

Is the Access Management Plan Working?

Monitoring Recreational Use in the Bighorn Backcountry

Final Report 2004 - 2008



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DISCLAIMER

This study did not intentionally single out any particular user group that recreates in the Bighorn Backcountry. Due to resource constraints, Alberta Wilderness Association has limited access to technological and logistical opportunities for data gathering, and this is reflected in our reporting. Where possible, we focused on all evident recreational activity. The goal of this study was to evaluate how environmental conditions in the Bighorn area can degrade as a result of inappropriate recreational use.

LIST OF ACRONYMS

AMP	(Bighorn Backcountry) Access Management Plan
AWA	Alberta Wilderness Association
BTN	Back Trail North
BTR	Back Trail Ranger
BTS	Back Trail South
CAN	Canary Creek Trail
CWH	Critical Wildlife Habitat
EE	Erosion Event
FLUZ	Forest Land Use Zone
FRA	Forest Recreation Area
HUM	Hummingbird Creek Trail
OHV	Off Highway Vehicle
ONC	Onion Lake Trail
PPZ	Prime Protection Zone
RNG	Ranger Creek/South Ram Trail
SRD	(Alberta Ministry of) Sustainable Resource Development

EXECUTIVE SUMMARY

Since the 1970s, when the Bighorn Backcountry² (Figure 1 on page 4) was identified as a provincially significant wilderness area, management priorities have focused on watershed protection, wildlife habitat conservation, and dispersed non-motorized recreational activities. Alberta Wilderness Association (AWA) has actively supported these priorities and, for more than 30 years, has sought protected area designation for the Bighorn area (Appendix C).

In 2002, through the Bighorn Backcountry Access Management Plan (AMP), the Alberta Ministry of Sustainable Resource Development (SRD) formally permitted motorized recreation of Off-Highway Vehicles (OHVs) in areas where these activities were formerly not allowed.

Research in other areas (Appendix D) suggests that unregulated, unenforced use of an area by OHVs over the long term negatively affects water quality, vegetation, historical trails, and wildlife. These activities may also dissuade many non-motorized recreationists from using the same trails.

In this document we evaluate management success in the Bighorn Backcountry five years after the implementation of the AMP. “Success” is defined by how well current management guidelines designate and enforce appropriate recreational use in order to “protect areas containing sensitive resources such as fish & wildlife and their habitats, vegetation, soils and watershed” (SRD 2002a).

The Alberta Government divides the Bighorn Backcountry into six Forest Land Use Zones (FLUZs). Our 5-year study focused on the 76-km network of trails designated for motorized and non-motorized use in the Upper Clearwater/Ram FLUZ (Figure 1) where we evaluated three criteria as indicators of management success:

1. Illegal use of trails,
2. Recreational impact on and around trails, and
3. Trends in motorized vehicle activity.

²AWA prefers the use of the term Bighorn Wildland (formerly officially called the Bighorn Wildland Recreation Area). Refer to Appendix C for information on the history of the area and related name changes to the region.

Key Findings³

1. **Illegal use of trails is increasing.** As of 2008, 15% of OHV traffic on trails does not comply with current FLUZ regulations (i.e., trails are used out of the designated season, or people are using non-designated trails or areas).
2. **Trail damage is increasing.** Twenty percent of trails evaluated were considered damaged. These damaged areas include 244 instances of trail braiding or widening. Erosion events (EEs) from recreational use were as high as 5.58 EEs per kilometre on some trails. The number of EEs associated with OHV use was proportionally higher than the number of EEs associated with equestrian use on six of seven trails.
3. **Non-designated backcountry camping is expanding.** The combined footprint from random backcountry campsites in the study area was 50,574 m². (This area is roughly equivalent to 32 NHL ice surfaces.) Garbage was found and removed from 54% of campsites.
4. **More than one non-designated trail junction was found for every kilometre of designated trail in the trail network.** Non-designated trails were defined as spur lines from the main trail with evidence of recent activity by hikers, bikers, horses and OHV users.
5. **Water bodies are not adequately protected.** We documented 89 trail water crossings throughout the trail network. Only 7% of these water crossings had formal crossing structures present, and 72% of the 89 water crossings went through a permanent water body.
6. **Motorized traffic on trails increased substantially.** OHV traffic on designated trails increased more than fourfold between 2004 and 2008.
7. **Albertans want to see ecological values in the Bighorn given the greatest priority⁴.** Albertans rank healthy environment and ecosystems as the number one desired outcome for land use planning (SRD 2007).

³See Appendix B for photo documentation

⁴AWA 2008, Government of Alberta 2008.

Recommendations

These findings suggest current access management in the Bighorn Backcountry is not protecting the environment from degradation caused by recreational impacts. Reasons may include 1) enforcement and voluntary compliance of FLUZ regulations are not reducing the amount of illegal activity on trails, 2) current levels of recreational activity are causing severe environmental degradation, and 3) there is an increasing trend in trail use suggesting that these problems will grow into the future.

Changes to current access management practices and FLUZ regulations in the Bighorn Backcountry could improve SRD's ability to meet the environmental objectives of the FLUZ and their obligation to protect the ecological values of this landscape. We recommend the following actions be taken:

1. Restrict motorized recreation in the Prime Protection Zone.

AWA recommends the severe curtailment, if not full removal, of motorized activity in the Prime Protection Zone⁵. If the primary goal of the FLUZ is to protect watersheds and wildlife habitat (Government of Alberta 1984; Alberta Forestry 1986), then prudent management intervention is needed to prevent further, and possibly unrecoverable, damage from occurring in this area. Without full legal protection of the Prime Protection Zone, the following recommendations must be implemented immediately.

2. Increase enforcement patrols and action in backcountry areas, including substantial fines for illegal activities.

3. Ensure that all non-designated (i.e., illegal) trails are physically blocked and signed at the junction, with language indicating that motorized users proceeding off of the main trail are in violation of FLUZ regulations.

Well-placed signs appear to reduce the use of non-designated trails. However, signs have often been vandalized (e.g., removed or shot), which reinforces the need for more enforcement. Vandalized signs should be removed.

4. Redesign elements of the trail network to facilitate safety and enforcement patrols.

Trails should be clearly marked legal or illegal for OHV use, and should loop (e.g., like the Hummingbird Creek Trail) to remove the temptation for users to develop illegal trails back to their staging area.

⁵ Under the 1977 Eastern Slopes Policy, the Prime Protection Zone (PPZ) became the zone with the highest level of protection, with the only allowed activities being "dispersed back-country" non-motorized recreation.

5. Ensure that amateur stewardship efforts to repair damaged trail sections are overseen by professional engineering and construction personnel.

We found evidence of trail stewardship by local clubs, as encouraged by SRD, but in some situations these efforts will only temporarily address the problem. In many cases, water movement near or across the trail is not adequately addressed by the drainage methods used (H. Unger, P.Eng, pers. comm.). Attempts by some groups to reduce the impact of their own activities within the Bighorn Backcountry are commendable; however, additional expertise is needed in these endeavours and a more systematic approach to trail improvement must be implemented.

6. Address water quality and fisheries objectives by improving water crossings along designated trails, through the construction of bridges for permanent streams and hardened fords for ephemeral streams.

Evidence suggests an avoidance of crossing structures by many users. Approaches to streams should be hardened with gravel to reduce bank erosion and fenced to encourage their use.

7. Designate campsites along trails and enforce regulations about the removal of garbage and semi-permanent structures. Close sites where reclamation is necessary.

Unregulated camping can lead to human-wildlife conflict, wildlife habituation, conflicts between users and further landscape degradation. SRD should designate campsites to less sensitive areas, and enforce their use.

8. Increase management responsiveness to changing trail conditions by closing areas until repairs are made or the area naturally regenerates.

We recommend initiating a pilot project to measure the recovery of damaged areas and to anticipate recovery times. This would allow managers to move forward with restoration projects throughout the area and set real targets for recovery of damaged sites based on local vegetation and soil characteristics.

9. Enforce a three-metre-wide trail designation.

The 10-m or 23-m designated trail width (SRD 2002b) in the Bighorn is far wider than in many jurisdictions in North America where OHV use is common. Having more reasonable and enforceable trail widths will help minimize environmental degradation as well as improve the efficiency of stewardship efforts.

Future actions by AWA

This report is intended to provide complementary data and analysis for government agencies responsible for access management decisions in the Bighorn Backcountry.

AWA will continue to monitor recreation use in the Bighorn Backcountry and advocate for its protection. We will:

- 1) Continue to promote full legal protection of the Prime Protection Zone;
- 2) Continue monitoring efforts using traffic counters;
- 3) Spot-check severely disturbed areas for management intervention and update the photo-database of areas;
- 4) Continue “hot-spot” monitoring of trail network for comparison against baseline data to determine trends of impacts on landscape (Appendix G);
- 5) Continue to bring management/enforcement issues to the attention of authorities;
- and,
- 6) Continue to be a resource for those who have questions about recreational impacts in the Bighorn and want to find a way to help.

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INTRODUCTION

An important piece of Alberta's Eastern Slopes, the Bighorn Backcountry (Figure 1 on page 4) is a large and intact wilderness that retains its ecological integrity largely due to the absence of roads and industrialized access. The "Bighorn Wildland Recreation Area" was designated by the Government of Alberta in 1986, but the legislation to protect it has never been passed. The area is now managed under the regulations of the Forest Land Use Zones put in place by the implementation of the *Bighorn Backcountry Access Management Plan* (SRD 2002a). Alberta Wilderness Association is seeking Wildland Park⁶ protection for the Bighorn area.

In this document we evaluate management success in the Bighorn Backcountry five years after the implementation of the Alberta government's Access Management Plan (AMP). "Success" is defined by how well current management guidelines designate and enforce appropriate recreational use, in order to protect "sensitive resources such as fish and wildlife habitats, vegetation, soils and watershed" (SRD 2002a: 10).

This introduction provides context for the monitoring work and management assessment contained within. Below we discuss general background, conservation concerns in the Bighorn Backcountry, and our involvement in the development of monitoring programs. Our desire to understand the effects of current regulations and help shape new policy led us to engage in a science-based monitoring program that can help inform management decisions.

⁶Within the general category of Provincial Park, wildlands is a special subcategory established by a set of regulations established in 1996. Based closely on the Willmore model, this designation was intended to allow for the establishment of large protected areas where a wide variety of nature-based recreation could be enjoyed. It is now the form of protected-area designation under which most land is protected in Alberta.

General background

Recreational trail use is growing in Alberta as more people become engaged in backcountry activities and as unregulated access to wilderness areas increases with new infrastructure development (Canada West Foundation 2006). Alberta's backcountry users include naturalists, hunters and anglers, hikers, skiers, mountain bikers, trappers, ranchers, rock climbers, rafters, commercial outfitters, horseback riders, and off-highway vehicle (OHV) and snowmobile riders. These backcountry users come from a variety of communities with equally varying values and opinions about wilderness protection and management.

These myriad views can lead to severe challenges for consensus-based land-use management under the Alberta government's current "multi-use" paradigm (Canada West Foundation 2006). The Alberta Ministry of Sustainable Resource Development (SRD) is responsible for meeting often competing demands for new recreational opportunities from these user groups. SRD must also address human impacts on water quality, forest maintenance and regeneration, wildlife habitat, and other ecological backcountry services. These responsibilities are further complicated by inconsistencies in management direction (Appendix F).

Conservation issues in the Bighorn Backcountry

Since the 1970s, the Bighorn Backcountry has been identified as a provincially significant wilderness area. The Eastern Slopes Policy (Government of Alberta, revised 1984⁷) gives management precedence to the protection of watershed, native vegetation, and wildlife habitat over all other uses of this sensitive foothills and alpine area.

In 2002, the Bighorn Backcountry was placed under new access management regulations through the designation of six Forest Land Use Zones (FLUZs). These regulations enabled the government to legally designate recreational trails for specific uses and seasons. The government also publicized access to the Bighorn area with a map, brochure, and website (SRD 2006a), and officially permitted motorized access in areas where these activities were formerly not allowed.

