



CASCADE ENVIRONMENTAL RESOURCE GROUP

DRAFT

July 28, 1999

Panorama Mountain Village
Panorama, B.C.
VOA 1T0

Attention: Paul Stashick

Re: Wildlife Overview for Toby Creek - DRAFT

File #: Panorama 0140112

This report is intended to provide an overview of wildlife use in the Toby Creek watershed around Panorama Mountain Village (hereafter referred to as Toby Creek valley). Primary research for this document was conducted by Linda Dupuis, M.Sc., R.P.Bio. with review and editorial provided by Mike Nelson, R.P.Bio. and Dave Williamson, B.E.S. The information is based on (1) a reconnaissance survey carried out by Cascade Environmental Resource Group (CERG) in April of 1999; (2) data and/or maps from government agencies, various studies conducted by GeoAlpine Environmental Consulting Ltd. (now part of CERG) since 1995; and (3) conversations with local biologists, outfitters and government representatives.

Introduction

Toby Creek flows from the Purcell Mountains to the Columbia Mountain Trench. The Purcell Wilderness Conservancy occupies a significant portion of the Toby Creek headwaters in the Purcell Mountains. The Conservancy affords good summer range habitat for ungulate species as well as a significant species pool of mid-sized and large mammals. Real estate development and hunting are forbidden within the Conservancy. The lower reaches of Toby Creek are located within the Rocky Mountain Trench, through which the Columbia River flows. The Trench provides good deer and elk winter range. The Trench also contains innumerable wetlands for waterfowl, passerines, amphibians and several aquatic or riparian-dependent mammal species, and it is a critical wildlife corridor, linking populations from the South Kootenays to Canal Flats.

Toby Creek provides a direct linear link between the Conservancy and the Trench making it a significant route for seasonal, altitudinal migrators. The Toby Creek valley includes a number of important attributes that add to its value as a habitat corridor. The presence of a mineral lick enhances the value of the Toby Creek valley as a dispersal corridor for elk and deer species. In addition, the Toby Creek valley contains a number of avalanche

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paths to the west and northwest. Avalanche paths contain abundant native grasses, forbs and shrubs, providing ample foraging opportunities for wildlife. The Toby Creek valley also contains a variety of plant communities ranging from old forests of Douglas-fir, dense young stands of lodgepole pine, upland and valley bottom wetlands, lakes, and alpine meadows (Ministry of Forests, 1998).

Panorama Mountain Village, established in the 1970's, is 18 kilometres from Invermere on the Toby Creek Road leading to Jumbo Pass. The 3076 ha land base available for resort/recreation development extends from Toby Creek to the heights of Panorama Mountain (2500 m), Mount Goldie and Pica Peak (a.k.a. the Panorama Mountain Village Plan Area). As part of the Ski Area Agreement with the Province of British Columbia, Panorama Resort earned development rights in exchange for developing lift and ski resort infrastructure. The resort has recently undergone a revitalization process since it was purchased by Intrawest. It now consists of an 18-hole golf course (Grey Wolf), nine lifts which access more than 80 ski runs, recreational trails, and a variety of tourist accommodations.

Within the overall land base approximately 237 ha are designated for base area developments. In existence or proposed are: single family residential, townhome, multi-family and hotels. These development rights are reflected in the new Official Community Plan (OCP) which is currently in the approval process.

The purpose of this project is to assess the effect of Panorama Mountain Village on wildlife use and movement patterns while recognizing that Panorama Mountain Village will continue to execute its development agreement with the Province of British Columbia. Upon completion of this study Cascade Environmental Resource Group will provide a set of recommendations which will assist the resort in successfully coexisting with wildlife in the Toby Creek valley as it continues to develop in accordance with its OCP.

WILDLIFE OVERVIEW

Information for this wildlife overview was gathered from (1) CERG (including GeoAlpine Environmental Consulting Ltd.) field studies; (2) government agencies; (3) scientific reports; and (4) local biologists and outfitters. This report focuses on large and mid-sized wildlife species (carnivores and herbivores) because they require large areas for survival, and are thus most susceptible to development. Further, the overview deals with animals occurring, or expected to occur within the Panorama Village Mountain Plan Area. This overview does not specifically address wolverine and smaller mustelids at this time because little information about their use or presence within the Toby Creek valley was found during our initial research. With the exception of rare and endangered species,

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Subject: **Panorama Wildlife Overview**

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small wildlife species (e.g., rodents and insectivores) are also not discussed. They would likely only be subject to minor displacement from areas of hard disturbance.

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CERVIDS

General Information

The following discussion deals with each of the locally resident ungulate species. In general, it is felt that ungulate populations occupying the Toby Creek valley are healthy.

Rocky Mountain elk (*Cervus canadensis nelsoni*) over-winter in the Columbia Valley at roughly 1000 metres in elevation (Holmes, pers. com.). The large burn on the west side of Windermere Lake in particular, represents prime winter habitat for the species (Burk, pers. com.). Similarly, the Toby Benches near Lillian Lake appear to be an important staging area as they undertake their spring migration to the alpine meadows of the Purcells (Kinley, pers. com.). Rutting occurs at high elevation, prior to the species fall migration to the Columbia Valley. Conversely, calving occurs during the spring's upward migration, in the Hopeful and Barbour watersheds. In order to access the Hopeful and Barbour watersheds the elk must pass by (or through) Panorama Mountain Village on their way up the Toby Creek valley. The local elk population, unlike national park populations, is considered shy and it is commonly believed that elk travel along the south facing slopes of the Toby Creek valley near Panorama Mountain Village (Holmes, pers. com.; Rad, pers. com.). In support of this, game trails are wider (more trodden) on the north side of the valley (Scott Barsby, pers. com.) While conducting investigations for the River Bend and Springs Creek projects field crews found extensive evidence of movement and foraging activity (browsed shrubs, stripped aspens) on the south facing slopes across from the resort (CERG, 1999).

The extensive wetlands along the Columbia River are an important over-wintering area for the whitetail deer (*Odocoileus virginianus ochrourus*) and the mule deer (*Odocoileus hemionus hemionus*). Similarly, the Toby Benches may be valuable foraging grounds during migration (Kinley, pers. com.). In the summer, whitetail deer frequent shrubby areas on moderately flat terrain, such as the benchlands west of Jumbo Pass (Holmes, pers. com.). The mule deer is more dispersed. It forages in the avalanche paths distributed throughout the Toby Creek watershed (Holmes, pers. com.). Both deer species travel along Toby Creek, past Panorama Mountain Village to reach their summer rangelands. As with elk, mule deer calve in the Hopeful and Barbour drainages.

Unlike deer and elk, moose summer and winter in Toby Creek valley because they are more adapted to deep snow conditions. Their main habitat appears to be the wetland at the base of Barbour Creek, on the outer loops of Panorama Mountain Village's cross-country ski trails. Based on a preliminary survey, moose appear to forage along the riparian zone of Toby Creek's tributaries during winter months (CERG, 1999). Wetlands are critical summer habitat for moose, as they do not tolerate heat. Moose have even been known to use one of the Grey Wolf golf course ponds. They have also been sighted

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on the sidehills of Hopeful and Taynton drainages (GeoAlpine 1998, 1999). Wetlands and seepage areas are also critical during the spring calving season and summer months.

Mountain caribou (*Rangifer tarandus montanus*) overwinter in old-growth forests. The caribou population at Duncan Lake occasionally spills into the upper Toby Creek valley. Transient caribou are unlikely to wander into the mid- and lower Toby Creek valley (including the vicinity of Panorama Mountain Village) which is largely characterized by old burns and manifested in dense lodgepole pine forests. The availability of shrubs in the young and mature lodgepole pine forests is not of sufficient quality or quantity to support the species (Kinley, pers. com.).

Potential Impacts and Management Recommendations

The Toby Creek valley is a relatively narrow travel corridor and migratory wildlife may be affected by development in the valley bottom if it blocks or impedes migration. An effort should be made to protect dispersal routes with priority placed on preservation of routes in more pristine areas.

The Hopeful watershed is considered a traditional calving ground for the elk and mule (Holmes, pers. com.). Lately, the elk and mule deer have been observed calving in the Barbour drainage, and in clearings of upper Hopeful Creek valley such as "Sunbowl" (Scott Barsby, pers. com.). In order to protect the Sunbowl herd, hiking, mountain biking, and guiding activities should be curtailed during vulnerable months (May and June). By prohibiting use of the trails that pass within 200 m of calving areas during the vulnerable months it is possible to greatly reduce disturbance and facilitate habituation of ungulates (Frid, 1997, and Cederna and Lovari, 1985). Protection of the Barbour drainage and wetland should also ensure the future co-existence of moose, deer and elk populations with Panorama Mountain Village. Moose would also benefit during winter months from preservation of riparian buffers along the other Toby Creek tributaries.

BOVIDS

General Information

The mountain goat (*Oreamnos americanus*) inhabits rough terrain, at altitudes at or above timberline. It generally forages in alpine meadows within reach of cliffs and broken rock, which serve as escape terrain (McTaggart Cowan and Guiget, 1978). Although goats are distributed throughout the height of land of the Toby Creek drainage basin, densities are largest in the Upper Brewer and Ben Abel drainages (Kinley, pers. com.). This population appears to have suffered more significant declines than populations elsewhere in the East Kootenays. The reasons for this decline are not presently known, however, human disturbance may be a factor (Kinley, pers. com.). Disturbance has energetic costs to the

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animals, such as increased heart rate and overt antipredator behaviour (escape to cliffs leads to increased energy expenditure and reduced foraging efficiency). Other costs of disturbance are mother-young separation, which leads to increased kid mortality, and group splintering, which renders the smaller subgroups more vulnerable to predation and antipredator behaviour (Frid, 1997).

Potential Impacts and Management Recommendations

Trails should be properly planned to avoid areas of known goat concentrations, and their use enforced. There is evidence suggesting that goats will habituate to trail use, if trails are at least 200 m from summer mineral licks and kidding cliffs (MacArthur et al. 1982). Goats adopt anti-predator behaviour even if a single person approaches them from an unpredictable location. The use of aircraft at the height of land within the Panorama Mountain Village Plan Area should be discouraged until locations of goat use are more clearly defined.

