COLUMBIA BASIN FISH & WILDLIFE COMPENSATION PROGRAM

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BRITISH COLUMBIA

2000 SOUTHERN EAST KOOTENAY GOAT AERIAL SURVEY

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FOR

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Executive Summary

Mountain goats exist throughout the high elevation areas of the East Kootenay. Previous inventories have been conducted over most of the 2000 inventory area. These inventories were relative abundance surveys with sex and age classifications limited to adults and juveniles. The mountain goat population is hunted in most areas covered by this inventory during the fall hunting season, but hunts are on a Limited Entry basis. Gaining further knowledge of the current number of animals, sex and age ratios, distribution and the required habitat types to provide better management of this species is the objective of this project. Updated knowledge of the number of animals and the required habitat types will result in better goat management in the East Kootenay.

B.C. Environment and the Columbia Basin Fish and Wildlife Compensation Program requested a goat inventory for four Management Units in the East Kootenay – M.U.'s 4-01 (Flathead River drainage), 4-02 (Wigwam River drainage) , 4-23 (Elk River drainage), and 4-22 (Bull River drainage). Funding for this inventory was provided by the Columbia Basin Fish and Wildlife Compensation Program and C.L.I.B (Coordinated Land Inventory Base).

All census flights were done using a Bell 206 helicopter flying between 30 and 70 m above ground level and at speeds of 60 - 100 km / hr, depending on tree cover and terrain. Animal locations were recorded using a GPS Pathfinder receiver. Locations were recorded where the animals were first sighted.

The inventory was completed according to RIC Standards. Composition was to the level of adults and kids, due to the difficulty of sexing adult goats and the terrain compromising the safety of the Mt. Goats and the observers.

Tabulation of all count and classification data was done using previous sightability data . Conservative management population estimates for these areas were made using sightability estimates made in other areas of the province.

Table 1. Summary of South East Kootenay Goat Inventory

	Observed				Sightability Correction (50%)			
M.U.	**Total**	**Adults**	**Juveniles**	**Kids / 100 Adults**	**Total**	**Adults**	**Juveniles**	**Kids / 100 Adults (%)**
4-01	156	113	43	39	312	226	86	39 (27)
4-02	25	18	7	38	50	36	14	38 (28)
4-22	342	268	74	27	684	536	148	27 (21)
4-23	361	264	97	36	722	528	194	36 (26)
Total	**884**	**663**	**221**	**33**	**1768**	**1326**	**442**	**33 (25)**

A total of 884 goats were observed during the inventory, including 156 in Management Unit 4-01, 25 in Management Unit 4-02, 342 in Management Unit 4-22 and 361 in Management Unit 4-23. The management population estimates for these management units are 312 for M.U. 4-01, 50 for M.U. 4-02, 684 for M.U. 4-22 and

722 for the surveyed portion of M.U. 4-23. It should be noted that portions of M.U. 4-23 were not surveyed due to adverse weather conditions, and this estimate is for only the surveyed portion of the management unit.

The adult to juvenile ratio for the study area was 33 juveniles per 100 adults, or juveniles made up 25% of the goat population. The proportion of juveniles observed (25%) was equal to the percent juveniles observed during summer/early fall surveys in the Robson Valley (25%), and higher than those undertaken in the Babine Mountains (17-18%);the Hazelton and Coast mountains (19%); and interior BC (15-23%). The late summer - fall recruitment rates of juvenile goats appear to be satisfactory to maintain and increase this goat herd. The highest percentage of juveniles was found in Management Unit 4-02 (Wigwam River) at 28%, followed closely by Management Unit 4-23 (Elk Valley) with 26% and Management Unit 4-01 (Flathead River) at 27%. The lowest percentage of juveniles was found in Management Unit 4-22 (Bull River) at 21%. However, it should be noted that this percentage is still higher than most other recently recorded goat inventories within the province of British Columbia.

Several previous goat surveys have been undertaken within the inventory area between 1977 and 1991 (Table 10). However, caution should be exercised in comparing these previous data with the results of the 2000 inventory. It is unknown if previous results encompassed the entire management zone, and what the survey intensities were on these flights. Goat populations have declined in certain management zones in Management Units 4-01 and 4-23. Interpreting past data from goat inventories in Management Unit 4-22 are difficult to interpret, as it cannot be made certain that the entire management zones were surveyed on these previous flights.

Acknowledgments

We would like to thank the Ktunaxa - Kinbasket Tribal Council for their participation in this project, particularly Vic Clement for his participation in the inventory. We would also like to thank Bob Forbes of B.C. Environment and Larry Ingham of the Columbia Basin Fish and Wildlife Compensation Program for their guidance and assistance, as well as Clay Wilson of Bighorn Helicopter for once again providing quality pilots for this inventory.

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Introduction

B.C. Environment and the Columbia Basin Fish and Wildlife Compensation Program requested a mountain goat inventory for four Management Units in the East Kootenay – M.U.'s 4-01 (Flathead River drainage), 4-02 (Wigwam River drainage) , 4-23 (Elk River drainage), and 4-22 (Bull River drainage). Funding for this inventory was provided by C.L.I.B. (Common Land Inventory Base) and the Columbia Basin Fish and Wildlife Compensation Program. Mountain goats exist throughout the high elevation areas of the East Kootenay. There is some concern that goat populations in some areas within the East Kootenays have or are declining. This was indicated on preliminary goat census flights comjpleted by B.C. Environment and C.B.F.W.C.P. during the summer of 1999 in the Purcell Mountains.

Previous inventories have been conducted over most of the 2000 inventory area. These inventories were relative abundance surveys with sex and age classifications limited to adults and juveniles. The mountain goat population is hunted in most areas covered by this inventory during the fall hunting season, but hunts are on a Limited Entry basis. Gaining further knowledge of the current number of animals, sex and age ratios, distribution and the required habitat types to provide better management of this species is the objective of this project. Updated knowledge of the number of animals and the required habitat types will result in better goat management in the East Kootenays.

Methods

An aerial survey was conducted between September 1 and 9, 2000 using an absolute count. Four management units were identified for survey, including 4-01 (Flathead River drainage), 4-02 (Wigwam River drainage) , 4-23 (Elk River drainage), and 4-22 (Bull River drainage). Each Management Unit was surveyed by flying all areas from approximately 200 m below timberline to the ridge top.

All census flights were done using a Bell 206 helicopter flying between 30 and 70 m above ground level and at speeds of 60 - 100 km / hr, depending on tree cover and terrain. The search pattern varied from transects parallel to contours to transects across the contours. Transects were flown between 150 - 250 m apart, depending on tree cover and terrain. Once animals were sighted, they were circled to obtain age and sex information. Animal locations were recorded using a GPS Pathfinder receiver. Locations were recorded where the animals were first sighted. Flight lines were also recorded using this feature. All flight lines and goat locations were differentially corrected using PFINDER software.

A four-man survey team, including the pilot, was employed on the census flights. During the census flights, the primary observer sat in the front seat, next to the pilot and operated the GPS receiver. The secondary observer sat behind the pilot and recorded all the data while the third observer sat behind the primary observer.

The inventory was completed according to RIC Standards. Composition was to the level of adults and kids, due to the difficulty of sexing adult goats and the terrain compromising the safety of the Mt. Goats and the observers. Locations of individuals observed were recorded on 1:50,000 topographic maps and total numbers, composition, vegetation type, percent cover and activity (bedded, moving or standing of first observed) at each individual location, was recorded on RIC "Animal Observation Form-Ungulate (Aerial) Sample Block "forms. Approximately 200 m below treeline was used as lower elevation boundary, however lower elevation sites dominated by escape terrain were also searched. Flight lines were identified on the maps by hand, as well as being recorded using G.P.S. This will help in documenting the distribution of Mountain Goats as well as assist in identifying potential enhancement projects.

