

647

P R O P O S A L

- Management Plan -

for

**Sheep Mountain near Faro and its
Fannin sheep population**

Manfred Hoefs

Fish and Wildlife Branch

1988



EXECUTIVE SUMMARY

Curragh Resources will expand its Faro mining operations and develop the ore deposits of the Vangorda Plateau. This development will include two open pit mines and their waste rock dumps, a haul road, transmission line and creek diversion. The ore will be transported to the concentrator at the present Faro mine site, a distance of 14 km. This development will prolong the life expectancy of the Faro mining activity and that of the Town of Faro at least to the Year 2000.

This development will have environmental impacts. Most importantly, a local sheep population, numbering around 90 head, will be affected. Besides various disturbances that go along with new, large scale industrial developments, the migration pattern of this sheep herd may be disrupted. These sheep move between "Sheep Mountain", their winter range located along the Pelly River just east of Faro, and Mt. Mye, their summer range, through the proposed development area (Fig. 1). Most of the frequently used trails will be destroyed or the development will be so close to them that their continued use by sheep may be affected. This sheep population is important. Because their winter range is accessible and close to Faro, they have become an attraction for people interested in wildlife viewing and photography. These dark sheep -- locally referred to as Fannin sheep -- are relatively rare. Of about 22,000 wild sheep in the Yukon, only 3,000 are coloured sheep, and this is the only location where they can be observed at close range. While the much more abundant white Dall sheep receive full protection in numerous national parks, these coloured sheep, which technically belong to the Stone sheep subspecies, are protected only in a few areas such as the MacArthur Sanctuary and the Muncho Lake Reserve in B.C.

Besides the impacts industrial developments will impose on these sheep, there are other problem areas that have to be addressed if this population is to remain viable. The most important are illegal hunting and disturbances by human use of the winter range for recreational purposes, wood cutting and A.T.V.'s.

Discussions between Curragh Resources staff and representatives of the Yukon Government, Fish and Wildlife Branch, as well as consultation with various interested parties, have led to the recommendation that the mitigative measures to be implemented to maintain the sheep population and its habitat should be combined with a determined effort to develop this area for non-consumptive wildlife uses and to develop it into a first class nature interpretative site and tourist visitation point. This proposal, if implemented, will therefore serve two purposes: it will mitigate the impacts of the mining development and maintain the local sheep population and its critical winter range, and it will also broaden and diversify the regional economic base and create employment possibilities and business opportunities for the

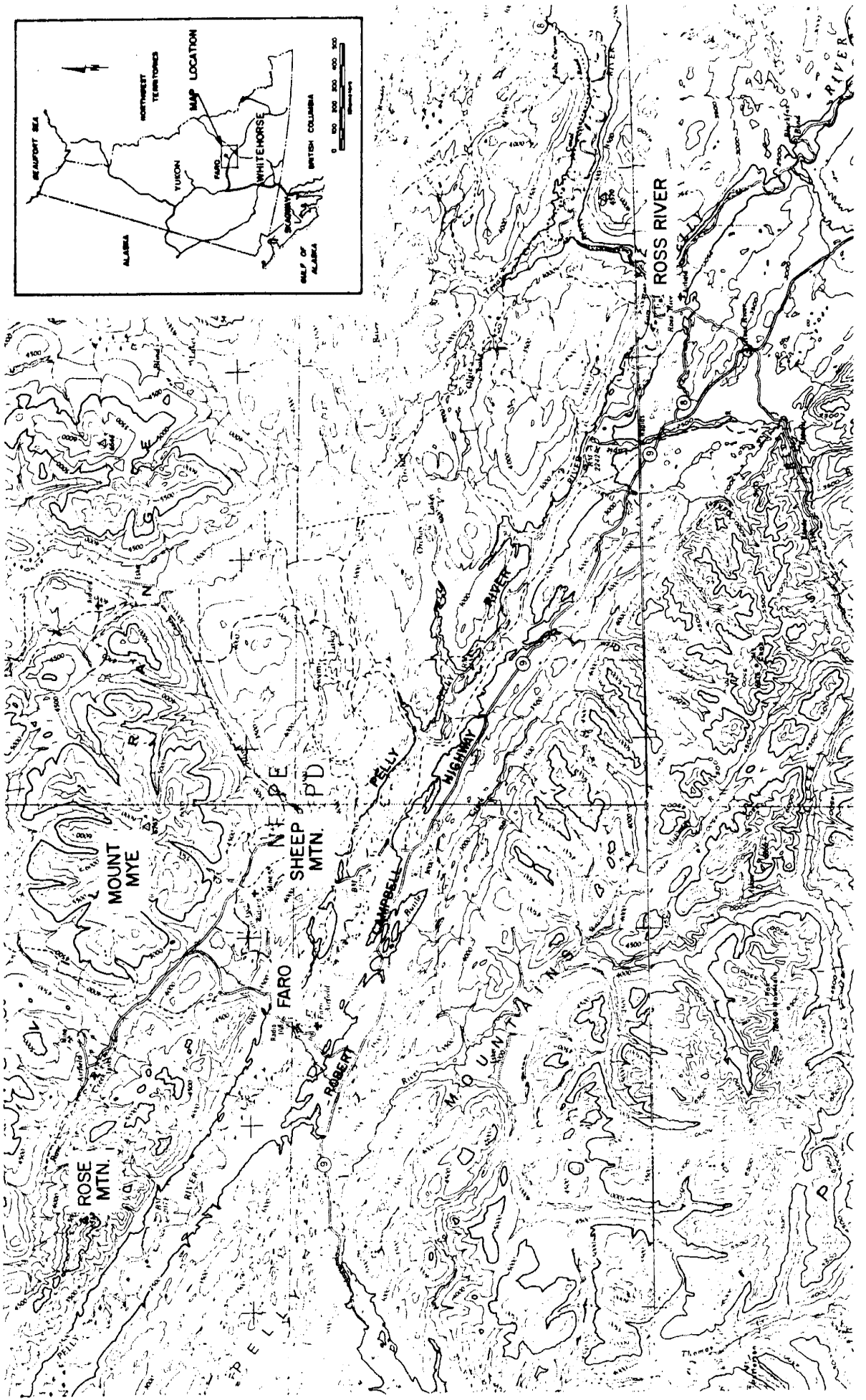


FIGURE 1
LOCATION MAP



residents of Faro and Ross River, by developing the potential for nature interpretation this project and other natural history features in this area offer.

The mitigative phase of this cooperative project will consist of the preservation of a migration corridor between the proposed open pits, development of an alternate migration route that circumvents the development area, and the habituation of sheep to use these routes. There will also be protection and enhancement measures implemented for the key sheep habitats and various regulations to reduce disturbances, hunting and use of A.T.V.'s.

The proposed development of the nature interpretive potential of the area will include rerouting of the road at the base of Sheep Mountain, two viewpoints with interpretive displays, picnic sites and nature trails. Besides the sheep and their habitat, other interpretive topics will be explored and developed, among them salmon spawning in Blind Creek, grizzly and black bear use of the area, golden eagle nesting, and various themes dealing with flora and vegetation.

It is envisioned that this joint undertaking be officially accepted as one of the demonstration projects of the Yukon Conservation Strategy. If approved and implemented, it will show that industrial development and wildlife management need not be adversaries but can go "hand in hand" for the benefit of both.

TABLE OF CONTENTS

1. Background

- 1.1 Curragh Resources' Vangorda Plateau development.
- 1.2 Importance of the local fannin sheep population.
- 1.3 Problems this population is facing because of the proposed mining development and illegal hunting activities.
- 1.4 Summaries of previous reports that describe these problems and propose mitigative measures.
- 1.5 Faro's desire to diversify its economy.

2. Management Objectives

- 2.1 Joint, cooperative management of this sheep population and its range by Y.T.G. and Curragh Resources.
- 2.2 Maintain the population's migration pattern across the Vangorda Plateau.
- 2.3 Protect the range of this sheep population, particularly its winter range with associated lambing areas and mineral licks.
- 2.4 Build up the population to the level of the carrying capacity of the winter range.
- 2.5 Manage the population for non-consumptive uses.
- 2.6 Manage the population and its range for local (Faro and Ross River) benefits.

