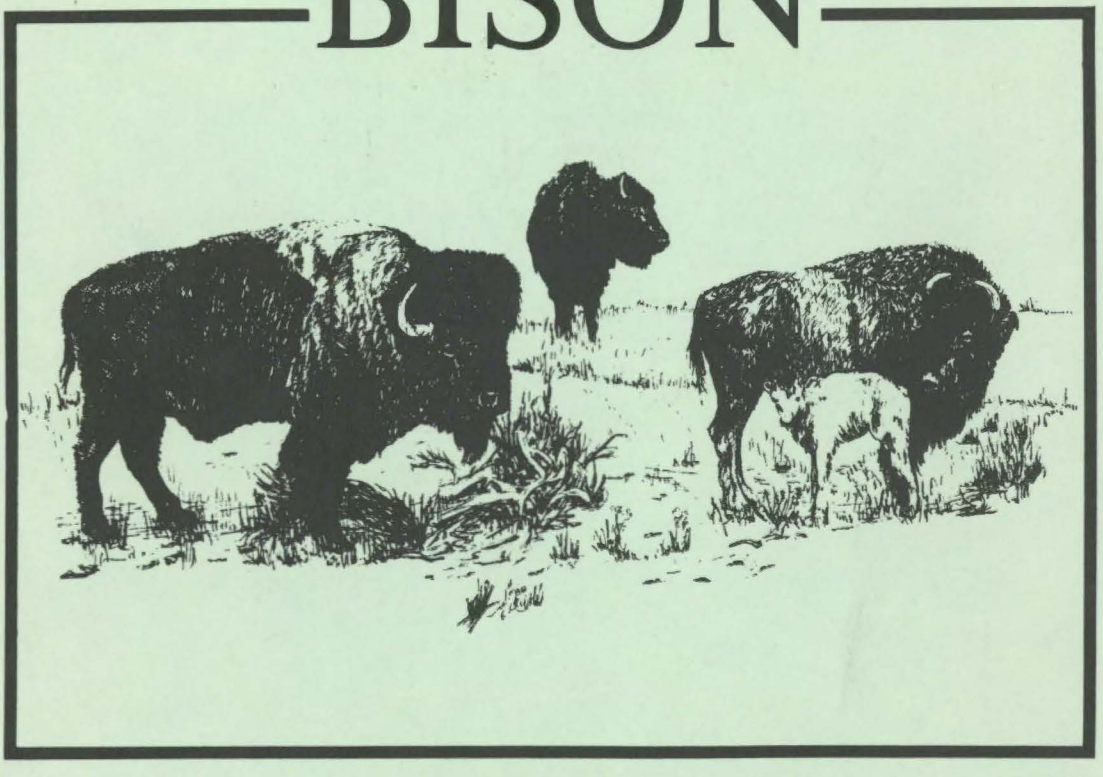
Alaska Department of Fish and Game
Division of Wildlife Conservation
Federal Aid in Wildlife Restoration
Annual Report of Survey—Inventory Activities
1 July 1987—30 June 1988

BISON



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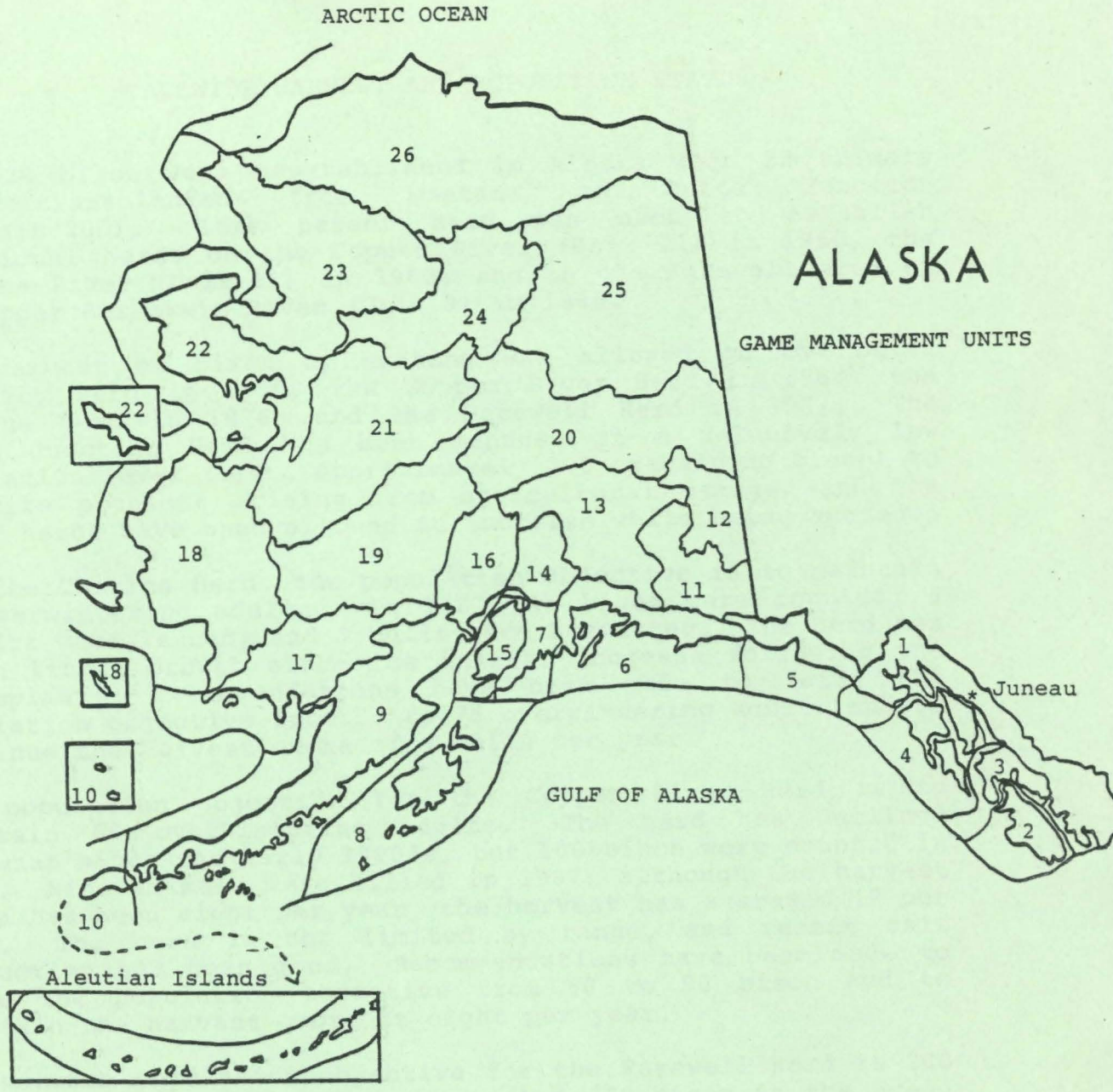
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STATEWIDE HARVEST AND POPULATION STATUS

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. In 1987, 45 bison were counted, 6 permits were issued, and 3 bulls were harvested. The herd has shown little growth since its initial increase following the transplant. Recommendations have been made to raise the population objective from 50 to 75 overwintering adults and to continue the harvest quota of 4 bulls per year.

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 100 bison were counted in 1987. Nine animals were killed in 1987; although the harvest quota has been eight per year, the harvest has averaged 12 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.

The minimum population objective for the Farewell Herd is 200 bison; in 1987 there were an estimated 270 bison in the area. The herd has experienced an average annual growth rate of 10%. In 1987, 17% of the herd were calves and 21 animals were harvested. The success rate for those permittees who hunted was 66%. The burn in 1977 has produced excellent winter forage, but the summer range may be overutilized. Recommendations have been made to increase the number of animals so that additional harvest can be taken from the enlarging herd.

The precalving population and composition objectives for the Delta Junction Herd are 300 animals and 35-65 bulls:100 cows, respectively. In the spring of 1988, the precalving population was estimated at 337 bison, which is slightly

above the population objective. In 1987 24% of the herd were calves and there was a bull to cow ratio of 44:100. In 1987-88, 50 permits were issued and 49 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 1988.

Steven R. Peterson
Survey and Inventory
Coordinator

STUDY AREA

GAME MANAGEMENT UNIT: 11 (13,300 mi²)

GEOGRAPHICAL DESCRIPTION: Chitina River

BACKGROUND

The Chitina Bison Herd originated with animals that had been 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 56 bison in 1981; currently it numbers 45.

