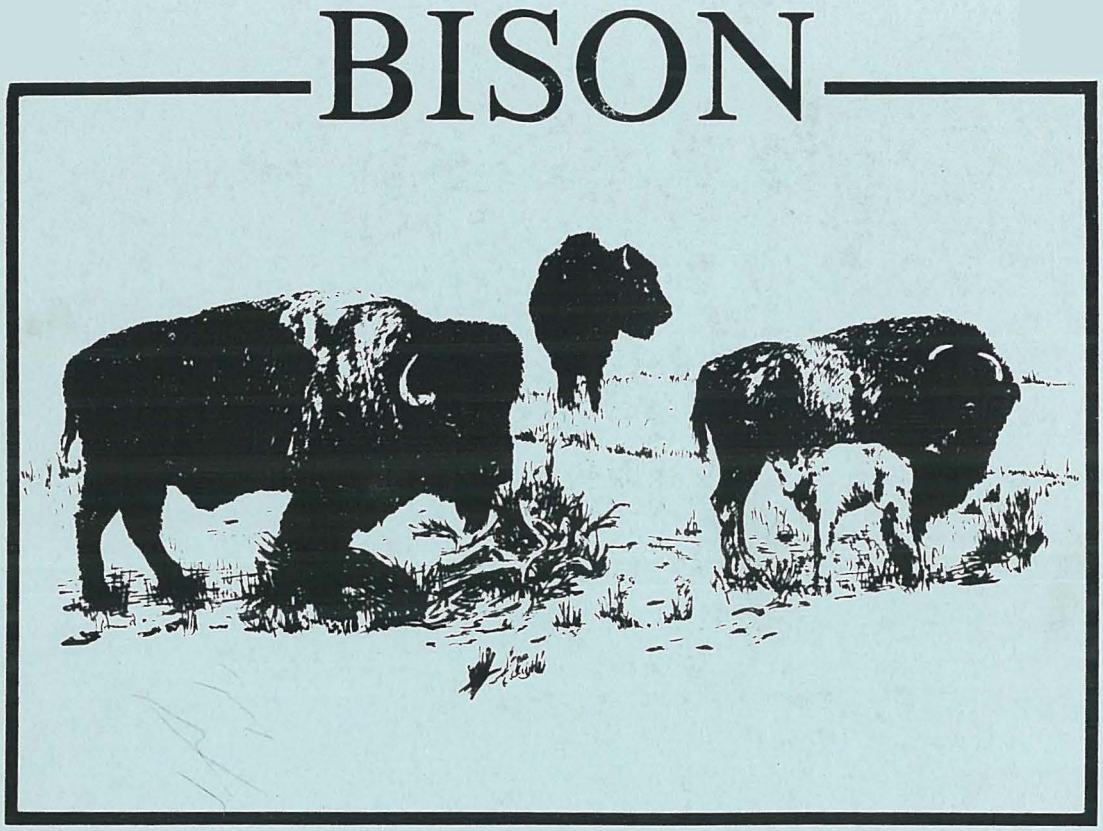
Alaska Department of Fish and Game
Division of Wildlife Conservation
Federal Aid in Wildlife Restoration
Annual Report of Survey-Inventory Activities
1 July 1988-30 June 1989

BISON



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Vol. XX, Part I
Project W-23-2, Study 9.0
May 1990

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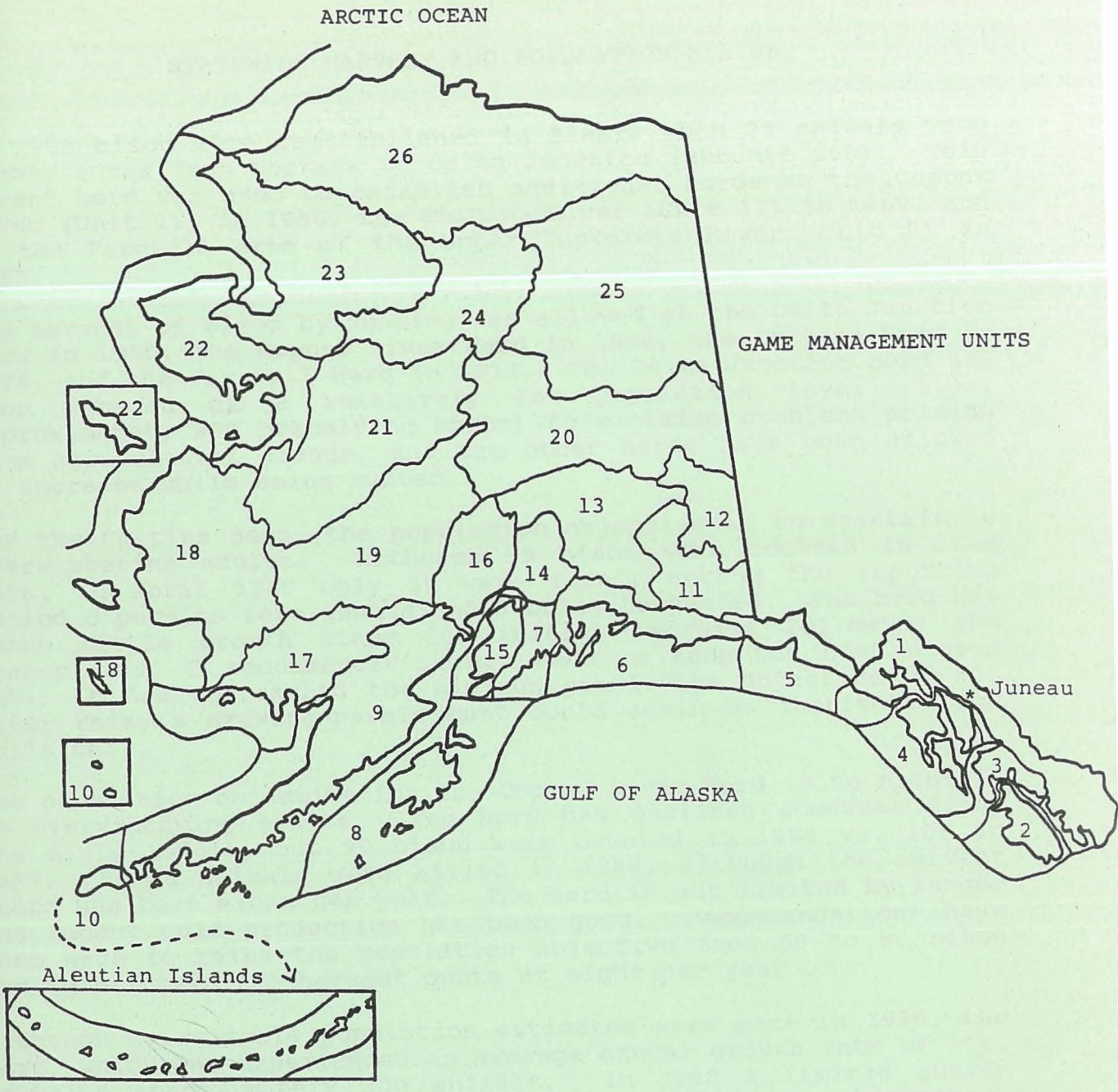
TABLE OF CONTENTS


ARCTIC OCEAN
GAME MANAGEMENT UNITS
26
23
24
25
22
22
21
20
13
12
18
19
16
14
11
17
15
7
1
18
6
5
Juneau
9
4
3
10
GULF OF ALASKA
8
2
10
Aleutian Islands

STATEWIDE HARVEST AND POPULATION STATUS

In 1928 bison were reestablished in Alaska when 23 animals were transplanted from Montana to Delta Junction (Subunit 20D). This parent herd was used to establish additional herds on the Copper River (Unit 11) in 1950, the Chitina River (Unit 11) in 1962, and in the Farewell area of the Upper Kuskokwim River (Unit 9) in 1965.

