



CARNIVORES IN THE SOUTHERN CANADIAN ROCKIES: CORE AREAS AND CONNECTIVITY ACROSS THE CROWSNEST HIGHWAY

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SUMMARY

The ‘southern Canadian Rocky Mountains’ — between Banff National Park and Glacier National Park at the U.S. border — support an assemblage of carnivores that appears unique in North America for its intact diversity. Due to their particular geographic position, the southern Canadian Rockies also represent one of the most strategically important sections in maintaining broad ecological connectivity in the western mountains of North America.

The predominant orientation of mountains and valleys in the southern Canadian Rockies provides natural north↔south movement conduits for wide-ranging carnivores. However, this natural connectivity is vulnerable to fracture by the Crowsnest Highway (Hwy 3) transportation and development corridor that runs mostly east↔west. Expanding human developments and activities — along the Crowsnest Highway but also throughout the region — pose a threat to maintaining the security and connectivity of habitats and populations across this landscape. The increasing extent and intensity of this network may fragment carnivore populations into smaller and more vulnerable units, reduce gene flow, and restrict options for ecological and geographic shifts in response to climate change.

To address this problem of habitat and population fragmentation, we conducted modeling and field research during 2001-2004 to provide critical information pertaining to the viability, security, and connectivity of carnivore populations across the southern Canadian Rockies.

In stage 1, we selected a suite of six carnivore species — grizzly bear, lynx, badger, bobcat, wolf, and wolverine — that represent a broad variety of ecological conditions. For each of these landscape species, we developed and applied regional models of distribution and vulnerability across the entire southern Canadian Rockies (30,000 km²). In stage 2, we used hair-snaring and DNA analysis to sample the actual distribution of two species (grizzly bear and lynx) within a zone (10-20 km wide) that paralleled and included the Crowsnest Highway. We collected these field data to assess and refine the regional models and to determine occurrence and general movements relative to the highway.

Our modeling projected rather high landscape suitability for grizzly bears in the mountains and higher foothills throughout much of our study region, both south and north of the Crowsnest Highway. Landscapes of high suitability include the following areas: (1) the lower Flathead basin (BC) and adjacent Castle drainage (AB), (2) east side of the Wigwam basin (BC), (3) the upper

reaches of the Flathead basin (BC) and adjacent Carbondale area (AB), (4) Michel Creek (BC) and adjacent Ptolemy Creek area (AB), (5) Alexander drainage (BC) and upper Oldman River basin (AB), (6) upper Elk River basin (BC) and adjacent upper Highwood River drainage (AB), (7) west side of the upper Elk River (BC), and (8) Lizard Range (BC).

Our model of landscape suitability for lynx projected a patchy distribution of highly suitable habitat along major ridge complexes and valleys at higher elevations. This patchy distribution indicates that the stability of the regional lynx population likely is dependent on the productivity, security, and connectivity of several key areas. Important landscapes include: (1) ridges east of Fernie and south of Sparwood and the upper Flathead River basin in British Columbia, (2) upper Elk River drainage and confluence of the upper branches of the White River in BC, and (3) a narrow band of habitat in Alberta just east of the Continental Divide extending from upper Racehorse Creek northward to upper Highwood River. In some areas, young conifer regeneration following natural fire or logging has provided suitable habitat at present for snowshoe hare and lynx. Habitats along the primary highways in the major valleys usually provide lower suitability.

Landscapes with potential to support badgers coincide with low elevations and relatively dry and open conditions. Our modeling suggested that the most extensive landscapes with high suitability for badgers occurs primarily in the dry, open grasslands of the Rocky Mountain Trench along Highway 93 in British Columbia and the Rocky Mountain foothills north and south of Lundbreck in Alberta.

Given that bobcats in this region currently are near the limit of their geographic range, their habitats coincide with low elevation forested landscapes associated with relatively dry and mild climatic conditions in winter. Distribution of bobcats tends to be somewhat peninsular in this region, occurring mostly along the flanks of the Rocky Mountain Trench parallel to Highway 93 in British Columbia as well as forested plains and foothills in Alberta.

The potential distribution of wolves coincides mostly with major valley networks throughout the region — specifically the grasslands and foothills flanking the east side of the Canadian Rockies in Alberta and the larger montane valleys in British Columbia such as the Elk, Flathead, Kootenay, and Columbia River valleys. However, the actual distribution of this species has undoubtedly been impacted by human efforts to reduce wolf numbers. Currently, the regional wolf population likely is dependent on the productivity and somewhat higher security of landscapes such as the Flathead River basin and the upper Elk Valley. Wolf research within the region supports the conclusion that major valleys parallel to the Continental Divide from Glacier National Park up to Banff National Park and associated passes along the Continental Divide are conduits for wolf movements. In particular, the Flathead River, upper Carbondale-Castle River, and upper Elk River valleys appear to be important areas for wolves.

Our model of landscape suitability for wolverines predicted rather high suitability in the mountains and higher foothills throughout much of the regional study area. Many of the areas of high suitability for grizzly bear also appear good for wolverines.

Not surprisingly, our modeling suggested that this suite of carnivores are most vulnerable where suitable landscapes occurred proximal to settlements, highways, and primary roads in the region that facilitate high-intensity recreation and motorized access. These include Hwy 3 (Crowsnest Highway), Hwy 43 (Elkford Highway), and Hwy 93 in British Columbia, and Hwy 3, Hwy 22 (Chain Lakes Highway), Road 940 (Forestry Trunk road) and Road 774 (Castle River road) in Alberta.

