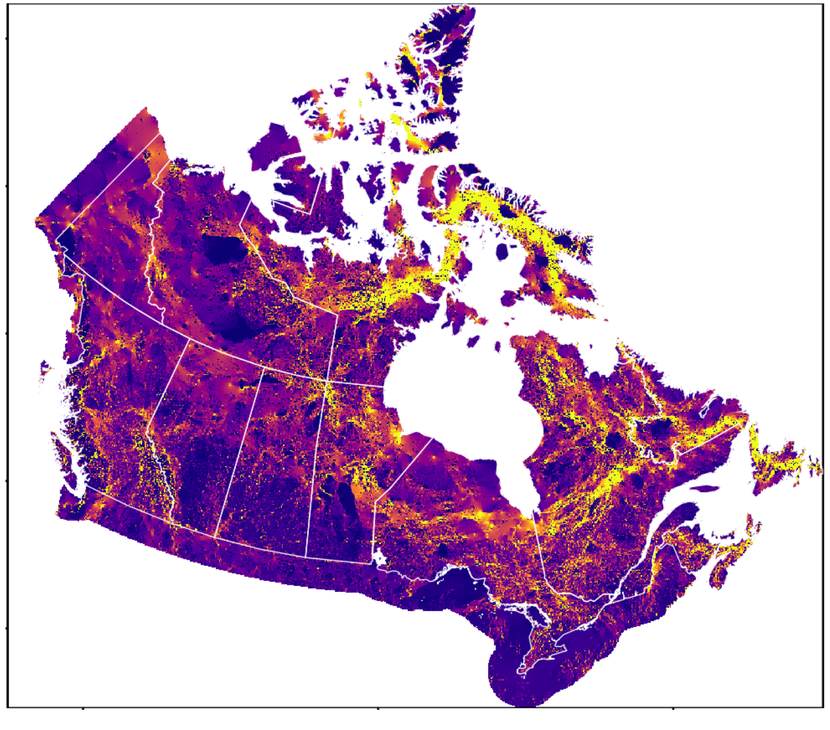
New Validation Study

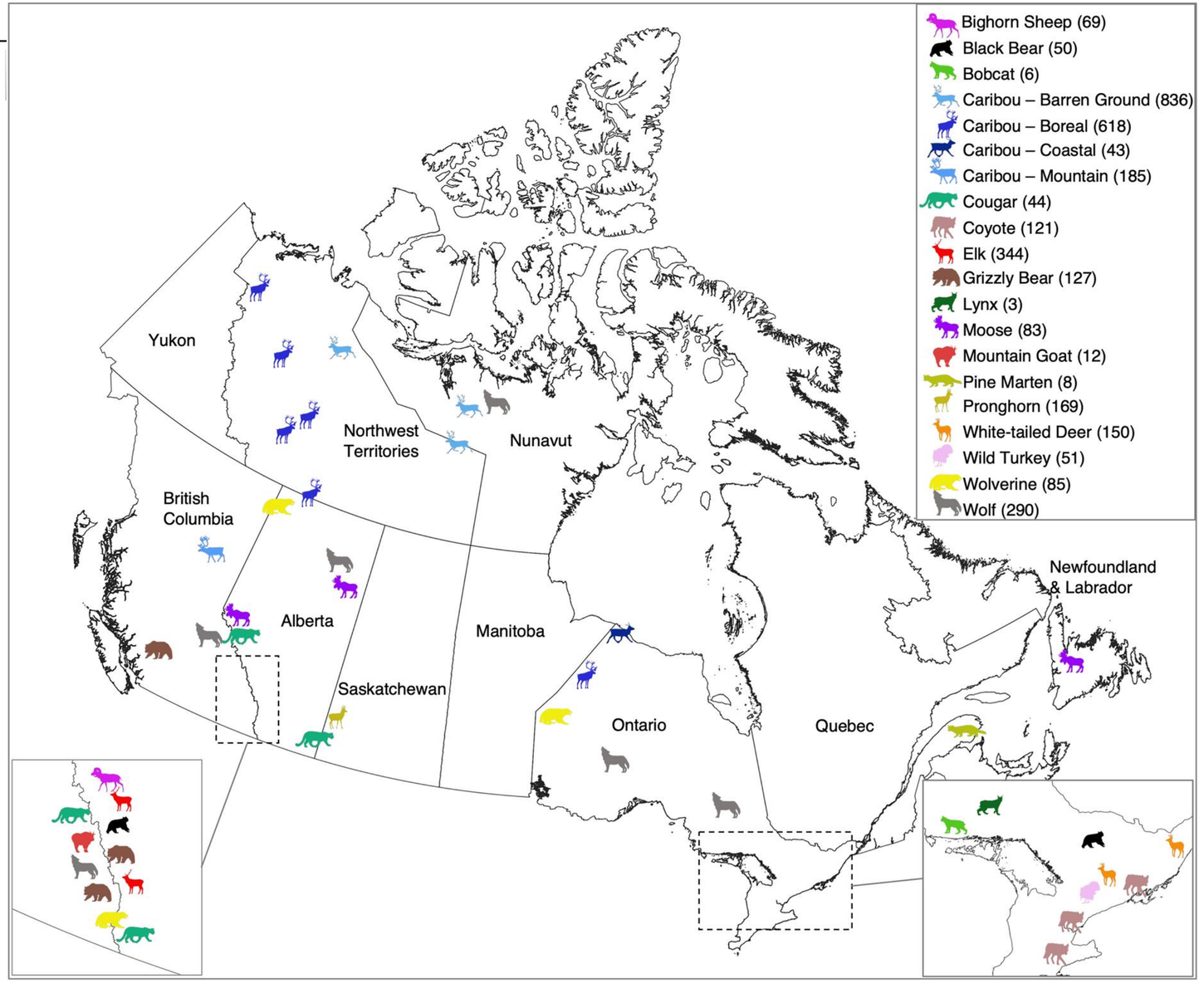
Landsc Ecol (2025) 40:200
https://doi.org/10.1007/s10980-025-02227-5