The total number, adults and juveniles, as well as juveniles per adult were summarized for each management zone and management unit. CBFWCP Inventory block results were not analyzed due to the lack of defined blocks over most of the inventory area. Results were compared to previously completed inventories or research projects when possible to assist in the evaluation of the status or health of these goat populations.

Tabulation of all count and classification data was done using previous sightability data. Poole and Heard (1999) estimated goat sightability to be approximately 67 - 68% during an inventory in the Robson Valley (north of the inventory area). Chichowski et. al., (1994) also reported similar results during a mark / resurvey inventory also conducted in British Columbia. However, goat sightability has also been recorded as low as 30% (Hebert and Langin, 1982; Smith, 1984; Smith and Bovee, 1984). Conservative goat population estimates were made using 50% sightability, which is the mid-point between these sightability estimates. Population estimates for Management Units and Zones were made using these numbers.

Results

Flathead River (M.U. 4-01)

A total of 156 goats were observed during these census flights. Of this total, 113 were adults and 43 were juveniles. The age class ratio was 39 juveniles : 100 adults (Table 2). Using the 68% sightability reported by Poole and Heard (1999) and Chicowski et. al (1994), the estimated goat population of the Management Unit is 229, comprised of 166 adults and 63 juveniles. At 50% sightability, which is being used for management estimates, the goat population for the Management Unit is 312 goats, comprised of 226 adults and 86 juveniles (Table 2). Raw data for M.U. 4-01 (as well as other surveyed Management Units) appear in Appendix 1.

Table 2. Goat Inventory Data, M.U. 4-01 by LEH Zone.

Zone	Observed			68% Sightability			50% Sightability (Management Estimate)			30% Sightability			
	Adult	Juvenile	Total	Adult	Juvenile	Total	Adult	Juvenile	Total	Adult	Juvenile	Total	Juvenile : 100 Auult
401A	23	10	33	34	15	49	46	20	66	77	33	110	43
401B	22	6	28	32	9	41	44	12	56	73	20	93	27
401C	24	9	33	35	13	48	48	18	66	80	30	110	37
401E	15	6	21	22	9	31	30	12	42	50	20	70	40
401X	24	11	35	35	16	51	48	22	70	80	37	117	45
401Y	5	1	6	7	1	8	10	2	12	17	3	20	20
TOTAL	**113**	**43**	**156**	**165**	**63**	**229**	**226**	**86**	**312**	**377**	**143**	**520**	**37**

Goat management zone 4-01A consists of the drainages of Kisheneena Creek and the south side of Sage Creek. A total of 33 goats (23 adults and 10 juveniles) were observed in this zone. The age class ratio was 43 juveniles : 100 adults (Table 2). Using the 50% sightability calculation, the population estimate for the management zone is 66 goats, including 46 adults and 20 juveniles.

Goat management zone 4-01B consists of the drainage of Commerce Creek and the north side of the Sage Creek drainage and the south side of Middle Pass Creek.. A total of 28 goats (22 adults and 6 juveniles) were observed in this zone. The age class ratio was 27 juveniles : 100 adults (Table 2). Using the 50% sightability calculation, the population estimate for the management zone is 56 goats, including 44 adults and 12 juveniles.

Goat management zone 4-01C consists of the land on the east side of the Flathead River from the north side of Middle Pass Creek to the south side of Pincher Creek. A total of 33 goats (24 adults and 9 juveniles) were observed in this zone. The age class ratio was 37 juveniles : 100 adults (Table 2). Using the 50% sightability calculation, the population estimate for the management zone is 66 goats, including 48 adults and 18 juveniles.

Goat management zone 4-01D consists of the land on the east side of the Flathead River from the north side of Pincher Creek and the Squaw Creek drainage. As no goats were observed within this management zone, no population estimates are available.

Management zone 4-01X consists of the land bordered between the west side of the Flathead River and the east side of Harvey Creek. Prominent drainages within this unit include McLatchie and Shepp Creeks. There is currently no goat hunting within this unit. A total of 35 goats (24 adults and 11 juveniles) were observed in this zone. The age class ratio was 45 juveniles : 100 adults (Table 2). Using the 50% sightability calculation, the population estimate for the management zone is 70 goats, including 48 adults and 22 juveniles.

Management zone 4-01E consists of the area bordered by the height of land between MU 4-01 and 4-02 in the west, the west side of Harvey Creek and the Flathead River to the east, and the north side of Cabin Creek to the south. A total of 21 goats

(15 adults, 6 juveniles) were observed in this zone. The age class ratio was 40 juveniles : 100 adults (Table 2). Using the 50% sightability calculation, the population estimate for the management zone is 42 goats, including 30 adults and 12 juveniles.

Management zone 4-01Y consists of the portion of Management Unit 4-01 west of Cabin Creek. There is currently no goat hunting within this unit. A total of 6 goats (5 adults and 1 juvenile) were observed in this zone. The age class ratio was 20 juveniles : 100 adults (Table 2). Using the 50% sightability calculation, the population estimate for the management zone is 12 goats, including 10 adults and 2 juveniles.

Wigwam River (M.U. 4-02)

A total of 25 goats were observed during this census flight. Of this total, 18 were adults and 7 were juveniles. The age class ratio was 38 juveniles : 100 adults. Using the 68% sightability reported by Poole and Heard (1999) and Chicowski et. al (1994), the estimated goat population of the Management Unit is 36, comprised of 26 adults and 10 juveniles. At the 30% sightability reported by Hebert and Langin, (1982) and Smith and Bovee, (1984), the estimated goat population for the Management Unit is 83 goats, comprised of 60 adults and 23 juveniles (Table 3). The only goat management zone within the Management Unit is 4-02A. The management estimate for the Management Unit (using 50% sightability) is 50 goats, comprised of 36 adults and 14 juveniles.

Table 3. Goat Inventory Data, M.U. 4-02 by LEH Zone.

Zone	Observed			68% Sightability			50% Sightability (Management Estimate)			30% Sightability			
	Adult	Juvenile	Total	Adult	Juvenile	Total	Adult	Juvenile	Total	Adult	Juvenile	Total	Juvenile : 100 Auult
4-02A	18	7	25	26	10	36	36	14	50	60	23	83	38
TOTAL	**18**	**7**	**25**	**26**	**10**	**36**	**36**	**14**	**50**	**60**	**23**	**83**	**38**

Bull River (M.U. 4-22)

A total of 342 goats were observed during this census flight. Of this total, 268 were adults and 74 were juveniles. The age class ratio was 27 juveniles : 100 adults. At 68% sightability, this equates to a population of 503 goats, of which 394 are adults and 109 juveniles. At 30% sightability, the total population estimate is 1140 goats, consisting of 893 adults and 247 juveniles. The largest group of goats observed in the Management Unit was 39. A total of 89 groups of goats were classified in the Bull River drainage (Table 4).

Table 4. Goat Inventory Data, M.U. 4-22 by LEH Zone.

Zone	Observed			68% Sightability			50% Sightability (Management Estimate)			30% Sightability			
	Adult	Juvenile	Total	Adult	Juvenile	Total	Adult	Juvenile	Total	Adult	Juvenile	Total	Juvenile : 100 Auult
4-22A	34	9	43	50	13	63	68	18	86	113	30	143	26
4-22B	34	6	40	50	9	59	68	12	80	113	20	133	17
4-22C	11	3	14	16	4	21	22	6	28	37	10	47	27
4-22D	44	9	53	65	13	78	88	18	106	147	30	177	20
4-22E	84	27	111	124	40	163	168	54	222	280	90	370	32
4-22F	36	11	47	53	16	69	72	22	94	120	37	157	30
4-22G	25	9	34	37	13	50	50	18	68	83	30	113	36
TOTAL	**268**	**74**	**342**	**394**	**109**	**503**	**536**	**148**	**684**	**893**	**247**	**1140**	**27**

Goat management zone 4-22A consists of the land on the east side of the Bull River between the north side of Iron Creek and the south side of Sulphur Creek. A total of 43 goats (34 adults and 9 juveniles) were observed in this zone. The age class ratio was 26 juveniles : 100 adults (Table 4). Using the 68% sightability calculation, the population estimate for the management zone is 63 goats, including 50 adults and 13 juveniles. Using the 30% sightability calculation, the population estimate for the management zone is 143 goats, including 113 adults and 30 juveniles. The management estimate for this zone (50% sightability) is 86 goats, consisting of 68 adults and 18 juveniles.