Research in other study areas (Appendix D) suggests that unregulated, unenforced use of an area by OHVs over the long term negatively affects water quality, vegetation, historical trails, and wildlife.

⁷Reiterated in the 1986 Nordegg-Red Deer River Sub-regional Integrated Resource Plan (Alberta Forestry 1986).

Monitoring recreational activity in the Bighorn Backcountry

The protection of the Bighorn Backcountry is the responsibility of SRD, and the ministry recognizes that mixed recreational use of the area will bring challenges to the task of protecting sensitive resources (SRD 2002b).

Concerned about these challenges, in 2003 AWA planned a 5-year program to monitor OHV and other recreational activities. We aimed to assess how well new FLUZ regulations protect the sensitive ecosystem of the Bighorn.

A short time after the development of the AWA monitoring program, SRD created a Trail Impact Monitoring Program (SRD 2003) based on the recommendations of the Bighorn Advisory Group (SRD 2002b), a multi-stakeholder group designed to provide access management advice to SRD. Through this monitoring program, SRD aims to manage the Bighorn Backcountry “to ensure the protection of the environment, while allowing responsible and sustainable recreational use” (SRD 2006b). A report based on 5 years of monitoring is expected in early 2009.

AWA supports the goals of the Trail Impact Monitoring Program and believes that decisions made by managers of the Bighorn should be evidence-based. AWA also believes that access management regulations can be improved through monitoring studies that address changes to environmental conditions.

This report is intended to provide complementary data and analysis for government agencies responsible for access management decisions in the Bighorn Backcountry area.

STUDY AREA

This study took place in the Upper Clearwater/Ram FLUZ within the Bighorn Backcountry, which is located approximately 90 km southwest of Rocky Mountain House (Figure 1).

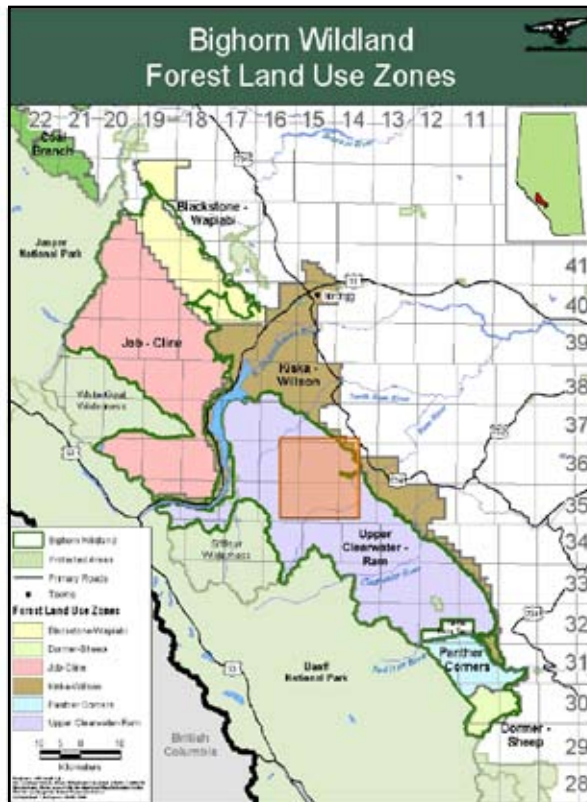


Figure 1. General location of study area. The specific study area is indicated by the pink-shaded square near the centre of the figure (see Figure 2). Legal land survey coordinates are shown along the right and top margins of the map.

The Bighorn Backcountry is adjacent to Banff and Jasper National Parks and consists of approximately 5,000 km² of public lands. Within the Bighorn Backcountry, the Upper Clearwater/Ram FLUZ is the largest of the six FLUZs, with an area of approximately 2,000 km². The Upper Clearwater/Ram FLUZ consists of Alpine and Subalpine subregions of the Rocky Mountain Natural Region. Most of the trails we focused on occur within the Subalpine, an area characterized by forests of lodgepole pine (*Pinus contorta*), Engelmann spruce (*Picea engelmannii*), and subalpine fir (*Abies lasiocarpa*); high elevation meadows comprising hairy wild rye (*Elymus villosus*), june grass (*Koeleria cristata*), and bearberry (*Arctostaphylos uva-ursi*); wetlands; and shrub areas. Large carnivores (e.g., bears, wolves, cougars), ungulates (e.g., deer, elk, bighorn sheep), songbirds, and cutthroat and bull trout are also prevalent here. Since the 1970s, there has been no industrial activity in the Upper Clearwater/Ram FLUZ, in contrast to adjacent lands on the Bighorn's eastern boundary.

METHODS

We designed a five-year monitoring program (2004-2008) that looked at three indicators of management success⁸:

- 1) Illegal activity on trails,
- 2) Recreational impacts on and near trails, and
- 3) Trends in motorized vehicle activity.

Study area

We chose to focus our efforts on trails based in the Hummingbird Forest Recreation Area. These trails are part of the largest OHV-designated trail system in the Bighorn and are located within the Prime Protection Zone. We divided the trail network into seven sections based on names identified on the FLUZ map published by SRD (2006b; revised from 2003). Where designated trails were not named, we added complementary names to specific stretches (Figure 2).

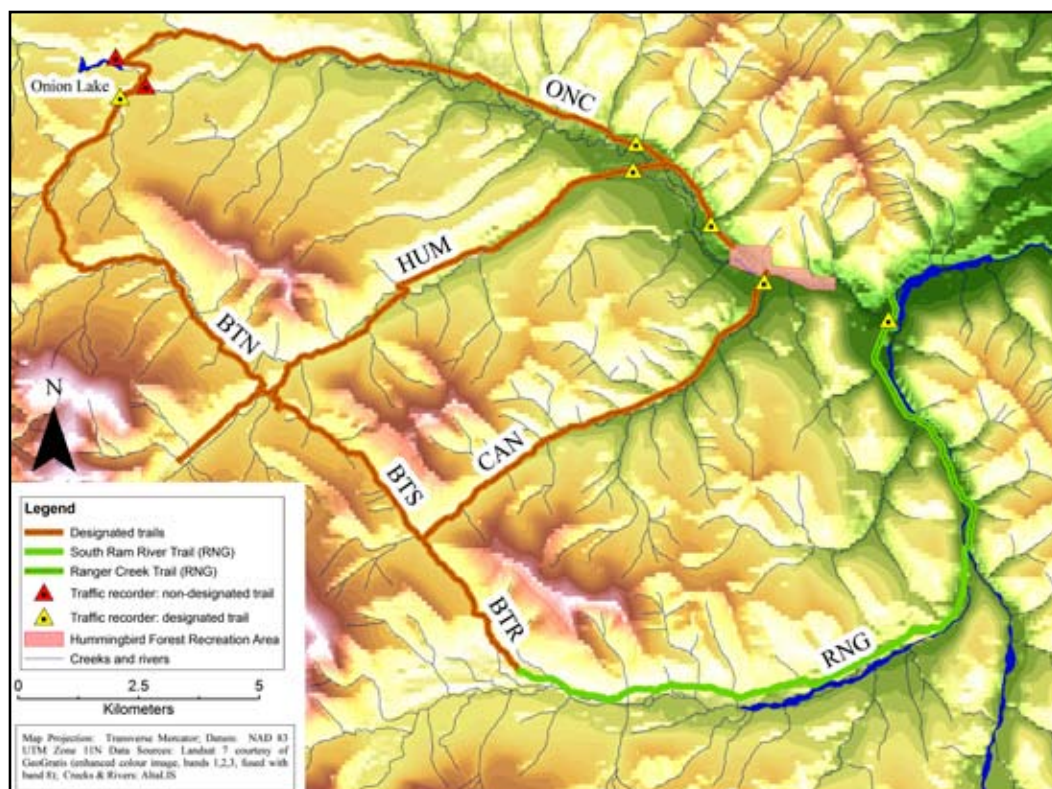


Figure 2. Location of trails monitored during this study

⁸Five years is adequate time to gather data on trends, and this coincides with SRD's own recreational monitoring project (SRD 2003) which will monitor trails at least every five years.

Four of these seven trails are former resource exploration roads dating to before 1970. These include the Onion Lake Trail (ONC), Hummingbird Creek Trail (HUM), Canary Creek Trail (CAN), and Ranger Creek/South Ram River Trail (RNG). The three trails we assigned names to are Back Trail North (BTN), Back Trail South (BTS) and Back Trail Ranger (BTR). These three sections appear to be former equestrian trails that are now designated for motorized access and, for the most part, are more remote and less developed than ONC, HUM, CAN, and RNG. For classification purposes, we combined the lower portion of the Ranger Creek Trail with the South Ram River Trail to its junction with BTR (Figure 2). This classification allowed us to efficiently survey the trail network, as well as evaluate the effectiveness of trail regulations (e.g., temporal restrictions and equestrian versus OHV use).

Monitoring illegal activity on trails

We monitored two kinds of illegal activity on trails; traffic on designated trails during non-designated times, and traffic on non-designated trails.

Traffic counters⁹ monitored OHV traffic year round. Passes by equestrian and other non-motorized users, including mountain bikes, were not detected. We placed each traffic counter near a trail, about 20 cm below ground surface to enable detection of passing vehicles and to minimize disturbance of the device by animals and people.

The data were uploaded in late June/early July and again in late summer/early fall. After uploading data, traffic counter batteries were changed and the devices were reburied in their original locations. Eight traffic counters were used in this study, although one was later found to be defective. We are therefore only reporting the results of the seven.

One traffic counter was placed on each of ONC, HUM, CAN, BTN, and RNG trails near the most likely access point of the trail (see Figure 2). Two traffic counters were placed on non-designated trails near Onion Lake to capture potential illegal use of non-designated trails in those areas. In 2006, a unit that had originally been on a non-designated trail but turned out to be defective was replaced.

⁹TrafX trail counters: <http://www.trafx.net/products.htm>.

To determine whether a trail section was open or closed, we used regulations published by SRD (2006a), with corresponding seasonal access changes made in 2005¹⁰. We then counted the number of vehicle passes that fell inside and outside the regulated period. To control for yearly changes in overall traffic, we divided the number of passes recorded during closed periods by the total number of passes recorded for each traffic counter within each year (2004-2008). We excluded days when the traffic counters were not functioning due to battery failure. For the two traffic counters monitoring permanently closed trails, we included the total number of passes counted, since all passes by motorized vehicles along these trails are considered illegal.

Monitoring the impacts of recreational activities on and near trails

We surveyed the trail network for four types of recreational activity impact: 1) damaged sites, 2) water crossings, 3) campsites, and 4) non-designated trails. Damaged sites were defined as part of a designated trail where the rutted depth exceeds five centimetres and where vegetation damage exceeds a width of three metres. We chose this depth as it signifies enough soil loss or compaction to affect plant regeneration (Godefroid et al. 2003). The three-metre width we chose is similar to trail design guidelines in British Columbia (2.2 m; BCMoF 2000), Newfoundland (4 m; ECGNL 2004) and Ontario (2.5 m; CDCSSMA 2003). It is also reflected in SRD's definition of a designated trail (3 m; SRD 2002a). Note, however, that SRD guidelines for monitoring trail damage (SRD 2003) are inconsistent with these definitions¹¹. On hardened sections of some trails (i.e., ONC, CAN, HUM, RNG), we were less strict with these definitions to account for the presence of historical roads, which in many cases were already more than three metres wide. In these cases, damage was assessed as obvious vegetation trampling or trail widening beyond the roads' historical boundaries.

¹⁰ All trails except RNG are designated for OHV access from July 1 to March 15 (as of 2005) or July 1 to April 30 (for 2004). OHV access is permitted on RNG from December 1 to March 15 (as of 2005) or December 1 to April 30 (for 2004). Snowmobile access is permitted on all trails; RNG, from July 1 to April 30. Snowmobile access is permitted on RNG from December 1 to April 30.