The first bison hunt conducted in the Chitina herd was held by drawing permit in September 1976. Permit hunts have been held every year since then. Sport hunters have taken a total of 54 bison from this herd, with an average annual harvest of 4.5 animals.

POPULATION OBJECTIVES

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

METHODS

Aerial surveys to determine composition of the herd were conducted in the spring following the calving period. We plan to radio-collar up to 8 adult cows to facilitate locating the herd for future surveys. Habitat evaluation was done in cooperation with the National Park Service. Harvest and hunting pressures were controlled by allowing hunting by drawing permit only. Harvests were monitored by requiring successful permittees to check in at the Alaska Department of 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). In 1986, 41 bison were observed in the Chitina herd, representing a 47% decline from 56 animals counted in 1985. This decline was attributed to a much higher-than-normal harvest in the fall of 1985. The Chitina herd increased by 10% during 1987.

Population Size:

An aerial survey conducted on 16 June 1987 resulted in a total count of 45 bison. Survey techniques included flying

Table 1. Maximum numbers of bison observed during aerial surveys of the Chitina River bison herd, Unit 11, 1962-1987.

Year	Total	Calves	Adults[a]
1962	35	0	35
1963	28	--	--
1964	12	5	7
1965		NO DATA	
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

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

transects through all the known bison habitat in the lower Chitina valley to obtain a direct count. An extrapolated herd estimate was not made.

Population Composition:

Thirty-eight adults and 7 calves were observed during aerial surveys of the Chitina herd during 1987. There were 2 more calves present in 1987 than in the previous year, but calves currently compose only 16% of the herd, compared with 22% (n = 12) in 1985. Since the annual bison surveys are usually conducted in June, timing of the survey was not thought to be a factor in the reduced count. The observed decline was attributed to low calf production following a high harvest of adult cows in 1985.

Distribution and Movements:

The Chitina Bison Herd usually ranges within the riparian and upland habitat below an elevation of 2,000 feet along the upper Chitina Valley. Although movements vary considerably, the herd can usually be located 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; the best survey results have been obtained in this area. We intend to radio-collar up to 8 adult cows to assist in locating animals during yearly counts and monitoring herd movements during various times of the year.

Mortality

Season and Bag Limit:

The open season for resident and nonresident hunters in GMU 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 harvesting 3 bulls during the 1987 bison season. This harvest is similar to last year's take of 4 animals and is consistent with the harvest rate observed over the past 9 years, excepting 1985 when the harvest was 8 bison (Table 2). The harvest increased in 1985 because only subsistence hunting by local residents was allowed. These individuals were more familiar with the area, spent more time hunting, and as a result, were more successful.

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

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

[a] One permittee killed 2 bison.

The poaching of bison from the Chitina River area has occurred in past years. The number of animals taken illegally and the impact of this poaching on the herd are not known. However, in some years the illegal harvest has probably equaled or exceeded the legal harvest. One local resident freely admitted to harvesting 1 bison/year for winter meat; this individual has not been cited because of lack of evidence.

Hunter Residency and Success:

All successful applicants for the 1987 Chitina bison permit were residents of Alaska. A nonresident has not drawn a permit for this hunt in over 5 years. The overall success rate for the 6 permittees was 50%. Two permittees (33%) reported hunting unsuccessfully, and one (17%) did not hunt. One successful hunter was a local resident; the others were nonlocal Alaskan residents. Successful hunters reported spending an average of 4 days afield to harvest a bison, while unsuccessful hunters spent 5 days in the field.

Permit Hunts:

Six drawing permits were issued for the Chitina Bison Herd. Although up to 12 permits have been authorized by the Board of Game, the number of permits issued may be reduced by ADF&G for biological reasons (e.g., poor calf cohorts). During 1987 there were 359 applicants; the drawing success rate was less than 2%. The number of applications submitted each year has been declining since 1984, when 1,454 applications were received.

Transport Methods:

Aircraft were used by the successful hunters during 1987. Of the 22 successful bison hunters reporting transportation methods since 1983, 20 (91%) used aircraft, one (4.5%) used a riverboat, and one (4.5%) used a dog team.

Natural Mortality:

Natural mortality rates have not been determined for the Chitina Bison Herd. 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 lower portion of the upper Chitina Valley received substantial use from an undetermined number of horses occupying 2 grazing-lease areas. The most

recent attempt to evaluate habitat use by ADF&G personnel was directed at determining the level of browse utilization. Impressions from this early work were that browsing and grazing were heavy, especially near horse-grazing leases, and the size of the Chitina herd should be held at about 30 overwintering adults (ADF&G files).

In 1984 the National Park Service conducted a range study in the upper Chitina Valley (Miquelle 1985) and determined that grazing by ungulates on the Chitina bison range has not caused any recent deterioration in plant condition. The range was actually found to be recovering from earlier overuse by horses, which had been abundant on the grazing leases. Miquelle (1985) concluded that the current herd size of 50 animals had not adversely affected the habitat and therefore the management plan calling for 30 overwintering bison could be changed accordingly. However, he also concluded that the range could never support a very large bison 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 the hunt as a sport hunt during its 1986 meeting. No additional changes in regulations occurred in 1987.

CONCLUSIONS AND RECOMMENDATIONS

The Chitina Bison Herd has shown little growth since its initial increase following the transplant. Although no studies have been conducted to determine factors limiting herd expansion, it appears that current harvest rates, coupled with existing natural mortality losses, are sufficient to stabilize the herd. I consider the human harvest of adult cows, both legal and illegal, to be the most important factor limiting herd growth. On reasonably good range, cow bison typically do not produce a calf until they are 4 years of age; this age may even be prolonged if range conditions are more marginal or winters are severe.

I recommend the population objective for the Chitina herd be increased from the current minimum of 50 adult bison to 75. The Chitina bison range probably cannot support a herd larger than 100-125 bison, because steep mountains surround the area and suitable habitat is limited to the narrow valley floor. Also, there will always be some competition with other ungulates for space and food. After the herd reaches the projected level, an evaluation of the range should be conducted to determine the effect an increased number of bison

has had on available plants. At that time, management plans would be amended in response to the results of the evaluation.

I recommend that the bag limit for the Chitina bison hunt be changed from any bison to bulls only, with 6 drawing permits issued. Population modeling suggests that a harvest of 4 bulls per year, the expected take with 6 permits issued, will allow the herd to expand to about 75 adult bison in approximately 7 to 10 years. The time needed for herd growth would be longer, however, if poaching continues at levels similar to past years.

LITERATURE CITED

Miquelle, D. 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:

Robert W. Tobey
Game Biologist III

SUBMITTED BY:

Lawrence J. Van Daele
Survey-Inventory Coordinator

STUDY AREA

GAME MANAGEMENT UNIT: 11 (13,300 mi²)

GEOGRAPHICAL DESCRIPTION: Copper River

BACKGROUND

The Copper River Bison Herd was started with a transplant 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 Game Management Unit (GMU) 11. These bison eventually moved away from the release 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 1st bison hunt (i.e., registration permit) for the Copper River herd was held in 1964. Since then registration permit hunts have been held in all but 6 years. Hunters have harvested 210 bison from this herd; the average annual harvest has been 12 animals.

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 approximately 5 adult cows to facilitate locating the herd during surveys. 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 Alaska Department of Fish and Game (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 initial expansion in the 1960's (Table 1). Survey data collected between 1981 and 1985 suggested herd numbers declined somewhat from previous levels. Because this herd inhabits an area that is heavily timbered,

Table 1. Maximum numbers of bison observed during aerial surveys of the Copper River Herd in Unit 11, 1950-1987.

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

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

total counts are difficult to obtain. Some yearly variation in population estimates are expected; however, they are attributed to survey conditions rather than actual changes in herd size. Survey data obtained in 1986 and 1987 indicate the herd has grown during the past 2 years.

Population Size:

An aerial survey conducted on 23 June 1987 resulted in a count of 100 bison. Survey techniques included locating the 4 radio-collared bison present in the herd and counting all the animals observed nearby. In addition, transects were flown through the known bison habitat between the Dadina and Chesnina Rivers to count additional bison that had not been located with the radio-collared ones. An extrapolated herd estimate was not made.

Population Composition:

Eighty-three adults and 17 calves were observed during aerial surveys of the Copper River herd during 1987 (Table 1). Calf numbers were similar to the 18 observed in 1986, suggesting that calf production and/or survival during the past 2 years has been greater than that of the previous 5 years (1981-85), when an average of 11 calves were counted. Since the bison counts are usually in June or early July of each year, timing of the surveys was not thought to be an influencing factor of survey results. The decline in calf recruitment observed during the mid 1980's was attributed to a decline in the number of adult bison present in the herd.