CANIDS

General Information

Wolves (*Canis lupus*) are regular residents in the Toby Creek valley (Scott Barsby), feeding on deer, moose, caribou and mountain sheep (McTaggart Cowan and Guiget, 1978). Since wolves secure their prey by running them down, they require open habitats as exemplified by the open stands on the south-facing slopes of Toby Creek.

Coyotes are abundant throughout British Columbia. In Panorama Mountain Village, tracks were noted along all existing roads, and on Toby Creek gravel bars (CERG, 1999). The coyote is very tolerant of human disturbance and is unlikely to be affected by Panorama Mountain Village activities and development.

Potential Impacts and Management Recommendations

Wolves give humans wide berth and their elusive behaviour implies that developed areas are avoided and of little effect. Protection of the north slopes for ungulate movement will also afford the wolf some protection.

Coyotes rely heavily on roads and areas of compacted snow above the Toby Benches, thereby encroaching on lynx habitat. Roads should be minimized in densely forested areas, particularly on steep slopes.

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FELIDS

General Information

The cougar (*Felis concolor missoulensis*) frequents the ranges of large ungulates, principally those of deer (McTaggart Cowan and Guiget, 1978). It is the most abundant predator in the Toby Creek valley (Scott Barsby, pers. com.) which reflects the healthy status of local ungulate populations. Cougars den in rocky areas with an abundance of overhead and horizontal cover for security (Apps, pers. com.). They range widely through a variety of habitats and require dense stalking cover during hunting forays. Cougars avoid thinned stands.

Although the bobcat (*Lynx rufus*) travels widely in the summer, it is restricted to the lower portions of Columbia Valley tributaries in winter. It has an elevation limit of roughly 1200-m in the Toby watershed (Kinley, pers. com.). The bobcat is thus associated with the Interior Douglas-fir biogeoclimatic zone and the lower fringes of the montane spruce zone (Apps, 1996). The Douglas-fir stands must be multi-layered and structurally diverse, to provide the species with good stalking cover; bobcats rely heavily on red squirrels (Apps, 1996). Regular bobcat sightings on the Toby Bench suggest the presence of a traditional movement pathway within an animal's home range. Bobcats have been detected at Panorama Mountain Village in the snow-free season (Wrazej, pers. com.), but the Toby Benches, down valley from Panorama Mountain Village, represent the species' upper winter limit.

Numerous sightings of lynx (*Rufus canadensis*) (e.g., Holmes, pers. com.; Wrazej, pers. com.; Kinley, pers. com.) and of lynx tracks (CERG, 1999) indicate that the species are a resident in the Panorama area. As with all wild cats, the lynx relies heavily on forests with dense overhead and understory cover for stalking and security. Denning habitat consists of blow down areas high up on steep slopes. Foraging occurs in dense young stands of all terrain types within the species elevational range limit (1200 to 3,000+ m; see Apps et al. 1999). The lynx is well adapted to living in deep snow and its winter range occurs within a limited elevation band that generally precludes it from bobcat wintering habitat (the two species may overlap somewhat on the Toby Benches). In the East Kootenays the lynx is an opportunistic feeder, although the snowshoe hare (*Lepus americanus*) comprises roughly 50% of its diet (Apps, pers. com.). Hares are common in young, dense lodgepole pine stands. For example, CERG (1999) found hares to be very abundant in the young stands found immediately west of the Springs Creek confluence with Toby Creek, as well as in all densely vegetated draws north of Toby Creek road (especially on the old Springs debris fan). The regular distribution of hare pellets within sub-optimal habitats (open stands) suggests that hare populations are at a, or near a peak. According to fur-bearer statistics (Ministry of Environment, 1999a), lynx populations do not appear to have recovered from their 1996 low in Management Unit 4-26 of the East Kootenays.

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Populations may be on the rise given the hare population peaks, although the closely tied hare-lynx population cycles typical of boreal forests may not be pronounced here (Apps, pers. com.).

Potential impacts and Management Recommendations

The occurrence of lynx in Panorama is significant because the lynx population in the East Kootenays has a patchy distribution; the species is wide-ranging but it does not occur in unsuitable landscapes (Apps, pers. com.). Because the animals are relatively fragile, radio-collaring them to determine the whereabouts of their den is not feasible (Apps, pers. com.). Therefore management of lynx, should concentrate on protection and avoidance of habitat. Prior to thinning and spacing of gentle and moderate slopes trail planners and builders should consider the potential impacts to this species. Thinning on steep, densely forested slopes should be minimized.

Deep snow habitats are ideal for lynx as they preclude potential competitors. The development of roads gives coyotes an artificial advantage enabling them to access lynx habitat, to the detriment of lynx populations. Road development and snow compaction, which allow the coyote to persist, should be minimized within densely forested stands. Trails should be carefully planned to accommodate lynx and cougar needs, by maintaining large forested slopes. Dogs should be kept on a leash if they are permitted on trails.

URSIDS

General Information

The Purcell Mountains represent important habitat for the grizzly bear (*Ursus arctos horribilis*) population. During a 2000 km² tracking and DNA study of grizzlies in the headwaters of Toby Creek, Proctor (pers. com.) noted that densities were highest in the area encompassing Mineral, Coppercrown, Hamil and South Toby creeks. Proctor (pers. com.) obtained an unbound population estimate of 45 animals for the study area. This represents a significant number of bears when one considers the 1982 estimate of 100 grizzly bears in all of Management Unit 4-26 (Ministry of Environment, 1999b). Based on DNA analyses grizzlies are wide-ranging and it is likely that parent-offspring relationships exist between the south and north sides of Toby Creek valley.

In the vicinity of Panorama Mountain Village, grizzlies are present in the Taynton watershed (GeoAlpine, 1998; Kinley, pers. com.) likely because of the abundance of grouse berry (*Vaccinium scoparium*) (Kinley, pers. com.). Local outfitter Scott Barsby encountered grizzlies in upper Taynton in late fall, which suggests the possibility of a denning site in these headwaters. Grizzlies have also been encountered in the Springs Creek watershed (Proctor, pers. com.), and young grizzlies were sighted on the west

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outskirts of the Grey Wolf Golf Course (S, Barsby, pers. com.). Grizzly bears are not generally attracted to the low-lying areas of Panorama Mountain Village because fires in the lower Toby Creek area have eliminated any dense shrub (foraging) habitat likely to attract them. The presence of young bears at Hopeful, and the results of the DNA analyses in upper Toby, suggests that juveniles occasionally wander through the area in search of breeding territories. Grizzlies are also known to descend into the Trench during the summer to feed on Kokanee (Holmes, pers. com.). Kokanee do not occur upstream of the Toby Creek canyon.

The American black bear (*Ursus americanus*) population is relatively high in the area (Ministry of Environment, 1999b; Holmes, pers.com.; Proctor, pers. com.). Sows and cubs have been sighted in large numbers in the Hopeful watershed (Scott Barsby, pers. com.), and in the Barbour drainage (Rad, pers. com.). There is also some evidence of black bear foraging forays along the north slopes, across from Panorama (CERG, 1999).

Potential Impacts and Management Recommendations

Although some grizzlies may have been displaced as a result of development, well-planned recreation trails in high elevation areas such as the Taynton Creek and Hopeful Creek headwaters may prevent further disruption, particularly if their use is curtailed during the breeding season.

Bear-proof containers throughout Panorama Village can ensure that the wild black bear population does not habituate to humans.

RARE AND ENDANGERED WILDLIFE

The red-listed least chipmunk (*Eutamias minimus selkirki*) occurs in the headwaters of Springs Creek (Conservation Data Centre, 1999). The species occurrence at lower elevations is unknown and should not be discounted (Panian, pers. com.). Chipmunks generally co-exist with humans and development of sites like Springs Creek should not be expected to adversely impact the populations. However, collection of chipmunk specimens would be necessary to determine if the species observed on the Springs Creek fan are least chipmunks and to delineate the isolated population's range and distribution.

The blue-listed badger (Conservation Data Centre, 1997) has been recorded in the Invermere area (McTaggart Cowan and Guiget, 1978). It may wander through the Panorama area, but there are no local breeding records for the species (Holmes, pers. com.). Similarly, the blue-listed wolverine (Conservation Data Centre, 1997) may pass through the subject area (CERG, 1999) but this secretive animal occupies a large home

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range and breeds at or near treeline. Panorama Mountain Village activities and developments are not likely to influence these blue-listed, wide-ranging animals.

The blue-listed rubber boa (Conservation Data Centre, 1997) seeks moist forests, and may occur on the Springs Creek fan. Although the tailed frog (*Ascaphus truei*) is not documented in this region of the province, Springs Creek represents suitable breeding habitat for it (an unconfirmed record exists as far north as Kimberley)(Friis, pers. com.). Herpetological surveys carried out during the summer months would help to determine the presence or absence of these species. Preservation of riparian buffers would permit such species to exist within the Panorama Mountain Village regardless of development outside the buffers.

The red-listed northern leopard frog (*Rana pipiens*) (Conservation Data Centre, 1997) may occur in the Barbour wetlands based on one unconfirmed 1997 sighting. A spring survey for calling males and egg masses merits consideration as part of a stewardship program. This species is declining throughout Canada and the U.S. largely as a result of habitat fragmentation. Population viability is dependent on the metapopulation dynamics arising from the dispersal of juveniles (Seburn et al., 1997). The low level of development in the Barbour area suggests that Panorama Mountain Village has no influence on this species.

