

STATUS OF CALIFORNIA AND ROCKY MOUNTAIN
BIGHORN SHEEP IN THE UNITED STATES

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ABSTRACT

California bighorn (*Ovis canadensis californiana*) and Rocky Mountain bighorn (*O. c. canadensis*) sheep reached all time lows in the United States during the first few decades of this century, but they have steadily increased since that time. In the last decade a few herds were lost but many more were established and sheep numbers generally have increased. Successful transplants and reintroductions account for much of the increase. There are now over 2,800 California bighorns and 19,000 Rocky Mountain bighorns in the United States. Transplants, harvest, research, habitat improvement programs, and management problems in each state are discussed.

INTRODUCTION

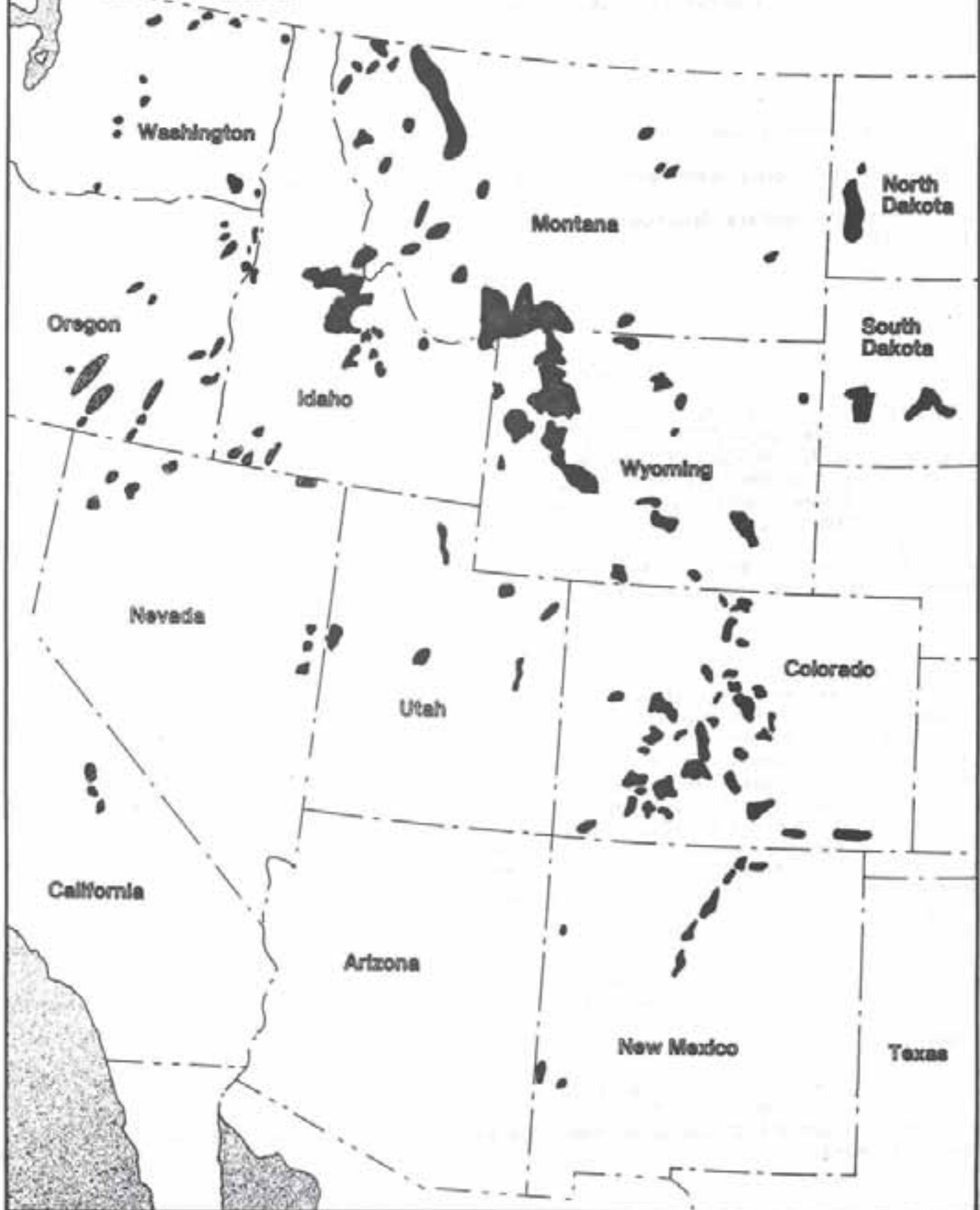
An indepth report on the status of bighorn sheep was last compiled in "The Wild Sheep in Modern North America" (Trefethen, J. B. ed. 1975 Proceedings of the Workshop on the Management Biology of North American Wild Sheep, Boone and Crockett Club, The Winchester Press, New York, 302 pp.), which summarized historic and current status of bighorn by state and province up to 1974. It is the purpose of the present report to summarize changes in status during the past 10 years and determine the status of bighorns in 1984. This report is concerned only with Rocky Mountain and California bighorn sheep south of the Canada-United States border. All remarks regarding 1974 and earlier are from Trefethen (op. cit.), and their map has been updated to show the present distribution (Fig. 1).

STATUS OF CALIFORNIA
BIGHORN SHEEP BY STATE

CALIFORNIA

In 1979 there were approximately 195 California bighorns in the Sierra Nevada Range and the number was declining. The California bighorn is listed as rare by the California Fish and Game Commission and has not been legally hunted for over 100 years.

Fig. 1 : Distribution of California (/) and Rocky Mountain (\) Bighorn Sheep in the U.S.A.



Population Status

There are currently a minimum of 300 California bighorns in five herds in California. The largest (195) is the Baxter herd in the Sierra Nevada Range. California bighorns seem to be responding well to transplant programs and the overall number of sheep is increasing. California bighorns in California are inventoried by aerial surveys using fixed-wing aircraft and helicopter and ground searches.