¹¹ The Bighorn Backcountry Access Management Plan (SRD 2002b:10) defines a designated trail as "that part of the route to a width of three metres (9.8 feet) or less as approved by a Forest Officer, and a parking zone of 10 metres or less on either side of the trail." This equates to 23 m in width for a designated trail. In the Recreation Trail Monitoring Guidelines, trails are considered 10 m wide: e.g., "any tracks or obvious evidence of use beyond the 10 m wide established trail will be considered a trespass" (SRD 2003:3) and "the cross-sectional area is measured by placing a rope or rigid bar across the trail (all 10 meters)" (SRD 2003:2). It is unclear if SRD considers a designated trail 23 m or 10 m wide; however, neither of these widths is considered acceptable for a backcountry recreation area by AWA and several North American jurisdictions.

Once a damaged site was identified, we 1) geo-referenced it with a handheld GPS unit¹², 2) photographed the area, 3) measured the depth of the rut at the deepest point with a tape measure, 4) measured the width of the site at its widest point with a tape measure, and 5) pace-counted the length of the damaged site. When measuring the depth of ruts, we noted when a rut was deeper than 25 cm for a distance of three metres or more, as this qualifies the site as an Erosion Event (EE) (Figure 3). The EE designation is based on SRD standards for trail integrity. Under current objectives, the number of EEs per kilometre of trail is expected to stay the same or decrease over time (SRD 2003). We also classified each damaged site and EE by the type of tracks present: motorized, equestrian, or mixed. Motorized vehicle tracks are characterized by two parallel ruts formed by the wheels, approximately 1.0 to 1.6 m wide, with tire tread marks showing in moist soil conditions. Equestrian tracks are characterized by a single track, roughly 45 cm wide, with crescent-shaped marks from horseshoes present in moist soil conditions. Mixed tracks are characterized by the presence of both motorized and equestrian tracks¹³. We also looked for evidence of hikers, mountain bikers, and horse-drawn wagon tracks at all sites. Interpretation of user group association at a site by the presence of tracks is most indicative of recent use rather than total use of that trail. We are most likely underestimating the amount of equestrian use on mixed-used trails since OHV tracks can easily mask horse tracks.

Water crossings were defined as areas along designated trails where at least one of the following features was found: a physical crossing structure (e.g., a bridge or ford), water in a visibly permanent stream bed, water running on the trail, or an impermanent stream bed (e.g., ephemeral stream). At each water crossing, we photo-documented the site and geo-referenced the coordinates with a handheld GPS unit.

Campsites were defined as areas where overnight camping activities likely occurred and where at least one of the following was found: one or more fire pits, camping furniture (e.g., tables, chairs, storage, latrines), tielines or corrals for horses. We photographed, geo-referenced, collected garbage if present, and pace-measured the length and width of each site.

¹²10 m± accuracy; Garmin (<http://www.garmin.com/garmin/cms/site/us>) or Magellan (<http://www.magellangps.com>)

¹³There were few, if any, such tracks that could be distinguished.



Figure 3. Measuring the depth of an Erosion Event along RNG

Non-designated trails were defined as spur lines from the main trail with evidence of recent activity by hikers, bikers, horses, or OHVs that extend beyond 10 m from the junction of the main trail. We assigned recreational activity association based on track evidence (see above) for the first 10 m of each non-designated trail, as measured from the junction of the non-designated trail and the designated trail. We chose 10 m as the minimum length of a spur following the SRD monitoring program. Furthermore, this classification allows us to quantitatively differentiate between a trail braiding or widening (i.e., a damage site) and a non-designated trail. At each junction of the main trail and the non-designated trail, we photographed and geo-referenced the site using handheld GPS units.

We summarized the total number of damaged sites, water crossings, random campsites, and non-designated trails for each trail. Using GIS software¹⁴, we divided each of the seven trails into unit lengths of 500 m and added up the total number of EEs and non-designated trail junctions within each section. This information was then mapped to provide a qualitative assessment for the location of environmental degradation throughout the trail network (Figures 5 and 6).

¹⁴ArcGIS 9.2, Environment Systems Research Incorporated, Redlands, CA. <http://www.esri.com>

Monitoring trends in motorized vehicle activity

We compared the number of passes at each counter during a replicable window over a two- or three-year period, depending on the functionality of our traffic counters. One window was established for summer use (approximately July 1 to September 30) and one for winter use (December 1 to January 31). We used replicable recording windows specific to each traffic counter, rather than complete years, because of different operating periods among individual devices (see Appendix A).

Error handling in traffic counts

Traffic data is based on motorized vehicle passes recorded by seven digital traffic counters that were in place on the trail network since 2004.

The traffic counters incurred errors in data recording that may have either underestimated or exaggerated the actual number of vehicle passes. They may have underestimated the actual number of vehicle passes if they missed vehicles passing beyond the two-metre detection range or because two or more vehicles were driving close together and were counted as a single pass. Traffic counters were known to be non-functioning during certain periods due to battery failure, thus missing some recordings. Each period where the traffic counters did not report data are shown in Appendix A. All analyses relating to temporal trends in traffic volume are adjusted by the number of reporting days for each individual traffic counter.

The traffic counter may have exaggerated the actual number of vehicles due to recording errors. To find and address these errors, we executed the following protocol once data were uploaded to the PC. First, we removed counts that appeared to be repeated: that is, if there was a second (or more) pass at the exact same recorded time and date, then the additional pass(es) were deleted. We then removed counts associated with counters being unearthed for reviewing. Finally, we removed extra counts that may have been associated with a slow-moving vehicle. Slow-moving vehicles can trigger extra counts at exactly two-second intervals but will record these passes as if they were moving from opposite directions. The traffic counter is equipped with a two-second buffer, meaning that no additional passes will be recorded within two seconds of one another. By excluding these counts, we reduce the likelihood that a slow-moving vehicle will trigger more than one count for a single slow-moving vehicle, but we also exclude those situations where two vehicles may have passed one another at the traffic counter within a two-second interval. Overall, traffic counts reported in this study are conservative estimates of the actual number of vehicle passes.

RESULTS

Trends in illegal activity on trails

We found that the total number of passes by motorized vehicles during non-designated periods increased from 0.37 Passes Per Day (PPD) in 2004 to 0.73 PPD in 2008, an almost 100% increase. The total number of passes made during non-designated periods, relative to the total amount of traffic recorded on the trail network, fluctuated depending on the year; but, overall, an increasing trend is exhibited from 2004 to 2008 (Figure 4). As of 2008, illegal passes account for 15% of all passes recorded. ONC (1)¹⁵ showed an increase in the proportion of motorized traffic during non-designated periods since 2004, while illegal traffic on CAN and ONC (2) has decreased since 2004 (Table 1). Since 2004, the number of illegal passes made on two non-designated trails has risen and fallen depending on the year. In 2008, there was 33% more illegal passes on the non-designated trails than in 2004.

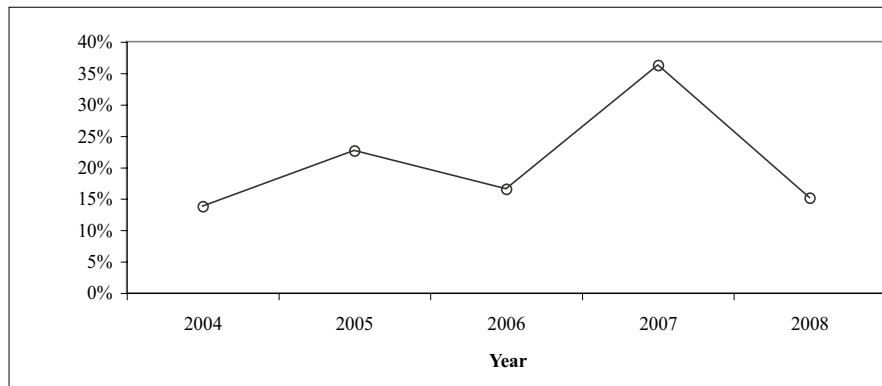


Figure 4. Percentage of illegal passes per day per year out of the total number of passes. Data from designated trails only

Trail	2004	2005	2006	2007	2008
ONC(1)	0.04	0.19	0.18	n/a	0.21
CAN	0.05	0.17	0.37	n/a	0.02
ONC(2)	n/a	n/a	n/a	0.41	0.14
RNG	1.00	0.66	0.33	1.20	0.80
BTN	0.00	0.11	0.14	n/a	n/a
TOTAL	0.14	0.23	0.17	0.36	0.15

Table 1. Ratio of illegal passes to the total number of passes recorded for designated trails

¹⁵There were two counters on the Onion Lake Trail (ONC) referred to here as ONC(1) and ONC(2).

Recreational impact on and near trails

We surveyed more than 76 km of designated trails and found 453 features of concern. These features were not distributed equally among trails (Tables 2, 3 and 4) or sections of trails (Figure 5). The sum length of damaged trail sections varied from 7% of the BTN to 64% of the BTR, for an overall length of 20% of the 76-km trail network. The number of Erosion Events (EEs) was highest on BTR (5.58 EE/km) followed by BTS (3.13 EE/km), while CAN (0.93 EE/km) and HUM (0.91 EE/km) had the lowest density of EEs. Overall, we found roughly one EE for every 600 m of trail in the network. The number of EEs associated with OHV tracks was proportionally higher than the number of EEs associated with equestrian tracks on every trail except for RNG¹⁶. On RNG, equestrian tracks were associated with 86% of the EEs (see Figure 3). The maximum width of damage sites on all trails was an average of 8.87 m (n=223), with the two widest damage sites on ONC (50 m) and RNG (50 m). The mean maximum depth was greatest on BTR (0.45 m) and BTN (0.44 m), and the deepest site we found was 1.6 m on BTR.

More than one non-designated trail junction was found for every kilometre of designated trail in the trail network, with most of these occurring along RNG and associated with equestrian trail use (Figure 6). Non-designated trails found along BTN, BTR, BTS, and ONC were most often associated with OHV use (Table 5).

The density of campsites was similar among trails, with one site for every 2 km of trail throughout the study area (Table 4). Campsites ranged in size from 25 m² to 12,000 m² (both on RNG), for a combined footprint from all campsites of 50,574 m² in the study area. For a familiar comparison, this area is roughly equivalent to 32 NHL ice surfaces. Additionally, we found garbage left behind at 54% of campsites, with the majority of these sites occurring along RNG.

Trail	Length (km)	Damage sites per km	Total length of damage sites	Percent of trail damaged
BTN	11.04	1.54	826	7
BTR	3.77	8.50	2,421	64
BTS	5.12	4.69	1,188	23
CAN	9.68	2.17	2,983	31
HUM	13.15	1.06	1,684	13
ONC	15.34	3.78	5,882	38
RNG	18.10	3.43	6,565	36

Table 2. Damage site summary by trail

¹⁶RNG is only designated for non-motorized use in the summer. It is open to motorized use in the winter.

We documented 89 water crossings throughout the network with the highest water crossing densities along CAN, HUM, and BTS (Table 4). Of these 89 water crossings, 7% had formal crossing structures present while 72% had permanent water moving through them. Of the six crossing structures we found, two were on ONC and two were on BTN. In many cases, vehicle tracks were found adjacent to crossing structures indicating that some riders are avoiding their use (Figure 7).