SUMMARY

In addition to being of economic import, the healthy deer and elk populations are keystone species in the Toby watershed, supporting a large and diverse predator base. Ungulates may be the most affected by Panorama Mountain Village development because of their migratory needs. It is critical that elk and deer species, along with their natural predators, have clear passage from their valley bottom winter ranges to their summer grounds in the Purcells. Given the extent of Panorama Mountain Village's development on the south side of Toby Creek, the northern slopes may represent an important dispersal route in the long-term. Individuals also cross to the south side of Toby Creek across from the golf course, to reach their calving grounds in the Hopeful and Barbour watersheds. The importance of this Toby Creek crossing should be investigated in order for adequate wildlife management plans to be incorporated into any future development. In the interim, Panorama Mountain Village should avoid the establishment of additional crossings at Toby Creek. It is understood that a valley trail bridge is planned that will double as a fire protection bridge. Siting of this bridge should consider wildlife migration. By protecting the ungulates' migration routes, mineral licks, and known calving grounds and kidding areas, Panorama Mountain Village can successfully accommodate tourists and provide them with ample wildlife opportunities.

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Carnivores by nature do not densely populate their habitat. Although it is not feasible to quantify the effects of Panorama Mountain Village development on these wide-ranging animals, some basic measures can be taken to ensure their co-existence with Panorama Mountain Village. Providing them with an alternative means of dispersal may be achieved by protecting the north slopes across from Panorama Village, as well as Toby Creek Crossing. Aside from the development of a parking lot, campground and affordable housing site, the Official Community Plan (OCP) limits development on the north side of the Toby Creek valley. Maintaining riparian zones along Toby Creek's tributaries, and protecting mature forests with dense deciduous understories, may also help these more elusive animals to move securely. Riparian zones are particularly valuable because they are highly productive and structurally complex habitats, which house a disproportionately high diversity of plants and animals (Bunnell and Dupuis, 1995). Lastly, minimizing the thinning of young stands may benefit the lynx, whose presence in the area may be significant.

In conclusion, ecological research and thoughtful planning can help to maintain the integrity of ecosystems. Enabling wildlife and recreationists to co-exist in Toby Creek valley can ultimately increase the values of the Panorama Mountain Village.

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MEMORANDUM

DATE: Friday August 10, 2000
TO: Gary Tipper, MoELP
CC: Chris Hartman, Intrawest
Brad Brush, Panorama Mountain Village
Ed Opal, BCAL
Peter Christensen
FROM: Dave Williamson, Principal
Catherine Conroy, B.Sc.
Linda Dupius, M.Sc., R.P.Bio.
RE: Wildlife Management Plan Discussion Paper
FILE #: 014-01-13

1.0 Introduction

This Discussion Paper was produced for the purposes of the August 14, 2000 Round Table Meeting.

In recent years the concept of maintaining biodiversity has received considerable attention, particularly in the Rocky Mountains (see Conservation Biology, Volume 10[4], 1996). In particular, there is a concern that resort development may effect migratory movements of wildlife from the Purcell Mountains to the Columbia River basin, through the narrow Toby valley. Isolation and constriction of natural communities can reduce species richness and abundance (Soule, 1987). Cascade Environmental Resource Group Ltd. (CERG) was retained by Panorama Mountain Village to complete a landscape-level wildlife management plan for the resort in accordance with direction from and pursuant to Terms of Reference established by MoELP.

The first phase of the management plan consisted of an overview of current background information. This phase was completed in draft form July 28, 1999, by Linda Dupuis, R.P.Bio. and CERG Principal Dave Williamson, B.E.S. A copy of the report was submitted to MELP on July 29, 1999. The second phase of the project involved field surveys to document current abundance and distribution patterns of wide-ranging wildlife species. The experimental design for this research component was developed by Linda Dupuis under the supervision of CERG principals Dave Williamson and Mike Nelson, R.P.Bio. Data acquisition occurred in the fall (October 1999), winter (February 2000), and spring (June 2000) to encompass the seasonal nature of wildlife movement.

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Progress reports were submitted to MELP following each field season. Ungulate surveys were carried out by Linda Dupuis, Sharleen Hamm, Dipl., Tech., Craig Kelly, Peter Christensen, and Mike Neto, Dipl. Tech. Winter tracking of predators was conducted by Dave Williamson and Craig Kelly. Data compilation and analysis was conducted by Linda Dupuis with assistance from Kirsty Bennett, M.Sc. Summary reports were completed by Linda Dupuis, and reviewed by Dave Williamson and Mike Nelson.

2.0 Background Information

Toby Creek flows from the Purcell Mountains to the Columbia River, in the Rocky Mountain Trench. The Purcell Wilderness Conservancy occupies a significant portion of the Toby Creek headwaters. The Conservancy affords good summer range habitat for ungulate species and likely represents a significant species pool for wide-ranging predators because hunting and real estate development are forbidden in the area. Biodiversity in the Rocky Mountain Trench, which encompasses the lower reaches of Toby Creek, is similarly high. The Trench provides good deer and elk winter range, is dotted with wetlands rich in aquatic and riparian-associated wildlife, and serves as a significant wildlife corridor linking populations from the South Kootenays to Canal Flats. Toby Creek provides a link between the Purcell Wilderness Conservancy and the Columbia River valley, making it a significant route for altitudinal migrators. Toby Creek valley contains a number of important wildlife attributes that add to its value as a habitat corridor, including mineral licks, a very high diversity of plant communities, and innumerable avalanche paths that provide ample foraging opportunities.

Panorama Mountain Village, established in the 1970's, is 18 kilometres from Invermere on the Toby Creek Road leading to Jumbo Pass. The 3,076 ha land base available for resort/recreation development extends from Toby Creek to the heights of Panorama Mountain (2500 m), Mount Goldie and Pica Peak (a.k.a. Panorama Mountain Village Plan Area). As part of the Ski Area Agreement with the Province of British Columbia, Panorama Resort earned development rights in exchange for developing lift and ski resort infrastructure. The resort was purchased by Intrawest in 1993 and has undergone a revitalization process. It now consists of an 18-hole golf course (Grey Wolf), nine lifts that access more than 80 ski runs, recreational trails, and a variety of tourist accommodations.

Within the overall land base, approximately 237 ha are designated for base area developments. In existence or proposed are: single and multifamily residents, townhomes, and hotels. These development rights are reflected in the Official Community Plan (OCP) and the RDEK zoning bylaw, which received regional and provincial government approval.

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3.0 Methodology

3.1 Preliminary Wildlife Assessment

Information for the wildlife overview was gathered from (1) CERG (including GeoAlpine Environmental Consulting Ltd.) field studies (GEC 1998, 1999); (2) government agencies; (3) scientific reports; and (4) local biologists and outfitters. The focus was on large mammals expected to occur within the Panorama Mountain Village Plan Area, because they require extensive tracts of wildlands for survival and are thus more susceptible to the impacts of development (Clark et al., 1996). The overview is referred to in this document as CERG (1999b).

3.2 Experimental Design/Study Area

Field surveys for the acquisition of current ungulate and predator distribution data were conducted from October 1999 to June 2000 in compliance with the MELP correspondence of August 11, 1999 and October 18, 1999, and in accordance with the approved work schedule submitted to Panorama Mountain Village on September 24, 1999. In order to make the management plan applicable regionally, study sites were chosen within the resort area and to the east and west of it (hereafter referred to as Toby Creek valley). Eight sites were chosen for the purpose of this study: East Taynton Creek (site 1), West Jackpine Creek (site 2), Panorama Village/Elkhorn cabin (site 3), West Springs Creek (site 4), West Hopeful Creek (site 5), East Clearwater Creek (site 6), East Barbour Creek (site 7), and West Delphine (site 8). These sites were paired to allow for north/south wildlife comparisons in the vicinity of the resort, and beyond it (Map 1).

Within each site, there were three study plots, which corresponded to the valley bottom (1200-1300m), mid-slopes (1400-1500m), and upper slopes (1600-1700 m) of Toby Valley. These plots allowed for comparisons to be made between valley bottom and high elevation habitat use. Each plot was comprised of fifty 10-m transects, laid out in a systematically random fashion within a roughly 100 x 400 m grid. The optimal transect number for pellet-group surveys was calculated a-priori (see White and Eberhardt, 1980) using preliminary data (CERG, 1999a). The distances between transects varied from 10 to 60 m.

3.3 Toby Creek Valley Description

During the experimental lay-out phase, baseline information was gathered for Toby Creek valley. Characteristics of interest included the general topography of the valley,

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overall gradient of each sub-basin (study area), extent (km) of existing resort development along the valley bottom, location of other significant land uses, and percentage of thermal/hiding cover on the north and south slopes. The latter was determined by selecting representative 20 x 20 m quadrats within each plot, and assessing the percentage of cover from ground level to a height of 2.5 m, against a vertical stack bar subdivided into 25 cm bars. The percent obscured for each bar was recorded from the four cardinal directions and averaged out for general comparison. This vertical cover method was modified from the Bow Valley wildlife corridor and habitat patch guidelines (Bow Corridor Ecosystem Advisory Group, 1998) to suit the economic constraints of the study.

3.4 Ungulate Surveys

During October 1999 and June 2000, deer, moose and elk pellet groups were tabulated along each transect. Differences in ungulate distribution were then tested using a model developed by White and Eberhardt (1980) that looks specifically at pellet-group means and dispersion (degree of aggregation). Differences in pellet group abundance among sites and elevations were tested using the General Linear Models Procedure for rank data (SAS, 1988). A multiple range test (Ryan-Einot-Gabriel-Welsch [REGWQ]) for rank data was then employed to group the sites based on pellet counts (SAS, 1988). Other wildlife evidence such as tree scarring, digs, scats, scrapes and tracks was also noted.

3.5 Predator Surveys

During February 2000, four 100-m slope-contouring transects were surveyed within the 100x400 m grids established in the fall of 1999. The transects were searched for evidence of winter tracks and scats, by means of backcountry skis. Detailed measurements of all tracks were made, including the animal's print size, straddle and stride. Given the variability of an individual's movements and of imprint clarity, a minimum of five measurements were taken where possible, for the purpose of identification. Scat width, length and content were also noted. Information on predators was merged with fall 1999 and spring 2000 wildlife sign data to gain a more accurate picture of their distribution and abundance in Toby Valley.

