Bison
Management Report
of survey-inventory activities
1 July 2001–30 June 2003

Cathy Brown, editor
Alaska Department of Fish and Game
Division of Wildlife Conservation

Photo by Riley Woodford, ADF&G

Funded through
Federal Aid in Wildlife Restoration
Grants W-27-5 and W-33-1, Project 9.0
December 2004

STATE OF ALASKA

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Please note that population and harvest data in this report are estimates and may be refined at a later date.

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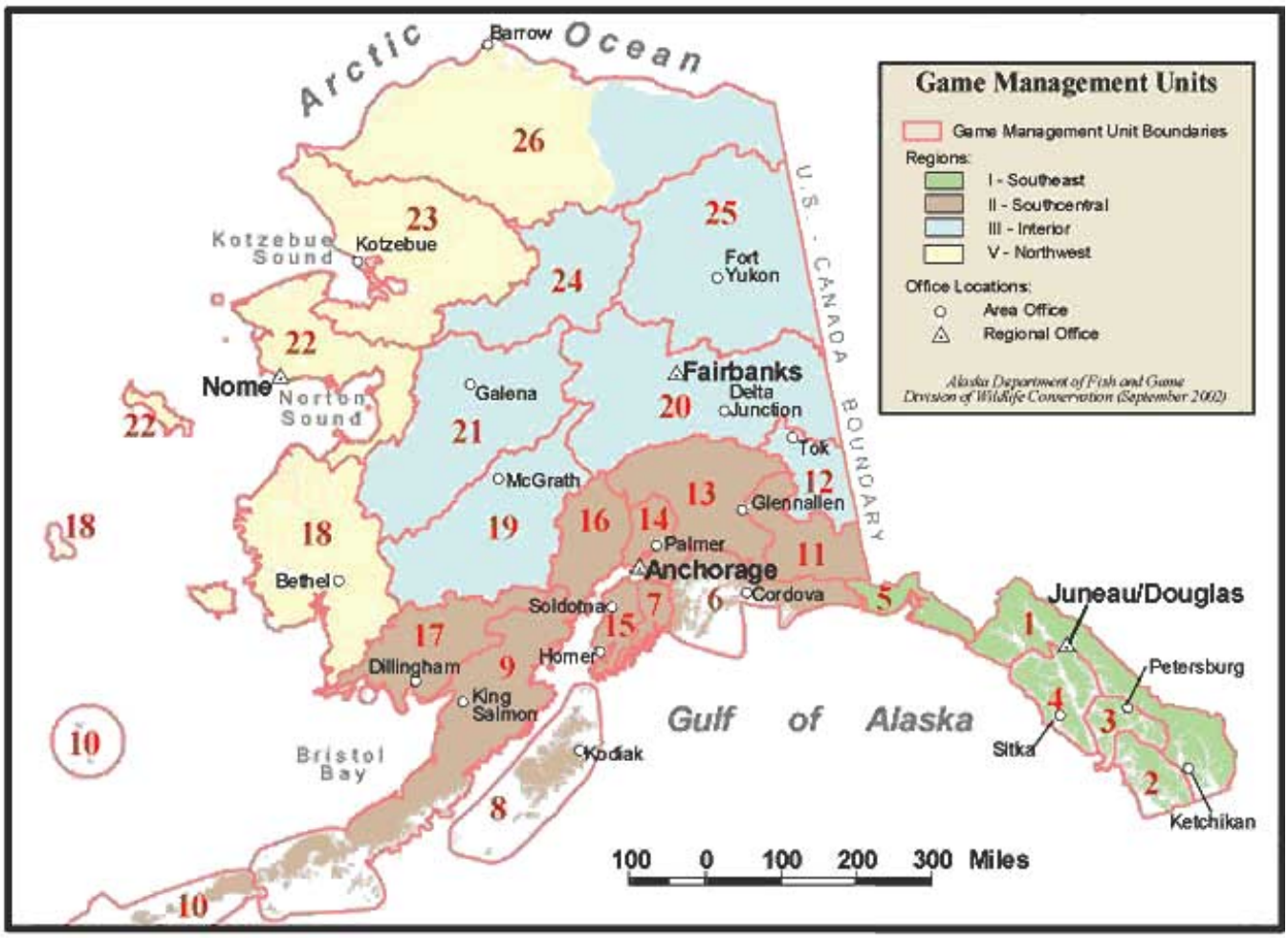
If this report is used in its entirety, please reference as: Alaska Department of Fish and Game. 2004. Bison management report of survey-inventory activities 1 July 2001–30 June 2004. C. Brown, editor. Juneau, Alaska.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BISON MANAGEMENT REPORT

From: 1 July 2001
To: 30 June 2003

LOCATION

GAME MANAGEMENT UNIT: 11 (12,784 MI^2)

Unit 11 – Copper River Herd – Dadina River to the Kotsina River

BACKGROUND

The Copper River Bison Herd originated from animals relocated to Delta Junction, Alaska, from the National Bison Range in Moise, Montana, in 1928. In 1950, 5 bulls and 12 cows were moved from the Delta herd to the Nabesna Road in northern Game Management Unit 11. These bison moved away from the release site, and by 1961 they had moved into the Dadina and Chetaslina rivers where they remained. The herd has numbered as many as 120. Factors controlling herd size are hunter harvest, snow depths and accidental mortality.

The department held the first hunt, by registration permit, for Copper River bison in 1964. Between 1964 and 1988, hunters harvested a total of 217 bison from this herd. The hunt was closed in 1989 by emergency order because of a decline in herd size. Hunting remained closed until 1999 when herd size and productivity increased enough to resume annual harvests.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

Maintain the herd at a minimum of 60 overwintering adults by controlling the number of bison taken by hunters.

METHODS

I conducted aerial surveys to determine composition of the herd following the spring calving period. Between 1984 and 1992, radio collars were used to facilitate finding the herd during spring surveys. Currently there are no radio collars in this herd. Surveys are conducted in early June when bison are most aggregated in open areas along the Copper or Dadina rivers.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Following a period of growth in the 1950s, the Copper River Bison Herd was relatively stable during the late 1960s and 1970s. Numbers declined appreciably in the late 1980s and remained

low until the mid 1990s. The herd started increasing after dropping to an estimated 64 animals in 1995. The 2003 count of 110 total bison was the highest in 29 years. The highest count ever was 119 bison in 1970.

Population Composition

Aerial surveys showed 88 adults and 22 calves in 2003 (Table 1). Calf production/survival has been high the last seven years, averaging 18 calves (Range = 14–22) a year, compared to only 10 calves (Range = 3–14) from 1988–92 when the herd declined. The number of adults in the herd reached 70 in 1997, exceeding the overwintering population objective of 60 adults for the first time since 1992. The management objective of 60 overwintering adults has been met every year since 1997.

Distribution and Movements

The Copper River Bison Herd inhabited 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 to the east. Bison or bison sign seldom were observed north of the Dadina River or south of the Kotsina River. Seasonal distribution included intensive use of the Copper River flood plain and bluffs along the Copper River during winter and spring. During summer the bison moved to higher elevations along the Dadina and Chetaslina Rivers to feed on plants as they green up later in the season. During the late 1970s and the 1980s, there were only occasional reports of bison observed along the western bank of the Copper River in Unit 13. We surmised human disturbance in the Kenny Lake area and hunting pressure prevented range extension to the west. During the 1990s, however, bison were reported grazing in hay and crop fields in the Kenny Lake area. If a large number of bison cross the Copper River and feed extensively on the Kenny Lake farms, a serious conflict with farmers will arise.

MORTALITY

Harvest

Season and Bag Limit. The season for residents and nonresidents in Units 11 and 13D is 1 September to 31 March. The hunt area includes that portion of GMU 11 east of the Copper River, south of the Nadina River and Sanford Glaciers, west of a line from Mount Sanford to Mount Wrangell to Long Glacier, and west of the Kotsina River and that portion of GMU 13D east of the Edgerton Highway. The bag limit is 1 bison every 5 regulatory years.

Board of Game Actions and Emergency Orders. During its spring 1999 meeting, the Board of Game opened the Copper River bison hunt for the first time in 10 years. The hunt was changed from a registration permit to a drawing permit and the hunt area was enlarged to include a portion of GMU 13D.

Hunter Harvest. There were 11 bison (8 bulls, 3 cows) taken during the 2002 season (Table 2).

Permit Hunts. The hunt is administered through drawing permits (DI 454). Between 1999 and 2001, 12 permits were issued annually. In 2002, 20 permits were issued and 778 hunters applied. Permittees were required to indicate prior to 1 September if they would hunt. If not, an alternate was chosen. Permittees reported to the Glennallen office to pick up their permits and receive detailed maps of the hunt area. This gave us the opportunity to emphasize the need to respect

private property rights. Successful hunters reported to the Glennallen office within one day of leaving the field.

Hunter Residency and Success. One local resident reported taking a bison in 2001 and one nonresident was successful in 2002 while the other successful hunters were nonlocal Alaska residents (Table 3). Historically, the hunt was popular with local rural residents, and during the 1988 registration hunt 40% of the hunters were local residents. Changing from a registration to a drawing hunt reduced the level of local resident and nonresident participation because nonlocal Alaskan residents account for the vast majority of the applicants and thus receive the majority of permits.

Harvest Chronology. Six bison were taken in September, 1 in October, 1 in January and 3 in March (Table 4). The season provided approximately 210 days of hunting opportunity. When this hunt was a registration hunt, the last 3 seasons (1986–1988) lasted only 2 or 3 days before the desired harvest was reached and the season was closed by emergency order.

Transport Methods. Historically, riverboats were the most popular method of transportation. This changed in 1999 when highway vehicles were more important (Table 5). In 2000 and 2002 riverboats again became the most important method of transportation for successful hunters, while snowmachines were more important in 2001 (Table 5).

Other Mortality

We monitored winter severity and the potential for winter starvation by recording snow depths at the Dadina Lake snow station. This station is near the bluffs along the Copper River where the herd winters. The last "severe" winter was recorded in 1994, the year before the population bottomed out. Snowfall in 1996 was "moderate," but every winter since has been rated as "mild." Snow depth appears to be a critical factor in overwinter bison survival. In years with deep snow bison mortality increases and calf production/survival declines. Mild winters undoubtedly have been a factor in the herd increase observed during the last few years.

Observations of the Copper River herd suggest accidental death may be an important source of natural mortality to bison (Table 6). Sources of accidental mortality include falling off steep bluffs that border the Copper River and drowning in the river. During winter bison use the bluffs extensively for feeding. These slopes have predominantly clay soils, which hold moisture and freeze. The frozen clay creates a steep slide with little, if any, secure footing for the bison. Drowning mortality is difficult to document because dead bison are swept downriver.

Wolves, black bears and brown bears are relatively abundant on the Copper River bison range. These predators are certainly capable of killing bison, but we have not conducted research into predation rates on Copper River bison.

HABITAT

Assessment

Studies to evaluate habitat conditions have not been conducted on the Copper River bison range. Most of the range is black spruce forest. Bison frequent swamps, sedge openings, grassy bluffs, and river bars of the Copper, Dadina, and Chetaslina rivers. Field observations of these preferred

feeding locations, such as the Copper River bluffs, show evidence of heavy use and reduced forage production.

CONCLUSIONS AND RECOMMENDATIONS

The Copper River Bison Herd started increasing in 1996 and reached a 29-year high in 2003. Calf production/survival the last 7 years has been high, with 14 or more calves observed each year. The number of adult bison has exceeded the management objective of 60 overwintering bison for the last 7 years.

The Copper River bison hunt was opened in 1999 after being closed for 10 years, and was changed from registration to a drawing permit hunt. When it was by registration permit, hunt conditions were poor due to a very small hunt area and overcrowding during the short season. With heavy hunting pressure, the harvest quota was often reached in 1 to 3 days, and the possibility was great that the harvest quota would be exceeded before the season could be closed by emergency order. The Board of Game addressed overcrowding and overharvesting issues by changing the hunt to a drawing hunt. However, hunters receiving a permit were assured a long season with aesthetic hunting conditions.

