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STONE SHEEP AND THE GRUM - VANGORDA OPEN PIT MINE NEAR FARO, YUKON: IMPACT ASSESSMENT AND MITIGATION RECOMMENDATIONS

WESTERN
WILDLIFE ENVIRONMENTS
CONSULTING LTD.

STONE SHEEP

AND THE

GRUM - VANGORDA OPEN PIT MINE

NEAR FARO, YUKON:

IMPACT ASSESSMENT AND MITIGATION RECOMMENDATIONS

Brian L. Horejsi

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OK Biological Services Ltd.
Box 506, Postal Station G
Calgary, Alberta
T3A 2G4

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I. INTRODUCTION

Shortly after Curragh Resources Inc. reopened the lead-zinc mine near Faro, Yukon Territory, in January 1986, it began to investigate expansion of surfacing mining activity to the Vangorda Plateau, 14 km away. The plateau was largely treed and lies as a lowland between two heights of land, Mount Mye and Sheep Mountain. A small but highly visible and relatively unique population of Stone sheep (Ovis dalli stonei) occupies those two mountain areas and moves between them via the Vangorda Plateau (Anonymous 1987a).

Two open pit mines are to be developed on the Vangorda Plateau. The Vangorda pit, to be developed first, will cover an estimated 30 ha. The Grum pit will be developed shortly after the Vangorda pit, such that the two will be operated at the same time. It will cover about 70 ha. Pit size changes as the mine proposal evolves. Dumps for overburden and waste will be located adjacent to each pit and normally far exceed the pits in area. They could occupy an area roughly 225 ha in size.

A haul road is being built to take ore to the existing mill at the Faro pit. This road will rise well above the lay of the land and will be travelled by 154 tonne haul trucks every 20 minutes, day and night.

A power line and maintenance facilities will be constructed. The pit areas will be occupied 24 hours a day. Construction activities will

be associated with the diversion of Vangorda Creek around the Vangorda pit and the draining of Doal lake.

Additional information regarding the proposed development can be found in Curragh's Report "Initial Environmental Evaluation, Vangorda Plateau Development Stage One: 1987 Program (Anonymous 1987b).

II. THE STONE SHEEP POPULATION

There are not more than 80 sheep in the Sheep Mountain population east of Faro. The most recent (April 1987) estimate of population size is between 60 and 80 sheep, a number thought not to have changed since 1980 (Hoefs 1987). No official count is available prior to 1980.

The maximum number of sheep actually observed on Sheep Mountain and its immediate environs is 55 on 20 October 1980 (McLeod 1981). No rams were included in this count. On 24 April 1987 Hoefs (1987) observed 54 sheep (13 rams, unclassified). I counted 37 sheep (1 ram, 18) on 18 September 1987.

The sheep that winter on Sheep Mountain appear to populate a vast summer range in the Anvil Mountains. No telemetry or marking studies have been conducted on these sheep but there is evidence based on intermittent observation of individual sheep or bands of sheep, and observation of trails, that animals from Sheep Mountain disperse to the Anvil Range via Rose Mountain and Mount Mye. Movement, by rams, to the Pelly Range is not impossible.

At present there is no historical data on the Faro sheep. I speculate that prior to 1969, when the Campbell Highway extension crossed the Pelly River, the Faro Sheep population had rarely, if even, seen white men. The possible exception may have been around the turn of the century during the gold rush days.
The proximity of the population to the Pelly River, however, likely meant periodic visits from Native Indians. It is probable that losses associated with these visits would have been sporadic and light.

In 1969, the Pelly River was bridged and Faro was created. By 1975 there were 1400 people living there (Anonymous 1976). Energy related workers have a marked preference for use of recreational vehicles, usually markedly higher levels of disposable income than do existing residents, and exhibit a decided preference for outdoor recreation activities, particularly hunting (Streeter et al. 1979). It is highly likely that legal and illegal killing of sheep in the early years of Faro's development took a considerable toll on the population. In any event, by 1980 this population had at least an 11 year history of hunting and harassment.

Unfortunately, heavy reliance on ATV's and illegal hunting continue today (Eamer 1987) thus this population now has a relatively long history (18 years) of negative interactions with humans.

Small populations of sheep require special management considerations (Krausman and Leopold 1986). They are important;

1) as indications of our ability to scientifically manage and learn from small populations, particularly since more of today's population are small as a consequence of human impacts
2) as evidence of societies commitment to conserve wildlife and
3) because their small size makes them extremely vulnerable to human influence.

They are valuable to society for their inspirational, aesthetic, photographic, recreational and scientific values i.e. for their social value. With the loss of any one of these populations there is an immense and far reaching, as yet immeasurable, loss in ecosystem, species, and genetic diversity (U.S. Congress 1987). Within each of these populations is stored thousands of years of knowledge regarding seasonal ranges and migration routes. Like all other natural (versus transplanted) populations, this is true of the Faro sheep.