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4.0 Results and Discussion

4.1 General Description of Toby Creek Valley

Toby Creek runs through a narrow valley, with no significant wildlife 'hiding' features such as benches and ravines which alleviate disturbances from human activities in the proximity of the resort. The north slope of Toby Creek valley is much steeper than the south slope (Table 1). Most tributaries to Toby Creek are incised thereby providing good riparian refuge.

Table 1. The overall slope gradient in the vicinity of Panorama Village

Location	Site No.	Overall Gradient (%)
<u>South Slope</u>		
Taynton	1	28
Panorama	3	22
Hopeful	5	36
Barbour	7	31
<u>North Slope</u>		
Jackpine	2	34
Springs	4	48
Clearwater	6	46
Delphine	8	53

Panorama Mountain Village occurs on the more moderate terrain of the south slope, for a distance of approximately three kilometres. Road-building and forest harvesting by Small Business (Ministry of Forest) is currently taking place in the lower Barbour watershed. Toby Creek Adventures (owned by Lyle Barsby) has a horse ranch along the Toby Creek, near Clearwater Creek. There is also an outfitting operation (owned by Scott Barsby) on the low/midslopes of Jackpine, which is a source of year-round vehicular traffic.

4.2 Vegetation Characteristics

The north and south slopes of Toby Creek valley are comprised of the Montane Spruce (Msdk) biogeoclimatic zone at lower elevations, and the Englemann Spruce/Sub-alpine Fir (ESSFdk) zone at higher elevations. There is also a small section of Interior Douglas Fir (IDF) in the valley bottom, along the lower portions of the Springs and Jackpine sub-basins (refer to local biogeoclimatic zone map, MOF).

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Structurally, the habitat on both sides of Toby Creek represents a mosaic of open forest and dense pole-sapling stands. The open lodgepole pine forest generally has 1200 to 2800 stems/ha, a canopy cover of less than 30%, and is dominated by forbs. Conversely, the dense conifer stands have up to 8,000 stems/ha, a canopy cover of greater than 30%, and a scant or patchy understory and forb layer. Dense forest stands were more common on the south side of the valley, although many of the young coniferous stands within the Panorama and Hopeful sites have been transformed into ski runs and a golf course, and are now comprised of grass and/or shrub clearings. Mature, open stands, bluffs and scree slopes were more common on the north side. The dense stems of the young conifer forests generally provide good vertical vegetation cover (Table 2). The open stands vary in vertical cover availability, depending on how extensive the shrub understory is (Table 2). Cover in these open stands is a function of season, stand age, nutrient and moisture regimes.

Table 2. Range of fall vertical vegetation cover; south and north slopes of Toby Creek valley

Veg Ht (m)	Dense forest			Open forest		
	Sample 1	2	3	1	2	3
2.5	64	33	65	13	34	68
2.25	59	29	50	11	28	65
2.0	64	26	50	11	27	64
1.75	61	25	46	14	28	70
1.5	64	23	43	10	20	65
1.25	66	26	40	20	19	75
1.0	70	26	45	21	21	73
0.75	61	28	30	18	23	55
0.5	56	30	38	18	16	51
0.25	48	29	43	20	24	42

Although the plant assemblage is similar on the north and south slopes, Douglas fir is more dominant and reaches a greater age on the south-facing slopes. Forbs associated with these open stands are more extensive on the south-facing slopes, accordingly (although forbs are extensive on the ski hill). The greatest diversity and abundance of plants is found within avalanche paths, seepages and riparian zones. Riparian zones and seepages are equally distributed on both sides of the Toby Creek, but avalanche paths are more common on the steeper, north slope (see Table 1). In summary, foraging opportunities are found on both slopes of the Toby Creek valley but are more abundant on the north side in sub-basins containing avalanche paths.

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4.3 Cervid Distribution (Ungulates)

A total of 1200 transects were established within the three elevation zones of the eight selected study sites. Ungulate pellet groups were readily encountered along the 10-m transects particularly during the fall surveys (Table 3). For example, deer pellets were found along 20% of the transects in October 1999, and 12% of the cleaned transects the following spring. Similarly, moose pellet groups were found along 14% and 5% of transects, in the fall and spring respectively. The mean numbers of pellet groups encountered seem to be fairly representative for the Toby Creek valley study area: the confidence interval, as expressed as a percentage of the mean, was roughly 30% for all species and surveys. That is, much of the natural variability in pellet group distribution was captured in this data set.

Fecal pellets vary in their decomposition rates according to moisture regime, which in turn is governed by aspect, habitat type and topography (Harestad and Bunnell, 1987). The pellets encountered in the fall did range in visibility and content, which suggests that they represented scats from several previous seasons. Thus, the fall pellet group surveys were more indicative of overall, annual animal distribution and abundance whereas the spring surveys reflected strictly spring activity. As deer, moose and elk pellet group abundance and distribution varied significantly between the two surveys, results are presented separately.

4.3.1 Elk

Rocky Mountain elk (*Cervus canadensis nelsoni*) over-winter in the Columbia Valley at roughly 1000 metres in elevation (CERG, 1999b). In particular, the large burn on the west side of the Trench south of Lake Windermere represents prime winter habitat for the species. Similarly, the Toby Benches near Lake Lillian appear to be an important staging area as the elk undertake their spring migration to the alpine meadows of the Purcells (CERG, 1999b). Rutting occurs at high elevation, prior to the species fall migration to the Columbia Valley. Conversely, calving is thought to occur at lower elevations on the way up to the Purcells, namely in the Hopeful and Barbour watersheds (CERG, 1999b).

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Table 3. Ungulate pellet group counts in Toby Creek valley

					Spring 2000		
Site	Elevation	Deer	1999 Elk	Moose	Deer	Elk	Moose
<u>Down Valley from Panorama Mountain Village</u>							
Taynton (Site 1)	Valley Bottom	7	2	8	10	0	1
	Midslope	22	7	21	14	2	5
	Upperslope	28	6	9	9	0	3
Jackpine (Site 2)	Valley Bottom	31	3	15	12	0	2
	Midslope	snow	snow	snow	0	0	1
	Upperslope	snow	snow	snow	8	0	6
<u>In the Vicinity of Panorama Mountain Village</u>							
Panorama (Site 3)	Valley Bottom	31	0	3	3	0	0
	Midslope	0	3	2	2	0	1
	Upperslope	3	6	0	20	3	0
Springs (Site 4)	Valley Bottom	23	0	3	9	0	0
	Midslope	19	5	4	8	0	0
	Upperslope	28	5	24	17	0	7
Hopeful (Site 5)	Valley Bottom	13	7	5	12	0	0
	Midslope	7	4	12	12	0	3
	Upperslope	5	13	6	12	0	0
Clearwater (Site 6)	Valley Bottom	20	2	2	5	0	1
	Midslope	2	4	13	3	0	1
	Upperslope	2	7	28	10	0	10
<u>Up valley of Panorama Mountain Village</u>							
Barbour (Site 7)	Valley Bottom	8	8	7	0	0	5
	Midslope	0	5	16	1	1	12
	Upperslope	4	2	11	2	0	2
Delphine (Site 8)	Valley Bottom	14	7	4	9	1	0
	Midslope	22	8	13	7	0	1
	Upperslope	7	11	7	3	0	1

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Elk sign was present but scarce in all the sub-basins within and surrounding Panorama Mountain Village. In 1999, the species appeared to occur primarily in the Delphine and Hopeful watersheds; pellet groups were least abundant in the Panorama study area and directly across from the village in Springs Creek. Elk sign was found at all elevations, although 58% of pellet groups were encountered above 1600 m in the vicinity of the resort area (Panorama, Hopeful). 32% of the pellet groups occurred up-valley of the resort (Barbour and Delphine watersheds). This preference for higher elevations in the vicinity of Panorama Mountain Village lends support to the suggestion that the local elk near Panorama are shy compared to the national park populations in Jasper and Banff (CERG, 1999b). Elk do not appear to favour south-facing slopes in the vicinity of the resort during their seasonal migrations, as was suggested by some locals. Elk sign was equally distributed on both sides of Toby Creek during the field surveys: there was a mean of 0.11 ± 0.03 pellet groups/transect on both north and south slopes in 1999.

4.3.2 Deer

The extensive wetlands along the Columbia River are an important over-wintering area for whitetail (*Odocoileus virginianus ochrourus*) and mule deer (*Odocoileus hemionus hemionus*). In the summer, whitetail deer frequent shrubby areas on moderately flat terrain whereas mule deer are more dispersed and forage in the avalanche paths distributed throughout the Toby Creek watershed (CERG, 1999b). Both species travel along Toby Creek, past Panorama Mountain Village, to reach their summer rangelands. Local outfitters and biologists believe that mule deer birthing grounds are in the Hopeful and Barbour drainages.

Deer sign was significantly more common on the north side of the valley (mean = 0.36 ± 0.07) than on the south side (mean = 0.20 ± 0.05) in 1999 (Pelanal; $p=0.0002$), but no difference in aspect preference was observed during the spring of 2000 (Pelanal; $p=0.8711$). This suggests that the north-facing slopes may be favoured during some seasons, and/or favored by non-migrators. Both the 1999 and 2000 survey data illustrate that deer distribution is governed less by slope aspect and more by the habitat characteristics and existing land uses (Table 3) that are present in the Toby Creek valley. Indeed, the abundance of deer pellet groups varied significantly among sites in the fall (Anova; $p=0.0001$) and spring (Anova; $p = 0.0001$), and with elevation within each study site (Nested Anova: $p=0.0001$ for both seasons). For example, although deer sign was virtually absent from the midslopes of the Panorama study site (Table 3), 91% of the pellet groups were encountered in upper Panorama in the spring of 2000 and 80% of the pellet groups were found in lower Panorama in 1999. This seasonal variation in the use of lower and upper slope habitats was also observed in the Clearwater drainage, and may relate to snow conditions. Deer sign was relatively scarce in the Hopeful watershed in 1999 (survey period in which pellets from several previous seasons were recorded) compared to the spring of 2000.