The harvest of bison by hunting was allowed on the Delta Junction Herd in 1950, the Copper River Herd in 1964, the Chitina Herd in 1976, and the Farewell Herd in 1972. The Delta Junction Herd has been managed at a relatively low population level (i.e., approximately 300 precalving bison) to minimize problems arising from agricultural damage, and the other herds have been allowed to increase while being hunted.

For the Chitina Herd, the population objective is to maintain 50 overwintering adults. Although 39 bison were counted in June 1988, in April 1989 only 30 were found; during the reporting period 6 permits were issued and 4 bulls harvested. The herd has shown little growth since its initial increase following the transplant. A recommendation was made to keep the hunt closed until it had approached the minimum population objective of 50. After this, a drawing-permit hunt could again be instituted for bulls only.

The population objective for the Copper River Herd is to maintain 60 overwintering adults. The herd has declined somewhat since the early 1980's, but 90 bison were counted in 1988 vs. 100 in 1987. Seven animals were killed in 1988, although the harvest quota has been eight per year. The herd is not limited by range, and recent calf production has been good. Recommendations have been made to raise the population objective from 60 to 90 bison and to maintain the harvest quota at eight per year.

Although no reliable population estimates were made in 1988, the herd, which has experienced an average annual growth rate of 10%, contains approximately 300 animals. In 1988 a limited survey suggested the herd contained 25% calves, 21 bison were harvested, and the success rate for those permittees who hunted was 68%. The burn in 1977 has produced excellent winter forage, but the summer range may be overutilized. A spring cold-burn is being planned for 1989 or 1990 on a portion of the Old Bear Creek burn, where grasses and sedges are declining. The number of drawing permits should be increased to 70 so that about 50 bison can be harvested.

The precalving population and composition objectives for the Delta Junction Herd are 350 bison and 35 bulls:100 cows, respectively. In the spring of 1988, the precalving population was estimated at 366 bison, which is slightly above the population objective. In 1988, 22% of the herd were calves and

there was a bull:cow ratio of 22:100. During the reporting period (1988-89), 50 permits were issued and 45 bison were harvested. As agriculture developed in the area in the late 1950's, depredations started to occur. Since then considerable emphasis has been placed on improving the bison habitat to attract the animals away from the cultivated cereal grain and hay fields. As in previous years, the objective of preventing depredations in the Delta Agricultural Project until 1 October each fall was again accomplished in 1989 for the 3rd year in a row.

Steven R. Peterson
Survey and Inventory Coordinator

STUDY AREA

GAME MANAGEMENT UNIT: 11 (13,300 mi^2)

GEOGRAPHICAL DESCRIPTION: Chitina River

BACKGROUND

The Chitina Bison Herd originated from animals transplanted from the National Bison Range in Moise, Montana to Delta Junction, Alaska in 1928. In 1962, 29 cows and 6 bulls were transplanted from Delta Junction to May Creek. From this initial transplant the herd increased to as many as 56 bison in 1981; it currently numbers 45.

The first Chitina bison drawing-permit hunt was held in September 1976. Permit hunts have been held every year since then. Sport hunters have taken a total of 57 bison from this herd; the average annual harvest has been four.

POPULATION OBJECTIVES

To maintain the herd at a minimum of 50 overwintering adults.

METHODS

To determine composition of the herd, aerial surveys conducted in the spring following the calving period. Survey techniques included flying transects through all the known bison habitat in the lower Chitina Valley to obtain a direct count. An extrapolated herd estimate was not made. Harvest and hunting pressure were controlled by drawing permits. The harvest was monitored by requiring successful permittees to check out of the Alaska Department Fish and Game (ADF&G) office in Glennallen.

RESULTS AND DISCUSSION

Population Status and Trend

The Chitina Bison Herd appeared to be fairly stable for the 10-year period between 1976 and 1985 (Table 1). Since 1985 the number of bison observed in the Chitina herd has declined by 26 (46%).

Population Size:

An aerial survey conducted on 16 June 1988 resulted in a count of 39 bison, but only 30 were found during an early spring survey on 28 April 89.

Population Composition:

Thirty-four adults and 5 calves were observed during aerial surveys of the Chitina herd during 1988 (Table 1). There were 2 less calves present in 1988 than in the previous year. Calves composed 13% of the herd in 1988, compared with a mean of 16.5% for the previous 5 years. Since the bison surveys are usually conducted in June each year, timing of the survey was not thought to be a factor in the reduced 1988 count. Calves also composed 13% of the herd in April 1989, although more calves may have been born after the April survey.

Distribution and Movements:

The Chitina Bison Herd usually ranges within the riparian and upland habitats below elevations of the 2000 feet along the upper Chitina Valley. Although movements vary considerably, the herd can usually be found between the Tana River and Barnard Glacier. During the past few years, especially heavy use of the riparian zone near Bryson Bar has been observed, and the survey efforts have focused on this area. Future plans call for radio-collaring up to 5 adult cows to assist in locating animals during yearly counts and to monitor herd movements during various times of the year.

Mortality

Season and Bag Limit:

The open season for resident and nonresident hunters in Unit 11 for drainages of the Chitina River east of the Chakina River and south and east of the Nizina River is from 6 September to 30 November. The bag limit is 1 bison every 5 regulatory years by drawing permit only. Up to 12 permits will be issued.

Human-induced Mortality:

Hunters reported killing 4 bulls during the 1988 bison season, one more than was taken in the previous year. The current harvest is consistent with levels observed over the past 9 years, excepting 1985 when the harvest increased to 8 bison (Table 2). In 1985 only subsistence hunting by local residents was allowed. Local residents were more familiar with the area, spent more time hunting, and as a result, were more successful.

The poaching of bison from the Chitina River has occurred in past years. The number of illegal animals taken and its impact on the herd is unknown; however, in some years the illegal take has equaled or exceeded the legal harvest. One local resident freely admitted to taking 1 bison each year for winter meat, but he has never been cited because of lack of evidence.

Five female bison were captured on 4 April 1989 and equipped with radio collars. Four of these cows were subsequently found dead on 20 April. Necropsies were conducted on two of the dead bison. Based on physical examination, all of the captured bison were classified in poor condition attributable to deeper-than-normal winter snow conditions. Although the necropsied bison had depleted fat stores, they were not starving and may have survived without the added stress of capture. All of the dead bison moved away from their capture sites and lived for unspecified periods after collaring.

Hunter Residency and Success. All successful applicants for 1988 Chitina Bison permits were Alaska residents. Nonresidents have not drawn a permit for this hunt in over 6 years. The overall success rate for the 6 permittees was 67%. Two permittees (33%) did not hunt. Two successful hunters were local residents. Successful hunters reported hunting an average of 3.3 days to kill a bison.

Permit Hunts. Currently 6 drawing permits are issued for the Chitina Bison hunt. Although up to 12 permits have been authorized by the Board of Game, the number of permits issued has been reduced by the Department for biological reasons. In 1988 there were 423 applicants for a drawing success rate of less than 2%. The number of applications submitted the past 3 years has ranged between 359 and 423.

Transport Methods. Aircraft were used by all the successful bison hunters during 1988. Of the 26 successful bison hunters reporting transportation methods since 1983, 24 (92%) used aircraft, one (4%) used a river boat, and one (4%) used a dog team.

Natural Mortality:

Although instances of wolf predation on bison have been reported by trappers and local residents, there have been no investigations into causes of natural mortality in this herd.

Habitat Assessment

Until 1980 the bison habitat in the upper Chitina Valley received substantial use from an undetermined number of horses kept on 2 grazing leases in the area. A cursory evaluation of forage utilization in bison habitat by the Department resulted in tentative determinations that browsing and grazing were heavy, especially on horse grazing leases, and the size of the bison herd should be held at about 30 overwintering adults.

