Planning Wildlife Crossings in Canada's Mountain Parks

ID95 SESSION: Highway Mitigation: new insights for practitioners

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Abstract

Canada's primary east-west transportation corridor intersects north-south wildlife corridors in national parks of the central Rocky Mountains. For the past 30 years in Banff National Park, Parks Canada has installed wildlife fencing and built over 40 large wildlife crossing structures while progressively upgrading the Trans-Canada Highway (TCH). Based on this success, we expect to continue westward on the TCH through Yoho National Park, and southwest on Highway 93 through Kootenay National Park. Planning is underway for both parks. In Yoho, new challenges include difficult terrain, co-alignment with the Canadian Pacific Railway, and the continental-scale need to facilitate crossings by mountain goats. In Kootenay, a small wildlife crossing project is underway without highway upgrades, and future phases are likely. In addition to the need to protect and provide connections for the full suite of carnivores and ungulates in Kootenay, three main planning considerations are a large but dispersed moose population, a concentrated roadside population of white-tailed deer, and the need to link three or four mountain ranges for seasonally migrating bighorn sheep. Future mitigation will strive to provide safe, efficient transportation while maintaining or enhancing ecological integrity. Knowledge gained by monitoring existing mitigation infrastructure continues to be incorporated into new projects.

Background

The Trans-Canada Highway (TCH) is Canada's main east-west transportation corridor. It bisects the Rocky Mountains of southern Canada, including Banff National Park, Alberta, and Yoho National Park, British Columbia (Figure 1). In doing so, the TCH intersects the continental north-south flow of animals, wildlife populations and gene pools. When plans for upgrading the TCH from two to four lanes ("twinning") through the mountain parks began in the 1970s, wildlife-

vehicle collisions were already common. For example, an average of 117 elk and deer were killed annually on the TCH in Banff from 1977 to 1980 (Woods 1980). With obvious concerns about the effect of a twinned highway on human safety and animal populations, and a Parks Canada mandate that includes both ecological integrity and visitor experience, mitigation was needed. Highway upgrades began in 1981, with the first wildlife-exclusion fencing and wildlife underpasses completed in 1983. Twinning and mitigation have proceeded generally westward through Banff since then.

