Landscape composition mediates movement and habitat selection in bobcats (*Lynx rufus*): implications for conservation planning

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Goal of paper:

- Determine characteristics of bobcat movement, habitat selection, and the environmental covariates that influence these characteristics

Data used in analysis

- GPS collars on 41 bobcats, narrowed to 13 bobcats
  - Location data collected as x,y coordinates
- Land cover types based on National Land Cover Database
  - reclassified from 16 types to 5
    - forest, wetland, developed, agriculture, and scrub-rock
- Topography data taken from DEM
- Orthophotos to determine road densities

Methods (GIS and spatial analysis)

- Point feature class created for each bobcat using x,y location data
- Hawth's Tools analysis package used to create continuous movement paths
- Resource selection via compositional analysis
  - Location data buffered by Euclidean distance traveled between consecutive points
  - Python & ArcGIS used to extract statistics on land cover proportions
- Comparison of 4 corridor designs using cost map
  - Habitat suitability raster converted to cost raster where pixel with low score = low cost

Results

- Study based on 13 individual bobcats: 5 female, 8 male
- Males travelled ~65m more than females in 20 minute period and ~4.7km more per 24 hour period
- Forested and scrub-rock land cover most preferred
- Forest edge, wetland edge, areas of high stream density preferred during movement
- Bobcats moved faster through least-preferred land cover types (developed) and slower through preferred types

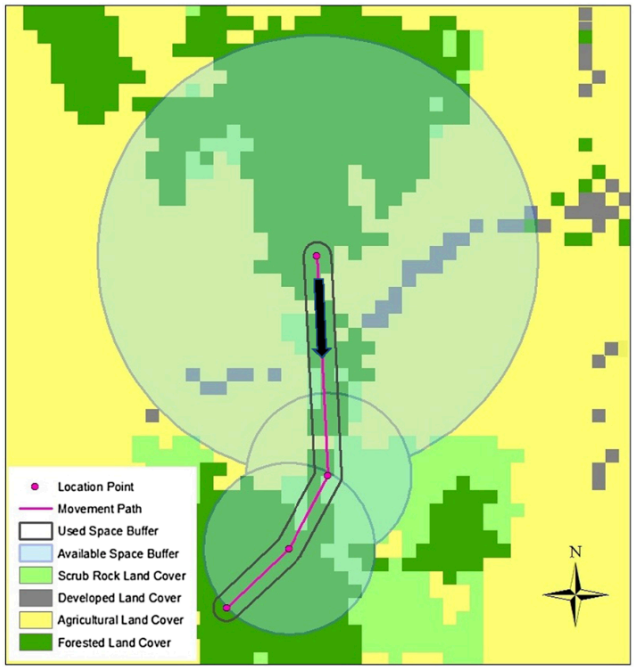


Fig. 1 Diurnal travel path of adult male bobcat B1 headed south in the Champlain Valley, Vermont, USA. The area shaded in dark green consists of deciduous, mixed and coniferous forest. Actual GPS location data, re-created movement path, 60-m used space buffer and variable width available space buffer based on the mean Euclidian distance traveled within the movement segment are shown