Small populations are of concern because of their potential inviability. As a rule of thumb the minimum population size for preserving individual fitness is 50 while the minimum for preserving genetic variance is 500 (Krauseman and Leopold 1986). Fitness is defined as the proportion of genes left by an individual in the population gene pool (Pianka 1974). I would venture to guess that

the Faro sheep population has declined to below 50 animals at least once or twice since white man has appeared in the Yukon and it may already have experienced reduced fitness and some degree of inbreeding because of this.

It has been suggested that a population must have an effective size of 50 to prevent short-term inbreeding (Skiba and Schmidt 1982). Effective size is contingent upon the number of males that actually breed and the number of females that actually breed. If we assume there are about 25 females two or more years of age and five males that participate in breeding, the effective size of the Sheep Mountain wintering population is 17. Although we know that males are extremely mobile (Geist 1971b; Cochran and Smith 1983), and thus are capable of introducing new blood to a population, they must be breeding animals to facilitate gene flow. In any event, the effective population of the Faro sheep is very small and any human activities which may cause mortality or changes in reproduction must be viewed as serious.

III. HUMAN IMPACTS ON MOUNTAIN SHEEP: EMPIRICAL AND SCIENTIFIC EVIDENCE

Man has dramatically reduced the number of Bighorn sheep in North America during the last century (Buechner 1960). Although the impact of man and his industrial and agricultural activities has not been as dramatic on Dall sheep as it has on Bighorns, Dall and Bighorn sheep are the same kind of animal. The Desert Bighorn, in particular, has paid the price for man's advances (Bailey 1980; Tsukamoto 1987). The

dry, hot southwest is a stringent and severe environment and it could be argued that the dry and cold northern environment which Dall sheep occupy is equally as demanding. At the same time, it is obvious that man's capabilities to impact wildlife and wildlife habitat are far greater today then at any other time in our history. Given the immense power of industrial and population might, an inflexible environment, and a small population of sheep, as at Sheep Mountain, there is evident need for a great deal of caution and care.

Empirical evidence of man's impact on mountain sheep continues to accumulate. Buechner's (1960) monograph summarized early concerns-they were the obvious ones: over hunting, disease contracted from domestic stock, competition with domestic livestock for forage, and destruction of habitat.

Exploration for and development of mines has had a massive impact on wildlife populations and wildlife habitat in North America. The potential for additional impacts is even greater. From a local or regional perspective, mining represents a principal land use change that may have an influence for decades, and "can alter the regions' suitability for wildlife resources" (Streeter et al. 1979). Although the impact on sheep of unregulated hunting associated with mining communities is reasonably well known (Hoefs and Cowan 1979:39), the impact of physical destruction of habitat, which will have a more permanent impact, has not been documented. I suggest the reason for the latter is the requirements for pre-development baseline data and

monitoring during and after development, all of which require the commitment of considerable resources. This has never been done.

Habitat destruction and its impact on sheep has, however, been documented in relation to other developments. In Northwest Montana the destruction of 4350 acres of essential habitat by flooding and 580 acres through highway reconstruction precipitated a decline in sheep numbers from 150 - 200 head to 20 - 25 animals (Yde et al. 1985). In Colorado, the construction of a dam and associated facilities so constricted sheep range that the animals were forced to exist in close proximity to human activity. They were subjected to intense stress. In winter 1980/81 these unnatural conditions resulted in stress related death of 60 sheep, reducing the population to 18 animals. The population had not recovered as of 1985. Part of the identified causes of this populations almost total demise was a loss of migration tradition (Bailey 1986). It is note worthy that sheep in the Montana and Colorado populations did not "move somewhere else" or disperse.

Destruction of habitat, of course, continues to be a major factor in the decline of sheep numbers and is certainly a threat in the Faro area. Less obvious and more recently recognized, however, are the insidious and subtle negative effects of human presence. These impacts began to receive the attention of wildlife conservationists and managers as it became evident that ungulates, including mountain sheep, were capable of learning and associating human actions or presence with their own well being (Geist 1971a; Geist 1971b).

DeForge (1972) indentified a road on sheep winter range, and the vehicle activity and noise that followed, as the major cause of decline in the number of sheep using the area. He felt survival of the sheep depended on removal of the road. Significant declines in sheep numbers and changes in sheep movements have resulted from urbanization and recreational activities, often as a consequence of road construction and use. In one Arizona population, migration has effectively been eliminated by traffic and disturbance along a highway. Two other highways are expected to produce the same result (Ferrier 1974). Vehicle presense in or near finite critical habitats, such as licks, or converging trail systems, can be expected to restrict or prevent sheep use. Bighorn use of a watering hole when vehicles were present was reduced by 50% compared to days when vehicles were not present (Jorgensen 1974). Even traffic where human activity outside vehicles is restricted, as in the shuttle bus system in Denali National Park, Alaska, resulted in 38% of the sheep within 400 m of the road fleeing when encountering a vehicle (Singer and Beattie 1986). These were unhunted sheep that do not have a long history of negative association with man. When vehicle regulations were lifted to allow the unrestricted use of private vehicles in Denali, significantly more sheep responded to vehicles by fleeing.