Distribution and Movements:

The Copper River Herd inhabits an area bounded by the Dadina River on the north, the Copper River on the west, the Kotsina River to the south, and the Wrangell Mountains to 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 have been observed along the western bank of the Copper River in GMU 13, human disturbance in the Kenny Lake area appeared to be preventing 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 movement to higher elevations along the Dadina and Chetaslina Rivers during the summer to feed on plants.

Mortality

Season and Bag Limit:

The open season for resident and nonresident hunters in GMU 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 9 bison during the 1987 season (Table 2). The harvest was composed of 7 bulls and 2 cows; one of the cows was an adult and the other a yearling. The season was closed by Emergency Order on 24 September, because the desired quota of 8 bison had been exceeded in only 3 days. This was the 2nd consecutive year the season had been closed after only a 2- or 3-day hunt.

Additional mortality attributable to the wounding of bison also occurred during the hunts, but the number of animals lost each year has not been documented. This herd is hunted in heavy timber; although long-range shots are not usually taken, hunters have often shot, when their vision has been obscured, at bison moving through timber. Unless an animal is killed immediately, tracking in heavy timber without snow is difficult, thus contributing to wounding mortality.

Hunter Residency and Success:

There were 55 registration permits issued for the 1987 hunting season, 15 fewer than in 1986. Thirty-two permits were issued to local residents, 22 to nonlocal Alaska residents, and one to a nonresident. Thirty-seven permittees hunted, and the hunter success rate was 24%. Four successful permittees were local residents, while the remaining 5 were other Alaska residents. Because the hunt was closed after only 3 days, all the permittees that hunted averaged slightly under 2.5 days in the field.

Permit Hunts:

An unlimited number of registration permits were issued for the Copper River herd. Permits were available only in Glennallen, and all hunters were required to report hunt results. The hunt may be closed by Emergency Order, if the desired harvest has been reached before the official closure 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.

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

Transportation Methods:

Riverboats were the most popular method of transportation; 79% (22) of all permittees and 78% (7) of the successful ones reported their use. Six other permittees reported using aircraft; two were successful. Aircraft use has declined in recent years because the seasons have closed before 5 October. As part of the permit hunt requirements, use of mechanized vehicles, including aircraft, has been prohibited until 5 October, except on the Copper and Dadina Rivers and 4 designated lakes.

Natural Mortality:

Sources and rates of natural mortality have not been determined for the Copper River herd; one documented cause of mortality, which may be higher than that in other herds, was accidental falls from the steep bluffs that border the Copper River. During the winter bison use the bluffs extensively for feeding. Soil composition of the slopes is predominantly clay, which holds a lot of moisture and freezes hard, creating a steep slide with little, if any, secure footing for the bison.

Habitat

Studies to evaluate plant composition, abundance, and utilization have not been conducted in recent years on the Copper River bison range. Random observations along the flood plain and bluffs, as well as some sedge meadows, suggest heavy use in preferred locations. The lack of evidence of dispersal from the current range suggests bison numbers are not limited by the range.

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, and in 1982 and 1983 the estimated number of overwintering adults was below the management goal. Calf production and survival were somewhat lower during that period also. Some of the observed decline may be attributed to difficult observation conditions that occurred when bison were located in heavy timber, leading to lower counts. During the past 2 years, bison numbers have been increasing; in 1987 the postseason estimate exceeded the management objective of 60 overwintering adults by 14 bison. Calf production and survival also improved over the past 2 years and are twice that observed in 1985.

Bison harvests have been kept fairly low since 1981, mostly as a management response to reduced total counts and an apparent decline in calf recruitment. Between 1978 and 1981 the harvest quota was 15 bison, but since then, it has been reduced to eight. In addition, hunts were not held in 1982 and 1985.

Hunter interest in the Copper River bison hunt has always been high; however, during the past 2 years the overall number of permits issued has been lower than those issued in the late 1970's and early 1980's because the seasons have been closed so early. Undoubtedly, early closures limit hunter participation. Because of restricted access and the heavy hunting pressure on opening day, hunters were crowded together at the more popular hunting spots along the Copper River. The Copper River bison hunt has always been considered a quality experience. The crowding of hunters and early closures, however, have threatened this status.

I recommend the management objective for the Copper River herd be raised from 60 to 90 overwintering bison classified as older than calves. An increase in the number of adult cows in the herd should result in higher annual calf recruitment. If calf recruitment increases, the yearly harvest could be higher. The current management objective appears to ensure maintenance of the herd at a level that can only sustain a yearly harvest of 8 bison. If a number of adult cows are taken, the calf production declines, necessitating season closures for a year or more. Also, with a larger herd, an overharvest of a few animals would have less biological impact on the herd. Increasing the herd would make it less likely that periodic closures of seasons would be needed to rebuild bison numbers.

In addition to increasing productivity of the herd, an increase in herd size will facilitate management of the permit hunt because of an increased allowable harvest. It is difficult to hold a hunt for fewer than 8 bison. The logistical difficulties associated with successful hunters reporting to the ADF&G office in Glennallen within 24 hours of harvesting a bison and ADF&G then notifying all hunters in the field of a closure increase the chances of exceeding the harvest quota. This has been especially true during the past 2 years, when heavy hunting pressure has occurred right from the start on opening day. In past years, hunters have often killed a number of bison early in the season before the hunting pressure drove the bison off the river and into the dense timber. When bag limits were higher, however, the early harvest did not usually result in a closure and the season often ran until officially over because the animals had been more difficult to harvest in the timber. With a higher quota,

the chances of exceeding it in the first few days of heavy pressure would once again decrease.

Current range conditions should not preclude attaining this new population objective, because the range has carried in excess of 90 bison in the past. Average body and blood condition parameters obtained from captured cows suggest adequate nutrition is available. However, a range study to evaluate condition, composition, and utilization of plants is needed. Long-term management decisions concerning this herd should take range conditions into consideration.

To achieve the proposed objective of 90 overwintering adult and subadult bison, yearly harvests should be maintained at the current level of 8 bison/year. Since the herd has increased, this harvest rate should be somewhat below the sustained-yield level to allow for herd growth. If my recommendation to increase the management objective is not acceptable, the 1988 harvest quota will need to be increased so that the current management objective of 60 adults can be maintained.

PREPARED BY:

Robert W. Tobey
Game Biologist III

SUBMITTED BY:

Lawrence J. Van Daele
Survey-Inventory Coordinator

STUDY AREA

GAME MANAGEMENT UNIT: 19C and 19D (18,790 mi²)

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

BACKGROUND

The ancestors of modern bison first colonized North America after migrating from Asia to Alaska over the Bering Land Bridge (Reynolds et al. 1982). Subsequently, 2 subspecies developed: woods bison in Alaska and parts of Canada and plains bison in Canada and the contiguous United States. Bison were once the most abundant large mammal in Alaska, but they became extinct about 500 years ago because of changing climatic conditions.

In 1928, 23 plains bison were transplanted from the National Bison Range in Montana to the Delta River. By 1947 the herd had increased to 400 animals and furnished bison for the original Farewell transplant.

The Farewell Bison Herd was established in 1965, following 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 of Farewell bison was in 1972, after aerial surveys revealed that the herd could sustain nominal harvests. Since that time, 15 permit hunts have been administered and a total of 203 bison have been harvested from the area.

MANAGEMENT OBJECTIVES

1. To maintain a minimum population of 200 bison while harvesting the annual increment.

2. To maintain aesthetic hunting conditions.

METHODS

Herd Inventory and Management

On 2 June and 4 July 1987, Fish and Wildlife Protection Officer Charles Beatty and I surveyed the known range of the Farewell bison herd in a Piper PA-18-150 Super Cub. We attempted to locate the previously radio-collared bison but

failed, because expiring radio collars caused the signals to be weak and erratic.

Hunting Management

A drawing-permit hunt in which 827 applicants applied for 40 available permits was held in 1987. The hunt was monitored by telephone and mail contacts with the permittees.

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 bison herd appears healthy and is continuing to increase in numbers. The herd has not expanded its range since 1977, when it colonized the new range created by the Bear Creek Burn.

Population Size:

On 4 June 1987 we found 225 bison during 3.2 hours of count time. On 2 July, 249 bison were counted during 2.7 hours of count time. During the latter census, an additional group of approximately 20 bison was not actually located, but its tracks were observed about 30 km from the nearest counted group. Based on that 2 July census, the Farewell Bison Herd was estimated at approximately 270 individuals (Fig. 1) after calving.