Results

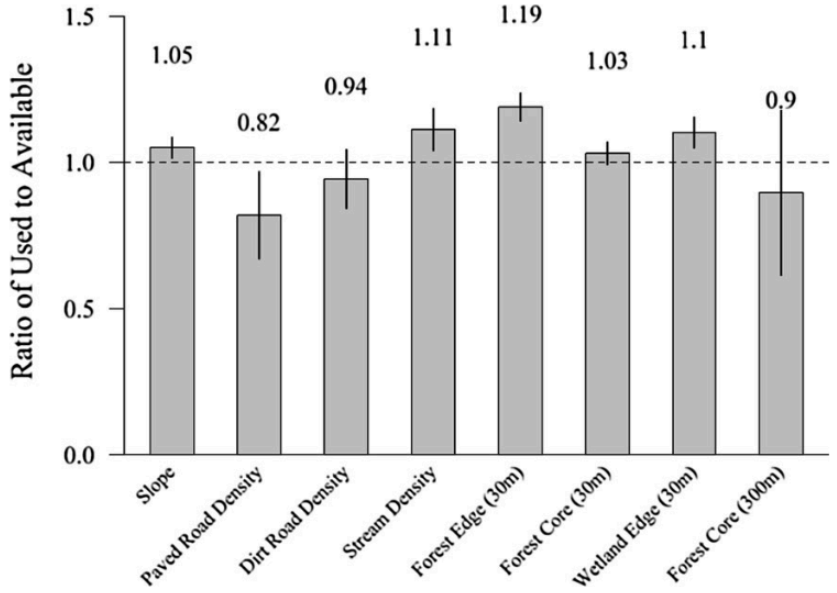
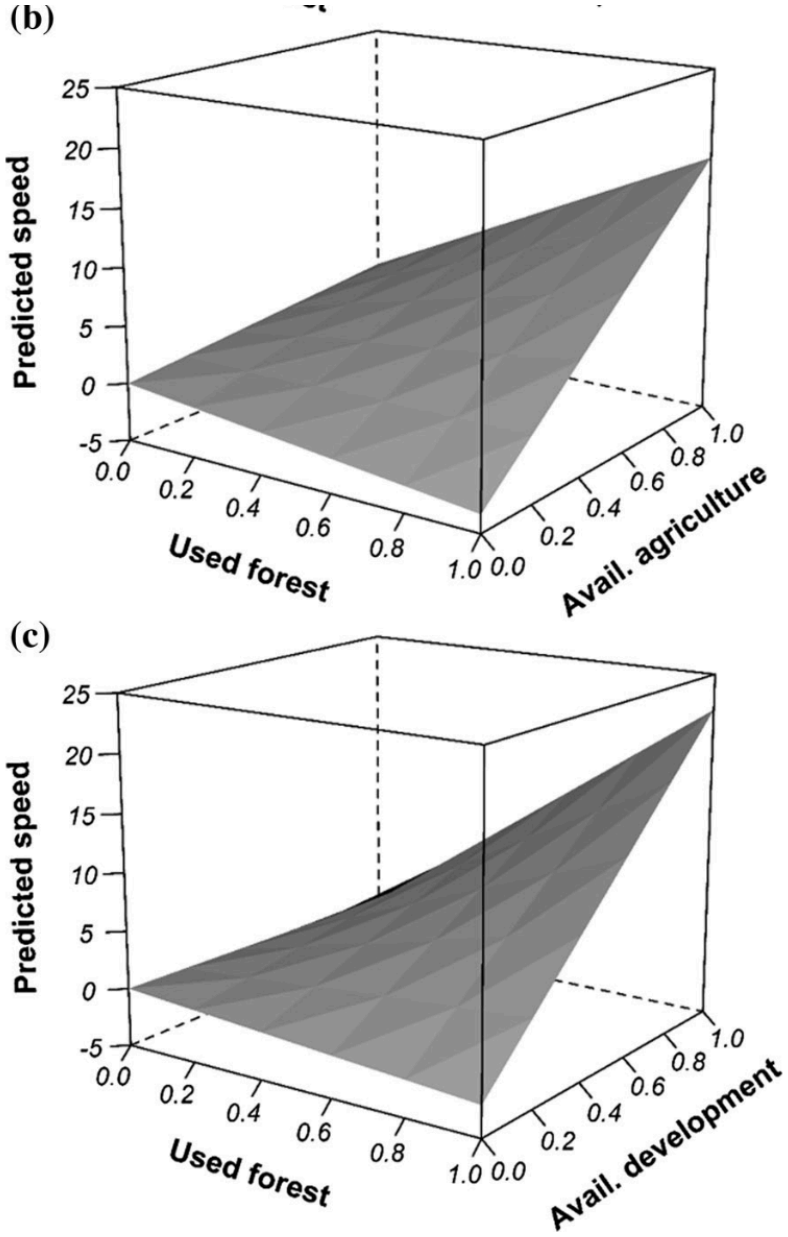


Fig. 4 Ratios of used to available habitat for 7 covariate classes for bobcats (n = 11) in the Champlain Valley of Vermont, USA. The value "1" represents no effect. Values above "1" convey a higher usage given availability for a particular habitat. Values below "1" convey a lower usage given availability for a particular habitat. Error bars are 95% confidence intervals based on a t distribution with 10 degrees of freedom



