Surrogacy & umbrella effects of grizzly bears on songbirds is scale dependent

Theme 1 – Question 1.3

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Calgary, Alberta
18 October 2019
Theme 1: Environment

Question 1.3

Objective: Determine the ability for grizzly bears to act as a surrogate species for songbirds in Alberta, based on the assumption of mutually beneficial overlapping habitat
**TERMINOLOGY**

**SURROGACY**

- Describes the use of one species as a representative for another

**Why?**

Provide a simplification of the management of many species

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**FLAGSHIP SPECIES**

- Chosen based on charisma / public interest

**UMBRELLA SPECIES**

- Chosen based on ecological impact / biological factors

- Encapsulate other species in their conservation

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- Successes, failures, caveats
Study design: scale and questions

UMBRELLA

Largest scale

1) Compare to other flagships: species’ range & planning unit size
2) Compare effect of location w/in a flagship’s range

INTERMEDIATE

1) Examine relationship b/w bear resource selection functions (RSFs) & bird diversity

LOCALIZED

Smallest scale

1) Compare sites selected by grizzly bears vs. local random sites for bird diversity & composition

Pre-existing spatial data + modelling

Field study (data)

Environment

Cicon et al. (in prep)
UMBRELLA

UMBRELLA EFFECT

Compare flagship species

Spatial variation within flagship range

Planning unit size

Planning unit location

Cicon et al. (in prep)
Compare flagship species

Spatial variation within flagship range

Planning unit size

Planning unit location
Flagship species:

versus songbird species richness
PLANNING UNIT SIZE

6 PLANNING UNIT SIZES

- 25 km²
- 35 km² (GSG)
- 100 km²
- 338 km² (GB)
- 382 km² (WC)
- 1000 km²

SAME BOUNDARY

- Alberta

Average Spp. Richness Per Planning Unit

Planning Unit Size (km²)

Alberta

Cicon et al. (in prep)
1 PLANNING UNIT SIZE
- 25 km²

3 BOUNDARIES
- Woodland Caribou (BLUE)
- Grizzly Bear (ORANGE)
- Greater Sage-grouse (PURPLE)

Key result: Grizzly Bear > Woodland Caribou > Greater Sage-grouse
UMBRELLA

UMBRELLA EFFECT

Compare flagship species

Spatial variation within flagship range

Planning unit size

Planning unit location

Cicon et al. (in prep)
SPATIAL VARIATION: BMA COMPARISON

BMA = BEAR MANAGEMENT AREA

1 PLANNING UNIT SIZE
- 338 km²

7 BOUNDARIES (BMAS)

Cicon et al. (in prep)
SPATIAL VARIATION: BMA COMPARISON

- All songbird species
SPATIAL VARIATION: BMA COMPARISON

- Species at risk (only)
Example songbird (of 104)

Alder Flycatcher (*Empidonax alnorum*)
Normalized Predicted Relative Abundance: Current

Key result (intermediate scale): 5% increase in bird diversity per 1 unit increase in grizzly habitat

Relationships (richness ~ RSF)

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<th>RSF</th>
<th>Beta</th>
<th>SE</th>
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</tbody>
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Cicon et al. (in prep)
1) Compare sites selected by grizzly bears for activities and nearby random sites

- 130 points
- 65 pairs
1) Compare sites selected by grizzly bears for activities and nearby random sites

ARU = Autonomous Recording Unit
**Key result (local scale):** No relationship between grizzly habitat (use) & bird diversity/composition
DISCUSSION

Determine the ability for grizzly bears to act as a surrogate species for songbirds in Alberta, based on the assumption of mutually beneficial overlapping habitat

- Umbrella
- Intermediate
- Localized

- Stronger relationships in cross-taxon surrogacy are more likely at larger scales (attributed to the species-area relationship)

- But location at larger scales still matters with grizzly range > caribou > sage grouse
Acknowledgements
& questions

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Gordon Stenhouse

GoA collaborators:
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