In a case where sheep range was bisected by a road, built for the purposes of obtaining gravel, sheep abandoned part of a range for at least three years rather than cross the road. In 1980 and 1981, prior to road development, three females spent 24% of their time in

that part of their range that was split off from the main range by the road in 1982. In 1982, with large trucks using the road, only 1% of the females' time was spent in the area. One female never returned . In 1983 road traffic decreased and although sheep use increased slightly it remained sporadic and infrequent as of 1985 (Krausman and Leopold 1986).

Construction activity associated with a canal near water sources caused nine of 17 marked ewes to abandon a nearby water source in favor of more distant ones (Leslie and Douglas 1980). Counts of all sheep showed a statistical decline in the number of animals watering near construction activity. The researchers were unable to refute or support their hypothesis that the changes in distribution resulted in decreased productivity. It would appear, however, that in theory, they were on sound footing if we accept that sheep are capable of selecting those habitats that are most favorable to them. I would argue that given the hundreds or thousands of years of trial and error, where improper choices have been penalized by death or unsuccessful reproduction, sheep in habitats relatively undisturbed by man, such as Sheep Mountain, are largely using the most favorable habitats. This cannot be said of all present day sheep populations. Construction activity associated with water projects, in addition to reducing overall visitation rates to nearby water sources, has been demonstrated to force sheep to come to water before or after the daily construction period (Campbell and Remington 1981). This obviously interferes with daily activity patterns, adapted to allow the most efficient use of energy budgets, and has implications for

reproductive performance.

Seismic activity, including truck and helicopter supported drilling concurrently on lines one to three miles apart, appears to have caused sheep to completely abandon an alpine plateau in September-October. Despite small samples sizes data are instructive; During 1982, prior to seismic activity, 71% of radio locations of seven adult ewes were on the plateau. In 1983, during seismic activity, 0% of the relocations of six sheep were on the plateau. In 1984, without seismic activity, 45% of the relocations of six ewes were on the plateau. The sheep did not move to new areas - they restricted their movements to less favorable parts of their home range. There was evidence to suggest that the average annual home ranges declined in size 28% during seismic activity (Hook 1986). The level of activity expected on the Vangorda plateau is likely to be significantly greater than that experienced during this Montana seismic operation.

I have considered harassment to take two forms: active and passive (Horejsi 1976). Active harassement causes an obvious change in activity and results in flight. Passive harassment does not cause flight, and its effects on activity are usually subtle; as often as not, it simply results in exclusion of sheep from sheep habitat. It acts to prevent sheep from exercising their ecological options, that is being in the right place at the right time. Frequent use of bighorn habitat by skiers resulted in the exclusion of sheep from even high value habitat (Light 1971). Over a 15 year span, where

once sheep had been quite common, they became rare after ski hill development. Where bighorn were not entirely excluded, they were restricted to areas immediately adjacent to escape terrain. Frequent recreational use by hikers was related to declines in the number of sheep on three ranges while sheep numbers on two adjacent ranges not "exposed to this surge of recreationists" remained stable (Dunaway 1971). No vehicles had ever been permitted. One of these declining populations was studied five years later, after off-trail hiking had been restricted and limits placed on the number of hikers allowed in the area. It was then concluded that the population was no longer declining due to recreational use (Hicks and Elder 1979). Thorne et al. (1979) report that almost all sheep observed encountering people, such as backpackers, reacted in a negative way. In their Wyoming study area ewe - lamb bands reacted less strongly to humans than did rams, typical of a hunted population. Rams "reacted with increased alertness, attention, and usually a strong flight response". In their efforts to avoid human contact they altered their distribution on winter range. In Canyonlands National Park, Utah, 41% of 337 bighorn groups observed to come in contact with humans moved to a new habitat type. Seventy-eight (78) percent of those on flat areas moved to escape terrain (Bates, Jr. 1983). Miller and Smith (1985) observed 1093 groups of bighorn sheep confronted with a potential disturbance. The population was hunted. Thirty eight (38) and 49 percent of the groups, respectively, reacted strongly (ran or trotted, left the area) to the presence of one and two humans on foot.

In recent years, the study of human harassment of sheep has become more intense and more scientific. There now exist results from several exceptional studies that substantiate earlier observations and give us cause to believe man's impact on sheep and sheep populations may be even greater than predicted on the basis of behavioral observations.

