THE SUN RIVER BIGHORN SHEEP MANAGEMENT PLAN

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Abstract:

Data concerning population dynamics, movements, and harvest of the Sun River bighorn sheep herd were compiled for the period 1941 to 1975. The data indicated that four management directions should be initiated in 1975 to reduce the overall sheep population to 800 head over a 3-year period.

1. Divide the present Hunting District into four new hunting districts corresponding with the identified herd segments.

2. Issue either-sex permits in each area based on the number of 3/4 curl rams in each herd segment.

3. Issue ewe-only permits within each area based on the estimated carrying capacity of that herd segment's winter range.

4. Continue to trap and transplant sheep out of each area based on the estimated carrying capacity of that herd segment's winter range.

INTRODUCTION

An attempt was made during 1974 to analyze all the available research data concerning bighorn sheep in the Sun River area with the purpose of developing a management plan. Data concerning movements and range use as well as population dynamics were reviewed. Special attention was paid to maintaining the bighorn population within the carrying capacity of its range and hopefully preventing any future large die-offs as have occurred in the past (1925, 1927, 1932, and 1934). Four management directions were developed from these data:

1. Divide the present Hunting District 420 into four new hunting districts.

2. Issue either-sex permits to accomplish the wanted ram harvest.

3. Issue ewe-only permits to maintain each herd segment within the carrying capacity of its range.

4. Continue a trapping program to help in population control as well as establish bighorn in other areas.

1. Divide the present Hunting District 420 into four new hunting districts

Harvest Data

Hunting of bighorn sheep in the Sun River area was established in 1953 following a long period of closure dating back to 1912. Table 1 indicates the past seasons and harvests in the area since 1955. It should be noted that for the 10-year period 1957-1966, when the number of permits remained at 40, the harvest averaged nearly 31 every year. When the permits were increased to 60 for the period 1967-1969, the harvest was 52 for the first year and progressively dropped in each succeeding year. Upon resumption of the 40 permits in 1971, the harvest again averaged near 31. The data indicated that 60 permits were to great to maintain a trophy hunt with high success, while 40 permits maintained a stable harvest.

However, in reviewing the data further it became apparent that it wasn't the number of permits that was significant in the past, but where these permits were used by the hunter. That is, a large percentage of the kills had occurred in the most accessible areas. The Castle Reef and Ford Creek areas are the most accessible to the hunter (Fig. 1). These areas have provided 41 and 30 percent of the total harvest, respectively, over the 6-year period 1969-1974 while containing only 25 and 24 percent of the total population (Table 2). Also, Hannan Gulch, one of the most accessible drainages within the Castle Reef area has provided on an average 18 percent of the harvest since 1966. In some years this area has provided over 50 percent of the harvest.

During the years 1970 and 1971, classifications made in December indicated a decrease in the number of rams 1/2 curl and above in the Castle Reef area (Table 3). This is thought to be a result of the heavy harvests of 1967-1969 when 60 permits were issued. Although the disparity has been somewhat masked by the rapidly increasing population in all areas, the same situation appears to still exist at present. Consequently, harvest data indicate a more balanced harvest amongst the herd segments could be achieved if the area was divided. Also, the problem that developed when 60 permits were issued might be somewhat alleviated because with a split area more hunters could be directed to the areas with higher concentrations of trophy rams.

Movement Data

A 5-year range use and movement study on the Sun River bighorn sheep herd was completed in 1974 (Erickson 1972, Frisina 1974). During those 5 years a total of 98 bighorn sheep were tagged and/or neck banded in the area. Subsequent observations of those marked animals throughout all seasons of the year have indicated there exists four herd segments in the Sun River area--Castle Reef, Gibson Lake North, Ford Creek, and Deep Creek. Erickson and Frisina both indicated these segments remained separate throughout the year

Table 1. Bighorn sheep harvested in the Sun River Area, 1955-74.