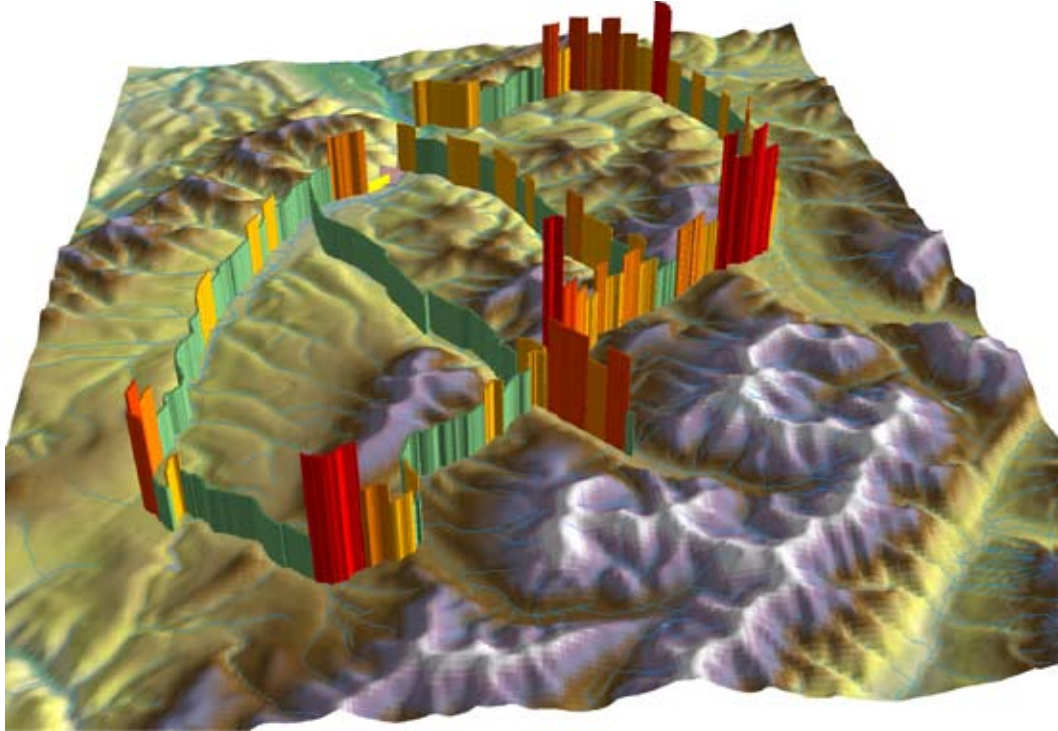


Figure 5. Erosion Event (EE) distribution within the trail network; view looking southeast from above the North Ram River headwaters. Height and colour of 500-m trail sections is related to the number of EEs within each section: 0 EEs=green; 1 EE=yellow; 2 EEs=orange; 3 EEs=dark orange; 4-6 EEs=red. Scale is variable on this projection, but the length of individual trail sections is 500 m. See Figure 2 for names of individual trails.

Trail	Length (km)	EE per km	% of damage sites with an EE	Motorized EE	Equestrian EE	Multi-user EE
BTN	11.04	1.18	76%	13	1	1
BTR	3.77	5.58	66%	20	4	3
BTS	5.12	3.13	67%	11	7	2
CAN	9.68	0.93	43%	7	4	2
HUM	13.15	0.91	86%	11	0	0
ONC	15.34	1.24	33%	19	0	0
RNG	18.10	1.93	56%	3	35	3

Table 3. Erosion Event summary by trail and user group association

Trail	Length (km)	Random campsites per km	Non-designated trails per km	Water crossings per km
BTN	11.04	0.45	1.18	1.09
BTR	3.77	0.00	2.12	0.53
BTS	5.12	0.59	0.59	1.17
CAN	9.68	0.62	0.52	2.58
HUM	13.15	0.23	1.14	1.75
ONC	15.34	0.72	0.65	0.59
RNG	18.10	0.55	2.38	0.72

Table 4. Other recreational impacts, summarized by trail

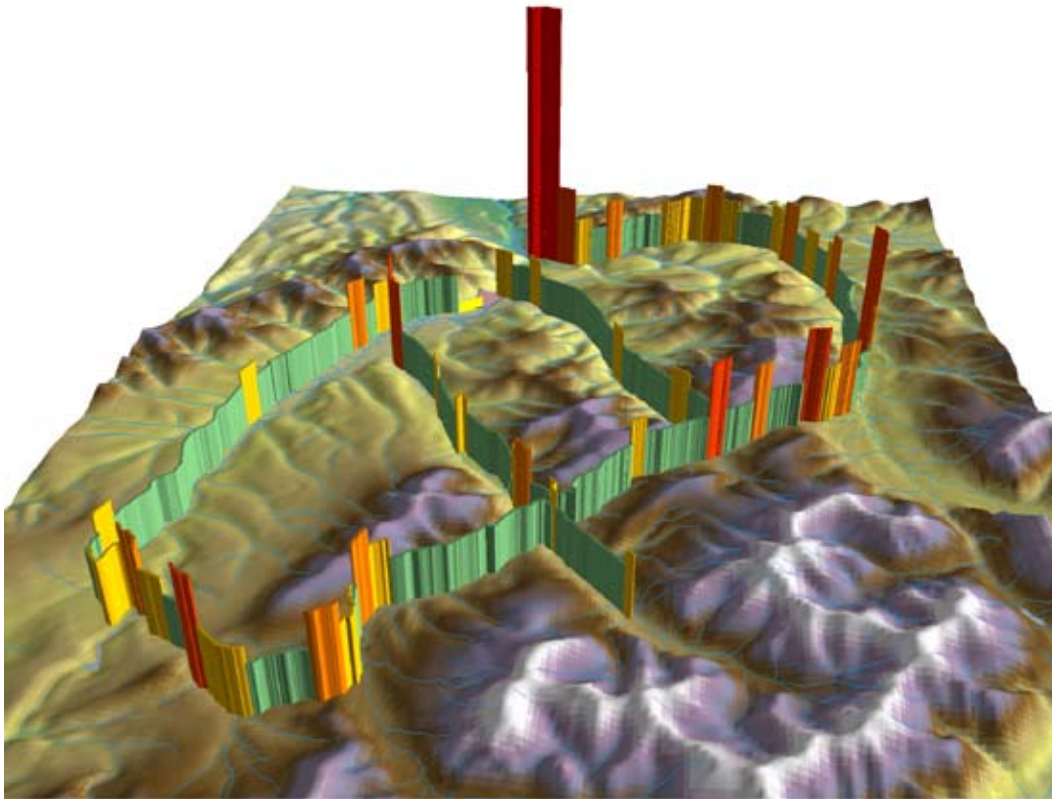


Figure 6. Non-designated trail distribution within the trail network; view looking southeast from above the North Ram River headwaters. Height and colour of 500-m trail sections is related to the number of non-designated trail junctions within each section: 0=green; 1=yellow; 2=orange; 3-5=dark orange; 6-9=red. The length of individual trail sections is 500 m, but the scale is variable on this projection. See Figure 2 for names of individual trails.

Trail	Motorized*	Equestrian*	Mixed-use*
BTN	10	3	0
BTR	3	3	1
BTS	2	1	0
CAN	1	3	1
HUM	5	9	1
ONC	3	0	7
RNG	0	34	4

Table 5. The above table shows the number of junctions of non-designated trails.

*Refer to text for explanation of how impacts were assigned to each activity.



Figure 7. A water crossing on BTN. The bridge was placed on the main trail, but users continue to drive OHVs through the creek on the left side of the photo.

Trends in motorized vehicle activity

We found a four-fold increase in the overall number of vehicle passes on designated trails (excluding ONC(2) which was only active as of 2006) during the summer period from 2004 to 2008, with the most dramatic increases at ONC(1) (Table 6). RNG was excluded from this table because motorized recreation is not permitted on this trail during the summer. We found an increase in the number of vehicle passes (Table 7) for two traffic recorders (ONC(1), CAN) operating during the winter recording window (December 1 to January 30) from the 2004/2005 season. ONC(2) has shown an increase in passes during the two winters it has been in place. Motorized traffic along BTN decreased from the 2004/2005 winter to the winter of 2006/2007. Data from BTN was not available from the 2007/2008 winter due to equipment failure.

Traffic recorder	Trail	Trend	5-year change	Total number of vehicle counts					Dates
				2004	2005	2006	2007	2008	
1	ONC(1)	INCR	577%	382	n/a	906	1712	2585	Jul 1-Sep 30
4	CAN	INCR	341%	236	379	327	701	1040	Jul 1-Sep 10
5	ONC(2)	n/a	n/a	n/a	n/a	n/a	n/a	1586	Jul 1-Sept 23
7	BTN	INCR	270%	210	343	381	n/a	778	Jul 1-Sep 11

Table 6. Summer traffic trend on designated trails, 2004-2008

Traffic recorder	Trail	Trend	4-year change	Total number of vehicle counts				Dates
				2004-2005	2005-2006	2006-2007	2007-2008	
1	ONC(1)	INCR	83%	24	35	n/a	44	Dec 1-Jan 30
4	CAN	INCR	463%	8	21	9	45	Dec 1-Jan 30
5	ONC(2)	INCR	14%*	n/a	n/a	36	41	Dec 1-Jan 30
7	BTN	DECR	45%	38	2	21	n/a	Dec 1-Jan 30

Table 7. Winter traffic trend on designated trails, 2004-2008

* Trend reported for only two seasons that unit was active.

DISCUSSION

The wilderness environment in the Bighorn Backcountry is being negatively affected by certain recreational activities. Drawing on the data from 2004 – 2008, we found that the amount of illegal activity has increased, that trail damage is severe and common, and that the overall use of the area is growing. Here we discuss the implications of our main findings.

Trend in illegal activity on trails

We found an overall increase in the amount of OHV traffic during non-designated periods, suggesting that 1) enforcement efforts during the closed period are inadequate, and/or 2) a growing number of OHV users are unwilling to abide by FLUZ regulations. Our results do not support commonly used statements like “5% of the rowdy users ruin it for the 95% of the compliant users” (SRD 2006c). Instead, we found that, as of 2008, approximately 15% of vehicle passes recorded occurred during seasonal closures when it is illegal to operate motorized vehicles on the trails, a number that has increased over the course of this study. Although this number fluctuated over the years, it never dropped below the 14% recorded in 2004, reinforcing the fact that illegal traffic is significantly greater than 5% of rowdy users.

Illegal activity on two non-designated trails has also fluctuated over the study period with alternate years showing an increase and then a decrease in illegal use. In 2008, illegal passes on these two trails have increased 33% percent since 2004. It is important to remember that these two trails represent only 5% of the non-designated trails we found that had evidence of use by motorized vehicles. Further research is warranted to determine the extent of non-designated trail use. Presently the trend is unclear and our sample size is limited in this regard. Anecdotal evidence documented during this study suggests that signs or barriers placed at the junction of non-designated and designated trails may reduce the frequency of illegal use (Figure 8).

Recreational impact on and near trails

We found extensive damage (~20% of all trails) and intensive erosion (1 EE for every 600 m of trail) throughout the trail network. There were particularly high levels of damage on BTS and BTR (Figure 9). In most cases, this damage was associated with OHV use, except on RNG, where 93% of the 41 EEs were associated with equestrian use. Both equestrian and motorized users appear capable of causing similar levels of trail damage in the area; however, we do not have data on the relationship between equestrian-user density and associated levels of trail damage. Anecdotal evidence suggests that the hardened conditions of the eastern portion of the ONC trail are at least partly responsible for the relative absence of OHV and equestrian-related damage here. The relatively flat slope along some sections of ONC, CAN, and HUM may also contribute to the durability of these sites to trail activities (Coleman 1981). Visual evidence clearly suggested that a large percentage of the trail damage observed and recorded is due to inadequate storm and stream water drainage; the mostly amateurish stewardship efforts at controlling and managing runoff on the trails had little effect.



Figure 8. SRD has placed a sign beside the trail stating that no motorized vehicles are permitted. Illegal activity persists but is declining at this site. The sign states: "Forest Land Use Zone. No motorized vehicles permitted."



Figure 9. Trail degradation due to a combination of poor water drainage and excessive motorized traffic. Pooling water in one section of the trail leads to trail braiding and exacerbates vegetation loss and soil erosion.