Access to the Copper River herd is limited to public lands along the Copper River and private farms along the Edgerton Highway. A large portion of the herd's range includes private property not open to bison hunters. As a result, hunters with the best chances of success watch bison movements, then hunt when bison are on open land. To the best of my knowledge, there have been no trespass incidents by permittees. Farmers in the Kenny Lake area have responded favorably to this hunt because it has decreased the incidence of crop loss from bison. Access restrictions eased somewhat in 2001 as a local airboat transporter received access to private land owned by the Chitina Native Village along the Copper River below the mouth of the Tonsina.

Limiting factors on the size of the herd include human harvests, habitat, accidental deaths, snow depth, and possibly predation. In years with good calf production/survival, human harvests were used to keep the herd near the management objective. In years with deep snow, survival and production declined and human harvests were stopped. Accidental deaths from falls and drowning while crossing thin ice have been observed frequently enough to be considered an important cause of mortality. Wolves and bears are relatively abundant on the home range of the Copper River herd, but their impacts have not been researched.

I recommend holding a bison hunt as long as calf production/survival is high enough to maintain 60 overwintering bison. Considering this hunt takes place in the timber where visibility often is poor, limiting this hunt to bulls only would be impractical. Sex identification in the thick timber is difficult and could lead to mistakes and wasted cows should they be taken during a bulls-only season. The percent of cows in the harvest needs to be monitored and yearly harvest quotas adjusted to maintain productivity in the herd. Hunters need to be educated so bulls are selected when possible, leaving adult cows in the herd. No changes in season length or bag limit are recommended, and the number of permits issued next year should be kept at 20, reflecting high productivity and survival in the herd during recent years.

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SUBMITTED BY:

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Management Coordinator

Please cite any information taken from this section, and reference as:
Tobey, R.W. 2004. Unit 11 Copper River Herd bison management report. Pages 1–8 *in* C. Brown, editor. Bison management report of survey and inventory activities 1 July 2001–30 June 2003. Alaska Department of Fish and Game. Project 9.0. Juneau, Alaska.

Table 1 Copper River bison spring aerial composition counts and estimated population size, 1999–2003

Regulatory Year	Adults[a]	Calves	(%)	Bison Observed	Estimated Population Size[b]
1999–2000	68	19	(22)	87	87
2000–2001	73	14	(16)	87	87
2001–2002	89	19	(18)	108	108
2002–2003	86	22	(20)	108	108
2003–2004	88	22	(20)	110	110

[a]Fixed-wing aircraft survey – no composition other than adults and calves.
[b]Extrapolated estimates not calculated from aerial counts.

Table 2 Copper River bison harvest data by permit hunt, 1988–2003 (DI 454)

Regulatory Year	Permits Issued	Applications	Percent Did not Hunt	Percent Unsuccessful Hunters	Percent Successful Hunters	Bulls	(%)	Cows	(%)	Unknown	Total Harvest
1988–1989	38	38	32	73	27	6	(86)	1	(14)	0	7
1999–2000	12	678	17	30	70	6	(86)	1	(14)	0	7
2000–2001	12	617	25	45	55	5	(100)	0	(0)	0	5
2001–2002	12	680	33	50	50	4	(100)	0	(0)	0	4
2002–2003	20	778	15	35	65	8	(73)	3	(27)	0	11

Table 3 Copper River bison hunter residency and success, 1988–2003

Regulatory Year	Successful					Unsuccessful				Total hunters
	Local[a] Resident	Nonlocal Resident	Nonresident	Total	(%)	Resident	Non-resident	Total	(%)	
1988–1989	1	6	0	7	(27)	19	0	19	(73)	26
1999–2000	0	7	0	7	(70)	3	0	3	(30)	10
2000–2001	1	4	0	5	(55)	4	0	4	(45)	9
2001–2002	1	3	0	4	(50)	4	0	4	(50)	8
2002–2003	0	10	1	11	(65)	6	0	6	(35)	17

[a]Local means resident of Unit 11 or 13.

Table 4 Copper River bison harvest chronology, 1988–2003

Regulatory Year	HARVEST PERIOD							
	Sept	Oct	Nov	Dec	Jan	Feb	Mar	N
1988–1989	7	0	0	0	0	0	0	7
Closed by EO 2 Sept								
1999–2000	2	3	0	0	0	0	2	7
2000–2001	2	2	0	0	0	1	0	5
2001–2002	2	0	0	0	0	0	2	4
2002–2003	6	1	0	0	1	0	3	11

Table 5 Copper River bison harvest percent by transport method, 1988–2003

Regulatory year	Percent of harvest								
	Airplane	Horse	Boat	3- or 4-wheeler	Snow-machine	ORV	Highway Vehicle	Unknown	N
1988–1989	14%	0	86%	0	0	0	0	0	7
1999–2000	14%	0	14%	14%	14%	0	43%	0	7
2000–2001	0	0	40%	20%	20%	0	20%	0	5
2001–2002	25%	0	25%	0	50%	0	0	0	4
2002–2003	9%	0	55%	0	27%	0	9%	0	11

Table 6 Copper River bison harvest and accidental death, 1988–2003

Regulatory Year	Hunter Harvest										
	Reported						Estimated				
	M	(%)	F	(%)	Unk.	Total	Unreported	Illegal	Total	Accidental death	Total
1988–1989	6	(86)	1	(14)	0	7	--	--	--	5 [a]	12
1989–1992[b]	--	--	--	--	--	--	--	--	--	0	0
1992–1993[b]	--	--	--	--	--	--	--	--	--	7 [c]	7
1994–1998[b]	--	--	--	--	--	--	--	--	--	0	0
1999–2000	6	(86)	1	(14)	0	7	--	--	--	0	7
2000–2001	5	(100)	0	(0)	0	5	--	--	--	0	5
2001–2002	4	(100)	0	(0)	0	4	--	--	--	0	4
2002–2003	8	(73)	3	(27)	0	11	--	--	--	0	11

[a]3 falling from bluffs of Copper River, 1 winter kill, 1 radiocollaring mortality.
[b]Hunting season closed.
[c]Includes all observed natural mortalities.

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BISON MANAGEMENT REPORT

From: 1 July 2001
To: 30 June 2003

LOCATION

GAME MANAGEMENT UNIT: 11 (12,784 MI^2)

Unit 11 - Chitina River Herd - The Chitina River from the confluence of the Tana River to the Chitina Glacier

BACKGROUND

The Chitina Bison Herd originated from animals relocated to Delta Junction, Alaska, from the National Bison Range in Moise, Montana, in 1928. In 1962, 29 cows and 6 bulls were moved from Delta Junction to May Creek. The herd increased to as many as 56 bison in 1985, declined to a low of 30 in 1994, then increased until the winter of 1997–1998. That year the herd declined due to deep snow, but at the turn of the century began increasing again.

The first Chitina bison hunt was held by drawing permit in September of 1976. Permit hunts were held for 13 years. Hunters took 57 bison, an average yearly harvest of 4 animals. The hunt was closed in 1989 because of a decline in herd size. Hunting resumed in 1999 with drawing permits for bulls only.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

Maintain the herd at a minimum of 50 overwintering adults by increasing or decreasing human harvests when bison numbers exceed or fail to reach the objective.

METHODS

Aerial surveys to determine composition of the herd were conducted in spring after the calving period. Survey techniques included flying transects throughout all bison habitat within the Chitina Valley to obtain a direct count.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

The Chitina Bison Herd was stable from 1976 to 1985. Between 1985 and 1989 the number of bison observed declined 46% from 56 to 30 animals. From 1989 to 1994 the herd stabilized at 30 to 35 animals. It increased between 1995 and 1997, peaking at 46 bison in 1997. In 1998, the herd declined 28% to 32 bison. The spring 2003 population estimate of 50 bison shows a 56% increase in herd size since 1998 (Table 1).

Population Composition

I observed 41 adults and 9 calves during aerial surveys of the Chitina Herd in 2003 (Table 1). Calf production and/or survival increased slightly during this reporting period. Historically, calf production and survival are low after a severe winter, as observed during 1997–98 in the lower Chitina Valley. Timing of the surveys probably was not a factor in variable calf counts because surveys were usually conducted in June or early July every year.

Distribution and Movements

The Chitina Bison Herd ranges throughout the riparian and upland habitat below 2000 feet elevation along a 40-mile portion of the upper Chitina Valley. Although movements vary considerably, the herd usually can be located between the Tana River and Barnard Glacier. During the 1990s, biologists observed especially heavy use of the riparian zone between Bryson Bar and Bear Island; survey efforts have focused on this area. Old bulls in this herd are loners, exhibiting solitary behavior (often bedding in forested areas), making them difficult to count.

MORTALITY

Harvest

Season and Bag Limit. The hunting season for residents and nonresidents in Unit 11 is 6 September to 30 November. The bag limit is 1 bull every 5 regulatory years by drawing permit. The hunt area is that portion of the Chitina River east of the Chakina River and south and east of the Nizina River in Unit 11.

Board of Game Actions and Emergency Orders. In 1999 the Board of Game opened the Chitina bison hunt after a 10-year closure.

Hunter Harvest. Hunters killed 1 bull during the 2001 season and 2 bulls in the 2002 season (Table 2).

Permit Hunts. Chitina bison are hunted under a drawing permit hunt (DI 450) with up to 2 permits authorized. In 2001 and 2002, 307 and 241 hunters respectively applied for the available permits.

Hunter Residency and Success. The hunter success rate was 75% for this reporting period (Table 3). All permittees were nonlocal Alaska residents (Table 4). The average number of days hunted in order to take a bison was highly variable, with successful hunts averaging 1–6 days.

Transportation Methods. All successful hunters reported the use of aircraft (Table 5). Historically, aircraft have been the only practical means of accessing this remote hunt area.

Predation. Trappers and local residents have reported wolf predation on bison. Brown bears also have been observed feeding on bison carcasses, but it is not known if they killed the bison or were scavenging. Research on wolf or brown bear predation on Chitina River bison has not been conducted because of high costs associated with such a study and because of the remote nature of this herd.

Other Mortality

Deep snow over a prolonged period during the winter may be an important cause of mortality and reduced productivity in the Chitina bison herd. Deep snows were considered important factors in the herd decline in the late 1980s and poor recruitment during the early 1990s. Unfortunately, snow records were not recorded until 1992–1993 and were not available to ADF&G until May 1998 (Rick Kenyon, personal communication, ADF&G files, Glennallen). Snow records for Chitina from 1992–1995 indicate moderate winter severity, mild winter conditions from 1995–1997, and a very severe winter in 1997–1998. Calf recruitment in the Chitina herd was low following moderate winters between 1992 and 1995 but increased after a mild winter in 1996–1997. During the severe winter of 1997–1998, 6 adult bison were found dead. All were judged to have starved because they were emaciated, had low bone marrow fat and there was no sign of predation. This assumption as to the cause of death is supported by a report from a local trapper (M. McCann, personal communication) that snow depths were the deepest he had observed in 20 years. He also reported that a lack of wind kept important feeding areas along the Chitina River covered with snow. In other years wind often cleared river bars of snow, making foraging easier for bison.

HABITAT ASSESSMENT

In 1984 the National Park Service studied the range in the upper Chitina Valley (Miquele 1985). This study indicated grazing by ungulates on the Chitina bison range had not caused recent plant deterioration. The range was recovering from earlier overuse when horses were abundant on grazing leases. Miquele (1985) also concluded that a bison herd of 50 animals had not adversely affected the habitat, and the management objective of 30 overwintering bison could be increased. He also concluded the range could not support a very large bison herd.