Year	3/4 Curl Permits	Either-sex Permits	Ewe Permits	Rams Harvested	Ewes Harvested	Total Harvested
1955	20	-	-	12	-	12
1956	20	-	-	15	-	15
1957	40	-	-	32	-	32
1958	40	-	-	30	-	30
1959	40	-	-	35	-	35
1960	40	-	-	30	-	30
1961	40	-	-	32	-	32
1962	40	-	-	28	-	28
1963	40	-	-	31	-	31
1964	40	-	-	27	-	27
1965	40	-	-	37	-	37
1966	40	-	-	34	-	34
1967	60	-	-	52	-	52
1968	60	-	-	45	-	45
1969	60	-	-	40	-	40
1970	40	-	-	29	-	29
1971	40	-	-	34	-	34
1972	-	40	-	31	1	32
1973	-	40	-	35	3	38
1974	-	40	20	39	14	53
Total	700	120	20	648	18	666

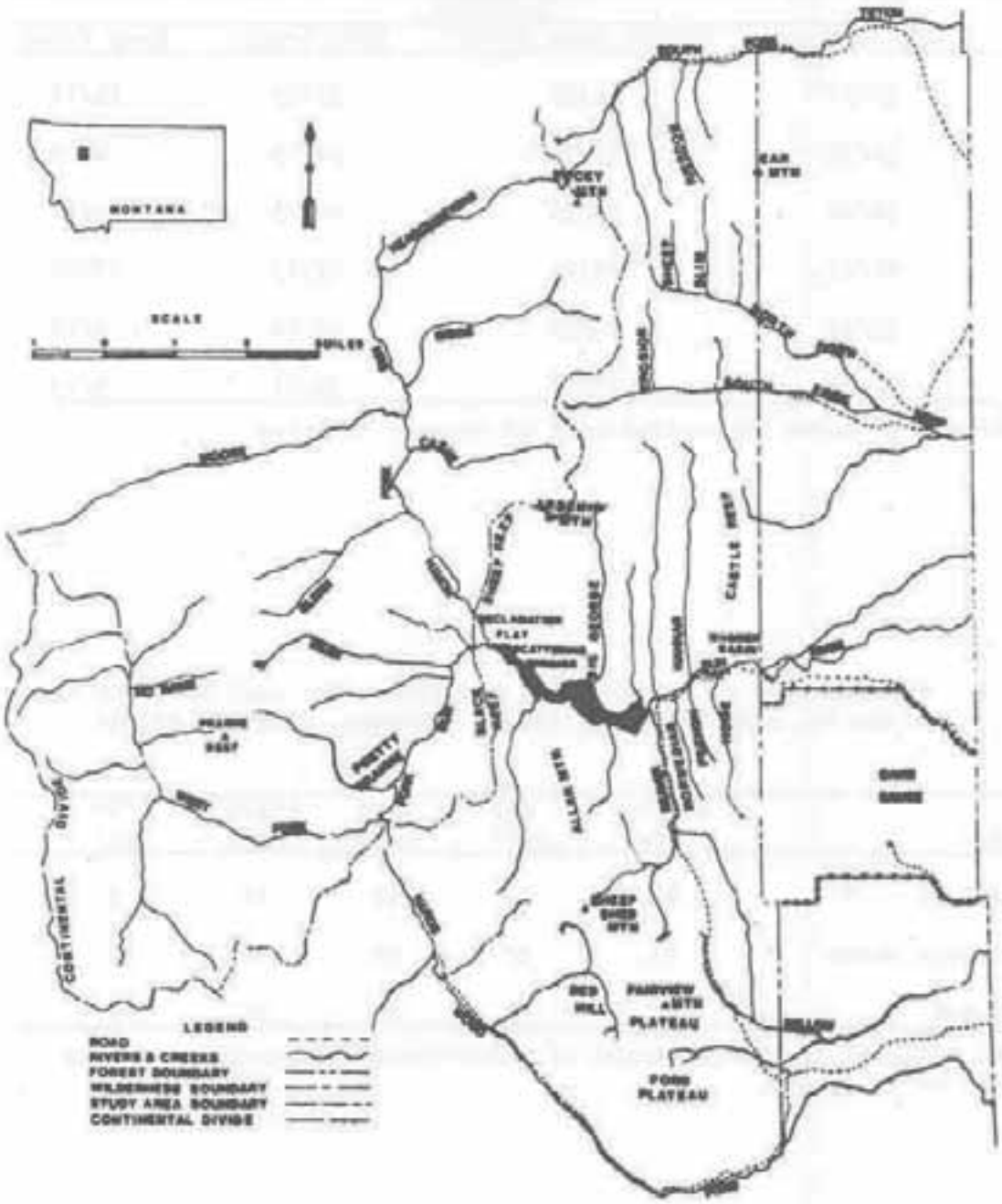

Figure 1. Map of study area showing major drainages.