Population Composition:

In July 1987 we found 17% calves in the Farewell Bison Herd (Table 1). Between 1970 and 1987, the Farewell Bison Herd has contained an average of 19.5% calves (Table 1, Fig. 2). Although calves are easily discerned from older animals, an extended calving season may preclude an accurate calf count because some calves may have been born after surveys had been conducted. In Wood Buffalo National Park, a calf crop of 20-25% is expected during the latter part of June and early July (Fuller 1966). Sex ratios within the herd are not known; however, in Wood bison there is usually a slight preponderance of males (Fuller 1966) at birth.

Distribution and Movements:

Movement patterns of the Farewell Bison Herd during 1987-88 were similar to those that have been documented since 1977 (i.e., Bear Creek Burn). During the winter, the herd has been

Table 1. Population size, numbers of calves, and numbers of bison harvested from the Farewell Bison Herd from 1965 to 1987.

Year	Herd size	No. calves (%)	No. harvested (%)
1965	17	4 (24)	-
1966			-
1967			-
1968	45	14 (31)	-
1969			-
1970	78	19 (24)	-
1971	75	18 (24)	-
1972	75	1 (1)	10 (13)
1973	75	20 (27)	-
1974	85	14 (16)	7 (8)
1975	106	21 (20)	10 (9)
1976	111	23 (21)	12 (11)
1977	116	25 (22)	16 (14)
1978	114	26 (23)	13 (11)
1979	123	19 (15)	30 (24)
1980	123	29 (24)	7 (6)
1981	129	27 (21)	11 (21)
1982	157	31 (20)	10 (6)
1983	154	16 (10)	8 (10)
1984	190	46 (24)	8 (4)
1985	223[a]	41 (18)	20 (9)
1986	(245)*		19 (8)
1987	270	44 (16)	21 (8)

[a] Extrapolated estimate.

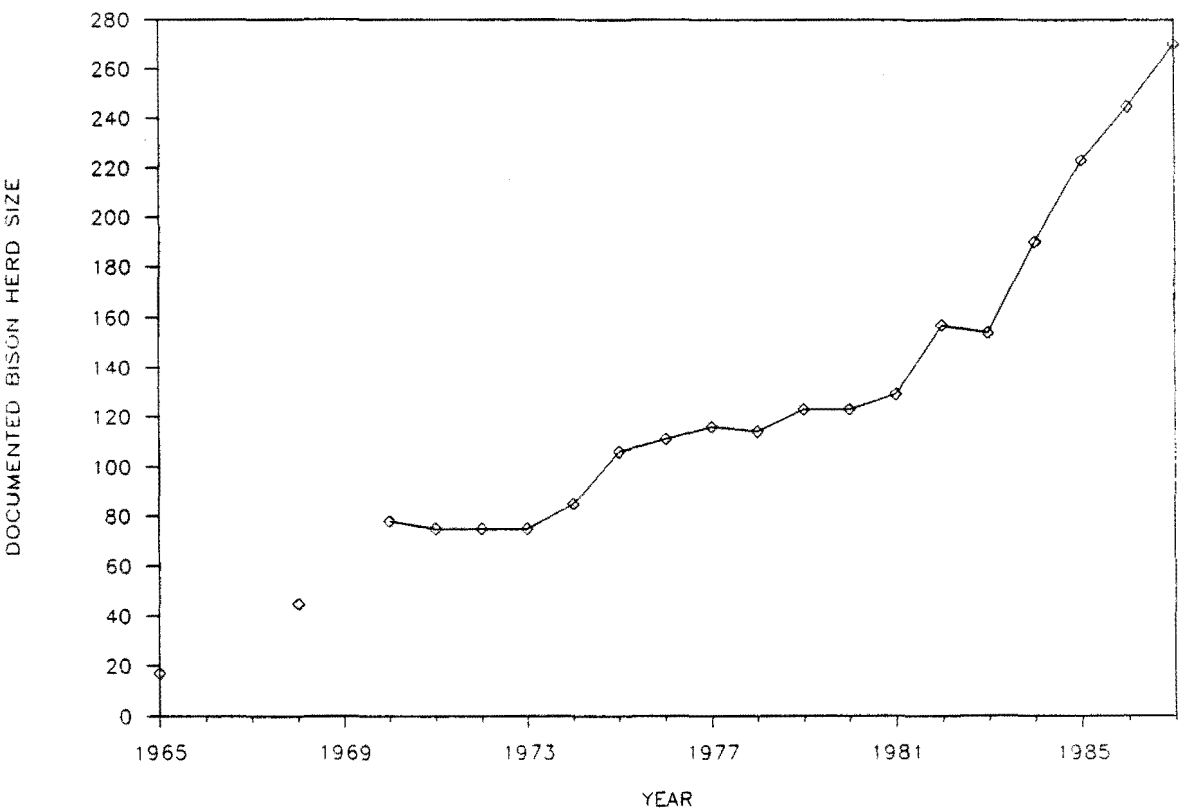

Figure 1. Pre-hunt documented herd size of the Farewell Bison Herd from 1965 to 1987 based on aerial censuses.

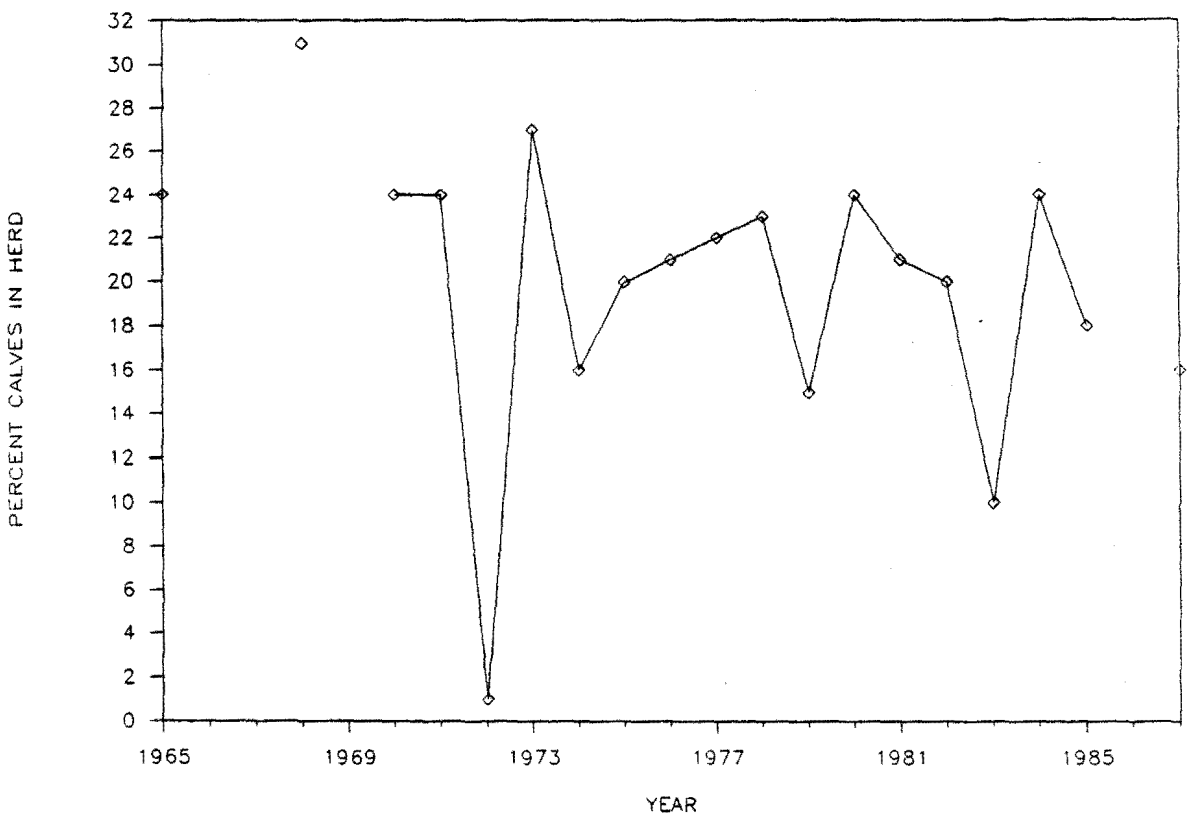

Figure 2. Percent calves in the Farewell Bison Herd from 1965 to 1987 based on aerial surveys conducted in June and July of each year.

typically dispersed throughout the Farewell Burn and surrounding ranges. Small groups (10-35 animals) utilize windswept grass and sedge forage in these areas. During summer, the subgroups begin moving onto the floodplain of the South Fork Kuskokwim River, proceeding 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 the Ptarmigan Valley (i.e., between the headwaters of the South Fork Kuskokwim River and Happy River in Unit 16). Bison have also been seen 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 will be issued.