Appreciable vegetation loss occurred on the Chitina bison range during the early 1990s. This is a result of rechannelization of the Chitina River toward the north bank. The first area affected was the floodplain northeast of Bear Island. This was a heavily used riparian area before 1991 when flooding first occurred and more than 50% of the vegetation was washed away. Since 1991 flooding has occurred east of Bear Island, near Bryson Bar, and has extended toward Hubert's Landing. Recent bison mortality during a winter with deep snow indicates this loss of critical river bar habitat may have reduced the carrying capacity below the previous estimate during moderate or severe winters.

CONCLUSIONS AND RECOMMENDATIONS

The Chitina bison herd declined by almost 50% between 1985 and 1989, remained relatively stable through 1995, increased for 2 years, then experienced a severe die-off during the winter of

1997–1998. The herd increased slowly between 1999 and 2001. In 2002 survey results showed a large increase in adults, presumably due to increased survival because the winter of 2002 was one of the mildest on record. Some fluctuations in count data between years probably reflect survey technique rather than actual changes in bison numbers. Solitary bulls are especially difficult to find on aerial surveys. Legal harvests by sport hunting were stopped in 1989 after the herd declined. Because the herd grew in prior years, even with a sport harvest, hunting was not considered a limiting factor on herd growth. Severe winters with deep snow and lack of sufficient wind to clear bars of snow are now considered important limiting factors on bison productivity and survival. Flooding of critical river bars and loss of vegetation cover has reduced carrying capacity, especially during periods of deep snow. Wolves and bears are abundant and could also influence herd size, but a lack of research precludes documenting predation rates.

The decline in productivity and survival during winters with moderate to severe snow conditions presents a management dilemma. The management objective of 50 overwintering bison was based on a range study conducted during the mid 1980s. Recent changes in the river have reduced food availability, lowering the carrying capacity during moderate to severe winters. I assume the impact of deep snow on survival is density independent because increased mortality and a decline in productivity have been observed at various stocking levels. Examination of winter-killed bison indicates very old bison are especially susceptible. I suspect calves of the year also have high mortality rates, but they are not found because they die earlier in the winter and are more easily scavenged. The magnitude of a die-off in a deep snow year will depend on the calf production and number of aged bison in the population. The number of bison entering the old age (>8 years) category will depend on the frequency of severe winters and human harvests.

Future management should focus on meeting the herd objective and reducing the impact of severe winters by lowering the number of susceptible old bison present in the herd. To accomplish this, a limited harvest of adult bulls was instituted in 1999. Management efforts will focus on harvesting a limited number of adults every year, depending on herd size, thus reducing the number of animals in the “aged” class that is susceptible to winter mortality. Because winter mortality appears to be somewhat density independent, limited bull harvests should be allowed if the herd exceeds 30 bison but is below the objective of 50 animals. Cow harvests would be instituted when the herd approaches 50 overwintering animals and when calf recruitment exceeds 8 calves. Because we cannot assure that hunters will select the oldest bison, we can only presume that a long season for a very limited number of hunters will encourage them to attempt to take large trophies. While this limited harvest will not prevent winter mortality, it will provide some human use of the Chitina Bison Herd even when numbers fall below the 50-bison objective. (To date, all harvested bison have been old, trophy bulls; thus current harvest strategies are meeting management objectives). Conducting a very small drawing permit hunt for bison is justified because of the popularity of all hunts on wild bison.

I recommend issuing 2 bull and 2 cow permits in 2004 if overwintering survival remains high in 2003–2004 and there are 8 or more calves in the spring 2004 count.

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Please cite any information taken from this section, and reference as:
Tobey, R.W. 2004. Unit 11 Chitina River Herd bison management report. Pages 9–15 *in* C. Brown, editor. Bison management report of survey and inventory activities 1 July 2001–30 June 2003. Alaska Department of Fish and Game. Project 9.0. Juneau, Alaska.

Table 1 Chitina bison spring aerial composition counts and estimated population size, 1999–2003

Regulatory Year	Adults[a]	Calves	(%)	Bison Observed	Estimated Population Size[b]
1999–2000	27	6	(18)	33	33
2000–2001	31	6	(16)	37	37
2001–2002	32	6	(16)	38	38
2002–2003	32	7	(18)	39	39
2003–2004	41	9	(18)	50	50

[a]Fixed-wing aircraft survey – no composition other than adults and calves.
[b]Extrapolated estimates not calculated from aerial counts.

Table 2 Chitina bison harvest and accidental death, 1999–2003

Regulatory Year	Hunter Harvest										
	Reported						Estimated				
	M	(%)	F	(%)	Unk.	Total	Unreported	Illegal	Total	Accidental death	Total
1999–2000	2	(100)	0	0	0	2	0	0	0	0	2
2000–2001	1	(100)	0	0	0	1	0	0	0	0	1
2001–2002	1	(100)	0	0	0	1	0	0	0	0	1
2002–2003	2	(100)	0	0	0	2	0	0	0	0	2

Table 3 Chitina bison harvest data by permit hunt, 1999–2003 (DI 450)

Regulatory Year	Permits Issued	Applications	Percent Did not Hunt	Percent Unsuccessful Hunters	Percent Successful Hunters	Bulls	(%)	Cows	Harvest
1999–2000	2	373	0	0	100	2	(100)	0	2
2000–2001	2	294	50	0	100	1	(100)	0	1
2001–2002	2	307	0	50	50	1	(100)	0	1
2002–2003	2	241	0	0	100	2	(100)	0	2

Table 4 Chitina bison hunter residency and success, 1999–2003

Regulatory Year	Successful					Unsuccessful					
	Local[a] Resident	Nonlocal Resident	Nonresident	Total	(%)	Local[a] Resident	Nonlocal Resident	Nonresident	Total	(%)	Hunters
1999–2000	0	2	0	2	(100)	0	0	0	0	(0)	2
2000–2001	1	0	0	1	(50)	0	0	0	0	(0)	1
2001–2002	0	1	0	1	(50)	0	1	0	1	(50)	2
2002–2003	0	2	0	2	(100)	0	0	0	0	(0)	2

[a]Local means Unit 11 or 13 resident.

Table 5 Chitina bison harvest percent by transport method, 1999–2003

Regulatory Year	Percent of harvest								
	Airplane	Horse	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway Vehicle	Unknown	*n*
1999–2000	100	--	--	--	--	--	--	--	2
2000–2001	100	--	--	--	--	--	--	--	1
2001–2002	100	--	--	--	--	--	--	--	2
2002–2003	100	--	--	--	--	--	--	--	2

Alaska Department of Fish and Game
Division of Wildlife Conservation
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BISON MANAGEMENT REPORT

From: 1 July 2001
To: 30 June 2003

LOCATION

GAME MANAGEMENT UNIT: 19 **(**36,486 mi^2**)**

UNIT 19 – FAREWELL HERD - All of the drainages into the Kuskokwim River upstream from Lower Kalskag. Bison inhabit only the Farewell area of Units 19C and 19D.

BACKGROUND

In 1965 a translocation of 18 animals from the Delta bison herd established the Farewell bison herd. The Alaska Department of Fish and Game (ADF&G) translocated an additional 20 bison to the area from Delta in 1968 to supplement the herd. Since 1968 the herd has flourished, reaching a population size of approximately 350 animals by 1999 and remaining stable through 2003. The first hunting season was held in 1972. Hunting the Farewell bison herd has been by permit only. Almost 1900 drawing permit applications are received annually for the combined fall and spring hunts, indicating strong hunter interest in remote bison hunts. In 1998 a governor's permit system was initiated and since then one additional permit was issued to a sportsman's group that auctioned the permits, with 90% of the proceeds returned to the department.

MANAGEMENT DIRECTION

The Farewell bison herd is managed for optimal sustained yield of animals, while providing uncrowded and aesthetic hunting conditions. The herd generally ranges over the 1977 Bear Creek burn area or on the South Fork Kuskokwim River bars where available forage is adequate. Because range appears adequate, we will continue issuing the current number of drawing permits to allow the herd to slowly increase.

MANAGEMENT OBJECTIVES

- OBJECTIVE 1: Maintain a minimum population of 300 bison.

Activities

- Maintain a sample of radiocollared bison to monitor the herd distribution and movements.
- Conduct aerial surveys of bison to assess the population status and herd composition.

- ❖ Promote a diverse successional stage habitat mosaic within the range of the bison herd to benefit bison and other species by cooperating with other land and resource management agencies.

➢ OBJECTIVE 2: Maintain a harvest of up to 40 bison.

Activity

- ❖ Issue 40 drawing permits, 20 for the fall season and 20 for the spring season.

METHODS

We conducted aerial surveys annually to estimate herd size and composition. Surveys were flown using fixed-wing aircraft and we used both visual search techniques and radiotelemetry to locate groups of bison. We estimated herd size by locating 4 radiocollared bison and counting bison associated with them. In addition, we searched heavily used bison habitat in the Farewell burn and along the South Fork Kuskokwim and counted bison found in those areas. We then adjusted the total number upward by estimating the number of bison we might have missed. Estimates included assessing the sex of animals seen and repeated surveys in previous years, which suggested 12–15% of bison were missed during standard-intensity surveys. During surveys we classified bison as adults and calves. To assist in locating groups of bison, we radiocollared 8 adult cows in fall 2003 using helicopter-supported darting techniques. Bison were immobilized with darts from a Cap-Chur™ rifle or short-range pistol. Darts were loaded with 5 mg carfentanil citrate (Wildnil®, Wildlife Pharmaceuticals, Fort Collins, Colorado USA) and 60 mg xylazine hydrochloride (Anased®, Lloyd Laboratories, Shenandoah, Iowa USA).

Survey flights were conducted during May or June within the traditional range of the herd to monitor the extent of winter mortality. We flew known wintering areas, using fixed-wing aircraft, to search for evidence of kill sites and to check for mortality among radiocollared animals.

The U.S. Bureau of Land Management is considering a plan for prescribed burning on its managed lands in the Farewell area. Staff from the Department of Fish and Game and the Department of Natural Resources (DNR) Division of Forestry are cooperating where possible.

The drawing permit hunts for Farewell bison were administered from the McGrath area office. Hunt reports collected from permittees included harvest date, location, chronology, transportation and effort. Harvest data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY02 = 1 Jul 2002 through 30 Jun 2003).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Estimated annual herd growth between 1968 (when aerial surveys were initiated) and 1988 was about 10%. Since 1988 hunting and mortality due to predation have likely slowed herd growth (Table 1). In RY91, RY92, and RY95 the number of drawing hunt permits was reduced from 80 to 50, then to 40 to allow a slow increase in the bison herd (Table 2).

Population Size

We have not conducted a full census of the Farewell bison herd since 1988, but recruitment and mortality data indicate the population increased to about 350 bison by 1999 (Table 1). Repeated attempts to completely enumerate herd size during each of the past 5 years have not been successful because of unpredictable movements and the small number of bison with radio collars. During the report period, 8 bison were radiocollared to assist in future herd surveys. At the end of RY04, 11 bison had functioning radio collars. This will assist with future population surveys.

Population Composition

During surveys in May, January, or September RY01–RY02 when most of the herd was seen, calf percentages were from 10 to 16%, averaging 11% (Table 1). The number of bison counted during 1996 was the most recorded, at 276 animals. Since 1996 the most bison observed on a single day survey was 265 on 30 May 2000. During this reporting period, RY01–RY02, the largest single day count was 145 on 7 May 2003 (Table 1). That count had a big enough sample size to be compared to previous spring counts. However, May counts probably are before the end of calving, so the estimated 15% calves in 2003 is likely low. Fall composition data were not obtained during RY01–RY02 due to the lack of funding.