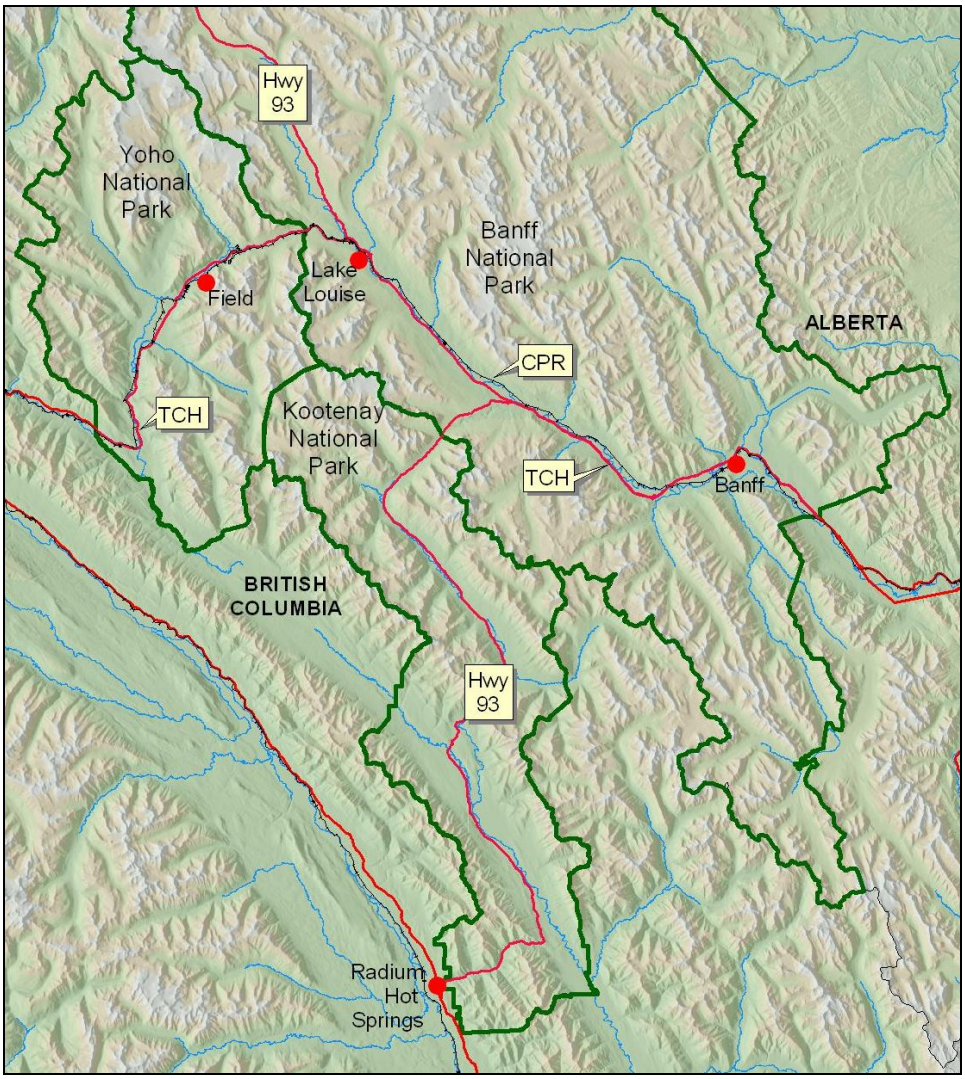

Figure 1. Trans-Canada Highway, Highway 93 and Canadian Pacific Railway in Yoho, Banff and Kootenay National Parks.

Various levels of monitoring have been undertaken since the first underpasses were completed (Ford et al. 2010), including by Parks Canada staff, graduate students, consultants and, most recently, through a government-academic-foundations contribution agreement. Construction

methods have been adjusted based on earlier monitoring. For example, fences now include a buried chainlink apron to prevent carnivores from digging under and a cable on top to reduce the impact of falling trees. Parks Canada is now deploying electric mats on a trial basis where side roads intersect the fence, in response to carnivores breaching cattleguards to enter the TCH roadway. The desire to improve the passage of carnivores across the TCH (Ford et al. 2010) led to North America's first wildlife overpasses in 1996. By the end of 2013 there will be six wildlife overpasses and nearly 40 wildlife underpasses across 82 km of highway in Banff, in addition to many smaller culverts that aid the movement of fish or small mammals.

With upgrades at completion on the TCH through Banff, Parks Canada is planning wildlife mitigation westward on the TCH through Yoho National Park and southwest on Highway 93 through Kootenay National Park. Small projects are expected in both parks in 2013. This paper describes longer-term wildlife mitigation planning approaches for the entire highway extent in Yoho and the south half of Highway 93 in Kootenay.

Yoho National Park

Yoho includes about 46 km of the TCH (Figure 1) through the Kicking Horse River valley. From 2003 through 2012, an average of 28 medium to large mammals was confirmed killed annually through wildlife-vehicle collisions. There are assumed to have been many more that died out of sight of the highway, were removed by scavengers, or were juveniles lost as a result of their mothers' deaths. Twinning has now been completed to both the east and west boundaries of Yoho, so it is expected to continue through the park over the short to medium term. In fact, twinning, fencing and one underpass are expected to extend up to a kilometre into the park from the existing project in Banff during 2013.

Conditions beside the TCH in Yoho offer challenges to wildlife mitigation not apparent in the broad Bow River valley of Banff. The route through Yoho includes the Upper Canyon of the Kicking Horse, the Field Hill (which drops 300 m in 5 km), several kilometres of rock cuts, many kilometres where the road is only a few metres above the water table, and the run-out zone of several avalanche paths. These features, the general proximity of the highway to streams or lakes, and the presence of several roads or human-activity nodes beside the TCH limit underpass and overpass siting options for much of the park. The highway also passes over the Canadian Pacific Railway (CPR) tracks at four points. About 12 km of the current two-lane road is within 80 m of the railway tracks and some portions are separated by less than 20 m. That separation will decrease as the highway is widened to four lanes. This further limits options for locating crossing structures and fencing. If structures are built immediately beside the tracks, the railway might act as a deterrent to animal passage, and in extreme cases such proximity

might increase the risk of train-wildlife collisions. Furthermore, where the railway and highway are very close, the fence alignment will be constrained by the need for a safe zone adjacent to the highway, the legal boundary of the CPR right of way, and damage to fencing from material thrown by highway and railway snowploughs. Combining the above constraints with the need to link major patches of wildlife habitat in tributary valleys makes the task of planning overpasses and underpasses much more complex than simply identifying preferred crossing points at regular intervals.

Another unique feature of Yoho is that its steep terrain and narrow valleys are conducive to cross-valley movement by mountain goats. The broad, forested Bow valley in Banff is unlikely to facilitate movements of goat populations and genes across the TCH and onward through the Rockies. In contrast, there are at least three locations in Yoho where goats are regularly active immediately beside the TCH where steep terrain is adjacent to both sides of the highway. A preliminary assessment (Poole 2012) has suggested the value of establishing crossing opportunities at some or all of these points to benefit goats and other species.