Human-induced Mortality:

In 1987, 7 female and 13 male bison were legally harvested and 1 bison of unknown sex was illegally harvested. The total harvest represented 7.8% of the postcalving herd. Since 1974 the annual harvest has averaged about 9.5% of the total prehunt population, although since 1980 the harvest has not exceeded 9% (Table 1, Fig. 3).

Hunter Residency and Success:

The majority of applicants for the 40 permits were from the Anchorage vicinity (i.e., 538 applicants, 65%) (Table 2). The number of applicants from communities on the road system was 689 (83% of the total). Nonresidents accounted for only 1% of the applicants. Sixty-seven residents of Unit 19 applied. Thirty-nine of the 40 successful applicants were Alaskan residents (Table 2). The single nonresident who obtained a permit did not hunt, and an additional seven of the resident permittees did not go afield. Of the 32 permittees who actually went afield, 20 (66%) harvested a bison.

Harvest Chronology:

Mean number of days afield was 4.7 for successful hunters and 6.9 for unsuccessful hunters. Success rates also varied by hunt period. Hunters in the 1st period (1-10 Sep) had a success rate of 55% (5 of 9); 2nd-period (11-20 Sep) hunters

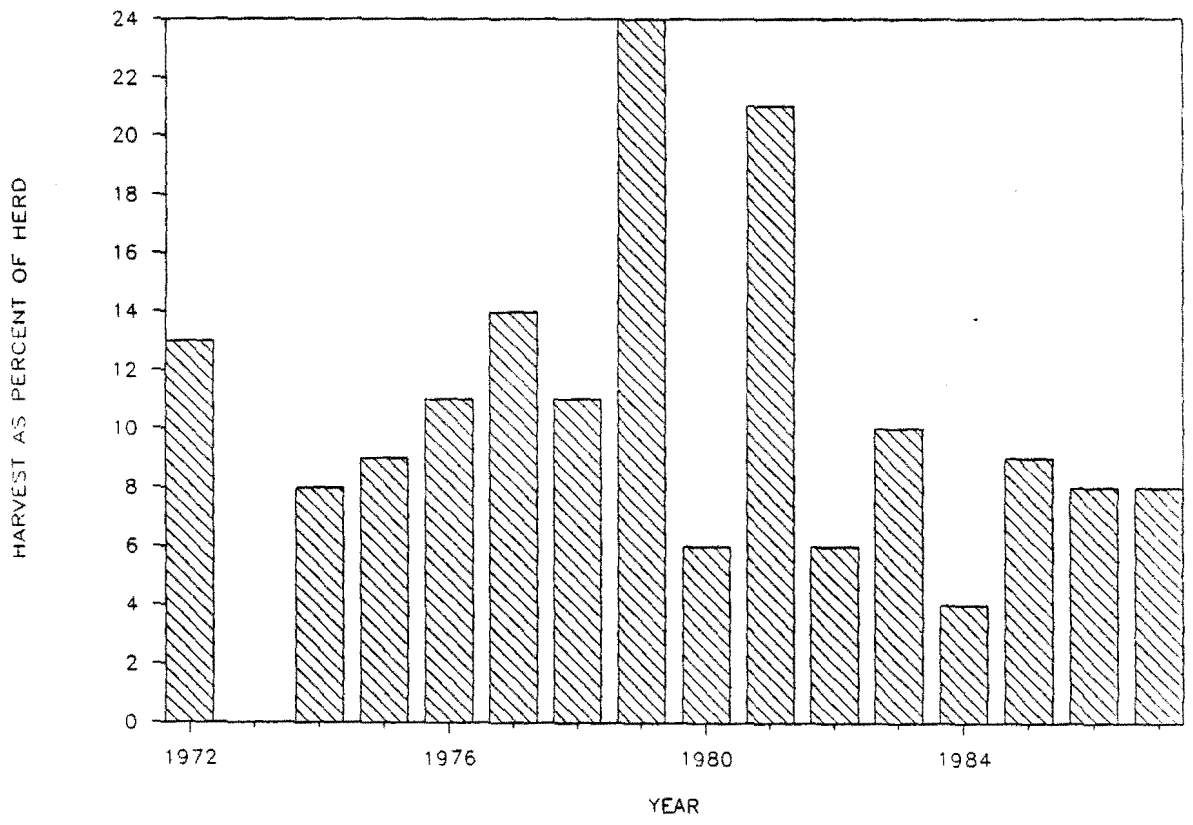

Figure 3. Annual harvest rates of the Farewell Bison Herd expressed as a percentage of the total pre-hunt population size, 1972-1987.

Table 2. Residency locations of permit applicants and successful permit winners for the 1987 Farewell bison hunt.

Residence	Applicants		Permittees	
	No.	%	No.	%
Unit 19	67	8.1	3	7.5
Other Alaska rural areas	34	4.1	0	-
Kenai Peninsula	70	8.5	2	5.0
Anchorage and vicinity	538	65.1	31	77.5
Other communities off the road system	18	2.2	0	-
Other road system communities	81	9.8	3	7.5
Nonresidents	9	1.1	1	2.5
Unknown residency	10	1.2	0	-
Total	827	100.1	40	100.0

were successful 71% of the time (5 of 7). Six of seven 3rd-period (21-30 Sep) hunters (86%) were successful, and 44% (4 of 9) of 4th-period (1-10 Oct) hunters were successful.

Permit Hunt:

Successful permittees were assigned one of four 10-day hunting periods based on their randomly selected permit numbers; they were allowed to hunt only during that period. However, hunters were contacted by phone or mail well in advance of their assigned hunting period and were given an opportunity to switch periods if scheduling conflicts prohibited them from participating during their assigned time. Sixteen of the 40 permittees (40%) switched to a different time period; however, no more than 10 hunters were assigned to any 10-day hunt period. This assured uncrowded hunting conditions required by the 2nd management objective.

Hunters were required to check in at McGrath, 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).

Transport Methods:

One hunter, a resident of Nikolai, used a riverboat. All others used aircraft for primary access. Once hunters were in the hunt area, many (14 of 32, 44%) used small ATV's (three- and four-wheelers) that they brought in by air. Two (6%) hunters used inflatable rafts to hunt bison.

Harvest Locations:

Harvest locations were largely confined to the Bear Creek Burn and adjacent stretches of the South Fork Kuskokwim River. No harvest locations were reported upriver beyond the Rohn River.

Horn Trophy Sizes:

As part of the questionnaire, permittees were asked to provide measurements for computing the Boone and Crockett score; they were provided a form where measurements could be reported. Cow bison horn scores ranged from 55.13 to 79.25 Boone and Crockett points, with a mean of 63.9 points ($\underline{n}$ = 5). Bulls ranged from 95.5 to 128.25 points, with a mean score of 106.82 points ($\underline{n}$ = 13). Using these rough, unofficial scores, two of the bulls harvested had sufficiently high scores to qualify them for entry into the Boone and Crockett record books.

Natural Mortality:

With the probable exception of high calf mortality (or perhaps low production) that occurred in 1972, natural mortality appears to be low in the Farewell Bison Herd. Annual harvest since 1976 has averaged 9.5% of the prehunt population, and the mean annual herd increase has been about 10%. These figures combined 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 the summer range are available, heavy use is evident. Measurements of range use should be conducted during the summer of 1989.

Enhancement:

In cooperation with the Alaska Department of Natural Resources, a cold burn is being planned for the spring of 1989. It will be conducted on a portion of the 12-year-old Bear Creek Burn, where grass and sedge growth appear to be declining and native black spruce reinvading. Plans are not yet firm on timing and extent of the burn, but the intentions are to provide nutritious winter forage for bison and stimulate browse production for moose.

Game Board Actions and Emergency Orders

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

CONCLUSIONS AND RECOMMENDATIONS

Because of the apparent low natural mortality experienced by the Farewell Bison Herd and the great interest in bison hunting, the population can be effectively managed by varying the number of drawing permits allocated. 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 winter forage for bison was increased. Presently, it appears that the burn area provides suitable

habitat for wintering bison, but the limited summer habitat in the headwaters of the drainages may have become overbrowsed. Before the herd is allowed to continue its present growth, surveys should be undertaken to estimate carrying capacity of the summer range.