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4.3.3 Moose

Unlike deer and elk, moose (*Alces alces*) summer and winter in Toby Creek valley because they are better adapted for deeper snow conditions. Their main habitat appears to be the Barbour wetland (CERG, 1999b). Wetlands are essential habitat for moose during the spring, when they calve, and in the summer because they do not tolerate heat well. Moose have even been observed using the Grey Wolf golf course ponds during summer months (CERG, 1999b). According to the Ministry of Environment's ungulate capability map for Toby valley, moose forage along the riparian zone of Toby Creek's tributaries, particularly during winter months.

Moose pellet group distribution showed a similar pattern to that of deer in 1999 (Table 3). Habitat use patterns were similar on both sides of the valley but moose population means differed significantly (Pelanal; $p = 0.0045$): moose were more common on the north side (mean = 0.22 ± 0.05) than the south (mean = 0.13 ± 0.04). However, there was no difference in the mean number of pellet groups between north and south slopes in the spring of 2000 (Pelanal; $p=0.3$). As with deer, the abundance and elevational distribution of moose pellets is site-specific (Anova: $p=0.0001$ in 1999 and 2000). In 1999, moose pellet groups were primarily found at upper elevations on the north slope tributaries, and mid elevations on the south slopes. In the spring of 2000, moose were most frequent in mid Barbour and upper Clearwater. This abundance of moose sign in Taynton, Clearwater, upper Springs and mid Barbour during both surveys confirms the information provided on the MELP capability map for Toby valley. The high density of moose pellet groups in mid Barbour during the spring lends support to the local outfitters and biologists' observation that the Barbour wetland is a critical feature for the local moose population.

5.0 Predator Distribution

A tally of predator and bear sign in the Toby Creek study area is presented in Table 4. Fifty percent of the more elusive, mid and large-sized predators' sign ($n=36$) occurred beyond (west of) the resort compared to 10% within the Panorama and Hopeful Creek areas. Small predators and bears were common throughout Toby Creek valley.

5.1 Felids (cats)

There was some sign of cats in all watersheds (Table 4); 50% of the sightings were found at upper elevations compared to 11% in the valley bottom. Cougars (*Felis concolor missoulensis*) are supposedly common in the Toby Creek valley (CERG, 1999b) and they frequent the ranges of large ungulates, principally those of deer (McTaggart Cowan and Guiget, 1978). Some of the cat sign evidenced in the Taynton,

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Clearwater, Delphine, Springs, Jackpine and Hopeful sub-basins, where deer densities were high, could be attributed to cougars. The innumerable scrapes and tracks in upper Springs suggest that a cat or pair of cats resides there. The steep and bluffly terrain of the upper Springs drainage corresponds to the den requirements of cougars.

There have been numerous sightings of lynx (*Rufus canadensis*) and lynx tracks in the resort area, suggesting that the species is a resident in the Panorama area (CERG, 1999b). The lynx dens in blowdown areas, high up on steep, inaccessible slopes. A resident in the resort area would thus inhabit the headwaters of Hopeful and/or Taynton Creek. In the East Kootenays, lynx are opportunistic feeders, although the snowshoe hare (*Lepus americanus*) comprises roughly 50% of its diet (CERG, 1999b). Hares were extremely abundant throughout the Toby Creek watershed during the survey period. Thus, lynx sign could be encountered anywhere, particularly in the heavily forested stands that provide cats with stalking cover and security. Although tracking conditions were not ideal during the winter survey period, the majority of the observed cat tracks appeared to be those of lynx.

5.2 Canids (dogs)

Wolves (*Canis lupus*) are regular residents in the Toby Creek valley (CERG, 1999b). In support of this, evidence of wolf packs was found in the Barbour and Clearwater watershed during the fall, winter and spring surveys. Tracks on a horse trail in the upper Taynton may have been those of a wolf, or of a large dog. Sixty-two percent of wolf sign was encountered at upper elevations compared to 0% in the valley bottom (Table 4). The species occurrence up valley of the resort, and at high elevations, may mean that wolves avoid human activity. Wolves prey on deer, moose, caribou and mountain sheep (McTaggart Cowan and Guiget, 1978). The data suggest that wolf populations in the Toby Creek study area may prey primarily on moose populations, at least in the spring.

Conversely, 50% of the coyote (*Canis latrans*) tracks and scats were found in the valley bottom, and 40% of the coyote sign was within the Panorama and Hopeful Creek study areas (Table 4). These data confirm the fact that the coyote is very tolerant of human disturbances and activities. That 23% of the coyote tracks were found at upper elevations in the Panorama and Hopeful study areas compared to 3% everywhere else lends support to the theory that coyotes rely on roads and areas of compacted snow for movement (CERG, 1999b).

5.3 Mustelids (Weasels)

Fishers (*Martes pennanti*) and wolverines (*Gulo luscus*) are wide-ranging predators. Sign of their presence was found near Barbour Creek and in the headwaters of Springs and Jackpine Creeks. The wolverine frequents coniferous forests and talus slopes and

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often ranges into sub-alpine areas whereas the fisher inhabits mixed forests and is seldom found above treeline (McTaggart Cowan and Guiget, 1978).

The smaller mustelids inhabiting Toby Creek valley include the mink (*Mustela vison*), marten (*Martes americana*), long-tailed weasel (*Mustela frenata*) and short-tailed weasel (*Mustela erminea*). Martens are by far the most common small predator in the area. Although the species was present in all the Toby Creek tributaries, marten tracks were two to three times more abundant in the Taynton watershed than elsewhere. Small mustelids occupy small territories. For example, martens occupy home ranges of up to 25 km² (McTaggart Cowan and Guiget, 1978). These species likely suffer more minor displacements than wide-ranging species in the event of hard disturbance and will not be considered in the overall wildlife management plan for Toby Creek valley.

5.4 Ursids (Bears)

Although the grizzly bear (*Ursus arctos*) is occasionally seen within the Toby Creek study area (e.g., upper Taynton, Hopeful, upper Springs), the species is not generally attracted to this low-lying area because fires have eliminated any dense shrub habitat likely to attract them during their foraging forays (CERG, 1999b). For this reason, and because differentiating between grizzly and black bear scats is unreliable, all bear sign encountered during the 1999 and 2000 surveys was reported as black bear sign.

The American black bear (*Ursus americanus*) population is said to be relatively high in the Panorama area (CERG, 1999b) and this is supported by the regular presence of ripped logs, scarred trees, digs, and scats in Panorama Village and all the sub-basins of the Toby Creek study area. Bear sign was noticeably more prevalent in the Barbour drainage than elsewhere during the spring of 2000. In the fall of 1999, the Barbour and Springs watersheds had the most bear sign, followed by the Hopeful drainage. These data are consistent with observations made by local people (CERG 1999b). As suggested in the preliminary overview (CERG 1999b), Barbour Creek appears to be particularly important bear habitat.

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Table 4. Wildlife evidence in the vicinity of Panorama Mountain Village during 1999 and 2000

Species	Taynton	Jackpine	Panorama	Springs	Hopeful	Clearwater	Barbour	Delphine
<u>Mid/Large Predators</u>								
Coyote	3VB*		2VB, 3U	2 VB, 1M	2VB, 6M	5VB, 2M, 1U	1VB,1M	2VB,3M
Wolf						2M, 5U	3M, 3U	
Cat	2U	2U	1M	1VB, 2M, 2U	2M, 1U	1M, 1U	1M, 1U	1M
Wolverine				1M, 1U				
Fisher		2U					1M	
Unidentified		1VB	2M, 2U	1VB, 1M, 1U		3U	1VB, 1M, 8U	1M
<u>Small Predators</u>								
Mustelids (marten, mink, short & long-tailed weasels)	7VB, 9M, 11U	5VB, 2M, 1U	4VB, 2M, 2U	7VB, 4M, 3U	5VB, 2M, 4U	5VB, 4M, 4U	3VB, 5M, 6U	7VB, 4U
Bears	4VB, 4M, 3U	1VB, 4M, 6U	5VB, 1M	8VB, 5M, 4U	9VB, 2M, 1	2VB, 2M, 4U	1VB, 11M, 10U	1VB, 1M, 1U

*VB = valley bottom; M = mid slope; U=upper slope

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6.0 Rare and Endangered Species

The blue-listed wolverine (*Gulo luscus*) and yellow badger (*Taxidea taxus*) are wide-ranging animals that may move through the Toby Creek watershed, particularly along the upper elevations. Although resort activities are unlikely to influence these species, they would benefit from a management plan protecting the higher reaches of Toby Valley. So would the red-listed least chipmunk (*Eutamias minimus selkirki*), which occurs in the headwaters of Springs Creek (CERG, 1999b).

7.0 Summary

Ungulate abundance in Toby Creek valley varies from one sub-basin to the next, regardless of aspect. Similarly, elevation is significant but site-specific. Based on pellet group counts, ungulate numbers appear to be governed by ecological parameters, human land use patterns and seasonality. Table 5 summarizes the relative importance of each study site for deer and moose, based on statistical analyses of data gathered through the course of a year.

Although there is a similar distribution of plant communities and predator/thermal cover on both north and south sides of the valley, the resort has a greater proportion of exposed habitats as a result of the ski runs and golf course. Land use may explain why ungulates are generally absent from the mid Panorama and lower Hopeful areas (Map 1). Similarly, trees between Hopeful and Barbour Creeks were recently felled and chipped and the Ministry of Forest undertook road construction in the Lower Barbour during the winter/spring of 2000. This could affect wildlife distribution in the vicinity of the Barbour wetland. Thirdly, the local outfitter's year-round use of motorized vehicles may influence the distribution of resident and migratory species at mid elevation in the Jackpine area. The steep terrain in the mid and upper Delphine likely accounts for the low rates of wildlife sign encounters in this drainage (Map 2). Lastly, the presence of the Toby Creek Adventures ranch near the Clearwater confluence with Toby Creek, may contribute to the relatively low numbers of ungulates observed in the lower reaches of this sub-basin.