In 1984 National Park Service staff conducted a range study in the upper Chitina Valley (Miquelle 1985), determining that grazing by ungulates on the Chitina bison range had not resulted in any recent deterioration in plant condition. The range was determined to be recovering from earlier overuse by horses on the

grazing leases. Although Miquelle (1985) concluded that a bison population of 50 animals had not adversely affected the habitat and the management objective of 30 overwintering bison could be increased, he also concluded that the range could never support a very large herd.

Game Board Actions and Emergency Orders

In 1985 the Board of Game changed the designation of the Chitina bison hunt from a sport hunt to a subsistence hunt. Only local rural residents were eligible for the permits. The Board reclassified it as a sport hunt during its 1986 meeting. Because of the number of bison counted in the spring of 1989 was well below the population objective, the Department cancelled the 1989 hunt.

CONCLUSIONS AND RECOMMENDATIONS

The Chitina Bison Herd has declined by 26 animals over the past 3 years. Fifteen bison have either been taken by hunters (11) or died as a result of capture operations (4). Additional sources of mortality are unknown. The herd is currently 24 adults below the stated management objective of 50 overwintering animals older than calves.

I recommend the Chitina bison hunt remain closed until the herd approaches the minimum population objective of 50 bison. After this a drawing-permit hunt could again be instituted for bulls only and 6 drawing permits issued.

LITERATURE CITED

Miquele, Dale. 1985. Food habits and range conditions of bison and sympatric ungulates on the Upper Chitina River, Wrangell-St. Elias National Park and Preserve. U.S. Dept. of Interior. Nat. Park Service. Ak. Region Research/Resources Management Report AR-8. Anchorage. 112pp.

PREPARED BY:

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Wildlife Biologist III

SUBMITTED BY:

Gregory N. Bos
Survey-Inventory Coordinator

Table 1. Maximum numbers of bison observed during aerial surveys of the Chitina River bison herd, Unit 11, 1962-1989.

Year	Total	Calves	Adults[a]
1962	35	0	35
1963	28	--	--
1964	12	5	7
1965	--	--	--
1966	9	--	9
1967	12	2	10
1968	16	2	14
1969	15	--	--
1970	16	2	14
1971	16	3	13
1972	16	--	16
1973	23	4	19
1974	32	6	26
1975	35	--	--
1976	52	9	43
1977	49	13	36
1978	46	7	39
1979	40	6	34
1980	42	6	36
1981	56	12	44
1982	43	5	38
1983	46	6	40
1984	54	12	42
1985	56	12	44
1986	41	5	36
1987	45	7	38
1988	39	5	34
1989	30	4	26

[a] The adult category includes yearling and older bison.

Table 2. Chitina bison harvest data by permit hunt, 1976-88

Year	No. applicants	Permits issued	Did not hunt	Unsuccessful hunters	Successful hunters	Males	Females	Total
1976	--	8	--	--	9[a]	6	3	9[a]
1977	--	9	--	--	7	3	4	7
1978	--	14	--	--	6	3	3	6
1979	--	--	16	--	--	4	0	4
1980	--	8	--	--	1	1	0	1
1981	--	8	--	--	3	3	0	3
1982	--	12	--	--	2	1	1	2
1983	--	12	4	4	4	3	1	4
1984	1,454	12	3	6	3	1	2	3
1985	46	12	1	3	8	3	5	8
1986	410	6	1	1	4	3	1	4
1987	359	6	1	2	3	3	0	3
1988	423	6	2	0	4	4	0	4

[a] One permittee killed 2 bison.

STUDY AREA

GAME MANAGEMENT UNIT: 11 (13,300 mi^2)

GEOGRAPHICAL DESCRIPTION: Copper River

BACKGROUND

The Copper River bison herd originated from animals transplanted from the National Bison Range in Moise, Montana to Delta Junction, Alaska in 1928. In 1950, 17 bison were transplanted from the Delta herd to the Nabesna Road area in northern Unit 11. These bison moved away from the transplant site and by 1961 had become established in the Dadina and Chetaslina River area where they have remained ever since. From this initial transplant the herd has grown to as many as 120 bison. For the most part, herd growth has been controlled by human harvesting.

The first Copper River bison hunt (i.e., registration permit) was held in 1964. Since then registration permit hunts have been held in all but 6 years. Hunters have harvested 217 bison from this herd; the average annual harvest has been 11 bison.

POPULATION OBJECTIVES

To maintain the herd at a minimum of 60 overwintering adults.

METHODS

Aerial surveys to determine composition of the herd were conducted in the spring following the calving period. Radio collars were maintained on 3 adult cows to facilitate locating the herd during surveys. Transects were flown through known bison habitat between the Dadina and Chesnina Rivers to count additional animals not located with the radio-collared bison. Harvests and hunting pressure were controlled by allowing hunting by registration permit only. Harvests were monitored by requiring all permittees to register and check out at the ADF&G office in Glennallen.

RESULTS AND DISCUSSION

Population Status and Trend

The Copper River bison herd was relatively stable during the 1970's and early 1980's, following a period of growth in the 1960's (Table 1). Survey data collected between 1981 and 1985 suggest herd numbers had declined somewhat from previous levels. During the past 3 years, yearly counts have reflected an increase

in the herd size. Because this herd inhabits an area that is heavily timbered, total counts are difficult to obtain. The yearly variation in population estimates that occur are attributed to survey conditions rather than actual changes in herd size.

Population Size:

An aerial survey conducted during June 1988 resulted in a count of 90 bison. An extrapolated estimate of herd size was not made.

Population Composition:

Seventy-six adults and 14 calves were observed during aerial surveys of the Copper River herd in 1988 (Table 1). Although the number of calves was down from those observed during the previous 2 years (1987 & 1988), they have been greater from 1986-1988 ($\underline{x}$ = 16) than from 1981 to 1985 (1981-85) ($\underline{x}$ = 11). Because bison are usually counted in June or early July each year, timing of the surveys did not influence survey results.

Distribution and Movements:

The Copper River Bison Herd inhabits a home range bounded by the Dadina River on the north, the Copper River on the west, the Kotsina River to the south, and the Wrangell Mountains on the east. Few observations of bison or bison sign have been made north of the Dadina River or south of the Kotsina River. Although bison occasionally are observed along the western bank of the Copper River in Unit 13, human disturbance in the Kenny Lake area appears to be preventing home range expansion to the west. Seasonal distribution patterns include heavy use of the Copper River flood plain and bluffs during winter and spring, followed by a movement to higher elevations along the Dadina and Chetaslina Rivers during the summer.

Mortality

Season and Bag Limit:

The open season for resident and nonresident hunters in Unit 11 for the area east of the Copper River, south of the Nadina River and Nadina and Sanford glaciers, and west of a line from Mount Sanford to Mount Wrangell to Long Glacier, and west of the Kotzina River is 21 September to 10 November. The bag limit is 1 bison every 5 regulatory years by registration permit only.

Human-induced Mortality:

Hunters killed 6 bulls and 1 cow during the 1988 season (Table 2). The season was closed by Emergency Order on 23 September after 7 bison had been killed. Had the season remained open to allow an additional bison to be harvested, an overharvest would

have probably occurred. This was the 3rd consecutive year the season had been closed after a 2- or 3-day hunt.

Additional hunting mortality attributable to crippling also occurs during these hunts; however, the number of bison lost each year has not been documented. This herd is hunted in heavy timber; although long-range shots are not usually taken, hunters often shoot at bison moving through timber that obscures their vision. Unless an bison is killed immediately, tracking in heavy timer without snow is difficult, and wounded animals can be lost.

Hunter Residency and Success. Thirty-eight registration permits were issued in 1988, 17 fewer than in 1987. Fifteen and 23 permits were issued to local and nonlocal residents, respectively. Twenty-six permittees hunted, and the hunter success rate was 27%. Only 1 successful permittee was a local resident. Because the hunt was closed after only 3 days, all the permittees that hunted averaged slightly under 2.5 days in the field.