Crossing structures in Yoho will ideally be located to optimize links across the TCH within patches of lower-elevation forest and also the unique habitat features required by mountain goats. In doing so, plans will work around more physical and land-ownership constraints than were present in Banff. In particular, Parks Canada will need to work closely with CPR regarding locations and types of overpasses or underpasses and fencing. There may even be opportunities to consider one or more continuous passages across both the TCH and CPR, either as extended overpasses or a combination of overpasses for the highway and at-grade crossings for the railway.

Kootenay National Park

Southwest of the TCH, Highway 93 passes through 10 km of Banff and 93 km of Kootenay (Figure 1). In contrast to Yoho, there are no plans to twin Highway 93 in the short to medium term, so there is neither an obvious starting point for wildlife mitigation nor a construction project with which to associate funding. However, with an average of 53 larger mammals confirmed killed annually on the highway in Kootenay over the past decade, mitigation is a priority (Parks Canada 2010a). Under contract to Parks Canada, the Western Transportation Institute (WTI) of Montana State University developed a conceptual long-range plan to fence and install crossing structures on 62 km of the highway (Huijser et al. 2008). Based on that, $4.88M was approved under the federal Action on the Ground Program, mainly to fence at least 3 km and install at least one animal underpass. This work is planned for 2013, in the Kootenay River valley about 70 km southwest of the TCH. That location was selected because it has the highest wildlife-

vehicle collision rate in the park and has few physical constraints – the terrain is generally level, is high enough above the water table to permit underpasses, and has no exposed bedrock.

Longer-range planning of wildlife mitigation for the southern half of Highway 93 in Kootenay is now underway, based on the WTI report. This area has much less difficult terrain overall than in Yoho, no railway, and few major human-use nodes. The main limitations are shallow groundwater or steep hillsides in some locations outside the 2013 project area, but in general these can be avoided with careful site planning. There are three main protection and connectivity needs throughout the broader planning area of southern Kootenay National Park. From spring through late fall several hundred white-tailed deer inhabit the Kootenay River valley. These animals are disproportionately concentrated on the roadside, probably because much of the landscape has matured to closed forest, about 20 m of cleared area on each side of the pavement provides abundant forage with early green-up, roadside salt is available, and the highway runs through the highest capability deer habitat. Whitetails account for about 60% of known wildlife-vehicle collisions in the park. Limiting those collisions and ensuring ongoing seasonal and daily movements of deer makes fencing and wildlife underpasses an important goal.

Rocky Mountain bighorn sheep are also seasonal residents of the park, and move between four mountain ranges bisected by Highway 93. They are commonly killed by vehicles at the south end of the park or just outside it. The ability to fence the southernmost extent of Highway 93 within the park is limited by canyon walls, a creek and existing infrastructure but sheep would benefit from fencing slightly farther north, in the upper Sinclair Creek valley. Preliminary planning prioritizes known sheep valley-crossing points for overpasses and underpasses.

Targeting moose collision hot spots may be more challenging. Moose occur year-round throughout the park but are most abundant in the northern half. Over the past decade an average of seven moose has been confirmed killed in the park annually. Given the size of moose, this represents a notable risk to motorists and impact to the ecosystem. The 2008 WTI report recommended fencing several discontinuous portions of Highway 93 in the northern part of the park, covering the sites of many of the past moose-vehicle collisions. However, the distribution and numbers of moose may be changing due to the effects of a 166 km^2 fire in 2003 which enhanced habitat, and a large wolf population that preys upon moose. Moose are likely to be further affected by loss of habitat as the burn matures. In addition to considering the full suite of ungulates and carnivores along Highway 93 in Kootenay and southern Banff, future wildlife mitigation will need to balance priorities between large, well-defined, persistent and abundant population of white-tailed deer that poses a lesser risk to motorists per collision, and a

small, geographically and numerically less stable population of moose that is concentrated farther north and poses a considerably greater risk per collision.

Summary

The management plans for Yoho and Kootenay national parks indicate the importance of reducing wildlife-vehicle collisions and maintaining landscape-level connections while ensuring efficient transportation (Parks Canada 2010a, 2010b). Based on the success of fencing and wildlife passages on the TCH in Banff National Park, mitigation associated with highway upgrades in the short to medium term in Yoho should achieve those goals. Doing so will require overcoming limitations posed by terrain, co-alignment with a railway, and the need to facilitate goat movement across the highway. In Kootenay, mitigation is likely to proceed more slowly after a small project is completed in 2013. Bighorn sheep and whitetailed deer are obvious targets for mitigation infrastructure. Ongoing observations of the persistence and predictability of moose populations may also play a role in prioritizing fencing and crossing structure locations in Kootenay.

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