RESEARCH ARTICLE

National-scale multispecies connectivity models represent movements for a majority of species tested

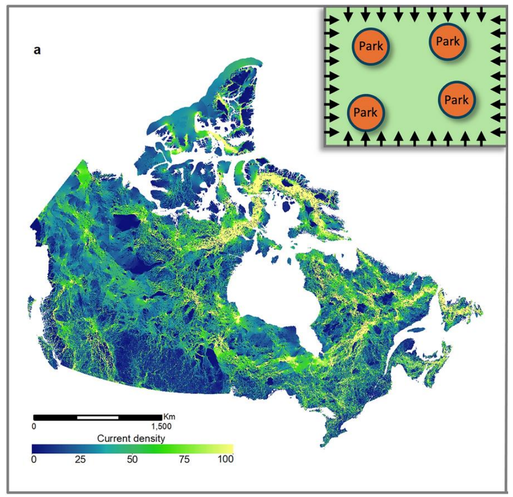
A. Brennan · J. Bowman · L. Custode · S. Moran · R. Abernethy · J. Baici · M. Boyce · G. Brown · M. Cote · A. Ford · M. Hebblewhite · K. Hirsh-Pearson · A. F. Jakes · P. F. Jones · C. T. Lamb · M. McLellan · K. Munro · J. Northrup · M. Obbard · P. O'Brien · B. R. Patterson · A. Shafer · M. A. Scrafford · D. Sigouin · S. Sucharzewski · T. Wheeldon · J. Whittington · B. K. Woodworth · R. Pither