Table 2. Percent of harvest and percent of population occurring in each of four herd segment areas, 1969-1974.

Year	Location			
	Castle Reef	Gibson Lake North	Ford Creek	Deep Creek
1969	37/31[1/]	2/28	37/25	24/16
1970	52/34	20/37	24/19	4/10
1971	38/22	24/38	28/19	10/21
1972	47/23	13/31	23/27	17/20
1973	39/20	36/32	25/24	0/24
1974	39/24	13/30	39/27	9/19

1/ Percent of known harvest/percent of known population.

Table 3. Percent rams in each of five categories for each of three major wintering areas censused during December, 1970 and 1971[1/]

Location	Sample size	0-¼ Curl	¼-½ Curl	½-3/4 Curl	3/4+ Curl
Castle Reef	81	53	32	12	3
Gibson Lake North	90	37	32	21	10
Ford Creek	47	35	24	26	15

1/ The December census consisted of unduplicated observations during each of the years.

with very few exceptions (Fig. 2 and 3). All of the exceptions, of which there were two ewes and three rams, occurred between the Castle Reef and Gibson Lake North segments.

By dividing the Sun River hunting district into four new areas corresponding with the respective herd segments, problems within each area can be more adequately dealt with (Fig. 4). For example, competition with elk and restricted winter ranges due to weather conditions make the Gibson Lake North area more susceptible to range problems. Reduction of this herd segment because of deteriorated range conditions would be possible if the area were split out from the other areas. Hunters could be directed to the problem area.

2. Issue either-sex permits to accomplish the wanted ram harvest.

Harvest of rams was limited to those having a 3/4 curl or greater from 1953-1971. During that period numerous citations were issued to sportsmen for killing "near-legal" rams. Arguments concerning how to determine if a ram was 3/4 curl insued between sportsmen and department personnel as well as between divisions within the department. In 1972, 40 either-sex permits were issued in place of the previous 40 3/4 curl permits. It was felt that the sportsmen would not be arrested for killing a ram that he felt was a trophy and the argument over what constitutes a 3/4 curl ram would be eliminated. Also, it was possible that a limited number of ewes would be harvested, helping to establish ewe hunting in the area and alleviating some pressure on 4-5 year old rams allowing them to become larger.

Since 1972, 40 either-sex permits have been issued in the Sun River area each year. During that period the horn measurements have remained nearly equal to those recorded during the period of 3/4 curl regulation (Table 4). Four ewes have been harvested and very few rams less than 3/4 curl have been harvested. Thus, as long as the number of either-sex permits is limited to that number of 3/4 curl rams that can be harvested, they appear to be the best method of controlling the ram harvest.

3. Issue ewe-only permits to maintain each herd segment within the carrying capacity of its range.

Considering previous regulations for harvest (either-sex permits) and the difficulty of using the trapping and transplanting technique for population control (Watts et al. 1971), there is a possibility that the bighorn sheep will overpopulate their range and suffer die-offs similar to those occurring in the 1920's and 30's. Annual surveys during the winter (December and January) have indicated a steady increase in numbers of bighorns (Table 5). During recent years, when the number of yearlings has been estimated, there has been a sharp drop in the number of yearlings. Also, the number of yearlings has dropped disproportionately amongst the four separate herd segments (Table 6). Just completed surveys in January 1976 have also indicated a drop in the ratio of lambs is occurring in the Ford Creek area. Yearling ratios were low in all areas. These data indicate the population is beginning a period of decline. It becomes apparent that to maintain a viable sheep population, portions of the female segment should

