

ATTRACTION OF BIGHORN SHEEP TO WELLSITES AND OTHER MAN-MADE MINERAL LICKS  
ALONG THE EASTERN SLOPES OF ALBERTA: A MANAGEMENT CONCERN.

LUIGI E. MORGANTINI, Wildlife Resources Consulting Ltd., Box 642, Sub 11,  
Univ. of Alberta, Edmonton, AB T6G 2E0

ELDON BRUNS, Alberta Fish and Wildlife Division, Rocky Mountain House, AB  
T0M 1T0

**Abstract:** Bighorn sheep (*Ovis canadensis canadensis*) were attracted to salty deposits found on gas wellsites and on other disturbed areas in the Panther River region along the eastern slopes of the Rocky Mountains of Alberta. During the study on movements and distribution, it was determined that sheep frequently used 5 man-caused mineral licks within 45 km<sup>2</sup> of mountain terrain. The use of these sites was observed during all seasons and frequently involved long range movements. The concentration of bighorn sheep on these sites, their habituation to people and vehicular traffic, and their increased exposure to legal and illegal hunting, are reasons for concern and are discussed in this paper.

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Wildlife use of wellsites and other industrial locations has been previously reported and the attraction has been related to the presence of sodium and other minerals spilled on the soil during operations (Jones and Hanson 1985, Morgantini and Worbets 1988). However, until recently (Morgantini and Worbets 1988), the extent to which some species may use these sites was little appreciated.

During the 1960s and 1970s, numerous gas wells were drilled along the eastern slopes of the Rocky Mountains in Alberta. They are located in a variety of habitat types from low elevation muskegs and black spruce forests to upper-subalpine pine and spruce forests, and open slopes. Over the years, incidental observations by hunters and biologists indicated that some of the sites were used as mineral licks by bighorn sheep, elk, deer and moose. Unverified reports warned that, because of easy vehicular access, animals on these sites were frequent victims to unregulated hunting (poaching and native hunting). Nevertheless, the use of wellsites by wildlife was not believed to be a reason for major concern.

This paper reports on the results of a 3 year study on bighorn sheep movements and distribution along the eastern slopes of the Rocky Mountains in west-central Alberta (Morgantini and Worbets 1988, Morgantini unpubl. data).

ATTRACTION OF BIGHORN SHEEP TO GAS WELLSITES

In the Panther River region of west-central Alberta, bighorn sheep were attracted to 4 wellsites and one seismic shothole found within 45 km<sup>2</sup> of mountainous terrain (Table 1).

Table 1. Approximate linear distance (kilometers) between wellsites used as mineral licks by bighorn sheep in the eastern slopes of Alberta's Rocky Mountains.

	Canterra 5-23	Panther 1	Panther 3	Panther 7	Shothole
Canterra 5-23	0				
Shell Panther 1	3	0			
Shell Panther 3	6	3	0		
Shell Panther 7	9	7	9	0	
Shothole	3	6	8	6	0

The animals that frequented these wellsites were part of a population that ranged over 400 km<sup>2</sup>, inside and outside Banff National Park. As of 1988, the wellsites were capped and not in production. Until recently, motorized access on all-weather roads was possible.

The wellsites were found in different environments. Two were located in the upper foothills, within dense pine and spruce forests, 3 and 6 km distant (linear) from sub-alpine and alpine spring-summer ranges. One wellsite was located in a mature spruce forest at the base of a sub-alpine open slope used as early-winter range. The last wellsite was in the upper-subalpine within spring-summer ranges. The shothole was found in a mature spruce forest along a creek that separated winter from spring-summer ranges.

The wellsites were used, at one time or another, by all the animals in the region. However, the season and the level of use differed (Table 2), reflecting distance from seasonal ranges and the presence of escape terrain.

While the use of 3 wellsites had never been continuously monitored, data collected with time-lapse cameras (one frame every 3 1/2-4 minutes during daylight hours) on Canterra 5-23 and Shell Panther 7 (Morgantini and Worbets 1988, Morgantini unpubl. data) were considered representative for the entire region, particularly for the months of May and June (Table 3). The cameras only monitored the mineral lick and did not record the numerous instances when bighorn sheep were forced off site by vehicles or people taking pictures.

The strong attraction of bighorn sheep to wellsites was evident not only during the servicing and testing of Canterra 5-23 (Morgantini and Worbets 1988), but also in June 1987, when bighorn sheep detected the presence of an open sump on Shell Panther 1, a wellsite that previously did not have any lick on site. A herd of 18 young rams took over the

Table 2. Season and level of use of 5 wellsites by bighorn sheep, 1984-1987.

	Season	Time	No. animals at one time	Sex-age
Canterra 5-23	Spring-summer-fall	Almost everyday	up to 50	rams-ewes-lambs
Panther 1 <sup>a</sup>	Spring-?-	Almost everyday	up to 20	rams
Panther 3	Spring-summer-fall	Almost everyday	up to 30	ewes-lambs
Panther 7	Winter-spring-(summer)	Periodic	up to 15	rams
Shothole	Winter-spring-summer-fall	Almost everyday	up to 50	rams-ewes-lambs

<sup>a</sup> The attraction to this wellsite developed as a result of well testing in the fall of 1986. In spring, when bighorn sheep started using the site, the area was fenced off with a 2 m high pagewire fence.

Table 3. Use of Canterra 5-23 and Shell Panter 7 wellsites by bighorn sheep as measured through time-lapse cameras.