Permits Hunts. Currently, an unlimited number of registration permits are issued for the Copper River bison hunt. Permits are available only in Glennallen, and all hunters must report hunt results there also. The hunt may be closed by Emergency Order, if the desired harvest is reached before the season closes on 10 November. The current harvest quota is 8 bison. Hunters must carry a portable radio and listen to daily news announcements on the local radio station for Emergency Closure notification.

Transportation Methods. River boats were the most popular method of transportation; 88% (23) of all permittees and 86% (6) of the successful hunters reported their use. Three other permittees reported using aircraft, one of which was successful. Aircraft use has declined in recent years, because the season has closed before 5 October. Use of mechanized vehicles (including aircraft), except on the Copper and Dadina Rivers and 4 designated lakes, is prohibited until 5 October as part of the hunt's requirements.

Natural Mortality:

Accidental death due to falling off steep bluffs may be higher than in other bison herds. During the winter bison use the bluffs bordering the Copper River extensively for feeding. Soil composition of the slopes is predominantly clay, which holds moisture and freezes hard, creating a steep slide with little, if any, secure footing for the bison. During the 1988 hunting season, hunters reported finding 3 dead bison at the base of a steep bluff along the Copper River. Based on the age of the skeletons and their location, cause of death was attributed to falling off the cliff. This was the 2nd documented case of this type of mortality. In April 1988, a dead radio-collared bison was observed from the air; based on its location and appearance, it was considered a winter kill. A radio-collared bison was

found dead on 20 April 17 days after it and 4 others had been captured and radio-collared. This bison had traveled over 2 miles from the capture site; because of its location, it could not be reached for necropsy. The cause of death was attributed to added stress during capture. All of the captured bison were in poor condition, based on physical examination and evaluation of body condition.

Bison collared during April 1985 were apparently in better physical condition, and no capture mortalities occurred. The poor physical condition was attributed to increased snow depths during the 1988-89 winter. Snow depths measured at the Dadina Lake snow course, within the Copper River bison range, were 80% above normal. Deep snow accumulated in early October, 2 months prematurely, and remained all winter.

Habitat Assessment: Studies to evaluate plant composition, abundance, and utilization have not been conducted on the Copper River bison range. Casual observations along the Copper River flood plain and bluffs and at some sedge meadows suggest heavy use in preferred locations. There is little evidence of dispersal from the current range. If the Copper River herd were range limited, movements of bison into ungrazed areas would be expected.

Game Board Actions and Emergency Orders

During its spring 1989 meeting, the Board of Game changed the 1989 opening date for the Copper River bison hunt from 21 September to 5 October. It was set back 2 weeks to reduce opening-day hunting pressure; moreover, a mixed-bag moose and bison hunt will no longer be possible.

CONCLUSIONS AND RECOMMENDATIONS

The Copper River herd has numbered between 70 and 100 bison for over 15 years. Between 1981 and 1985 estimates of herd size declined; in 1982 and 1983 the estimated number of overwintering adults was below the management goal. Calf production or survival was also lower during this period. Some of the decline may be attributed to poor sightability of bison located in heavy timber. In 1985, 5 bison were fitted with radio collars to assist in finding the herd during surveys. During the past 3 years, bison numbers have been higher, and in 1988 the postseason estimate exceeded the management goal of 60 overwintering adults by 9 bison. Calf production and survival have been higher over the past 3 years than during much of the prior decade.

In response to reduced total counts and apparent decline in calf recruitment, harvests have been reduced since 1981. Between 1978 and 1981 the harvest quota was 15 bison. Since then it has been eight. In addition, the hunt was not held in 1982 and 1985.

Hunter interest in the Copper River bison hunt has always been high; however, during the past 3 years, the overall number of permits issued has been lower than in the late 1970's and early 1980's. Undoubtedly, early closures serve to limit hunter participation. Because of the heavy hunting pressure and restricted access on opening day, hunters were crowded together at the more popular hunting spots along the Copper River. This hunt has always been considered a quality experience; however, recent crowding of hunters and early closures have threatened this status.

I recommend the management goal for the Copper River bison herd be raised from 60 to 90 overwintering bison (i.e., older than calves). An increase in the number of adult cows in the herd should result in higher annual calf production; accordingly, increasing calf recruitment would result in larger annual harvests. Under the current management goals the herd can only sustain a yearly harvest of 8 bison; if adult cows are taken, calf production declines, necessitating closing the hunting season for a year or more. With a larger herd, overharvesting of a few animals would have less biological impact on the herd. If the herd were increased, periodic season closures would not be needed to rebuild it.

In addition to increasing annual recruitment of the herd, an increase in herd size will facilitate management of the permit hunt because of an increase in the allowable harvest. It is difficult to conduct a hunt with a quota of fewer than 8 bison. The logistical difficulties associated with successful hunters reporting to the Glennallen office within 24 hours and the Department then notifying all hunters in the field of the closure increase the chances of exceeding the harvest quota. This has been especially true for the past 2 years, because hunting pressures have been heavy on opening day. Higher quotas, would probably result in a longer, less pressured season.

Current range conditions should not preclude attaining this increased population objective, because the range has supported more than 90 bison in the past. Although body and blood condition parameters (i.e., obtained from captured cows during winters with normal snowfall) suggest adequate nutrition is available, during severe winters with prolonged deep snows, added mortality can be expected. To achieve the proposed goal of 90 overwintering adult and subadult bison, annual harvests should be maintained at the current level of 8 bison per year to achieve a harvest rate below the sustained-yield level and allow for slow herd growth.

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Wildlife Biologist III

SUBMITTED BY:

Gregory N. Bos
Survey-Inventory Coordinator

Table 1. Maximum numbers of bison observed during aerial surveys of the Copper River Bison Herd, Unit 11, 1950-1988.

Year	Total	Calves	Adults[a]
1950	17	0	17
1961	29	--	--
1962	74	13	61
1963		NO DATA	
1964	97	17	80
1965	84	19	65
1966	79	7	72
1967	51	14	37
1968	102	19	83
1969	100	18	82
1970	119	21	98
1971	87	11	76
1972	82	12	70
1973	97	18	79
1974	111	14	97
1975	89	13	76
1976	78	14	64
1977	90	18	72
1978	94	17	77
1979	97	23	74
1980	86	15	71
1981	75	10	65
1982	63	11	52
1983	74	15	59
1984	72	11	61
1985	68	8	60
1986	88	18	70
1987	100	17	83
1988	90	14	76

[a] The adult category includes yearlings.

Table 2. Copper River bison harvest data by permit hunt, 1976-87.

Year	Permits issued	Did not hunt	Unsuccessful hunters	Successful hunters	Males	Females	Total
1980	132	--	--	15	9	6	15
1981	110	36	66	8	5	3	8
1982	No Open Season						
1983	50	20	23	7	5	2	7
1984	34	12	17	5	2	3	5
1985	No Open Season						
1986	70	26	36	8	2	6	8
1987	55	18	28	9	7	2	9
1988	38	12	19	7	6	1	7

STUDY AREA

GAME MANAGEMENT UNIT: 19C and 19D (18,790 mi^2)

GEOGRAPHICAL DESCRIPTION: Dainages of the South Fork Kuskokwim River from the headwaters north to Farewell, including the Farewell Burn

BACKGROUND

The Farewell Bison Herd was established in 1965 with a transplant of 18 animals from the Delta Bison Herd. An additional 20 bison were transplanted to the area in 1968 to supplement the existing herd. The first legal harvest from this herd occurred in 1972, after aerial surveys revealed that it could sustain nominal harvests. Since that time, 16 drawing-permit hunts have been administered, and a total of 224 bison have been harvested from the area.

The Farewell bison hunt has traditionally been administered as a drawing-permit hunt, although in 1979 and 1984 it was administered as registration and "Tier II" subsistence hunts, respectively. From 1980 through 1983, 20 permits were allotted each year. From 1985 to 1987 the number of permits was increased to 40.

MANAGEMENT GOALS

To maintain the bison population in Unit 19 for the optimal sustainable yield of animals.