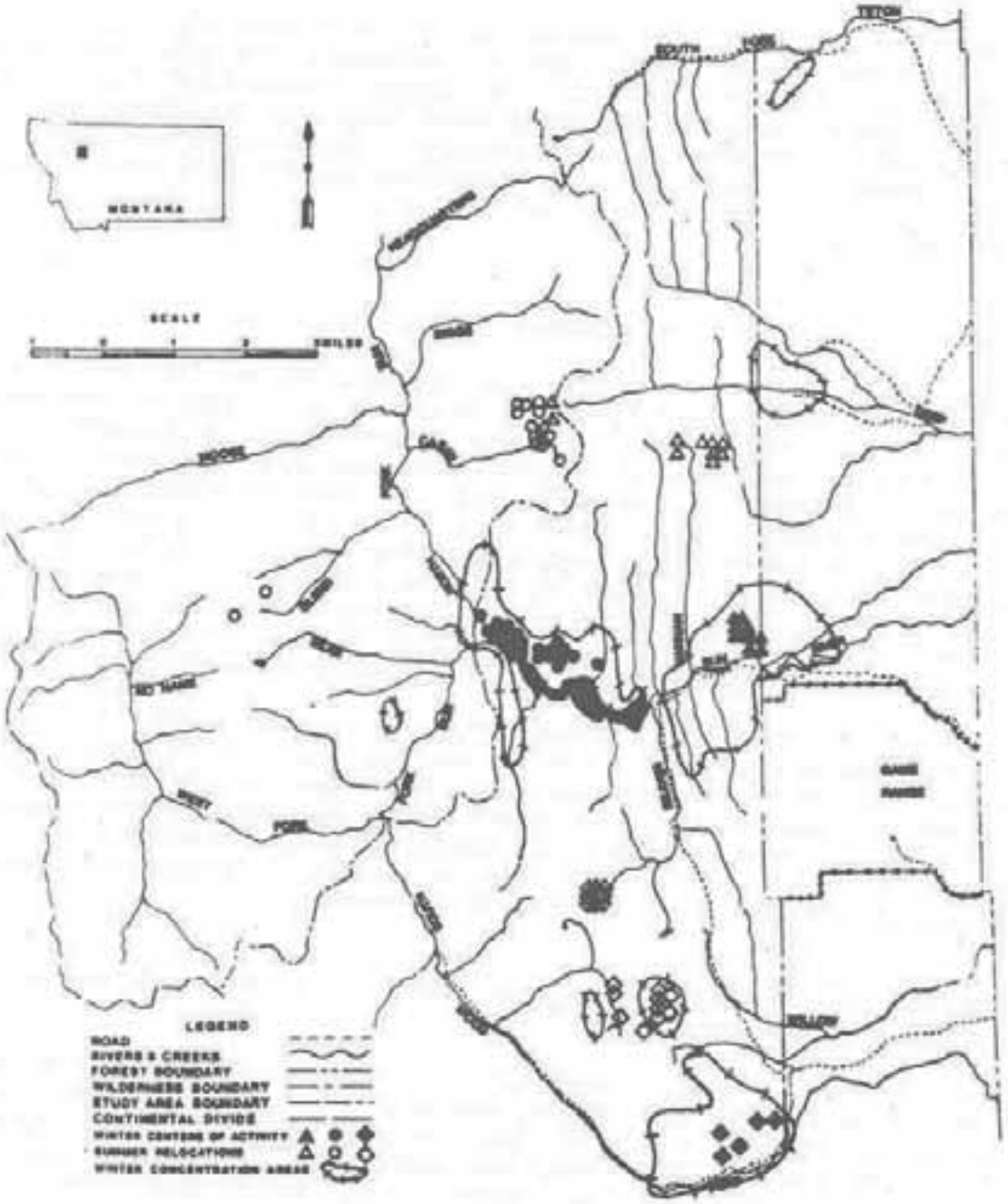

Figure 2. Map of study area showing the distribution of bighorn sheep in winter and summer.(Ericksen 1972)

