Wildlife Census on Rocky Mountain Bighorn Sheep (Ovis canadensis canadensis) in Jasper National Park

By Dean Allan

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Submitted to Len Dunsford and
Gord Gibson in fulfillment of
the Practium course.

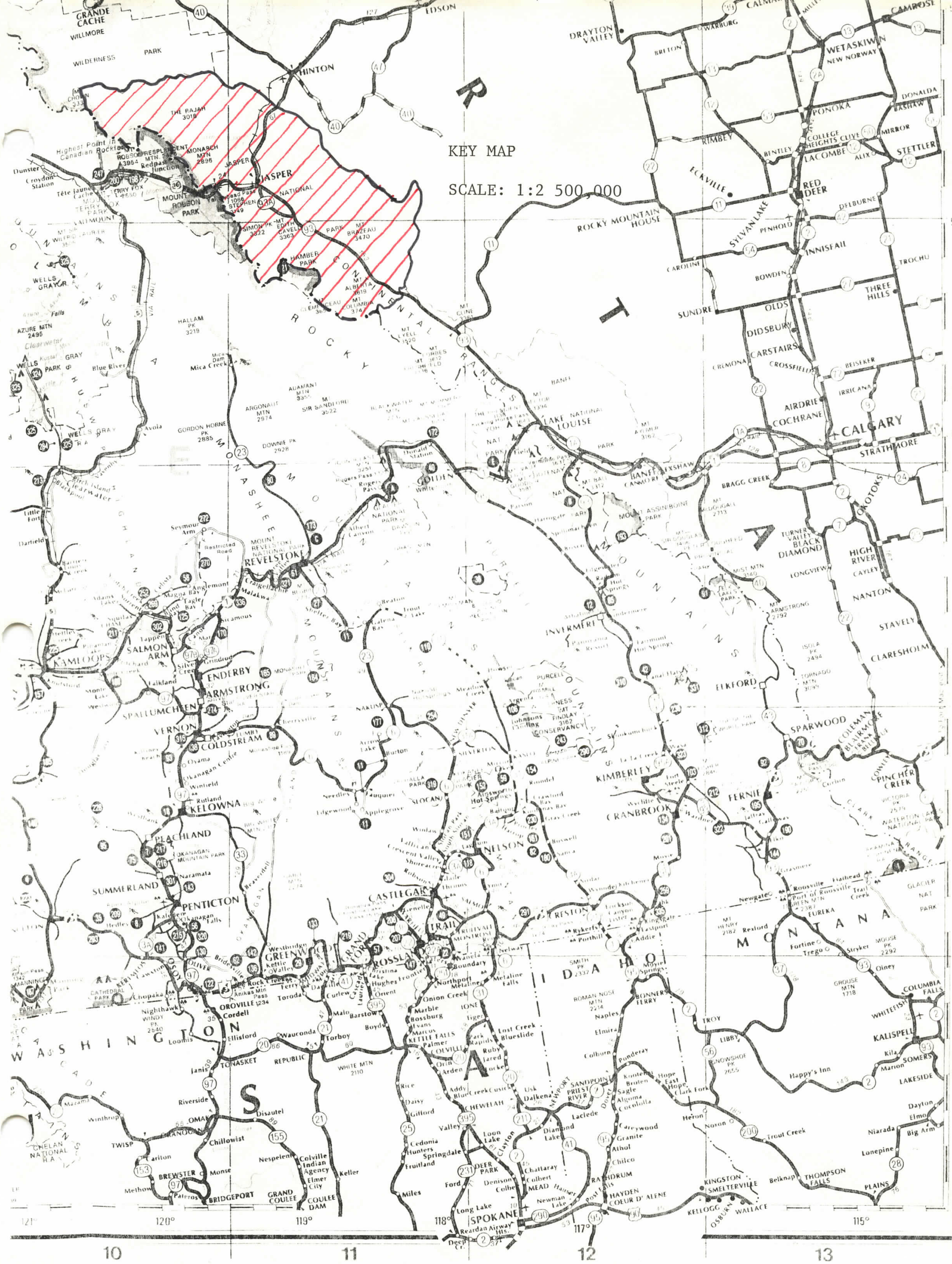
Copy to Jasper National
Park Warden Service.

Acknowledgements

A special thank you is given to Wes Bradford and Lawrence Baraniuk as well as the rest of the Warden staff for their help and information in the completion of the census and this report.

Summary

Bighorn Sheep are one of Jasper's many animal species. The monitoring of these animals helps to determine the population sizes and productivity of the herds. In this study some of the more common herds were counted. A total of 455 sheep were counted of which 255 were females, 112 were males and 85 were young of last year. There was a good lamb to ewe ratio of 33.3 which shows that generally the herds are doing well. However, some of these herds may be affected by highway and railway mortalities. Poaching of large mature rams may also affect the herd. Wildlife monitoring is becoming more important in the duties of national park wardens.


KEY MAP
SCALE: 1:2 500 000
JASPER
HINTON
EDSON
GRANDE CACHE
DRAYTON VALLEY
WETASKIWIN
RED DEER
CALGARY
BANFF
LAKE LOUISE
GOLDEN
REVELSTOKE
KAMLOOPS
SALMON ARM
ENDERBY
ARMSTRONG
VERNON
KELOWNA
PEACHLAND
SUMMERLAND
PENTICTON
OLIVER
GREENWOOD
GRAND FORKS
ROSSLAND
TRAIL
CASTLEGAR
NELSON
CRESTON
CRANBROOK
KIMBERLEY
FERNIE
SPARWOOD
INVERMERE
ELKFORD
HIGH RIVER
NANTON
CLARESHOLM
SPOKANE
KALISPELL
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Wildlife Census of Rocky Mountain Bighorn Sheep (Ovis canadensis canadensis) in Jasper National Park.

1.0 Introduction

Rocky Mountain Bighorn Sheep (Ovis canadensis canadensis) is one of the numerous animal species found in Jasper National Park. It is also one species that has been studied more intensively in Jasper. John Stelfox a biologists for the Canadian Wildlife Service has done studies on the range ecology and population dynamics of bighorns in the four Mountain National Parks.

This census was done as part of the wildlife monitoring plan. It took place from April 26, 1988 to May 9, 1988. Some of the data on sheep included in this report was obtained by park warden Wes Bradford before I arrived.

1.1 Location

The study area occurs within Jasper National Park, which is the largest mountain reservation in Canada (Soper 1970) (see key map). The surveys took place in the Athabasca valley with the exception of one observation which occurred in the Maligne Canyon (figure 1). The sheep were still present on their wintering ranges which are located in the valley bottoms (figure 2). This area is a montane ecoregion made up of prairie grasslands with Douglas fir (Pseudotsuga menziesii) and Lodgepole pine (Pinus contorta) stands (Parks Canada 1973). The average temperatures in the valley are 20 degrees celsius in June, 23 degrees celsius in July, and 22 degrees celsius in August. As fall approaches the temperature falls slowly until mid september where it levels off (Soper 1970).

1.2 Objectives

The following are objectives of the census.

Objective one: Determine sex of sheep in the study area.

Objective two: Determine the number of young of last year in the study area.

Objective three: Obtain data on location and activities of the sheep for the Wildlife Monitoring plan.

Objective four: Determine the number of lambs per 100 ewes for the study area.