Distribution and Movements

In winter the Farewell bison herd is typically scattered in small groups (10–40 animals) on the Bear Creek burn and surrounding ranges, taking advantage of windswept grass and sedge forage in these areas. These groups began moving onto the South Fork Kuskokwim River floodplain during the summer, generally moving in a southerly direction toward the headwaters of that drainage. In recent years bison were seen as far upriver as Sled Pass (Hartman River/Stony River headwaters) and into Ptarmigan Valley (South Fork Kuskokwim/Happy River headwaters). Bison also were observed 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. Several small groups pioneered into a large burn caused by lightning in 1991 on the east side of the South Fork Kuskokwim. Since spring 1998 at least 150 bison have been found in that area, indicating herd range expansion.

MORTALITY

Harvest

Season and Bag Limit.

Bag limit	Resident Seasons	Nonresident Seasons
Unit 19		
1 bison every 5 regulatory years by drawing permit only.	1 Sep–30 Sep (DI351) or 1 Mar–31 Mar (DI352)	1 Sep–30 Sep (DI351) or 1 Mar–31 Mar (DI352)

Alaska Board of Game Actions and Emergency Orders. No Board of Game actions or emergency orders were taken or issued during this reporting period.

Hunt History. The first legal harvest from this herd occurred in RY72 after aerial surveys revealed that it could sustain small harvests. Since then, 41 hunts have been held in 27 of 28 regulatory years (no hunt in RY73). The Farewell bison hunt was generally administered as a drawing permit hunt, although in RY79 it was a registration hunt and in RY84 it was a Tier II subsistence hunt. During RY80–RY83, 20 permits were allocated each year. During RY85–RY88 the number of permits was increased to 40. The first spring bison hunt was held in March 1990. During RY89–RY90, 70 drawing permits were awarded annually, 40 for fall hunts and 30 for spring (March) hunts. In RY91, 80 permits were awarded, (40 fall/40 spring). In RY92–RY94, 50 permits were awarded (30 fall/20 spring), and in RY95–RY99, 40 permits were issued (20 fall/20 spring). In RY99, hunt conditions that confined hunters to a 10- or 15-day period during the season were changed to allow permittees to hunt any time during the fall or spring seasons. There have been no changes in the seasons or bag limits since RY99.

Hunter Harvest. Annual harvest of bison was 16–29 during RY99–RY03 (Table 3). The proportion of bulls harvested during this period was 40–73%. Hunters prefer to take bulls because they are larger and have both more meat and trophy potential; however, misidentification and low numbers of bison sighted per hunter can result in some female harvest.

Permit Hunts. In RY98, a "Governor's Permit" was issued to the Alaska Bowhunters Association to auction. The group kept 10% of the proceeds and returned the rest of the money to the department. These permits sold for $8100 for RY98, $7500 for RY99, and $5500 for RY01. The RY98 permittee hunted in spring 1999 and was not successful, but the RY99 permittee, who hunted in spring 2000, harvested a large bull using archery equipment. The RY01 permittee hunted in spring 2002 and harvested a female.

Harvest Chronology. Harvest chronology prior to RY99 was determined by the deliberate distribution of permittees through the season, rather than by hunter choice or success (Table 4). Beginning in RY99 permittees were allowed to choose when to hunt during their respective season. Distribution of hunters during the fall season based on hunter check-ins indicates fairly even temporal dispersion. Spring hunter check-ins were skewed toward the beginning of the season when the snow conditions were usually better. Overall hunter distribution was adequate based on a lack of negative comments from surveys collected from each hunter.

Hunter Residency and Success. The vast majority of applicants and permittees for the Farewell bison hunt were Alaska residents (Table 5). Nonresidents obtained 5 permits during RY98–RY02, while local residents (permittees residing in Unit 19) obtained 6 permits, and nonlocal Alaska residents obtained 189 of the 200 permits.

Success rates for the September hunt DI351 were good (mean RY99–RY03 = 61%). Hunter success rates in the March hunt DI352 were usually higher (mean RY99–RY03 = 83%). Success rates were calculated for permittees who actually hunted during RY99–RY03. The higher hunter success rates during March were due to increased access opportunities (snowmachines and airplanes), an absence of moose hunters, and the availability of guide services.

Transport Methods. During the September hunt (DI351), initial access to the Farewell area was typically by aircraft (Table 6). About half the September hunters used all-terrain vehicles as a secondary access method. During the March hunt (DI352), the primary access method was also by airplane. However, access by snowmachines became more popular among permittees. Generally, hunters who used aircraft to reach the hunting area in March used skis or snowshoes to stalk and retrieve bison.

Natural Mortality

Wolf and grizzly bear predation was first documented in the Farewell herd in the early 1990s, more than 20 years following bison introduction. Since 1995, we have found consistent evidence of wolf and bear predation. During RY01–RY02, we had one report that a moose hunter took a grizzly bear found on a buried cow bison carcass. The McGrath Fish and Wildlife Protection officer found a dead cow bison in spring 2003 along the South Fork Kuskokwim. No bullets or bullet wounds were observed, but he observed that the cow had just given birth and we suspect the cow died as a complication of the birthing process. We were not able to necropsy the animal.

HABITAT

Little is known about the range conditions for the Farewell bison herd. The herd spends winters on and adjacent to the Bear Creek burn and a burn east of the South Fork Kuskokwim where forage appears adequate. Summer range is generally limited to a smaller area of the Bear Creek burn and various river floodplains within the Alaska Range. Although no estimate of carrying capacity is available, a cursory examination of selected areas in summer 1995 by University of Alaska graduate student Maria Berger and an additional aerial evaluation by Robert Stephenson (ADF&G) in spring 1998 indicated adequate forage availability, with unused range to the north, east, and west.

In cooperation with DNR, a spring burn was planned on a portion of the 1977 Bear Creek burn where grass and sedge growth is declining and is being replaced by black spruce to provide increased forage for bison and stimulate browse production for moose. The prescription was met in spring 2000; however, the burn was not accomplished because burning conditions for black spruce were not favorable. From this we learned that remote prescribed fires are very expensive to complete, which led to our decision to wait, at least in the short-term, for a naturally ignited wildfire. At this time the Bureau of Land Management is working on a prescribed fire plan on adjacent federally managed lands. ADF&G and DNR Division of Forestry will cooperate to the extent possible to help with that prescribed fire plan and implementation.

CONCLUSIONS AND RECOMMENDATIONS

We met our objective to maintain a minimum of 300 bison in the Farewell area, as the population is estimated at 350. We maintained and monitored up to 6 radiocollared bison. Two other radio collars were shed or the bison died. We deployed 8 more radio collars on cow bison in RY03. At the end of RY03, we had 11 bison with functioning radio collars. We completed periodic aerial bison surveys, but aircraft availability made these flights less frequent than desired. We promoted habitat diversification by working with DNR and other

landowners to promote naturally occurring wildfires. We met our objective to maintain the harvest of bison (<40), while maintaining some herd growth. We administered permit hunts for the Farewell bison herd. The permit hunt continued to attract many prospective hunters to this truly unique hunting experience.

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Please cite any information taken from this section, and reference as:

Boudreau, T.A. 2004. Unit 19 bison management report. Pages 16–27 *in* C. Brown, editor. Bison management report of survey and inventory activities 1 July 2001–30 June 2003. Alaska Department of Fish and Game. Project 9.0. Juneau, Alaska.

TABLE 1 Farewell bison aerial composition surveys and estimated population size, 1992–2003

Survey date	Adults	Calves	(%)	Bison observed	Estimated population size
5/18/92	123	18	(12.8)	141	
5/20/92	134	36	(21.2)	170	
5/22/92	141	34	(19.4)	175	
6/02/92	158	32	(16.8)	190	
6/30/92	117	31	(21.0)	148	
7/21/92	163	33	(16.8)	196	280
8/03/92	90	16	(15.1)	106	
11/11/92	110	18	(14.1)	128	
11/19/92	157	26	(14.2)	183	
6/22/93	171	51	(23.0)	222	
7/21/93	82	22	(21.2)	104	300
10/26/93	70	26	(27.1)	96	
5/07/94				175	
5/16/94	172	44	(20.4)	216	
5/26/94	155	42	(21.3)	197	
7/27/94	76	24	(24.0)	100	300
4/30/95	89	21	(19.9)	110	
7/05/95	210	50	(19.2)	260	300
7/18/95	153	30	(16.4)	183	
7/18/96	229	47	(17.0)	276	320
7/01/97	181	31	(14.6)	212	
7/28/97	140	24	(14.6)	164	320
8/25/99	42	13	(23.6)	55	350
5/30/00	234	31	(11.6)	265	350
6/18/01	157	31	(16.5)	188	350
1/30/02	34	1	n/a	35	350
9/3/02	32	6	(16.0)	38	350
5/7/03	130	15	(10.0)	145	350
11/16/03	109	n/a	n/a	109	350

TABLE 2 Farewell bison harvest data by permit hunt, regulatory years 1995–1996 through 2003–2004[a]

Hunt no.	Regulatory year	Permits issued	Permittees not hunting	Unsuccessful hunters[b]	Successful hunters	Bulls	Cows	Unk	Total harvest
DI351	1995–1996	20	6	9	5	3	2	0	5
(Fall)	1996–1997	20	4	6	10	7	3	0	10
	1997–1998	20	8	7	5	2	3	0	5
	1998–1999	20	3	12	5	3	2	0	5
	1999–2000[c]	20	3	4	13	8	5	0	13
	2000–2001	20	0	9	11	8	3	0	11
	2001–2002	20	8	8	4	4	0	0	4
	2002–2003	20	8	3	9	5	4	0	9
	2003–2004	20	9	4	7	5	2	0	7
	Subtotal	180	49	62	69	45	24	0	69
DI352	1995–1996	20	4	0	16	11	5	0	16
(Spring)	1996–1997	20	4	0	16	12	4	0	16
	1997–1998	20	3	3	14	12	2	0	14
	1998–1999	20	6	3	11	8	3	0	11
	1999–2000	20	4	0	16	12	4	0	16
	2000–2001	20	5	2	13	7	6	0	13
	2001–2002	20	1	3	16	11	4	1	16
	2002–2003	20	8	5	7	3	4	0	7
	2003–2004	20	4	3	13	5	8	0	13
	Subtotal	180	39	19	122	81	40	1	122
Regulatory	1995–1996	40	10	9	21	14	7	0	21
Year	1996–1997	40	8	6	26	19	7	0	26
totals	1997–1998	40	6	15	19	14	5	0	19
	1998–1999	40	9	15	16	11	5	0	16
	1999–2000[c]	40	7	4	29	20	9	0	29
	2000–2001	40	5	11	24	15	9	0	24
	2001–2002	40	9	11	20	15	4	1	20
	2002–2003	40	16	8	16	8	8	0	16
	2003–2004	40	13	7	20	10	10	0	20
Total	1995–2004	360	88	79	191	126	64	1	191

[a] Figures only represent legally harvested animals.
[b] Successful/Unsuccessful Hunter information only includes those who actually hunted, not total permittees.
[c] Hunters were allowed to hunt anytime in September 1999; specific periods were not assigned.