Transplant Program

California's first effort to reintroduce bighorns into historic habitat was made in 1971 when California bighorns from British Columbia were placed in a large enclosure at Lava Beds National Monument. This confined herd was to serve as a source of bighorns for reintroduction and four were released into the Warner Mountains, Modoc County in 1980. In 1981 the entire remaining herd succumbed to pneumonia. Sheep were transplanted from the Baxter herd in 1979 (9), 1980 (31), and 1982 (19) and these transplants appear to be successful. Three of California's five herds are a result of reintroduction, and additional transplants from the Baxter herd are anticipated.

Hunting Opportunity

Currently, hunting bighorn sheep is not allowed in California. Bills to change the legal status of all bighorns failed in the California Assembly in 1968, 1979, and 1982; and in 1983 a bill was submitted seeking to remove Nelson's bighorn (O.c.nelsoni) from the list of fully protected mammals.

NEVADA

In 1974 California bighorns were extinct as free-ranging animals in Nevada. There was one captive herd, which was being held for transplant purposes, on the Charles Sheldon National Wildlife Refuge. California bighorn sheep formerly were common in the mountains of northwest Nevada. The last report of sheep of this race was in the 1930's after there had been a continued decline due to competition with domestic livestock for habitat and the impact of mining.

Population Status

There are five herds resulting from reintroductions in Nevada. They total about 131 animals: Hell Creek 50-70, Eightmile Mountain 31, Granite Mountains 27, Jarbidge Mountains 10, and Jackson Mountains 13 sheep. The last herd is a 1984 transplant. The Hell Creek and Eightmile Mountain herds are increasing while those of Granite Mountains and Jarbidge Mountains are static.

Transplant Program

All herds in Nevada resulted from successful reintroductions. Fifteen potential release sites in historic range have been identified.

Hunting Opportunity

The first legal hunts for California bighorns was held in 1984 when three permits were offered on the Charles Sheldon National Wildlife Refuge. A legal ram is a trophy male at least 7 years old or with a Boone and Crockett score of 144 points. No ewe hunts are planned.

OREGON

Historically, California bighorns inhabited much of Oregon east of the foothills of the Cascade Mountains, except the Columbia Basin. The last native sheep were seen in the State in 1910 to 1912. In 1954 20 sheep were obtained from British Columbia and released into an enclosure in the Hart Mountain National Wildlife Refuge. In 3 years, 28 were released or escaped to form a free-ranging population. From 1960 through 1971 additional releases were made, and in 1974, there were four thriving herds numbering 320 animals. Hunting seasons were opened in 1965.

Population Status

Helicopter, Super cub, and ground counts indicate 10 populations totalling 1,007 sheep (Table 1).

Table 1. Status of California bighorn sheep in Oregon - 1984.

Area	Estimated Numbers
Steens Mountains	250
Alvord Peaks - Black Point	70
Pueblo Mountains	50
Leslie Gulch	200
Hart Mountain	280-300
Abert Rim	40
Alkali Rim	12
Deep Creek	5
Aldrich Mountain	50
Strawberry Mountains	25-30
Total	1,007

Transplant Program

All California bighorns in Oregon resulted from the reintroduction of 20 sheep to Hart Mountain in 1954, and the success of this program has been excellent. Over 22 sites for future reintroduction have been indentified.

Hunting Opportunity

In 1983 5,400 resident applications were received for 38 permits; odds of drawing a permit were 1 in 142. By hunt unit, the chance of drawing a permit

ranged from 0.4 to 1%. The harvest was 34 rams with a success of 89%. A legal ram has a 3/4 horn curl or greater or is an old ram with heavily broomed horns with blunt ends less than 3/4 curl. Hunters are required to attend a orientation session prior to hunting. Five of 10 populations are hunted. In Oregon there is no ewe season; as populations reach management objectives, trapping and transplanting to unoccupied range will have priority.

Habitat Improvement Program

Habitat work has included development of guzzlers and modification of livestock fences from four to three wires.

WASHINGTON

California bighorns once inhabited much of the eastern side of the Cascade Mountains and were relatively abundant. The last native sheep was seen near Hart Pass about 1925. Reintroduction of California bighorns began in 1957 when 18 sheep were obtained from British Columbia. By 1970 their offspring had been transplanted to ten other areas and numbered about 400 animals. However, in 1974 three of those herds had declined in number.

Population Status

Washington has about 550 California bighorns in nine herds (Table 2). Estimates may be questionable for some herds. California bighorns are stable or increasing in Washington.

Table 2. Status of California bighorn sheep in Washington - 1984(1).

Area	Estimated numbers	Apparent trend
Aeneas Mountain	150-200	Stable
Tucannon	40	Increasing
Colockum	10	Stable
Clemans Mountain	40	Stable
Swanke Canyon	30	Stable
Umtanum	75	Increasing
Mount Hull	35	Stable
Vulcan Mountain	70	Increasing
Cottonwood Creek	50	Increasing
Total	550	

(1) Compiled by R.L. Johnson.

Transplant Program

All present day populations are results of reintroductions. The Hull Mountain population is now being controlled by transplant, and transplants in Washington are regarded as successful.

Hunting Opportunity

In 1983 3,549 sportsmen applied for 23 permits; the odds were 1 in 154. Rifle hunters had a 0.1% chance of drawing three permits, muzzle loaders 0.5% chance of drawing two permits, and bowhunters 2.45% chance of drawing 18 permits. Only four rams were taken, three with rifle and one with muzzle loader. Washington restricts harvested to 3/4 curl rams. A ewe season was held in 1973.

IDAHO

Historically, California bighorns inhabited the Nevada-Oregon canyons of southwest Idaho. There was an early decline and gradual disappearance after the introduction of large numbers of domestic livestock and extensive mining development. The last native California bighorns were observed near the turn of the century. Reintroductions from British Columbia began in 1963, and by 1974 there were estimated to be 275-300 California bighorn sheep in Idaho.

Population Status

California bighorns are now confined to the Owyhee River drainage, Bruneau River drainage, and Little Jacks Creek in the southwest corner of the State. The topography is basically a high plateau bisected by numerous abrupt canyons. Based upon the most recent helicopter classification counts, there are 355 sheep in the East Fork Owyhee population, 150 in the Little Jacks Creek herd, and 25 in the West Fork Bruneau River population for a total of 530 animals. Bighorns in the East Fork Owyhee River and Little Jacks Creek are increasing in number, and occupation of available habitat is increasing. Those sheep in the West Fork Bruneau River were recently introduced.