To provide uncrowded and aesthetically pleasing hunting conditions.

MANAGEMENT OBJECTIVES

To determine the optimal population size for current winter and summer ranges by 1992.

To reduce annual herd growth rate to 5% until the optimal population size is determined.

To conduct a spring burn on at least 1,000 acres of bison winter habitat by 1991.

To limit the number of bison hunters afield in the Farewell area to 10 or less at any one time.

METHODS

Herd Management

On 9 August 1988 Fish and Wildlife Protection Officer Charles Beatty and I surveyed the known range of the Farewell Bison Herd in a Piper PA-18-160 Super Cub aircraft. Eight bison were counted, although tracks of at least 200 additional bison were seen. The season and time of day were not conducive for a bison survey, and all animals were in heavy spruce stands. No attempt was made to use telemetry, because previously deployed transmitters were no longer functional. A drawing-permit hunt, in which 854 applicants applied for the 40 available permits, was held in 1988. After hunting, permittees reported back to the ADF&G office in McGrath by telephone and mail. Twenty-one bison were harvested.

To reduce crowding and provide a high-quality hunt, 10 successful permittees were assigned to each of four 10-day hunting periods, based on their randomly selected permit numbers; however, as a service to hunters, each was contacted by phone or mail well in advance of their assigned hunting period and given an opportunity to switch periods if scheduling conflicts prohibited them from participating during their assigned time. Twelve of the 40 permittees (30%) switched to a different time period.

Hunters were required to check in and out at McGrath either by phone or in person prior to and following their hunt. Hunters were also required to fill out and return a questionnaire following their hunt (Appendix A).

RESULTS AND DISCUSSION

Population Status and Trend

Since 1968 when formal surveys were initiated, the Farewell Bison Herd has experienced an average annual growth rate of about 10% (Table 1). The herd appears healthy and has continued to increase in numbers, although they have not expanded into previously uninhabited areas since 1977 (i.e., following creation of additional range by the Bear Creek Burn).

Population Size:

Although a survey flight to assess population size of the Farewell Bison Herd was conducted in late summer 1988, only eight were located; thus no reliable population estimate was made during FY 1989 prior to the hunt. Based on previous growth history, I believe the Farewell Bison Herd contains approximately 300.

Population Composition:

No surveys specifically designed to assess sex or age composition in the Farewell Bison Herd were completed in 1988; however, some information on age composition was obtained incidentally during a moose composition flight on 22 October 1988. Twenty of 81 (24.7%) bison observed during the moose survey were calves. This value is slightly higher than the long-term average of 19.5% calves for the period.

Distribution and Movements:

Movement patterns of the Farewell Bison Herd in 1987-88 were similar to those documented since the Bear Creek Burn occurred in 1977. During the winter the herd is typically scattered in small groups (10-35 animals) on the Farewell Burn and surrounding ranges, taking advantage of windswept grass and sedge forage in these areas. During the summer the subgroups begin moving onto the South Fork Kuskokwim River floodplain, generally moving erratically in a southerly direction toward the headwaters of that drainage. In recent years, bison have been seen as far upriver as Sled Pass (i.e., between the headwaters of the Hartman River and Stony River) and into Ptarmigan Valley (i.e., between the headwaters of the South Fork Kuskokwim River and Happy River in Unit 16). Bison have been observed occasionally as far west as the Windy Fork of the Kuskokwim River and north to within 20 km of Nikolai on the South Fork Kuskokwim River.

Mortality

Season and Bag Limit:

The open season for resident and nonresident hunters is 1 September to 10 October. The bag limit is 1 bison every 5 regulatory years by drawing permit only. Forty permits were issued.

Human-induced Mortality:

In 1988, 6 female and 15 male bison were legally harvested. No bison were known to have been taken illegally. Between 1974 and 1988, annual harvests averaged about 9.5% of the total prehunting population, although since 1980 the harvest has not exceeded 9% of the herd (Table 1).

Hunter Residency and Success. The majority of hunt applicants for the 40 permits (537 applicants, 63%) were from the Anchorage area (Table 2). Applicants from all roaded (urban) areas of the state totaled 753 (88%). Nonresidents (n = 5) accounted for less than 1% of the applicants. Thirty-eight residents from Unit 19 applied (4%). Thirty-eight applicants who were successful at obtaining a permit were Alaska residents (Table 2). The 2 nonresidents who obtained permits did not hunt, and an additional

seven of the residents also did not hunt. Of the 31 permittees who actually went afield, 21 (68%) bagged a bison.

Permit Hunting. Twenty-eight of the 31 hunters who actually went afield returned hunter questionnaires that had been supplied with their permits; the other 3 hunters responded to reminder letters. Costs of administering and monitoring the Farewell bison hunt were estimated at about $450 for 1988. This estimate does not include personnel time spent at Farewell Station, nor does it include prehunting census work. Although it could be done less expensively, I believe it is easily justified from the public relations standpoint. Comments provided on the questionnaire were, without exception, enthusiastic and appreciative. This is a high-profile big game species, and providing information and assistance to hunters positively on the Department. I encourage a continuation of the current permit hunting administrative practices that are based at McGrath.

Transport Methods. All hunters utilized airplanes to initially access the area. Once hunters were in the hunt area, 13 of 31 (42%) utilized small ATV's (three- and four-wheelers) that they brought in by air. Two hunters (6%) utilized inflatable rafts to hunt bison.

Hunt Duration, Success Rates, and Harvest Chronology. Mean number of days afield was 4.9 for successful hunters and 5.1 for unsuccessful hunters. Success rates also varied by hunting period: 1st period (1-10 Sept.), 100% (6 of 6); 2nd period (11-20 Sept.), 78% (7 of 9); 3rd period (21-30 Sept.), 57% (4 of 7); and 4th period (1-10 Oct.), 44% (4 of 9).

Harvest Locations. Locations of the harvested bison were largely confined to the Bear Creek Burn and adjacent stretches of the South Fork Kuskokwim River. No known harvest locations were upriver from Rohn Roadhouse, which is typical of past years.

Horn Trophy Sizes. The questionnaire asked the permittees to rough-score the horns and provided a form whereby typical trophy measurements could be recorded. Cow bison horn scores ranged from 67.5 to 76 points with a mean of 72.3 points (n = 4). Bulls ranged from 63.5 to 121.5 points, with a mean score of 99.6 points (n = 13). Unofficially, one of the bulls harvested had measurements sufficiently high to qualify it for entry into the Boone and Crockett record books.

Natural Mortality:

There appears to be very little natural mortality in the Farewell Bison Herd. Annual harvests since 1976 have averaged 9.5% of the prehunting population, and the mean annual herd increase has been about 10%; these figures equal the 20% mean annual calf production observed since 1968.

Habitat

Assessment:

The Farewell bison spend winters on and adjacent to the Bear Creek Burn where forage appears to be adequate; however, summer range is limited to river floodplains within the Alaska Range. Although no recent estimates of bison carrying capacity on summer range are available, high use or possible overuse is evident.

Enhancement:

In cooperation with the Alaska Department of Natural Resources, a spring cold-burn is being planned for 1989 or 1990. This work will be conducted on a portion of the Bear Creek Burn where grass and sedge growth appears to be declining and native black spruce reinvading. Plans are not yet firm on the time and extent of the burn, but the intent will be to provide nutritious winter forage for bison and stimulate browse production for moose.

Game Board Actions and Emergency Orders

In March 1989 the Board of Game approved the Department's proposal to issue up to 100 drawing permits and extend the open season to 10 August through 31 March to reduce herd growth and establish winter hunting opportunities.

CONCLUSIONS AND RECOMMENDATIONS

Because of the low natural mortality in the Farewell Bison Herd and the great interest in hunting bison, the population can be effectively managed by varying the number of drawing permits available each year. Following the occurrence of the Bear Creek Burn in 1977, when 350,000 acres were burned by a naturally occurring wildfire, the area's capability to provide forage for bison was increased. Presently, the burn area provides suitable habitat for wintering bison; however, but the limited summer habitat may become overbrowsed. Until ADF&G staff can determine the carrying capacity of the summer range, the herd's growth rate should be reduced to prevent range damage.