Figure 1. Bighorn Sheep census areas

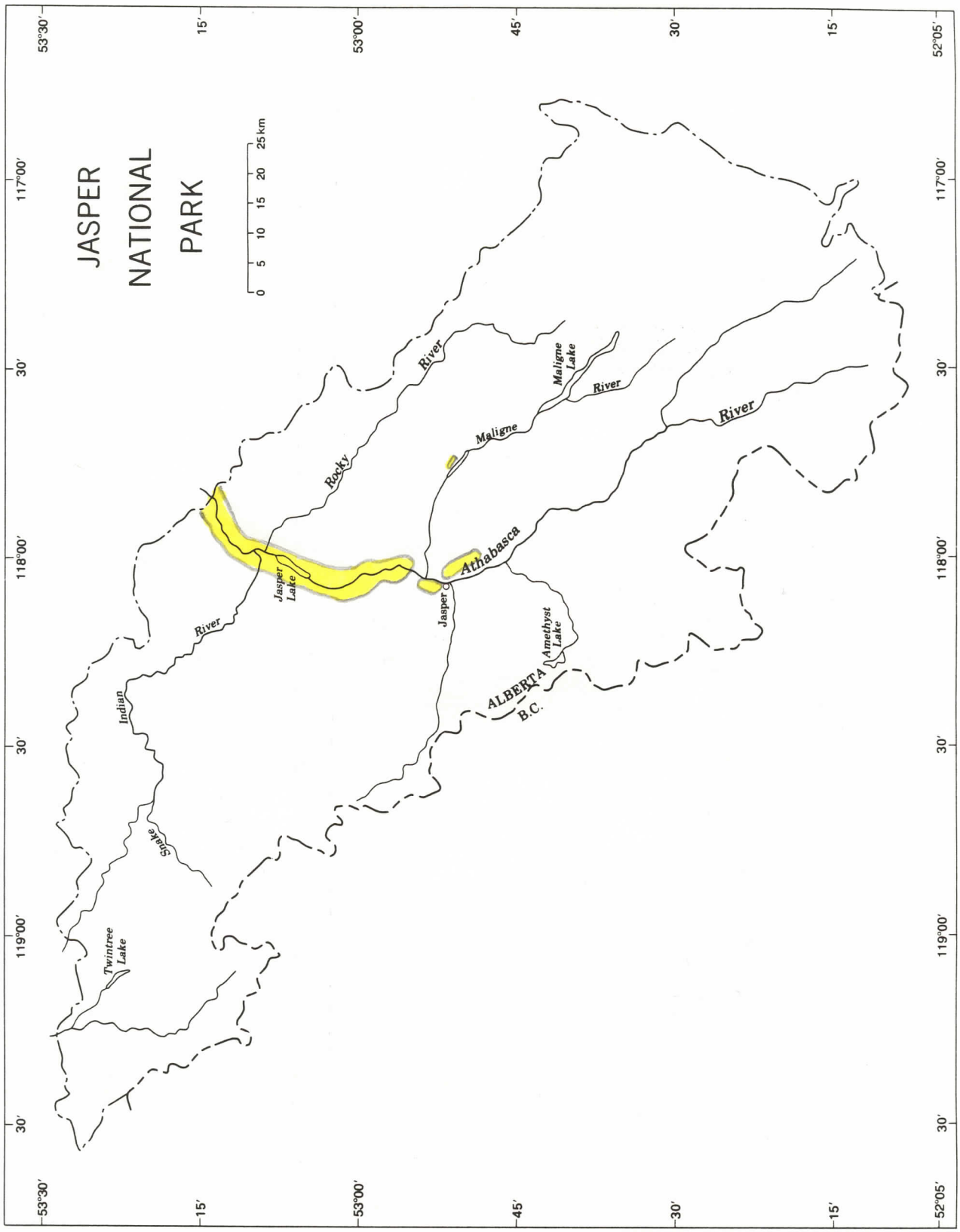
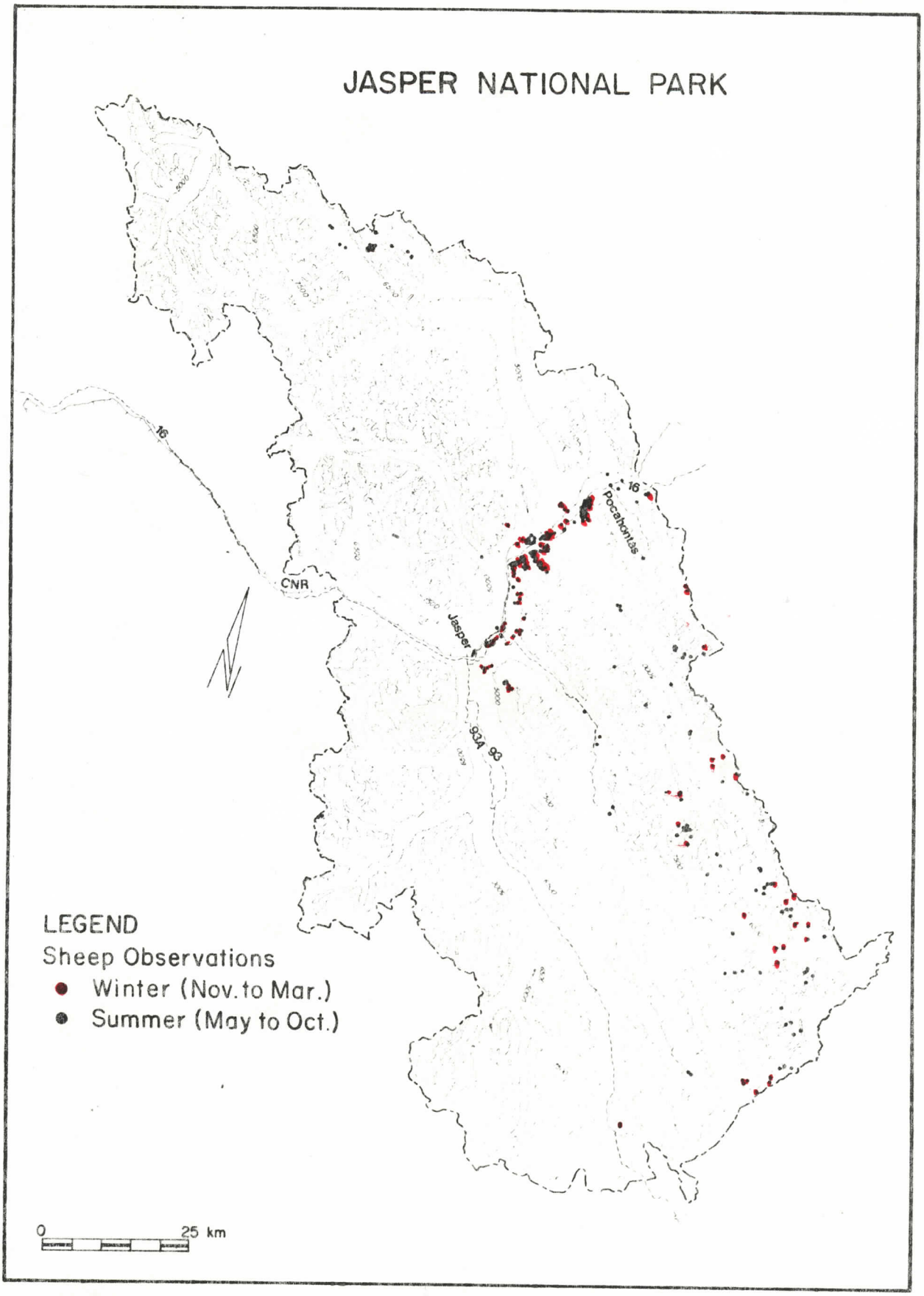


Figure 2. Distribution of bighorn sheep observations in Jasper, summer and winter.



Source: (Holroyd and Van Tighem 1983)

1.3 Wildlife Monitoring Plan

1.3.1 General

National parks have a continuing wildlife monitoring plan which is used to gather data on wildlife within the parks. Mountain Parks Wildlife Data cards are filled out by the wardens when they retrieve or investigate mortalities. These cards are also filled out when carnivores are sighted. Bears are an exception to this because there are separate bear monitoring forms. Dens, licks, and nests are recorded if they are not already known. Raptors are recorded because there is not a well developed record for the park. Care must be taken to correctly identify the species as general comments such as eagles are useless. (see appendix 1) (Bradford 1988).