Transplant Program

All three herds result from transplants. Additional sites for future transplants have been identified, and an agreement has been made to provide sheep to Nevada.

Hunting Opportunity

In 1983 11 permits were available for California bighorns. Hunter and public interest in Idaho is high. Since 1974 sportsmen have been allowed to kill only one bighorn sheep in a lifetime. In addition, any person making application for a bighorn sheep hunt is prohibited from applying for any other controlled hunt. Only 3/4 curl or larger rams are legal for harvest. Two of the three populations are hunted.

NORTH DAKOTA

The unglaciated western portion of the State was historic range of the badlands bighorn (O.c.auduboni), which became extinct in North Dakota in 1905.

The State was without bighorns until 1956 when 18 California bighorns from British Columbia were introduced into the Badlands. They were held in an enclosure and by 1974 five releases had been made from the original 18.

Population Status

Currently there are about 225 (+25) bighorns in western North Dakota.

Transplant Program

Nine sheep were transplanted in 1983. This was the first transplant since the mid 1960's, and additional transplants are planned for the future.

Hunting Opportunity

North Dakota closed its bighorn hunting in 1980 after encountering a severe lungworm related problem. A season with six permits was anticipated for 1984. Permits are granted only to residents by lottery, and legal rams must have 3/4 horn curl or greater on the largest side. Harvested sheep must be presented to the Game and Fish Department within 24 hours to be registered and marked. Any person who has received a licence to hunt bighorn sheep cannot be eligible to apply for another such licence. Hunter success in North Dakota is high.

Lungworm Problem

Lungworms were identified as a cause of lamb mortalities in the late 1970's. By 1980 a program of chemotherapeutic treatment for lungworms using apple pulp bait apparently was successful. Confidence in this program has allowed reopening of the hunting season and once again transplanting of bighorns in North Dakota.

STATUS OF ROCKY MOUNTAIN BIGHORN SHEEP BY STATE

ARIZONA

No Rocky Mountain bighorns were reported in Arizona in 1974.

Population Status

There are two small populations in eastern Arizona near the New Mexico border presently. No information is available regarding population trends.

Transplant Program

Both herds are the results of transplants into the same drainage. One herd is shared with New Mexico and a result of a New Mexico transplant. The

other is a result of 20 bighorns received from Colorado and released farther downstream on the drainage.

Hunting Opportunity

There is no hunting of Rocky Mountain bighorns in Arizona.

NEW MEXICO

Native Rocky Mountain bighorns were extirpated by 1906, and present populations resulted from reintroduction. Historically, they occurred in large numbers in the southern Rocky Mountains. There were approximately 350 bighorns in New Mexico in 1974.

Population Status

There now are approximately 500 Rocky Mountain bighorns in eight herds in New Mexico (Table 3). Well over 300 of this estimated number are based upon surveys made by horseback, helicopter, and on foot which are felt to be reliable. The largest herd (200) is in San Francisco Canyon and has a ram:ewe:lamb ratio of 105:100:62 and is increasing. Two other large increasing herds are Turkey Creek (50) and Manzano Mountains (50) with ram:ewe:lamb ratios of 40:100:56 and 45:100:54, respectively. The Pecos Wilderness herd (125) is decreasing and has a ram:ewe:lamb ratio of 54:100:25. Rocky Mountain bighorns in New Mexico generally are increasing.

Table 3. Status of Rocky Mountain bighorn sheep in New Mexico - 1984(1).

Area	Year released	Est. numbers	How obtained(2)	Ratios ram:ewe:lamb	Apparent trend
Sandia Mountains	1940	30	A	-	Decreasing
San Francisco Canyon	1964	200	B,C	105:100:62	Increasing
Turkey Creek	1965	50	D	40:100:56	Increasing
Pecos Wilderness	1965	125	B	54:100:25	Decreasing
Wheeler Wilderness	1968 & 1970	25	A	-	Stable
Manzano Mountains	1972 & 1978	50	D	45:100:54	Increasing
Latir Wilderness	1977	10	B	-	Die-off-1981

Table 3 (contd.)

Area	Year released	Est. numbers	How obtained(2)	Ratios ram:ewe:lamb	Apparent trend
Cimarron Canyon	1970 & 1978	10	A	-	Decreasing (escaped from captivity)
Ft. Wingate	1972				
	Total	500			

(1) Prepared by A.V. Sandoval.

(2) A - incidental observations, not reliable.

B - horseback survey, reliable.

C - helicopter survey, reliable.

D - foot survey, reliable.

Transplant Program

Current distribution and numbers of bighorns in New Mexico are the result of reintroductions begun in 1940. The most recent transplants took place in 1978 into the Manzano Mountains southeast of Albuquerque, Cimarron Canyon southwest of Raton, and the Latir Wilderness northeast of Taos. The Manzano transplant supplemented a release made in 1977. The Cimarron Canyon transplant supplemented a small population that derived from a 1968 release in the Wheeler Wilderness approximately 40 km west of Cimarron Canyon.

Hunting Opportunity

Sport hunting was allowed first in 1959 in the Sandia Mountains and discontinued in 1962 when the population there was used as a source of animals for reintroduction elsewhere in the State. A limited season was held in the Sandia Mountains again in 1965, and since 1970 hunting has been allowed in two or more areas. Hunting is a once in a lifetime opportunity, and only residents and nonresidents who have never held a licence or authorization to buy a license may apply. Licences are issued by public drawing, and resident and nonresident applications are pooled together with equal opportunities of being drawn.

A total of 109 rams have been harvested, with 66 taken since 1974. Hunter success has been 29% in the Sandia area, 34% in the Pecos area, 66% in the Turkey Creek area (no season since 1972), and 75% in the San Francisco area. Demand for permits is high. In 1983, when 11 permits were issued, 468 applications were received for six San Francisco permits and 114 applications were received for five Pecos permits.

Legal rams must have at least one horn with 3/4 curl or a 72-point Boone and Crockett Score. Ewes have never been harvested in New Mexico. Horns of

all bighorns harvested, imported, or picked up must be measured, photographed, and tagged and sealed within 10 days.