Because of negligible natural mortality and good recruitment, about 50 bison would need to be harvested in 1989 to stabilize the herd (assuming age and sex classes are taken in approximately the same proportion as recent harvests). Therefore, I have recommended that the number of drawing permits be increased to 70, effectively increasing the annual take to approximately 35 bison. This strategy will slow herd growth to about 5%, while the carrying capacity of the summer range is studied.

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Table 1. Population size, numbers of calves, and numbers of bison harvested from the Farewell Herd from 1965 to 1988.

Year	Herd size	No. calves(%)	No. harvested(%)
1965	17	24	--
1966	--	--	--
1967	--	--	--
1968	45	31	--
1969	--	--	--
1970	78	24	--
1971	75	24	--
1972	75	1	10 (13)
1973	75	27	--
1974	85	16	7 (8)
1975	106	20	10 (9)
1976	111	21	12 (11)
1977	116	22	16 (14)
1978	114	23	13 (11)
1979	123	15	30 (24)
1980	123	24	7 (6)
1981	129	21	11 (9)
1982	157	20	10 (6)
1983	154	10	8 (5
1984	190	24	8 (4)
1985	223	18	20 (9)
1986	245[a]	--	19 (8)
1987	270	16	21 (8)
1988	300[a]	25	21 (7)
$\bar{x}$		19.3	223 (10)

[a] Extrapolated estimate.

Table 2. Residency locations of permit applicants and permittees for the 1988 Farewell bison hunt.

Residence	Applicants		Permittees	
	Number	Percent	Number	Percent
Unit 19	38	4.4	3	7.5
Other rural Alaska	25	2.9	0	0
Kenai Peninsula	66	7.7	5	12.5
Anchorage and vicinity	537	62.9	18	45.0
Other urban Alaska	150	17.5	11	27.5
Nonresidents	5	0.6	2	5.0
Unknown residency	33	3.9	1	2.5
Total	854	99.9	40	100.0

APPENDIX A. 1988 Farewell Bison Hunter Survey

1988 FAREWELL BISON HUNTER SURVEY

NAME:_____

ADDRESS:_____

_____

PHONE NUMBER:_____

HUNT PERIOD:_____THROUGH_____1988
DID YOU HUNT BISON?_____(IF NO, PLEASE STOP HERE)

DATES HUNTED:_____THROUGH_____1988
WHAT WAS YOUR PRIMARY ACCESS METHOD?_____
(airplane, boat, other)
WHAT WAS YOUR SECONDARY ACCESS METHOD?_____
(foot, boat, raft, track vehicle, 3-wheeler, horse, other)
HOW MANY BISON DID YOU SEE (from air?)_____(ground?)_____
DID YOU (OR OTHER PARTY MEMBERS) HUNT OTHER SPECIES WHILE ON YOUR BISON HUNT?_____(list species hunted)
DID YOU (OR OTHER PARTY MEMBERS) KILL ANY OTHER SPECIES?_____
_____(list species and number harvested)
HOW MANY OTHER BISON HUNTERS DID YOU SEE?_____
HOW MANY PEOPLE IN YOUR HUNTING PARTY?_____
DID YOU KILL A BISON?_____IF YES, WAS IT A BULL OR A COW?_____
HOW MANY BISON WERE IN THE GROUP YOU HARVESTED ONE FROM?_____
DID THE BISON YOU HARVESTED HAVE EARTAGS?(LIST NUMBERS)_____
HOW BIG WERE THE HORNS?

	LEFT HORN	RIGHT HORN
Total length (base to tip)	_____	_____
Base circumference	_____	_____
Circumference at first quarter	_____	_____
Circumference at halfway	_____	_____
Circumference at third quarter	_____	_____
Spread at widest point	_____	
Tip to tip spread	_____	

WERE THE HORN TIPS BROOMED OFF?_____
WHAT CALIBER OF GUN (OR BOW WEIGHT) DID YOU USE_____HOW MANY SHOTS____

COMMENTS:_____
_____
_____
_____

AGAIN, THANKS FOR TAKING THE TIME TO FILL OUT THIS QUESTIONNAIRE. HOPE YOUR HUNT WAS ENJOYABLE.

RETURN THIS QUESTIONNAIRE WHETHER YOU HUNTED OR NOT!!!

STUDY AREA

GAME MANAGEMENT UNIT: 20D (5,720 mi^2)

GEOGRAPHICAL DESCRIPTION: Central Tanana Valley near Delta Junction

BACKGROUND

In 1928, 23 plains bison were transplanted from the National Bison Range in Montana to the Delta River (at the time the wood bison was thought to be extinct). By 1947 the herd had increased to 400 animals. Hunting, which began in 1950, is used to limit the size of the herd. Delta bison have been transplanted to other parts of Alaska to establish additional herds.

As agriculture developed on their established range, the Delta Bison Herd began to include hay and cereal grains in their fall and winter diets. Eventually, bison began to impact fall agricultural harvests. Depredation began in the late 1950's, continued through the 1970's, and escalated with development of the Delta Agricultural Project in 1979. Most damage occurred when bison used the crops prior to fall harvest.

In 1979 the Alaska Legislature established the 90,000-acre Delta Junction Bison Range (DJBR) south of the Alaska Highway and adjacent to the Delta Agricultural Project. The purposes of the DJBR were to perpetuate free-ranging bison by providing adequate winter range and to alter seasonal movements of bison to reduce damage to agriculture. In 1984 the Legislature appropriated $1.54 million for DJBR development and increased the Delta bison permit hunt application fee from $5 to $10. Funds from the fee increase were intended for management of the DJBR. Since 1984 the appropriation has been used to develop 2,800 acres of bison forage on the DJBR, purchase equipment for forage management, and hire personnel to accomplish these tasks.

Damages to farms in the Delta Agricultural Project by bison were significantly reduced in 1985 with the first substantial forage development on the DJBR. Forage development continued in 1986 and no fall depredations occurred that year or during this report period.

MANAGEMENT GOALS

To provide opportunities to selectively hunt bison.

To minimize conflicts between agriculture and bison in the Delta Junction area.

To provide an opportunity to view and photograph bison.

MANAGEMENT OBJECTIVES

To increase bison forage on the DJBR to attract bison away from the Delta Agricultural Project until 1 October annually.

To maintain a precalving population of 325-360 bison with a minimum herd composition of 35 bulls:100 cows, unless summer range on the Delta River is found to be inadequate.

To structure the bison hunt so that as many hunters as possible can select bison of any sex or age class.

METHODS

DJBR Management to Encourage Use by Bison

To encourage use of the previously unused Panoramic Fields, we cleared a trail 150 feet wide and 8 miles long between the Panoramic and Gerstle Fields on the DJBR. The trail was not planted because it was extremely wet and could not be plowed.

To attract bison to the DJBR in the fall, ADF&G staff fertilized previously planted perennial grasses with N60-P50-K25-S10 fertilizer. Two 660-gallon stock tanks were also kept full of water, and several 50-pound trace element salt blocks were placed at various locations.

The University of Alaska Cooperative Extension Service staff conducted tests on the DJBR to evaluate methods for eliminating bluejoint in bison range fields. Test plots were established in planted perennial grasses that had significant growth of bluejoint. Test plots measured approximately 30 X 60 feet. Methods tested to control bluejoint included the following:

1. Application of the herbicide Roundup (Glyphosate) using a hand wiper with 3.5 parts water/1 part Roundup. Plants were wiped twice in opposite directions.