3. Implementation Strategies

- 3.1 Regulations and enforcement.
 - a) Impose hunting restriction of all species on winter range, migration range and Mt. Mye summer range (G.M.S. 4-46).
 - b) Bring into force land use controls to protect the winter range by designation as "special wildlife area".
 - c) establish and maintain a high profile enforcement.
- 3.2 Regulate access to winter range.
 - a) Realign the Blind Creek Road away from winter range and around the mineral lick.

Table of Contents (cont'd...)

- b) Control access to winter range on foot or by ATV by the development of trails which avoid sensitive areas and reduce disturbance of sheep and other wildlife at critical times.
- 3.3 Mitigate for mining development on the Vangorda Plateau.
- a) Construct a migration route from the point of departure from Sheep Mountain around the mine development toward Mt. Mye.
 - b) Habituate the sheep to use this trail by placing bait and by other means.
- 3.4 Develop the Sheep Mountain area as a focal point for non-consumptive uses.
- a) Construct viewpoints along the road with access to both the winter range and the mineral licks.
 - b) Develop interpretation displays at these viewpoints and possibly in town.
 - c) Explore and develop other nature interpretation topics besides fannin sheep for this area, such as salmon spawning, eagle nesting, wild flowers, etc.
- 3.5 Manage the winter range as key sheep habitat.
- a) Describe vegetation types and extent, produce a habitat map and prioritize habitat components in relation to their importance to sheep.
 - b) Use this information in the determination of routing of interpretive trails.
 - c) Evaluate forage production and estimate range carrying capacity.
 - d) Enhance certain habitat components to improve the carrying capacity of this winter range as well as to improve visibility. This would include removal of fire-killed trees and slashing and burning of aspen regeneration.
- 3.6 Promote this cooperative undertaking as a demonstration project for the Yukon Conservation Strategy.
- a) Improve methods to resolve conflicts over resource use.

Table of Contents (cont'd...)

- b) Find and implement methods to protect wildlife habitats outside of parks or full protected areas.
 - c) Offer opportunities for increased local participation.
- 3.7 Monitor the effectiveness of these management strategies.
 - a) Equip 10 to 12 sheep with radio collars, preferably by means of a livetraps, to aid in the documentation of range use and migration patterns.
 - b) Monitor the response to habitat disturbance by mining development and the use of alternate migration routes across the Vangorda Plateau, prior to, during and after the mining activities.
 - c) Monitor population structure and growth during this mining activity and in response to the mitigative measures implemented.
 - d) Monitor range use pattern of the population prior to, during and after mining development.
 - e) Monitor visitor use to the area.
 - f) Collect these data in a scientifically sound manner so that this innovative wildlife management project can serve as a model to solve similar land use problems in the future.
- 4. **Project Management**
 - 4.1 Establishment of Advisory Committee.
 - 4.2 Commissioning of a consultant to assess nature interpretive potential of area.
 - 4.3 Habitat assessment and Habitat mapping.
 - 4.4 Realignment of parts of the Blind Creek Road.
 - 4.5 Development of observation sites and nature interpretive trails.
 - 4.6 Habitat enhancement project.
 - 4.7 Training of interpretive staff.
 - 4.8 Involvement of local people for Faro and Ross River.

5. Acknowledgements**6. References**

1. BACKGROUND

1.1 Curragh Resources' Vangorda Plateau Development.

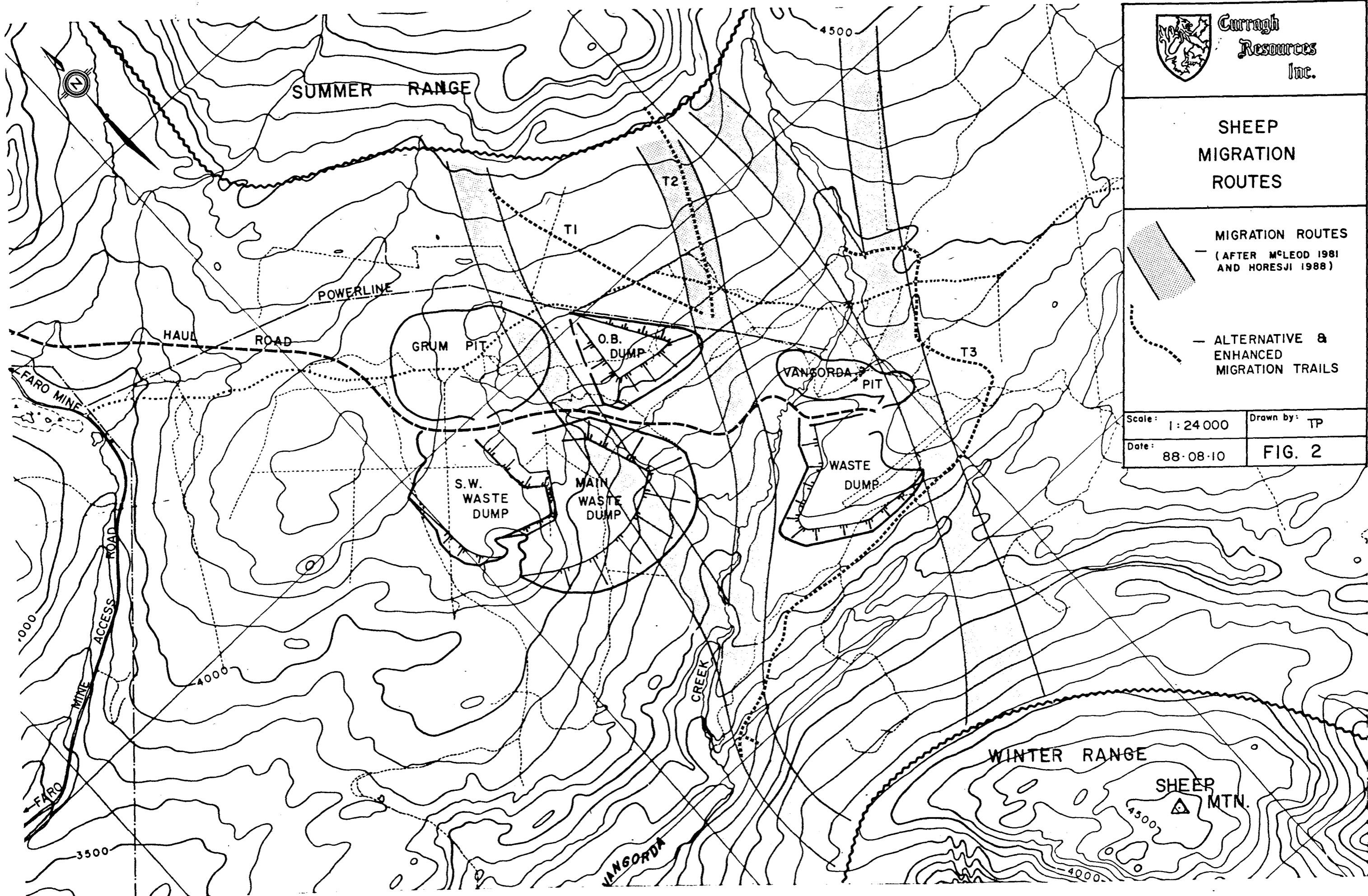
Curragh Resources Inc. is developing two new lead-zinc mines on the Vangorda Plateau: the Vangorda and Grum open pits. A 14 km haul road between the pits and the Faro concentrator is under construction. The final configuration of pits, waste rock dumps, and roads is depicted in Figure 2. Traditional sheep migration routes and the alternate route which is being constructed are also shown on this map.

- a) The Vangorda-Grum Development: Site preparation for the two mines began in late 1987; some overburden will be removed from the Grum, and possibly the Vangorda, pit areas in late 1988 to provide haul road construction material. Full-time stripping at both pits will start in the spring of 1989. Ore extraction will begin at Vangorda in 1990, at Grum in 1992. Work will stop at the Vangorda site in 1992, but Grum will be mined until about the year 2000.

The Vangorda ore deposit is located beneath Vangorda Creek. The Creek will be diverted for a period of about 2 years through a culvert along a bench of the pit. It will then be returned to its original course, through the abandoned pit. There will be one waste dump for this mine, located on a gently-sloping ridge south of the pit. The dump will be covered with a thick layer of compacted till and will be 14 to 41 m in height, with 15 to 21 degree slopes.