Goat management zone 4-22B consists of the land between the north side of Tanglefoot Creek and the south side of Galbraith Creek. A total of 40 goats (34 adults and 6 juveniles) were observed in this zone. The age class ratio was 18 juveniles : 100 adults (Table 4). Using the 68% sightability calculation, the population estimate for the management zone is 59 goats, including 50 adults and 9 juveniles. Using the 30% sightability calculation, the population estimate for the management zone is 133 goats, including 113 adults and 20 juveniles. The management estimate for this zone (50% sightability) is 80 goats (68 adults, 12 juveniles).

Goat management zone 4-22C consists of the land on the west side of the Bull River from the north side of Quinn Creek to the height of land. A total of 14 goats (11 adults and 3 juveniles) were observed in this zone. The age class ratio was 27 juveniles : 100 adults (Table 4). Using the 68% sightability calculation, the population estimate for the management zone is 21 goats, including 16 adults and 4 juveniles. Using the 30% sightability calculation, the population estimate for the management zone is 47 goats, including 37 adults and 10 juveniles. The management estimate for zone 4-22C is 28 goats (22 adults, 6 juveniles).

Goat management zone 4-22D consists of the east side of the Bull River from the north side of Norboe Creek to the height of land. A total of 53 goats (44 adults and 9 juveniles) were observed in this zone. The age class ratio was 20 juveniles : 100

adults (Table 4). Using the 68% sightability calculation, the population estimate for the management zone is 78 goats, including 65 adults and 13 juveniles. Using the 30% sightability calculation, the population estimate for the management zone is 177 goats, including 147 adults and 30 juveniles. The management estimate for zone 4-22D is 106 goats, using 50% sightability. This total includes 88 adults and 18 juveniles.

Management zone 4-22E consists of the land on the east side of the Bull River between the north side of Sulphur Creek and the south side of Norboe Creek. A total of 111 goats (84 adults and 27 juveniles) were observed in this zone. The age class ratio was 32 juveniles : 100 adults (Table 4). Using the 68% sightability calculation, the population estimate for the management zone is 163 goats, including 124 adults and 40 juveniles. Using the 30% sightability calculation, the population estimate for the management zone is 370 goats, including 280 adults and 90 juveniles. The management estimate for this zone (using 50% sightability) is 222 goats, including 168 adults and 54 juveniles.

Management zone 4-22F consists of the land on the west side of the Bull River between the north side of Galbraith Creek and the south side of Quinn Creek. A total of 47 goats (36 adults and 11 juveniles) were observed in this zone. The age class ratio was 31 juveniles : 100 adults (Table 4). Using the 68% sightability calculation, the population estimate for the management zone is 69 goats, including 53 adults and 16 juveniles. Using the 30% sightability calculation, the population estimate for the management zone is 157 goats, including 120 adults and 37 juveniles. The management estimate for zone 4-22F is 94 goats, including 72 adults and 22 juveniles.

Management zone 4-22G consists of the land in M.U. 4-22 south of Iron Creek, and includes both Little and Big Sand Creeks. A total of 34 goats (25 adults and 9 juvenile) were observed in this zone. The age class ratio was 36 juveniles : 100 adults (Table 4). Using the 68% sightability calculation, the population estimate for the management zone is 50 goats, including 37 adults and 13 juveniles. Using the 30% sightability calculation, the population estimate for the management zone is 113 goats, including 83 adults and 30 juveniles. The management estimate for this zone is 68 goats, including 50 adults and 18 juveniles.

Elk River (M.U. 4-23)

Due to inclement weather, portions of this Management Unit were not flown, or were flown in adverse conditions. In management zone 4-23B, the portion of the zone lying north of the confluence of Cadorna Creek and Abruzzi Creek, and management zone 4-23C surrounding the Elk Lakes were not censused. Although this is a small portion of the management zone, it is suspected that a significant number of goats occupy this area.

All of management zone 4-23E and a small portion of 4-23G were flown on a day after a fresh snowfall. Therefore, it is suspected that several goats were missed in these areas and accurate population estimates are not possible, especially in 4-23E.

A total of 361 goats were observed during census flights. Of this total, 264 were adults and 97 were juveniles. The age class ratio was 37 juveniles : 100 adults. Using the 68% sightability reported by Poole and Heard (1999) and Chicowski et. al

(1994), the estimated goat population of the Management Unit is 476, comprised of 348 adults and 128 juveniles. At the 30% sightability reported by Hebert and Langin, (1982) and Smith and Bovee, (1984), the estimated goat population for the Management Unit is 614 goats, comprised of 449 adults and 165 juveniles (Table 5).

Table 5. Goat Inventory Data, M.U. 4-23 by LEH Zone.

Zone	Observed			68% Sightability			50% Sightability (Management Estimate)			30% Sightability			
	Adult	Juvenile	Total	Adult	Juvenile	Total	Adult	Juvenile	Total	Adult	Juvenile	Total	Juvenile : 100 Auult
423A	81	27	108	119	40	159	162	54	216	270	90	360	33
423B*	112	42	154	165	62	227	224	84	308	373	140	513	37
423C*	12	6	18	18	9	27	24	12	36	40	20	60	50
423E**	2	1	3	-	-	-	4	2	6	-	-	-	50
423G**	16	6	22	24	9	33	32	12	44	53	20	73	37
423J	38	13	51	56	19	75	76	26	102	127	43	170	34
423X**	4	1	5	5	-	-	8	2	10	-	-	-	25
TOTAL	**264**	**97**	**361**	**388**	**143**	**531**	**530**	**192**	**722**	**880**	**323**	**1203**	**36**

*Zone only partially surveyed
** Zone (or a portion thereof) flown in inclement conditions)

Goat management zone 4-23 A consists of the land on the west side of the Elk River between the north side of Brule Creek and the south side of Bingay Creek. A total of 108 goats (81 adults and 27 juveniles) were observed in this zone. The age class ratio was 33 juveniles : 100 adults (Table 5). Using the 68% sightability calculation, the population estimate for the management zone is 159 goats, including 119 adults and 40 juveniles. Using the 30% sightability calculation, the population estimate for the management zone is 360 goats, including 270 adults and 90 juveniles. The management estimate for zone 4-23A is 216 goats, of which 162 are adults and 54 are juveniles.

Goat management zone 4-23B consists of the land on the west side of the Elk River from the north side of Bingay Creek to the south side of Cadorna Creek. A total of 154 goats (112 adults and 42 juveniles) were observed in the surveyed portion of this zone, with some goats undoubtedly being missed in the unsurveyed portion. The age class ratio was 37 juveniles : 100 adults (Table 5). Using the 68% sightability calculation, the population estimate for the management zone is 227 goats, including 165 adults and 62 juveniles. Using the 30% sightability calculation, the population estimate for the management zone is 513 goats, including 373 adults and 140 juveniles. The management estimate (50% sightability) for this zone is 308 goats, consisting of 224 adults and 84 juveniles.