Trail widths in damaged areas (mean width: 8.87 m) exceed the width required for two passing OHVs or horses. SRD (2002a) defines an OHV as having a wheel-base of 1.86 m or less, so a trail designed for vehicles with this width would have a theoretical maximum width of 5.6 m for two-way traffic, which includes a 1.86-m safety buffer between oncoming traffic. In other jurisdictions, trail widths are even less than this 5.6-m theoretical maximum. For instance, the standard width used for two-way OHV trails is 2.2 m in British Columbia (BCMoF 2001), 2.5 m in Ontario (CDCSSMA 2003), 2.4 m in Wisconsin (WDNR 2005), 3 m in Nebraska (NGPC 2006), 2.1 m in Iowa (IDoT 2000), and 2.4 m for the United States Forest Service (USFS 2005). Similarly, equestrian trails are generally 0.5 m wide and possibly 3 to 4 m wide in some places for passing (BCMoF 2001; USFS 2005). Dale and Weaver (1974) found that equestrian trails with 10,000 human visits per year ranged in width from 0.75 to 2.0 m.

The results of our study and others (e.g., Snyder et al. 1976; Griggs & Walsh 1981; Iverson et al. 1981; Payne & Leninger 1983; Trunkle & Fay 1991) indicate that recreational trail use causes soil degradation and vegetation loss due to soil compaction and trampling. Thus, if environmental damage within the 23-m-wide swath of a “designated trail” (SRD 2002a) goes unaddressed, then the areal extent of tolerated vegetation and soil loss could be up to 175 ha within our study area.

In 93% of cases where designated trails encounter streams, there are no crossing structures present to help minimize the effects of OHVs or horses on water quality and fisheries. Even though we found that most water crossings occurred at permanent streams, we found few cases where bridges or fords have been established to achieve water management objectives. Without these structures, people using OHVs and horses to cross streams are causing increased bank erosion and sedimentation of the stream bed (Brown 1994; Baayens & Brewin 2002), which can in turn affect fish populations (reviewed in Baayens & Brewin 2002). Furthermore, streams in the study area are designated as Class C under Alberta’s Water Act (Government of Alberta, 1999). This designation means that from May 16 to August 31 (which partly coincides with the permitted season for OHV use on designated trails), pipeline or telecommunications construction must operate using “isolation” techniques to protect water quality while crossing streams. Alberta’s Water Act (Government of Alberta, 1999) states that for a Class C stream, “any accumulations of silt and sediment within the isolation area resulting from the works in the trench must be removed to a location where the materials will not enter a water body” (Schedule 3, Part 3, Section f). Allowing recreational trail damage on the scale we document here seems wholly inconsistent with the Water Act’s guidelines, which were established to protect wildlife and water resources.

Overall, trail sections farther away from the Hummingbird Forest Recreation Area (BTN, BTS, BTR) suffered greater amounts of damage than the hardened, flat sections of ONC, CAN, and HUM. Interestingly, these latter three trails had the highest motorized traffic densities in our study. In other words, we found relatively low amounts of damage on highly traveled trails. The discrepancy between traffic density and trail damage strongly supports the notion that the “back trails” in the Bighorn Backcountry are not properly designed and sited for their currently designated use (i.e., they were originally equestrian trails).

In 2008, we began resurveying areas along the trails that had greater potential for further degradation for the purpose of investigating trends in the intensity of impacts on the landscape. For results of the 2008 fieldwork see Appendix G.

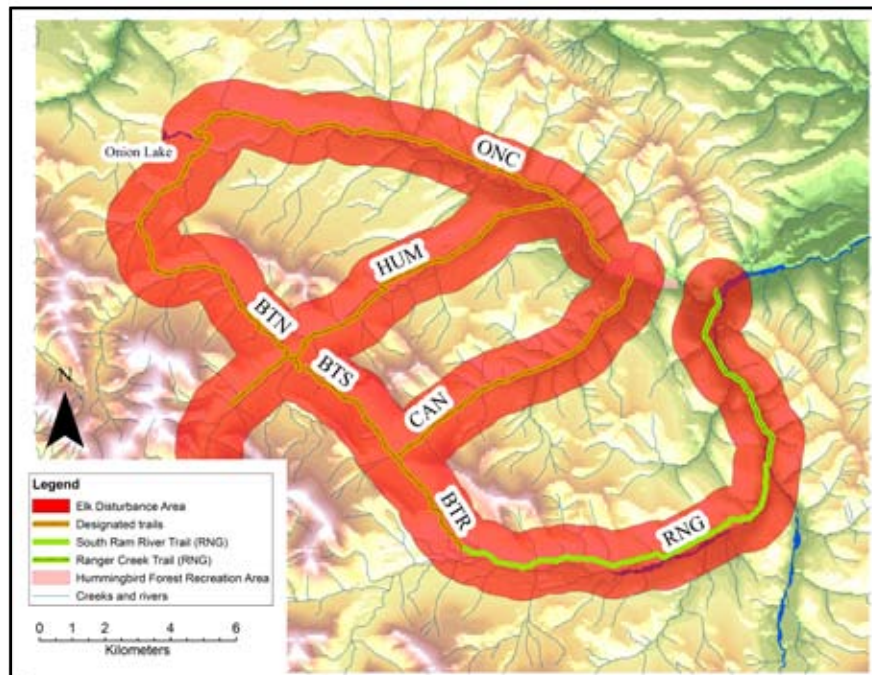


Figure 10. Trail network showing disturbance area to elk (*Cervus elaphus*), an area approximately equal to 14,355 ha (see Figure 2 for map metadata). This map is based on the results of Preisler et al. (2006), who found that probability of a flight response by an elk to an approaching OHV was ≈ 0.2 when the elk was 500 m from a trail and an OHV was 1,000 m away. The probability of disturbance increases both as elk are closer to the trail and as OHVs are closer to the elk. For example, the probability of response was closer to 0.6 when the elk was 20 m from the trail and the OHV was 1,000 m away. Likewise, the probability of response was as high as 0.4 for elk 20 m from a trail when an OHV was 3,000 m away.

Overall trend in motorized vehicle activity

We found a fourfold increase in the number of vehicle passes recorded during the summer months between 2004 and 2008. These numbers are likely underestimates of the actual amount of traffic on the trail network due to limitations in data recording by the traffic counters and because of SRD trail closures during 2005. At that time, SRD closed portions of the trail network due to abnormally high amounts of precipitation (D. Samson pers. comm.). Nonetheless, using data from 2004 to 2008 it is clear that motorized vehicle use is increasing following the establishment of the Bighorn Backcountry Access Management Plan (AMP), and the AMP is not merely regulating established, “long-term” users. In this way, problems associated with motorized recreation (see Appendix D) can be expected to increase in the future. For example, higher traffic volumes along designated trails (see Figure 10) can lead to a loss of effective habitat for elk (Preisler et al. 2006).

Given the increasing lack of compliance with FLUZ regulations, the extensive damage to the trails and surrounding areas, and the trend in increasing motorized activity, current management efforts in the Bighorn Backcountry are failing to meet the goal of the FLUZ regulations to protect “areas containing sensitive resources such as fish and wildlife and their habitats, vegetation, soils and watershed” (SRD 2002a:10). The extent and intensity of impacts reported here jeopardize the very possibility of a quality backcountry recreation experience in the future for all users and are inconsistent with wildlife habitat and watershed protection objectives.

The opinion that opening the area up to motorized recreation may have had an adverse impact on other recreational users is supported by a survey conducted by AWA of users in the Bighorn Backcountry (AWA 2008). When asked what factors hinder their optimal experience, the greatest number of respondents, both individuals and organizations, ranked other recreational users as number one. When asked to specify these other users, the greatest number then identified motorized vehicles, primarily OHVs. In the same survey respondents identified pristine wilderness, fish and wildlife habitat and a source of clean water as their top priorities for the Bighorn Backcountry.

Although 2008 marked the end of the five-year period for primary data collection for this study, AWA believes that the results warrant further monitoring of the trail network. As such, AWA will continue to monitor both traffic trends and illegal use through traffic counters. AWA will also continue with its resurveying of damage “hot spots” that began in 2008. The results from these efforts will supplement this report in the years to come.

RECOMMENDATIONS AND FUTURE RESEARCH OBJECTIVES

Below we describe issues that have arisen as a result of the change in access under the FLUZ guidelines, along with recommendations to address those issues.

Issue: *Protection of the Bighorn Backcountry's environment is long overdue.*

1) Restrict motorized recreation in the Prime Protection and Critical Wildlife Zones.

AWA recommends the severe curtailment, if not full removal, of motorized activity in the Prime Protection and Critical Wildlife Zones. If the primary goal of the FLUZ is to protect watersheds and wildlife habitat (Government of Alberta 1984; Alberta Forestry 1986), then prudent management intervention is needed to prevent further, and possibly unrecoverable, damage from occurring in this area. Without full legal protection of the Prime Protection Zone, the following recommendations must be implemented immediately.

Issue: *Illegal use of trails is increasing.*

2) Increase enforcement patrols and actions in backcountry areas (especially along BTN, BTS, and BTR trails), including substantial fines for illegal activities.

3) Ensure that all non-designated (i.e., illegal) trails are physically blocked and signed at the junction, with language indicating that motorized users proceeding off of the main trail are in violation of FLUZ regulations.

Well-placed signs appear to reduce the use of non-designated trails. However, signs have often been vandalized (e.g., removed or shot), which reinforces the need for more enforcement. Vandalized signs should be removed.

4) Redesign elements of the trail network to facilitate safety and enforcement patrols.

Trails should be clearly marked legal or illegal for OHV use, and should loop (e.g., like the Hummingbird Creek Trail) to remove the temptation for users to develop illegal trails back to their staging area.

¹⁷Under the 1977 Eastern Slopes Policy, the Prime Protection Zone (PPZ) became the zone with the highest level of protection, with the only allowed activities being "dispersed back-country" non-motorized recreation.

Issue: *Trail location and design is inappropriate for the types of use permitted in the FLUZ.*

5) Ensure that amateur stewardship efforts to repair damaged trail sections are overseen by professional engineering and construction personnel.

We found evidence of trail stewardship by local clubs, as encouraged by SRD, but in some situations these efforts will only temporarily address the problem. In many cases, water movement near or across the trail is not adequately addressed by the drainage methods used (H. Unger, P.Eng, pers. comm.). Attempts by some groups to reduce the impact of their own activities within the Bighorn Backcountry are commendable; however, additional expertise is needed in these endeavours and a more systematic approach to trail improvement must be implemented.

6) Address water quality and fisheries objectives by improving water crossings along designated trails, through the construction of bridges for permanent streams and hardened fords for ephemeral streams.

Evidence suggests an avoidance of crossing structures by many users. Approaches to streams should be hardened with gravel to reduce bank erosion and fenced to encourage their use.

7) Designate campsites along trails and enforce regulations about the removal of garbage and semi-permanent structures. Close sites where reclamation is necessary.

Unregulated camping can lead to human-wildlife conflict, wildlife habituation, conflicts between users and further landscape degradation. SRD should designate campsites to less sensitive areas, and enforce their use.

8) Increase management responsiveness to changing trail conditions by closing areas until repairs are made or the area naturally regenerates.

We recommend initiating a pilot project to measure the recovery of damaged areas and to project recovery times. This would allow managers to move forward with restoration projects throughout the area and set real targets for recovery of damaged sites based on local vegetation and soil characteristics.

9) Enforce a three-metre-wide trail designation.

The 10-m or 23-m designated trail width (SRD 2002b) in the Bighorn is far wider than in many jurisdictions in North America where OHV use is common. Having more reasonable and enforceable trail widths will help minimize environmental degradation as well as improve the efficiency of stewardship efforts. This would likely entail revision of the FLUZ regulation.