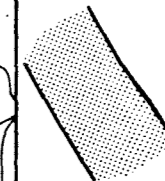
The Grum pit is much deeper and larger than the Vangorda. There will be several dumps for till overburden and waste rock. The final dumps will range from 27 to 200 m in height, with slopes of 13 to 25 degrees. The southeast overburden dump, the first dump to be developed, will cover the main route the ewes and lambs have used in crossing the Plateau.

- b) The Dy Underground Mine: Curragh Resources is also developing Dy, a lead-zinc deposit to the southeast of the Vangorda deposit. Current plans are to mine the Dy deposit by underground methods, with site preparation starting in 1991 and ore removal in 1993. The minesite would not interfere with sheep migration, as surface disturbance would be minimal and as it is outside of the area used by the sheep. The haul road would be extended further along the Plateau, however, crossing the alternate migration route described above.



Curragh
Resources
Inc.

SHEEP
MIGRATION
ROUTES



MIGRATION ROUTES
(AFTER MCLEOD 1981
AND HORESJI 1988)

— ALTERNATIVE &
ENHANCED
MIGRATION TRAILS

Scale: 1:24 000

Drawn by: TP

Date: 88-08-10

FIG. 2

1.2 Importance of the local Fannin sheep population.

The sheep population using Sheep Mountain, east of Faro, as their winter range is currently estimated at 80 to 90 animals. There are indications that this herd was at one time larger and that their winter range can support more than 90 sheep. This population is important for 3 reasons.

- a) The winter range of this herd, locally referred to as "Sheep Mountain", has been made accessible by a number of roads. These roads have been used for mining exploration, firewood cutting, and recreational purposes. Because of the use of these roads over a number of years, sheep have habituated to the presence of man and have tamed down to a considerable degree. They have become an attraction to people interested in observing wildlife, particularly residents of Faro. This area has therefore great potential for non-consumptive wildlife uses and as an attraction point for tourists with wildlife interests. Organized wildlife viewing opportunities are rare in the Yukon, and this has been a common complaint of tourists visiting this territory. Sheep can now be observed only at one other location: Sheep Mountain in Kluane National Park.
- b) These sheep are relatively rare. It is estimated that there are currently about 22,000 wild sheep in the Yukon, 19,000 of which are white Dall Sheep and only 3,000 are coloured sheep (Hoefs and Barichello, 1985). These sheep, displaying a range of pelage colours, are now classified as Stone sheep, but they are not as dark as the typical Stone sheep of British Columbia. For this reason they were at one time considered a distinct taxonomic entity and referred to as "Fannin sheep". Although this designation no longer has a scientific basis, hunters still accept these sheep as something special and come to the Yukon for the expressed purpose of hunting "Fannins", a type of sheep not found anywhere else. This winter range near Faro is the only place where these sheep can be observed at relatively close range from an accessible location.
- c) Coloured sheep, be it in reference to Stone sheep or the local Fannin sheep, do not currently receive the degree of protection the much more abundant Dall sheep are provided. Stone sheep, with a world population of only 12 to 15,000 are not found in any

existing national park, and only a few hundred are protected from hunting in such areas as Spatizi (B.C.), Muncho Lake (B.C.), and the McArthur Mountains (Yukon). In contrast, Dall sheep, the most common sheep in the world with a population size of over 100,000, are protected in numerous locations, among them Kluane National Park, Northern Yukon National Park, Nahanni National Park, McKinley National Park, and the Richardson Mountains. It is estimated that up to 20,000 Dall sheep inhabit areas where not only the animals themselves, but also their habitats are fully protected.

1.3 Problems this sheep population is facing because of the proposed mining development and illegal hunting activities.

The proposed mining developments on the Vangorda Plateau have already been outlined. They will affect the sheep in various ways, most importantly by largely disrupting some of the known migration routes currently being used to move between the winter range on Sheep Mountain and neighbouring benches along the Pelly River and the summer range on Mt. Mye to the north. These migration trails are located in an area where two open pits (Vangorda and Grum) will come into being, as well as the waste rock dumps for these pits. Other proposed construction projects that may interfere with migration include the haul road and transmission line. There will in addition be increased disturbance of sheep while they are on winter range because of increased activity, particularly higher noise levels, from drilling and blasting, dumping of waste rock, and ore movement on the haul road.

Besides these impacts resulting from mining development, the accessible location of this sheep herd during the period of September to June following has made it very vulnerable to various other impacts such as firewood cutting on their winter range, recreational activities such as A.T.V. use, squatting with the presence of domestic animals such as dogs, pigs, goats and horses, but most importantly, illegal hunting. This has been a problem ever since the mine and the town of Faro came into being and has reached such a magnitude in recent years that it exceeds the sustainable removal rate for a herd of this size. There is fairly reliable documentation that during the 1987/88 period alone, 8 sheep were killed in this area. (D. Lindsey, Conservation Officer, Ross River, pers. comm.). These were largely illegal kills plus a small native harvest by the Indians from Ross River.

The mitigation of the proposed mining development is therefore only one of the problems this management plan is attempting to address.

1.4 Summaries of previous reports that deal with the wildlife resources of the area, the potential impacts of new mining developments, and recommended mitigative measures.

Ever since the ore deposits on the Vangorda Plateau were discovered and their development contemplated, some thought has been given to the potential impact of such development on the wildlife resources of the area. A number of studies have been conducted over the past dozen years, all short-term in duration, dealing with these questions. It is interesting to note that even though our knowledge has increased over this decade, the major problems identified have remained the same. Sheep were recognized from the early 1970's as the most important wildlife species in the area and the one most likely affected by the proposed development. Illegal hunting was already a problem at that time, as was improper garbage management and its impact on bears. This latter problem has never been solved and remains a very serious concern.

The first study conducted was by Montreal Engineering (1976). It mentions the various big game and furbearing animals of the area and their exposure to hunting and trapping activities; it highlights the Mt. Mye sheep population as the primary resource and the one most vulnerable to impact. Even though very little time was spent in the field, the consultants did a reasonable job in describing the migration patterns of this sheep herd and in estimating the numbers involved. Their report dealt with the increased human population of Faro, which at that time was predicted to double in response to the development of the Vangorda Plateau. The potential problems with bears if the refuse disposal question was not addressed properly, were emphasized and they also made reference to illegal hunting, particularly the illegal hunting of sheep, which are very easy targets on their accessible winter range. No specific recommendations were made for mitigation except for the establishment of a no-hunting zone, and it was suggested that these potential problem areas should be addressed in the planning phase of this development.

The second study was carried out from October 1980 to June 1981. It was a cooperative effort between Cyprus Anvil Mining Corporation and the Yukon Wildlife Branch. A contract biologist, H. McLeod, was hired to carry out this investigation. This study was precipitated by Cyprus Anvil's proposal in June 1980 to develop the deposits on the Vangorda Plateau.

The major objectives of this project were the determination of the exact location of migration trails and timing of migration. Secondary objectives were the evaluation of population structure and seasonal ranges. The project was to conclude with an evaluation of the impact of the proposed development on sheep and recommendations for mitigation.

The proposed development was somewhat different than what is currently planned, in that a conveyor belt was the first choice for transporting ore from the open pits to the concentrator at the Faro mine over a distance of 17 km.

McLeod did a good job in documenting the migration patterns, seasonal ranges, and population parameters. The information was based mostly on field work but also on numerous interviews of people familiar with the area and interested in these sheep. Most of the recommendations made are still appropriate today and have been repeated by subsequent investigators. Some however, particularly those in reference to the conveyor belt transportation system, are no longer relevant. McLeod made 12 recommendations, the most important being the following:

- Document the seasonal range of this sheep population, specifically the existence of alternate winter ranges.

- Have a biologist on site continuously at critical time periods to document migration patterns, range use, and the effects of mitigative measures.

- Equip sheep with radio transmitters to enhance the efforts of documenting migration patterns and range use strategies.

- Establish alternate migration routes, if no migration corridors can be maintained through the development area.

- Restrict hunting, including hunting by natives, and cut down on other disturbances by regulating A.T.V.'s, snowmobiles and dogs running loose.

- Undertake a public relations program to familiarize residents with this project and to gain public support for it.