TABLE 3 Farewell bison harvest, regulatory years 1992–1993 through 2003–2004

Regulatory	Reported						Estimated			
year	M	(%)	F	(%)	Unk	Total	Unreported	Illegal	Total	Total
1992–1993	10	(71)	4	(29)	0	14	0	0	0	14
1993–1994	9	(53)	8	(47)	3	20	0	1	1	21
1994–1995	12	(52)	11	(48)	0	23	0	0	0	23
1995–1996	14	(67)	7	(33)	0	21	0	0	0	21
1996–1997	19	(73)	7	(27)	0	26	0	1	1	27
1997–1998	14	(74)	5	(26)	0	19	0	0	0	19
1998–1999	11	(69)	5	(31)	0	16	0	1	1	17
1999–2000	20	(69)	9	(41)	0	29	0	0	0	29
2000–2001	15	(62)	9	(38)	0	24	0	0	0	24
2001–2002	15	(71)	5	(24)	1	21	0	0	0	21
2002–2003	8	(50)	8	(50)	0	16	0	0	0	16
2003–2004	10	(50)	10	(50)	0	20	0	0	0	20
Totals	157	(63)	88	(35)	4	249	0	3	3	252

TABLE 4 Farewell bison harvest chronology by month/day, regulatory years 1992–1993 through 2003–2004

Regulatory year	Harvest chronology by month/day						Unk	*n*
	9/1–10	9/11–20	9/21–30	3/1–10	3/11–20	3/21–31		
1992–1993	1	4	0	4	3	2	0	14
1993–1994	2	3	3	3	1	1	7	20
1994–1995	3	4	3	4	0	3	6	23
1995–1996	1	3	0	7	5	3	2	21
1996–1997	3	2	5	9	2	2	3	26
1997–1998	3	1	1	9	3	2	0	19
1998–1999	2	0	1	4	4	1	4	16
1999–2000	4	3	4	7	7	2	0	27
2000–2001	5	3	3	7	2	4	11	35
2001–2002	1	1	2	7	6	1	8	26
2002–2003	6	2	1	5	0	2	1	17
2003–2004	0	3	2	8	1	3	3	20
Total (%)[a]	31 (36)	29 (34)	25 (30)	74 (55)	34 (25)	26 (19)	45	264

[a] Percentage is calculated for each season.

TABLE 5 Farewell bison hunter residency and success, regulatory years 1992–1993 through 2003–2004 (hunters and nonhunters combined)

Regulatory year	Successful					Unsuccessful					Total permits
	Local[a] resident	Nonlocal resident	Nonresident	Unk	Total (%)	Local[a] resident	Nonlocal resident	Nonresident	Unk	Total (%)	
1992–1993	1	13	0	0	14 (28)	1	35	0	0	36 (72)	50
1993–1994	1	17	2	0	20 (40)	2	28	0	0	30 (60)	50
1994–1995	3	20	0	0	23 (46)	0	27	0	0	27 (54)	50
1995–1996	1	19	1	0	21 (52)	0	19	0	0	19 (48)	40
1996–1997	2	23	1	0	26 (65)	0	13	1	0	14 (35)	40
1997–1998	0	17	2	0	19 (48)	0	18	3	0	21 (52)	40
1998–1999	0	16	0	0	16 (40)	1	22	1	0	24 (60)	40
1999–2000	3	25	1	0	29 (73)	0	11	0	0	11 (27)	40
2000–2001	1	23	0	0	24 (60)	0	16	0	0	16 (40)	40
2001–2002	0	19	1	0	20 (50)	0	20	0	0	20 (50)	40
2002–2003	2	11	3	0	16 (40)	0	24	0	0	24 (60)	40
2003–2004	0	19	1	0	20 (50)	1	18	1	0	20 (50)	40
Totals	14	222	12	0	248 (49)	5	251	6	0	262 (51)	510

[a] "Local resident" refers to hunters living in Unit 19.

TABLE 6 Farewell bison harvest by primary transport method, regulatory years 1992–1993 through 2003–2004

Regulatory year	Harvest percent by transport method					*n*
	Airplane (%)	Boat (%)	3 or 4 wheeler (%)	Snowmachine (%)	Unknown (%)	
1992–1993	10 (71)	0 (0)	0 (0)	4 (29)	0 (0)	14
1993–1994	14 (70)	0 (0)	0 (0)	4 (20)	2 (10)	20
1994–1995	17 (74)	0 (0)	0 (0)	4 (17)	2 (9)	23
1995–1996	11 (52)	0 (0)	0 (0)	8 (38)	2 (10)	21
1996–1997	15 (58)	0 (0)	0 (0)	8 (31)	3 (11)	26
1997–1998	11 (58)	0 (0)	0 (0)	8 (42)	0 (0)	19
1998–1999	7 (39)	0 (0)	0 (0)	10 (55)	1 (6)	18
1999–2000	12 (40)	0 (0)	1 (3)	16 (53)	1 (4)	30
2000–2001	13 (54)	0 (0)	0 (0)	11 (46)	0 (46)	24
2001–2002	4 (100)	0 (0)	0 (0)	0 (0)	0 (0)	4
2002–2003	11 (69)	0 (0)	0 (0)	5 (31)	0 (0)	16
2003–2004[a]	12 (60)	0 (0)	0 (0)	7 (35)	1 (5)	20
Totals	137 (58)	0 (0)	1 (1)	85 (36)	12 (5)	235

[a] Preliminary data

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BISON MANAGEMENT REPORT

From: 1 July 2001
To: 30 June 2003

LOCATION

GAME MANAGEMENT UNIT: 20D (5637 mi^2)

UNIT 20D – DELTA HERD – 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: wood bison (*Bison bison athabascae*) in Alaska and parts of Canada, and plains bison (*B. b. bison*) in Canada and the contiguous United States. Bison were once the most abundant large mammal in Alaska, but became extirpated about 200–300 years ago probably due to a combination of changing habitat and overhunting (Skinner and Kaisen 1947; Stephenson et al. 2001; D. Guthrie, University of Alaska Fairbanks, personal communication). Bison lived along the Delta River near Delta Junction before their extirpation in Alaska (D. Guthrie, personal communication).

In 1928, 23 plains bison were translocated from the National Bison Range in Montana to the Delta River. At the time biologists were unaware of the existence of wood bison in Canada. By 1947 the herd increased to 400 animals. Hunting began in 1950 and is now one of the most popular permit drawing hunts in the state. Hunting is used to manage the size of the herd. Delta bison have been translocated to other parts of Alaska, and 3 other herds have been established (i.e., Farewell, Chitina River, and Copper River herds).

As agriculture developed on their established range, the Delta bison herd (DBH) began to include hay and cereal grains in their fall and winter diets. In 1976 the State of Alaska made agricultural development a priority within the established range of the DBH, and large-scale agricultural land disposals began in 1978. Eventually bison began to negatively impact agricultural harvests by feeding on crops in the fall before 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 (DAP). The purpose of the DJBR was to perpetuate free-ranging bison by providing adequate winter range and altering 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, with the intent that $5 from each application be used for DJBR management. Since 1984 the appropriated funds have been used to hire

personnel, purchase equipment for forage management, and develop 2800 acres of bison forage on the DJBR in 2 field complexes, the Panoramic and Gerstle Fields.

Bison damage to farms in the DAP was significantly reduced in 1985 with the first substantial forage production on the DJBR. The DJBR forage development and management continued through this reporting period, reducing conflicts between bison and agriculture.

MANAGEMENT DIRECTION

MANAGEMENT GOALS AND OBJECTIVES

The 2000–2005 Delta Bison Management Plan has the following goals and objectives:

Herd Health Management Goal: Ensure that the DBH remains healthy and free of any diseases that might threaten the herd or other wildlife species.

Objective 1: Monitor the DBH to determine if any diseases are present that might threaten the health of the herd or other wildlife species.

Objective 2: Prevent the transmission of diseases between livestock and the DBH.

Objective 3: If diseases are transmitted from livestock to the DBH, prevent the spread of diseases from bison to other wildlife species or to other livestock.

Herd Size and Composition Goal: Manage the DBH to accomplish a reasonable balance between providing the greatest opportunity to hunt and view bison while keeping negative impacts to private property to a minimum.

Objective 1: Manage the DBH to maintain a herd size of approximately 360 bison at the precalving count.

Objective 2: Manage the DBH to maintain a sex ratio of no less than 50 bulls (≥ 1-year-old):100 cows.

Bison Conflict Management Goal: Minimize conflicts between bison and the public, including, but not limited to, agriculture interests in the Delta Junction area.

Objective 1: Administer the Delta bison hunt to minimize landowner-hunter conflicts in order to help maintain bison and hunter access to private agricultural land to the greatest extent possible.

Objective 2: Enhance bison summer range west of the Richardson Highway to increase its attractiveness to the DBH to attempt to delay the herd's migration towards the DJBR and private agricultural lands.

Objective 3: Manage the DJBR to encourage the DBH to remain south of the Alaska Highway, and out of private agricultural land as late in the fall as possible, and to

attract more bison to the DJBR in the winter and provide greater accessibility to the herd for bison hunters.

Objective 4: The department will provide assistance to the public regarding bison conflicts.

Bison Viewing Management Goal: Provide opportunities for nonconsumptive enjoyment of the DBH, such as bison viewing, interpretation, and education.

Objective 1: Investigate methods and funding sources other than bison permit fees to improve bison viewing opportunities for the public.

METHODS

DJBR MANAGEMENT

The perennial grasses, nugget bluegrass (*Poa pratensis*) and arctared fescue (*Festuca rubra*), were fertilized on the DJBR each year with N60-P20-K0-S10 at the rate of 200 lb/ac. Fertilizer was applied with an 8-ton capacity broadcast spreader pulled by a John Deere 4250 tractor.

Oats were planted each year on acreage being treated to control bluejoint reedgrass (*Calamagrostis canadensis*). Prior to planting, fields were fertilized with about 200 lb/ac of N60-P20-K0-S10 by broadcasting fertilizer onto the fallow soil with a broadcast spreader. Approximately 100 lb/ac of oat seed were spread using the broadcast spreader and the field was disked with a field disk to incorporate the fertilizer and seed into the soil.

We analyzed forage quality by collecting forage subsamples and pooling them into 1 composite sample by forage type and location. Samples were sent to the University of Alaska Plant and Soils Lab, Palmer, Alaska for analysis. Samples were analyzed moisture-free and as-fed for relative feed value (RFV), dry matter, crude protein, phosphorus, potassium, calcium, acid-detergent fiber, in vitro dry matter disappearance, total digestible nutrients, metabolizable energy, and net energy-lactation. Generally, RFV was reported to compare forage quality.

We provided trace element mineral blocks in the Panoramic and Gerstle Fields and water in stock water tanks supplied by a well in the Panoramic Fields. We monitored rain gauges in both the Panoramic and Gerstle Fields.

Bison Forage Selection on the DJBR. Bison forage selection was monitored during this report period because of controversies concerning conflicts between moose hunting and bison forage management. The Bison Range Youth Hunt Management Area (BRYHMA) was established in 2002 to regulate moose hunting that was impacting bison forage management on the fields of the DJBR. One resultant criticism of DJBR forage management was that oats planted for bison forage were not used sufficiently by bison to justify their planting. The claim was that bison were frequently using browse species such as shrubs and forbs as forage. Therefore, oats should not be planted as bison forage thus removing them as an attractant to moose in the DJBR fields and negating the need for the BRYHMA. To better understand bison use of

DJBR forage crops, bison habitat selection was recorded on the DJBR from July to October 2003.

The BRYHMA totals 6380 acres, about 2800 acres of which are cleared, and consists of the Panoramic and Gerstle Fields in the DJBR. The Panoramic Fields encompass about 3950 acres with about 1700 acres cleared. The Gerstle Fields encompass about 2430 acres with about 1100 acres cleared.

Bison habitat selection in the DJBR fields was recorded using the following 3 types of observations:

1. Radiocollared bison were located during aerial censuses. Habitat selected by the aggregation containing the radiocollared bison was recorded and the number of bison in the aggregation was counted or estimated. This data is an unbiased record of habitat selection because bison were found regardless of their location, habitat selection, or the difficulty of observing them.

2. Aggregations observed during aerial censuses without a radiocollared bison were counted or estimated and their habitat selection recorded. Although the fields were searched thoroughly each census, these data may be slightly biased toward more open habitats because small aggregations without a radiocollared bison may have been overlooked in habitat types where bison were difficult to see (i.e., forest types).

3. Bison observed from the ground during DJBR field operations were counted or estimated and their habitat selection recorded. This data is the most biased of the 3 types collected because most ground observations are of bison in the most visible locations.

Habitat selected by bison was recorded as the following:

1. Oats.

2. Bluegrass.

3. Browse: shrubs including willow and aspen regrowth, and forbs such as fireweed.

4. Other: bare dirt without vegetation, fallow areas with vegetation but without browse, deciduous and coniferous forest.