CONCLUSION

Our study provides evidence of extensive impacts to the environment caused by recreational activities in the Bighorn Backcountry. These impacts violate the intent of the Bighorn Backcountry Access Management Plan and the FLUZ regulations. Allowing recreational activities to continue at current levels is wholly inconsistent with the vision of the Prime Protection Zone designation under the Eastern Slopes Policy. Furthermore, it is inconsistent with the views of many Albertans who wish to see this area's wilderness and natural values given the greatest priority (AWA 2008). This attitude is also reflective of Albertans who, during the public consultation process for the Land-Use Framework (LUF), ranked healthy environment and ecosystems as the number one desired outcome for the LUF almost four times as often as the other two goals of well-planned places to live and play, and sustainable prosperity supported by our land (SRD 2007). A study of Albertans completed for Alberta Tourism Parks and Recreation (2008) further supports AWA's findings:

"Albertans' feel the top priority for Alberta Tourism, Parks and Recreation should be to set aside more land and leaving it in an undisturbed state (page 5). The area of lowest priority is infrastructure and land to support off-highway vehicle use (page 6)."

The recreational impacts in the Bighorn Backcountry described here underscore the sort of access management issues that are becoming common throughout the province (Canada West Foundation 2006). Similar issues are apparent in the Castle-Crown, the southeast slopes, Kananaskis Country, the Ghost-Waiparous, and areas further north along the Eastern Slopes. As access management issues continue to dominate backcountry land management, policy and management plans need to better reflect the importance of these areas for non-motorized recreation like hiking, skiing, horseback riding and mountain biking. Our government must establish clear and enforceable regulations that will ensure the protection of wildlife, watersheds, and all ecosystem services.

Recreational access issues in the Bighorn Backcountry represent both a challenge and an opportunity for users and governments. The challenge will be to meet the concerns expressed by individual user groups while ensuring that wilderness, wildlife and watershed values of the land are not depreciated. The opportunity before us is to bring traditionally disparate users together under active public land protection and stewardship by the provincial government.

Future actions by AWA

This report is intended to provide complementary data and analysis for government agencies responsible for access management decisions in the Bighorn Backcountry.

AWA will continue to monitor recreation use in the Bighorn Backcountry, and advocate for its protection. We will:

- 1) Continue to promote full legal protection of the Prime Protection Zone;
- 2) Continue monitoring efforts using traffic counters;
- 3) Spot-check severely disturbed areas for management intervention and update the photo-database of areas;
- 4) Continue “hot-spot” monitoring of trail network for comparison against baseline data to determine trends of impacts on landscape (Appendix G);
- 5) Continue to bring management/enforcement issues to the attention of authorities;
and,
- 6) Continue to be a resource for those who have questions about recreational impacts in the Bighorn and want to find a way to help.

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APPENDIX A. Reporting periods for traffic counters, 2004-2008

Year		2004												2005												2006											
Month		9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12								
Traffic counter (Trail)	1 (ONC-1)											11		1																							
	2 (NDT-1)*																										30										
	3 (NDT-2)*																									12											
	4 (CAN)																																				
	5 (NDT-3)**	31																					6	Not in this location at this time**													
	5 (ONC-2)**	Not in this location at this time**																												11							
	6 (RNG)			5									12																								
	7 (BTN)																																				
8 (HUM)	31											11											21														

Year		2007												2008									
Month		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	
Traffic counter (Trail)	1 (ONC-1)							12															
	2 (NDT-1)*									23													
	3 (NDT-2)*						19											15					
	4 (CAN)				24			12															
	5 (NDT-3)**	Not in this location at this time**																					
	5 (ONC-2)**							15		23													
	6 (RNG)																						
	7 (BTN)			4														15					
8 (HUM)																					23		

Periods when the recorders were deemed malfunctioning are highlighted in grey. Bold numbers indicate the day when the traffic recorder was not recording.

*Non-designated trails

** The original counter #5, located on a non-designated trail (NDT-3), was found to be faulty. It was replaced and relocated to ONC further up trail from the junction with HUM (ONC (2)). The unit at NDT-3 was removed on June 6, 2006 and the unit ONC (2) was launched on September 11, 2006. The dark grey highlights times when counter #5 was not in the location indicated in the left column of the chart.

APPENDIX B. Photo documentation of selected recreational impacts in the Bighorn Backcountry



1) A non-designated "frolic area" on Onion Lake. The tracks in the lakebed on the left side of the photo are from OHVs and have been found in this location every year since at least 2003.



2) A poorly-designed water crossing along HUM. Sites like these are contributing to water quality degradation and fish habitat loss.



3) Use of a non-designated trail by at least one OHV rider near traffic counter 3 in the Onion Lake area.



4) Trail braiding along the ONC trail. Note the puddling on the left branch.



5) A section of damaged trail along HUM. Poor trail construction is leading to water pooling and rutting along this OHV track.



6) Reclamation efforts along BTS by SRD. Costs of reclaiming damaged areas, as well as additional enforcement personnel needed for backcountry patrols, need to be included in any cost-benefit evaluation of managing this wilderness resource.



7) Backcountry campsite along RNG



8) Garbage gathered from one backcountry campsite along RNG

APPENDIX C. History of the Alberta Wilderness Association's interest in the Bighorn Backcountry

- **1972** – AWA begins clean-up in Bighorn Area – Pinto Lake.
- **1973 to 1974** – Province-wide public hearings include a review of the AWA's proposed Wildland Recreation Areas (areas proposed for wilderness preservation like Willmore Wilderness Park). Included is what the Alberta government later names the Bighorn Wildland Recreation Area (proposed as Panther Corners, Ram-Whiterabbit and White Goat Wildland Recreation Areas).
- **1975** – Alberta government announces that it accepts the protection recommendations of the 1974 Environment Conservation Authority report into the future of the Eastern Slopes:

“This will ensure that while some carefully selected projects will proceed in certain areas, vast tracts of land will be kept in a natural and wilderness state. A conservative estimate is that a **minimum of 70% of the Eastern Slopes Region will be maintained in present natural or wilderness areas.**”

(Government of Alberta, 1984 (revised))
- **1979** – Eastern Slopes Policy designates most of Bighorn as Prime Protection Zone, off-limits to industry and OHV use.
- **1981** – Following the establishment of Kananaskis Country in 1977, the Alberta government proposes to establish a second country, David Thompson Country – a large area in west-central Alberta including the currently proposed Bighorn Wildland.
- **1982 to 1984** – AWA is a full public consultant to the Nordegg-Red Deer River and the Rocky-North Saskatchewan Sub-Regional Integrated Resource Planning processes.
- **1984 to 1994** – AWA conducts an annual trail clean-up blitz in the Bighorn Area.
- **1986** – At AWA's annual meeting, the Minister of Forestry announces completion of the Nordegg-Red Deer River Integrated Resource Plan and names the Bighorn Wildland Recreation Area in response to the AWA's proposal. The government releases a park-like brochure, and the Wildland Area goes onto government maps.
- **1992** – In a letter to AWA, the Minister of Tourism, Parks and Recreation states his belief that the Bighorn Wildland Recreation Area “could be legislated in a manner that would provide both an appropriate level of protection and facilitate opportunities such as hiking, cross-country skiing and equestrian use.... It is our hope that imminent decisions will result in an opportunity for this positive strategy to get underway.”

- **1993** – The government appoints an Advisory Committee on Special Places 2000 and recommends that areas already managed as wildlands, including Bighorn Wildland Recreation Area, be formally designated as protected areas by the end of 1994.
- **1994** – AWA adopts the Bighorn Historic Trail through Alberta Land and Forest Services. Located in the Rocky-Clearwater Forest, the trail starts at Crescent Falls and goes to Wapiabi Gap and on to the Blackstone Gap. In addition, AWA asks to adopt an extension of this trail, from the Blackstone, over the Chungo Gap to the FLUZ boundary on the east.
- **1996** – An Alberta government report, *Parks and Protected Areas: Their Contribution to the Alberta Economy*, finds the economic contribution of provincial parks and other legally protected areas to be comparable to that of other resource-based sectors and, in particular, similar to the agricultural and forestry sectors. The report calculates only the recreation and tourism values, noting that there are also social, environmental, and other economic values from parks. In terms of employment, parks are similar to the forestry and energy sectors.
- **1998** – The “Bighorn Country” Wildlands Coalition is established, with members consisting of provincial organizations, local citizens, outdoor recreationists, ecotourism operators, and guides and outfitters from the Sundre, Nordegg, Rocky Mountain House, and Red Deer areas. The Coalition’s goal is the following:

To encourage the establishment of “Bighorn Country” as a means of ensuring the protection of this outstanding wildland for present and future generations while providing for heritage appreciation and a range of recreation and eco-tourism opportunities which are dependent on undeveloped, natural environments.
- **1998 to 2001** – AWA participates in the Alberta Forest Service–Friends of the West Country–Sunpine regular meetings in Rocky Mountain House.
- **2000** – AWA undertakes extensive discussions with Talisman Energy Inc. and the EUB regarding drilling and pipeline plans for Bighorn Country.
- **2001** – AWA withdraws from the “Bighorn Country” Wildlands Coalition to concentrate efforts on securing protection for Bighorn Wildland. Government denies existence of Bighorn Wildland. AWA demands that promised Bighorn Wildland Recreation Area be protected by legislation. Alberta government sells gas leases under Bighorn Range and within Bighorn Country, in the Wapiabi-Blackstone valleys.
- **2001** – Government re-issues gas leases under Bighorn Range.
- **2001-2002** – AWA participates in Bighorn Access Management Advisory Group.

- **2002** – AWA initiates public forums to discuss the future of the Bighorn Wildland. AWA declines to sign off on the Bighorn Access Management recommendations. AWA gives a presentation to Standing Policy Committee. Bighorn Backcountry Access Management Plan is endorsed by Alberta Cabinet. The plan goes to Caucus for final approval. The plan allows motorized access into Prime Protection Zone in violation of the Eastern Slopes Policy.
- **2003** – AWA launches the Bighorn Recreation and Impact Monitoring Program. AWA publishes a new book, *Bighorn Wildland*, and begins a book tour through Alberta communities to educate Albertans about the Bighorn and conservation, and to re-launch the Bighorn campaign. AWA meets with Minister SRD Mike Cardinal and representatives to demand Wildland Park designation for the Bighorn and the prohibition of motorized and industrial access.
- **2004** – The tenth anniversary of AWA's stewardship of the Bighorn Historic Trail.
- **2005** – AWA meets with Minister of Community Development Gary Mar to discuss, among other items, designating Bighorn as a Wildland Park in celebration of Alberta's centennial year. Mar indicates that with the current government, it is extremely difficult to get any new protected areas in Alberta. Although Mar says that he wants Alberta's parks to be the "lens through which the world sees Alberta," he says his focus is to maintain existing parks in Alberta with upgrades to infrastructure and programming. This is backed up in following months with the release of the budget allocating approximately \$60 million to parks for infrastructure, staffing, and fire prevention. Unfortunately, there is no mention of the creation of any new parks or protected areas.
- **2006** – AWA continues community outreach efforts and meets with members of the Alberta Equestrian Federation to review concerns of common interest, including trail damage and overuse. Restoration efforts and plans to work together are discussed. AWA completes the 2006 field season (five field trips) and interim report for the Bighorn Wildland Recreation Monitoring Project (BWRMP) 2005 season. An executive summary of 2005 BWRMP interim report is sent to SRD, Clearwater Area. The report contains 10 recommendations on policy and management of the Hummingbird Recreation Area. AWA discusses some points at a meeting with SRD, Clearwater Area, and requests a written response to our recommendations. AWA holds an additional meeting with SRD, Clearwater Area to discuss TRAFx data in detail, as well as locations of damage, etc. AWA receives acknowledgement from SRD, Clearwater Area, on the 2005 Interim Report; they note that AWA concerns and many recommendations have been included in their work plans for this year. An Executive Summary of BWRMP, covering letter, and copy of the Bighorn Wildland book are sent to all MLAs. AWA participates in government-led meetings and processes regarding R11 FireSmart and the Ya Ha Tinda Environmental Assessment related to elk management ideas and plans.

AWA participates in meetings and open house sessions in Sundre with SRD Forest Service, individuals, and local interests in response to development plans submitted by Panther River Adventures under the ATRL process. Oil and gas development in the Bighorn area are reviewed routinely throughout the year with the major companies operating in the area. AWA continues its commitment to the Bighorn Historic Trail with the completion of a successful trail-clearing trip. Concerns with trail conditions and usage report are filed with SRD, Clearwater Area.