The more elusive species, wolf, cougar, lynx, wolverine and fisher, were primarily found up valley from the resort (50%; n=36) and were uncommon within the village, ski hill and golf course complex (10%). Moreover, these species were more likely to be encountered at higher elevations. These data illustrate that the more elusive species generally avoided the developed areas as was suggested in the wildlife overview (CERG, 1999b). It is commonly known that large carnivores numbers tend to be low in settled areas (Clark et al., 1996).

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Table 5. Relative value of Panorama Mountain Village and nearby sub-basins, to ungulates (as determined by REGWQ test).

Species	Value	1999	Spring 2000	Overall
Deer	High	Lower Jackpine Lower Panorama Upper Springs Upper Taynton	Lower Jackpine Upper Panorama Upper Springs Mid Taynton	Lower Jackpine Upper Springs Mid/Upper Taynton
	Mod.	Lower & Mid Springs Mid Taynton Mid Delphine Lower & Upper Clearwater Upper Hopeful	Upper Hopeful Upper Clearwater Lower & Upper Taynton Lower & Mid Delphine	Upper Hopeful Upper Clearwater Mid Delphine Lower & Mid Springs
	Low	Upper & Mid Panorama Upper & Mid Barbour	Lower & Mid Springs Upper Jackpine Lower & Mid Clearwater Upper Delphine Lower & Mid Panorama Barbour (all elevations) Mid Jackpine	Mid Panorama Barbour (all elevations)
Moose	High	Upper Clearwater Upper Springs Mid Taynton	Mid Barbour Upper Clearwater	Upper Clearwater Mid Barbour Upper Springs Mid Taynton
	Mod.	Mid & Upper Barbour Lower Jackpine Mid Clearwater Mid Delphine Mid Hopeful	Upper Jackpine Upper Springs Lower Barbour Mid Taynton	Jackpine (missing data)
	Low	Lower Clearwater Mid & Upper Panorama Upper Hopeful	Lower & Upper Panorama Lower & Mid Springs Lower & Upper Hopeful Lower Jackpine Lower Delphine	Panorama (all elev.) Upper Hopeful

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The Barbour watershed appears to be the most valuable watershed in the vicinity of Panorama Mountain Village because of its seemingly high large predator, bear and moose occupancy (Map 2). Other 'hotspots' include the mid/upper Springs Creek and upper Clearwater Creek areas. These drainages harbour large predators and bears, and had frequent, year-round sign of deer and moose (Map 2). Although large predator sign was not abundant in the Taynton watershed, deer, moose and mustelids appear to be common here. Hopeful Creek also appears to be important to ungulates and bears, depending on the season.

8.0 Management Guidelines

- ◇ A regional habitat patch should be established on either side of Toby Creek. The Barbour Creek and Springs Creek watersheds have high wildlife values and protecting them could meet the food, rest and/or breeding requirements of many grazers and predators. Protecting the Springs Creek headwaters on the north side of Toby Creek would also afford some protection to the red-listed least chipmunk, and to large mustelids.
- ◇ Wildlife corridors can be provided by linking the two recommended habitat patches and the valuable moose and deer sites listed in Table 5. Corridors in the vicinity of the resort would facilitate the seasonal movements of deer and elk from the Purcell Mountains to the Columbia Basin. These linkages would also provide cover for the local moose population during individuals' movements among the tributaries.
- ◇ A primary corridor should be situated on the north slope across from the resort to protect moose winter ranges, large predator home ranges, and important foraging areas for deer and elk such as avalanche chutes and the Interior Douglas Fir (IDF) section between the Jackpine and Springs Creeks confluences with Toby Creek. There is little development on this side of the valley. An ideal corridor is wide and linear with few cul-de-sacs or doglegs that could trap, disorient and lead animals into conflicts with humans. The valley is narrow and steep and there are no topographic 'hiding' refuges on the north side, across from the resort. Predator sightings and winter ranges occur primarily at upper elevations. A corridor beyond the minimum 1-km width is recommended (see Bow Corridor Ecosystem Advisory Group, 1998).
- ◇ A narrower corridor should be established at upper elevations on the south side of Toby Creek to accommodate the movement of moose, elk and deer between the upper Taynton area, the Hopeful headwaters and the Barbour watershed. A

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secondary wildlife corridor such as this one can contain landscape disturbances of a low impact nature, such as trails, lifts and ancillary buildings.

- ◇ Road building at mid and upper elevations on both sides of the valley should be minimized because roads artificially expand the altitudinal range of the coyote at the expense of the lynx population.
- ◇ Riparian zones conforming to the Development Guidelines for the Protection of Aquatic Habitat (Chilibeck, 1993) should be maintained along the tributaries to Toby Creek as these productive areas are invaluable to the majority of wildlife (Bunnell and Dupuis, 1995).
- ◇ Specific details regarding size and delineation of the proposed corridors and habitat patches within the subject area will be provided in the management plan to follow.

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Memo To: Gary Tipper, MoELP
Subject: Wildlife Management Plan Discussion Paper
Prepared for the Purposes of the August 14, 2000 Round Table Meeting



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02/12/01

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MAP 1 - WILDLIFE SAMPLING LOCATIONS

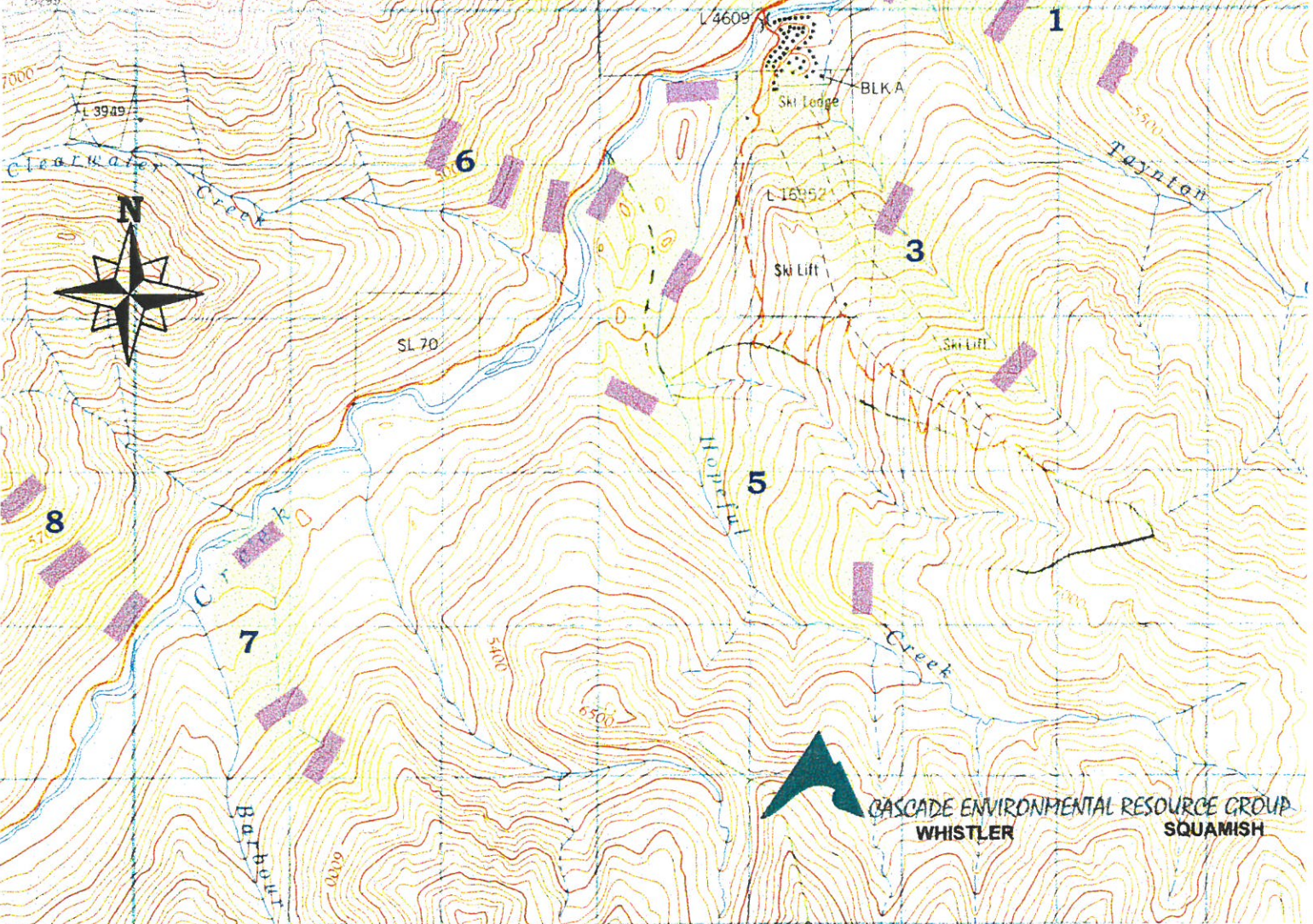
LEGEND

- | | | |
|------|---|------------|
| Site | 1 | Taynton |
| | 2 | Jackpine |
| | 3 | Panorama |
| | 4 | Springs |
| | 5 | Hopeful |
| | 6 | Clearwater |
| | 7 | Barbour |
| | 8 | Delphine |

Plot

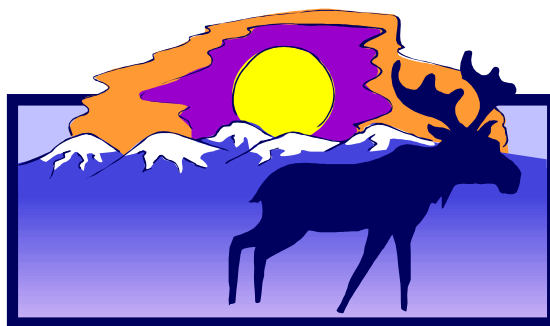
Scale 1:50000

NTS Mapsheet 82 K/8



Panorama Mountain Village

Wildlife Management Plan Summary Report



Produced for:

Panorama Mountain Village
Panorama, B.C. V0A 1T0



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March 2001

Panorama Mountain Village



Wildlife Management Plan

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Panorama Wildlife Management Plan Summary Report

March 9, 2001

1.0 Background

Cascade Environmental Resource Group Ltd. (CERG) was retained by Panorama Mountain Village (PMV) to complete a landscape-level wildlife management plan for the resort. The first phase of the wildlife management plan, an overview of current background information was completed in draft form on July 28, 1999 and a copy was provided to MoELP at that time. The second phase of the project involved field studies, which took place during 1999 and 2000 in accordance with Terms of Reference approved by Ministry of Environment, Lands and Parks. This third phase represents the synthesis of this information into a wildlife management plan for PMV and the surrounding area. The purpose of this project is to provide a habitat management plan that will enable wildlife in the Toby Creek Valley to successfully co-exist with PMV as it develops 7084 bed units, and related resort improvements in accordance with the government approved OCP and its supporting documents.

