

notes from *abroad*

HIGHWAYS AND WILDLIFE: HABITAT FRAGMENTATION AND COLLISION MORTALITY

Challenges and solutions in Banff National Park, Canada

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The die was cast for how humankind would utilize and travel through Canada's Rocky Mountain cordillera when the glaciers retreated 11,000 years ago. Glacially carved U-shaped valleys became critical travel routes for wildlife, and later, human explorers and settlers. Road and rail travel routes were pioneered and have had increasing use since the 1880s. In the 1970s, a conflict between modern travel expectations and resource management erupted in Banff National Park, Alberta, and has continued to this day. This conflict has caused Parks Canada to employ innovative measures for the protection of wildlife in Banff, Canada's first national park. Now a world heritage site, Banff remains rich in its original assemblage of Rocky Mountain wildlife (fig. 1).



Figure 1. The conflict between modern travel and animal migration caused Parks Canada to employ innovative measures for the safe passage of wildlife across parts of the Trans-Canada Highway, which transects Banff National Park. Banff is a world heritage site and retains its original assemblage of Rocky Mountain wildlife, including cougar, grizzly, coyote, and wolf. PARKS CANADA (4)

The problem

The Trans-Canada Highway, probably the most important highway in the nation, transects the Bow Valley of Banff National Park—a montane and subalpine environment important to the sustenance of 12 species of large mammals and myriad smaller species. By the 1970s the highway had become known as the “Meatmaker” because of the large number of wild animals, primarily elk, killed by vehicular traffic each year (fig 2). Safety concerns associated with increasing traffic volume, along with expectations for increased speed, demanded that the roadway be upgraded. Because of the need to protect the pristine habitat that the highway traversed, proponents of traditionally mutually exclusive goals began to work together to find engineering solutions that effectively integrated ecological considerations. Rather skeptical stakeholders conducted an unusually transparent forum for research, planning, and design. Planners strategized about how to meet extraordinary budget requirements to fund exceptional elements of nontraditional highway construction.

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Figure 2. Prior to the erection of highway fencing, the Trans-Canada Highway in Banff National Park was known as the “Meatmaker” because of the number of vehicle-wildlife collisions that occurred on the road. Elk were the primary victims in these accidents. GREG BELLAND

The project

Construction began in 1979 and continued in phases until 1997. To date, 28 miles (45 km) of highway have been “animal proofed,” involving 21 underpasses and 2 overpasses along with 8-foot- (2.4-m-) high fences (fig. 3, page 24). Some of the fences are combined with buried aprons to prevent animals from digging their way under. Construction also includes the use of cattle guards on secondary roads and pedestrian gates through the fences at frequently used locations. From the beginning of the project to 1997, Parks Canada spent about \$85 million (Canadian), with environmental budget components increasing from 16% of the original phase to 20% and 30% of subsequent phases.

Performance and research

Parks Canada was obliged to study the performance of the works and undertake remedial interventions as needed. In the time since the last phase was completed, track recording and instrumentation has documented more than 63,000 wildlife passages by animals coyote size or larger through the crossing structures (table 1, page 24); investigators have confirmed that all native species with

home ranges in the glacial valleys have made passages. Wildlife collisions on the fenced portion of the roadways have been dramatically reduced; for example, in the case of elk, collisions have decreased by 96%. Traffic flow and vehicle transit times have improved, and serious traffic accidents have declined. Research associated with the project has produced numerous MS and PhD degrees and dozens of technical articles. Planners, engineers, resource managers, and biologists from around the world have attended conferences and tours that focus on the project.



Table 1. Wildlife and human crossings of the Trans-Canada Highway between Banff National Park (east gate) and Castle Junction, November 1996–March 2005

Animal	Box culvert (4)	Elliptical culvert (6)	Open-span underpass (8)	Creek bridge (3)	Overpass (2)	Total
Black bear	81	200	467	60	35	843
Cougar	64	144	541	124	39	912
Coyote	667	846	2,723	422	227	4,885
Deer	324	3,960	11,855	975	5,077	22,191
Elk	506	2,854	21,885	999	1,241	27,485
Grizzly bear	5	10	112	6	72	205
Moose	0	2	22	2	32	58
Sheep	0	1	2,893	11	0	2,905
Wolf	85	370	2,795	212	115	3,577
Total	1,732	8,387	43,293	2,811	6,838	63,061
Human use	90	263	9,860	432	62	10,707

Source: Dr. Tony Clevenger for Parks Canada.



Figure 3. Banff National Park now has two multispecies overpasses that are part of a network of linkages designed to minimize the impacts of the Trans-Canada Highway on wildlife. Research has shown that human use of wildlife crossing structures has a greater impact on carnivore use than either placement or structural characteristics of the crossing. BRUCE LEESON, PARKS CANADA

We have learned a great deal about what works and what does not for this kind of project. These lessons are helping to guide future wildlife mitigation projects. For example, research has shown that human use of wildlife crossing structures has a greater impact on carnivore use than either placement or structural characteristics of the crossings, highlighting the importance of concurrent public education. When human use is not a factor, different species tend to prefer different types of structures. These preferences are in keeping with the natural history characteristics of particular species. For example, cougars and black bears tend to prefer darker, smaller crossings with vegetative cover at the access and egress, while ungulates and grizzly bears prefer bright, wide passages in open topography, allowing for long lines of sight. (Detailed research findings are discussed in the articles listed in the reference section.)