Moose Forage Selection on the DJBR. Another public concern of DJBR forage management and the BRYHMA was that planting oats for bison forage attracts moose from the surrounding area into the BRYHMA during the hunting season, making them unavailable to hunters outside of the BRYHMA. To better understand moose use of the BRYHMA during the moose hunting season, moose surveys were flown in the BRYHMA prior to and during the 2003 moose hunting season.

Substantial acreage in both fields also includes willow and aspen regrowth ranging in height from 1-3 feet to tall trees. Two major wildfires have burned on the DJBR and created

excellent moose habitat. The 1987 Granite Creek fire burned west of the 1408 Road near the Panoramic Fields. The 1994 Hajdukovich Creek fire burned between Charlie Boyd Road and the Gerstle River Road, including much of the Gerstle Fields.

Surveys were flown in early morning and late evening once a week prior to and during the BRYHMA and general moose hunting seasons. Morning surveys were started within ±30 minutes of sunrise and evening surveys were begun approximately 30–45 minutes before sunset. With one exception (4 September), surveys were not flown during BRYHMA assigned hunting periods so that surveys did not interfere with hunters.

Linear transects were flown over the BRYHMA fields in a Piper PA-18. The forested inclusions within each field were not surveyed. Surveys were flown at approximately 300–500 feet above ground level at about 70 mph.

A low pass was made over all moose seen, to classify them as bulls, cows or calves for all surveys expect the Panoramic Fields on 4 September. Antler spread of bulls was estimated and the number of brow tines was counted if possible. Moose were classified as adults if they were ≥ 1 year old.

The habitat moose were observed in was recorded as oats, nugget bluegrass, low shrub (shrubs estimated to be ≤4 ft in height), tall shrub (shrubs estimated to be >4 ft in height), deciduous (deciduous trees estimated to be ≥10 ft in height), or spruce (spruce trees). Activity of the moose was recorded as lying or standing.

One comparative survey was flown inside as well as outside the BRYHMA prior to moose season opening. This survey compared the BRYHMA to an area immediately south and west of the Gerstle Fields in the Hajdukovich Creek burn.

HERD MANAGEMENT

Population Status and Trend

We used aerial censuses to estimate herd size. A Piper Super Cub (PA-18) fixed-wing aircraft was used to conduct visual searches and to locate aggregations that contained radiocollared bison during April–September. Aggregations were counted visually if possible. Aggregations difficult to count visually were photographed with a 35-mm camera on ASA 400 print film or a digital camera, and counted from the photographs. We conducted replicate censuses and considered the prehunt population size to be the maximum number of bison counted during a single census.

A precalving population estimate was obtained by subtracting hunting mortality, estimates of wounding loss, and other known and estimated sources of mortality from the prehunt population estimated for the previous fall.

Population Composition

Sex and age composition surveys were conducted from the ground by locating groups containing radiocollared bison. We determined the sex and age of bison by observing them with 8×40 binoculars or a 15-60 power spotting scope. Bulls were differentiated from cows by

body size, head size and shape, pelage, circumference of horn bases, horn shape, and presence of a penis sheath. Yearling bulls were differentiated from adult bulls by horn size and shape. We usually conducted multiple surveys and the survey that resulted in the largest sample size was used to calculate composition data.

Bulls were further classified into 4 different horn categories to estimate age structure for the bull segment of the population based on horn morphology. Yearlings were bulls with straight horns without any upward curvature. “Small bulls” were bulls with horn tips that were starting to curve upward (vertically relative to the horn base) but were not pointing straight up. “Medium bulls” were bulls with horn tips turned 90° vertical, relative to the horn bases. “Large bulls” had horns with tips curved inward toward the center of the skull. To aid in the classification of age relative to horn shape, photographs were taken when possible of all bison killed by hunters. Horn morphology relative to age will be evaluated by comparing horn shape to age based on tooth eruption and wear. We summarized composition data by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY01 = 1 Jul 2001–30 Jun 2002).

Distribution and Movements

We monitored bison movements by locating radiocollared bison and from reports by people who observed and reported bison moving through the area. We located radiocollared bison from the ground by using a single antenna and listening for peak signal strength to determine general location. We also obtained more precise locations using aircraft.

We usually captured bison from a Robinson R-22 helicopter to attach radio collars by immobilizing them with darts from a Cap-Chur™ rifle or short-range pistol. Occasionally bison were darted from a truck by approaching them closely. Darts were loaded with 5 mg carfentanil citrate (Wildnil®, Wildlife Pharmaceuticals, Fort Collins, Colorado USA) and 60 mg xylazine hydrochloride (Anased®, Lloyd Laboratories, Shenandoah, Iowa USA). During RY02 we were concerned that xylazine may result in abortions by pregnant cows immobilized in April; therefore, xylazine was not included in the drug mixture during April 2002. Once immobilized, bison were fitted with radio collars, then given an intramuscular injection of naltrexone hydrochloride (Trexonil®, Wildlife Pharmaceuticals) at a dose of 100 mg naltrexone citrate/mg carfentanil citrate to reverse the immobilization.

Disease Management

Bison hunters were asked to collect approximately 30 ml of blood from their kills. These samples were centrifuged and serum was removed by aspiration. Sera were frozen until tested for diseases that included epizootic hemorrhagic disease, bluetongue, infectious bovine rhinotracheitis, bovine viral diarrhea, respiratory syncytial virus, parainfluenza 3, *Brucella suis* IV, *Leptospira interrogans*, *Toxoplasma gondii*, and Q fever. Samples of uncoagulated whole blood were also collected for future genetic work. In RY03 hunters collected fecal samples to test for Johne’s disease.

Harvest Management

Bison hunters were assigned a beginning hunt date starting 1 October, and a new group of hunters was started every 5 days. Once hunters were eligible to start hunting, they had until the end of the season on 31 March to hunt. Bison hunters attended a mandatory prehunt

orientation. The purpose of the orientation was to teach hunters to differentiate between bulls and cows, to discuss land status in the hunt area, and to give hunters supplies and instructions for collecting biological samples.

Bison hunters were required to check out within 24 hours after their hunt. They completed a questionnaire concerning date and location of kill, number of days afield, number of shots required, weight of bullet, and caliber of firearm. If hunters checked out after normal office hours, they put the questionnaire, biological samples, and the distal end of the lower jaw in a drop box at the Delta Junction ADF&G office. If hunters checked out during working hours, we examined the carcass to record tooth eruption and to extract an I1 tooth from bison that had all permanent teeth. We sent teeth to Matson Laboratories (PO Box 308, Milltown, MT 59851) for aging. Horns were measured according to the Boone and Crockett Club scoring system and photographed. Harvest was monitored using permit harvest reports and questionnaires. Harvest data were summarized by regulatory year.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

RY01. Estimated prehunt population size in fall 2001 was 471 bison (Table 1) from surveys flown 20 and 27 June; 23 and 27 August; and 6, 10, 18, and 20 September 2001. The highest count was achieved during the 10 September survey when the bison were located in the DAP. Estimated precalving population in spring 2002 was 373, which was 13 bison above the population objective.

RY02. Estimated prehunt population size was 476 bison (Table 1) from surveys flown on 15, 16, and 27 June; 5 and 7 July; 1, 9, 20, and 29 August; and 4, 23, and 24 September 2002. The highest count was achieved during the 24 September survey in the DJBR and DAP. Estimated precalving population in spring 2003 was 365, which was 5 higher than the population objective.

RY03. Estimated prehunt population size was 407 bison (Table 1) which was substantially lower than expected.

Because of bison management issues related to bison calving on U.S. Army Alaska (USARAK) land, I started bison surveys in April 2003 using USARAK funds to document calving locations. At the suggestion of the department, USARAK personnel also flew spring bison surveys in April–May to determine the location of bison when calving on military lands. Surveys were flown on the following dates, with USARAK surveys noted (all others were flown by the department): 11 and 18 April; 1–2 (USARAK), 6–7 (USARAK), 13–14 (USARAK), 16, 25, and 30–31 (USARAK) May; 9 and 30 June; 3, 8, 18, 25, and 30 July; 3, 18, 19, 25, 27, and 28 August; and 4, 10, and 15 September 2003. The highest count of 407 was during the 3 July survey when the bison were located along the Delta River. Estimated precalving population in spring 2004 was 327, which was below the population objective by 33 bison.

One interesting aspect of the May surveys is that a number of bison were located west of the Delta River in the 1992 Buffalo Dome burn. This was the most extensive use of this burn we had ever observed by the DBH and bison were very difficult to count there. Peak use was observed on the 16 May survey when 196 bison in 13 aggregations were observed in the burn. It is very likely that additional bison were also in the burn but missed due to poor sightablity.

In late June I received a report that up to 50 bison had been observed all spring on DAP Tract 7. During the 30 June census we surveyed the DAP, including Tract 7 and adjacent tracts, but saw no evidence of the bison. In addition, air taxi pilot Jim Cummings reported that he had never seen these reported bison during numerous flights over the area.

The highest 2003 bison census of 407 bison is 54 bison lower than the predicted population of 461. There are 4 possible explanations for the low census results including 1) my population model was inaccurate, 2) the bison were present but not counted, 3) an unidentified mortality source killed bison, or 4) a cumulative combination of the above factors. I discuss each of these possibilities below.

Modeling Mistake. The population model is a simple Microsoft®Excel® spreadsheet that has been fairly reliable. With the exception of 1999, the last 10 modeling exercises have predicted population estimates that were as likely to be high as low, with survey estimates being high or low 50% of the time, respectively. High estimates averaged 3.4% high (range 2–6%), or 8–27 bison. Low estimates averaged 3.2% low (range 0.4–7%), or 2–29 bison.

Although the RY03 census of 407 was 54 bison fewer than the modeled estimate of 461, at its extremes the model has varied by about 28 bison in the last 10 years, and has an equal chance of being high or low. Therefore, the current discrepancy is 26 bison lower than the predicted error of ±28 bison.

Bison Not Counted. During bison censuses, the DBH can usually be found aggregated together either along the Delta River in June–early July, or on the DJBR/DAP in August or September. Although conceivable, it would be unusual for a segment of the population to remain uncounted.

The DBH had 13 active radio collars in summer 2003, for a ratio of approximately 1 collar/30 bison. This is about the maximum number of radiocollared bison maintained in the herd and past censuses have been achieved with substantially fewer collars. When I place radio collars on bison I do not make a concerted effort to place collars on different segments of the population because I have made the assumption that radiocollared bison distribute themselves randomly through the herd within several months of collaring. The most recent collaring effort was in April 2003, when the reported group of 50 bison may have been in the DAP. It is possible that this group of bison remained separate from the herd and did not have a radio collar so went uncounted. However, they likely would have joined the herd during the rut and would have been counted in August or September.

It is possible that a group of bison dispersed outside of the normal Delta bison herd range; however, there is no evidence this occurred. Bison use of the Buffalo Dome burn this summer was interesting and resulted in range expansion but likely did not lead to dispersal.

Mortality. Poaching and illegal harvest of Delta bison probably occur at an unknown rate. However, if significant poaching had occurred, I assume it would occur on adults, which would skew the calf percentage higher. The percent of calves in the herd (22%) is within the normal range, which tends to discredit poaching as a mortality source.

It is doubtful that a large number of bison would have died from other causes (disease, military activity, etc.) without some evidence being reported. There is no anecdotal evidence that disease reduced productivity or caused mortality. Results of recent serological tests that do not identify a mortality source are discussed below. I can develop numerous mortality scenarios, but there is no basis to assume any have merit.

Population Composition

RY01. We calculated sex and age composition from a sample of 278 bison counted on 25 and 27 September 2001 (Table 2). Calf survival was 57 calves:100 cows, and calves composed 25% of the sampled population. Adult and yearling cows composed 45% of the sampled population.