Goat management zone 4-23C consists of the land on the west side of the Elk River from the north side of Cadorna Creek to the height of land. A total of 18 goats (12 adults and 6 juveniles) were observed in this zone. The age class ratio was 50 juveniles : 100 adults (Table 5). Using the 68% sightability calculation, the population estimate for the management zone is 27 goats, including 18 adults and 9 juveniles. Using the 30% sightability calculation, the population estimate for the management zone is 60 goats, including 40 adults and 20 juveniles. The management estimate for the surveyed portion of this zone is 36 goats, including 24

adults and 12 juveniles. A significant portion of this zone was not flown due to inclement weather, and several goats were undoubtedly not observed and classified. Therefore, population estimates should be interpreted with extreme caution.

Goat management zone 4-23E consists of the Henretta Creek drainage, the Aldridge Creek drainage and the Fording River drainage above the confluence of Henretta Creek. This zone was surveyed after a fresh snowfall and the vast majority of the goats within the zone were not observed. Therefore, population estimates are far too unreliable to describe for this area.

Management zone 4-23G consists of the land bordered between the south side of Ewin Creek, the north side of Line Creek, the east side of the Fording River and the B.C. - Alberta boundary. Small portions of this zone were surveyed during inclement conditions and some goats were undoubtedly missed during census flights. A total of 22 goats (16 adults and 6 juveniles) were observed in this zone. The age class ratio was 37 juveniles : 100 adults (Table 5). Using the 68% sightability calculation, the population estimate for the management zone is 33 goats, including 24 adults and 9 juveniles. Using the 30% sightability calculation, the population estimate for the management zone is 73 goats, including 53 adults and 20 juveniles. The management estimate for this zone is 44 goats, of which 32 are adults and 12 are juveniles.

Management zone 4-23J consists of the land bordered between the south side of Brule Creek, the North side of Lladner Creek and the west side of the Elk River. A total of 51 goats (38 adults and 13 juveniles) were observed in this zone. The age class ratio was 34 juveniles : 100 adults (Table 5). Using the 68% sightability calculation, the population estimate for the management zone is 75 goats, including 56 adults and 19 juveniles. Using the 30% sightability calculation, the population estimate for the management zone is 170 goats, including 127 adults and 43 juveniles. The management estimate for zone 4-23J is 102 goats, including 76 adults and 26 juveniles.

Management zone 4-23X consists of the land bordered between the east side of the Fording River, the south side of Henretta Creek and the north side of Ewin Creek. Prominent drainages within this unit include Todhunter and Chauncey Creeks. This unit was flown shortly after a fresh snowfall, and therefore goats may have gone unobserved during the census flight. There is currently no goat hunting within this unit. A total of 5 goats (4 adults and 1 juvenile) were observed in this zone. The age class ratio was 25 juveniles : 100 adults (Table 5). Due to the unreliability of the census flight, population estimates for this zone were not made.

Discussion

Population Estimates

Following is a discussion on each of the survey areas. Included is an analysis of the populations and population demographics of each area. For each survey area, four population estimates are provided. The first estimate is based on the number of observed goats and assumes the “Perfect Visibility”, and assumes that no goats were missed from the censused sampling units during the aerial survey. At best, this can be used as a minimum population estimate. The ‘68% Efficiency’ estimate is based

on the 68% observer efficiency in timbered habitats reported by Poole and Heard (1999) and Chicowski et al, 1994. This estimate was calculated by dividing the perfect visibility estimates by 0.68 to account for the estimated 32% of the goats missed during census flights. This estimate assumes that our observer efficiency was similar to the listed surveys. The '30% Efficiency' estimate is based on the 30% observer efficiency reported by Hebert and Langin and Smith and Bovee. This estimate was calculated by dividing the perfect visibility estimates by 0.30 to account for the estimated 70% of the goats missed during census flights. This estimate assumes that our observer efficiency was similar to the listed surveys. This estimate should provide an upper population estimate for the survey areas. The management estimate was calculated by dividing the number of goats observed by 0.5 to account for the assumed sightability of 50%.

Management Units and Management Zones

Flathead River (4-01)

We believe that the population of 156 goats using perfect visibility underestimates the actual goat populations in the management unit and for all management zones as well (Table 6). This is because the weather was hot and dry during the inventory, and some goats were undoubtedly missed either in timbered habitats, rough terrain and caves. Other goats may also have been across provincial or international boundaries at the time of the inventory. However, the estimated 510 goats using 30% efficiency is probably an overestimate. We believe that the actual goat population in M.U. 4-01 is probably between these two numbers. The 50% efficiency estimate (312) would be a conservative management estimate. Table 6 shows population estimates by management zone based on three different sightability correction values.

It is interesting to note that the population estimate for management zone 4-01 D is zero. This is a definite underestimate. This is because no goats were observed in the area during the time of the census. This is probably due to the fact that much of the zone straddles the Continental Divide, the goats were probably in the neighboring province of Alberta during the census flight (Alberta was not surveyed and no goats were observed across the provincial boundary).

Management estimates of goat populations ranged from a low of 0 in zone D to a high of 70 in zone X. It is interesting to note that no goat hunting is allowed in zone X. Management estimates for other zones are 66, 56, 66, 42 and 12 for zones A, B, C, E and Y respectively (Table 6).

Table 6. Population estimates using three methods, Flathead M.U. 4-01.

Management Zone	Perfect Visibility	68% Efficiency	50% Efficiency (Management Estimate)	30% Efficiency
401 A	33	49	66	110
401 B	28	41	56	93
401 C	33	48	66	110
401 D	0	-	-	-
401 E	21	27	42	60
401 X	35	51	70	117
401 Y	6	8	12	20
Total	**156**	**224**	**312**	**510**

Wigwam River (4-02)

As there is only one goat management zone within M.U. 4-02, the discussion on the total goat population also pertains to goat management zone 4-02A.

We believe that the actual goat population in M.U. 4-02 is probably between the perfect visibility estimate and the 30% sightability estimate (Table 7). The 50% efficiency estimate (50) would be a conservative management estimate.

Table 7. Population estimates using three methods, Wigwam M.U. 4-02.

Management Zone	Perfect Visibility	68% Efficiency	50% Efficiency (Management Estimate)	30% Efficiency
402 A	25	36	50	83
Total	**25**	**36**	**50**	**83**

Bull River (M.U. 4-22)

The actual goat population of the unit is probably between the perfect visibility estimate (342) and the 30% sightability estimate (1140). The estimate of 684 goats using the 50% sightability estimate is a good conservative management estimate.

Management estimates for zones ranged from a low of 28 goats in 4-22C to a high of 222 goats in 4-22E. Population estimates for Management Zones 4-22A, 4-22 B and 4-22D were 86, 80 and 106 respectively, while estimates for zones 4-22F and 4-22G were 94 and 68 goats respectively.

Table 8. Population estimates using three methods, Bull River M.U. 4-22.

Zone	Perfect Visibility	68% Sightability	50% Sightability (Management Estimate)	30% Sightability	Juvenile: 100 Adult
Zone					
4-22A	43	63	86	143	26
4-22B	40	59	80	133	17
4-22C	14	21	28	47	27
4-22D	53	78	106	177	20
4-22E	111	163	222	370	32
4-22F	47	69	94	157	30
4-22G	34	50	68	113	36
TOTAL	**342**	**503**	**684**	**1140**	**27**

Elk River (M.U. 4-23)

Some areas within this Management Unit were only partially surveyed, and some were surveyed in adverse conditions, and some goats undoubtedly went unseen during census flights as well. In addition, there are some areas where no goat hunting is currently allowed that were also not surveyed. As is the case for other surveyed Management units, we feel that the 30% efficiency population (1203) probably overestimates goat populations within the surveyed area. We believe that a good conservative management estimate of goat populations can be made using the 50% efficiency calculation (an estimated 722 goats). Table 9 shows population estimates by management zone based on three different methods.