Heart rate telemetry has confirmed many of the concepts (Geist 1971a: Geist 1975a: Horejsi 1976) advanced during the earlier study of wildlife harassment. Although heart rate is not an exact measure of energy expenditure the two are closely related. It is also a "sensitive physiological indicator of disturbance" in sheep (MacArthur et al. 1979). Heart rate, and thus energy expended above maintenance requirements, increase when sheep trot or run, which in turn causes heat stress and further elevation in heart rate; heart rate increases with distance from escape terrain i.e. steep slopes and rocky out-croppings or cliffs, it increases when sheep are in a valley floor or on the lower end of a slope; it increases when they do not have clear visibility or a vantage; it increases when humans approach sheep, and rises even more if the approach is persistent; heart rate of a ewe increases when she cannot see her lamb and it increases when sheep are close to a road and declines at greater distances from the road. Further, sheep become sensitized to human harassment, that is they react more strongly after having been exposed to these kinds of incidents (MacArthur et al. 1979; Stemp 1983). There appears to be some habituation amongst individuals

after a population has had prolonged exposure (20 years plus) provided the exposure has not been overtly negative. Even then the heart rate increases occur but they are of lesser magnitude and/or duration (Geist et al. 1985). These increased costs of maintenance reduce the amount of energy available for growth and reproduction. All of the situations listed have direct application to the movement of sheep from Mount Mye and Rose Mountain to Sheep Mountain. These Yukon sheep must descend from escape terrain with good visibility and a physical vantage into the flat, treed Vangorda plateau (or the expanse between Rose Creek and Sheep Mountain) where contact between individuals is difficult to maintain, where humans and vehicles are known to be present and are unpredictably encountered, where there is pressure to cross quickly (trot or run) and where escape terrain is, at best, sporadically available. The only thing in their favour is a known trail and that is likely to disappear as mine development advances.

All of these factors acting on the sheep at once produce an acute level of stress and would be expected to increase energy costs between 25 and 50% above normal. Given the prolonged recovery in heart rates that have been recorded this condition may well last several hours. As MacArthur et al. (1979) have concluded, the 20% rise in the mean HR (heart rate) of ewes " during continuous exposure to nearby humans indicates that the cumulative effects of these peaks may indead be energetically significant".

In a superb piece of work comparing sheep behavior in two adjacent

areas with contrasting disturbance histories, one of which had very little human activity, the other with a much higher level of activity, King (1985, 1986) was able to demonstrate that sheep were behaviorally more senstive, and reacted more negatively, where human activity was more frequent. The White Canyon area of Utah was considered undisturbed: he recorded 0.3 vehicles per visit, it experienced five hunter days per season, and only five rams had been killed there since 1967. Red Canyon was considered a disturbed area: 1.7 vehicles per visit, 105 hunter days per year and 55 rams killed. Eighty five (85) percent of Red Canyon sheep fled when harassed, compared to 18% of White Canyon sheep. Red Canyon sheep fled an average of 1080 m (3500 ft) when harassed, whereas White Canyon sheep fled 395 m (1300 ft). Red Canyon ewe and ram bands were more wary than groups from the undisturbed area. In summer, disturbed sheep spent significantly less time feeding under harassed conditions than did White Canyon sheep. The opposite was true when sheep weren't being harassed (King 1985; King 1986). Despite the relatively low level of human activity, a level perhaps lower than that the Faro sheep are exposed to, pronounced differences in behavior were evident, as a result of negative interactions with man. Given that Faro sheep are hunted legally and illegally, may legally be hunted throughout the year by treaty Indians, are exposed to moose and bear hunters, and are exposed to 4-wheel vehicles and ATV's on migratory routes and on winter range, it is safe to consider them a disturbed population in the definition of King (1985).

IV. RESULTS: FIELD PROGRAM (16 - 22 SEPTEMBER 1987)

The author spent seven days in the field in the Vangorda Plateau area. The objectives were to:

1. improve and confirm our knowledge of the migration routes sheep use in travelling from Mount Mye to Sheep Mountain and
2. evaluate the prospects for mitigation of mine developments and initiate mitigation projects if possibilities existed.

A. TRACK SURVEYS

There were at least 14 sheep on Sheep Mountain by 16 September, confirming early supposition that sheep would be moving to winter range at this date. The ground surveys, consisting of regular appearances on the Vangorda Plateau road, extended observation of the slopes of Mount Mye and Sheep Mountain and walking suspected or known wildlife trails, were designed to record the location of sheep trails and observe sheep as they moved across the plateau. These trails were then followed in an effort to delineate the important routes across the plateau.

Since fall migration is mostly from summer range on Mount Mye to winter range on Sheep Mountain, all movement was expected to be in this direction and that proved to be the case. Although it may well be that, in spring, sheep move back to Mount Mye along the same routes, I would expect there to be some differences as a consequence of differences in snow pack between fall and spring.

In the eight day period the Vangorda road was driven, tracks of one sheep were observed crossing the road just north of Vangorda Creek. I will return to this observation later. There were numerous tracks on the plateau from weeks preceding the field trip. All indicated travel toward Sheep Mountain, including tracks of 10 animals seen near the junction of Vangorda and Shrimp Creeks. Walking the length of trails T1 (near what was Doal Lake) and T2 (along west side of Vangorda Creek) confirms their importance as routes for fall movement from Mount Mye to Sheep Mountain. The location of these trails (see Page 21), as identified in this reconnaisance, is very similar to routes identified by McLeod (1980).