The bull:cow ratio was 68:100 which met the objective, and bulls ≥1-year-old composed 23% of the sampled population. The yearling bull:cow ratio of 11:100 was lower than last year's ratio. We observed 84 bulls during composition surveys; 6 of these were not classified by horn morphology. Based on the sample of 78 bulls that were classified, "medium bulls" were the largest component composing 39% of all bulls (Table 3).

RY02. We calculated sex and age composition from a sample of 229 bison counted on 5 and 17 September 2002 (Table 2). Calf survival was 59 calves:100 cows, and calves composed 24% of the sampled population. Adult and yearling cows composed 41% of the sampled population.

The bull:cow ratio was 87:100 which met the objective, and bulls ≥1-year-old composed 27% of the sampled population. The yearling bull:cow ratio of 19:100 was higher than last year. We observed 79 bulls during composition surveys, with 23% yearlings, 23% small bulls, 34% medium bulls and 20% large bulls (Table 3).

The 2000–2005 Delta Bison Management Plan states on page 17 that "The Delta bison permit hunt will be managed to provide the greatest reasonable hunting opportunity. This objective will provide the greatest number of bison for hunting and viewing but will not maximize the number of large mature bulls in the herd." The department has interpreted this to mean that the bull:cow ratio will be managed for not less than 50 bulls ≥1-year-old:100 cows to maximize the number of permits. However, with declining hunter success in recent years, it was necessary to increase the number of permits to meet the precalving population objective. It is my assessment that approximately 130 permits is the practical limit to the number of hunters that can be managed logistically when taking into account landowner issues, hunter crowding, department orientations, etc. Therefore, I have allowed the bull:cow ratio to increase in recent years to limit the number of hunting permits to approximately 130 per year. I reviewed this strategy with the Delta Bison Working Group at their meeting on 15 May 2001 and they concurred with this management approach.

RY03. We calculated sex and age composition from a sample of 266 bison counted on 3 September 2003 (Table 2). Calf survival was 45 calves:100 cows, and calves composed 22% of the sampled population, which is slightly lower than recent years. Adult and yearling cows composed 49% of the sampled population.

The bull:cow ratio was 60:100, which met the objective, and bulls ≥1-year-old composed 16% of the sampled population. The yearling bull:cow ratio of 26:100 was higher than last year's ratio. We observed 77 bulls during composition surveys, with 44% being yearlings, 29% small bulls, 17% medium bulls, and 10% large bulls (Table 3).

Distribution and Movements

RY01. During April and May bison were distributed from the DJBR/DAP area to the Delta River. The first report of bison moving west to the Delta River drainage was received on 1 April 2002 when approximately 50 bison were seen crossing the Richardson Highway in the Donnelly Flats area. On the same day I received reports of 12–15 bison in both the Gerstle Fields and Panoramic Fields, and approximately 50 on Tract 3 of the DAP. On 26 April, 18 bison were seen with 1 newborn calf on the Panoramic Fields. This is the first report of bison possibly calving on the DJBR. Eight bulls were reported on the Panoramic Fields on 1 May. Approximately 40 bison were reported on Tract 3 of the DAP on 4 May. On 7 May, approximately 50 bison were reported on Tract 3 with a newborn calf and approximately 20 bison were seen in 2 groups on the Panoramic Fields.

USARAK monitored bison use of the Donnelly Training Area in spring 2002 to determine potential conflicts between development of new military training areas and bison calving. These aerial observations occurred earlier in the year than when the department typically conducts aerial surveys. During a USARAK survey on 7 May, approximately 193 adults and 16 newborn calves were observed along the Delta River. The most northerly bison were approximately 1.5 miles north of Buffalo Dome at lat. 63°45.12, long. 145°56.82. The most southerly group was located approximately 1 mile south of the mouth of McGinnis Creek at lat. 63°37.69, long. 145°55.09 (A. Payne, USARAK, personal communication). This survey stopped about 4 miles north of Black Rapids Glacier.

During a military observation flight on 13 May, 223 adults and 38 calves were observed along the Delta River between points opposite Allen Army Airfield and Black Rapids Glacier. The farthest north aggregation was located on the Donnelly Training Area's Washington Range at lat. 63°48.27, long. 145°58.73. The group farthest south was located in the Delta River opposite Bear Creek at lat. 63°37.09, long. 145°55.03.

I received a report that a "large group of bison" was seen at Black Rapids Glacier on 13 May. On 14 May, 21 adults and 13 calves were located in the DAP on Tracts 3 and 7.

RY02. No data were collected on the DBH spring movement to the Delta River portion of their range.

Some bison remained in the DAP and calved there in May. On 4 May, 40 bison were seen in DAP Tract 3 (J. Cummings, personal communication). On 7 May, 50 bison and 1 new calf were seen on DAP Tract U and approximately 20 were seen on the DJBR Panoramic Fields

(R. Swanson, personal communication). On 14 May, 6 adults with 4 calves were seen on DAP Tract 3, and 16 adults with 9 calves were seen on DAP Tract 7 (J. Cummings, personal communication). On 17 May, 25 adults were seen on the DJBR Panoramic Fields and 5 adults with 4 calves were seen on the Schultz Farms (Tracts 3, 5, or U) in the DAP.

Also in May, bison were being seen on the Delta River. On 13 May, a "large group" was reported at Black Rapids and on 15 May, approximately 25 adults with 5 calves were seen near Big Lake on the Fort Wainwright Donnelly Training Area East (K. Kelly, USARAK, personal communication). USARAK personnel flew a bison survey on 23 and 24 May and located 232 adult bison with 52 calves along the Delta River with the northerly most group on the Washington Range of the Donnelly Training Area at lat. 63°47.98, long. 145°59.17 and the southerly most group on the Delta River south of McGinnis Creek at lat. 63°37.72, long. 145°55.11. During a USARAK survey on 28 May, the observers thought a substantial number of bison had moved onto the Delta River uplands in the vicinity of Fort Wainwright's Texas Range; however, they did not survey there. On the 28 May survey, the southernmost bison was a single adult north of Black Rapids at lat. 63°36.25, long. 145°56.28. The northernmost group was 32 adults with 6 calves on Washington Range at lat. 63°51.37, long. 145°56.37. Bison were still migrating toward the Delta River in late May as reported by R. Swanson, (Alaska Bureau of Wildlife Enforcement, personal communication) who saw approximately 15 bison crossing the Richardson Highway heading west in the Donnelly Flats area on 28 May.

During aerial surveys on 15, 16, and 27 June and 5 and 7 July the DBH was located along the Delta River and Delta River uplands, which is primarily military land.

Bison began moving from the Delta River toward the DJBR in mid July when 3 bison were seen in the Panoramic Fields on 13 July. During an aerial survey on 1 August most of the DBH was located on the Panoramic Fields of the DJBR; however, 2 aggregations totaling 30 bison were still on the Delta River. An aerial survey on 9 August found the herd divided between the DJBR's Panoramic Fields and Gerstle Fields, with tracks of an estimated 30 bison seen in the Gerstle River near DAP Tract M. However, no bison were observed in the DAP.

The first bison seen in the DAP were 8-9 seen on Sawmill Creek Road in the DAP on 27 July. The first day that large numbers of bison were seen in the DAP was 12 August when 300 were seen on Tract M. By late August, most bison had moved from the DJBR into the DAP.

In late August, some bison began returning to the DJBR. A 20 August aerial survey found 59 bison in the Gerstle Fields with the remainder of the DBH in the DAP. Aerial surveys on 23, 25, and 29 August found a similar distribution.

On a 4 September aerial survey, the animals in the DBH were located in the DAP. However, in late September a substantial number of bison had returned to the DJBR. During surveys on 23 and 24 September, 292 and 328 respectively were found on the DJBR. A large number of bison were still present on the DJBR when the bison hunting season opened on 1 October. The return of bison to the DJBR in late September in such large numbers may have been due to the reduced level of human disturbance from moose hunters in the fields resulting from the

BRYHMA regulations that allowed hunting by only 24 permit holders and restricted the use of motorized vehicles for hunting in the fields.

RY03. Data on DBH movement from their winter range is sparse in RY03. The only observation was 6 March when approximately 50 bison were seen moving west at a location about ½ mile north of Butch Lake, which is approximately one-half the distance from the DJBR's Panoramic Fields to the Delta River.

During an aerial survey on 11 April, all bison located were along the Delta River on the Fort Wainwright Donnelly Training Area East from near Big Lake at lat. 63°51.09, long. 145°55.68 to an area south of Washington Range at lat. 63°45.57, long. 145°56.51. On 18 April, the herd had a similar distribution; however, 3 aggregations totaling about 29 bison were located in the Panoramic Fields and one aggregation of 4 bison was located near Butch Lake at lat. 63°50.88, long. 145°38.40, moving west toward the Delta River.

During a USARAK survey of the Delta River on 1 May, the DBH was distributed from north of Bolio Lake to an area south of McGinnis Creek. During USARAK and ADF&G surveys on 6 and 7 May, the northerly distribution of the herd remained similar; however some animals had moved south toward Black Rapids. On a 16 May ADF&G survey, we observed that the DBH had moved back north, perhaps because plant phenology was not as advanced at Black Rapids. Twelve aggregations totaling 184 bison were located in the Buffalo Dome burn. On 25 May, DBH animals had moved back south with the herd distributed from Fort Wainwright Donnelly Training Area East's Texas Range to Black Rapids. By late June, the DBH had moved north from the Black Rapids area and was distributed on military land of the Donnelly Training Area East. On 8 July, 4 aggregations with 80 bison moved south again to the Pillsbury Creek–Black Rapids area, with the remainder of the herd on military land.

The DBH began moving to the DJBR in late July. On 16 July, 50 bison were seen in the Panoramic Fields. During a 30 July aerial survey, the DBH was distributed from the Delta River to the Panoramic Fields. Most bison were still on military land; however, 2 aggregations with 11 bison were in the Panoramic Fields and one aggregation was located on Jarvis Creek south of Butch Lake at lat. 63°48.66, long. 145°39.99, en route to the Panoramic Fields. On 3 August, the number of bison in the Panoramic Fields had increased to 32, with 133 bison observed there on 18 August, and approximately 243 observed in the Panoramic Fields on 19 August.

Bison were first observed in the DAP on 18 August when we received a report of 8 bison in the DAP. During a 25 August survey, approximately 220 were observed in the DAP and 48 in the Panoramic Fields. On 4 September the entire DBH was located in the DAP.

Radiocollaring — To enhance our abilities to track the herd's distribution and movements and monitor population size and composition, 9 female bison were immobilized on 12 April and fitted with radio collars. Because we were immobilizing the bison in April prior to calving, there was concern that including xylazine in the drug mixture may cause abortions in pregnant cows. Therefore, xylazine was not included as in previous years. Induction time was adequate at 2.5–6 min for most bison; however, the bison were very difficult to handle on the ground with much head movement, kicking, and generally high levels of activity. After an

intramuscular injection of naltrexone, recovery time was 2.5–8 min. There were no post capture mortalities.

MORTALITY

Harvest

Season and Bag Limit. The resident and nonresident bison hunting season was 20 July–31 March during the RY01–RY03 hunting seasons, however, hunting did not routinely begin until 1 October each year so farmers in the DAP could finish harvesting their crops before the hunt started.

Hunters participated in the hunt by drawing permit. Hunt DI403 was for bulls only and hunt DI404 was for cows only. The department and the Governor's office also issued special permits some years. These hunts were designated as DI405. Recipients of these permits were required to follow all regulations and permit conditions that applied to the drawing permits. The following conditions applied to all permits:

- Permittees were required to attend an orientation course before hunting. Hunter orientations were scheduled every 5 days coinciding with the hunt period starting dates.
- Permittees were assigned specified periods to begin hunting that were determined by the order permits were drawn.
- Permittees were required to use a rifle capable of shooting a 200-grain bullet with 2000 ft/lb of retained energy at 100 yards. Bows had to comply with 5 AAC 92.075(4) to be a legal means of harvest. Crossbows were prohibited. Certain muzzleloading firearms qualified.