Habitat Improvement Program

In addition to limited hunting opportunities, management consists of evaluation of historic habitat and population monitoring. The Department of Game and Fish is currently involved in a statewide habitat evaluation program which has an objective of ranking historic habitats in order of suitability for successful reintroduction of bighorns. There are no ongoing habitat improvement projects; however, salt is provided by helicopter to the Pecos Wilderness population.

Latir Wilderness Die-off

The Latir Wilderness population was established in 1978 by transplant and contained 40 to 45 bighorns by 1981. During the summer of 1981 approximately 115 domestic sheep were grazed in bighorn habitat and shared range with bighorns. An all age die-off occurred that summer. Chronic fibrinopurulent pneumonia was diagnosed and Pasteurella sp. was recovered. Circumstantial evidence suggests domestic sheep were the source of disease to the Latir bighorns.

UTAH

In 1974 Utah reported two populations; a native herd in the Uinta Mountains (est. 100) and a transplant herd of no more than 100 animals on Willard Peak. Historically, Rocky Mountain bighorns occurred in the Uinta and Wasatch Mountains and also inhabited many of the smaller mountain ranges in northern Utah.

Population Status

The current statewide bighorn population is around 200 animals in six herds (Table 4). Population trends, where known, are increasing, but some transplant herds are too new to have established trends. The Dinosaur National Monument herd is not managed or censused by the State and the herd on the Ute Indian Reservation is not under the authority of the State.

Table 4. Status of Rocky Mountain bighorn sheep in Utah - 1984.

Area	Year released(1)	Est. numbers	Ratios ram:ewe:lamb	Apparent Trend
Willard Peak	1966(34)	?		?
Mount Nebo	1981 & 82(48)	57+	50:100:54	Increasing
Bear Mountain	1983 & 84(36)	?		Probably Increasing

Table 4 (cont'd.)

Area	Year released (1)	Est. numbers	Ratios	Apparent trend
			ram:ewe:lamb	
Deep Creek Mountain	1984(16)	?		?
Dinosaur National Monument	1960's (several)	25-50		?
Ute Indian Reservation	? (several)	?		Increasing

(1) Number of sheep reintroduced in parentheses.

Transplant Program

All Utah's present day bighorns are the result of reintroductions. The 1966 transplant of 34 bighorns to Willard Peak involved Canadian and Wyoming sheep. All subsequent transplants have apparently originated in Wyoming. The Mount Nebo transplant of 1981 and 1982 was held in a paddock for lungworm treatment and released just before lambing season.

Wildlife managers in Utah are very optimistic about the Mount Nebo and Bear Mountain transplants and plan reintroduction into three or four additional areas in the northern portion of the State. If these and past reintroductions are successful, transplants into additional areas that are transitional habitat between that of desert and of Rocky Mountain bighorns may be attempted. In the northern portion of Utah, much former bighorn habitat has been lost to urbanization and development.

Hunting Opportunity

There is no hunting for Rocky Mountain bighorns in Utah; to date there has not been a hunting season on the Ute Indian Reservation.

Habitat Management

In cooperation with the U.S. Forest Service, management to enhance bighorn habitat is being conducted on Bear Mountain. Livestock have been removed and the area reserved for wildlife habitat. A portion of the area was burned with apparent good results. In addition, roads have been closed and water has been developed on the mountain top to assure a year-round water supply.

Research

A biologist has been assigned to monitor each recently reintroduced herd, and telemetry is used to assist these endeavors. Utah is optimistic about the success of recent and future reintroductions and is looking forward to the time when there are sufficient rams to allow hunting seasons.

COLORADO

Historically, Rocky Mountain bighorns were numerous in Colorado. There was a general downward trend in sheep numbers until the early 1970's when the Division of Wildlife initiated intensive research and management programs. In 1970 there were thought to be 2,200 bighorns in the State. Legal hunting has been allowed since 1953, and Colorado has tried a variety of horn size restrictions ranging from 1/2 to full curl. In 1961 the Rocky Mountain bighorn was designated as the State animal.

Population Status

In 1984 4,030 bighorn sheep were estimated to be in Colorado. There are 48 herds (Table 5), 32 of which are hunted, and eight herds are a result of reintroductions. In general, Colorado's bighorns are increasing in number.

Transplant Program

Colorado began transplanting sheep in 1944 and in the mid 1970's was a leader in using a drop net trap baited with apple pulp. Since 1974, the transplant program has been very active with one transplant in 1974, one in 1977, four in 1978, one in 1979, three in 1980, two in 1981, three in 1982, and five in 1983. Most of these have involved about 20 animals. Trapping and transplanting is used as a method of population control.

Table 5. Status of Rocky Mountain bighorn sheep in Colorado - 1984(1).

Area (2)	Estimated Number	Apparent trend (3)
Gore	15	Static/decreasing
Snowmass East(H)	120	Increasing
Snowmass West(H)	100	Increasing
Clinetop Mesa	25	Decreasing
Neversummer(H)	180-200	Increasing
Battlement Mesa	40	Static
Dinosaur	80	Static
Cross Mountain(H)	40-60	Increasing(1977)
Indian Peaks	10	Static
Derby Creek	20	Successful(1981)
Basalf(H)	60	Increasing(1972)
7 Castles	25	Static
Geissler Mountain	15	Static
New York Peak	15	Static
Pikes Peak(H)	185	Increasing
Beaver Cr.(H)	75	Decreasing(4)
Texas Cr.(H)	80	Increasing(1982-83)
Sangre de Cristo(H)	200	Increasing
Collegiates No.(H)	150	Increasing
Collegiates So.(H)	90	Increasing

Table 5 (cont'd.)

