Corridors for Conservation: Integrating Pattern and Process

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Developments and transportation routes "fill in" the valley of Crowsnest Pass, Alberta, Canada forcing wildlife to travel around these developments or cross roadways.

Introduction

Corridors are commonly used to maintain connectivity for wildlife populations, but often neglect processes of habitat selection and movement of animals.

Process-based approaches are needed if corridors are to fulfill their conservation promise.

New technologies and analytical tools make it possible to better integrate landscape patterns with behavioural processes to improve corridor design, implementation and study.

A typical wildlife corridor created from remnant habitat left after suburban development near Canmore, Alberta, Canada.

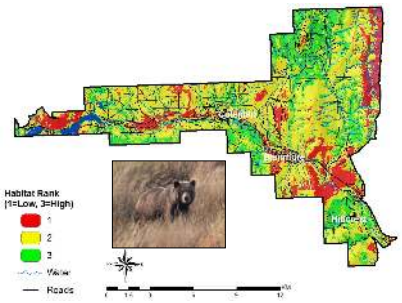
Quantifying Habitat Selection Processes to Corridor Designs

Corridor designs based on patterns of habitat and non-habitat neglect the continuum of habitats in which animals really occur.

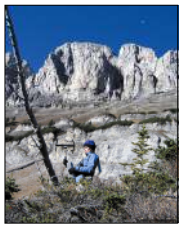
Resource selection functions (RSF) characterize habitats in a gradient-based, multivariate way.

Location data from Global Positioning System (GPS) radiotelemetry collars on grizzly bears (*Ursus arctos*) and cougars (*Puma concolor*), were used to develop seasonal RSFs for two landscapes in the Canadian Rocky Mountains.

Mapping RSFs in a Geographic Information System (GIS) represents areas with high probability of occurrence (*green*) relative to areas of low probability of occurrence (*red*).



Spring RSF model for grizzly bears in Crowsnest Pass, Alberta.



Quantifying Movement Processes to Corridor Designs

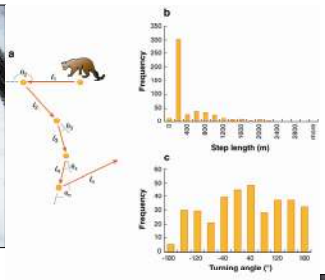
Movement processes are seldom explicitly included in corridor designs.

GPS radiotelemetry provides detailed spatial and temporal information about movement, particularly for large, wide-ranging species.

GPS locations of 8 grizzly bears and 16 cougars were quantified into movement pathways (*a*), step lengths (*b*), and turning angles (*c*).

Areas of high movement and straight pathways can indicate potential corridor locations.

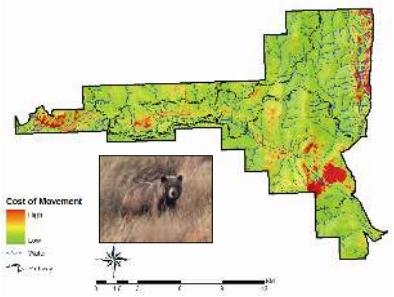
Movement patterns (i.e., deflecting or channeling) at habitat edges can support corridor locations and designs.



Quantifying the movement pathway (*a*) into (*b*) step lengths and (*c*) turning angles for cougar CACO1 in Canmore, Alberta during 2000-2001.

Chetkiewicz C-LB, et al. 2006. Annu. Rev. Ecol. Evol. Syst. 37:317–42

Integrating Habitat and Movement Processes to Corridor Designs



RSFs offer new ways to quantify landscapes for LCP analyses. The inverse of an RSF can be used to generate a cost-surface in LCP analyses to examine potential corridor and road-crossing locations.

Several techniques can be used to integrate key behavioural processes with landscape features to better design, implement and study corridors.

We advocate least-cost path (LCP) analyses[1] that qualitatively evaluate the cost of moving between two habitat patches; Step Selection Functions (SSF)[2] that model pathway segments instead of single locations; and, Graph Theory[3] that explicitly incorporates movement metrics.

Significance

Too often corridor planning ignores key behavioural processes of habitat selection and movement. Process-based approaches to corridor design are needed.

Key processes of habitat selection and movement can be quantified using GPS and GIS technologies and RSF analyses.

Key processes can be integrated with landscape patterns using several tractable techniques such as LCP analyses and SSFs.

Using these tools and techniques can overcome current limitations of identifying and designing corridors for functional connectivity.

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