2. Application of Roundup using a hand sprayer at an application rate of 1 quart/acre.

3. Application of the growth inhibiter Embark (Mefluide) using a hand sprayer at an application rate of 1 quart/acre.

4. Mechanical cutting in late June during the root stage of plant development.

Population Management

Estimating Population Size and Composition:

I estimated herd size by aerial photocensuses on 25 May, 26 and 31 July, and 29 August 1988. In May and July the bison were on the Delta River and in August the bison were on the DJBR. Three counts were flown with a Bellanca Scout and one with an Army UH-1 helicopter. Bison were located by visual searching and by radio-tracking aggregations that contained a radio-collared bison. Aggregations of approximately 1-15 were counted visually. Larger aggregations were photographed with a 35-mm camera and ASA 400 print film.

Sex and age composition data were collected on 15 September and 10 October 1988 by locating aggregations of bison with radio-collared individuals on the ground and observing them with 8 X 40 binoculars or a 15- to 60-power spotting scope. Bulls were differentiated from cows by body size, pelage, horn shape, and presence of a penis sheath. Yearling bulls were identified by horn shape.

Investigation of Possible Limiting Factors:

Hunters were required to collect 2 vacutainers of blood from their bison kills to enable us to test for disease in the herd. Vacutainers were centrifuged, and sera were removed by aspiration. Sera were kept frozen until tested by the National Veterinary Services Laboratories (USDA, Ames, Iowa) for the following diseases: epizootic hemorrhagic disease, bluetongue, infectious bovine rhinotracheitis, bovine viral diarrhea, parainfluenza 3, brucellosis, and Q fever.

A Delta River habitat assessment study plan was developed with assistance from the Soil Conservation Service. As part of this study plan, bison browse surveys were conducted on the Washington Range of Fort Greely Military Reservation on 19 May 1989, and fresh fecal samples were collected from bison on 10 May and 2 June 1989. The browse surveys and the fecal samples have not been analyzed.

Harvest Monitoring:

When bison hunters checked out after their hunt, they were given a questionnaire to determine (1) date of harvest, (2) location of harvest, (3) how many days hunted, (4) number of shots required, (5) caliber of weapon and size of bullet, (6) how much money they spent in Delta Junction, and (7) how much money they would pay for a bison harvest tag if one were required. Harvested bison were aged by tooth replacement and wear and by horn annuli. The horns on large bulls were measured according to the Boone and Crockett Club scoring system.

RESULTS AND DISCUSSION

Population Size

The greatest number of bison counted in a single census in summer 1988 was 426 (Table 1). Based on hunting mortality, estimated wounding loss, and other overwinter mortality, the spring 1989 precalving population estimate was 366 bison. The 1989 precalving population estimate slightly exceeds the new population objective; it is also the highest one since 1983.

Population Composition:

Calf survivals to fall and 18 months of age continue to be good (Table 2). The herd continues to have a prolonged calving period, and 4 newborn calves were observed as late as 10 October 1988. The number of bulls in the herd is at its highest level since 1981. Trends in population composition reflect regulatory changes, rather than natural biological responses or hunter selection.

Distribution and Movements:

Bison continued to use the floodplain of the Delta River for calving and summer range. During June and July, the herd ranged along the Delta River between Black Rapids Glacier and the Washington Range on the Fort Greely Military Reservation. During July and August the herd moved north along the Delta River to the mouth of Jarvis Creek. Between late July and early September the herd migrated east, crossing the Richardson Highway enroute to the DJBR.

Bison migrated from the Delta River to the DJBR on 31 July 1988, which is the earliest date recorded for fall movement to the DJBR. Some bison may have arrived on the DJBR as early as 25 July. A group of about 200 bison left the DJBR and moved into the Delta Agricultural Project on August 31. We believe these bison were driven off the DJBR by people on ATV's, because ATV tracks were mixed in with tracks from running bison. We responded within about 2 hours and tried to herd the bison back onto the DJBR; however, this attempt was complicated when local farmers tried to take pictures of the bison, driving them farther north into the Agricultural Project. As a result, a herd of about 50 bison was separated from the main herd, remaining on the Agricultural Project for the remainder of the fall.

During winter months, the herd used perennial grass planted for the Conservation Reserve Program in the Delta Agricultural Project and fertilized fescue on the DJBR. They also caused some depredation of hay crops that were not stored in barns or within fenced areas.

Mortality

Season and Bag Limit:

The open season for residents and nonresidents is from 7 October to 31 March. Participation in the hunt required drawing-permit for bulls (hunt No. 403, 20 permits issued) or cows (hunt No. 404, 30 permits issued). The bag limit is 1 bison every 5 years. The following requirements applied to both permit hunts: (1) Permittees were required to attend an orientation course before hunting; (2) Permittees were assigned specified time periods for hunting, determined by the order their permit was drawn; and (3) Rifles used by permittees were required to be capable of firing a 200-grain bullet with 2,000 ft/lbs retained energy at 100 yards. Bows were to comply with 5 AAC 92.075(4); crossbows were prohibited.

Human-induced Mortality:

Hunters killed 22 bulls and 23 cows during the 1988-89 hunting season (Table 3). Two hunters did not hunt. The average hunt lasted 3.5 days, which is a slight (although not statistically significant) decrease from the 4.1 days of the previous year. The most commonly used weapon during 1988-89 was a 300 Winchester Magnum (Table 4).

The number of bison killed on the DJBR increased from 4 in 1987-88 to 10 in 1988-89. Most harvested bison (33) were killed in the Delta Agricultural Project, because the herd spends the majority of its time there during the hunting season. In addition, the Delta Agricultural Project is much more accessible than the DJBR during the hunting season.

In addition to the reported harvest, I estimated that about 10 bison died from other human-induced causes. Five probably died after being wounded by hunters, three from poaching, and two from other causes such as snares, cars, or military activities.

Permit Results. The number of applications for Delta bison permits increased from 6,434 in 1987 to 9,705 in 1988 (Table 5). The increased number of applications resulted from the change in application procedures that now allows applicants to apply for more than 1 hunt per species. With the current procedure, applicants can apply for both hunts (i.e., Nos. 403 and 404).

The time necessary for the required prehunting orientation is a problem with hunt Nos. 403 and 404. The orientation, which takes about 1 hour, is designed to teach hunters to identify bull and cow bison, inform hunters of land ownership status in the Delta Junction area, and give them supplies for collecting biological specimens from their bison. The check-in process should be modified to require less time from the Delta area staff.

Harvest Chronology. Most bison were harvested during 2 distinct periods within the 26-week hunting season. Fifty-nine percent of the harvest occurred during the first 7 weeks; 2-5 bison were killed each week. Only 5 bison (11%) were killed during weeks 9-14. No bison were killed during weeks 15-18 (13 Jan-9 Feb). Thirteen bison, totaling 30% of the harvest, were killed during weeks 19-25 (10 Feb-31 Mar).

A significant number of permitees hunted late in the season. They hunted late for a variety of reasons including (1) failure to kill a bison earlier, (2) inability to hunt earlier, or (3) they were hunting for a trophy. Weather also influenced harvest chronology. Most bison were killed early in the season, when temperature and daylight hours are conducive to hunting. By late November, short days and cold temperatures made it very difficult to hunt. Hunting resumed again in mid-February when daylight hours increased.

Transport Methods. Method of transportation is not recorded for hunt Nos. 403 or 404. The majority of hunters use highway vehicles to locate bison. They usually walk from the road to the bison; however, some hunters use three- or four-wheelers early in the season or snow machines late in the season.

Natural Mortality:

There are no records of predation on Delta bison; however, wolves, grizzly bears, and black bears, which are capable of killing bison, occur in the area. The herd is not food limited, and weather is rarely a mortality factor. Virtually all calves survive their 1st year.

The greatest potential for mortality to Delta bison is disease transmitted from domestic livestock in the Delta Junction area. Cattle in the Delta Junction area are known to have bovine viral disease, infectious bovine rhinotracheitis, and bovine respiratory syncytial virus (D. Quarberg, pers. commun.). Results from the serologic survey from bison killed during 1988-89 were not available for this report.