Area(2)	Estimated Number	Apparent trend(3)
Buffalo Peaks(H)	110	Increasing
Marshall Pass(H)	80	Static
Tarryall(H)	150	Increasing
Rampart	60	Increasing
Browns Canyon(H)	40	Increasing(1980)
Greenhorn Mountain(H)	20	Static(1975)
Pole Mountain(H)	25	Increasing
Apishapa	100	Increasing(1977)
Carrizo	25	Increasing(1980)
Trickle Mountain(H)	400	Static/increasing
Sheep Mountain(H)	50	Static
Cimarron Peak(H)	75	Static
Cow Cr.(H)	200	Increasing
LaGarita(H)	300	Increasing
Taylor R.(H)	70	Increasing(5)
Vallecito(H)	30	Static
Alamoso(H)	75	Increasing
Conejos R.(H)	50	Increasing
Blanco R.(H)	50	Increasing
Lake City	25	Static/decreasing
Poudre R.(H)	70	Decreasing(6)
Lone Pine(H)	100	Increasing
Mount Evans(H)	100	Static/decreasing
Graut(H)	70	Static/decreasing
Waterton	15	Decreasing(7)
Rawahs	25	Static
Kenosha(H)	75	Increasing
Georgetown(H)	75	Increasing
Total	4,030	

(1) Compiled by G.G. Schoonveld.

(2) Hunted population.

(3) Year following trend indicates a transplanted herd and year of transplant.

(4) The Beaver Creek herd experienced an apparent die-off during the winter 1982-83.

(5) The Taylor River herd experienced a die-off in 1981.

(6) The Poudre River herd experienced a die-off during the winter 1983-84.

(7) The Waterton Canyon herd experienced an extensive die-off in 1979 and 1980.

Hunting Opportunity

In 1984 Colorado permitted nonresident sheep hunting for the first time. Thirteen nonresident permits were issued through a random drawing. Hunters may apply for either a sheep or a goat license but not both. All sheep taken in Colorado must be reported to the Division of Wildlife within 5 days, and ram

horns are permanently marked with a metal plug. Since 1979 harvest of a 1/2 curl or larger ram has been a once in a lifetime opportunity. Ewes are hunted in only two areas. In the Mount Evans area, harvest of any sheep is permitted due to the presence of the disease paratuberculosis (Johne's disease). Ewes are hunted in the Pike's Peak area as a means of population control and in an effort to disperse the population.

During the last 5 years averages of 86.0 and 3.6 rams, respectively, have been harvested by rifle and archery hunters, and in the last 3 years, 31 ewes have been harvested, 28 by rifle and 3 by archers. Hunter success has been about 30% among rifle hunters and about 7% by archers. In 1983 2,081 applications were received for 324 rifle licenses and 190 applications were received for 80 archery licenses.

Habitat Improvement Program

Two projects which involve prescribed burning are currently in progress. Colorado's bighorn sheep population has nearly doubled since 1974, and there is reason for optimism. Nonresident hunting, which began in 1984, should increase out-of-state interest in Colorado's bighorn and their management programs.

Research

There are currently two research projects underway in Colorado directed towards bighorn sheep, these are: "Use of Prescribed Burning to Improve Bighorn Sheep and Mule Deer Winter Range" and "Investigation into the Potential Competition Between Mountain Goats and Bighorn Sheep."

Obtaining data on the value of prescribed burning to improve bighorn sheep range is essential if herd managers are to sell land management agencies on the use of this tool for range improvement. Objectives of this study are to (1) quantify the effects of burning mountain shrub and grassland communities on the nutritional status of bighorn sheep during winter, (2) examine the effects of fire on food niche relationships and ecological separation of mule deer and bighorn sheep, and (3) explain changes in responses of forage resources, both in quantity and quality in terms of process in the nitrogen cycle and soil water relationships.

Objectives of the bighorn sheep and mountain goat investigation are to evaluate the extent to which mountain goat populations limit seasonal habitat utilization of bighorn sheep in alpine environments and to describe patterns and rates of dispersal of mountain goats from colonization sites.

IDAHO

Bighorn were once numerous in Idaho, but the State experienced a population decline in the late 1880's and early 1900's. A low of about 1,000 sheep was reached in the 1920's and 1930's. In 1974 it appeared there had been no major change in the status of the Middle Fork Salmon River and Salmon River herds during the previous 30 years. In 1970 Rocky Mountain bighorns were first transplanted into Idaho from Banff National Park, Alberta. Hunting

seasons became controlled hunts in 1971. No estimate of sheep present was given in 1974.

Population Status

Rocky Mountain bighorns occupy the central mountains of Idaho; most are located in the Salmon River drainage. A small remnant population exists on the upper Snake River near Yellowstone National Park, another small population inhabits the upper Selway drainage, and a new population exists in Hells Canyon of the Snake River. Topographically, habitat in Idaho is mountainous, rugged, and rocky. Seventeen herds in Idaho total about 2,800 sheep (Table 6). Eleven are native and six are results of reintroductions. Population estimates, except for Targhee and Badger Creek-Uncle Ike Creek herds, were derived from helicopter counts made during winter.

Population trends are generally increasing, although the rate of increase is slow in most herds. The Panther Creek population grew to about 400 sheep by 1978. Since then three severe winters have occurred, and the population declined to a low of 177 in 1982. The herd has grown during the last 2 years. Very little is known about the Targhee population, and it is assumed they are static. Some, if not all of these sheep move into Montana.

Table 6. Status of Rocky Mountain bighorn sheep in Idaho - 1984(1).

Area	Estimated Number	Ratios ewe:lamb:yr1:ram	Apparent Trend
Middle Fk.			
Salmon River	600	100:45:24:45	Static/increasing
Main Salmon River	475	100:27:--:23	Static increasing
South Fk.Salmon River	150	100:31:14:72	Increasing
Panther Creek	270	100:24:28:60	Increasing
Horse Creek-			
Colson Creek	200	100:49:18:47	Increasing
Morgan Creek	160	100:59:29:67	
Cronks Canyon	30-40	200:22:22:144	Increasing
Birch Creek-			
Bayhorse Ck.	40	100:33:67:67	Increasing
East Fk. Salmon River	140	100:80:45:66	Increasing
Mt. Borah	250	100:20:25:25	Increasing(R)
Elbow-Jaggles Canyon	60-70	100:50:100:113	Increasing(R)
Copper Mtn.-			
Blue Dome	20-30		Increasing(R))
Badger Cr.-			
Uncle Ike Cr.	50		Increasing(R)
Selway River	150	100:51:20:43	Increasing
Targhee	30		Static
Hells Canyon	150	100:63:33:93	Increasing(R)
Captain John Creek			
Total	2,805		

(1) Prepared by W.O. Hickey.

(2) Reintroduced=(R).