1.3.2 Ungulates

Ungulate observations such as moose, goats and caribou should be recorded as data for them is not abundant in the park. Sheep, elk, white tail deer and mule deer will not be recorded when observed in the front country because they will be counted during specific census periods. If marked or tagged animals are observed they should be recorded. Any ungulate observations in the backcountry should be recorded as these animals are not observed as often (Bradford 1988).

1.3.2 Where data is recorded

Observations from specific census are recorded on survey forms and National Park Wildlife Survey Data forms. These forms along with the wildlife cards are checked over periodically by park wardens and then sent to Canadian Soils Inventory System (CanSIS) in Ottawa. There they are put into a computer data base that can accessed in the future for specific wildlife information.

1.4 Background

Since the early 1800s bighorn sheep have been present in the Canadian Rockies. Sightings from early travellers state that sheep were abundant throughout the Rockies. Since that time the ranges have remained basically the same but populations have fluctuated greatly due to some sever die-offs (Stelfox 1971). The latest die-off occurred in the winter and spring of

1947-1948. At this time the population diminished from an estimated 2500 to approximately 400 sheep. After the die-off the populations started to recover rather rapidly (Stelfox 1971). In 1966 the population was thought to be about 2600 sheep (Stelfox 1978).

Although the ranges have stayed basically the same over time the sizes of the wintering ranges have decreased. The reason for the reduction can be attributed to forest succession and overgrazing (Stelfox 1970). After examining the 1983 and 1987 counts the population seems to have leveled off at approximately 2280 sheep (Bradford 1987).

2.0 Methods

Ground surveys by foot and vehicle were do on various wintering areas in the Athabasca valley with the exception of one survey done in the Maligne Canyon. These areas are subunits of the ones shown in figure 7. The ranges were glassed from a couple of vantage points to get a good coverage of the range. Where time permitted and access was available the ranges were covered on foot. This produced a more accurate count of numbers, age, and sex. From the data the number of lambs per 100 ewes was calculated to provide information on the productivity of the herd. This calculation was done by using a direct ratio.

2.1 Classifying

Each sheep was classed as male, female, or young of last year (YLY). Where the observer was unable to classify the sheep, they were placed into an unknown category. The males were further broken down by horn size classes (figure 3). Full curl or greater than 4/5 curl, and less than 4/5 curl. For an example of a sheep with greater than 4/5 curl see (figure 4). Figures 5 and 6 show examples of male and female sheep. The males can be Identified by the larger size and prominent horns. The males tend to be darker also.

2.2 Recording

The field observations were recorded on general survey forms (appendix 2). After a day of observations, summary forms were filled out for each area and species observed (appendix 3). The information was also recorded on National Park Wildlife Survey data forms for Mountain Parks (appendix 4). These forms are sent to CanSIS in Ottawa.

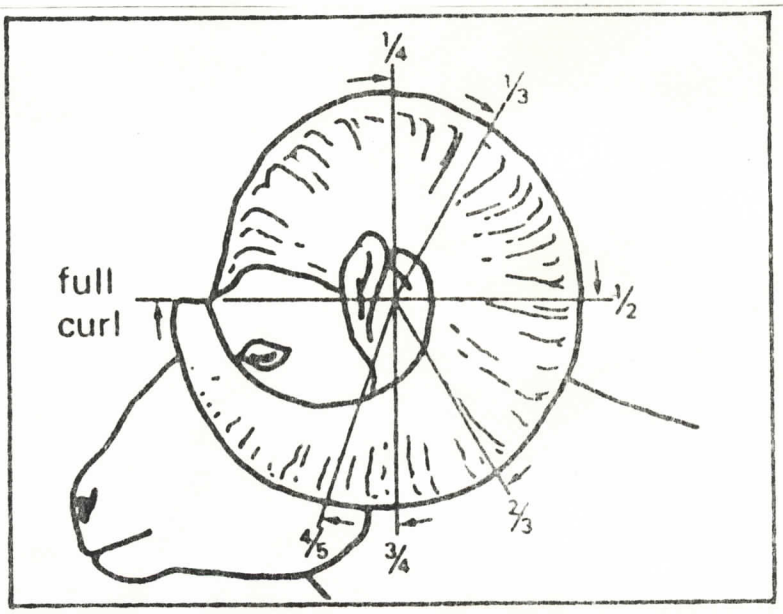


Figure 3. One example of a horn classification system used by the Alberta Wildlife branch.

Figure 4. A full curl ram on the south slopes of Signal Mountain Jasper National Park.

Figure 5. A group of rams on Edna Knoll Jasper National Park.

Figure 6. A group of lambs and ewes on the South slopes of Signal Mountain Jasper National Park.

3.0 Results

A total of 455 sheep were counted on the 10 wintering areas. A break down of the counts is shown in table 1. Of the total count, 255 or 56.0% were ewes, 112 or 24.6% were males and 85 or 18.7% were YLY. There was three sheep unknown that were probably ewes but because I could not be sure I did not classify them, therefore, they were not added into the calculation of lambs per 100 ewes. There was a total of 33.3 lambs per 100 ewes which is a fairly good production rate.

A total of 5 days were used to complete the survey. This includes half days where observations were only made for part of the day. The report compilation and writing took a total of 3 days.

4.0 Limiting Population Factors

The main cause of mortality in Jasper national Park is highway and railway kills. There is also some input by poaching, predators, disease and sever winters. There is also the odd case of drowning (Holroyd and Van Tighem 1983).

4.1 Poaching

Poaching is one factor that should be considered. A low number of animals are taken each year by poachers but the ones that are take are usually the large mature males. This is because of the high price paid for trophy animals. A trophy bighorn may be worth up $20000 in United States funds (Home 1986). Another problem is created because the removal of these prime animals upsets the status of the herd.

The mature males are often in strong physical condition and good health, so by removing them from the herd the quality is decreased. Park warden Wes Bradford has been working on a sheep marking program. In this program the wardens immobilize the sheep and brand the horns with a letter and a number. Then pictures are taken of the horns from all four sides. The rams that are over 10 years old are not branded because it would put to much stress on them. The ones that winter out side the park are not marked because they may move into legal hunting areas. So far Only 8 sheep have been branded in Jasper, this is because branding can only take place when funds are available (Home 1986).

Table 1. Summary of survey counts in the 1988 ground census.

Area	Total	Unknown	Females	Males	YLY
Medicine Slabs	20		5	9	6
Old Fort Point	73		45	12	16
Mile #3	51		25	18	8
Maligne Range	4			4	
Cinquefoil	10	3	7		
Mile #12	10			10	
Edna Knoll	83		52	17	14
Windy-Devonia	63		35	22	6
Disaster Point	71		48	13	10
Brule	70		38	7	25
Total	455	3	255	112	85

4.2 Highway and Railway

4.2.1 History

Highway and Railway is the biggest cause of mortality in sheep. Van Tighem (1981) states that from 1952 to 1980 a total of 421 sheep were killed by highway and railway collisions. The railway took the largest toll of 265 sheep with highway mortalities following at 156. The reasons for these high numbers is that at least 43% of Jasper's bighorns winter in the Athabasca valley which contains the Yellowhead highway and the C.N.R. railway (Van Tighem 1981).

From 1980 to 1987 there have been 72 sheep killed by the railroad and 105 killed by highway. Most of the mortalities occur between November and March when the sheep are on their wintering ranges. There is also periods in the summer when they utilize the natural mineral licks along side the highway and railway (figure 7) (Bradford 1988).