After a prolonged mine shut-down, Curragh Resources took over this property and reopened the mine in January 1986. Soon after take-over, the expansion of the mining activity to the properties on the Vangorda Plateau was

reactivated. The sheep were once again one of the major environmental issues to be addressed. After consultation with the Yukon Wildlife Branch, an expert on sheep behaviour, Dr. Brian Horesji, was hired in the fall of 1987 to assess the situation and make recommendations for mitigation. The terms of reference for this consultant were similar to those given to H. McLeod in 1980. The seriousness of the issue and the cost of mitigation required of a second opinion, that of a biologist with a known reputation as sheep expert. The investigator spent only 7 days in the field (Sept. 16 - 22, 1987) to get additional information on fall migration, but he did a much more detailed job than McLeod had done in putting the Faro sheep situation into proper perspective. Through a review of current literature he evaluated impacts on sheep by similar industrial development in other areas, and his recommendations are supported by the experience gained in these studies as well as by theoretical consideration of sheep physiology, behaviour, and genetics. Horesji made 17 recommendations; several of them had already been brought forth by McLeod in 1981. Some of the more important suggestions which have been used in this management plan are as follows:

- a) Actively manage this population for non-consumptive use, by developing its potential for nature interpretation and wildlife photography.
- b) Declare the range of this population a "Special Wildlife Management Area", and transmit this designation to the public by appropriate educational programs and posting of signs.
- c) Restrict hunting of all species within the range of this sheep population, including the signing of a non-hunting agreement with the Indian Bands.
- d) Restrict the use of A.T.V.'s.
- e) Regulate the cutting of fire wood and the location of the residence of the wood cutter so that disturbance of sheep is minimized.
- f) Make this project a high profile example of the Yukon Conservation Strategy.
- g) Intensively monitor the sheep population by having expert staff in the field at appropriate, critical times and equip 10 ewes with radio transmitters to enhance this work.
- h) Develop an alternate migration trail by clearing a 20m wide swath of vegetation and habituate sheep to use this trail during the winter 1988/89 by use of bait.

i) Use expert staff for this project.

As a follow-up to Horejsi's recommendations, a contract biologist was hired in the spring of 1988. The objectives were again to document spring migration patterns between Sheep Mountain and Mt. Mye over the Vangorda Plateau, the location of lambing areas and lambing success, population size and structure compared to the 1980 estimates by McLeod, and most importantly, to begin the capture of ewes to be equipped with radio transmitters. Grant Lortie carried out this project and was on site for most of the period from April 7, 1988 to June 6, 1988.

Lortie essentially reconfirmed the migration routes and timing established previously. He was able to carry out detailed population counts which showed that the estimated size of about 80 sheep is still on target, but that earlier estimates by McLeod were probably too conservative since removal from the population by illegal hunting and native hunting is a very serious matter, amounting to 8 sheep during the 1987/88 year alone. Lortie also documented the impacts of disturbance on sheep from substantial traffic on the road along the base of the winter range as well as from use of A.T.V.'s. He showed that the location of this road prevented sheep from using parts of their winter range and an important mineral lick as soon as traffic increased at the start of spring bear season and the road was graded to facilitate its use. Lortie therefore recommended a rerouting of part of this road to allow sheep to again use their winter range in its entirety and to have access to the mineral lick on the escarpment overlooking the Pelly River floodplain. This recommendation was adopted in this management plan. Attempts to capture sheep and to equip them with radio transmitters were not successful.

For the specific purpose of flagging out the routing of an alternate migration corridor -- a very critical component of the mitigation plan -- B. Horjesi was commissioned for the week of May 31 to June 7, 1988. This route was to bypass the development area and leave a sufficiently wide buffer zone so that future use of this corridor by sheep would not be interfered with. Wherever possible, this route was to coincide with existing trails and was to make use of landscape features known to be preferred by sheep. Horejsi did a good job in completing this task and provided detailed instruction on how the trail was to be developed. Its development is planned for the winter of 1988. In addition, Horejsi provided comments on other project parameters such as sheep capture, research methodology, and the development of this management plan.

1.5 Faro's desire to diversify its economy.

There is considerable interest in Faro to reduce its dependency on a single industry and to diversify its economic base primarily by encouraging the growth of Faro as a tourist attraction. The mine itself is the only interpretive theme that has so far been developed for visitors, and Curragh Resources is conducting guided tours here.

A recent study, sponsored by the Faro Economic Action Group, under the title "Keeping Faro on the Map - an economic diversification study for the Town of Faro", deals with this topic. Many of the recommendations made relate to the renewable natural resources of the area such as game, fish and forests and their potential use in regional economic growth.

Sheep Mountain, located only a few miles east of Faro, has considerable potential to assist the town in its desire to develop regional tourist attractions. This potential has been recognized by various biologists who have worked in the area, as well as several Faro residents who have spent a considerable amount of time observing sheep and other wildlife at their doorstep. To accommodate the views of these knowledgeable individuals and the long range plans of the town of Faro, the objectives of this plan were expanded. While the mitigation of various negative impacts on the local sheep population remain the top priority, the development of this area for nature interpretation is being dealt with in considerable detail as well.

2. MANAGEMENT OBJECTIVES

2.1 Management of this project will be a cooperative effort between the Yukon Government and Curragh Resources:

Curragh Resources has certain responsibilities in this matter, since its proposed developments on the Vangorda Plateau will disrupt the most heavily used seasonal migration routes of the sheep population as well as seasonal habitats, and as part of the environmental impact assessment of this development it is to implement mitigative measures. The Yukon Government has responsibility for wildlife management. Sheep Mountain, the critical winter range of this population, as well as Mt. Mye, the summer range, are not affected by this development, and it is on these ranges where these sheep spend most of their time. The accommodation of non-consumptive wildlife users and the build-up of the tourism potential of the area are also government responsibilities. For these reasons it is recommended that this project be managed cooperatively by the Yukon Government and Curragh Resources with a number of other interested parties, especially the town of Faro and the Ross River Indian Band, being involved as much as possible.

2.2 The migration pattern of the sheep population across the Vangorda Plateau will be maintained:

Sheep have traditionally used the Vangorda Plateau during their migrations between summer and winter ranges. There are no alternate summer ranges available within the distance of Mt. Mye, their current summer range. Some rams of this population appear to use Rose Mountain as their summer range. However, to try to persuade the entire population to use Rose Mountain as their summer range and thus avoid the Vangorda Plateau is not an acceptable solution, even if it could be implemented. The migration route from Sheep Mountain to Rose Mountain is considerably longer than to Mt. Mye and it crosses extensive areas of burnt forests as well as a major road leading from the town of Faro to the present mine site. Rose Mountain has its own sheep population and its density may be saturated. Other potential, alternate summer ranges are even farther away and require crossing of the Pelly River and the Campbell Highway. For these reasons, the distance to potential alternate summer ranges and the great difficulty in persuading an animal as traditional as sheep to use them, it is recommended that the current migration pattern over the Vangorda Plateau from Sheep Mountain, the major wintering area and Mt. Mye, the prime summer range, be maintained. The destruction of existing trails by the proposed developments must be compensated for by the development of alternate routes and the sheep must be taught to use these.

2.3 The range of this sheep population, particularly its winter range with associated lambing areas and mineral licks, will be protected:

It is known that among the different seasonal habitats used by sheep winter ranges, lambing areas, mineral licks and major migration trails can be considered critical to the welfare of a population. This is explained by the traditional manner in which habitat components are used by sheep and their intensity and duration of use. Winter ranges often only constitute 10% or less of the total range available to a population; however, they may be used up to 10 months of the year. The protection of such key areas is, therefore, a priority consideration in sheep management. The winter range of this population consisting primarily of Sheep Mountain and associated lower benches with south-facing slopes, canyons, and steep rocky slopes used for lambing, as well as mineral licks, will be protected by designation as a "Special Wildlife Area". The western boundary of this special area will be Blind Creek. A request for notation has already been submitted to the Yukon Lands Branch. Some of the seasonal migration trails will be destroyed by the proposed development. New routes will be developed as a mitigative measure. For the summer range, which is extensive and may include mountainous areas in addition to Mt. Mye, it is recommended that at this time the prohibition of all hunting and a restriction on the use of A.T.V.'s is all that is needed.