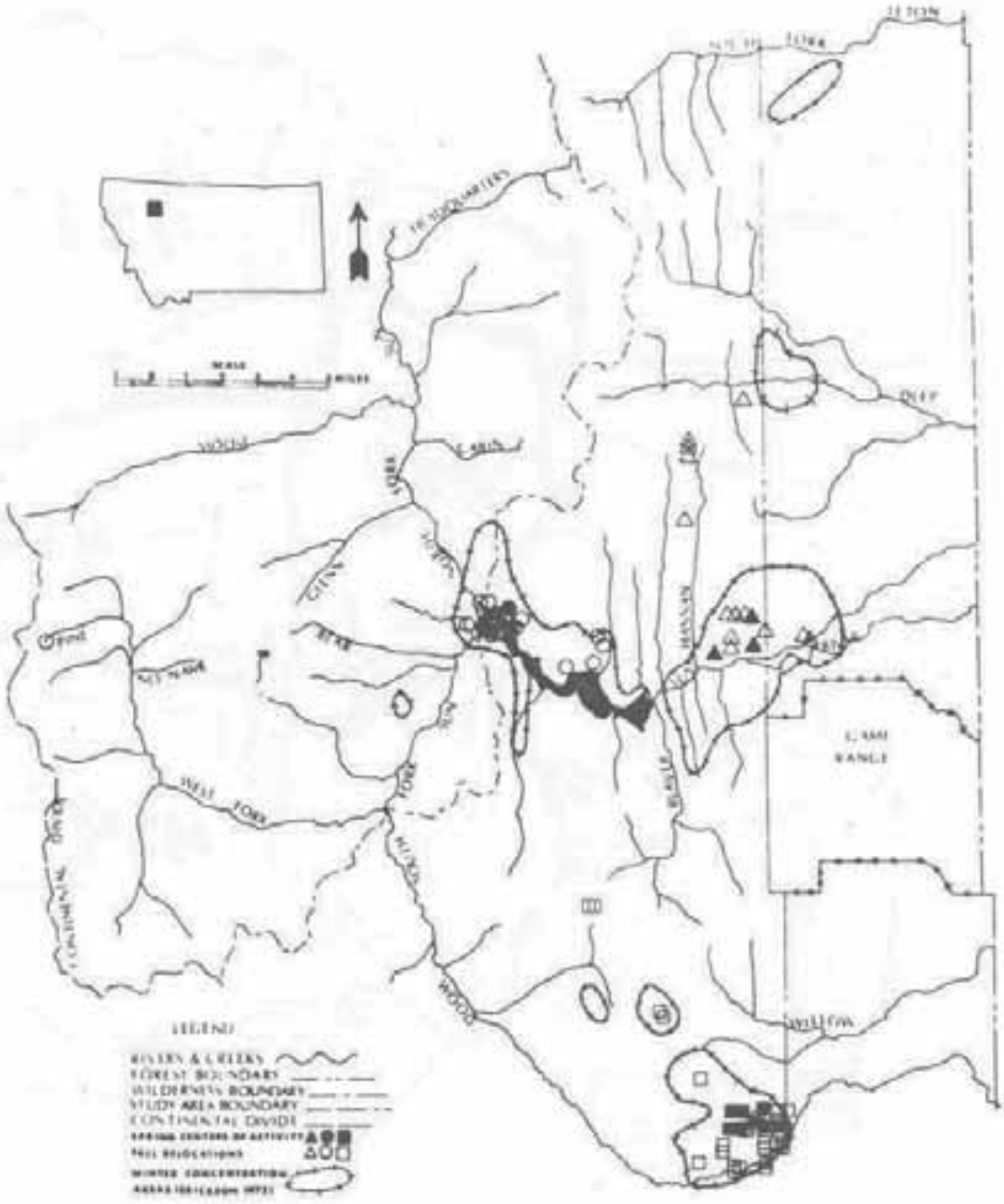

Figure 3. Map of the study area showing the distribution of bighorn sheep in fall and spring. (Frisina 1974)