	Total no. of frames	No. of frames with animals	Total no. of animals counted
Canterra 5-23:			
May 1-31, 1985	5,582	2,779	16,098
May 16-June 27, 1986	10,317	2,021	8,974
Shell Panther 7:			
June 11-July 19, 1986	5,817	387	570

site, did not want to leave in spite of the use of numerous scaring devices by the senior author. After a 2 m high pagewire fence was erected, the young rams attempted to jump over it or to knock it down.

On all wellsites, bighorn sheep licked and ate soil containing minerals used during gas well drilling and testing. Sodium appeared to be

the major attraction. In some instances, the lick was localized to a specific site. For instance, on Canterra 5-23 and Shell Panther 3 the mineral lick was represented by water seeping through old sumps. On Shell Panther 7, water seeped upward through the sump. However, in most cases, each lease area (approx. 10,000 m<sup>2</sup>) had turned into a mineral lick following bulldozer work to recontour the site. The mineral lick at the seismic shothole was associated with minerals brought up by a flowing spring.

#### MANAGEMENT CONCERNS

The presence of these artificial mineral licks and their heavy use by bighorn sheep are reasons for concern: 1) crowding and range depletion, 2) altered distribution, 3) tameness, 4) toxic chemicals, and 5) hunting (recreational, poaching, subsistence). These concerns are discussed in order.

Large numbers of bighorns concentrate and remain for a long time on small areas trying to eat soil and dirt. Dominance interactions with body contacts among all sexes and ages are frequent. Abrasion of the skin by the soil creates ideal conditions for the development of contagious ecthyma (Samuel et al. 1975, Karstad 1981). Associated crowding allows it to spread, as well as spreading of any other infectious disease. In 1986, 2 lambs showing the initial stages of contagious ecthyma were found on 2 wellsites. One ram, with its face badly scarred by secondary infections, was observed on another wellsite, and later was taken by a hunter. The continuous use of wellsites also leads to overgrazing conditions on the limited adjacent range.

One of the wellsites is located in the upper foothills, within a black spruce forest. The animals forage on grasses growing in the cleared area. The proximity of a ravine offers some escape terrain. Another wellsite is also located in what would be considered marginal bighorn sheep habitat. It could be suggested that these wellsites are beneficial to bighorns because they actually expand the range of the population. However, increased vulnerability to predation, increased energy expenditures for travel, and foraging on suboptimal ranges may be ultimately deleterious to the long term health of the population.

The over-riding attraction to mineral licks, association with motorized vehicles, and the frequent presence of industry personnel and recreationists can ultimately lead to the habituation of bighorn sheep to people. This modified behaviour detracts from the bighorn's image as a wilderness alpine species and predisposes them to exploitation and risks.

There is no evidence that mineral licks on the wellsites at the present contain toxic chemicals. Canterra 5-23 wellsite was drilled in 1961 and, since then, bighorn sheep have been using the seepage through the old sump. The site might have been toxic at that time. However, the existence of a well established set of trails in the area, and the presence of an apparently healthy animal population, indicate that the site has not been toxic for a significant period. The same line of reasoning can be applied to the other wellsites. Nonetheless, in view of the large array of chemicals which are used during well operations, the

dynamic nature of drilling research, and considering that historically all chemicals used to be dumped in sumps, the potential for toxicity is present.

The bighorn's stubborn use of wellsites despite efforts to chase them off (Morgantini and Worbets 1988), increases their susceptibility to hunters. Vehicular access on all-weather roads further compound the problem. Reports of up to 20 ewes and lambs taken from Canterra 5-23, and of unknown numbers from the vicinity of the seismic shothole, could not be verified. However, the recent slaughter of some 35 ewes and lambs by natives at an easily accessible natural mineral lick in the same drainage, indicates the potential management problem.

#### MITIGATION

Unless a need for an adjacent mineral lick at a new wellsite can be demonstrated (to provide essential compounds and elements), bighorn sheep should be denied access to the salt impregnated soil of wellsites. Well-sites are by their nature difficult to keep free of contaminants. The number of people on site, their frequent shift changes, the recruitment of new workers, adverse weather conditions and heavy dependency on short term contractors, make the regulation of spillage very ineffective. The economics of waste disposal, use of heavy equipment and temporary storage of large volumes of fluids and chemical compounds, make sump pits and spillage on wellsites unavoidable. After drilling, reclamation is of limited value. The drilling muds, circulation fluids, detergents, rig wash, and lubricants used at wellsites can have very high concentrations of salts and other chemicals. Bulldozer work will stir the soil and turn the entire area into a mineral lick. In the Panther River region, bighorn sheep were attracted on reclaimed wellsites with sodium concentrations as low as 40 ppm (0.004%).

On some sites (very dry, well drained), it may be possible to bury the sump pit and wellsite with overburden that will remain free of leached and waterborne contaminants. At most sites in the rugged terrain occupied by bighorn sheep, this is ineffective or economically aesthetically unacceptable. The only recourse is to erect a permanent fence around the entire site. Reclamation and denial of vehicular access to the wellsite are usually desirable to prevent further habitat degradation.

Seismic shotholes that turn into mineral licks should be dealt with in the same way as a wellsite. In most cases, the access trail will be easier to close to traffic.

If reclamation and physical blockage of vehicle access are not feasible, legislation that will reduce human use of the site even if only for part of the year may be required. The creation of a Wildlife Sanctuary or Wildlife Control Zone may also be advisable.

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