2.4 The population will be built up to the carrying capacity of its winter range:

The population using Sheep Mountain as wintering area is currently estimated at 80 to 90 sheep. Indications are that the winter range can support more sheep and that this population was at one time at a higher level. Illegal hunting and development-related disturbances appeared to have brought about a decline. Various proposed mitigative and enhancement measures should result in population growth, which will improve its potential as a target for non-consumptive wildlife uses.

2.5 The population will be managed for non-consumptive uses:

There are essentially four reasons that led to the recommendation to manage this sheep herd for non-consumptive uses.

- a) The winter range of this population is very accessible, and it is already an attraction for wildlife viewing, particularly for residents of Faro. Certain parts of the winter range can be seen directly from Faro.

- b) The town of Faro is a "one-industry" community; it is built on and survives on mining. There are plans to broaden the economic base, so that the fate of this town becomes less dependent on the ups and downs of the mineral industry. One potential avenue to explore is tourism, and a major wildlife attraction on the doorstep will help with this endeavor.
 - c) This sheep population lives in close contact with man. This contact will intensify as development proceeds and as the wildlife viewing opportunities on the winter range becomes known. For the proposed mitigative measures to be effective and for the non-consumptive uses to be fully realized, these sheep must learn to trust man and to lose their fear of man. This cannot be accomplished if these sheep are subject to hunting. Sheep can not tell the difference between a hunter, a naturalist or a photographer. As long as they or their comrades are shot at, they will not tame down to the degree desirable for non-consumptive management nor will they easily be taught by man to change their migration patterns.
 - d) Although there has been a lot of talk about the accommodation of non-consumptive wildlife users and although the most common complaint by tourists visiting the Yukon is the lack of wildlife viewing opportunities, government has done little to date to address these matters. The Dempster Highway nature interpretive program is the only exception that comes to mind. The opportunity exists at Sheep Mountain near Faro to establish a major focal point for non-consumptive wildlife uses and an attraction for tourists with wildlife interests.
- 2.6 The sheep population and its range will be managed with emphasis on benefits to the communities of Faro and Ross River:**

To accommodate Faro's desire to diversify and to increase the tourism potential of the area, to accommodate the interests of the Indian Band of Ross River in wildlife-related matters, and to support government's general policy on decentralization and on giving more responsibility and benefits to the regions, it is recommended that the benefits derived from the management of this sheep population and its range should go primarily to Faro and Ross River residents.

It has already been pointed out that the Sheep Mountain area should be developed as a wildlife viewing area.

Increased tourist flow to this region will, no doubt, benefit Faro and Ross River, particularly such businesses as hotels, grocery shops and gas stations.

Any work required to develop this area in relation to nature interpretation, which would include the construction of trails, some new roads, observation areas, picnic sites, and perhaps observation towers, should be done by residents of the region.

Residents of the region should be given priority for any employment opportunities resulting from implementation of this management strategy such as nature interpretative guides, campground attendants, enforcement assistants, etc.

There will also be employment in relation to habitat enhancement such as cutting out alternate migration routes, removing fire-killed timber to improve visibility and to slash and burn aspen regeneration to establish more open grassland for sheep.

3. IMPLEMENTATION STRATEGIES

3.1 Regulations and enforcement:

- a) Impose hunting restrictions for all species on the winter range, migration range, and Mt. Mye summer range.

Sheep hunting in the Mt. Mye area (GMZ 4-46) was banned in 1982. However, observations indicate that as long as other types of hunting can be carried out sheep will be subject to disturbance and harassment and a considerable amount of illegal hunting. It is, therefore, recommended that all hunting on the range of this sheep population be banned. To make this regulation as effective as possible and to prevent undue restrictions on hunters, it is recommended that the boundaries of GMZ 4-46 and 4-47 be altered to include the entire sheep range in one subzone (4-46). The winter range (Sheep Mountain) and some of the Vangorda Plateau are now part of GMZ 4-47. The new boundary should be the road leading from the Robert Campbell Highway to Faro and to the mine. The area east of this road should become part of GMZ 4-46, a separate wildlife management subzone.

- b) Bring into force land use controls to protect the range of this sheep population, particularly the winter range with associated lambing areas and mineral licks.

Sheep Mountain will be designated as a "Special Wildlife Area" and the management strategy imposed will permit only compatible land use activities. There will be no mining, exploration, gravel excavation, agriculture or grazing, nor will horses, dogs and other domestic animals be allowed to run loose. Based on the range use pattern of the sheep and the distribution of vegetation types on the mountain, zoning and trail development will be carried out that avoid disturbance of sheep at critical times and prevent the disturbance of key habitat components.

In addition, controls on the use of ATV's will be implemented. These vehicles not only disturb sheep and other wildlife but frequent use of them on the grassy slopes of winter ranges and in subalpine areas destroys sensitive vegetation types.

- c) Establish and maintain a high profile enforcement.

Enforcement will have to be enhanced to reduce, and it is hoped eliminate, the illegal hunting activities this population has been exposed to as

well as to make effective other mitigative and enhancement measures proposed. Steps have already been taken to bring this about. A seasonal Conservation Officer hired for the Ross River district is spending a considerable amount of his time in this area. A biologist hired this winter to work on the sheep project will live in a trailer parked at Sheep Mountain, and his presence there will help in reducing illegal hunting and disturbance of sheep. There is a strong interest in this project by certain residents of Faro. Suitable people should be considered for auxiliary Conservation Officer status, which would further enhance our enforcement and surveillance capabilities.

3.2 Access to the winter range will be regulated:

Reference has already been made to the importance of winter ranges, lambing areas and mineral licks to the welfare of a sheep population. The integrity of these critical habitat components must be maintained and their use by sheep must not be interfered with.

Two management steps are contemplated to regulate access to protect the range and to reduce disturbance of sheep.




- a) Realign the Blind Creek road away from the winter range and around the mineral licks.

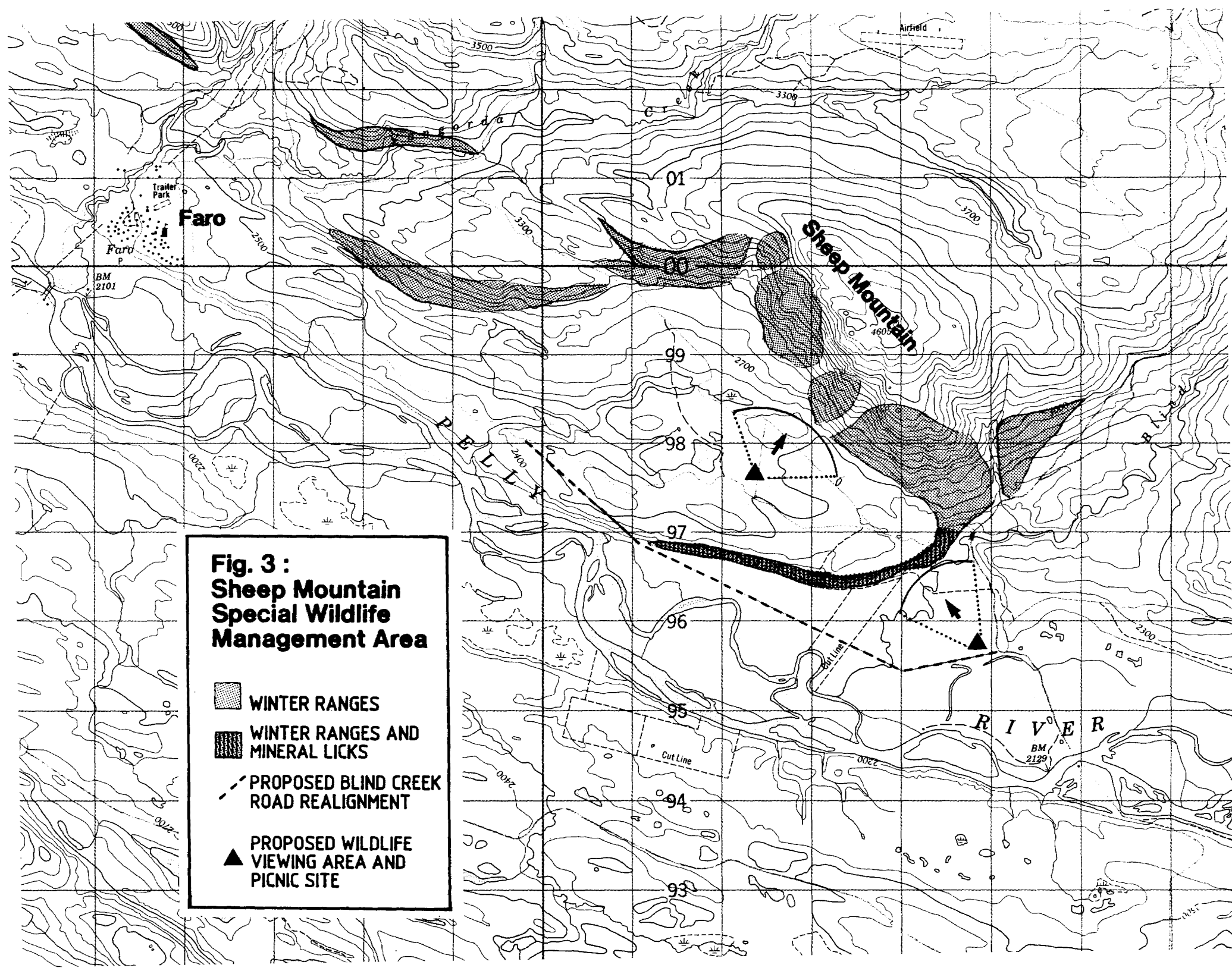
The road from the town of Faro to Blind Creek along the base of Sheep Mountain cuts off the lower parts of the winter range and a series of mineral licks. Sheep trails to this area and the accumulation of a thick layer of sheep pellets reveal that this range component is very important to this population and has in the past been used heavily. Increased use of the road, however, prevents sheep from using this area, particularly on weekends when many recreationists travel here. A biologist working in the area in spring 1988 documented only sporadic use of the area by sheep but counted up to 30 vehicles per day on the road.