2.0 Introduction

Connectivity of landscapes and habitat is an essential element of biodiversity (Paquet et al. 1994). Conservation theory suggests that establishing and protecting landscape linkages between remaining patches of habitat will prevent or forestall future losses of species within an area. The length of time that a population can persist in a fragmented landscape increases when remaining habitat are connected with appropriate linkages i.e. corridors. These concepts are the biological basis behind the document "Wildlife Corridor and Habitat Patch Guidelines for the Bow Valley" (Bow River Ecosystem Advisory Group 1998) which forms the framework for PMV's wildlife patch and corridor guidelines.

As with the Bow Valley Corridor model, PMV's wildlife management plan is adaptive. Participation of interested parties in corridor and patch configuration and location is voluntary, and takes into account the habitat requirements of wildlife for food, water, shelter and space. Establishing and maintaining functional corridors that can adapt to community needs and also allow individual animals to safely negotiate their way around and through highly developed areas can reduce the likelihood of future wildlife/human conflicts in the Toby Creek and PMV area.

Similar to the Bow Valley Model, PMV's wildlife management plan includes corridor and patch recommendations that are intended to be adaptive, recognizing



that as circumstances change at PMV, either due to market or biological trends, then the corridor and patch boundary widths and alignments are also subject to change. Because it is easier to maintain natural habitat in a natural state and because restoring altered habitat to a state of naturalness takes time, some areas within the Toby Creek Valley need a higher preservation priority status than do others.

This document will provide corridor and patch area guidelines in the vicinity of PMV. The management plan has the following objectives:

1. To identify areas of importance to wildlife in the Toby Creek Valley and the area surrounding PMV.
2. To identify standards for corridor and patch design in the Toby Creek Valley around PMV, including maximum length, minimum width, topography and vegetative characteristics.
3. To identify compatible uses within and adjacent to wildlife corridors and local patches.

3.0 Management Area

PMV is located 18 kilometres south east of Invermere on the Toby Creek Road leading to Jumbo Pass. The headwaters of Toby Creek are located in the Purcell Wilderness Conservancy (PWC) in the Purcell Range of the East Kootenays. The PWC provides important summer range habitat for ungulate species. It is thought to represent a significant species pool for wide-ranging predators. Toby Creek provides a direct linear link between the Purcell Wilderness Conservancy and the Columbia River valley, making it a significant route for altitudinal migrators. Toby Creek valley contains a number of important wildlife attributes that add to its value as a habitat corridor, including mineral licks, a high diversity of plant communities, and innumerable avalanche paths that provide ample foraging opportunities.

The 3,076 ha land base available for resort/recreation development extends from the Toby Creek valley bottom (1150-1300m) to the heights of Mount Goldie and Pica Peak (PMV Plan Area). As part of the Ski Area Agreement with the Province of British Columbia, Panorama earned development rights in exchange for building lift and ski resort infrastructure. The resort was purchased by Intrawest and subsequently, underwent a revitalization process. It now contains an 18-hole golf course (Grey Wolf), 10 lifts that access more than 98 ski runs, recreational trails, and a variety of tourist accommodations.

Within the overall land base, approximately 237 ha are designated for base area developments. In existence or proposed are: single and multifamily residences, townhouses, and hotels. These development rights are reflected in the government approved Official Community Plan (OCP), and the associated RDEK zoning bylaws.

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4.0 Observed use by Wildlife

4.1 General Wildlife Use

Data collected during the wildlife study in the Panorama area focussed on larger mammal species as presented within the Wildlife Management Plan Discussion Paper (CERG, 2000), there were a number of locations where higher animal use occurred than in surrounding areas. Of these, only two plots (Upper Springs and Upper Clearwater) showed high use by four wildlife categories: deer, moose, medium carnivore and large carnivore. Both of these plots were located on the north side of the valley above 1450 m, with dominant forest type identified as 40-60 year old Douglas-fir/lodgepole pine with at least 10% older (141-250 yr) forest and a moderately open canopy. Both sites have been classed as non-productive on forest resource inventory maps, likely due to steep terrain.

The table below summarizes the attributes of plots where high levels of wildlife use occurred, and plots where lower levels of wildlife use occurred.

Table 1. Summary of plot attributes according to wildlife use.

No. of Wildlife Categories Within Plot	Total Number of Plots	Tree Age Class	Tree Height Class	Dominant Tree Species	Average Elevation
4	2	3, 10% 8	2	fir, pine	1628
3	2	3 TO 4	2 TO 3	pine	1420
2	4	4	2	pine	1440
1	5	3 TO 4	2 TO 3	fir	1352
0	12	3 TO 6	2 TO 4	Pine, fir, alpine	1372

Key

Age Class	3	41-60yr	Height Class	2	10.5-19.4m
Categories:	4	61-80yr	Categories:	3	19.5-28.4m
	5	81-100yr		4	28.5-37.4m
	6	101-120yr			

4.2 Bear

As mentioned in the Wildlife Management Plan Discussion Paper (CERG 2000), all bear sign were reported as black bear. Although grizzly are present in this area, they typically avoid areas of high human use such as in the vicinity of PMV. Plots where high bear use occurred were located at a variety of elevations, from the valley floor to 1600m, reflecting bears' generalist habitat requirements. Plots which indicated high bear use were predominated by lodgepole pine forests trending towards 60-80 years of age. The forests in these plots also demonstrated a wide variation in canopy closure, but it appears that forests with more closed canopies received more use by bear in the Panorama area, probably a reflection of their need for security cover.

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Areas of significance to bear include Barbour and Springs Creeks, followed by the Hopeful Creek drainage.

4.3 Medium Carnivores

Medium carnivores (fisher, wolverine, coyote) demonstrated high levels of use at mid to high elevations (>1500 m) in seven plots. Plots that indicated high levels of use by both large and medium carnivores were all located above 1500 m. Forty percent of coyote use was within Panorama and Hopeful Creek study areas, and 50% of all coyote sign occurred in the valley bottom indicating this species' high tolerance to human presence. Although coyotes are important predators and scavengers in a natural system, coyotes are a species whose presence can lead to unwanted conflicts with humans when encounters take place in an urban setting.

Pine forests with spruce and Douglas-fir secondary components were the predominant forest cover type showing high use by medium sized carnivores, followed by non-productive forest cover or alpine areas – i.e., avalanche tracks. Forests older than 40 years showed the highest levels of use (40 to 250+), but data suggests that forests 60 years of age and older are likely more significant. This was not tested statistically, however. As mentioned in the Wildlife Management Plan Discussion Paper (2000), smaller mustelids require less space than larger carnivores, and were therefore not considered in this management plan.

4.4 Large Carnivores

Wolf and cat sign were most often found in areas where high levels of use also occurred by ungulate species, indicating their reliance on ungulates as prey. In particular, wolf sign were associated with high levels of moose activity in Clearwater and Barbour study sites. These elusive species (wolf, cat) were uncommon within the village, ski hill and golf course complex (10% of sign). Sightings of resident lynx do occur in or near the forested areas above the Grey Wolf golf course complex. This forested area provides ample hiding and foraging habitat for a shy species such as lynx, and the forest above the proposed driving range should be retained as a linking wildlife corridor permitting movement of animals across the ski hill complex.

4.5 Moose

Moose were most often found in association with high use by medium and large carnivores, and deer (3 of 4 sites). Forests greater than 40 years old comprising of Douglas-fir, lodgepole pine and spruce showed the highest levels of use. Forests with less than 55% canopy closure were used most often, with a trend towards forests with moderate canopy closure (approx. 40%). The most important habitat for all ungulates is wintering habitat, and Upper Clearwater and Mid Barbour sites both demonstrated high levels of use by moose during the winter

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months. This indicates the value of these areas as critical winter habitat for this species. Overall, moose showed low use of Panorama and Upper Hopeful study areas.

4.6 Deer

Finally, deer showed a use pattern that is expected, trending towards higher use of older forests with a variation in canopy closure requirements. They occurred most often in plots associated with man-made or natural openings and disturbance (6 of 8 plots). Deer were most often found at mid-elevations (1300-1600m), however plots with high levels of deer use occurred from the valley floor to elevations >1800m. As mentioned in the Discussion Paper (CERG 2000), there were seasonal shifts in the elevational use of habitats by deer. Deer showed higher use at upper elevations during winter (>1400m). This may relate to unfavorable snow conditions at lower elevations during late winter freeze/thaw cycles. Analysis of the data did not indicate when these seasonal shifts were more likely to occur.

The following table summarizes habitat attributes by species.

Table 2. Summary of plot attributes according to species category use.