No population estimates were made for management zone 4-23 E, as the area was flown during adverse conditions. No estimate was made for the areas with no current goat hunting opportunities as well for the same reason. It should be further noted that the population estimate for management zones 4-23 B, 4-23 C and 4-23 G are based on partial surveys only. Approximately 85% of zone B, 33% of zone C and 60% of zone G was surveyed. Had the entire zones been surveyed, the resulting population estimates for these zones would undoubtedly be higher.

Management estimates of goat populations ranged from a low of 36 in zone C (partial survey) to a high of 308 in zone B (partial survey). Management estimates for other zones are 216, 44, and 102 for A, G, and J respectively (Table 9).

Table 9. Population estimates using three methods, Elk Valley M.U. 4-23 (survey area only).

Management Zone	Perfect Visibility	68% Efficiency	50% Efficiency (Management Estimate)	30% Efficiency
423 A	108	159	216	360
423 B*	154	227	308	513
423 C*	18	27	36	60
423 E**	-	-	-	-
423 G**	22	33	44	73
423 J	51	75	102	170
423 X**	-	-	-	-
Total	**361**	**531**	**722**	**1203**

*Zone only partially surveyed
** Zone (or a portion thereof) flown in adverse conditions)

Overall Populations

The total conservative management estimated goat population for the combined survey area is 1768 goats. The highest estimated goat population is in Management Unit 4-23, with an estimate of 722 goats (partial survey), or approximately 40% of the total goat population for the survey area. Management Unit 4-22 had the second highest estimated goat population, with 684 goats. The lowest estimated goat population was 50 in Management Unit 4-02.

Adult : Juvenile Ratios

The adult to juvenile ratio for the study area was 33 juveniles per 100 adults, or juveniles made up 25% of the goat population. The proportion of juveniles observed (25%) was equivalent to the percent juveniles observed during summer/early fall surveys in the Robson Valley (Poole and Heard, 1999), and higher than the 17 - 18% found during surveys in the Babine Mountains (Cichowski et al. 1994), 19% found in the Hazelton Mountains (Demarchi et al. 1997), 15-23% in interior BC (McCrory 1979), and 21% for interior B.C. (Hebert and Woods 1984). However, direct comparisons may not be valid because juvenile estimates vary with survey techniques and time of year (Fiesta-Bianchet et al. 1994). In any event, it appears that late summer - fall recruitment rates of juvenile goats appears to be satisfactory to maintain and increase this goat herd. The adult to juvenile ratio varied between management unit. The highest percentage of juveniles was found in Management Unit 4-02 (Wigwam River) at 28%, followed closely by Management Unit 4-23 (Elk Valley) with 26% and Management Unit 4-01 (Flathead River) at 27%. The lowest percentage of juveniles was found in Management Unit 4-22 (Bull River) at 21%. However, it should be noted that this percentage is still higher than most other recently recorded goat inventories within the province of British Columbia. Goat management zones 4-22B and 4-22D had a lower juvenile to adult ratio in the observed population than the majority of the inventory area at 17:100 and 20:100 respectively. It is unknown why these ratios are lower than the rest of the inventory area.

Comparison With Past Surveys

Several previous goat surveys have been undertaken within the inventory area between 1977 and 1991 (Table 10). However, caution should be exercised in comparing these previous data with the results of the 2000 inventory. It is unknown if previous results encompassed the entire management zone, and at what intensity the surveys were flown.

Table 10. Number of goats observed on previous summer inventories by zone and year.

Census Unit	Year	Adult	Juveniles	Total	% Juvenile
4-01A	1991	47	12	59	20
4-01A	2000	23	10	33	30
4-01B	1982	67	22	89	25
4-01B	1990	38	11	49	22
4-01B	2000	22	6	28	21
4-01C	1980	22	8	30	27
4-01C	1982	77	20	97	21
4-01C	1990	19	4	23	17
4-01C	2000	24	9	33	27
4-01D	1980	25	15	40	38
4-01D	1982	12	2	14	14
4-01D	2000	-	-	-	-
4-23B	1982	575	132	707	19
4-23B	1983	465	90	555	16
4-23B	1985	52	6	58	10
4-23B	1986	302	14	316	4
4-23B	1989	259	35	294	12
4-23B	2000	112	42	154	27
4-23C	1989	27	4	31	13
4-23C	2000	27	4	31	13
4-23J	1982	17	7	24	29
4-23J	2000	38	13	51	25
4-22B	1991	8	1	9	11
4-22B	2000	34	6	40	15
4-22C	1977	20	6	26	23
4-22C	2000	11	3	14	21
4-22E	1977	26	16	42	38
4-22E	1982	61	20	81	25
4-22E	2000	84	27	111	24
4-22F	1982	75	18	93	19
4-22F	1991	35	8	43	19
4-22F	2000	36	11	47	23

Goat populations in Management Unit 4-01 appear to be declining in comparison with past goat aerial surveys. In goat management zone 4-01A, a total of 59 goats were observed in a 1991 survey, as compared to 33 in 2000. However, it should be noted that the percentage of juveniles in the population has increased from 20% in 1991 to 30% in 2000. Goat populations in management zone 4-01B have been

surveyed twice in the past, with 89 goats being observed in 1982 and 49 in 1990. This number has declined to 28 in 2000. The percentage of juveniles in the population for these surveys were 25%, 22% and 21% for 1982, 1990 and 2000 respectively. Management zone 4-01C has been surveyed three times previous to 2000. A total of 30, 97 and 23 goats were counted in 1980, 1982 and 1990 respectively. In 2000, a total of 33 goats were observed, which was higher than all survey years except 1982. No goats were observed in management zone 4-01D during the 2000 survey. A total of 40 and 14 goats were counted in this zone in 1980 and 1982 respectively. Data from previous surveys for this management unit should be viewed with caution. It is possible that these previous inventories also included a portion of the province of Alberta, which would increase the count.

In most cases, goat populations appear to be declining in Management Unit 4-23 as well. Management zone 4-23B has been one of the more intensively surveyed areas in past years, with 707, 555, 316 and 294 goats being observed in 1982, 1983, 1986 and 1989 respectively. This declining trend continued to 2000, with 154 goats being counted. It should be noted, however, that the 2000 survey only encompassed approximately 85% of the management zone. It is also interesting to note that the 27% juveniles in the population is significantly higher than any other recorded level within this zone. One previous goat survey has been undertaken in management zone 4-23C in 1989, with 31 goats being observed. A partial survey (approximately 60% of the zone) in 2000 resulted in 18 goats being counted. Due to the small areas surveyed, a valid comparison between the two areas is not possible. A previous goat inventory was undertaken in management zone 4-23J in 1982, with a total of 24 goats being counted. In 2000, a total of 51 goats were observed. It is unknown, however, if the 1982 inventory was completed over the entire management zone.

Results from Management Unit 4-22 are difficult to interpret. The most troublesome fact is that it is unknown whether or not the entire management zones were surveyed on these previous flights. Therefore, the comparisons should be made with caution. Management zone 4-22B was previously surveyed in 1991, with a total of 9 goats being observed. This compares to a total of 40 goats being counted in 2000. Management zone 4-22C was previously surveyed in 1977, with a total of 26 goats being counted. During the 2000 survey, 14 animals were classified. Management zone 4-22E was previously surveyed in 1977 and 1982, with 42 and 81 goats being counted respectively. This number increased to 111 during the 2000 goat survey. Management zone 4-22F was previously surveyed in 1982 and 1991. A total of 93 and 43 animals were counted on these inventories respectively. This compares to a total of 47 goats counted during the 2000 inventory. It appears that the goat population in this zone is below 1982 levels, but comparable to 1991 levels, assuming that the entire zones were surveyed during previous flights.