It is, therefore, recommended to relocate part of the road farther down hill toward the Pelly River so that the entire winter range and the mineral licks are again accessible to the sheep. This realignment would also improve viewing opportunities, since sheep using the mineral licks could be observed from the road. The proposed relocation of the road is drawn on the attached map (Figure 3).

- b) Control access to winter range on foot, and prohibit the use of ATV's in this area.

**Fig. 3 :
Sheep Mountain
Special Wildlife
Management Area**

-  WINTER RANGES
-  WINTER RANGES AND MINERAL LICKS
-  PROPOSED BLIND CREEK ROAD REALIGNMENT
-  PROPOSED WILDLIFE VIEWING AREA AND PICNIC SITE



Trails will be established on the winter range for use by hikers. The location of these trails will be decided after a habitat map of the area has been completed and the importance of various habitat components to the sheep has been established. These trails will avoid sensitive vegetation types and close proximity to such critical areas as lambing sites and mineral licks, so that hikers using such trails will not interfere with the use of these areas by sheep.

The use of ATV's will not be permitted. Their noise disturbs sheep and other wildlife and detracts from the wilderness and wildlife experience to be enjoyed by visitors. Frequent use of ATV's also damages the habitat, particularly the very sensitive grasslands on south-facing slopes. Evidence of such destruction by ATV's is already apparent on parts of this range.

3.3 Mitigate for the impacts of mining development on the Vangorda Plateau:

A corridor of undisturbed ground 550 m wide at the narrowest point will be maintained between the pits, along the northwest bank of Vangorda Creek. This route is currently used by some of the migrating sheep. Although an overburden dump for the Vangorda pit was originally planned for the area as it represents the shortest haul from the pit, mine plans have been altered to maintain this corridor.

In the fall of 1987, two sections of trail (T1 and T2 on Figure 2) were cut to encourage use of this route. T2 is an enhancement of an existing sheep trail; T1 is a new trail leading from what appears to be the main traditional migration route to the migration corridor.

Sheep following this route will have to cross the haul road, which will be active in this section from 1989 to 1992. From 1990 to 1992, a haul truck will pass any point on the road approximately every 10 minutes, day and night. Ramps will be built along the haul road in this corridor to allow the sheep to approach the road and see across it. When the road is extended to haul ore from the Dy underground mine, ramps will be built at the crossing of the alternate migration trail. Truck drivers will be instructed to stop traffic on the haul road when sheep are spotted in the vicinity.

In case sheep are reluctant to use existing, traditional trails, because of the development and noise levels in this vicinity, an alternate migration trail (T3 on Figure 2) will also be constructed to the southeast of the development. This trail will start near the mouth

of Shrimp Creek, the area where the sheep descend Sheep Mountain. The trail will be cut along the side of the Shrimp Creek valley, which provides maximum visibility for sheep. It will make use of a high berm along a drainage ditch to the east of the Vangorda Pit and will extend over the current mine road to the lower slopes of Mount Mye.

Obviously the construction of a new migration route by itself is not enough. Sheep must be made aware of its existence and must learn that the use of it is safer and causes less disturbance and harassment than trying to move through the development area.

Sheep are very traditional animals, using their seasonal ranges and the migration routes connecting them in a very predictable manner with very little, if any, deviation. Knowledge of the location of such habitat features is passed on from older to younger animals, which move together in the same bands. Generations of sheep have used the migration trails on the Vangorda Plateau, and a change in this pattern can not be easily brought about.

However, we also know that sheep are very intelligent animals that can learn and will take advantage of opportunities provided by man. Sheep have been tamed, they have been led around by means of salt, hay, applemash, molasses and other baiting material, they have taken to new grazing sites such as road allowances and lawns in National Parks such as Banff, Jasper and Waterton, and in doing so have given up long established range use practices. In Alaska Dall sheep have learned to use revegetated coal mining areas.

There is no doubt that sheep can be persuaded to adopt a new migration pattern if the effort necessary to teach them is made.

During the winter 1988/89 a biologist will be working with these sheep. He will habituate them to his constant presence, and they will learn to accept him as a regular feature of their environment. He will use hay and other baiting material to attract them. Once the sheep have taken to the baiting material, it can be used to influence their movements. Bait will be placed along the new migration trail in ever increasing distances from the winter range, and by the time the spring migration starts, the sheep will have become familiar with the new trail and have accepted it as part of their habitat.

This experiment may be repeated in 1989/90 depending on its success in the winter of 1988/89.

Following abandonment and reclamation, the cleared areas and the waste dumps will provide habitat that is likely to be more attractive to migrating sheep than the Plateau is in its current state. The area through which the sheep currently migrate is densely vegetated, and there are few vantage points.

3.4 Develop the Sheep Mountain area as a focal point for non-consumptive wildlife uses:

Reference has already been made to the potential of Sheep Mountain as a destination area for nature interpretation, and various reasons have been provided to manage this population and its habitat for non-consumptive wildlife uses.

As initial efforts to bring this plan about, the following steps are recommended:

- a) Construct viewpoints along the road with access to both the winter range and the mineral licks.

Two such viewpoints are envisioned. One will be at a site where the road is fairly close to the winter ranges of Sheep Mountain proper. From here most of the south-facing aspects of the mountain can be seen, including rock faces and a canyon used for lambing. To improve visibility, fire-killed trees should be removed, which will be discussed in more detail under the heading of habitat management.

The second viewpoint should be developed near the end of the road where it is proposed to be rerouted. This location is on the floodplain of the Pelly River shortly before Blind Creek. From this location excellent viewing is possible of the winter ranges on the lower benches and an extensive system of mineral licks.

Both viewpoints should be developed as picnic sites with tables, a viewing platform and toilet facilities. Their proposed location is shown on Figure 3.

- b) Develop interpretive displays.

The effectiveness of this area for non-consumptive wildlife uses and particularly its importance as a tourist attraction area can be greatly enhanced by an interpretive display. One of the viewpoints and possibly a visitor facility in town should have such displays. These should include photos, diagrams, tables and written text, dried plant specimens and perhaps mounted animals, all under protective glass

cover and preferably housed under a roof. The displayed material should cover not only sheep-related matters, but also other natural history features of the area.

- c) Explore and develop other interpretative topics besides sheep-related matters.