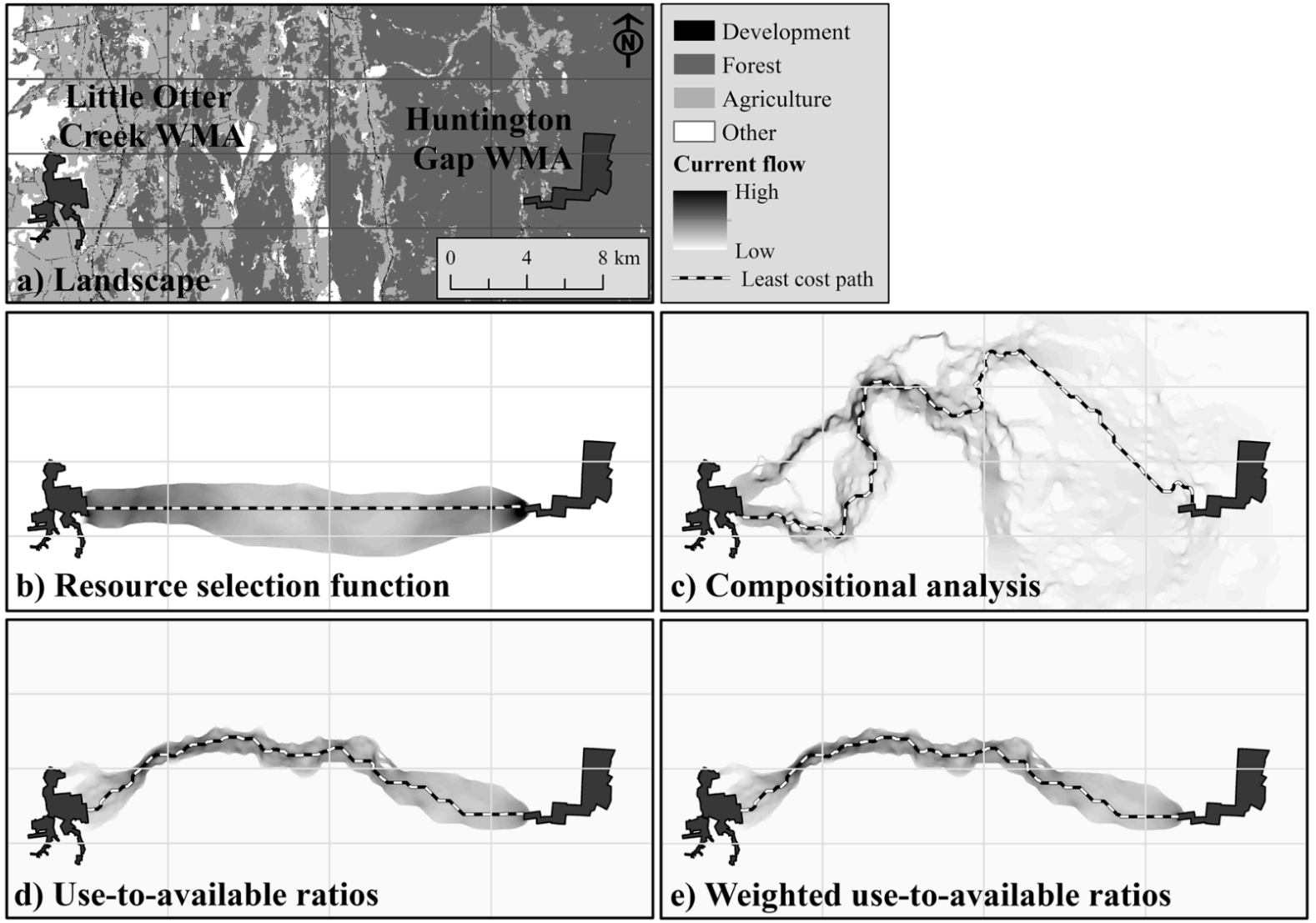


Fig. 6 Estimated movement flow through least-cost corridors between two wildlife management areas in the Champlain Valley of Vermont, USA. **a** shows the geographic extent of the analysis, location of areas, and distribution of major habitat types. The remaining panels show expected movement flow between areas based on different maps of habitat suitability: **b** suitability based on resource selection functions that did not incorporate information on preference, **c** suitability based on compositional analysis, **d** suitability based on use-to-available ratios, and **e** suitability based on use-to-availability ratios weighted by how far the use to availability ratios deviated from 1.0. Movement flow estimated using a circuit theory approach

Table 4 Measures of distance and corridor quality between two wildlife management areas (Little Otter Creek WMA and Huntington Gap WMA) in the Champlain Valley of Vermont, USA

Method	Cost-weighted distance (km)	Euclidean distance (km)	Least cost path (km)	Ratio (CWD:ED)	Ratio (CWD:LCP)
Resource selection function	955.2	22.9	23.0	41.7	41.5
Compositional analysis	197.6	22.9	42.2	8.6	4.7
Used to available ratio	1093.4	22.9	27.3	47.7	40.1
Weighted used to available ratio	1122.0	22.9	27.3	49.0	41.1

Conclusion

- Corridor designs should reflect empirical data and pixel resistance to better reflect true behaviour of focal species
  - This will result in more objective and transparent corridor designs
- Results of study, despite small sample size, consistent with other bobcat studies
- Critiques:
  - Paper was straightforward but would benefit from more tables to display data and maps to illustrate bobcat movement and habitat preference
  - Larger final sample size would provide more robust results
- Rating: 8/10