Animal Species	Total No. Plots	Tree Age Class	Tree Height Class	Crown Closure Class	Tree Species	Average Elevation
Deer	8	3 to 4	2 to 3	all	pine, fir, alpine	1413
Moose	4	3 to 4, 8	2 to 3	all	pine, fir, spruce, NP	1548
Carnivore (grouped)	9	3 to 4, 8	2 to 3	all (trend to denser)	pine, spruce, NP	1583
Bear	5	3 to 4	2 to 3	all	pine, fir, spruce	1436

5.0 Additional Considerations

5.1 Fording Sites

Important for north/south movement of wildlife species in the Toby Creek Valley is fording sites that allow wildlife to cross the creek in a safe manner. Two likely fording sites exist: one 2 km north and the other approximately 2 km south of Panorama Village. In order to maintain the ability of wildlife species to freely travel to and from either side of the valley, efforts should be taken to maintain the integrity of these fording sites and their connecting corridors.

5.2 Intact Habitat

Upon examination of the field data, the value of forested habitat to all wildlife categories was apparent, although this was not tested statistically. Habitat on the north side of Toby Creek consists mainly of forested, steeper (>25%) slopes with

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numerous avalanche paths. The habitat on the south slopes (mostly north-facing) where the ski hill complex occurs is considerably more fragmented, and subject to higher levels of human disturbance. Retaining intact forested patches directly up slope of the Grey Wolf golf course and driving range complex would contribute to a mid to lower elevation movement corridor across currently developed ski area lands.

5.3 Topography and Vegetation Cover

Due to the steepness of the topography (20-40% slopes) and the lack of adequate woody vegetation cover within the ski hill complex, an overall increase in widths and areas of corridors and patches is recommended. Increase in corridor width ranges from 50-100%; there are no established criteria that outline recommended increases in patch sizes. See section 7.0 for more comprehensive guidelines.

6.0 Corridor and Patch Locations

6.1 Local Patches

Taking into consideration available data, the topography of the Toby Creek Valley, the characteristics of the forest cover types found within plots, and forest cover types where high levels of use by wildlife occurred, two habitat patches were proposed: **Springs Creek** headwaters, and **Barbour Creek**. The attached map graphically represents the general conditions of the recommended corridor and patch locations. One year of data shows that these two sites have demonstrated importance to a variety of wildlife species and their preservation as local patches would be beneficial to maintaining current populations and species abundance in the area.

In particular, the **Barbour Creek Patch** should extend from valley bottom (1200m) to a minimum of 2.5 km up Barbour Creek, and should be approximately 1.9 km wide. The boundary of this patch is recommended to follow Toby Creek, with an east boundary roughly 600 m upstream and a west boundary 1500m downstream of the confluence of Barbour and Toby Creeks. The east/west boundaries should generally following heights of land in a straight line southward to an undetermined end point.

The **Springs Creek Patch** is a generally rectangular patch, with one corner located in the valley floor (1200m). The dimensions of this patch are approximately 3.2km x 2.2km with a total area of approximately 7km². The Bow River Ecosystem Advisory Group guidelines recommend that minimum local patch size be 4.2km². Average slopes of approximately 41% result in a minimum increase of 1km² to this patch. In addition, topography sloping directly up and away from the ski hill complex for at least half of the patch area should result in an undetermined increase in patch size to compensate for increased visual, auditory, and olfactory disturbance of wildlife in this area.

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6.2 Corridors

Two corridors link the Barbour and Springs Creek patches. On the south side of Toby Creek Valley, one **secondary corridor** crosses the ski hill. This corridor is intended for use by smaller animal species, and wildlife species that can easily adapt to human presence and activities. To compensate for slopes averaging 22% overall, the distance required to cross the ski hill complex (>5km) from one habitat patch to another, and a lack of adequate vegetation cover, the recommended minimum width of this corridor is 750m. This corridor could include forested patches above the golf course and driving range complex, with the lower boundary placed at approximately 4500 ft, or 1400m elevation.

A **primary corridor** is recommended on the north side of Toby Creek. Topography dictates the configuration of the corridor. For example increasing steepness results in the widening of a corridor. As a result of the slope gradients, the recommended corridor widths should be increased above the minimum 350m. As previously outlined, data indicated the use of higher elevation areas on the north side of Toby Creek to ungulates and carnivores. With this in mind, wildlife corridor widths on the north side should be generous enough to accommodate animals using higher elevations, but requiring access to the valley floor in order to move to important habitat on the south side of the valley. These considerations preclude most options other than a single, wide and contiguous wildlife corridor.

The boundary of this corridor could be set back up to several hundred meters from the forest service road in the valley bottom. In order to be of biological use to animals, connection to the fording site 2km north of Panorama and adequate lower elevation habitat should be maintained within the corridor. To compensate for slopes averaging >25%, and the distance required to access one habitat patch to another (>5km), the recommended minimum width of this corridor is 850m.

Slopes greater than 25% are considered inadequate for corridor function. Because the south side of the valley is presently developed and unsuitable as a primary corridor, this leaves the north side of the valley as a primary corridor in spite of topographical limitations.

7.0 Management Guidelines

7.1 Compatible Activities

Habitat Patches are areas of land linked together by wildlife corridors. They are generally large in area, meeting a wide spectrum of habitat requirements for species expected to use or reside in the Toby Creek Valley. Typically, larger species require more space for feeding, breeding, security cover, and resting, and therefore require larger patch sizes to accommodate them.

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Primary corridors are designed to be used by a wide variety of wildlife species (deer, cougar, wolf) including those species that are more wary of human activity. Primary corridors should have a minimum corridor width of 350 m, and wider if topography is >0% slope and vegetative cover less than 40%. Primary corridors should have buffers of 20m for residential and 40m for industrial developments. Vegetative cover at 2.5m height should be greater than 40%.

Acceptable activities within primary corridors and within local habitat patches includes:

- ◇ Perpendicular crossings of linear developments (roads, power lines)
- ◇ Perpendicular hiking/walking trails
- ◇ Vegetation management for fire, disease, weed control
- ◇ Wildlife habitat management activities
- ◇ Education
- ◇ Research

Secondary corridors are more appropriate for smaller wildlife species, and species that are capable of adjusting to the presence of human activity (coyote, deer). Secondary corridors should have a minimum corridor width of 250m, and have buffer widths of 20m for residential and 40m for industrial developments. Vegetative cover at 2.5m height should be greater than 40%. Acceptable activities within secondary corridors include trails, ski lifts and power lines. Low-impact ancillary buildings would also be acceptable if low levels of activity occur at the building location, and if the surrounding area is adequately shielded from artificial light sources attached to the building.

7.2 Considerations - Corridor and Patch Size

The following criteria should be considered when establishing, managing or altering boundaries:

- ◇ Steep terrain requires an increase in corridor width (+100m/<25% slope; +200m/25% slope; >25% slope inadequate as corridor function) and patch size (+0.5km²/<25% slope; +1km²/>25% slope). Steep terrain sloping up away from human activity is less effective as corridor habitat.
- ◇ Increasing corridor length results in increased corridor width (+125m/1km).
- ◇ Decreasing vegetative cover results in increased corridor width (+200m/50% loss in vegetation) and patch size (+1km²/50% loss in vegetation).
- ◇ Natural features such as gullies and ridgelines can reduce noise and light effects from human activity, with a corresponding reduction in patch and width size.
- ◇ Movement of animals across Toby Creek must be accommodated; maintenance of this movement requirement centers on the 2 available fording sites.

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- ◇ 20 m buffers for residential and 40 m buffers for industrial activity are recommended along patch and corridor boundaries. Buffers should be added to the corridor width calculations (i.e. 710 m corridor width calculation + 20m buffer x 2 sides = 750m corridor width).
- ◇ Corridors and patch boundaries should be linear, with no dog-legs or cul-de-sacs that could serve to confuse or trap animals.

As outlined in the Management Plan Discussion Paper (CERG 2000), road building at mid and upper elevation on both sides of the valley should be minimized to limit artificial expansion of coyote populations

In addition, riparian zones are important to a majority of wildlife species (Bunnell and Dupuis 1995) and riparian zones should be maintained along Toby Creek tributaries, including Taynton Creek and should conform to the Development Guidelines for the protection of Aquatic Habitat at a minimum (Chilibeck 1993).

7.3 Additional Management Recommendations

As outlined by the Bow Valley Advisory Committee, the following points should also be considered.

1. Human activity in the vicinity of and within the bounds of wildlife corridor and patch areas should be controlled and monitored. This can be done through the use of signage and trail closures within wildlife corridors and patches.
2. A minimal number of trails should be maintained for use by humans within patches and primary corridors
3. Where possible, multiple trails should be consolidated into a single series of widely spaced and perpendicularly aligned trails that respond to topography and soil conditions.
4. Seasonal trail closures can also be considered, depending upon the wildlife values within the patch or corridor that the trail enters.
5. Domestic dogs should be leashed at all times.

Taynton Area

A local patch should also be considered on the north side of the Taynton Bowl area. Data collected in the Taynton plots indicates high levels of use by three wildlife species categories; moose, deer and cat (cat species unknown). Although levels of use were not as high as Springs Creek or Barbour areas, the data does point towards the probable value of this area as habitat for wildlife.

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8.0 Conclusions

Data collected during field studies indicated that Barbour and Springs Creek areas have local importance for numerous wildlife species in the area surrounding PMV. Based on field data, these two areas would make good candidates for status as local wildlife patches with recommended minimum sizes of approximately 7km².

Two corridors could be established which link the Barbour and Springs Creek patches, one secondary corridor across the lower elevations of the ski hill complex with a minimum recommended width of 750m, and a primary corridor across the north side of Toby Creek, with a recommended minimum width of 850m.

In addition, there is some field evidence to indicate that a portion of Taynton Bowl should be considered for a third local wildlife patch. Connectivity between Taynton and the Springs and Barbour patches should then be considered.

The identification and protection of wildlife travel corridors are an important step in maintaining the migratory options and life requisite needs of wildlife species that occupy the Toby Creek Valley and the vicinity of PMV. Establishing core areas (wildlife patches) and maintaining interconnectivity of these core areas is thought to be a vital component of long-term persistence for wildlife species (Paquet et al. 1994, Soule 1987). PMV's proposed network of local habitat patches and linking primary and secondary corridors would ensure that migratory options remain open for wildlife species in the Toby Creek Valley. This would positively contribute to long-term viability of these species in the context of mountain resort.

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