With negligible natural mortality and good recruitment experienced by the herd, stabilizing the herd will require harvest of about 50 bison in 1989. This assumes age and sex classes are taken in approximately the same proportion as in present harvests. Therefore, I recommend that a variable ceiling on the number of drawing permits be increased to 80. This would effectively increase the annual harvest to approximately 40 bison.

Costs of administration and monitoring of the Farewell bison hunt were estimated at about $700 for 1987. This estimate does not include personnel time spent at the Farewell station, nor does it include prehunting census work. Although it could be done less expensively, I believe the costs are easily justifiable 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 certainly reflects positively on the Department. I feel the hunt should continue to be directly administered from McGrath.

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APPENDIX A. 1987 Farewell Bison Hunter Survey

1987 FAREWELL BISON HUNTER SURVEY

NAME:_____

ADDRESS:_____

_____

PHONE NUMBER:_____

HUNT PERIOD:_____THROUGH_____1987
DID YOU HUNT BISON?_____(IF NO, PLEASE STOP HERE)

DATES HUNTED:_____THROUGH_____1987
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?_____
DID ANY OF THE BISON HAVE COLLARS ON?_____
DID YOU HUNT ANY OTHER BIG GAME WHILE ON YOUR BISON HUNT?
_____
DID YOU KILL ANY OTHER SPECIES WHILE ON YOUR BISON HUNT?
_____
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?_____
DID IT 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	_____	

COMMENTS:_____
_____
_____
_____

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

STUDY AREA

GAME MANAGEMENT UNIT: 20D (5,600 mi²)

GEOGRAPHICAL DESCRIPTION: Central Tanana Valley near Delta Junction

BACKGROUND

The ancestors of modern bison first colonized North America after migrating from Asia to Alaska over the Bering Land Bridge (Reynolds et al. 1982). Subsequently, 2 subspecies developed: woods bison in Alaska and parts of Canada and plains bison in Canada and the contiguous United States. Bison were once the most abundant large mammal in Alaska, but they became extinct about 500 years ago because of changing climatic conditions. Bison were known to occur along the Delta River near Delta Junction before their extinction in Alaska (D. Guthrie, pers. commun.).

In 1928, 23 plains bison were transplanted from the National Bison Range in Montana to the Delta River. By 1947 the herd had increased to 400 animals. Hunting began in 1950 and is currently 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 and adjacent to the Delta Agricultural Project. The purposes of the DJBR were to perpetuate free-ranging bison by providing adequate winter range, alter seasonal movements of bison, and thereby 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 generated by the increase in fees were dedicated to 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.

Bison damage to farms in the Delta Agricultural Project was significantly reduced in 1985, following the 1st substantial forage development on the DJBR. Forage development continued in 1986, and no fall depredations occurred in that year or during this reporting period. Management of the Delta Bison Herd also includes maintaining a stable, productive herd and providing the greatest sustained opportunity to participate in hunting bison.

MANAGEMENT OBJECTIVES

To prevent bison depredation in the Delta Agricultural Project until 1 October annually.

To maintain a precalving population of 275-325 bison and a herd composition of 35-65 bulls:100 cows.

METHODS

DJBR Management to Prevent Depredation

Additional bison forage was developed on the DJBR by planting cleared acreage with either pure stands of nugget bluegrass or "arctared" fescue grass seed or a cover crop of weal barley. Bluegrass and fescue were planted with 5 lb/acre of seed. Barley cover crops were planted with 40 lb/acre of seed. All plantings were fertilized by broadcasting 120 lb/acre of urea and incorporating it into the soil prior to seeding and drilling 110 lb/acre of 11-55-0 fertilizer and 100 lb/acre of 0-0-30 into the soil with the grass seed.

To attract bison to the DJBR in the fall, established perennial grasses were fertilized with either 398 lb/acre of 120-60-30 to produce a high-quality fall forage or 175 lb/acre of 60-30-0 to provide a minimum application of fertilizer for winter forage. Additional bison attractants were two 660-gal stock tanks that were kept full of water and numerous 50-lb trace element salt blocks placed at various locations.

A barley-planting trial was conducted using no tillage-seeding techniques to determine if barley could be planted less expensively and still produce forage in sufficient quantity and quality to hold bison on the DJBR during the fall. Seed was drilled into the soil without disking. Seventy-one acres were planted with 40 lb/acre of seed. This acreage received 175 lb/acre of 60-30-0 broadcast, and 101 lb/acre of 30-15-8 were drilled with the grass seed.

On 20 July, 4 cow bison were immobilized and radio-collared to facilitate monitoring herd movements. Bison were immobilized

with 8 cc M99 (etorphine hydrolchloride, 1 mg/cc, Lemmon Co., Sellersville, PA) mixed with Wyadase (hyaluronidase, Wyeth Lab., Philadelphia, PA), and 2 cc Rompun (xylazine hydrochloride, 100 mg/cc, Haver-Lockhart, Shawnee, KA) loaded into a 10-cc Palmer Cap-Chur dart. Bison were darted from an U.S. Army UH-1 helicopter. Blood samples were collected from each bison.

Herd Management

Herd population size was estimated by aerial photo censuses on 17 and 27 July and 15 and 16 September. July counts were conducted while the herd was on the Delta River. September counts were conducted on the DJBR. Three counts were conducted with a Piper Super Cub, and one was conducted with an Army UH-1 helicopter. Bison were located either visually or 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 on ASA-400 print film. The population size is considered to be the maximum number of bison counted during any one photo census.

Fall bison movements were monitored by locating the 15 cow bison that had been radio-collared. General locations of bison were obtained from the ground by using a single antenna and listening for peak signal strengths. Precise locations were obtained from the air by mounting a pair of antennas on an aircraft and flying over the fall range.

A serological survey was conducted by requiring all bison hunters to collect 2 vacutainers of blood from their harvested bison. Vacutainers were centrifuged, and serum was removed by aspiration. Sera were kept frozen until tested by the National Veterinary Services Laboratories (USDA, Ames, IA) for the following diseases: epizootic hemorrhagic disease, bluetongue, infectious bovine rhinotracheitis, bovine viral diarrhea, parainfluenza 3, brucellosis, and Q fever.

When bison hunters checked out after their hunt, they were asked to complete a questionnaire specifying date of harvest, location of harvest, how many days they hunted, number of shots required, caliber of weapon and size of bullet, how much money they spent in Delta Junction, and 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 horn annuli. The horns on large bulls were measured according to the Boone and Crockett Club scoring system.

RESULTS AND DISCUSSION

Population Status and Trend

During this reporting period, the Delta Bison Herd was near the upper limits of its population size that had been set by Department staff (i.e., management objective); however, the Delta bison herd has the capability to increase rapidly beyond this management objective, and the actual population size is regulated by adjusting the annual harvest by hunters.

Population Size:

The Delta bison herd size was estimated to be 396 bison in September 1987. The following population estimates were obtained on 3 other photo-census flights: 27 July, 364; 15 September, 396; and 16 September, 337. The 16 September census was conducted in an Army UH-1 helicopter; it was not a thorough census because of fuel limitations. A 17 July photo census was not usable because of poor photograph quality.

In the spring of 1988 the precalving population was estimated to be 337 bison, based on harvest, estimated wounding loss, and other overwinter mortality. The following formula was used to calculate the precalving population:

precalving population size	equals	postcalving population size	minus	harvest	
minus	wounding loss	minus	overwinter mortality		

or 337 = 396 - 49 - 5 - 5

The precalving population estimate (i.e., 337) is the highest one since 1983 (Table 1), exceeding the population objective by 12 bison.

Estimates for wounding loss and overwinter mortality used to calculate the 1988 precalving population are different from those in previous reports. David Johnson, the ADF&G Game Biologist who authored earlier S & I Bison reports, estimated that wounding loss from hunters and overwinter mortality resulting from natural causes were equal to 3% and 5% of the herd size, respectively. Based on those percentages, the 1988 precalving populatin estimate was 320 bison. There is no accurate or precise estimate of annual wounding loss or other mortality factors for the Delta Bison Herd.