Conclusions

Although comparisons between previous surveys are difficult, it appears that goat populations have declined over much of the survey area. The most notable reduction appears to be in 4-23B, where 707 goats were observed in 1982, as compared to 154 in 2000.

The % juveniles within the population appears to be healthy. In fact, these numbers are higher than most other recent inventories within the province. This possibly suggests a recovery of the goat populations.

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Appendix

Appendix 1. Raw Data, 2000 Southern East Kootenay Goat Inventory

M.U	Zone	CBCP #	Group #	# in Group	Juvenile	U/C	Adult	Habitat Type	Activity	Northing	Easting
4-01	401A	-	1	1	0	0	1	Rock - Grass	Moving	5432017	702318.7
4-01	401A	-	2	2	0	0	2	Rock - Grass	Moving	5431225	702524.9
4-01	401A	-	3	1	0	0	1	Rock - Grass	Standing	5432635	702021.6
4-01	401A	-	4	3	1	0	2	Rock - Grass	Standing	5433431	701581.7
4-01	401A	-	5	1	0	0	1	Rock - Grass	Standing	5435468	698920.2
4-01	401A	-	6	6	3	0	3	Rock - Grass	Standing	5435692	703889.5
4-01	401A	-	7	2	1	0	1	Rock - Grass	Standing	5434988	704561.4
4-01	401A	-	8	1	0	0	1	Spruce - Balsam	Standing	5436199	705989.6
4-01	401A	-	9	1	0	0	1	Rock - Grass	Bedded	5432825	712008.2
4-01	401A	-	10	7	3	0	4	Rock - Grass	Standing	5430553	704928.1
4-01	401A	-	11	1	0	0	1	Rock - Grass	Standing	5430451	704241.6
4-01	401A	-	12	5	2	0	3	Rock - Grass	Standing	5430802	702855.3
4-01	401A	-	13	2	0	0	2	Rock - Grass	Standing	5439247	695041.2
4-01	401B	-	14	2	1	0	1	Rock - Grass	Standing		
4-01	401B	-	15	1	0	0	1	Rock - Grass	Standing	5440258	695554.5
4-01	401B	-	16	2	1	0	1	Rock - Grass	Standing		
4-01	401B	-	17	2	0	0	2	Rock - Grass	Standing	5448056	688860.3
4-01	401B	-	18	1	0	0	1	Rock - Grass	Moving	5449537	690210.1
4-01	401B	-	19	2	1	0	1	Rock - Grass	Standing	5450925	691666.5
4-01	401B	-	20	16	3	0	13	Rock - Grass	Standing	5454793	689157.2
4-01	401B	-	21	1	0	0	1	Rock - Grass	Moving	5454303	687807.1
4-01	401B	-	22	1	0	0	1	Rock - Grass	Moving	5456053	688212.2
4-01	401C	-	23	1	0	0	1	Rock - Grass	Bedded	5457950	689786.7
4-01	401C	-	24	1	0	0	1	Rock - Grass	Standing	5460469	682727.7
4-01	401C	-	25	3	1	0	2	Rock - Grass	Standing	5461137	683726.5
4-01	401C	-	26	1	0	0	1	Rock - Grass	Standing	5463607	681676.4
4-01	401C	-	27	2	1	0	1	Rock - Grass	Standing	5463083	681522.9
4-01	401C	-	28	1	0	0	1	Rock - Grass	Standing	5463735	682272.8
4-01	401C	-	29	4	1	0	3	Rock - Grass	Moving	5463795	680941.8
4-01	401C	-	30	16	6	0	10	Rock - Grass	Standing	5467014	682101.8
4-01	401C	-	31	4	0	0	4	Rock - Grass	Moving	5466982	681317.5
4-01	401X	-	32	11	4	0	7	Spruce - Balsam	Standing	5467170	672407.4
4-01	401X	-	33	1	0	0	1	Rock - Grass	Standing	5467334	672416.1
4-01	401X	-	34	5	1	0	4	Spruce - Balsam	Standing	5464527	672887.4
4-01	401X	-	35	16	5	0	11	Rock - Grass	Standing	5462472	669020.6
4-01	401X	-	36	6	2	0	4	Rock - Grass	Standing	5460752	671540.9
4-01	401E	-	37	2	0	0	2	Rock - Grass	Standing	5456126	673265.3
4-01	401E	-	38	3	0	3	0	Rock - Grass	Standing	5455372	664886.1
4-01	401E	-	16A	4	1	0	3	Rock - Grass	Standing	5452081	671060.9
4-01	401E	-	6A	2	1	0	1	Spruce - Balsam	Standing	5448822	670652

M.U	Zone	CBCP #	Group #	# in Group	Juvenile	U/C	Adult	Habitat Type	Activity	Northing	Easting
4-01	401E	-	7A	2	1	0	1	Spruce - Balsam	Standing	5451531	671002
4-01	401E	-	8A	1	0	0	1	Rock - Grass	Standing	5451697	667493
4-01	401E	-	9A	1	0	0	1	Rock - Grass	Standing	5451518	667232
4-01	401E	-	10A	6	3	0	3	Rock - Grass	Standing	5451146	666824
4-02	402A	-	1	1	0	0	1	Rock - Grass	Standing	5455545	659749
4-02	402A	-	2	1	0	0	1	Rock - Grass	Standing	5451001	661875
4-02	402A	-	3	1	0	0	1	Rock - Grass	Standing	5451682	664010
4-02	402A	-	4	7	3	0	4	Rock - Grass	Standing	5450997	667929
4-02	402A	-	5	1	0	0	1	Rock - Grass	Moving	5450114	668201
4-02	402A	-	11	4	2	0	2	Rock - Grass	Standing	5455734	662735
4-02	402A	-	12	1	0	0	1	Rock - Grass	Moving	5456005	662642
4-02	402A	-	13	3	1	0	2	Rock - Grass	Standing	5448341	662611
4-02	402A	-	14	1	0	0	1	Rock - Grass	Bedded	5454334	662689
4-02	402A	-	15	1	0	0	1	Rock - Grass	Standing	5446954	660443
4-02	402A	-	16	4	1	0	3	Rock - Grass	Standing	5440216	666595
4-02	402A	-	17	1	0	0	1	Rock - Grass	Moving	5437852	668078
4-02	402A	-	18	1	0	0	1	Rock - Grass	Standing	5437851	668244
4-02	402A	-	19	4	1	0	3	Rock - Grass	Standing	5440623	665952
4-22	422G	-	1	1	0		1	Rock - Grass	Standing	5478654	636205.4
4-22	422G	-	2	8	2		6	Rock - Grass	Moving	5482280	631605.7
4-22	422G	-	3	2	1		1	Rock - Grass	Bedded	5486771	625641.2
4-22	422G	-	4	1	0		1	Rock - Grass	Standing	5486726	626483.8
4-22	422G	-	5	1	0		1	Rock - Grass	Moving	5486945	627457.7
4-22	422G	-	6	2	1		1	Rock - Grass	Standing	5486560	627765.8
4-22	422G	-	7	17	5		12	Rock - Grass	Standing	5491386	630855
4-22	422G	-	8	1	0		1	Rock - Grass	Moving	5491543	629159.7
4-22	422G	-	9	1	0		1	Rock - Grass	Moving	5491917	628754.4
4-22	422A	-	10	2	0		2	Rock - Grass	Moving	5491599	634183.2
4-22	422A	-	11	1	0		1	Rock - Grass	Moving	5492406	634274.8
4-22	422A	-	12	4	1		3	Rock - Grass	Moving	5493053	634173.2
4-22	422A	-	13	4	1		3	Rock - Grass	Moving	5495042	632422.9
4-22	422A	-	14	1	0		1	Rock - Grass	Moving	5494347	633878.3
4-22	422A	-	15	3	0		3	Rock - Grass	Moving	5495086	633625
4-22	422A	-	16	3	1		2	Rock - Grass	Standing	5496144	632073.8
4-22	422A	-	17	2	1		1	Rock - Grass	Moving	5495770	632491.7
4-22	422A	-	18	1	0		1	Rock - Grass	Standing	5496615	631778.2
4-22	422A	-	19	3	0		3	Rock - Grass	Standing	5497229	632422.6
4-22	422A	-	20	1	0		1	Rock - Grass	Bedded	5499884	633355.7
4-22	422A	-	21	1	0		1	Rock - Grass	Moving	5497796	632889.3
4-22	422A	-	22	2	1		1	Rock - Grass	Bedded	5500060	633743
4-22	422A	-	23	2	0		2	Rock - Grass	Standing	5501720	635047
4-22	422A	-	24	1	0		1	Rock - Grass	Standing	5499534	634739.3
4-22	422A	-	25	1	0		1	Rock - Grass	Standing	5498564	636022.2
4-22	422A	-	26	5	1		4	Rock - Grass	Moving	5497677	635184.3
4-22	422A	-	27	2	1		1	Rock - Grass	Standing	5497216	635528.7