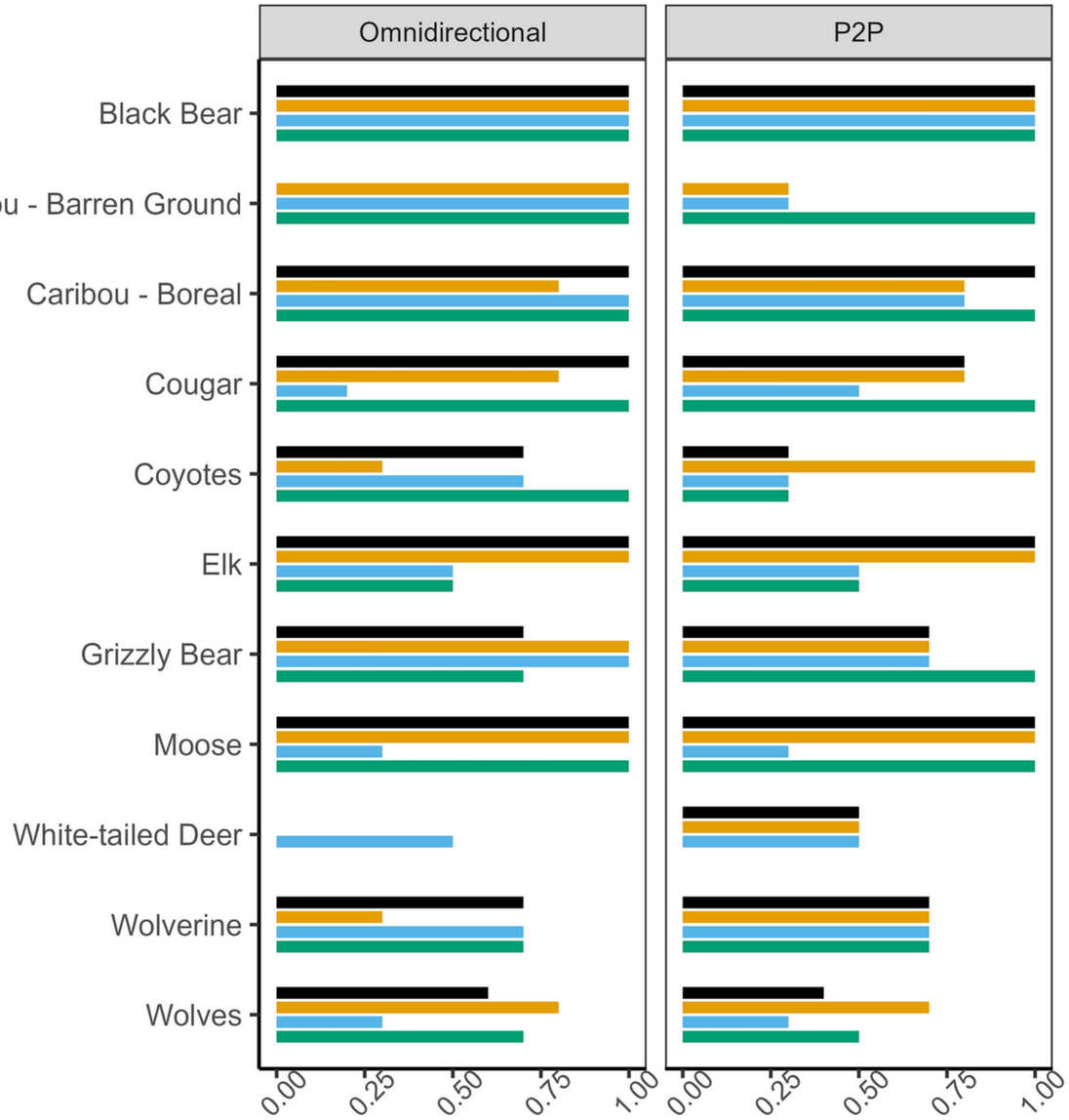


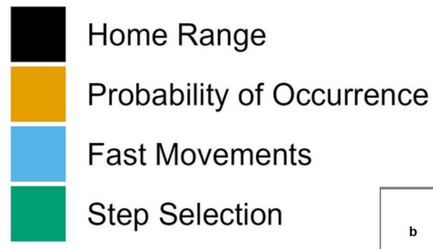


New Validation Study

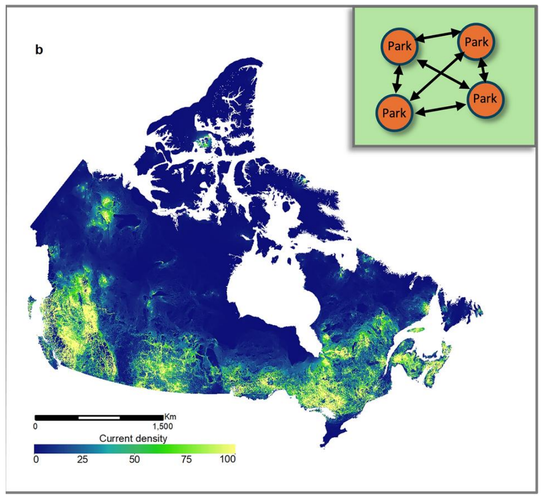
Landscape permeability







Habitat network:
large protected areas,
<100 km distances

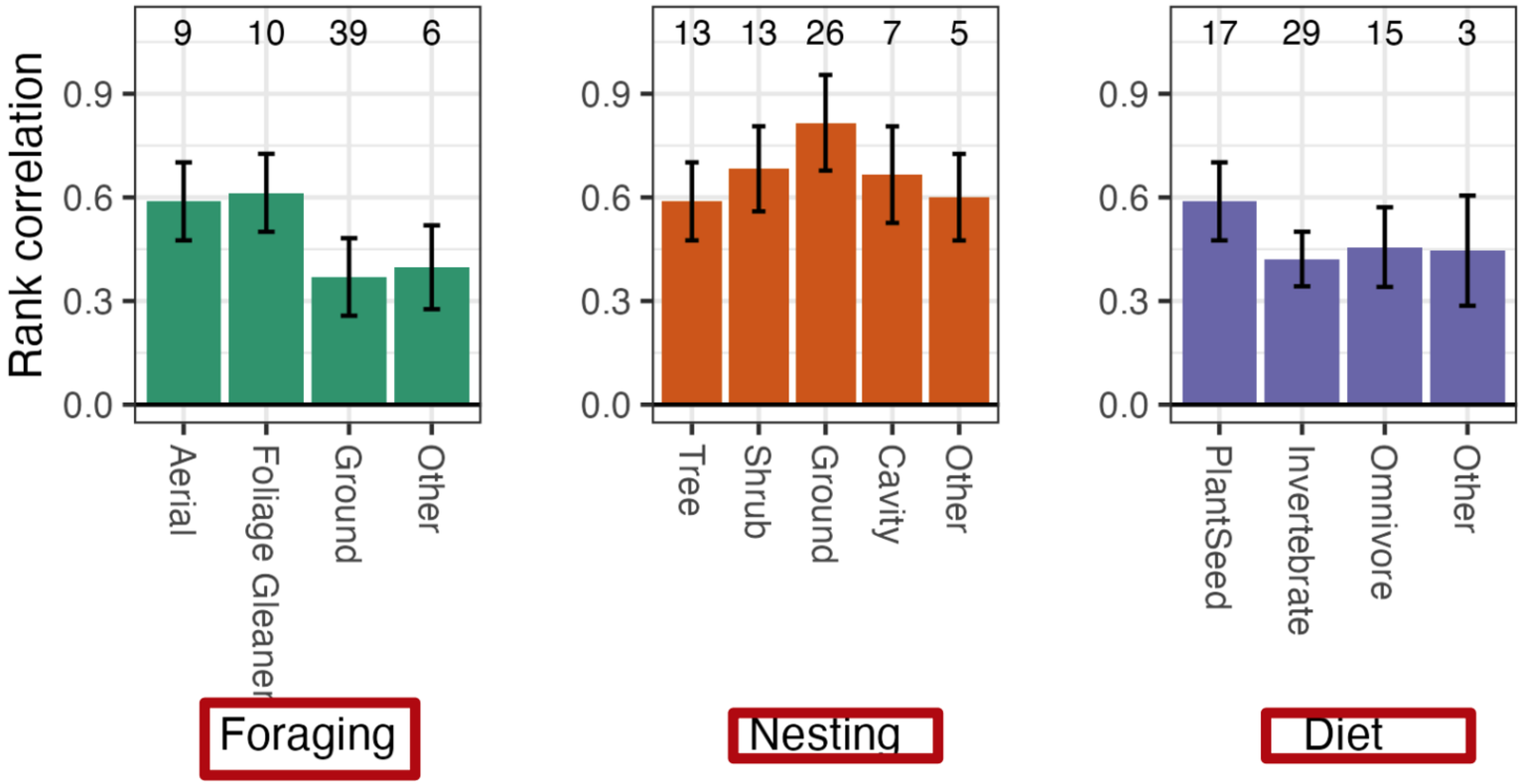


Brennan et al. 2025, Landscape Ecology

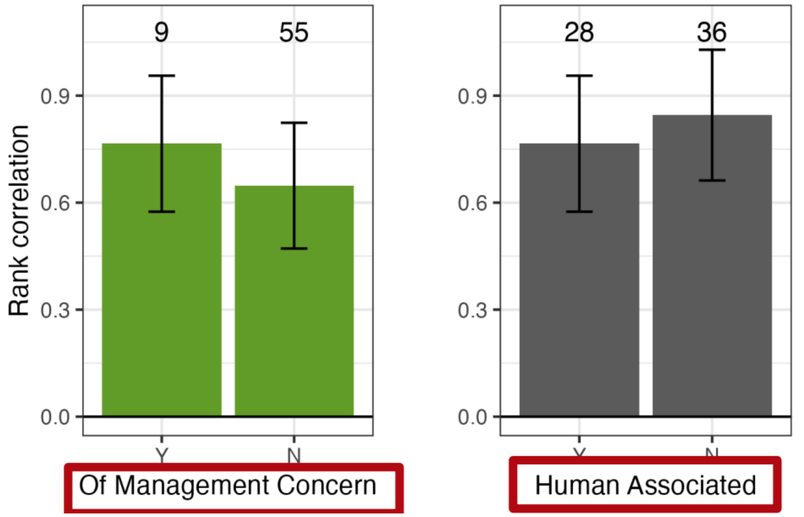
Viviana Quiroga
Angel, MSc

Which Bird Species are Better Represented?

By functional trait



By management category



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- Species-specific applied conservation in the greater Calgary area and pronghorn highway mitigation in SE Alberta
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    - Alvin First Rider, Blood Tribe Land Management

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