The Fannin sheep, their range, and the mitigative measures implemented are the prime feature for nature interpretation. The proposed enhancement of this population to the carrying capacity of its winter range and the proposed habitat manipulation measures will no doubt increase this potential. However, even then there will be an extended period in mid-summer when the sheep will be on summer range and not visible from the viewpoints. To overcome this problem and to make the facility as much as possible a year-round destination point, other interpretive features will have to be explored and developed. The habitat assessment project planned for 1989 will greatly assist in this exercise. Interpretive features that could be explored include golden eagle nesting, salmon spawning and wildflowers.

3.5 Habitat management:

Reference has already been made to the importance of the winter range and associated habitat components such as lambing areas and mineral licks and the necessity of protecting and managing these for the welfare of this population. Even though a number of short-term projects have been carried out in this area, we have not yet obtained the kind of detailed knowledge required for management purposes in relation to vegetation types present, their extent, their importance to sheep, and their suitability for enhancement. It is known that most forests in this area burnt down in 1969. These fire-killed trees, which cover much of the base on Sheep Mountain, are beginning to fall over and pose problems for the sheep for movement and grazing as well as reducing the opportunity of getting a clear, unobstructed look at the mountain. One sheep died in the fall of 1988 by getting tangled up in fire-killed fallen trees. Also much of the burnt area is growing up in very dense aspen regeneration. Many of these aspen have grown to heights where they can no longer be used by sheep for browsing in spring. These aspen regeneration areas also reduce the value of this winter range as well as obstructing viewing possibilities.

It is, therefore, recommended that the following projects are carried out to close our information gaps in relation to habitat management, population management, and nature interpretative potential of the area.

- a) Describe vegetation types and extent on Sheep Mountain, produce a habitat map, and prioritize habitat components in relation to their importance to sheep.

Field work for this project is planned for the summer 1989. The importance of various habitat components to sheep will be determined by direct observation over the 1988/89 winter, as well as indirectly during vegetation analysis by documenting signs such as trails, tracks and pellet groups.

- b) Use the habitat and vegetation information generated in the determination of the routes for hiking trails and in the development of interpretive topics (for example, rare and unique plant association and species, examples of succession, and the effects of fire).
- c) Evaluate forage production and estimate range carrying capacity.

In addition to the description of vegetation types and their extent, the annual forage production will be determined. Reference was made to the fact that biologists working on this project assume that the sheep population has been reduced by illegal hunting and various disturbances. It is a management objective to rehabilitate this population to the carrying capacity of its range. Forage production determinations are essential in the calculation of carrying capacity.

- d) Modify certain habitat components to improve the quality of this range and to enhance its potential for nature interpretation.

Even without the completion of the vegetation analyses it is known from other studies that burnt forest areas and the dense aspen regeneration are of little importance to sheep. Not only do they provide very little forage, but the density of young aspen and the entanglement of fallen trees on the ground will also make escape from predators more difficult than open terrain. In addition, in many areas they greatly obstruct the view and lessen the potential of this area for nature interpretation.

It is, therefore, recommended that the fire-killed trees be removed and that the dense aspen regeneration, in certain critical areas, be slashed and burnt, or destroyed by other means if possible. Since this habitat enhancement program would be associated with a lot of noise and other disturbances, it can not be carried out while the sheep are on the winter range. This work is therefore planned for the summer months.

3.6 Promote this cooperative undertaking as a demonstration project for the Yukon Conservation Strategy.

The Yukon Conservation Strategy is in the development stage. A public discussion paper has been prepared and a communications strategy developed. Part of this communications strategy involves the use of demonstration projects to generate interest in the process and to provide a focus for discussion of aspects of the Conservation Strategy. Demonstration projects will be promoted by the Yukon Government through public workshops, slide shows and the development of educational programs.

The following suggested action items from the public discussion paper on the Yukon Conservation Strategy can be explored through this demonstration project:

a) "Improve methods to resolve conflicts over resource use".

The resource uses and potential conflicts within the sheep's wintering and migrating ranges are:

- . MINING. Curragh Resources Inc. is developing two open pit mines on the Vangorda Plateau in the area of traditional migration routes.
- . HUNTING. The sheep have been hunted on their winter range, with at least eight animals killed in the winter of 1987-88. This harvest, which is a combination of illegal hunting and a small native harvest, is above the sustainable level for this small population.
- . ACCESS FOR RECREATION. The Blind Creek Road was built for mining exploration and development access and still serves that function. It is also now used for access during bear and moose hunting seasons, for viewing sheep, for truck access to recreational and wood-cutting areas, and for riding of ATV's. Small side roads and even parts of sheep trails are also used for recreational ATV riding. The road approaches the base of Sheep Mountain and separates the main winter range from mineral licks and smaller winter ranges at low elevations.
- . RESIDENTIAL AND SMALL BUSINESS. A wood-cutting operation and trailer home is located at the base of Sheep Mountain. The operation keeps the Blind

Creek Road open all winter and side roads at the base of the mountain have been created for access to wood. As the project proceeds, this operation may conflict with the use of the area for wildlife viewing and habitat enhancement.

These conflicts can only be resolved through a cooperative effort among the resource users. This management plan is the product of the first stages of that cooperative effort. Community education, public participation, and close cooperation with the Ross River Indian Band are essential if the plan is to succeed. Regulations and enforcement methods must also be evaluated and strengthened to resolve conflicts arising from illegal hunting and from excessive disturbance.

b) **"Find and Implement methods to protect wildlife habitats outside of parks or fully protected areas".**

There are primarily three habitat components critical to this population of Fannin sheep. These will be managed through legislated protection, through enhancement, and through development of alternative habitat where preservation is not feasible.

. **MIGRATION ROUTE.** Migration routes, especially for ewes and their young, are traditional. Sheep are known to cross the Plateau in the region of the new mine development. A migration corridor between the pits is being preserved, and trails have been cleared to encourage use of this corridor. An alternate migration route east of the pits will be enhanced through trail construction.

. **WINTER RANGE.** Sheep Mountain, through its mixture of grasslands on south aspect slopes and escape terrain, provides excellent winter range, probably underutilized by the band of about 90 Fannin sheep. This habitat is threatened by the proximity of the road -- parts of the habitat become unusable to the sheep due to disturbance.

The habitat will be protected by rerouting the road and will be enhanced by slashing and burning of aspen regrowth and removal of some of the burnt timber from the 1969 forest fire.

. **MINERAL LICK.** Located near the base of Sheep Mountain, along the top bluffs at the confluence of Blind Creek and the Pelly River. This area is

very extensive and frequently visited in spring by nursery bands. It provides pregnant ewes with calcium and other critical minerals during this time. Sheep must cross the Blind Creek road to reach this habitat. Their access is currently threatened by road traffic and ATV use of the bluffs in the road crossing area. The road will be rerouted and use of the area discouraged.

c) Offer opportunities for increased local participation.

Local benefits from the project include:

- . RECREATION, EDUCATION, TOURISM. Sheep Mountain has great potential as a viewing area. Vantage points will be created with interpretation displays at points near Sheep Mountain and near the mineral lick by Blind Creek. This will be developed both for local use and as a tourist attraction.
- . EMPLOYMENT. There are opportunities for local employment for habitat enhancement, trail construction and development of interpretative centres.

3.7 Monitor the effectiveness of these management strategies.

It is essential to determine the success of the various measures implemented in an acceptable manner so that modifications can be made if necessary and similar mitigative strategies be used under comparable land use conflict situations in the future. The following specific programs are recommended to evaluate the effectiveness of the management plan.

a) Equip 10 ewes with radio transmitters.

The presence of ewes with radio collars will improve our ability to monitor migration patterns, range use patterns, and population performance. It will also allow us to determine whether alternate winter ranges are available to this population. It need not be pointed out that the existence of alternate winter ranges in areas not affected by development would greatly enhance our efforts to maintain this population. A livetrapping on the winter range will be used to catch ewes for marking purposes. Ewes from different bands will be marked. The use of ewes and not rams for radio collaring is preferred for the following reasons: 1) Information to date

indicates that ewes moved over the Vangorda Plateau to their summer range on Mt. Mye. On the other hand, at least some of the rams move to the east to Rose Mountain and do not cross the Vangorda Plateau. If by chance, these rams are marked, they could not be used to monitor the success of mitigative measures. 2) Ewes are known to use their range in a more traditional, predictable manner than rams. 3) Marked ewes can also be used to determine lamb production and survival ~~and~~ lambs to yearling age.