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

Year	Precalving population estimate	Postcalving population estimate
1983	355	360
1984	300	356
1985	285	378
1986	300	361
1987	275	396
1988	337	--

Population Composition:

No composition data were collected during this reporting period. Table 2 lists composition data for the previous 6 years. Trends in population composition reflect adjustments made by managing hunter harvest; they do not reflect natural biologial 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 typically ranges along the Delta River between Black Rapids Glacier and the Washington Range on the Fort Greely Military Reservation. During July and August, the herd moves north along the Delta River to the mouth of Jarvis Creek. Sometime between late July and early September, the herd migrates east, crossing the Richardson Highway near Allen Army Airfield, and moves to the DJBR.

Intensive monitoring of herd movements began on 4 August, in anticipation of herd migration to the DJBR, and continued through 6 October. Radio-collared cows were located 17 days in August, 15 days in September, and 1 day in October.

Bison movements from 11 to 25 August were characterized by repeated movements between the Delta River and the DJBR. For example, cow No. 851 was observed moving between the Delta River and the DJBR 4 times in 20 days. Most radio-collared bison and presumably the majority of the herd appeared to be on the Delta River on 11th and 14th , the morning of 17th, and possibly 21st of August. They were on the DJBR on 14th, the evening of the 17th, 19th, and 25th, and on the 26th of August (Table 3).

The herd remained on the DJBR from approximately 25 August until at least 29 September; there was 1 known exception. A group of about 50 bison, including cow No. 851, was observed leaving the DJBR on the evening of 15 September. They departed the Panoramic Fields and headed north across the Alaska Highway until they encountered a fence surrounding Tract F in the Delta Agricultural Project. When observations ended at dark, they were still outside the fence. Cow No. 851 and presumably the remainder of the group were located on the DJBR again at 1600 hours the next day. Between 29 September and 6 October, most of the herd left the DJBR and moved into the Delta Agricultural Project.

The herd may have left the DJBR to search for unfrozen drinking water. Most open water on the DJBR, including the stock tanks, froze between 29 September and 6 October. After

Table 2. Composition data for the Delta bison herd from 1981 through 1987.

Year	Bulls: 100 cows	% Bulls	Yrlg bull: 100 cows	% Yrlg bull	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						

Table 3. Locations of radio-collared (RC) cow bison on the Delta River and the Delta Junction Bison Range (DJBR) from 11 through 26 August 1987.

Date	No. RC cows on Delta River	No. RC cows on DJBR	Unk cows
11 August	11	0	4
13 August	0	14	1
14 August	9	0	6
17 August a.m.	8	1	6
17 August p.m.	0	10	4
18 August	0	15	0
21 August	6	2	7
25 August	0	9	6
26 August	0	14	1

the herd left the DJBR, they were frequently located near open water along the Gerstle and Tanana Rivers.

During the winter months, the majority of the herd was located in the Delta Agricultural Project; however, groups of bison frequently used the DJBR. Some bison began leaving the winter range during March and April and were frequently located on the Texas and Washington Ranges at Fort Greely. Sections of the Texas Range used by bison had extensive areas of native grasses. Bison used the Texas and Washington Range areas during March and April and then returned to the floodplains of the Delta River.

Mortality

Season and Bag Limit:

The resident and nonresident 1987 bison hunting seasons were open from 7 October 1987 through 31 March 1988. Participation in the hunt required drawing a lottery permit for bulls (hunt No. 403) or cows (hunt No. 404). Thirty-five permits were issued for hunt No. 403 and 15 permits were issued for hunt No. 404. The bag limit is 1 bison every 5 years. The following requirements applied to both permit hunts:

1. Permittees must attend an orientation course before hunting.

2. Permittees were assigned specified time periods for hunting, determined by the order their permit was drawn.

3. Rifles used by permittees must fire a 200-grain bullet with 2,000 ft/lb retained energy at 100 yards. Bows must comply with 5 AAC 92.075(4). Crossbows are prohibited. Certain muzzleloaders may qualify.

Human-induced Mortality:

Hunters killed 37 bulls and 12 cows during the 1987-88 hunting season (Table 4). Two bulls were mistakenly shot by hunters with cow permits.

The average hunt lasted 4.1 days during the 1987-88 season; this represents an increase from the 1986-87 average of 3.2 days. Part of the increased time can be explained by the actions of 1 Delta Junction resident who hunted 25 days for a trophy bison. If this hunter is removed from the data set, the mean hunting time is reduced to 3.6 days.

Table 4. Annual reported harvest of Delta bison, number of hunters, and hunter success from 1982 through 1987.

Year	Bull kill	Cow kill	No. hunters	% Hunter success
1982	35	32	67	100
1983	25	36	61	100
1984	29	19	48	100
1985	16	33	49	100
1986	15	47	64	97
1987	37	12	50	98

The most commonly used weapon during 1987-88 was a 30-06 rifle (Table 5). The mean number of shots required to kill a bison was 2.5 (range = 1-8 shots). Surprisingly, hunters using 30-06 rifles required fewer shots to kill bison than hunters using larger calibers.

In addition to the annual reported harvest, approximately 10 bison die each year from other human-induced causes: five from wounding loss, three from poaching, and two from other causes (e.g., snares, hit by cars, or from military activities).

Forty and 5 bison were killed in the Delta Agricultural Project and DJBR, respectively; the harvest location for 4 bison is unknown. Most of the bison 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, and hunters were asked not to hunt on the DJBR during the 1987-88 season in an attempt to encourage them to spend more time there during the winter.

The mean age of bison killed by hunters during 1987-88 was estimated to be 3.7 years for bulls (range = 1-7) and 3.9 years for cows (range = 1-6). This indicates a very young age structure in the herd; hunters typically shoot the largest bison out of a group, putting heavy hunting pressure on older animals.

Hunter Residency and Success:

Lottery permits were drawn by 2 local Delta residents, 47 other Alaska residents, and 1 nonresident. Nonlocal residents throughout Alaska received permits, indicating statewide interest for hunting Delta bison. The following number of residents in each community received permits: Anchorage, 11; Fairbanks, 9; Eagle River, 5; Valdez, 4; Wasilla, 3; and Cordova, Delta Junction, and Homer, 2 each. One permit was issued to residents of the following communities: Chugiak, Craig, Glennallen, Juneau, Kenai, Kodiak, Ninilchik, Petersburg, Sitka, Soldotna, and Sterling. The nonresident who received a permit was from Idaho.

Hunter success is so high for Delta bison hunters that little relationship exists between residency and success. Table 4 shows that hunter success has been 97-100% for the last 6 years; the 1 unsuccessful hunter during 1987-88 was from Anchorage.

Permit Hunts:

For hunts Nos. 403 and 404, 6,4343 applications were received during 1987 (Table 6). This is slightly less than the 6,585 applications received in 1986.

Table 5. 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
30-06	13	1.8
300 Winchester Magnum	12	2.8
338	9	2.3
375	6	2.8
300 Weatherby	2	2.0
375 Weatherby	1	8.0
300 H & H	1	4.0
9.3 X 62	1	1.0
340 Weatherby	1	4.0
8 mm Remington Magnum	1	3.0

Table 6. Number of applications received for Delta bison hunts 403 and 404 from 1977 through 1987.

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	

The number of applicants declined after the 1985 Tier II hunt, even though the number of applications had increased steadily from 1977 through 1984. In 1985, 8,931 applications had been received when the Board of Game declared the Delta bison hunt a Tier II subsistence hunt. All 8,931 applications were returned to the applicants. Only administratively qualified subsistence hunters for Delta bison were eligible to reapply, and only 665 applications were received during the 2nd application period. The reduction in applications after 1985 may persist because some people still think the Delta bison hunt is a subsistence hunt. In 1986 the Alaska Legislature exempted bison from the subsistence priority.

The DJBR may be losing substantial revenues, if potential hunters mistakenly assume the Delta bison hunt is still a subsistence hunt. If the number of applicants from 1985 to 1987 had remained steady at the 1984 rate of 11,276, one-half of the application fees would have generated $56,380 annually for DJBR management. However, the number of applications following Tier II regulations has averaged only 6,500 (Table 6) and generated approximately $32,500 annually in DJBR management funds. If the reduced number of applications is a result of declaring Delta bison a subsistence species for 1 year, that action has resulted in approximately $71,640 of lost revenue for the State and the DJBR since 1985.

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

Harvest Chronology:

Bison were harvested during 2 distinct periods within the 26-week hunting season. Sixty-nine percent of the harvest occurred during the first 7 weeks; 4-8 bison were killed each week from 7 October through 11 November. The harvest rate declined to one in week No. 8 and two during week No. 9. No bison were killed during week Nos. 10-18 (9 Dec-7 Feb). Ten bison, totaling 20% of the harvest, were killed during week Nos. 19-25 (13 Feb-28 Mar). A significant number of permittees hunted late in the season for a variety of reasons: (1) failure to kill a bison earlier, (2) unable to hunt earlier, or (3) hunting for a trophy animal and were being selective.