4.2.2 Proposed Measures

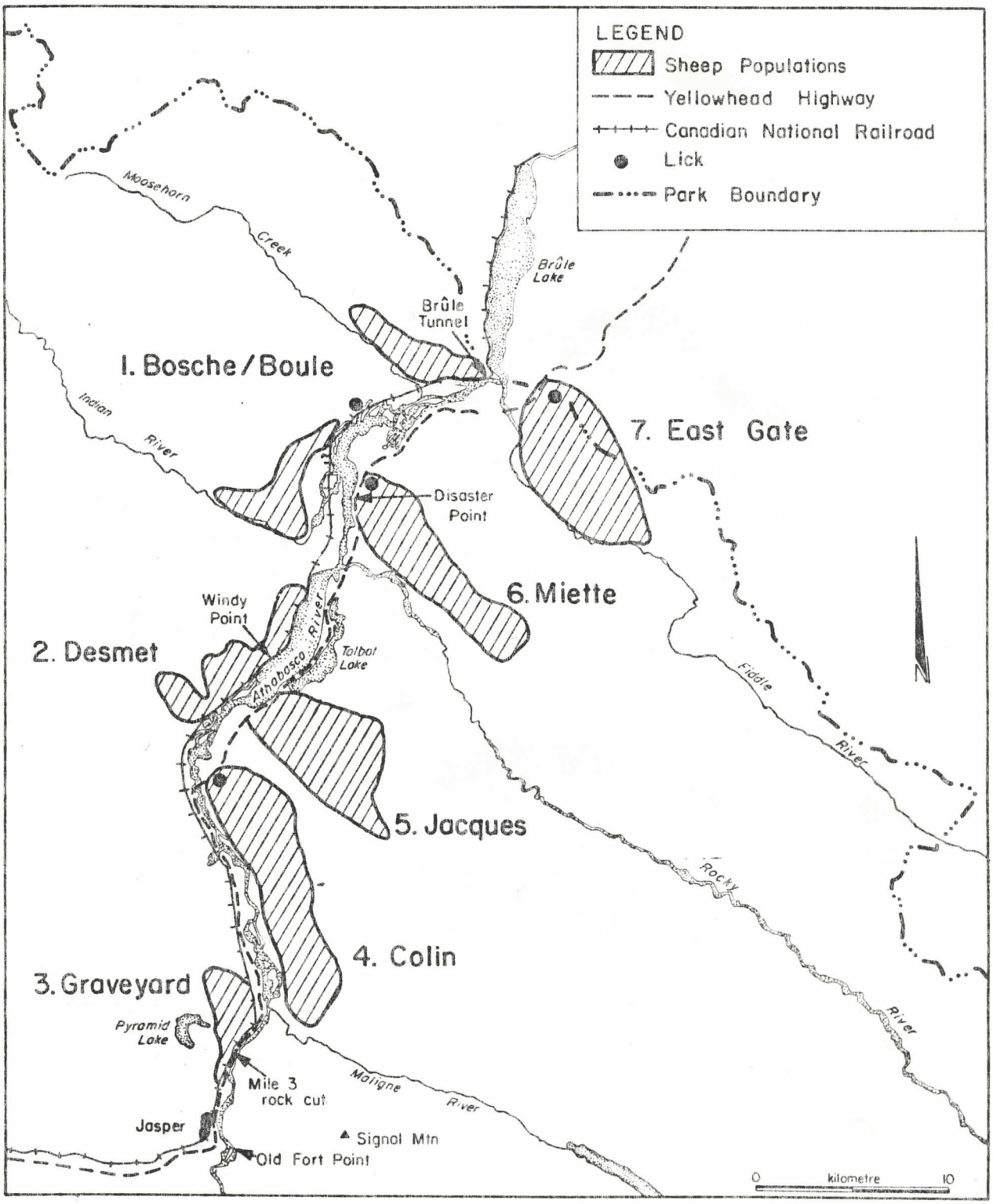
Some of the proposed measures in dealing with the problem are to discontinue use of salt on the road; to use deterrents such as light, sound, or scent from predators; to modify habitat for example fencing; to reduce population; and to alter highway design such as pull overs and speed signs. All of these methods have certain advantages and disadvantages. Some are being used at present in various places in the high mortality areas (Bradford 1988).

5.0 Discussions

The lamb to ewe ratio of 33.3 shows that in general the sheep in the study area are doing well, however, declines may be occurring in specific herds because of highway or railway mortalities. The herds in the Maligne canyon and on Old Fort Point are not affected by the railway and not as likely to be affected by the highway. A total population count did not take place so it is hard to see if there was an increase in the total population which was counted in a aerial survey in 1987.

Due to the fact that some observations were made solely by myself, who is inexperienced in glassing for sheep, some of the counts could be low. Total counts of some herds were

Figure 7 Sheep populations affected by railroad and highway mortality in the lower Athabasca valley.
Source: Van Tighem (1981).



accomplished when two observers walked into the range and counted the sheep up close.

The herd in the Maligne canyon seemed to be at a stable population of about 20-25 sheep. The count this year was 20 but there was a low number of ewes so some were probably hidden in the trees. Past counts made on this herd showed it to have a population of 23-25 sheep.

6.0 Recommendations

The following recommendations are made for the census.

1) Sheep surveys should be done in early morning or mid afternoon because most of the sheep are feeding at this time.

2) High powered binoculars or a spotting scope should be used to help in identification of the sheep.

3) The person doing the survey should have their own vehicle because the wardens are not always available for transportation.

4) Notes should be take in good detail on where the sheep were observed to aid the completion of CanSIS forms.

List of Appendices

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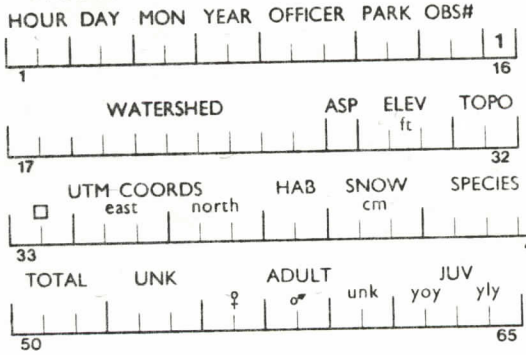
APPENDIX 1

MOUNTAIN PARKS WILDLIFE DATA



66 MARKED: Yes No

67 BEHAVIOR: Feed Rest Both Hunt Drink Travel/migrate manaGe/handle Lick rUt/mate/court uNafraid/encounter dEn/nest/calving cAll/sing flY Swim hoWl Other

68 SNOW CRUST: None Light Medium Hard

69 CAPTURED: Yes nO Dart Snare Trap otHer/unknown

70 ACTION: Autopsy mOve Tranquilized trp&moVe destroY/ remove slauGhter solD Baited Corralled trappEd otHer

71 SIGN: None One Few Mod Abund Unk

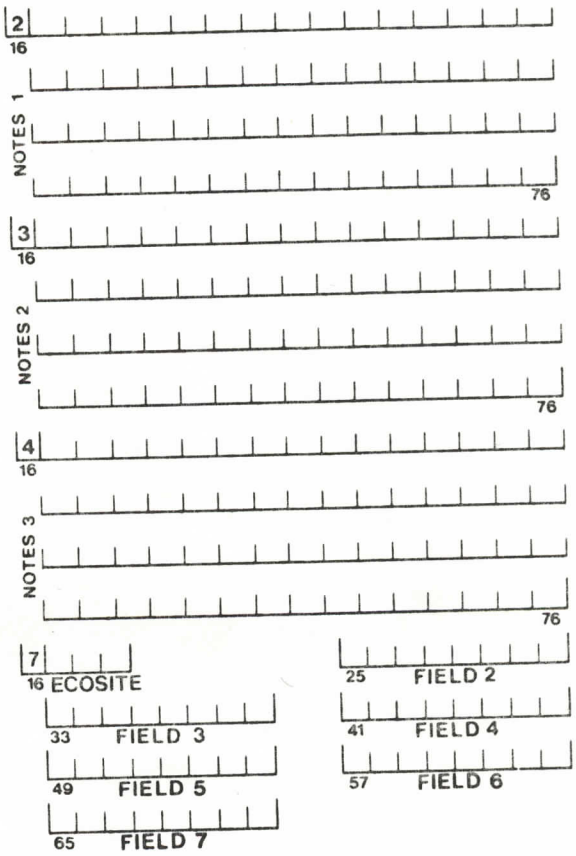
72 FOOD TYPE: Browse Forb Grass/sedge Mixed Aqua mEat/carrion gaRbage berrieS Insects rooTs seeD fisH Unknown/other