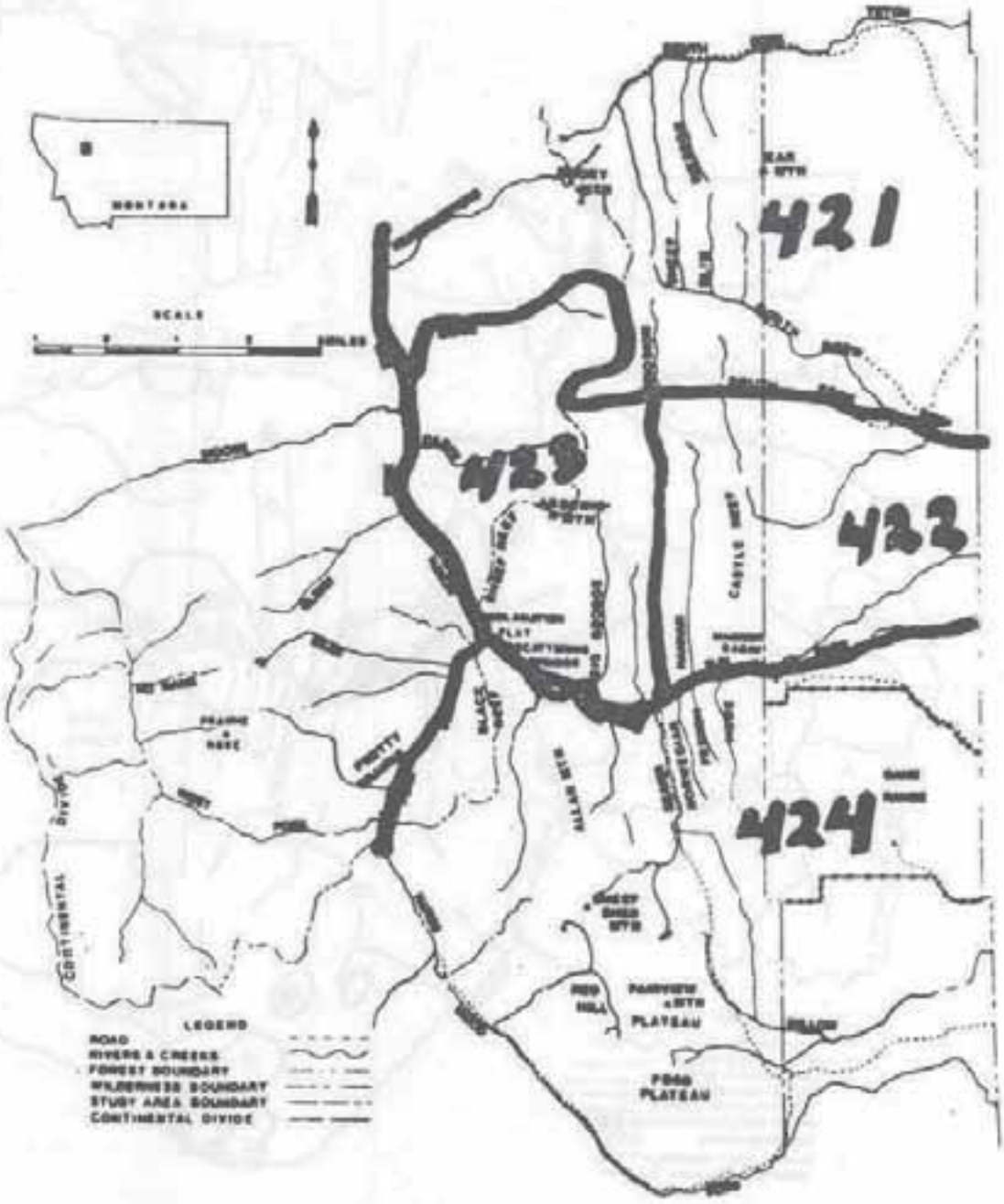

Figure 4. Map of study area showing proposed new hunting districts.

Table 4. Averaged measurements collected on bighorn rams checked at Augusta, Hunting District 420, 1966-1974.

Year	Permits Issued	Total Checked	$\bar{X}$ Age	$\bar{X}$ Curl Circ. (inches)		$\bar{X}$ Basal Circ. (inches)		$\bar{X}$ Tip-Tip (inches)	Score		$\bar{X}$ Weight (pounds)
				Right	Left	Right	Left		$\bar{X}$	Range	
1966	40	25		31.9	31.7	14.9	15.1	19.5	113.5	89.5-122.5	
1967	60	40		31.5	31.3	14.9	14.9	19.5	111.9	83.0-126.0	
1968	60	25		33.2	31.2	15.1	15.1	20.0	114.6	92.0-135.12	
1969	60	24		29.0	29.3	14.8	14.9	19.3	107.2	86.5-123.5	
1970	40	22	5	27.3	28.0	14.6	14.6	19.1	104.1	91.8-120.0	
1971	40	20	4.5	30.2	30.5	14.7	14.6	19.3	109.4	95.1-123.5	
1972	40[1/]	26		30.4	30.0	14.7	14.7	19.6	109.4	63.5-129.3	
1973	40[1/]	28	4	29.3	30.1	14.7	14.7	19.9	108.7	77.8-129.9	167.5
1974	60[2/]	31	4	30.4	30.7	14.5	14.5	20.0	110.58	95.75-129.3	170.8

1/ Either-sex permits, no size requirements on rams.
2/ Forty either-sex and 20 ewe only permits.

Table 5. Classified counts of bighorn sheep, Sun River, 1941-1975.