Weather also influences harvest chronology. Most bison are killed early in the season when temperature and day length are conducive to hunting. By late November, short days and cold temperatures make it very difficult to hunt. Hunting resumes again in mid-February when days are longer.

Transport Methods:

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

Natural Mortality:

Natural mortality has not been quantified for the Delta bison herd; however, it is probably very low. There are no records of predation on Delta bison, even though wolves, grizzly bears, and black bears occur in the area. The herd is not food limited, and weather rarely causes mortality.

The greatest potential for mortality to Delta bison is diseases 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 show that Delta bison are generally free of most diseases they have been tested for, except parainfluenza 3 (PI-3) (Table 7). The occurrence of PI-3 has increased from 0% prior to 1977 to 100% in 1984. PI-3 was probably introduced into the bison herd from domestic cattle (ADF&G files). The severity of the infection may range from mild to severe, but the death rate is usually low. The effects of PI-3 on bison are decreased vigor, low weight gain, and increased susceptibility to other diseases. Perhaps the most important implication of PI-3 in Delta bison is the apparent occurrence of disease being transmitted from livestock to bison. Measures should be taken to minimize this possibility.

Economic Survey of Bison Hunters:

Bison hunters reported spending an average of $329 in Delta Junction. This is a slight increase from the $290 reported during the 1986-87 season. Most money was spent on lodging ($106), followed by gasoline ($71), meals ($56), groceries ($49), and miscellaneous expenses ($45).

Table 7. Serum antibody prevalence for infectious diseases in Delta bison from 1984 through 1988. Table presents number samples tested positive/number samples tested.

Disease	1984	1985	1986	1987	1988
Infectious bovine rhinotracheitis	0/40	0/5	0/31	0/37	0/10
Bovine viral diarrhea	0/35	0/8	1/31	0/37	0/10
Parainfluenza 3	41/41	28/29	28/31	23/37	9/10
Epizootic hemorrhagic disease	0/42	0/28	0/31	0/37	0/10
Bluetongue	0/40	0/29	0/31	0/37	0/10
Q fever	1/6	0/27	0/28	0/33	0/6
Brucellosis	0/39	0/0	0/30	0/37	0/10

When asked how much money they would pay for a bison harvest tag if one were required, 65% of the hunters reported they would spend $100 or more (Table 8). Three hunters said they would spend $500. It is apparent that hunters are willing to pay additional fees to hunt Delta bison.

Habitat

Assessment:

Original DJBR development plans called for 4,000 acres of land to be cleared and planted. This plan was reassessed this year, and it was determined that no additional acreage would be cleared in 1987 for the following reasons:

1. The DJBR currently has 2,800 acres of cleared land that should provide sufficient fall forage to hold bison on the DJBR, if the forage is adequately maintained.

2. The DJBR should have enough winter forage to support 375 bison, if the fields are maintained at a sufficient level of forage production.

3. Bison are not restricted to the DJBR for winter forage, because farms in the Delta Agricultural Project are not being fenced as predicted in 1983.

4. Farm land being planted to perennial grasses and placed into the Conservation Reserve Program will be available as bison winter forage for the next 10-15 years. About 9,000 acres are currently in the program; another 5,000-7,000 acres may be eligible for the program in the future.

5. Clearing and planting cost about $300 per acre. Any significant additional clearing and planting will require major changes in the planned expenditure of remaining DJBR Capital Improvement Project (CIP) funds.

6. The most effective deterrent of bison depredations in the next 10-15 years will be relatively fewer acres of high-quality forage, as opposed to more acres of low-quality forage. Maintaining DJBR fields is very expensive, and future management of the 2,800 acres currently in production will exhaust anticipated funds. Clearing more acreage will place an added burden on DJBR management funds.

Grasses planted on the DJBR in 1985-86 were a mixture of nugget bluegrass and "arctared" fescue. Seed was mixed together at planting, because it was not known which seed

Table 8. The 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	5
25	5	300	1
50	7	350	0
100	20	400	0
150	1	450	0
200	0	500	3

would become established on DJBR soils and be most attractive to bison and there was not sufficient time to answer this question by experimentation. Current evaluation indicates that both grasses have become established on the DJBR. However, bluegrass produces higher-quality fall forage than fescue, and bison prefer bluegrass in the fall. On the other hand, fescue retains its nutrient qualities in the winter better than bluegrass and produces higher quality winter forage. Also, in mixed fields, it appears that fescue will probably out-compete and replace bluegrass; therefore, mixed fields of bluegrass and fescue will probably revert to homogeneous stands of fescue over time.

Rather than planting a mixture of bluegrass and fescue in 1987, it was decided to plant homogeneous fields of each. This will allow the 2 grasses to be managed differently and should ultimately provide the highest possible fall and winter forage to attract bison to the DJBR.

Enhancement:

In the Panoramic Fields on the DJBR, 770 acres of established perennial grasses were fertilized. Approximately 214 acres of bluegrass were fertilized with 398 lb/acre of 120-60-30 to produce high-quality fall bison forage. Approximately 556 acres of mixed bluegrass/fescue were fertilized with 175 lb/acre of 60-30-0 to produce winter bison forage. Fertilizer applications were completed on 14 July 1987.

In the Panoramic Fields, approximately 270 acres were planted with bluegrass and a cover crop of barley. Approximately 827 acres were planted in the Gerstle Fields; bluegrass was planted on approximately 571 acres, of which 59 acres had a cover crop of barley, and an "arctared" fescue was planted with a cover crop of barley on approximately 256 acres.

The absence of tillage-seeding techniques proved to be an effective method for planting barley. The barley crop that resulted from this procedure had a very low forage yield and was not used by bison.

Game Board Actions and Emergency Orders

There were no emergency orders or actions by the Board of Game pertaining to Delta bison during this reporting period.

CONCLUSIONS AND RECOMMENDATIONS

Even though the Delta bison herd is larger than its precalving population objective of 275-325 bison, there is considerable public interest in allowing the herd to continue growing,

rather than reducing its size. However, there may be political and biological consequences to managing a population that exceeds the current objective.

The 275-325 precalving population objective was approved by both the Department and the public in the Delta Bison Management Plan. Although a significant sector of the public wants the herd to grow, members of the agricultural community are very concerned that the herd may be larger than its population objective. Continued support from the agricultural community is essential to maintaining free-ranging bison and public use of bison on the Delta Agricultural Project. The current herd size objective will be retained, pending reevaluation of the Delta Bison Management Plan. These conflicting views will be addressed during the planning effort scheduled within the year.

There is also a possibility that bison summer range along the Delta River will not support a herd larger than the current population objective; therefore, it is important to manage the herd within the limits of the population objective for both political and biological considerations. This should be accomplished by issuing sufficient numbers of permits to reduce the herd to a precalving population of approximately 275 over the next 3 seasons.

No composition data were collected during the 1987-88 reporting period, so it is impossible to determine if the objective of 35-65 bulls:100 cows was met. However, this objective has been met each year since 1982, and it is assumed that current population composition is within the specified range.

The objective to manage bison forage on the DJBR to prevent bison depredations in the Delta Agricultural Project until 1 October was accomplished for the 2nd year in a row. If this objective is to be met in the future, 2 factors must be addressed. First, the DJBR is scheduled to "sunset" in August 1989. The legislative sunset clause must be extended or repealed, or the DJBR will terminate and bison forage development and management will cease. This will be detrimental to the future of the Delta Bison Herd and to farms in the Delta Agricultural Project. Second, staff must be provided in the form of a DJBR manager. The DJBR is 90,000 acres in size and has a large budget that must be managed. It is not possible for the Delta area biologist to manage the DJBR adequately without neglecting other duties.

The following work goals are recommended for 1988-89:

1. Continue the drawing permit hunts.

2. Adjust the number of permits to achieve a precalving population of 275-325 bison and a ratio of 35-65 bulls:100 cows within the next 3 years.

3. Continue DJBR development with CIP funds. Development should include planting additional perennial grasses, if needed, constructing a trail system to connect the Gerstle and Panoramic Fields, improving water sites, constructing a building for equipment storage, acquiring farm equipment, and managing existing perennial grasses to maintain high-quality forage on at least 500 acres in the fall.

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. Plan a study to investigate the carrying capacity of bison summer range along the Delta River.

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Federal Aid Project
funded by your purchase of
hunting equipment