I would suggest that movement of sheep across the Vangorda Plateau is at present much less predictable, and much more stressful for sheep, than it was prior to the extensive mineral exploration that obliterated trails and created new ones (i.e roads) running in every direction. In addition, the pressure of humans and machines on these trails and roads is not predictable, and further confounds the sheep. Even when exploration was dormant, ATV's and hunters utilized the trail/road network. For these reasons we are today not likely to see most of the sheep on one or two trails.

In an effort to try to provide sheep with one obvious trail, two sections of trail were cleared of vegetation. This was done to try to channel sheep movements down the west side of Vangorda Creek, which appeared to be the most commonly used trail, probably because it provided some visibility and the only escape terrain, as limited

as it is, on the Plateau. A trail 1.0 km long and 2 m wide was cut from the Mount Mye tree line on T1 almost due south toward Vangorda Creek. This would lead the trail away from Doal Lake and the Grum Pit. Trail T2 was cleared for 1.3 km of its length, from tree line on Mount Mye to just east of the Vangorda road. Both lines were hand cut. This mitigation strategy was based on the maintenance of a primarily undisturbed corridor existing along Vangorda Creek between the Grum and Vangorda pits. Although this corridor would have had a road and powerline corridor crossing it, it lies along the general route sheep use to move from Mount Mye to Sheep Mountain. Later in 1987 I was informed the corridor could not be maintained and had just recently suffered additional disturbance. As a consequence, I suspect our first efforts at mitigations went for naught.

B. SHEEP OBSERVATIONS

The most enlightening observation of the field study was the observation of an adult female made on 17 September. This animal was coming off Mount Mye, on a very well marked sheep trail (T1 on Figure 1), travelling south toward Sheep Mountain. My vehicle was the only vehicle on the Vangorda road and it sat directly in front of her but 1.5 km distant. I first sighted her at 1350 hrs. She was moving cautiously upslope, away from the road. She then bedded. There had been fresh snow the previous day and her tracks showed she had descended almost to tree line, then turned back several hundred metres to where first observed. The ewe was up at 1420 hrs, fed for 30 minutes, then continued to very slowly work her way upslope, where

she stood until 1535 hrs, alternately watching the road and staring off toward Sheep Mountain. She then bedded and remained so until 1700 hrs, all the while staring across the valley toward Sheep Mountain. By 1700 hrs the ewe was up feeding, but only for minutes, before she began to move determinedly along the slope parallel to the road, trotting through the shrubby areas. She stopped to feed for five minutes, then abruptly continued to travel the contour to the southeast. At T2 (see Figure 1) she turned sharply down the trail, entered the shrubs at a trot and disappeared into the trees at 1731 hrs.

I recount this episode because it demonstrates the apprehension sheep are faced with when traversing the Vangorda Plateau. It is a dangerous, stressful trip for them. It also points out that the appearance of only one vehicle can heighten their apprehension and cause withdrawal and indecision. It should also point out that when work on the plateau accelerates, crossing from Mount Mye to Sheep Mountain will be an extremely traumatic event for sheep. Some sheep may not cross. Others <u>will</u> be seen in the mine area amongst men and machinery but it must be emphasized that these animals will be highly stressed individuals.

Table 1 lists the sheep observations made while on the ground. Four observations made by Curragh personnel are included (Eamer 1987). It is of note that these observations were all of males and three of the four were made after most, if not all, of the females were on the Sheep Mountain winter range. (See aerial survey results, below).

Table 1. Sheep observations made during ground surveys and exploration activities in the Vangorda Plateau - Sheep Mountain area. Fall 1987. The observation number corresponds to the number on Figure 1.

Obs. No.	Date	No. sheep	Classification (1,2)
		THIS STUDY	
1	16 September	14	8F and YF, 5L, YM
2	17 September	1	F
3	21 September	4	3F, 1 u/c
4	22 September	24	14F, 3L, 2YF, 2YM, M(I♂), 2 u/c
		CURRAGH EMPLOYEES	
5	10 September	2	M (u/c)
6	22 September	3	M (u/c)
7	5 October	2	M (u/c)
8	10 October	3	M (u/c)

(1) F = female; L = lamb; YF = yearling female; YM = yearling male; M = male; u/c = unclassified.
(2) Males classified according to Geist 1971b.

C. AERIAL RECONNAISSANCE

On 18 September 1987 an aerial reconnaissance of the Sheep Mountain-Vangorda Plateau - Mount Mye area was completed. The flight (Bell 206 helicopter) lasted 57 minutes and concentrated on the area outlined in Figure 1. A total of 37 sheep were observed on Sheep Mountain and 13 on Mount Mye (Table 2).

Table 2. Sheep observed during a helicopter reconnaissance of the Sheep Mountain - Mount Mye area near Faro on 18 September 1987. Observation numbers correspond to those on Figure 1.