Year	Number 3/4 Curl Rams	Rams	Ewes	Lambs	Unk.	Total	Ratio/100 Ewes Rams	Ylgs.[1]	Lambs
1941	33	57	75	27	0	159	76	-	36
1942	43	41	58	36	0	135	71	-	62
1944 [2]	-	-	-	-	-	-	66	-	41
1945	-	36	38	17	10	101	95	-	45
1946	29	61	60	32	6	159	102	-	53
1947	18	37	56	14	11	118	66	-	25
1948-49	-	49	97	28	0	174	51	-	29
1951	-	58	68	38	17	181	85	-	56
1952	-	98	114	75	3	290	86	-	66
1953-54	-	57	98	27	60	242	58	-	28
1954-55	34	75	121	54	12	262	62	-	45
1955-56	-	62	113	62	38	275	55	-	55
1956-57	21	61	125	54	88	328	49	-	43
1957-58	19	43	89	50	143	325	48	-	56
1958-59	20	55	117	67	35	274	47	-	57
1959-60	20	77	131	52	109	369	59	-	40
1960-61	19	48	117	69	64	298	41	-	59
1961-62	17	67	209	86	55	417	32	-	41
1962-63 [3]	-	(20)	(85)	(29)	-	(134)	(24)	-	(34)
1963-64	8	37	117	61	34	249	32	-	52
1964-65 [4]	-	-	-	-	-	-	48	-	40
1965-66	12	78	138	75	0	291	56	-	54
1966-67	15	108	289	98	0	495	37	-	34
1967-68	-	66	172	78	0	316	38	-	45
1968-69	10	78	281	111	20	490	28	-	39
1969-70	9	119	288	135	69	611	41	43	47
1970-71	8	111	326	150	2	589	34	31	46
1971-72	11	138	310	142	8	598	45	37	46
1972-73 [5]	24	146	341	180	105+	772+	43	20	53
1973-74 [5]	32	182	371	167	174	894	49	29	45
1974-75 [5]	34	156	403	203	204	966	39	13	50

1/ Figure arrived at by following formula: $\frac{2\ (\#\text{Ylg.Rams})}{\#\text{Females}}$

2/ Repeated observations 2,215 sheep (Couey 1944).
3/ Incomplete classified count.
4/ Repeated observations 2,465 sheep (Schallenberger 1966)
5/ A large portion of Deep Creek Herd Segment not classified during these years - thus 3/4 curl ram figure is probably low.

Table 6. Ratios of lambs, yearlings and rams per 100 ewes for bighorn sheep classified in Hunting District 420, Region Four, 1969-75.

Year	Total Classified[1]	Lambs/ 100 Ewes	Yearlings/ 100 Ewes[2]	Rams/ 100 Ewes
Deep Creek (H.D. 421):				
1969-70	98	47	34	38
1970-71	63	51	23	29
1971-72	126	49	35	37
1972-73	126	46	19	54
1973-74	39	59	59	71
1974-75	0	-	-	-
Castle Reef (H.D. 422):				
1969-70	191	53	44	36
1970-71	201	54	40	36
1971-72	133	56	58	58
1972-73	176	53	12	25
1973-74	182	38	33	48
1974-75	228	59	20	47
Gibson Lake N. (H.D. 423):				
1969-70	119	48	33	48
1970-72	216	34	26	31
1971-72	222	39	22	37
1972-73	236	56	25	41
1973-74	282	54	31	43
1974-75	293	44	7	29
Ford Creek (H.D. 424):[3]				
1969-70	134	37	44	47
1970-71	107	56	30	43
1971-72	109	46	48	56
1972-73	129	54	24	64
1973-74	217	38	19	54
1974-75	241	51	16	45
Total Sun River Herd (Within H.Ds. 421, 422, 423 and 424):				
1969-70	542	47	43	41
1970-71	587	46	31	34
1971-72	590	46	37	45
1972-73	667	53	20	43
1973-74	720	45	29	49
1974-75	762	50	13	39

1/ Total is only those classified as to age and sex during the annual December-January census.