- **2007** – AWA completes the first phase of *The Bighorn Wildland Recreational Trail Monitoring Project: An Interim Research Summary from 2004 – 2006*. The report is officially released in a meeting with SRD Minister Ted Morton. Presentations are made to SRD staff from Clearwater Area; discussions and collaboration with field staff are ongoing. A recreational user survey is developed and organized user groups as well as individual users are surveyed to learn more about recreational user interests and values for the Bighorn area. AWA hosts talks about the Bighorn and the trail monitoring project. We continue to engage government and industry regarding the area and publish articles on the Bighorn in the *Wild Lands Advocate*. AWA continues its commitment to the Bighorn Historic Trail with the completion of a successful trail-clearing trip. Concerns with trail conditions and usage report are filed with SRD, Clearwater Area.
- **2008** – AWA finalizes report on the recreational user survey entitled *Recreational User Perceptions of the Bighorn: Land Management Values and Concerns, Present and Future*. A copy of the executive summary along with that of this report are mailed to every Alberta MLA. SRD Minister Ted Morton and Tourism, Parks and Recreation (TPR) Minister Cindy Ady receive full copies of the report. An article detailing the findings is published in the February issue of the *Wild Lands Advocate*. The final data collection of the trail monitoring project will be done during the summer of 2008. AWA conducts a water quality study on the Panther River to investigate concerns regarding development impacts related to four Alberta Tourism Recreational Leases. AWA carries out a trail maintenance trip up the Clearwater River drainage.
- **2009** – AWA completes the Bighorn Wildland recreational trail monitoring project begun in 2003 and produces a final report, *Is the Access Management Plan Working? Monitoring Recreational Use in the Bighorn Backcountry*. The report details increased illegal use of trails with seven major findings and makes a strong case for the removal of motorized trails from the Prime Protection Zone. AWA meets with Alberta SRD Minister Ted Morton to present the findings of the report and discuss protection of Bighorn Wildland.

APPENDIX D. Annotated bibliography on the impacts of motorized recreation on various environmental features

Feature	Impact	Effect	Jurisdiction	Source*
Soil	Toxins	Lead contamination from exhaust.	Wisconsin, USA	Collins & Sell 1982
Soil	Erosion	Soil loss 8 times greater in areas with vegetation loss caused by recreation.	California, USA	Snyder et al. 1976
Soil	Erosion	OHV caused cracks 24 cm deep within 1 season on wet soils.	California, USA	Griggs & Walsh 1981
Soil	Erosion	Sediment transport was 196 times greater and 80 times greater in heavy and moderate OHV-use areas, respectively, compared to no-use areas.	California, USA	Griggs & Walsh 1981
Soil	Compaction	Vegetation loss, water surface runoff increases, decreased sub-surface infiltration capacity.	California, USA	Iverson et al. 1981
Vegetation	Loss	Up to 99% of vegetation loss occurred after 32 passes by an OHV.	Northern Great Plains, USA	Payne et al. 1983
Vegetation	Weeds	2,000 knapweed seeds spread over 10 miles in 1 pass by a vehicle.	Montana, USA	Trunkle & Fay 1991
Water	Habitat	Sediment deposition in streams increases with OHV traffic volume and stream velocity.	Victoria, Australia	Brown 1994
Water	Toxins	Brook trout showed lead and hydrocarbon uptake from winter OHV use; fingerling stamina decreased in polluted areas.	Maine, USA	Adams 1975
Wildlife	Various	Decreased population size (45-80%) and biomass of reptiles, songbirds, and mammals in OHV areas.	California, USA	Bury et al. 1977
Wildlife	Bighorn sheep	Use of a watering site was 50% less when OHVs were in the area.	California, USA	Jorgensen 1974
Wildlife	Grizzly bear	Avoid areas with >10 vehicles per day.	Montana, USA	Mace et al. 1996
Wildlife	Elk	Flushed from areas near trails when an OHV approached at 3,000 m.	Oregon, USA	Preisler et al. 2006
Wildlife	Trout	Sedimentation of stream water by OHV crossing upstream was at levels high enough to affect behaviour and growth of trout.	Alberta, Canada	Baayens & Brewin 2002

*Complete reference information available on request.

APPENDIX E. Bighorn Wildland Recreational Impact Monitoring Study: Project inputs and outputs

Inputs

Field work

Personnel: 3,130 staff hours
1,058 volunteer hours

TOTAL: 4,188 hours

Capital costs: \$7,000 traffic recorders
\$12,229 expedition costs (e.g., food, transportation)
\$2,000 equipment (GPS, camping, safety, tools)
\$131,537 personnel
\$4,000 video documentary
\$20,000 *Bighorn Wildland* book
\$3,040 outreach activities
\$2,850 reconnaissance flights

TOTAL: \$182,656

Outputs

Final report on project released and delivered to Minister and staff of Sustainable Resource Development (March, 2009).

Documentation of trends in motorized recreational use of network, including total use and illegal out-of-season use.

Baseline documentation of recreational impacts on 76 km of trail, including photographs, geo-referencing, and measurements of illegal trails, water crossings, damage sites, and random campsites. Commencement of resurveying “hot-spots” in 2008.

Public presentations on research (Red Deer, December 2008; Calgary, October 2007).

Presentation to Ghost Stewardship Monitoring Group (June 2008).

Interim report presented to Hon. Ted Morton, Minister of Sustainable Resource Development (March 2007).

Meeting with AEF (Alberta Equestrian Federation) (November 2005).

Meeting with Hon. Gary Mar, Minister of Community Development, to discuss, among other items, designating Bighorn as a Wildland Park in celebration of Alberta’s centennial year (February 2005).

Poster presentation at the Interdisciplinary Research and Management in Mountain Areas Conference, Banff, AB. “Monitoring the Impact of Recreational Activities for Long-term Management in the Bighorn Wildland, Alberta” (September 2004).

Meeting with Hon. Mike Cardinal, Minister of Sustainable Resource Development, and representatives to discuss Wildland designation for the Bighorn and the prohibition of motorized and industrial access (November 2003).

Meetings with various Alberta MLAs regarding issues concerning the Bighorn (starting in October 2003).

Publication of the *Bighorn Wildland* book (September 2003).

Production of the documentary *Broken Promises*, with assistance from George Sibley of Gale Force Films (2003).

Various letters, meetings, and phone conversations between AWA and SRD officials in the Rocky Mountain House office (2003-2008).

Commencement of the Recreational Impact Monitoring Project (May 2003).

APPENDIX F. Inconsistencies in official statements with respect to access management in the Bighorn Wildland

Statement	Source	Contradiction
The widening and development of new trails requires written approval from a Forest Officer. Avoid wet, soft and sensitive areas.	Guidelines for Enjoying the Bighorn Backcountry (SRD 2006a)	<u>Field evidence:</u> 91 non-designated trails established as of 2006, with OHV tracks on 41% of these. 125 Erosion Events along trails. Mean width of damaged trail sections is ≈ 9 m, maximum ≈ 50 m. 244 cases of trail braiding and widening (AWA this report).
The Bighorn Backcountry is managed to ensure the protection of the environment, while allowing responsible and sustainable recreational use.	Introduction: Bighorn Backcountry (SRD 2006a)	<u>Field evidence:</u> Illegal use of trails is increased by 7% from 2004 to 2006. Approximately 20% of motorized vehicle traffic was recorded during non-designated (illegal) periods. Trail degradation was found on 20% of the trail network and motorized traffic in the area is increasing (AWA this report).
The area was included in the 1977 (revised 1984) Policy for Resource Management of the Eastern Slopes and also in the Nordegg-Red Deer River Sub-Regional Integrated Resource Plan of 1986. These plans remain in place, and are now (as of 2002) supported further by a Bighorn Backcountry Access Management Plan, developed with input from an advisory group and from the public at large.	Bighorn Backcountry Access Management Plan (SRD 2002a)	<u>Policy evidence:</u> The Nordegg-Red Deer River Sub-Regional Integrated Resource Plan of 1986 (Alberta Forestry) explicitly prohibits motorized recreation in areas now approved for these activities by the Access Management Plan, especially in the Upper Clearwater/Ram FLUZ.
Alberta implemented regulations in 2002 around camping, trail riding, and OHVs to protect Bighorn Backcountry's wilderness environment.	Bighorn Backcountry Access Management Plan (SRD 2002a)	<u>Field evidence:</u> 91 non-designated trails established as of 2006, with OHV tracks on 41% of these. 125 Erosion Events along trails. Mean width of damaged trail sections is ≈ 9 m, maximum ≈ 50 m. 244 cases of trail braiding and widening (AWA this report).

Statement	Source	Contradiction
The Nordegg-Red Deer River Sub-Regional Integrated Resource Plan of 1986 explicitly prohibits motorized recreation in areas now approved for these activities by the Access Management Plan, especially in the Upper Clearwater/ Ram FLUZ.	Bighorn Backcountry Access Management Plan (SRD 2002a)	<u>Field evidence:</u> 91 non-designated trails established as of 2006, with OHV tracks on 41% of these. 125 Erosion Events along trails. Mean width of damaged trail sections is ≈9 m, maximum ≈50 m. 244 cases of trail braiding and widening (AWA this report).
A 23-m trail width wherein damage to water, soil, and vegetation is allowed to occur is inconsistent with environmental protection objectives.	Bighorn Backcountry Access Management Plan (SRD 2002a)	<u>Field evidence:</u> 91 non-designated trails established as of 2006, with OHV tracks on 41% of these. 125 Erosion Events along trails. Mean width of damaged trail sections is ≈9 m, maximum ≈50 m. 244 cases of trail braiding and widening (AWA this report).
No-Go Zone: An area where OHV or other form of access (as posted) is not permitted, including any lands off the designated trails other than parking areas; any lands within 100 metres of a lake, pond or non-flowing body of water; any meadows, swampland, marsh, stream, grassed slope or other area off the designated trail.	Bighorn Backcountry Access Management Plan (SRD 2002a)	<u>Field evidence:</u> Water crossings over 89 streams, of which 7% had bridges (AWA 2007). 91 non-designated trails established as of 2006, with OHV tracks on 41% of these. 125 Erosion Events along trails. Mean width of damaged trail sections is ≈9 m, maximum ≈50 m. 244 cases of trail braiding and widening (AWA this report).
There must be adequate resources to ensure that regulations can be effectively enforced.	Recreational Access Recommendations for the Bighorn Area (SRD 2002a)	<u>Field evidence:</u> Illegal use of trails is increased by 7% from 2004 to 2006. Approximately 20% of motorized vehicle traffic was recorded during non-designated (illegal) periods.

Statement	Source	Contradiction
Activities allowed in this area will be restricted or delayed if present levels of activity are shown to compromise environmental integrity.	Recreational Access Recommendations for the Bighorn Area (SRD 2002b)	<p><u>Field evidence:</u> Water crossings over 89 streams, of which 7% had bridges (AWA this report). 91 non-designated trails established as of 2006, with OHV tracks on 41% of these. 125 Erosion Events along trails. Mean width of damaged trail sections is ≈ 9 m, maximum ≈ 50 m. 244 cases of trail braiding and widening (AWA this report).</p> <p><u>Policy evidence:</u> The Nordegg-Red Deer River Sub-Regional Integrated Resource Plan of 1986 explicitly prohibits motorized recreation in areas now approved for these activities by the Access Management Plan, especially in the Upper Clearwater/Ram FLUZ.</p>
User groups should be engaged directly in stewardship programs, giving them more responsibility for facility improvements and maintenance, but cautioned that the provincial government must also have adequate resources in place.	Recreational Access Recommendations for the Bighorn Area (SRD 2002b)	Stewardship efforts are poorly engineered to address water drainage issues near trails with OHV and high density equestrian traffic (AWA this report).
Temporary or permanent closures should be implemented in areas where continued use of those areas will have negative effects on fish and wildlife populations, natural habitat conditions, watershed integrity or traditional aboriginal sites.	Recreational Access Recommendations for the Bighorn Area (SRD 2002b)	Water crossings over 89 streams, of which 7% had bridges (AWA this report). 91 non-designated trails established as of 2006, with OHV tracks on 41% of these. 125 Erosion Events along trails. Mean width of damaged trail sections is ≈ 9 m, maximum ≈ 50 m. 244 cases of trail braiding and widening (AWA this report).
Where areas have deteriorated from overuse, these areas should be restored to natural conditions. This is especially true of areas around alpine lakes. Appropriate measures must be taken to ensure that the damage will not re-occur.	Recreational Access Recommendations for the Bighorn Area (SRD 2002b)	The lakebed of Onion Lake had new OHV track marks every year from 2004-2006 (AWA 2007). Water crossings over 89 streams, of which 7% had bridges (AWA 2007). 91 non-designated trails established as of 2006, with OHV tracks on 41% of these. 125 Erosion Events along trails. Mean width of damaged trail sections is ≈ 9 m, maximum ≈ 50 m. 244 cases of trail braiding and widening (AWA this report).