M.U	Zone	CBCP #	Group #	# in Group	Juvenile	U/C	Adult	Habitat Type	Activity	Northing	Easting
4-22	422A	-	28	4	2		2	Rock - Grass	Moving	5495085	636527.9
4-22	422E	4-22-54	29	1	0		1	Rock - Grass	Moving	5496412	643048.4
4-22	422E	4-22-54	30	39	11		28	Rock - Grass	Moving	5499324	643762.9
4-22	422E	4-22-54	31	1	0		1	Rock - Grass	Standing	5500143	643570.5
4-22	422E	4-22-54	32	28	7		21	Rock - Grass	Moving	5508727	637532.1
4-22	422E	4-22-54	33	2	0		2	Rock - Grass	Standing	5507549	635484.6
4-22	422E	4-22-54	34	1	0		1	Rock - Grass	Standing	5509112	636161.4
4-22	422E	4-22-54	35	1	0		1	Rock - Grass	Bedded	5514976	635020.9
4-22	422E	4-22-54	36	1	0		1	Rock - Grass	Standing	5517520	636770.6
4-22	422E	4-22-54	37	1	0		1	Rock - Grass	Moving	5517744	635274.4
4-22	422E	4-22-54	38	7	1		6	Rock - Grass	Moving	5520029	635822.9
4-22	422E	4-22-54	39	8	3		5	Rock - Grass	Moving	5520303	635888.4
4-22	422E	4-22-54	40	3	1		2	Rock - Grass	Moving	5522545	635824.1
4-22	422E	4-22-54	41	2	0		2	Rock - Grass	Moving	5524030	634935.2
4-22	422E	4-22-54	42	3	1		2	Rock - Grass	Moving	5542032	636540.4
4-22	422E	4-22-54	43	3	0		3	Rock - Grass	Moving	5551802	640099.1
4-22	422D	4-22-59	44	1	0		1	Rock - Grass	Moving	5552435	633141.1
4-22	422D	4-22-50	45	1	0		1	Rock - Grass	Moving	5538848	626117.7
4-22	422D	4-22-50	46	25	5		20	Rock - Grass	Moving	5537753	630339.6
4-22	422B	4-22-52	47	7	1		6	Rock - Grass	Moving	5507811	616281.4
4-22	422B	4-22-52	48	1	0		1	Rock - Grass	Moving	5506616	617986.3
4-22	422B	4-22-52	49	1	0		1	Rock - Grass	Moving	5509591	619544.8
4-22	422B	4-22-52	50	3	1		2	Rock - Grass	Moving	5507934	616571.7
4-22	422B	4-22-52	51	1	0		1	Rock - Grass	Moving	5508252	610476.5
4-22	422B	4-22-52	52	1	0		1	Rock - Grass	Standing	5514950	613660.6
4-22	422B	4-22-52	53	2	0		2	Rock - Grass	Standing	5516673	613640
4-22	422B	4-22-52	54	1	0		1	Rock - Grass	Moving	5520680	613449.1
4-22	422B	4-22-52	55	1	0		1	Rock - Grass	Standing	5516907	615368.6
4-22	422B	4-22-52	56	6	0		6	Rock - Grass	Moving	5520389	618552.3
4-22	422B	4-22-52	57	5	2		3	Rock - Grass	Standing	5519165	618773.9
4-22	422B	4-22-52	58	3	0		3	Rock - Grass	Standing	5518988	619036.2
4-22	422B	4-22-52	59	8	2		6	Rock - Grass	Moving	5518933	620034.9
4-22	422F	4-22-68	60	1	0		1	Rock - Grass	Moving	5513602	629529.5
4-22	422F	4-22-68	61	1	0		1	Rock - Grass	Moving	5513034	628075.1
4-22	422F	4-22-68	62	2	1		1	Rock - Grass	Moving	5519122	625018.3
4-22	422F	4-22-49	63	5	1		4	Rock - Grass	Moving	5527175	619978.4
4-22	422F	4-22-49	64	1	0		1	Rock - Grass	Bedded	5523841	619894.1
4-22	422F	4-22-49	65	3	0		3	Rock - Grass	Standing	5525412	618854.5
4-22	422F	4-22-49	66	2	0		2	Rock - Grass	Standing	5531161	619746.7
4-22	422F	4-22-49	67	3	1		2	Rock - Grass	Standing	5531460	619802.5
4-22	422F	4-22-49	68	1	0		1	Rock - Grass	Bedded	5531585	619490.2
4-22	422F	4-22-49	69	1	0		1	Rock - Grass	Standing	5532547	619030.6
4-22	422F	4-22-49	70	15	6		9	Rock - Grass	Standing	5533413	619991.4
4-22	422F	4-22-49	71	1	0		1	Rock - Grass	Moving	5533793	618692
4-22	422F	4-22-49	72	2	0		2	Rock - Grass	Standing	5534617	619052
4-22	422F	4-22-49	73	4	1		3	Rock - Grass	Standing	5534436	620059.7
4-22	422F	4-22-49	74	2	0		2	Rock - Grass	Moving	5538164	618128.7