Obs. No.	No. sheep	Classification (1,2)
9	2	F, YF
10	8	4F, 3L, YF
11	4	F, L, 2 YF
12	22	14F, 3L, 2YF, 2YM, M (I♂)
13	1	F
14	13	M (12 I♂ and II♂, 1 III♂)

(1) F = female; L = lamb; YF = yearling female; YM = yearling male; M = Male.
(2) Males classified according to Geist 1971b.

If this population consists of about 60 animals, the majority are already on the rutting - winter range of Sheep Mountain by mid-September. As is commonly the case, the males are the last to appear. Those on Mount Mye will have to cross the Vangorda Plateau. Fourteen sheep (unclassified female band) were also observed on Mount Rose, 20 km northwest of Sheep Mountain.

There is no advantage to speculating about the productivity of this population without a complete count. It is positive however, that eight yearlings were present.

Figure 1. Sheep observations in the Vangorda Plateau-Mount Mye-Sheep Mountain area near Faro, Yukon. Scale is 1:50,000. Observation numbers correspond to those in Tables 1 and 2.

- ● aerial observation
- ▲ ground observation
- ——— trails (T1 & T2) (---) = cleared
- ////// approx. location of open pits and waste rock/overburden dumps

V. RECOMMENDATIONS AND INTERPRETATION

Guidelines for Wildlife Policy in Canada (Anonymous 1983) were approved by the Wildlife Ministers in September of 1982. The Yukon Territory had a representative at that meeting and the Federal Government was the major player in bringing the policy about. The goals of the signatories and the policy are:

1. to safeguard the ecosystem upon which life depends
2. preserve the diversity of species
3. ensure that the enjoyment or use of wildlife is sustainable.

The policy states that "Governments should take the lead in implementing policies by working out well-planned and coordinated programs to maintain wildlife populations and rationalize their use" (Anonymous 1983).

The Status of Wildlife Habitat in Canada (Anonymous 1986) points out that the environmental implications of hard rock mining in areas of low productivity and high sensitivity, such as the Yukon, are enormous. Deficiencies in protecting wildlife habitat stem from an absence of policy and ineffective administrative frameworks. The status document points out that the Yukon Territory has no comprehensive wildlife policy and no comprehensive land management policy. As a federal territory it is reasonable to suggest that these policies, when developed in the Yukon, should consider equally the welfare of Yukoners and the welfare of non-Yukon Canadians.

Since most land in the Yukon is federal it would appear the burden

for land use planning falls largely, or certainly equally, upon the Federal Government agencies with jurisdiction. Their participation in planning land use developments in the Faro area, such that there is a demonstrated regard for wildlife and wildlife habitat, is difficult to detect.

About 83% of the Canadian population participated in some form of indirect wildlife related activity in 1981 (Filion et al. 1985). That equates to 15.5 million adults. In 1981 eighty (80) percent of Canadians believed that maintaining abundant wildlife was important to them. These are overpowering figures that cause one to marvel at why governments have not taken decisive steps to protect wildlife when public support for such actions are so strong.

I am apprehensive about the future of the Faro Stone sheep population. This population remains largely unprotected. In fact, only 3% of the Stone sheep in the Yukon have permanent protection (Hoefs and Barichello 1985). There is no Stone sheep population in the Yukon that is more accessible to man, nor is there any which is in closer proximity to a major mining development, than the Faro sheep.

My apprehension is based on the following:

1. exploration has been underway on the Vangorda plateau for at least 10 years and yet concern for the sheep population has focussed only recently. Much of this disturbance occurred before Curragh's involvement but much has also occurred

since.

2. There appears to be little flexibility in mine development plans, thus sheep mitigation efforts cannot be accomodated. Mining plans change frequently and communications between mine officials and biologists responsible for and concerned with the sheep, although recently improved, must be more open and more frequent.
3. Mitigation plans and ecological studies have been reactive. To be effective, they must be incorporated in the planning phase of any development, i.e. proactive.
4. Neither the Yukon government nor the Federal Government have a wildlife - land conservation - management strategy in place for the Faro area despite at least 19 years of intense industrial activity and the obvious vulnerability of the sheep population.
5. Recommendations to reduce the impact on sheep of the mining community of Faro have been in place with the Wildlife Branch for eight (8) years (McLeod 1980). It appears only one of 12 have been implemented. It led to this report. It may be that because these recommendations were made at a very low level within the heirarchy, they simply have not received any attention. For example, I do not believe any of them have ever gone to cabinet.

The recommendations of McLeod (1980) are even more relevant today than they were eight years ago and many of those given below will be a reiteration of those presently in existence.

1. It is RECOMMENDED that the Government of the Yukon manage the Faro Stone sheep population for it's non consumptive values. It is the only Stone sheep population in the world that is predictably accessible to humans during most of the year. The wildlife appreciation aspects of this situation can and should be exploited. Wildlife appreciation is a rapidly growing business in today's world (Filion et al. 1985) and the economic returns to the community of Faro and to the Yukon would be substantial and sustainable i.e. photographic and wildlife viewing tours.

contradicts the statement re. disturbance.