Transplant Program

Idaho has an active reintroduction program which generally has been successful. Badger Creek-Uncle Ike Creek (1983 and 1984) and Captain John Creek (1984) are the most recent releases. Other reintroductions are only a few years old; but they appear to be doing well, except the Copper Mountain-Blue Dome reintroductions, which may have failed.

Idaho has many areas with potential for bighorn sheep reintroduction. Management efforts will be in this direction. Environmental analysis reports are being completed for further reintroductions on the Challis and Salmon National Forests as well as the Salmon BLM District. Much remains to be done toward augmenting reintroductions that have already been made.

Hunting Opportunity

Permits are issued for rams in seven of the 16 populations. The unhunted populations are either recently reintroduced or small remnant populations. Only 3/4 curl or larger rams are legal for harvest. Idaho has not had an open season on ewes, and surplus ewes are regarded as valuable transplant stock. Public comment has indicated a preference that ewes be used to start new populations rather than be hunted.

As with California bighorn hunting in Idaho, sportsmen have been limited since 1974 to one Rocky Mountain bighorn in a lifetime. Statewide hunter success during 1979 through 1983 varied from 31% to 50%. Number of rams harvested during this 5-year period ranged from 31 in 1979 to a high of 63 in 1982, and the harvest trend has been upward. If the new proposal for defining a legal ram is adopted, the harvest in all probability will increase 80%.

All sheep hunting is by controlled hunt, and in 1983 126 permits were offered. Numbers of permits should increase as reintroduced populations produce sufficient ram cohorts. Odds for drawing a permit in 1983 were one in eight statewide. Odds of successful draw have decreased during the last 5 years.

Habitat Improvement Program

Personnel of the Salmon BLM District have been burning winter range on the East Fork Salmon River and Morgan Creek. There are plans to expand this program. Winter ranges of Panther Creek sheep have been burned on the Salmon National Forest. Installation of guzzlers in arid areas of several sheep ranges has recently been initiated.

Research

Recent programs have been completed, and no new projects are planned.

NEVADA

Native Rocky Mountain bighorn sheep were recorded last in 1929 on Wheeler Peak, White Pine County. Apparently, there were none in Nevada in 1974.

Population Status

Two herds, resulting from introduction, Moriah Mountain (30) and Wheeler Peak (40), occur in Nevada at present and total about 70 animals. The Mount Moriah herd is static, and the Wheeler Peak herd is increasing.

Transplant Program

Both herds resulted from reintroductions, most of which have been made in the last 5 years. Four potential reintroduction sites have been identified, and additional releases into existing reintroduced populations are considered desirable.

OREGON

Historically, Rocky Mountain bighorns were confined to the Wallowa and Blue Mountain ranges in the northeastern corner of the State. By the mid 1940's, only a few sheep remained in the Wallowa Mountains. Disease, competition with livestock, and overharvest were probably responsible for the decline. In 1971, bighorns from Jasper National Park, Alberta were released in the Snake River Canyon near Hells Canyon dam and on the Lostine River drainage of the Wallowa Mountains. By 1974 the Hells Canyon group could not be located and the Lostine River herd contained at least 30 animals.

Population Status

There are six Rocky Mountain bighorn sheep herds in Oregon, all of which are results of reintroductions (Table 7). Most recent transplants are Wenaha (1983), Bear Creek (1984), and Hass Ridge (1984). The 1984 population in Oregon is estimated to be 250 animals, based upon aerial counts from a Super Cub. The estimates are thought to be reliable.

Table 7. Status of Rocky Mountain bighorn sheep in Oregon - 1984(1).

Area	Population Estimate
Lostine River	110
Lower Imnaha River	50
Battle Creek	30
Wenaha	15

Table 7 (cont'd.)

Area	Population Estimate
Bear Creek	10
Hass Ridge	10
Misc. strays from several transplants	25
Total	250

(1) Compiled by V.L. Coggins and A.R. Polenz.

Transplant Program

Oregon has had mixed results with reintroductions of Rocky Mountain bighorns. Although the Lostine transplant has been very successful, the first Hells Canyon transplant failed. There were two failures at Bear Creek and one at Hass Ridge. Considerable dispersal has occurred from the release sites at both Wenhaha and Battle Creek. All these transplants were made with Lostine River stock; many bighorns returned to their home range from as far as 64 km away. Perhaps the main problem was the close proximity of release sites to the home range of the Lostine sheep and dissimilarity in habitat types. The 1979 Lower Imnaha River reintroduction, made with Salmon River stock, has been very successful. Nineteen sites for future releases have been identified in northeast Oregon. Several have low priority because of domestic sheep grazing in the potential habitat.

Hunting Opportunity

In 1983 1,344 applications were received for six permits, 1 in 224 odds. As of 1983 a total of 38 permits had been issued at a rate of six yearly and 34 rams had been harvested for an 89.5% success rate. All hunting is restricted to the Lostine River. A legal ram is 3/4 curl or more or an old ram with heavily broomed horns with blunt ends less than 3/4 curl.

Habitat Improvement Program

A 328 ha habitat purchase was made for Rocky Mountain bighorns, and an additional 64 ha purchase is under consideration. These two purchases would complete acquisition of winter range for the Lostine River sheep. Some burning and conifer clearing is planned in the future.

Research

There are no current research projects. Management studies involve transplant monitoring by telemetry and population and composition surveys. The Lostine herd is treated for lungworm.

WASHINGTON

Rocky Mountain bighorn sheep historic range is limited to the Blue Mountains of southeastern Washington and the Selkirk Mountains of northeastern Washington. The last native sheep was believed killed in 1917 in southeastern Washington. In 1972 bighorns were first reintroduced into the State from Waterton Lakes National Park, Alberta. At the end of 1973 this herd on Hall Mountain in the Selkirks numbered 20 sheep.

Population Status

Three herds in Washington total 101 Rocky Mountain bighorns. These are the Hall Mountain (40), Joseph Creek (45) and, Wenha-Tucannan Wilderness (16) herds. All three are increasing in numbers.

Hunting Opportunity

Rocky Mountain bighorns are not hunted in Washington.