Statement	Source	Contradiction
Some members believe that OHV use in the prime protection zone is specifically prohibited by existing policy. Other members believe that designated trails would be consistent with existing policy.	Recreational Access Recommendations for the Bighorn Area (SRD 2002b)	<u>Policy Evidence</u> The Nordegg-Red Deer River Sub-Regional Integrated Resource Plan of 1986 (Alberta Forestry) explicitly prohibits motorized recreation in areas now approved for these activities by the Access Management Plan, especially in the Upper Clearwater/Ram FLUZ.
Some members believe that OHV use causes damage to terrain and disruption to wildlife and people in areas they access. Others believe that OHV users will be highly responsible and will be positive contributors to the protection of the area, and the maintenance of trails and facilities.	Recreational Access Recommendations for the Bighorn Area (SRD 2002b)	<u>Field evidence:</u> Illegal use of trails is increased by 7% from 2004 to 2006. Approximately 20% of motorized vehicle traffic was recorded during non-designated (illegal) periods. Trail degradation was found on 20% of the trail network and motorized traffic in the area is increasing (AWA this report). <u>Policy evidence:</u> Uncontrolled vehicle access and lack of maintenance on roads leading up ... Onion Creek ... have resulted in terrain damage and erosion (Alberta Forestry 1986)
Where trails or campsites are too close to sites habitually used by ungulates or carnivores, these facilities should be moved or closed. In some cases, it may be necessary to restrict backcountry camping to designated campsites.	Recreational Access Recommendations for the Bighorn Area (SRD 2002b)	<u>Field evidence:</u> Figure 10 (elk disturbance area)
The intent of the Prime Protection Zone is to preserve environmentally sensitive terrain and valuable ecological and aesthetic resources. Regional objectives which are considered compatible with the intent of this zone include those of watershed, fisheries and wildlife management, and extensive recreational activities such as hunting, trail use (non-motorized) and primitive camping.	A Policy for Resource Management of the Eastern Slopes, revised 1984 (Government of Alberta 1984)	<u>Field evidence:</u> Water crossings over 89 streams, of which 7% had bridges (AWA this report). 91 non-designated trails established as of 2006, with OHV tracks on 41% of these. 125 Erosion Events along trails. Mean width of damaged trail sections is ≈9 m, maximum ≈50 m. 244 cases of trail braiding and widening (AWA this report). <u>Policy evidence:</u> Bighorn Backcountry Access Management Plan (SRD 2002a)

APPENDIX G. Results of 2008 survey of damage “hot-spots”

In 2008, AWA began resurveying areas along the trail that in the initial trail survey, conducted from 2003 to 2006, showed high potential for further degradation. In the initial survey of the trail network, as outlined in the main report, AWA found 453 specific features of concern. Out of these, 156 were identified as damage “hot-spots.” In 2008, 10 of the 156 hot-spots were randomly selected for re-measuring. Measurements were conducted using the same methods and protocol as used in the initial survey, outlined in the main report. Hot-spot monitoring will continue in future years so as to investigate trends in the intensity of recreational impacts on the trail network and surrounding landscape.



Map showing locations of hot spots revisited in 2008.

Results

Damage Sites **BTSDS003**

Dates Observed	Damage Type	Track type present	Max. Width (m)	No. of braids	Braid width (m)	Length (m)	Vegetation Damage	Structural Damage	Max Depth (m)	Erosion Event
08/03/2005	rut, braid, erosion	OHV	7	1	n/a	16	severe	severe	0.45	yes
07/14/2008	rut, braid, erosion	Old OHV	6.8	1	1.7	16	severe	severe	0.34	yes

Comments: Heavy damage on main trail and on braid. Trail has been rerouted and damage site blocked.

CANDS014

Dates Observed	Damage Type	Track type present	Max. Width (m)	No. of braids	Braid width (m)	Length (m)	Vegetation Damage	Structural Damage	Max Depth (m)	Erosion Event
08/03/2005	rut, braid, erosion	OHV/ horse	21	1	n/a	92	severe	severe	0.30	yes
08/17/2008	rut, braid, erosion	OHV/ horse	21	1	3.3	108	severe	severe	0.21	no

Comments: A well established trail into a random camp, severe damage with deep ruts, OHV and horse use.

CANDS016

Dates Observed	Damage Type	Track type present	Max. Width (m)	No. of braids	Braid width (m)	Length (m)	Vegetation Damage	Structural Damage	Max Depth (m)	Erosion Event
08/03/2005	rut, braid, erosion	OHV	12	1	n/a	460	severe	severe	0.35	yes
08/17/2008	rut, braid, erosion	OHV/ horse	15.5	2	2.9	n/a	severe	severe	0.24	no

Comments: Very lengthy damage site. OHV braiding to avoid wet sections on trail. Due to extensive use, braid has now become part of the main trail.

CANDS020

Dates Observed	Damage Type	Track type present	Max. Width (m)	No. of braids	Braid width (m)	Length (m)	Vegetation Damage	Structural Damage	Max Depth (m)	Erosion Event
08/03/2005	braid	OHV/ horse	22	1	n/a	75	severe	moderate	0.15	no
08/17/2008	braid	OHV/ horse	n/a	1	5	92	severe	moderate	0.15	no

Comments: ATV trail bifurcates before crossing Hummingbird Creek. Damage is severe in that it is a wide area that is impacted.

RNGDS001

Dates Observed	Damage Type	Track type present	Max. Width (m)	No. of braids	Braid width (m)	Length (m)	Vegetation Damage	Structural Damage	Max Depth (m)	Erosion Event
07/21/2004	braid	horse	10.4	1	n/a	21	severe	moderate-severe	0.35	yes
08/17/2008	braid	horse	11.5	2	1.4/ 0.7	24/ 19.3	severe/ slight	severe/ slight	0.28/ 0.08	yes/ no

Comments: High priority horse braid due to erosion depth and site width. Original braid has worsened; second braid beginning to avoid wet area as well.

Water Crossings

BTNWX005

Dates Observed	Crossing Structure	H₂O present	Width (m)	Length (m)	Area (m²)	Vegetation Damage	Structural Damage	Repair Type
08/02/2005	no	yes	2	n/a	n/a	slight	severe	
07/14/2008	no	yes	2.2	15	3.3	slight	severe	n/a

Comments: Stream may be ephemeral. Deep ruts on trail approaching water crossing from south. In 2005 ruts measured 0.9m deep; in 2008 ruts measured 0.7m. In 2008, water was flowing much further down trail than in 2005.

CAWX023

Dates Observed	Crossing Structure	H₂O present	Width (m)	Length (m)	Area (m²)	Vegetation Damage	Structural Damage	Repair Type
08/03/2005	no	yes	6	n/a	n/a	moderate	moderate	
08/18/2008	no	yes	3	5.2	15.6	moderate	moderate	n/a

Comments: Water source is a drainage/spring. Damage is light; however, water would normally run perpendicular to trail but a part of it drains off and runs down trail, creating damage.

RNGWX011

Dates Observed	Crossing Structure	H₂O present	Width (m)	Length (m)	Area (m²)	Vegetation Damage	Structural Damage	Repair Type
08/10/2005	no	yes	2	n/a	n/a	none	moderate	
08/18/2008	no	yes	0.74	3.7	2.74	none	moderate-severe	rock diversion

Comments: At first observation water was running down trail. Recently, large rocks have been placed to help divert water across trail, although evidence that at high flow water does run down trail. Accompanying damage from use of wet trail.

Random Camps

ONCCP001

Dates Observed	Width (m)	Length (m)	Area (m²)	Garbage present	No. of access points	Vegetation Damage	Structural Damage
08/03/2006	32	120	3840	yes	n/a	severe	severe
07/13/2008	37	117	4329	yes	slight	severe	severe

Comments: Random campsite has two access points from trail, several fire rings, garbage, and abandoned homemade latrines. Extensive horse use damage to trees and roots.

Systematic Survey Site

BTN F

Dates Observed	Systematic Site Type	Braiding present	Max Width (m)	Vegetation Damage	Structural Damage
08/02/2005	OHV	no	n/a	severe	slight
07/14/2008	OHV	yes	4.8	severe	moderate

Comments: Illegal OHV trail up ridge. Since first observation, a sign has been installed indicating that the trail is not to be used. However, tracks indicate that sign is being ignored and there is now a new braid 14m long.

Select Photographic Evidence



Observed July 21, 2004



Observed August 17, 2008



Observed July 14, 2004



Observed August 2, 2008



Observed August 2, 2005



Observed July 14, 2008

Discussion

Three and four years later, most damage sites revisited show comparable or slightly greater damage than was observed during the initial survey. All damage sites show a similar impact on vegetation and trail structure, often severe, as was previously noted with the exception being RNGDS001, which is showing signs of greater structural impacts since 2004. Length and width of damage is comparable considering that measurements include some subjective reasoning as to the endpoints of damage. One interesting note is that the maximum depth in four out of five cases has decreased. It is unclear whether this is caused by deposition from recreational activities or by natural means. It may warrant further investigation.

Water crossings also show a comparable level of damage as to when first observed three years ago. The size of the water crossings from one year to the next is highly variable due to several factors affecting flow and volume, such as timing of melt, precipitation, etc. Three years later none of the three water crossings we revisited had been improved in a satisfactory manner. While in other places along the trail culverts had been installed, these three crossings and their associated damage remain unresolved except for an improvised rock diversion at RNGWX011 that may offer a minimal and temporary solution at best.

As with the damage sites and water crossings, the random campsite we inspected remains in a similar state as when first surveyed. Its size may have increased and the several fire rings present may have been rebuilt in new locations, but the overall impact on the land remains the same. This site in particular has extensive vegetation damage associated with tying horses to trees. As well, during the recent visit it was noted that a homemade and abandoned latrine was found some way from the site. This remains a concern throughout the trail network with any one campsite showing evidence of several deserted latrines neither dismantled nor remediated in a satisfactory method.

Finally, the illegal trail located at the top of the BTN pass shows evidence of both positive and negative changes. There is now a sign posted identifying the trail as off-limits to OHVs and a small wood pile blocking the original trail. However, OHVs are circumventing the pile, creating a new braid. It is apparent that further efforts are needed in both trail maintenance and enforcement to address this concern.

Conclusion

In 2008, AWA revisited 10 sites along the trail network, resurveying the damage caused by recreation. Damage is comparable to two to four years ago. It appears that these sites are either maintaining the previous level of damage or slightly degrading. Due to the small sample of sites visited in 2008, further investigation is needed to be able to draw firm conclusions. In future years it will be important to continue the survey of hot-spots, optimally all 156, to gain enough data to draw firm conclusions as to how the landscape is impacted by current recreational use.



*"We are not fighting progress. We are making it.
We are not dealing with a vanishing wilderness.
We are working for a wilderness forever."*

- Howard Zahniser, author of the U.S. Wilderness Act



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