73 MORTALITY: Hwy Rr Pred Dis Winter pOached dEs reMoved poiS huNted Unknown/other

PROJECT

2 (76) (77–80)

3/87



MOUNTAIN PARKS WILDLIFE DATA

HOUR DAY MON YEAR OFFICER PARK OBS#

1	0	2	5	0	4	8	8	x	x	G	J	A	0	1	1

1 16

WATERSHED ASP ELEV TOPO

A	T	H	A	B	A	S	-	L	W	0	2	3	L	S

ft

17 32

UTM COORDS HAB SNOW SPECIES

□ east north cm

M	J	3	4	0	5	2	1	9	5	0	0	0	5	H	E	E

33 49

TOTAL UNK ADULT JUV

♀ ♂ unk yoy yly

0	0	1				0				

50 65

66 MARKED; Yes No

67 BEHAVIOR; Feed Rest Both Hunt Drink Travel/migrate manaGe/handle Lick rUt/mate/court uNafraid/encounter dEn/nest/calving cAll/sing flY Swim hoWl Other

68 SNOW CRUST: None Light Medium Hard

69 CAPTURED: Yes nO Dart Snare Trap otHer/unknown

70 ACTION: Autopsy mOve Tranquilized trp&moVe destroY/ remove slauGhter solD Baited Corralled trappEd otHer

71 SIGN: None One Few Mod Abund Unk

72 FOOD TYPE: Browse Forb Grass/sedge Mixed Aqua mEat/carrion gaRbage berrieS Insects rooTs seeD fisH Unknown/other

73 MORTALITY: (Hwy) Rr Pred Dis Winter pOached dEs reMoved poiS huNted Unknown/other

PROJECT

2

76

77 80

3/87

FIELD 7 65

FIELD 6 57

FIELD 5 49

FIELD 4 41

FIELD 3 33

FIELD 2 25

ECOSITE 16 7

76

NOTES 3 16 4

76

NOTES 2 16 3

76

NOTES 1 16 2

APPENDIX 2

~~Aerial~~ Survey Field Form

Time: 14:00 Date: 88/05/09 Observer: Dean Allan

Recorder:

Weather: Sunny Navigator:

Pilot:

Obs. #	Specie	Total	Unk-	Female	Male	YOY	YLY	
1	Sheep	5			5			2 Full curl Medicine Flats
2	Sheep	15		5	4		6	2 Full 1 4/5 Medicine Hat

Aerial Survey Field Form

Time: 09:30 13:00 Date: 88/05/05 Observer: Dean Allan

Recorder:

Weather: Sunny with some cloudy periods Navigator:

Pilot:

Obs. #	Specie	Total	Unk	Female	Male	YOY	YLY	
1	Sheep	10		8			2	Old Fort Point
2	Sheep	10	10					Old Fort Point
3	Sheep	8			8			Old Fort Point 1 full, 3 3/4, 1 1/2
4	Sheep	20	20					Old Fort Point
5	Sheep	12	12					Old Fort Point
6	Sheep	4			4			Old Fort Point 2 full, 1 1/2

Aerial Survey Field Form

Time: 09:30 – 14:30 Date: 88/05/04 Observer: Dean Allan

Recorder:

Weather: Overcast with snow flurries very windy

Navigator:

Pilot:

Obs. #	Specie	Total	Unk	Female	Male	YOY	YLY	
1	Sheep	3	3					Garonne creek
2	Sheep	4	4					Marro
3	Sheep	10			10			Mile #12 2 mature, 2 4/5, 1 1/2
4	Sheep	3		3				Edna Knoll
5	Sheep	18		1	17			Edna Knoll 2 Full 5 2/5
6	Sheep	44		34	5		5	2 mature Disaster pt
7	Sheep	4			Big rams. 4			Maligne

~~Aerial~~ Survey Field Form

Time: 09:30 - 14:00 Date: 88/05/02 Observer: Dean Allan

Recorder:

Weather: 7/10 over cast Navigator:

Pilot:

Obs. #	Specie	Total	Unk	Female	Male	YOY	YLY	
1	Mule Deer	2	1		1			Old Fort Point
2	Elk	3	3					Old Fort Point
3	Sheep	4		3	1 4/5			Old Fort Point
4	Sheep	9		9				Old Fort Point
5	Sheep	19		12			7	Old Fort Point
6	Sheep	12	1	7	2 small		2	Old Fort Point
7	Sheep	2			2 1/2 mature			Old Fort Point
8	Sheep	21		14			7	Old Fort Point

~~Aerial~~ Survey Field Form

Time: 10 00 - 1300 Date: 88/04/29 Observer: Wes Bradford

Recorder: Dean Allan

Weather: Overcast & Windy Navigator:

Pilot:

Obs. #	Specie	Total	Unk	Female	Male	YOY	YLY	
1	SHEEP	9			9			Mile #12 2 big rams
2	SHEEP	26		21	1		4	Mile #12
3	SHEEP	23	23					Windy
4	SHEEP	4			4			Windy
5	SHEEP	6			6			Edna Knoll 2 Full 4 4/5
6	SHEEP	9		9				Edna Knoll
7	SHEEP	14		12	1		1	Edna Knoll
8	SHEEP	44		25	9		10	Edna Knoll 2 full 2 4/5
9	SHEEP	9		6			3	Edna Knoll
10	SHEEP	45		27	10		8	Disaster Point
11	SHEEP	19		14	3		2	Disaster Point
12	SHEEP	7		7				Disaster Point
13	SHEEP	1		1				Cinquefoil ridge
14	SHEEP	3		3				Mile #12
15	SHEEP	1		1				Macro
16	SHEEP	5		5				Goronoe creek

~~Aerial~~ Survey Field Form

Time: 13:30 Date: 88/04/28 Observer: W. Bradford

Recorder: D. Allan

Weather: Navigator:

Pilot:

Mile #3

Obs. #	Specie	Total	Unk	Female	Male	YOY	YLY
1	sheep	3	-	-	3	-	-
2	sheep	2	-	2	-	-	-
3	sheep	16	-	7	3	-	6
4)	sheep	3	~~0~~	3	~~0~~	~~0~~	~~0~~

Aerial Survey Field Form

Time: 10:30 Date: 88/04/26 Observer: W. Bradford

Recorder: Dean Allan

Weather: 5/10 overcast Navigator:

Pilot:

Obs. #	Specie	Total	Unk	Female	Male	YOY	YLY	
								Devonia
1	Sheep	29	-	11	18	-	-	4 mature rams
2	Sheep	19	-	16	-	-	3	w/lambs
3	Sheep	14	-	8	3	-	3	w/lambs young rams

Aerial Survey Field Form

Time:

Date: 88/09/12

Observer: W. Bradford

Recorder: W. Bradford

Weather:

Navigator:

Pilot:

Brule tunnel and Area

Obs. #	Specie	Total	Unk	Female	Male	YOY	YLY	
1	Sheep	41	-	22	3	-	16	Brule Tunnel
2	Sheep	29	-	16	4	-	9	Brule Tunnel

Aerial Survey Field Form

Time:

Date: 88/04/03

Observer: Wes Bradford

Recorder:

Weather:

Navigator:

Pilot:

Obs. #	Specie	Total	Unk	Female	Male	YOY	YLY	
1	Sheep	51		25	18		8	Mile #3 4 mature Rams

Aerial Survey Field Form

Time:

Date: 88/04/03

Observer: Wes Bradford

Recorder:

Weather:

Navigator:

Pilot:

Obs. #	Specie	Total	Unk	Female	Male	YOY	YLY	
1	Sheep	51		25	18		8	Mile #3 4 mature ram

APPENDIX 3

~~AERIAL~~ SURVEY SUMMARY

Area: Medicine Slabs

Time: 14:00 Date: 88/05/09

Weather: Sunny & Warm Barometric Pressure:

Observer: Dean Allan Recorder:

Navigator: Pilot:

Number of Animals Seen

Specie	Total	Unk	Female	Male	Unk	YOY	YLY
Sheep	20		5	9			6

General Comments: 4 Full curl Rams
1 4/5 curl Rams

AERIAL SURVEY SUMMARY

Area: Old Fort Point

Time: 09:30 - 13:00 Date: 88/05/05
Weather: Sunny with cloudy periods Barometric Pressure:
Observer: Dean Allan Recorder:
Navigator: Pilot:

Number of Animals Seen

Specie	Total	Unk	Female	Male	Unl	YOY	YLY
Sheep	64	42	8	12			2

General Comments: Couldn't tell the difference between ewes and young of last year so didn't classify

3 full curl rams, 4 4/5 curl rams and one half curl.