2. I RECOMMEND that the area be declared a SPECIAL WILDLIFE MANAGEMENT AREA. If enabling legislation is not available, its creation should be given priority.

   a) large, conspicuous educational signs should be posted at strategic locations, and

   b) an education campaign (i.e. slide shows, leaflets) should be undertaken in the communities and schools of Faro and Ross River. It would emphasize sheep ecology and the merits of protection.

To achieve the goals of recommendations 1 and 2 (above) the sheep must receive near absolute protection from harassment and direct mortality. It is therefore RECOMMENDED that;

3. Sport hunting of sheep be prohibited in the area bounded by Blind Creek, Rose Creek and the Pelly River and including the Mount Mye complex (see Figure 2).

Do we want Rose mtn closed?

already protected

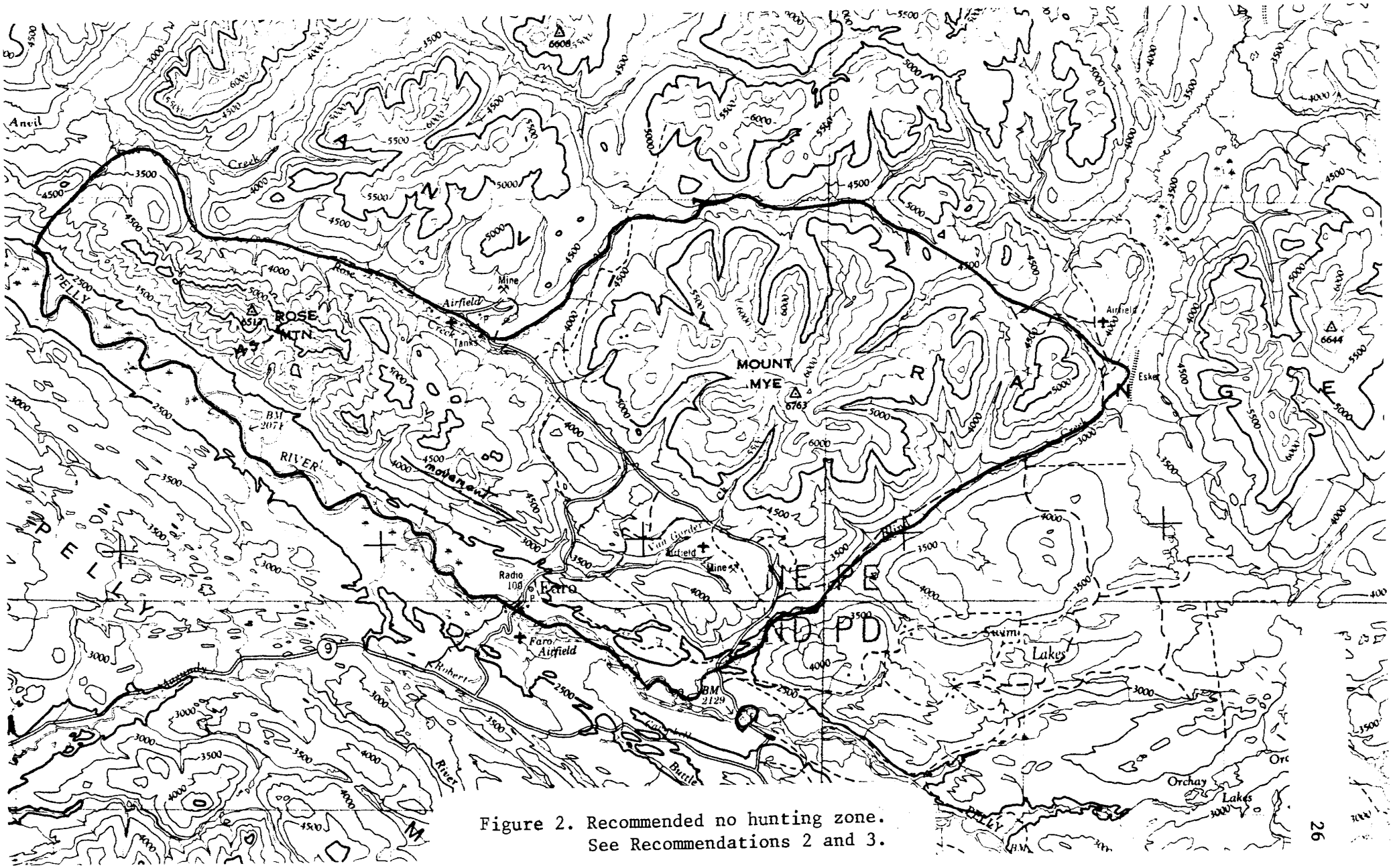

Figure 2. Recommended no hunting zone.
See Recommendations 2 and 3.