Through our summer field surveys in the vicinity of Crowsnest Pass, we detected 38 grizzly bears in 29 (81%) of the 36 grid cells (900 km² total size). Grizzly bears were common both north and south of the highway in terms of occupancy, occurrence, and relative density. We found grizzly bears concentrated in several areas. One area occurred south of the Crowsnest Highway near Crowsnest Pass itself and along both sides of the Continental Divide. Another concentration occurred north of the Crowsnest Highway and along either side of the Continental Divide in the upper reaches of Alexander Creek and the Oldman River. We detected one female and two males on both sides of the Crowsnest Highway and several others on both sides of the Continental Divide.

Within the same survey grid, we detected a minimum of seven lynx (6 males and 1 female) at 17 sites in 13 cells. North of the Crowsnest Highway, lynx detections clustered in upper Alexander Creek. South of the Highway, lynx were detected primarily west of Michel Creek. Although we did not detect any lynx individual on both sides of the highway, the Alexander-Michel Creek linkage appears to be a likely north↔south connector. For lynx, west↔east linkages across the Continental Divide are likely to include Racehorse Pass north of Crowsnest Highway and Tent Mountain and Ptolemy Passes south of the highway.

Within the lower Elk Valley grid, we detected 52 grizzly bears in 29 (73%) of the 40 cells during various survey sessions. We detected two males on both sides of the Crowsnest Highway. Grizzly bears were more common west of the Crowsnest Highway in terms of occupancy, occurrence, and relative density. We found grizzly bears to be concentrated in the ranges west of the Crowsnest Highway, including the Lizard Range between Elko and Fernie, the Island Lake and Iron Creek drainages west of Fernie, and the environs of Hartley Pass to the northeast. Although grizzly bear density abundance appeared to be lower east of the highway in the lower Elk Valley, we did detect several individuals within the Coal Creek and Morrissey Creek drainages east of Fernie.

On the same grid, we detected a minimum of seven lynx (4 males and 3 females) at 22 sites in nine cells. All of the lynx detected in this grid occurred in the upper drainages east of the Crowsnest Highway primarily between Sparwood and Fernie. This clumped distribution was consistent with predictions of our regional population distribution model. Although we detected no individual lynx on both sides of the Crowsnest Highway, optimal habitat did not occur directly adjacent to the highway in the valley, and major features such as highways often represent home range boundaries for lynx.

A review of scientific studies along other major highways in the region indicates that highways with high traffic volume strongly restrict carnivore

movements and have the potential to fragment populations. Grizzly bears are particularly vulnerable to these effects, with reproductive females being especially susceptible. Trains running on railroads that parallel major highways have been a major source of mortality. However, perhaps the greatest impact of highways is the cumulative human activity and spin-off development that they have facilitated over decades; current settlement and development patterns continue to proliferate along highways and associated access. These broader-scale impacts may well be the ultimate factor fracturing some carnivore populations. Through systematic sampling focused on the Crowsnest Highway, we confirmed that the highway and associated development has reduced the potential for movement by grizzly bears and perhaps lynx.

Two robust principles in conservation science are fundamental to a successful conservation strategy for carnivores, particularly in multiple-use landscapes such as the southern Canadian Rockies:

- safeguard against excessive mortality via a network of core areas of security with appropriate regulations, and
- maintain connectivity across the region with landscape linkages that connect core areas.

We identified and mapped 15 core areas in the southern Canadian Rockies and rated them in terms of conservation significance and current level of relative security with consideration for grizzly bear, lynx and wolverine. The following areas warrant special attention because they were rated as having *high to very high conservation significance* and *low to moderate levels of security* at present:

- Lower Flathead (BC),
- Michel (BC) – Ptolemy (AB),
- Upper Elk (BC) – Upper Highwood (AB), and
- Lizard Range – Hartley Pass (BC).

In addition, the West Elk – Upper Bull (BC) was rated as having high conservation significance, but security appears high at this time.

We identified and mapped 11 landscape linkages and movement corridors relative to the Crowsnest Highway and rated them in terms of conservation significance and level of vulnerability. We identified these connections based upon the modeling of key habitats for the focal species, empirical data from the hair-snagging surveys (grizzly bear and lynx), preliminary radio-tracking data (grizzly bear), and current mapping of existing human developments and activities. The following linkages warrant special attention because they were rated as having *high to very high conservation significance* and *moderate to high level of vulnerability*:

- Fernie to Morrissey
- Lizard Basin to Elk Valley
- Coal Creek to Elk Valley
- Mount Fernie slopes
- Hartley across Elk Valley
- Hosmer to Sparwood
- Michel Ck to Alexander Ck
- Crowsnest Municipality West

Several mountain passes provide crucial passage across the Continental Divide in the vicinity of Crowsnest Pass where connectivity across Highway 3 is quite limited: Ptolemy Pass, Tent Mountain Pass, Deadman Pass, and Racehorse Pass.

We urge land and resource managers, in concert with key stakeholders and the public, to implement the following recommendations toward conserving carnivores and other wildlife in the southern Canadian Rocky Mountains and ensuring that their populations are connected across the Crowsnest Highway.

- ✓ 1. Maintain a network of core areas with a high level of security through appropriate management practices. Important considerations include access management (implementing the Southern Rocky Mountain Access Management Plan), and avoiding excessive mortality through appropriate hunting and trapping regulations.
- ✓ 2. Develop a proactive conservation plan to provide connectivity across and around the Crowsnest Highway. This plan should consider assessment and planning of possible highway expansion, incentives for land-use covenants, and other practices.

In the context of expanding human population and developments and climate change, time is running out on these options.