AERIAL SURVEY SUMMARY

Area: Garonne Creek

Time: 09:30 Date: 88/05/04

Weather: Overcast with snow flurries Barometric Pressure:

Observer: Dean Allan Recorder:

Navigator: Pilot:

Number of Animals Seen

Specie	Total	Unk	Female	Male	Unk	YOY	YLY
Sheep	3	3					

General Comments: Hard to tell cause they were quite a ways away.

AERIAL SURVEY SUMMARY

Area: Marrow

Time: 10:00 Date: 88/05/04

Weather: Snow flurries and very windy Barometric Pressure:

Observer: Dean Allan Recorder:

Navigator: Pilot:

Number of Animals Seen

Specie	Total	Unk	Female	Male	Unk	YOY	YLY
Sheep	4	4					

General Comments:

AERIAL SURVEY SUMMARY

Area: Disaster point.

Time: 11:30 - 13:30 Date: 88/05/04

Weather: Snow flurries & windy Barometric Pressure:

Observer: Dean Allan Recorder:

Navigator: Pilot:

Number of Animals Seen

Specie	Total	Unk	Female	Male	Unk	YOY	YLY
Sheep	44		34	5			5

General Comments: 2 mature rams

AERIAL SURVEY SUMMARY

Area: Mile # 12

Time: 11:05 Date: 88/05/04

Weather: Overcast with snow flurries and windy Barometric Pressure:

Observer: Dean Allan Recorder:

Navigator: Pilot:

Number of Animals Seen

Specie	Total	Unk	Female	Male	Unl	YOY	YLY
Sheep	10			10			

General Comments: 2 full curl, 2 ¾ curl and one half curl.

AERIAL SURVEY SUMMARY

Area: Maligne

Time: 14:00 Date: 88/05/04

Weather: Snow flurries + windy Barometric Pressure:

Observer: Dean Allan Recorder:

Navigator: Pilot:

Number of Animals Seen

Specie	Total	Unk	Female	Male	Unk	YOY	YLY
Sheep	4			4			

General Comments: looked like all of them were full curl but can't be positive.

AERIAL SURVEY SUMMARY

Area: Edna Knoll

Time: 11:30 Date: 88/05/04

Weather: Snow flurries & windy Barometric Pressure:

Observer: Dean Allan Recorder:

Navigator: Pilot:

Number of Animals Seen

Specie	Total	Unk	Female	Male	Unk	YOY	YLY
Sheep	21		4	17			

General Comments: 2 Full curls and 5 9/5 curl.

AERIAL SURVEY SUMMARY

Area: Old Fort Point

Time: 12:00 - 14:00 Date: 08/05/02

Weather: 7/10 overcast

Observer: Dean Allan

Navigator:

Barometric Pressure:

Recorder:

Pilot:

Number of Animals Seen

Specie	Total	Unk	Female	Male	Unk	YOY	YLY
Sheep	67	1	45	5			16

General Comments: 1 mature Ram, 1 4/5 curl Ram and one 1/2 curl Ram.

Some were hidden in the bush so may have missed some.

AERIAL SURVEY SUMMARY

Area: Mile # 12

Time: 10:00 Date: 88/04/29

Weather: 9/10 cloud cover, windy Barometric Pressure:

Observer: Dean Allan Recorder:

Navigator: Wes Bradford Pilot:

Number of Animals Seen

Specie	Total	Unk	Female	Male	Unk	YOY	YLY
SHEEP	38		24	10			4

General Comments: 2 big rams

AERIAL SURVEY SUMMARY

Area: Garonne creek

Time: 13:30 Date: 88/04/29

Weather: 9/10 cloudy, windy Barometric Pressure:

Observer: Wes Bradford Recorder:

Navigator: Dean Allan Pilot:

Number of Animals Seen

Specie	Total	Unk	Female	Male	Unk	YOY	YLY
SHEEP	5		5				

General Comments:

AERIAL SURVEY SUMMARY

Area: Marro

Time: 13:30 Date: 88/04/29

Weather: 7/10 cloudy, windy

Observer: Wes bradford

Navigator:

Barometric Pressure:

Recorder: D. Allan

Pilot:

Number of Animals Seen

Specie	Total	Unk	Female	Male	Unk	YOY	YLY
SHEEP	1		1				

General Comments:

AERIAL SURVEY SUMMARY

Area: Cinquefoil Ridge

Time: 13:00 Date: 88/04/29

Weather: 7/10 cloudy, windy Barometric Pressure:

Observer: Wes Bradford Recorder:

Navigator: Dean Allan Pilot:

Number of Animals Seen

Specie	Total	Unk	Female	Male	Unk	YOY	YLY
SHEEP	1		1				

General Comments:

AERIAL SURVEY SUMMARY

Area: Edna Knoll

Time: 10:30 - 11:00 Date: 98/04/29

Weather: 8/10 cloudy, windy Barometric Pressure:

Observer: Wes Bradford Recorder:

Navigator: Dean Allan Pilot:

Number of Animals Seen

Specie	Total	Unk	Female	Male	Unk	YOY	YLY
SHEEP	82		52	16			14

General Comments: 4 full curl rams
4 4/5 curl rams

AERIAL SURVEY SUMMARY

Area: Windy

Time: 10:30 Date: 88/04/29

Weather: 9/10 cloud cover, windy Barometric Pressure:

Observer: Wes Bradford Recorder:

Navigator: Dean Allan Pilot:

Number of Animals Seen

Specie	Total	Unk	Female	Male	Unk	YOY	YLY
SHEEP	27	23		4			

General Comments: Hard to see because on the other side of the Valley.

AERIAL SURVEY SUMMARY

Area: Disaster Point

Time: 12:00 Date: 88/04/29

Weather: Rainy and windy Barometric Pressure:

Observer: Wes Bradford Recorder:

Navigator: Dean Allan Pilot:

Number of Animals Seen

Specie	Total	Unk	Female	Male	Unk	YOY	YLY
SHEEP	71		48	13			10

General Comments: No big rams in the bunch possible that some could have been hiding in the trees.