Projects of this type involve the integration of diverse scientific, engineering, legal, and political considerations and also may require effective partnerships, interjurisdictional cooperation, communication, and meaningful involvement of stakeholders and citizen advocates. However, the benefits are proven and extensive, and not restricted to the human travelers and wildlife on the roadway. New positive relationships have developed between traditional antagonists as many skeptics and critics have been converted to believers and supporters. In general, this initiative has helped raise awareness about ecology and transportation issues in other government departments and jurisdictions. A promising side benefit is the increased stewardship ethic that the project has engendered in visitors and nearby residents to the national park.

Current and future activities

The success of Parks Canada's initiative in Banff National Park has influenced planners and managers in other locations. Organizers of the 2002 G8 Summit held in Kananaskis—a protected wildland area adjacent to Banff—were so impressed with this stewardship accomplishment that the Canadian government established a legacy to construct similar wildlife connectivity works on provincial lands east of Banff. Here, the con-

struction of a wildlife bridge over a canal and an underpass at a primary wildlife corridor on the Trans-Canada Highway will address critical habitat linkages and factors affecting passage by wildlife (fig. 4).

With 4.5 million visitors and 5 million through-travelers annually in Banff National Park, Parks Canada is currently engaged in research and planning to extend this world-leading highway project another 20 miles (33 km). The environmental components for this latest phase comprise one-third of the budget and will involve construction of an additional 18 wildlife crossing structures and associated highway fencing. Parks Canada has budgeted \$50 million (Canadian) for the first 6 miles (10 km) of the project, with eight new wildlife crossing structures. Construction began in February 2005.

While the emphasis on integrating transportation and wildlife management addresses an acute problem, the efforts to preserve connected movement routes for wide-ranging mammal species also fit into a wider context in the Bow Valley and beyond. Provincial and municipal planners have been working with private developers on lands adjacent to Banff National Park for more than a decade to preserve wildlife corridors and educate the public about their stewardship responsibilities. On a

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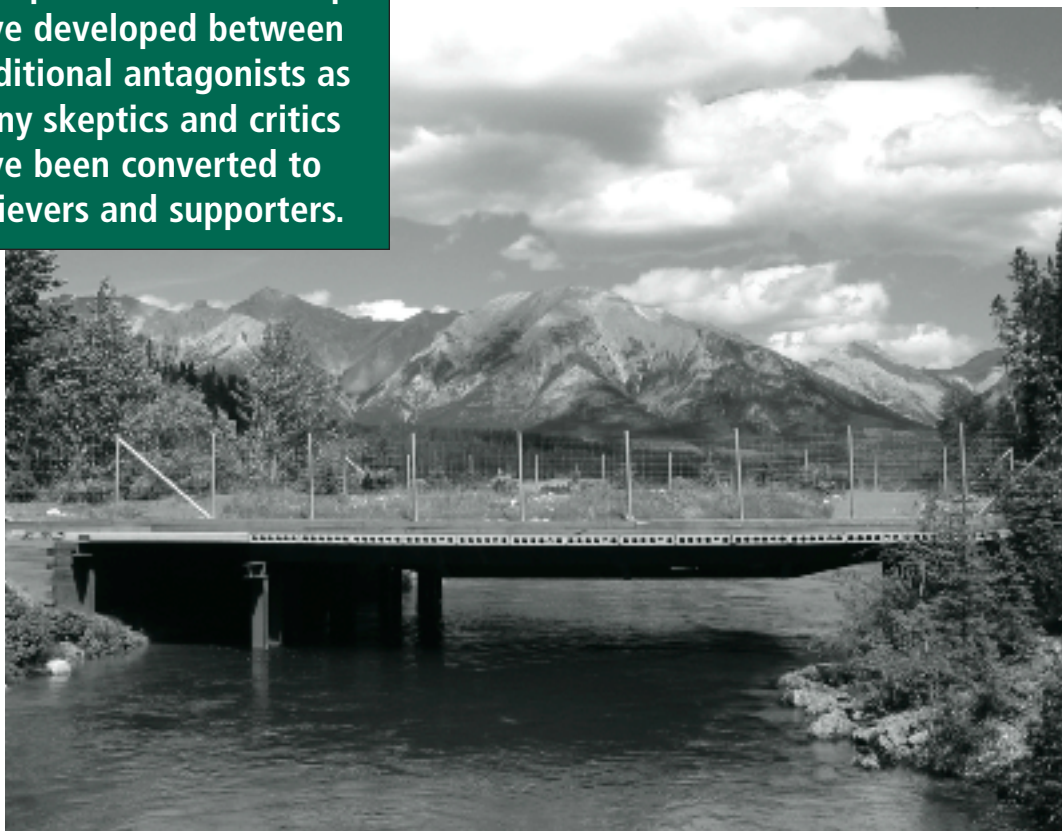


Figure 4. As part of the overall mitigation of restoring habitat continuity, Parks Canada constructed a wildlife bridge over a canal near Banff National Park. This particular bridge is a legacy of the G8 Summit held in Kananaskis, Alberta, in 2002. BRUCE LEESON, PARKS CANADA



broader scale, nonprofit groups like the Yellowstone Yukon Conservation Initiative are promoting the local establishment of such wildlife-movement corridors to connect core habitat areas along the entire length of the Rocky Mountain cordillera.

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