WYOMING

Most mountainous, foothill, and river-break areas in Wyoming historically were sheep habitat, and bighorns were numerous in Wyoming. Sheep declined around the turn of the century and continued to decrease until the 1920's and 1930's. Hunting has always been permitted in Wyoming. In the 1930's sheep were placed on special permits for 3/4 curl rams. Land acquisition for winter range has been a very successful program, especially with the Whiskey Mountain herds.

The first transplant was made in 1934; and after 1956 reintroduction was an important management tool. In 1974 the Wyoming Rocky Mountain bighorn sheep population was estimated to be 4,000 to 5,000 animals.

Population Status

There are 18 herd units in Wyoming at present, and the estimated population is 6,305 Rocky Mountain bighorns (Table 8). Population estimates are based upon trend counts and limited modeling; although likely not too accurate, they probably err on the conservative side. Seventeen herds are hunted and eight are reintroductions. In general, bighorns in Wyoming are increasing and objectives are to reach a statewide population of 7,180 sheep. Bighorns in Wyoming occupy an estimated 20,262 square miles of habitat, 127 square miles is critical winter range.

In 1940 2,500 bighorns were estimated to be in Wyoming. Since then they apparently have increased by about 2% per year. Hunter harvest has probably had a negligible influence during the past 43 years, and this low rate of increase, although encouraging, points out a precarious balance between natality and natural mortality. A slight increase in mortality could turn an increasing trend into one of decline. The extreme care necessary in land uses and human activities that have a potential to adversely impact sheep is apparent.

Table 8. Status of Rocky Mountain bighorn sheep in Wyoming - 1984(1).

Area(2)	Estimated number	Population objective	Apparent trend(3)
Clark's Fork(H)	500	500	Stable
Trout Peak(H)	450	440	Decreasing
Wapiti Ridge(H)	875	875	Stable
Yount's Peak(H)	900	900	Stable
Franc's Peak(H)	979	600	Stable
Targhee(H)	100	125	Stable
Jackson(H)	460	500	Decreasing
Sheep Mountain(H)	35	100	Decreasing
Whiskey Mountain(H)	960	1,000	Stable
Temple Peak(H)	152	250	Stable
North Bighorn(H)	50	200	? (R)
Paintrock Creek	20	40	? (R)
Barnum	4	300	Decreasing(R)
Sweetwater	0	150	Decreasing
Ferris	0	150	Decreasing(R)
Douglas Creek(H)	245	350	Increasing(R)
Laramie Peak(H)	310	500	Increasing(R)
Encampment(H)	160	200	Increasing(R)
Darby Peak	45	?	Increasing(R)
Duboix Badlands(H)	60	?	Stable
Total	6,305		

- (1) Compiled by W. Gasson.
 (2) H=hunted population.
 (3) R=reintroduced.

Transplant Program

Wyoming actively transplants Rocky Mountain bighorns, providing sheep for reintroduction both within the State and in neighboring states. Sheep are transplanted only from the Whiskey Mountain wintering herds. Transplant is used as a means of population control, and the number removed each year is based upon winter range forage production and utilization and sheep productivity. Consequently, thriving herds are artificially held stable. They are monitored frequently for the presence of diseases and, to date, remain healthy. Since 1975, 566 bighorns have been transplanted. With the exception of those in the Big Horn Mountains, most recent transplants in Wyoming have been successful. Transplants seem more likely to succeed when larger numbers of sheep are used. Sites identified for future transplants include the Ferris Mountains, Sweetwater Rocks, Sheep Mountain near Laramie, and the Big Horn Mountains, using larger numbers of sheep than previously.

Hunting Opportunity

From a strictly consumptive and economic perspective on a per-harvested animal-basis, bighorns are the State's most valuable animal. Hunters spent

over \$2,500 for each sheep harvested in 1982, nearly half a million dollars entering the State's economy. Hunter interest is high and demand seems to be increasing. All sheep hunting in Wyoming is by limited entry permits. In 1983, 4,211 applications were received and 360 permits were issued (Table 9). One fourth of the permits are reserved for nonresidents. No ewes are hunted in Wyoming. Only 3/4 curl or larger rams are legal. Within 10 days of harvest, horns must be presented at a Game and Fish Department office for registration, including measurements and photographs and permanent tagging.

Habitat Improvement Program

The only habitat improvement activities are on the Whiskey Mountain winter ranges. Land purchases by the Game and Fish Department and reservation of land by the U.S. Forest Service and Bureau of Land Management have resulted in protection of large winter ranges for bighorns. A meadow is irrigated and resultant grass saved for sheep forage during severe weather. During the last 3 years, apple pulp bait has been used to extend sheep distribution onto a previously unused site. This appears to be very successful. Burning, fertilization, and gouging are being used on small scales to improve forage production.

Research

An extensive ecology study using telemetry and focusing on distribution, migration patterns, habitat use, and sheep numbers is being conducted on the Trout Peak herd. A controlled study at the Sybille Wildlife Research Unit and University of Wyoming is examining heart rate and physiologic responses to stress.

Problems

Many herds need to be better described and most population estimates are inadequate. Hunter interest far exceeds ability to produce enough sheep to satisfy demand (Table 9). A small pneumonia induced all age die-off occurred in a segment of the Jackson herd in 1982 and disease remains a threat. Scabies has been diagnosed in three herds, and efforts are being made to control the disease. Seismic exploration threatens some herds with excessive disturbance.

Table 5. Wyoming bighorn sheep permit drawing (1983) and harvest (1982) statistics.

Area	Resident permits (1983)		Nonresident permits (1983)		No. of hunters	Hunter days/ram	Total Recreation days	Hunter success (%)
	Number issued	Odds to draw	Number issued	Odds to draw				
1	18	16:1	6	9:1	24	17	255	63
2	24	9:1	8	12:1	32	12	233	59
3	24	21:1	8	20:1	32	10	257	81
4	45	11:1	15	18:1	60	21	668	53
5	45	11:1	15	10:1	59	21	553	44
6	6	4:1	2	3:1	7	22	44	29
7	18	22:1	6	20:1	21	14	202	67
8	3	13:1	1	7:1	ND	ND	39	ND
9	2	7:1	8	5:1	71	19	732	55
10	30	21:1	10	13:1	6	107	107	17
11	6	4:1	2	4:1	0	0	0	--
17	3	106:1	1	29:1	8	11	55	63
18	6	21:1	2	21:1	ND	ND	ND	ND
19	6	25:1	2	13:1	4	3	10	100
21	3	45:1	1	44:1	0	0	0	--
22	3	23:1	1	21:1	4	14	43	75
23	6	20:1	2	17:1	ND	ND	ND	ND
Totals	248		90					

MONTANA

Mountain sheep once ranged throughout Montana with the badlands bighorn occurring in the east and Rocky Mountain bighorns being found in the mountainous west. Legal, controlled hunting began in 1953. Trapping and transplanting was initiated in 1947, but it has been used more intensively as a management tool since 1976. No population estimate was given in 1974.