~~AERIAL~~ SURVEY SUMMARY

Area: Mile #3

Time: 13:30 Date: 88/04/28

Weather: Overcast Barometric Pressure:

Observer: Wes Bradford Recorder: Dean Allan

Navigator: Pilot:

Number of Animals Seen

Specie	Total	Unk	Female	Male	Unk	YOY	YLY
Sheep	24		12	6			6

General Comments:

~~AERIAL~~ SURVEY SUMMARY

Area: Devonia

Time: 10:30 Date: 88/04/26

Weather: 5/10 overcast Barometric Pressure:

Observer: Dean Allan Recorder:

Navigator: Wes Bradford Pilot:

Number of Animals Seen

Specie	Total	Unk	Female	Male	Unl	YOY	YLY
Sheep	29		11	18			

General Comments: 4 Mature Rams

~~AERIAL~~ SURVEY SUMMARY

Area: Windy

Time: 13:30 Date: 88/04/26

Weather: 5/10 overcast

Observer: Wes Bradford

Navigator:

Barometric Pressure:

Recorder: Dean Allan

Pilot:

Number of Animals Seen

Specie	Total	Unk	Female	Male	Unk	YOY	YLY
Sheep	33		24	3			6

General Comments: Young rams

~~AERIAL~~ SURVEY SUMMARY

Area: Brule Tunnel and Area

Time: Date: 88/04/12

Weather:

Observer: Wes Bradford Barometric Pressure:

Navigator: Recorder:

Pilot:

Number of Animals Seen

Specie	Total	Unk	Female	Male	Unk	YOY	YLY
Sheep	70		38	7			25

General Comments:

AERIAL SURVEY SUMMARY

Area: Mile 43

Time: Date: April 3/88

Weather: Barometric Pressure:

Observer: W. Bradford Recorder:

Navigator: Pilot:

Number of Animals Seen

Specie	Total	Unk	Female	Male	Unk	YOY	YLY
Sheep	51	-	25	18	-	-	8

General Comments:

4 full curl rams

4 4/5 curl rams

10 small rams

APPENDIX 4

NATIONAL PARK WILDLIFE SURVEY DATA FORM

MOUNTAIN PARKS

HR	DA	MO	YR	OFF	PK	OBS. NO.	CARD	WATERSHED FIELD 1	WATERSHED FIELD 2	ASP.	ELEV.	TOP.	UTM CO-ORD. FIELD 3	HAB	SNOW	SPECIES FIELD 4	TOT	UNK	ADULT FEM	ADULT MALE	ADULT UNK	JUV YOY	JUV YLY	MARKED	BEHAV'R	SNOW CR	CAPTURED	ACTION	SIGN	FOOD	MORTALITY	SURVEY TYPE
11	03	05	88	xx	GJ	A03	1	ATHABAS-	L	F	033	VB	MJ2757	7	S	000SHEE	010			10				NF		ø			B		GPI6
							7	YL1/3																								
							T	WO MATURE	RAMS																								
11	03	05	88	xx	GJ	A04	1	ATHABAS-	L	S	033	VB	MJ3169	14	ø	S000SHEE	021		04	17				NB		ø		G			GPI6
							7	TA2/7C																								
							T	WO FULL	CURLS																								
13	03	05	88	xx	GJ	A05	1	ATHABAS-	L	S	034	LS	MJ3609	05	ø	S000SHEE	044		39	05			05	NB		ø		G			GPI6
							7	TA3/7C																								
							T	WO MATURE	RAMS																								
14	03	05	88	xx	GJ	A06	1	ATHABAS-	L	WO	034	LS	MJ3196	49	ø	S000SHEE	004			04				NF		ø		G			GPE6
							7	NY3-R/8C																								
							F	OUR MATURE	RAMS																								
12	09	05	88	xx	GJ	A01	1	ATHABAS-	M	F	033	UB	MJ3005	76		000SHEE	010		08				02	NB		ø		G			GPI6
							7	NY3/7C																								
12	04	05	88	xx	GJ	A02	1	ATHABAS-	M	S	034	LS	MJ3225	64		000SHEE	050	042		08				NB		ø		G			GPI6
							7	NY3/8C																								
12	04	03	88	xx	GJ	A03	1	ATHABAS-	M	E	033	VB	MJ2045	75		000SHEE	004			04				NB		ø		G			GPI6
							7	NY3/8C																								
							T	WO FULL	CURL	RAMS			ANL	14/5		CURL	RAM																

ASPECT
East North Flat
West South

TOPO
FP Floodplain
LS Lower slope
LL Lowlands
MS Mid-slope
PA Pass
RC Ridge crest
US Upper slope
VB Valley bottom
FR Rocky foreshore
FS Sandy beach/f'shore
IE Exposed } Inter-
IP Protected } tidal
IS Semi-prot }
SE Exposed } Sub-
SP Protected } tidal
SS Semi-prot }

MARKED No Yes

BEHAVIOR
Feed } Both
Rest }
dEn/nest
Drink
manaGed/handled
Hunt
Lick
Other
rUt/mate
Travel/migrate
uNafraid/encounter/
/nuisance/maul

SNOWCRUST
None Medium
Light Hard

CAPTURED nO Yes

ACTION
Autopsy
Baited
Corralled
mOve
otHer
slauGhter
solD
Tranquilized
Trapped & moVed
trappEd

SIGN
None Moderate
One Abundant
Few Unknown

FOODTYPE
Aqua
Browse
Forbs
gaRbage
Grasses/sedges
mEat/carrion
Mixed forage
Unknown/other

MORTALITY
dEstroyed by park staff
Disease
Highway
reMoved
huNted
pOaching
Predation
Railroad
poiSoned
Unknown cause
Winter weather

SURVEYTYPE
API6 Aerial
GPI6 Ground
CPI6 Radio telemetry
MSI6 Mortality
PGI6 Pellet group
MPI6 Random
(waterdst,type)
MPI7 Random
(capt'ification)

NATIONAL PARK WILDLIFE SURVEY DATA FORM

MOUNTAIN PARKS

HR	DA	MO	YR	OFF	PK	OBS. NO.	CARD	WATERSHED (FIELD 1)	ASP.	ELEV.	TOP.	UTM CO-ORD. (FIELD 3)	HAB	SNOW	SPECIES (FIELD 4)	TOT	UNK	ADULT FEM	ADULT MALE	ADULT UNK	JUV YOY	JUV YLY	MARKED	BEHAVR	SNOW CR	CAPTURED	ACTION	SIGN	FOOD	MORTALITY	SURVEY TYPE
10	29	04	88	XXG	JA	01	1	ATHABAS-L	N	033	VB	MJ277775	R	T	000S HEE	009			09				NB		Ø			G		GPI6
							7	TA3/7c																						
								TWO MATURE RAMS																						
10	29	04	88	XXG	JA	02	1	ATHABAS-L	W	034	LS	MJ298771	M	Ø	000S HEE	026		21	01			0H	NB		Ø			G		GPI6
							7	PREx/6c																						
								FOUR YOUNG OF LAST YEAR																						
10	29	04	88	XXG	JA	03	1	ATHABAS-L	S	033	VG	MJ309843	MS		000S HGE	023	023						NB		Ø			G		GPI6
							7	TA2/6c																						
10	29	04	88	XXG	JA	04	1	ATHABAS-L	S	033	VB	MJ312942	MS		000S HGE	004			04				NB		Ø			G		GPI6
							7	TA2/6c																						
								FOUR RAMS																						
10	29	04	36	XXG	JA	05	1	ATHABAS-L	W	033	VG	MJ315926	MS		000S HGE	082		49	20			18	NB		Ø			G		GPI6
							7	TA2/7c																						
								FOUR FULL CURL AND SIX FOUR/FIFTHS CURL RAMS																						
11	29	04	88	XXG	JA	06	1	ATHABAS-L	S	034	LS	MJ360905	MS		000S HEE	073		50	13			10	NB		Ø			G		GPI6
							7	TA3/7c																						
								SMALL RAMS																						
11	29	04	88	XXG	JA	07	1	ATHABAS-L	W	035	MS	MS302713	RT		000S HEE	001		01					NR		Ø			G		GPI6
							7	TA3/7c																						

East North Flat
West South

TOPO
FP Floodplain
LS Lower slope
LL Lowlands
MS Mid-slope
PA Pass
RC Ridge crest
US Upper slope
VB Valley bottom
FR Rocky foreshore
FS Sandy beach/f'shore
IE Exposed } Inter-
IP Protected } tidal
IS Semi-prot }
SE Exposed }
SP Protected } Sub-
SS Semi-prot } tidal

MARKED No Yes

BEHAVIOR
Feed } Both
Rest }
dEn/nest
Drink
manaGed/handled
Hunt
Lick
Other
rUt/mate
Travel/migrate
uNafraid/encounter/
/nuisance/maul

SNOWCRUST
None Medium
Light Hard

CAPTURED nO Yes

ACTION
Autopsy
Baited
Corralled
mOve
otHer
slauGhter
soID
Tranquilized
trapped & moVed
trappEd