M.U	Zone	CBCP #	Group #	# in Group	Juvenile	U/C	Adult	Habitat Type	Activity	Northing	Easting
4-22	422F	4-22-49	75	1	0		1	Rock - Grass	Moving	5538060	618516.6
4-22	422F	4-22-49	76	2	1		1	Rock - Grass	Standing	5541174	617972.2
4-22	422C	-	77	2	0		2	Rock - Grass	Standing	5536693	623942.3
4-22	422C	-	78	2	1		1	Rock - Grass	Moving	5536950	624123.8
4-22	422C	-	79	3	0		3	Rock - Grass	Bedded	5533398	624334.9
4-22	422C	-	80	1	0		1	Rock - Grass	Bedded	5532109	625395.1
4-22	422C	-	81	5	2		3	Rock - Grass	Standing	5530462	624172.8
4-22	422C	-	82	1	0		1	Rock - Grass	Moving	5530412	625521.5
4-22	422D	-	83	3	0		3	Rock - Grass	Moving	5530422	625686.3
4-22	422D	-	84	2	0		2	Rock - Grass	Moving	5528259	627029.9
4-22	422D	4-22-50	85	4	0		4	Rock - Grass	Standing	5530697	629830
4-22	422D	-	86	17	4		13	Rock - Grass	Moving	5537543	629254.5
4-22	422E	4-22-54	87	1	0		1	Rock - Grass	Bedded	5532602	636651.3
4-22	422E	4-22-54	88	5	2		3	Rock - Grass	Moving	5533900	636435.9
4-22	422E	4-22-54	89	4	1		3	Rock - Grass	Moving	5532130	638944.9
4-23	423J	4-23-53	1	1	0		1	Rock - Grass	Bedded	5515627	637521.6
4-23	423J	4-23-53	2	3	1		2	Rock - Grass	Moving	5519603	636822.2
4-23	423J	4-23-53	3	12	5		7	Rock - Grass	Standing	5518522	643044.9
4-23	423J	4-23-53	4	5	1		4	Rock - Grass	Moving	5518765	642310.4
4-23	423J	4-23-52	5	18	5		13	Rock - Grass	Standing	5517924	640824.8
4-23	423J	4-23-52	6	1	0		1	Rock - Grass	Moving	5518213	640514.8
4-23	423J	4-23-52	7	5	0		5	Rock - Grass	Standing	5520228	640339.3
4-23	423J	4-23-52	8	1	0		1	Rock - Grass	Standing	5518369	639874.5
4-23	423J	4-23-52	9	1	0		1	Rock - Grass	Standing	5518225	637912.3
4-23	423J	4-23-52	10	3	1		2	Rock - Grass	Moving	5520644	638047.6
4-23	423J	4-23-52	11	1	0		1	Rock - Grass	Standing	5520814	638084.5
4-23	423A	4-23-52	12	2	0		2	Rock - Grass	Standing	5523969	639471.6
4-23	423A	4-23-52	13	2	0		2	Rock - Grass	Moving	5524787	640565.7
4-23	423A	4-23-50	14	2	1		1	Rock - Grass	Bedded	5526659	640894.4
4-23	423A	4-23-50	15	3	2		1	Rock - Grass	Bedded	5528478	639381.1
4-23	423A	4-23-50	16	2	0		2	Rock - Grass	Moving	5532614	645375.1
4-23	423A	4-23-50	17	1	0		1	Rock - Grass	Standing	5532516	640845
4-23	423A	4-23-48	18	4	2		2	Rock - Grass	Standing	5540187	641316.3
4-23	423A	4-23-48	19	1	0		1	Rock - Grass	Bedded	5539691	640057.5
4-23	423A	4-23-48	20	9	3		6	Rock - Grass	Standing	5545005	638715.1
4-23	423A	4-23-48	21	6	2		4	Rock - Grass	Standing	5543960	640264.6
4-23	423A	4-23-48	22	1	0		1	Rock - Grass	Standing	5546500	642974
4-23	423A	4-23-48	23	1	0		1	Rock - Grass	Moving	5546337	642243.1
4-23	423A	4-23-48	24	13	5		8	Rock - Grass	Standing	5546221	639810.6
4-23	423A	4-23-47	25	1	0		1	Rock - Grass	Standing	5550956	643548.6
4-23	423A	4-23-47	26	1	0		1	Rock - Grass	Bedded	5551213	643353.6
4-23	423A	4-23-47	27	3	0		3	Rock - Grass	Standing	5552765	643148.2
4-23	423A	4-23-47	28	30	6		24	Rock - Grass	Moving	5553190	643313.1
4-23	423A	4-23-47	29	3	1		2	Rock - Grass	Moving	5555445	642003.1
4-23	423A	4-23-46	30	3	0		3	Rock - Grass	Standing	5557463	638344.6
4-23	423A	4-23-46	31	5	2		3	Rock - Grass	Moving	5558390	638662.4
4-23	423A	4-23-46	32	2	0		2	Rock - Grass	Standing	5559601	637885.9

M.U	Zone	CBCP #	Group #	# in Group	Juvenile	U/C	Adult	Habitat Type	Activity	Northing	Easting
4-23	423A	4-23-46	33	7	2		5	Rock - Grass	Standing	5563501	636039.3
4-23	423A	4-23-46	34	4	1		3	Rock - Grass	Standing	5564759	636122.1
4-23	423A	4-23-46	35	2	0		2	Rock - Grass	Bedded	5564900	635552
4-23	423B	4-23-46	36	3	0		3	Rock - Grass	Standing	5568808	634466.3
4-23	423B	4-23-45	37	11	7		4	Rock - Grass	Standing	5567428	638184.4
4-23	423B	4-23-45	38	21	4		17	Rock - Grass	Standing	5568561	638170.4
4-23	423B	4-23-45	39	6	2		4	Rock - Grass	Standing	5569687	637083.6
4-23	423B	4-23-45	40	1	0		1	Rock - Grass	Moving	5569872	635426.4
4-23	423B	4-23-45	41	1	0		1	Rock - Grass	Bedded	5570961	635697.7
4-23	423B	4-23-45	42	2	1		1	Rock - Grass	Bedded	5572499	635043.5
4-23	423B	4-23-45	43	14	4		10	Rock - Grass	Moving	5575075	637459.1
4-23	423B	4-23-45	44	18	6		12	Rock - Grass	Standing	5573461	640683.1
4-23	423B	4-23-45	45	17	5		12	Rock - Grass	Standing	5574259	638560.7
4-23	423B	4-23-45	46	6	1		5	Rock - Grass	Standing	5576499	638272.3
4-23	423B	4-23-45	47	1	0		1	Rock - Grass	Bedded	5577434	638336.1
4-23	423B	4-23-45	48	2	0		2	Rock - Grass	Standing	5580152	637461.1
4-23	423B	4-23-44	49	21	6		15	Rock - Grass	Standing	5577164	641857.8
4-23	423B	4-23-40	50	14	4		10	Rock - Grass	Moving	5583232	643541.5
4-23	423B	4-23-40	51	1	0		1	Rock - Grass	Standing	5583237	643099.5
4-23	423B	4-23-39	52	4	1		3	Rock - Grass	Standing	5586294	643248
4-23	423B	4-23-39	53	1	0		1	Rock - Grass	Standing	5586628	643263.9
4-23	423B	4-23-39	54	1	0		1	Rock - Grass	Standing	5586901	643261.4
4-23	423B	4-23-39	55	2	0		2	Rock - Grass	Standing	5587514	643225.7
4-23	423B	4-23-39	56	1	0		1	Rock - Grass	Bedded	5585662	639188.8
4-23	423B	4-23-39	57	3	1		2	Rock - Grass	Moving	5585184	638544
4-23	423B	4-23-39	58	1	0		1	Rock - Grass	Standing	5586506	638832.4
4-23	423B	4-23-39	59	2	0		2	Rock - Grass	Moving	5587357	640561.3
4-23	423C	4-23-37	60	1	0		1	Rock - Grass	Standing	5592640	641894.5
4-23	423C	4-23-37	61	8	3		5	Rock - Grass	Moving	5593870	640956.1
4-23	423C	4-23-37	62	9	3		6	Rock - Grass	Standing	5595692	639536.9
4-23	423G	4-23-64	63	4	1		3	Rock - Grass	Standing		
4-23	423G	4-23-64	64	1	0		1	Rock - Grass	Standing		
4-23	423G	4-23-64	65	3	1		2	Rock - Grass	Moving		
4-23	423G	4-23-64	66	1	0		1	Rock - Grass	Standing		
4-23	423G	4-23-64	67	6	3		3	Rock - Grass	Moving		
4-23	423G	4-23-64	68	1	0		1	Rock - Grass	Moving		
4-23	423G	4-23-67	69	3	0		3	Rock - Grass	Moving	5531210	657647.5
4-23	423G	4-23-67	70	1	0		1	Rock - Grass	Bedded	5530541	657647.1
4-23	423G	4-23-64	71	2	1		1	Rock - Grass	Moving	5533071	655283.4
4-23	423G	4-23-64	72	3	1		2	Rock - Grass	Moving	5537289	654882.8
4-23	423X	4-23-55	73	2	0		2	Rock - Grass	Moving	5548490	663936.1
4-23	423E	4-23-61	74	3	2		1	Rock - Grass	Moving	5569092	656303.9