2/ Figure arrived at by following: $\frac{2\ (\#\text{Ylg. Rams})}{\#\text{Females}}$

3/ Ford Creek area includes Home, Norwegian, and French Gulches.

be removed. Previously this was attempted through trapping and transplanting bighorn sheep to other areas. Trapping costs are high and are increasing every year just like everything else (Table 7). Also, the number of areas suitable for sheep transplants are becoming fewer. Since it is evident that the removal of 655 sheep since 1942 through transplanting has not been adequate enough for control, ewe-only permits appear to be the only way for population control. Holding the ewe-only season late in the fall (October-November) along with the regular general season on elk and deer should allow most of the ewes to be harvested off the winter range where the overpopulation occurs. This should also eliminate harvesting ewes on summer range where it was indicated by Erickson that some intermingling occurs between the herd segments. The division of the area into four new areas should allow adjustment of the number of permits so as to harvest heaviest where it is needed.

4. Continue a trapping and transplanting program to help in population control as well as establish bighorn in other areas.

Trapping and transplanting of bighorn sheep was begun in the Sun River area in 1942 (Table 8). Considerable effort has gone into the program since about 1967. The success of trapping appears to be related more to the type of winter than to anything else. Some years success is very good while others it is very poor. This inconsistency is trapping's main drawback for use in population control. However, if ewe-only permits are used to supplement trapping sucess, then it does have value. Also, ewe harvests in some of the more unaccessible areas might prove difficult to achieve under the present 7-year waiting period. Trapping and transplanting out of these areas would be very beneficial. Trapping also gives the opportunity to pick which sexes and age classes to remove from the area. This could prove to be trappings most valuable asset.

In conclusion, it should be noted that division of the area into four new areas is the primary management direction needed. Management by herd segments appears to be the most effective way to maintain a healthy and productive Sun River bighorn sheep herd.

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Table 7. Region Four trapping and transplanting costs for bighorn sheep, 1967-1971.

Year and Location	Mileage		Man Days		Snow-mobile	Heli-copter	Total Cost District Four	Number Bighorn Sheep Trapped	Cost/ Bighorn Sheep Trapped
	Number	Cost	Number	Wage Cost					
Head Gibson Lake:									
1967	2,637	$ 265.70	42.0	$1,054.00	$150.00	$	$ 1,469.70	29	$ 50.68
1967-68	606	99.70	23.5	541.85	50.00	675.00	1,366.55	36	37.96
1968-69	1,023	174.30	20.3	827.44	208.40		1,210.14	58	20.87
1969-70	1,365	127.74	33.5	681.19			808.93	35	23.11
1970-71	736	73.60	15.5	374.00			447.60	16	27.98
Sub-total	6,367	$ 741.04	134.8	$3,478.48	$408.40	$675.00	$ 5,302.92	174	$ 30.48
Castle Reef, Ford Creek, Deep Creek:									
1967	1,256	$ 170.84	15.0	$ 261.25	$	$	$ 432.09	21	$ 20.58
1967-68	4,395	439.50	40.0	738.00			1,177.50	12	98.12
1968-69	2,711	283.10	24.0	525.66			808.76	5	161.75
1969-70	10,401	1,035.90	84.0	1,675.15			2,711.05	14	193.65
1970-71	10,827	1,130.70	68.0	1,598.62			2,729.32	107	25.51
Sub-total	29,590	$3,015.04	231.0	$4,798.68	$	$	$ 7,858.72	159	$ 49.42
Total	35,957	$3,756.08 1/	365.8 1/2/	$8,277.16 1/	$408.40	$675.00	$13,161.64 3/	333	$ 39.52

1/ Some labor donated by U.S. Forest Service and Districts Three and Five of the Montana Fish and Game Department. Does not include costs of the State big game trapper.
2/ Number of miles and number of days not listed for the Regional Game Manager but costs are included.
3/ Does not include costs of traps or miscellaneous supplies and equipment.

Table 8. Sun River bighorn sheep trapped and transplanted to other areas, 1942-75.

Year	Male	Female	Unk.	Total
1942	2	10		12
1943	1	2		3
1954	3	3		6
1955	1	2		3
1956	5	8		13
1957	1	6		7
1958	6	6	3	15
1959	13	12		25
1960	1	2		3
1961	4	7		11
1962	6	13		19
1964	6	19		25
1967	12	38		50
1968	11	42		53
1969	8	46		54
1970	3	1		4
1971	60	24		84
1972	14	43		57
1973	2	9		11
1974	30	37		67
1975	29	89	15	133
Total	218	419	18	655

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