SIGN
None Moderate
One Abundant
Few Unknown

FOODTYPE
Aqua
Browse
Forbs
gaRbage
Grasses/sedges
mEat/carrion
Mixed forage
Unknown/other

MORTALITY
dEstroyed by park staff
Disease
Highway
reMoved
huNted
pOaching
Predation
Railroad
poISoned
Unknown cause
Winter weather

SURVEYTYPE
API6 Aerial
GPI6 Ground
CPI6 Radio telemetry
MSI6 Mortality
PGI6 Pellet group
MPI6 Random (waterdst,type)
MPI7 Random (capt'd,action)
SSI2 Special (to SSI6)
TCI6 Track count

NATIONAL PARK WILDLIFE SURVEY DATA FORM
MOUNTAIN PARKS

HR	DA	MO	YR	OFF	PK	OBS. NO.	CARD	WATERSHED (FIELD 1)	ASP.	ELEV.	TOP.	UTM CO-ORD.	HAB	SNOW	SPECIES	TOT	UNK	ADULT FEM	ADULT MALE	ADULT UNK	JUV YOY	JUV YLY	MARKED	BEHAV'R	SNOW CR	CAPTURED	ACTION	SIGN	FOOD	MORTALITY	SURVEY TYPE
12	29	04	88	XXG	JA	08	1	ATHABAS-L	N	033	VB	MJ277775	RT	000	SHEE	003		03					N	B		Ø			G		GPI6
							7	TA3/7c																							
12	29	04	88	XXG	JA	09	1	ATHABAS-L	W	033	VB	MJ277765	RT	000	SHEE	001		01					N	F		Ø					GPI6
							7	PT3/8c																							
13	29	04	88	XXG	JA	10	1	ATHABAS-L	W	034	LS	MJ301703	MØ	000	SHEE	005		05					W	B		Ø					GPI6
							7	HD1/5c																							
09	01	05	88	XXG	JA	01	1	ATHABAS-M	F	034	LS	MJ292578	AØ	000	MULE	002	001		01				N	F		Ø					GPI6
							7	NY3/7c																							
10	01	05	88	XXG	JA	02	1	ATHABAS-M	W	034	LS	MJ316565	MØ	000	ELK	003	003						N	B		Ø					GPI6
							7	PT1/7																							
12	01	05	98	XXG	JA	03	1	ATHABAS-M	S	035	MS	MJ326554	ØS	000	SHEE	067	001	45	05			16	N	B		Ø					GPI6
							7	NY3/8c																							
								ONE MATURE RAM AND ONE 9/5 CURL																							
09	03	05	88	XXG	JA	01	1	ATHABAS-L	W	034	LS	MJ304714	RT	000	SHEE	003	003						N	F		Ø					GPI6
							7	HD1/5c																							
10	03	05	88	XXG	JA	02	1	ATHABAS-L	W	034	LS	MJ298734	RT	000	SHEE	004	004						N	F		Ø					GPI6
							7	NY1X.R/9																							

ASPECT
East North Flat
West South

TOPO
FP Floodplain
LS Lower slope
LL Lowlands
MS Mid-slope
PA Pass
RC Ridge crest
US Upper slope
VB Valley bottom
FR Rocky foreshore
FS Sandy beach/f'shore
IE Exposed } Inter-
IP Protected } tidal
IS Semi-prot }
SE Exposed } Sub-
SP Protected } tidal
SS Semi-prot }

MARKED No Yes

BEHAVIOR
Feed } Both
Rest }
dEn/nest
Drink
manaGed/handled
Hunt
Lick
Other
rUt/mate
Travel/migrate
uNafraid/encounter/nuisance/maul

SNOWCRUST
None Medium
Light Hard

CAPTURED nO Yes

ACTION
Autopsy
Baited
Corralled
mOve
otHer
slauGhter
solD
Tranquilized
trapped & moVed
trappEd

SIGN
None Moderate
One Abundant
Few Unknown

FOODTYPE
Aqua
Browse
Forbs
gaRbage
Grasses/sedges
mEat/carrion
Mixed forage
Unknown/other

MORTALITY
dEstroyed by park staff
Disease
Highway
reMoved
huNted
pOaching
Predation
Railroad
poiSoned
Unknown cause
Winter weather

SURVEYTYPE
API6 Aerial
GPI6 Ground
CPI6 Radio telemetry
MSI6 Mortality
PGI6 Pellet group
MPI6 Random (waterdst,type)
MPI7 Random (capt'd,action)
SSI2 Special (to SSI6)
TCI6 Track count

NATIONAL PARK WILDLIFE SURVEY DATA FORM

MOUNTAIN PARKS

HR (1-2)	DA (3-4)	MO (5-6)	YR (7-8)	OFF (9-11)	PK (12-13)	OBS. NO. (14-15)	CARD (16)	WATERSHED / FIELD 1 (17-24)	ASP. (25)	ELEV. (26-30)	TOP. (31-32)	UTM CO-ORD. (33-40)	HAB (41)	SNOW (42-45)	SPECIES (46-49)	TOT (50-52)	UNK (53-55)	ADULT FEM (56-57)	ADULT MALE (58-59)	ADULT UNK (60-61)	JUV YOY (62-63)	JUV YLY (64-65)	MARKED (66)	BEHAV'R (67)	SNOW CR (68)	CAPTURED (69)	ACTION (70)	SIGN (71)	FOOD (72)	MORTALITY (73)	(74-76)	SURVEY TYPE (77-80)
1A	09	05	88	XXG	JA	01	1	MALIGNE-	M	F023	VB	MJ319626	T	S000	SHEE	005			05				Ø	L					U			GPI6
							7	PT1/5C																								
								TWO FULL CURL RAMS																								
14	09	05	88	XXG	JA	02	1	MALIGNE-	M	F051	VD	MJ485571	T	S000	SHEE	015		05	04			06	Ø	L					U			GPI6
							7	SB1/8																								
								ONE FULL CURL RAM AND ONE 4/5 CURL RAM																								

(Fields: FIELD 1 = cols 17-24, FIELD 2 = cols 25-32, FIELD 3 = cols 33-40, FIELD 4 = cols 41-49)

ASPECT
East North Flat
West South

TOPO
- FP Floodplain
- LS Lower slope
- LL Lowlands
- MS Mid-slope
- PA Pass
- RC Ridge crest
- US Upper slope
- VB Valley bottom
- FR Rocky foreshore
- FS Sandy beach/f'shore
- IE Exposed } Inter-
- IP Protected } tidal
- IS Semi-prot }
- SE Exposed } Sub-
- SP Protected } tidal
- SS Semi-prot }

MARKED No Yes

BEHAVIOR
- Feed } Both
- Rest }
- dEn/nest
- Drink
- manaGed/handled
- Hunt
- Lick
- Other
- rUt/mate
- Travel/migrate
- uNafraid/encounter/ /nuisance/maul

SNOWCRUST
None Medium
Light Hard

CAPTURED nO Yes

ACTION
- Autopsy
- Baited
- Corralled
- mOve
- otHer
- slauGhter
- solD
- Tranquilized
- trapped & moVed
- trappEd

SIGN
None Moderate
One Abundant
Few Unknown

FOODTYPE
- Aqua
- Browse
- Forbs
- gaRbage
- Grasses/sedges
- mEat/carrion
- MIxed forage
- Unknown/other

MORTALITY
- dEstroyed by park staff
- Disease
- Highway
- reMoved
- huNted
- pOaching
- Predation
- Railroad
- poiSoned
- Unknown cause
- Winter weather

SURVEYTYPE
- API6 Aerial
- GPI6 Ground
- CPI6 Radio telemetry
- MSI6 Mortality
- PGI6 Pellet group
- MPI6 Random (waterdst,type)
- MPI7 Random (capt'd,action)
- SSI2 Special (to SSI6)
- TCI6 Track count