4. Sport hunting for all other wildlife be prohibited in the above area (Figure 2). Sheep cannot distinguish a moose hunter from a sheep hunter. Nor can they distinguish a hunter from a geologist. They will react to all three in a like manner.

nor a photographer

5. A non-hunting agreement be negotiated with Indian bands in the Yukon.

6. The use of all terrain vehicles, whether they be recreational or commercial, be prohibited in that area bounded by the main road from Faro to the existing mine, Mount Mye, Blind Creek, and the Pelly River. Pressure from users and distributors of these machines is to be resisted. Their vested interests cannot be allowed to override the interests of society or the wildlife resource.

C.O. Services Wilson on this?

7. The Blind Creek road be physically closed, with a gate or whatever other structures are necessary, year round.

The cutting of wood poles/firewood at the base of sheep mountain is not conducive to providing complete protection for the sheep. The rights to do this should a) be purchased by the crown or b) be phased out and the operator compensated, or c) the operator should be assigned an alternate area, many of which exist.

Neither is nearly complete degradation of Vangorda Plateau! but he does have a point, the remainder should be protected. timber permits are for a one year term so there may not be anything to buy next

The World Conservation Strategy (Anonymous 1980) urges governments in the interests of the people they represent, to manage industrial development within environmental constraints. Be that the case, it is recognized that the two can coexist in most (but not all) parts of the world. Whereas the Faro area has been subjected to immense land use disturbance and yet the sheep population appears to be viable and the addition of the Grum - Vangorda pits will push this system very close to overload unless environmental constraints are recognized and attended to;

8. I RECOMMEND that the political and administrative levels of the Yukon Government focus their commitment and resources on resolving the Stone sheep/open pit mine conflict and make it a high profile example of the World Conservation Strategy in action. For this they will receive the accolades of Yukoners, other Canadians, and the international community.

Success in this endeavor will require the participation of Curragh Resources Inc. as well as implementation of recommendations 1 to 7 above.

How can we attempt to ensure the sheep population survives the squeeze of two open pit mines and all the associated mining activity on the Vangorda Plateau? Given the advanced state of the development, there are few options available. There appears to be no chance that a corridor will exist betwen the two pits, thus the only unobstructed

route between Mount Mye and Sheep Mountain will be around the pits. This proposed route does not appear to be used by the sheep today.

We must ascribe to the theories of Geist (1967; 1971b; 1975b) in trying to get the sheep across the Vangorda Plateau. That is, we must teach them to use, and provide them with, an alternate route. Concensus is this route should skirt the pits to the east and south, since this will also avoid all services and access which will enter the mine area from the north and west.

9. I RECOMMEND that the movement of sheep from Sheep Mountain this spring be monitored intensively and on a full time basis (15th April until all sheep are off the winter range, probably 15 June). It is critical that the location from which the sheep leave Sheep Mountain be known. This area is, by analogy, like the neck of a funnel. This point will reflect tradition use, perhaps based on the most beneficial snow conditions. Whatever the case, it is recommended that there be an effort to direct the sheep around the mine, starting from this point.

    a). toward achievement of 8., above, I RECOMMEND that 10 adult female sheep be radio collared and monitored on a daily basis from date of capture (suggest early April) until dispersal to summer range.

If the sheep demonstrate to observers the use of trails other than through the Grum - Vangorda pit area, particularly trails toward the east and south,

10. I RECOMMEND that a 10 metre wide swath of vegetation be cleared, beginning at the trail head used by the sheep but then leading around the mining activity to the east and continuing to Mount Mye.

11. I RECOMMEND the placement of hay, and perhaps some salt, at the Mount Mye trail head in fall. More importantly, however, hay, and possibly salt, should be placed at the Sheep Mountain trail head and perhaps well up the trail toward Mount Mye, in spring 1989.

12. The issue of professional involvment is one that has been discussed but not addressed. I DO NOT SUPPORT the use of a student as principal biologist on a project of this importance. My reasoning can be most succintly understood by asking this question: Would Curragh, or for that matter the government agency responsible for mines and minerals, support the use of a student to plan and execute the mine development? Professional supervision and involvement is as significant to the continuance of a viable sheep population as it is to the efficient extraction of ore from the pits!

If we are to assume a commitment has been made (it can only be measured by an unequivocal assignment of resources, primarily dollars) then we are asking that the program start from the most advanced level possible and that we document its progress in a

practical, scientific manner.

It must be remembered this population will be jeopardized by full mine development and that much time has already been lost. I am concerned that inexpensive has become the operative word. I urge all parties to put the value of the sheep population in the perspective of the cost of the overall mining operation. I therefore RECOMMEND that full professional biologist participation and supervision be considered the foundation of this program.

13. I further RECOMMEND that the government of the Yukon Territory, the Federal Government of Canada, and Curragh Resources Inc., move quickly to agree to participate in, and commit in writing adequate resources, for a four (4) year sheep mitigation/monitoring program including a senior level of professional involvment and the requirement that a final technical/management report be submitted.

we can have [illegible] have the work done by a student but can't have the staff to [illegible] someone there for four years. The monitoring should be done by the company.

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