Population Status

There are 12 native and 20 transplant populations in Montana. Native populations contained approximately 2,100 bighorns, and transplant herds supported about 2,500 sheep during winter 1983-84, a total of 4,600 animals (Table 10).

Transplant Program

Trapping and transplanting do not occur every year. Recent mild winters have made bighorns difficult to capture, and no major reintroductions have taken place in the last couple of years. The large Sun River herd has traditionally been Montana's main source of transplant stock. However, in the near future sheep from Thompson Falls, Wildhorse Island, Yellowstone-Gallatin, Upper Rock Creek, and National Bison Range herds will likely be used for transplant.

Hunting Opportunity

Limited entry and unlimited hunting areas occur in Montana. Ten of the 12 native and 13 of the 20 transplant herds are hunted. Fifteen areas are limited entry areas. Under limited entry permits in 1983, there were 23 any ram, 18 3/4 curl ram, 72 either sex, and 288 mature ewe licences granted. Eight native populations support unlimited hunter numbers, but the harvest is strictly regulated on a quota system. In 1983, the most recent year for which data are available, 676 hunters took advantage of the unlimited season. The total quota for that year was 21 3/4 curl rams. In two of these unlimited hunting districts, a late season, limited entry hunt was held in 1983 with three permits available for 3/4 curl rams. Horns of all bighorn rams harvested in Montana must be plugged by Montana Department of Fish, Wildlife and Parks personnel.

Table 10. Status of Rocky Mountain Bighorn Sheep in Montana - 1984(1).

Area	Estimated number	Apparent trend	Population origin(2)
Kootenai Falls	175	Stable	T
Thompson Falls	475	Stable	T
St. Regis Cutoff	80	Increasing	T
Berray Mountain	160	Stable	T
Wild Horse Island	50	Stable	T
Flathead Reservation	30	Stable	T
Ural-Tweed	40	Stable	N
International Boundary	40	Stable	N
Moise Bison Range	60	Stable	T
Lost Creek	180	Increasing	T
Upper Rock Creek	185	Decreasing(2)	T
Lower Rock Creek	55	Decreasing	T
Petty Creek	75	Stable	T
West Fork Bitterroot	80	Stable	N
East Fork Bitterroot	100	Stable	T
Yellowstone	300	Decreasing	N
Spanish Peaks	150	Stable	N
Hilgards	35	Stable	N
Absaroka	75	Stable	N
Highlands	150	Increasing	T
Sun River	1,100	Decreasing	N
Beartooth	350	Decreasing	T
Dupuyer	80	Decreasing	T
Stillwater	50	Decreasing	N
Monument Peak	35	Stable	N
West Rosebud	75	Stable	N
Hellroaring	100	Stable	N
Pryor	15	Stable	T
Little Rockys	80	Stable	T
Mickey Brandon	60	Stable	T
Iron Stake Ridge	50	Stable	T
Mizpah	100	Stable	T
Total	4,590		

(1) Compiled by S.T. Stewart.

(2) T=transplant, N=ative.

Habitat Problems

Elk in south central Montana are undergoing a tremendous increase in number on bighorn winter ranges. Policy differences between the State and National Park Service make it nearly impossible to control elk in some areas. Other habitat problems that impact many bighorn herds include conflicts with domestic livestock, particularly domestic sheep; loss of range due to large scale hydroelectric developments and hard-rock mining operations and deteriorating range conditions due to conifer and knapweed encroachment.

Sun River Herd Die-Off

The pasteurellosis outbreak that started in British Columbia and spread into Alberta recently moved through Glacier National Park and reached the Sun River herd this winter. Prior to this outbreak, there were approximately 1,100 bighorns in this largest herd in the State. Thus, the potential for significant loss is extremely high.

SOUTH DAKOTA

The now extinct Audubon's bighorn sheep were native to South Dakota. In 1922 Rocky Mountain bighorns were transplanted to Custer State Park to replace Audubon's bighorn. An all-age die-off in 1959 reduced the population to one female lamb. Additional sheep were reintroduced in 1964, and the population again leveled off at about 125 to 150 bighorns. Also in 1964, Rocky Mountain bighorns were released in the Badlands National Monument with an objective of using progeny of these sheep for transplant stock. In 1974 there were estimated to be 100-150 Rocky Mountain bighorns in South Dakota.

Population Status

The Custer State Park herd contains about 125 sheep, and there are approximately 40 animals in the Badlands National Monument herd, for a total of 165 bighorns.

Transplant Program

No transplant projects are currently underway. However, studies are being conducted in preparation for proposing a transplant onto U.S. Forest Service lands in the Black Hills of South Dakota.

Hunting Opportunity

Only residents of South Dakota are eligible to apply for once-in-a-lifetime opportunities to hunt bighorns in Custer State Park. Approximately five licences have been available each year since 1970. Hunter success is 100%.

Habitat Improvement Program

In Custer State Park all timber management is scheduled by management units and entries are performed according to schedule in the Vegetative Management Plan for the Park. Habitat improvements are accomplished through timber harvests, tree stand improvements, controlled burning, and protection of critical use areas.

Research

Current bighorn sheep related research projects include: Reproductive success and lamb mortality in Custer State Park bighorn sheep; Summer habitat use by Custer State Park bighorn sheep, Ram movements and spatial segregation in bighorn sheep, and a survey of disease status of big game animals of Custer State Park.

Problems

Custer State Park bighorns are infected with Muellarius sp. lungworms and mortalities have occurred. Anthelmintics have been used to control lungworms, but reinfection occurs within 1 year. In 1985 ivermectin will be used to determine if it provides more effective control of lungworms.

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