Economic Survey of Bison Hunters

Bison hunters reported spending an average of $227 per hunter in Delta Junction during 1988-89. This is a decrease from $329 spent per hunter in 1987-88. Most money was spent on lodging ($69), followed by gasoline ($51), meals ($27), groceries ($15), and miscellaneous expenses ($9).

When asked how much money they would pay for a bison harvest tag if one were required, 61% of the hunters reported they would spend $100 or more (Table 6), similar to 65% in 1987-88. Three hunters said they would spend $500. It is apparent that hunters are willing to pay additional fees to hunt Delta bison.

Habitat Improvement on the DJBR

Approximately 750 acres of the DJBR were treated with the fertilizer blend N60-P50-K25-S10. Fertilizer applications were completed by mid-July.

Mechanical cutting proved to be the most effective and cost-efficient method tested to control bluejoint on the DJBR. Bluejoint cut in late June had very few seed heads by mid-September; however, the grass continued to grow providing additional bison forage. If cutting prevents bluejoint from producing seeds and spreading and if bison will graze the leaves, then the perennial grasses will have a chance to outcompete bluejoint and eliminate it from the fields.

Spraying Roundup effectively killed bluejoint, but it also killed all the other more desirable perennial grasses in the test plots, making it unsuitable for use on large areas of bison forage. Roundup is also very expensive; the chemical and application costs per acre were about $25-30 and $6-8, respectively. Wiping Roundup was more selective than spraying, and it did not result in killing perennial grasses; however, about 35% of the bluejoint survived wiping. The high cost of wiping Roundup, combined with only partial elimination of bluejoint, make this an expensive method of bluejoint control.

Spraying Embark delayed plant maturity, but the plants still produced viable seed. Therefore, bluejoint would not be eliminated with Embark. Embark was also expensive, costing about $18-20/acre for the chemical and $6-8/acre for the application.

Game Board Actions and Emergency Orders

The Board of Game considered the following 6 regulation proposals during this reporting period:

1. Changing the description of the hunt area to include all of Subunit 20D and increasing the maximum number of drawing permits to 100 passed.

2. Allowing a June-July season for bison north of the Alaska Highway and south of the Tanana River (in the Delta Agricultural Project) failed.

3. Changing the bag limit from 1 bison every 5 years to 1 every year failed.

4. Changing the bag limit from 1 bison every 5 years to 1 per lifetime failed.

5. Designating 20 bison permits for muzzleloaders failed.

6. No action was taken on allowing the use of crossbows for hunting Delta bison, because ADF&G agreed to implement it administratively.

CONCLUSIONS AND RECOMMENDATIONS

A new precalving population objective of 325-360 bison was established during this reporting period. The new objective was approved by both the Department and the public at a public meeting of the Delta Fish and Game Advisory Committee; however, it is tentative until a 1990-95 Delta Bison Management Plan can be drafted and made available for public comment during the winter of 1989-90.

Even though the Delta Bison Herd is slightly larger than its new precalving population objective of 325-360 bison, there is considerable public interest in allowing the herd to grow even larger. Members of the agricultural community, however, are very concerned about depredation from a larger herd. Continued support from the agricultural community is essential to maintaining free-ranging bison and public hunting of bison on the Delta Agricultural Project. There is also a possibility that the summer range along the Delta River will not support a larger herd. To resolve this question, the Delta River habitat assessment study should be continued to determine if there is sufficient summer range to sustain the current size of the herd or a larger one.

The current bull:cow ratio exceeds the objective of 35 bulls:100 cows; however, consideration should be given to modifying the bull:cow ratio objective. Hunters prefer to shoot bulls; therefore, it may be desirable to have a higher ratio of bulls in the herd. This approach, however, will reduce the overall number of permits that can be issued.

Wolfe and Kimball (1989) found (1) the number of male bison in a population was underestimated by 40% during ground counts and (2) aerial counts were even less accurate. These errors occurred because bison aggregate in social groups that are separated by sexes during much of the year, with bulls being associated in smaller, less-represented groups. Based on this information, it may be important to review the composition data collection techniques used for the Delta Bison Herd.

The objective to manage bison forage on the DJBR to prevent fall depredations in the Delta Agricultural Project until 1 October was largely accomplished for the 3rd year in a row. If this objective is to continue to be accomplished in the future, staff must be provided in the form of a full-time DJBR manager. The DJBR is 90,000 acres and has a large budget that must be managed. The DJBR Manager cannot maintain continuity of management and planning while working as a seasonal employee.

The following work goals are recommended for 1989-90:

1. Continue the drawing permit hunts.

2. Increase the number of permits to achieve a precalving population of 325-360 bison.

3. Continue DJBR development with CIP funds. Development should include planting additional perennial grasses if needed, planting the trail system connecting the Gerstle and Panoramic Fields, improving water sites, managing existing perennial grasses to maintain high-quality forage on at least 500 acres in the fall, developing methods to control bluejoint in grass fields, eliminating berm piles that are the source of bluejoint, and developing and implementing prescribed fire plans and fires for forage management.

4. Explore methods for increasing DJBR revenues to help fund a full-time DJBR manager position.

5. Explore methods for decreasing the time required by Delta staff to administer permit hunts Nos. 403 and 404.

6. Continue the study to investigate the carrying capacity of bison summer range along the Delta River.

7. Draft a 1990-1995 Delta Bison Management Plan and hold meetings for public comment.

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Table 1. Precalving and postcalving population estimates for the Delta Bison Herd from fall 1983 through spring 1988.

Year	Precalving[a] population estimate	Highest postcalving population count
1983	355	360
1984	300	356
1985	285	378
1986	300	361
1987	275	396
1988	337	426
1989	366	

[a] Calculated by subtracting known mortality from previous postcalving population count.

Table 2. Composition data for the Delta Bison Herd from 1981 through 1988.

Year	Bulls: 100 cows	% Bulls	Yrlg bulls: 100 cows	% Yrlg bulls	Calf: 100 cows	% calf	n
1981	93	40	12	5	41	17	138
1982	61	28	18	8	55	25	402
1983	65	31	18	9	46	22	173
1984	58	29	17	9	40	20	228
1985	38	21	10	5	47	25	283
1986	44	29	15	7	51	24	119
1987	No data						
1988	72	33	17	8	45	22	141

Table 3. Annual reported harvest of Delta bison, number of hunters, and hunter success from 1982 through 1987.

Hunter Year	Harvest			No.	%
	Bulls	Cows	Total	hunters	success
1982	35	32	65	67	100
1983	25	36	61	61	100
1984	29	19	48	48	100
1985	16	33	49	49	100
1986	15	47	62	64	97
1987	37	12	49	50	98
1988	22	23	45	47	96

Table 4. Weapon caliber and number of shots required to kill Delta bison during the 1987-88 hunting season. Minimum weapon allowed is approximately a .30-06 with a 200-grain bullet.

Caliber	No. hunters	Mean no. shots
300 Winchester Magnum	11	1.5
.30-06	9	2.6
375 H&H Magnum	9	1.7
338	5	1.2
35 Whelen	2	3.5
340 Weatherby	2	2.0
300 Weatherby	2	3.0
338/.06 Improved	1	1.0
416 Taylor	1	2.0

Table 5. Number of applications received for Delta bison hunt Nos. 403 and 404 from 1977 through 1988.

Year	No. applications
1977	2,121
1978	3,555
1979	3,970
1980	4,561
1981	5,237
1982	8,105
1983	7,889
1984	11,276
1985	665(8,931 before Tier II regs.)
1986	6,585
1987	6,434
1988	9,705

Table 6. Amount of money Delta bison hunters would pay for a bison harvest tag if one were required.

$ Amount	No. hunters	$ Amount	No. hunters
0	4	250	3
25	3	300	2
50	11	350	2
100	11	400	1
150	1	450	0
200	5	500	3

Federal Aid Project
funded by your purchase of
hunting equipment