- b) Monitor the response of sheep to habitat disturbance by mining development and the use of man-made, alternate migration routes.

This monitoring has already started and will be improved on as radio-equipped animals are available. It will require the presence in the area of a wildlife biologist during April to early June and again in September to November. Intensive monitoring is particularly essential in the first two to three years as full-scale mining operation commences. In later years, after the new migration pattern has been adopted, the intensity of annual monitoring can be reduced. At this time it can not be predicted how long this monitoring will be necessary. It will depend on the reaction of sheep and the performance of the population as well as on long range mining developments in the area.

- c) Monitor population structure and growth.

The best indicator of successful mitigation is the continuing existence of a healthy population with good lamb crops and a natural age structure and sex ratio. This is the most important management objective, and its successful monitoring will require several population censuses per year. The first two years of work with the population will determine at what time such surveys are best carried out to get reliable data.

- d) Monitor the range use pattern of the population.

The use of winter range and transitional ranges, lambing areas, and licks in relation to intensity and timing may be affected by development, as well as by proposed enhancement programs. It is important to document such changes, and the existence of marked ewes will also assist with this project.

e) Monitor effectiveness of interpretive efforts.

The response by the public, in particular the increased use of the area by tourists in response to development of the area as a nature interpretation area, should be monitored.

f) Collect data in a scientifically sound manner.

It is imperative that these various monitoring efforts carried out to assess the effectiveness of mitigation as well as the development of this area for non-consumptive wildlife uses be conducted in an acceptable, statistically sound procedure. The mitigative measures proposed are innovative; they are the first of their kind. The development of a tourist attraction based primarily on a nature interpretative theme is also one of the "first" in the Yukon. It is essential that the information generated is made available not only in popular form for "general" consumption, but also in a technical format for use by wildlife managers and land use specialists.

4. PROJECT MANAGEMENT

The implementation of this proposal requires the cooperation of a number of government agencies and interest groups. Certain phases of implementation require a financial commitment of considerable magnitude which can only be estimated by the respective departments. Parts of this project that deal with mitigating negative impacts on sheep are proceeding regardless of whether the entire proposal is accepted and implemented or not. The mining development is progressing and the work on sheep will have to proceed concurrently if this populations viability is to be retained. On the other hand, some aspects of this proposal, particularly the development of this site for nature interpretive purposes, are optional. We recommend acceptance of this proposal in its entirety and we envision its implementation through a number of "action items" as listed below.

4.1 Formation of a committee that oversees this project.

This committee should have representatives from relevant government departments which would include Community and Transportation Services (Highways), Economic Development, Tourism, Renewable Resources (Fish and Wildlife); Parks, Resources and Regional Planning; Policy and Planning, and relevant interest groups such as Curragh Resources and representatives from the Town of Faro and the Ross River Indian Band.

4.2 Commissioning of a consultant in the 1989/90 fiscal year.

A consultant should be commissioned to assess the potential of the area for nature interpretation and to explore various interpretive themes in addition to the major attraction of the area, the fannin sheep. This is a very important undertaking, since there is a period of 6 weeks to 2 months in mid summer when the sheep are on their summer range and can not be observed from the Blind Creek road. It appears however, that a number of other themes can be developed to fill this gap. Examples are the enhancement of salmon spawning in Blind Creek, golden eagle nesting at very low elevation, a great variety of wild flowers and various successional stages of vegetation after the 1969 fire. Bird boxes could be installed to increase the abundance of such birds as kestrels, blue birds and flickers. The Faro area has a high density of grizzly and black bears and the habitat is suitable for ungulates such as mule deer and elk.

4.8 Involvement of local people.

We have stressed throughout this report that people of Faro and Ross River should be involved in implementing this proposal wherever possible. The following action items are particularly relevant in this context: 1, 4, 5, 6 and 7.

4.3 Develop a habitat map.

Develop a habitat map with a description of vegetation types for Sheep Mountain for the purpose of identifying key habitat components and critical areas for sheep and other wildlife. This information would then be used to assist in the routing of interpretive trails. Such trails should on the one hand, provide hikers with access to various nature interpretive themes; however, on the other hand, keep hikers far enough away from critical areas such as mineral licks, lambing areas and nest sites to prevent disturbance. This habitat assessment will also identify sites where enhancement is appropriate. This project should also be conducted in the summer of 1989/90.

4.4 Re-routing of part of the Blind Creek road.

Approximately 5 miles of the Blind Creek road should be realigned to avoid disturbance of sheep that want to use the mineral licks and low elevation winter ranges currently cut-off by the existing road. The re-routing will also enhance the wildlife viewing potential in the area. The work should also be carried out in 1989/90 and the approximate location of the realignment is shown in Figure 3.

4.5 Development of observation sites and nature interpretive trails.

This phase of the project could be done during the 1990/91 fiscal year after the road alignment is completed and the habitat assessment and nature interpretive potential have been determined.

4.6 Habitat improvement project.

Habitat enhancement will consist of two components. The first deals with eliminating the very extensive aspen regeneration that is invading many of the grasslands on the sheep winter range. The second project addresses the fire-killed forest at the base of Sheep Mountain. These trees are falling over and present an obstacle to the movements of sheep and wildlife viewers and they also obstruct viewing opportunities in many areas. These projects will take at least two years, and could be carried out in 1990/91 and 1991/92.

4.7 Training of Contract Staff.

Training of contract staff to manage picnic sites, observation sites and trails and conduct interpretive talks and tours. This project could start in the 1990/91 fiscal year, so that trained people are available at the time of formally announcing this area as a nature interpretive site, hopefully for the 1991/92 tourist season.

5. ACKNOWLEDGEMENTS

We are grateful to the following individuals who reviewed earlier drafts of this management plan and provided useful comments: Stephen Fuller, John Olynyk, Mark Hoffman, Cathryn Paish, Len Mychasiw, Dan Lindsey, Grant Lortie and Ray Schweinburg.

Most importantly, we acknowledge the great help provided by Joan Eamer, formerly of Curragh Resources who, among other contributions, submitted the sections dealing with the proposed mining developments and with the Yukon Conservation Strategy.

6. REFERENCES CITED:

- Anonymous (1988): Keeping Faro on the Map - An economic diversification study for the Town of Faro. Sponsored by the Faro Economic Action Group; 19pp plus appendices.
- Department of Renewable Resources and the Public Working Group on the Yukon Conservation Strategy (1988): Towards a Yukon Conservation Strategy: A Public Discussion Paper. Unpublished Draft Report on file with the Yukon Department of Renewable Resources.
- Geist, V. (1971a): Mountain Sheep - a study in behaviour and evolution. Chicago University Press, 363 pp.
- Geist, V. (1971b): A behavioural approach to the management of wild ungulates IN: E.Duffy and A.W. Watt (eds.): The scientific management of animal and plant communities for conservation. Blackwell Scientific Publications, Oxford (pp: 413-424).
- Hoefs, M. & N. Barichello (1985): Distribution, Abundance and management of wild sheep in Yukon. IN: M. Hoefs (ed.) "Wild Sheep". (pp: 16-34). A special publication of the Northern Wild Sheep and Goat Council.
- Horejsi, B. (1988): Stone sheep and the Grum-Vangorda open pit mines near Faro, Yukon: Impact Assessment and Mitigative Recommendations. O.K. Biological Services, Calgary, Alberta. 35 pp.
- Horejsi, B. (1988): Letter to Joan Eamer (Curragh Resources) dated June 23, 1988 covering the topics: Trail clearing, sheep capture, management and research programs. Letter on file with Curragh Resources, Whitehorse.
- Lortie, G. (1988): The Mount Mye-Vangorda Plateau Stone sheep mitigation project (April 7 to June 6, 1988). Unpublished report on file with Y.T.G. Department of Renewable Resources, 17 pp.
- McLeod, H. (1981): Cooperative investigation of migration patterns of the Mt. Mye sheep population. Unpublished report commissioned cooperatively by Cyprus Anvil Mining Corporation and Y.T.G. Wildlife Branch, 69 pp.
- Montreal Engineering Company Ltd. (1976): Biophysical and socio-economic program of the Vangorda Plateau ore deposit developments. Unpublished report commissioned by Cyprus Anvil Mining Corporation, 13 pp.