Alaska Board of Game Actions and Emergency Orders. At the March 2002 meeting of the Alaska Board of Game, the board considered a proposal (proposal 1) from the Delta Chapter of the Alaska Farm Bureau to extend the DBH hunting season from 31 March to 30 June. Their justification was to allow for an extension of the hunting season to take bison that might remain in the DAP after most others migrated to the Delta River in the spring. The proposal failed.

At the February 2004 Board of Game meeting, proposal 110 was submitted by the Delta Bison Working Group and the Delta Fish and Game Advisory Committee to amend moose hunting regulations for the BRYHMA. The proposal was developed from recommendations by the Bison Range Youth Hunt Ad Hoc Committee. The proposal changed the bag limit to 1 bull per lifetime with spike-fork antlers or antlers at least 50-inches wide or with at least 4 brow tines on one side and restricted motorized vehicles for all hunting. The proposal passed.

Human-Induced Mortality.

RY01 — Total human-induced mortality was estimated to be 107 bison (Table 4). Hunters killed 98 bison (51 bulls and 47 cows) and estimated wounding loss was 9 bison (7% of the number of permits issued). Hunters with bull-only permits (DI403) killed 47 bulls and 2 cows (Table 5). Hunters with cow-only permits (DI404) killed 45 cows and 4 bulls. Six hunters

killed bison of the wrong sex during both hunts. One special use permit (DI405) was issued to Alaska Fish and Wildlife Safeguard who raffled it to a hunter who killed a bull (Table 5).

Successful hunters with bull permits (DI403) hunted a mean of 7.6 days and unsuccessful hunters hunted a mean of 14.6 days (Table 6). Successful hunters with cow permits (DI404) hunted a mean of 5.9 days and unsuccessful hunters hunted a mean of 7.7 days.

RY02 — Human-induced mortality was estimated to be 114 bison (Table 4). Hunters killed 105 bison (54 bulls and 51 cows) and estimated wounding loss was 9 (7% of the number of permits issued). Hunters with bull-only permits (DI403) killed 51 bulls and 1 cow and hunters with cow-only permits (DI404) killed 50 cows and 0 bulls (Table 5). Only 1 bison was killed of the wrong sex. No special use permits (DI405) were issued during RY02 (Table 5).

Successful hunters with bull permits (DI403) hunted a mean of 5.2 days and unsuccessful hunters hunted a mean of 11.3 days. Successful hunters with cow permits (DI404) hunted a mean of 5.8 days and unsuccessful hunters hunted a mean of 11.1 days (Table 6).

RY03 — Human-induced mortality was estimated to be 86 bison (Table 4). Hunters killed 77 bison (43 bulls and 34 cows), and estimated wounding loss was 9 (7% of the number of permits issued). Hunters with bull-only permits (DI403) killed 40 bulls and 1 cow and hunters with cow-only permits (DI404) killed 33 cows and 3 bulls (Table 5). Four hunters killed bison of the wrong sex. One special use permit (DI405) was issued to Alaska Wildlife Safeguard and the hunter killed a cow (Table 5).

Successful hunters with bull permits (DI403) hunted a mean of 4.7 days and unsuccessful hunters hunted a mean of 11.1 days. Successful hunters with cow permits (DI404) hunted a mean of 8.1 days and unsuccessful hunters hunted a mean of 10.5 days (Table 6).

Permit Hunts. The number of permit applications is critical to DJBR operating funds because this is the only funding source for DJBR management, and legislative intent was that $5 from each application be used for DJBR management. The number of applications for Delta bison permits totaled 15,470 in 2001, 15,817 in 2002, 16,286 in 2003, and 14,519 in 2004 (Table 7).

RY01 — We issued 130 permits with 70 for the bull-only hunt (DI403), 60 for the cow-only hunt (DI404), and 1 either-sex permit to Alaska Fish and Wildlife Safeguard (DI405) (Table 5).

RY02 — We issued 135 permits, with 70 permits for the bull-only hunt (DI403) and 65 for the cow-only hunt (DI404) (Table 5).

RY03 — We issued 130 permits, with 70 permits for the bull-only hunt (DI403), 60 for the cow-only hunt (DI404) and 1 special use permit (DI405) to Alaska Fish and Wildlife Safeguard (Table 5).

RY04 — We issued 75 permits with 50 for the bull-only hunt (DI403) and 25 for the cow-only hunt (DI404; Table 5). This was a reduction from the number of permits printed in the spring drawing permit supplement newspaper, which listed 90 permits with 45 each for DI403 and DI404.

Hunter Residency and Success.

RY01 — Most Delta bison hunters continued to be nonlocal Alaska residents with 95% of all resident hunters residing outside of Unit 20D (Table 8). One (1%) hunter was a nonresident. Seventy-six percent of all permit holders were successful (Table 8). Two percent of permit recipients did not hunt (Table 5).

RY02 — Most Delta bison hunters continued to be nonlocal Alaska residents, with 98% of all resident hunters residing outside of Unit 20D (Table 8). Two (2%) hunters were nonresidents. Permit holders that hunted had an 80% success rate. Three percent of permit recipients did not hunt (Table 5).

RY03 — Most Delta bison hunters continued to be nonlocal Alaska residents, with 100% of all resident hunters residing outside of Unit 20D (Table 8). One (1%) hunter was a nonresident. Permit holders that hunted had the lowest hunter success rate since at least RY90, with only 63% of permittees who hunted killing bison. Five percent of permit recipients did not hunt (Table 5).

Harvest Chronology.

RY01 — Harvest chronology was similar to chronology in previous years, with most harvest (61%) in October and November and with rate of harvest slowing during December–February and increasing during March (Table 9).

RY02 — Harvest chronology was similar to chronology in previous years, with most harvest (66%) in October and November and with rate of harvest slowing during December–February and increasing during March (Table 9).

RY03 — Harvest chronology was similar to chronology in previous years, with most harvest (61%) in October and November and with rate of harvest slowing during December–February and increasing during March (Table 9).

Transport Methods.

RY01 — Successful bison hunters used highway vehicles most commonly (79%), while 13% of successful hunters used snowmachines. These modes of transportation continue to be the most common (Table 10).

RY02 — Successful bison hunters used highway vehicles most commonly (90%) (Table 10).

RY03 — Successful bison hunters used highway vehicles most commonly (75%), while 22% of successful hunters used snowmachines. These modes of transportation continue to be the most common (Table 10).

Harvest Locations.

RY01 — Most bison (65%) continued to be killed on private agricultural lands in the DAP; however, the proportion of bison killed in this area has decreased since RY89 (Table 11). The number of bison killed on the DJBR was 25%, with 10% killed in other locations.

RY02 — Most bison (78%) continue to be killed on private agricultural lands in the DAP (Table 11). Twenty-one percent of bison were killed on the DJBR with 1% killed in other areas.

RY03 — Most bison (71%) continue to be killed on private agricultural lands in the DAP (Table 11). Twenty-one percent of bison were killed on the DJBR with 8% killed in other areas.

Other Mortality

Natural mortality was not quantified for the DBH. Humans caused most nonhunting mortality through road kills, trapper snares, and other factors.

Disease Management

Disease transmission from domestic livestock in the Delta Junction area was the greatest potential source of nonhunting mortality. Cattle in the area have had infectious bovine rhinotracheitis, bovine viral diarrhea, bovine respiratory syncytial virus, infectious bovine kerato conjunctivitis, parainfluenza 3 (PI3), Johne's disease (positive in Alaska but not verified from Delta Junction), and Neospora caninum (D. Quarberg and C. Crusberg, personal communication).

The following serological tests and results were obtained during this reporting period for samples collected during 2000–2003: bovine viral diarrhea = 140 analyzed with 4 positive (2.9%); infectious bovine rhinotracheitis = 72 analyzed with 0 positive (0%); bovine parainfluenza-3 = 72 analyzed with 72 positive (100%); malignant catarrhal fever = 147 analyzed with 18 positive for ovine form (12.2%); brucellosis = 193 tested with 0 positive (%); Johne's disease = 193 tested with 0 positive (0%); and neospora = 210 submitted for testing with no results available. Also, fecal samples from 12 bison were submitted for culture of Johne's disease and were negative for Johne's disease and also negative for *Mycobacterium avium paratuberculosis*. It is noteworthy that 7 bison from the Farewell Herd were negative for bovine parinfluenza-3 and malignant catarrhal fever, whereas some Delta bison tested positive for these agents, indicating that exposure to domestic livestock continues to be a concern for the DBH. However, no dramatic changes in historic prevalence for infectious diseases were detected. We intend to collect lungs from hunter-killed bison in the future to look for clinical signs for parainfluenza-3 and malignant catarrhal fever.

HABITAT

2001 DJBR Habitat Management

Oats that were ungrazed in fall 2000 were grazed extensively over winter 2000–2001, with an estimated 90% of forage consumed in these areas by spring RY00. Bluegrass also appeared to have been grazed heavily over the winter.

Approximately 820 acres of nugget bluegrass and 50 acres of fescue were fertilized from 21–30 May in the Panoramic Fields and from 4–11 June in the Gerstle Fields for a total cost of $28,760. Approximately 300 acres of oats were planted in the Panoramic Fields and 100 acres in the Gerstle Fields on acreage being treated to control bluejoint reedgrass and as additional bison forage.

When bison began arriving on the DJBR on 19 July, oats were in the following growth stages: the 17 May planting was headed out and 16–28 inches tall; the 8 June planting was 18–24 inches tall; the 20 June planting was 8–18 inches tall; and the 29 June and 2 July planting was 4–8 inches tall.

Forage samples collected from the DJBR Panoramic Fields on 9–16 August indicated a wide range of forage quality available for bison. Oats planted on 20 and 28 June had high relative feed values (RFVs) of 205 and 206 respectively. Oats planted during May had RFVs ranging from 90–100. Bluegrass replanted in 2000 did not vary substantially in forage quality from bluegrass planted in the 1980s. The 2000 planting had an RFV of 113 compared to RFV of 117 for older bluegrass. Brome grass that had been mowed 11 July had higher forage quality (RFV = 115) than unmowed brome (RFV = 103). Bluegrass and oats in the Gerstle Fields had slightly lower forage quality than in the Panoramic Fields. Oats planted on 2 July had an RFV of 192 and bluegrass had an RFV of 93.

Bluejoint reedgrass was mowed in the Panoramic Fields on 16–17 July when the plants were 16-32 inches tall with 0-3 tillers.

Approximately 500 acres of woody regrowth were mowed in the Panoramic and Gerstle Fields. Approximately 115 acres in the Panoramic Fields were disked and fallowed to reduce bluejoint reedgrass.

Bison Viewing

No bison viewing enhancement activities occurred during this reporting period.

2002 DJBR Habitat Management

Approximately 420 acres of nugget bluegrass and arctared fescue were fertilized in the Panoramic Fields 20–30 May and 450 acres in the Gerstle Fields 3–6 June. Total cost to fertilize grasses was $27,173.

Derby oats were planted on 305 acres in the Panoramic Fields and 100 acres in the Gerstle Fields on acreage being treated to control bluejoint reedgrass. Oats were planted on a variety of dates to provide a range of growth stages and forage qualities when bison migrate from their Delta River range to the DJBR. Forage samples were collected on 30 August, near the time when bison migrated from the DJBR to the DAP. The following oat seeding dates, acreages, and RFVs were achieved:

Date	Location/Acres	RFV
22 May	Panoramic Fields, 40 acres	97
14 June	Panoramic Fields, 80 acres	127
21 June	Panoramic Fields, 35 acres	161
24 June	Panoramic Fields, 35 acres	169
27 June	Panoramic Fields, 50 acres	155
2 July	Panoramic Fields, 65 acres	150
5 July	Gerstle Fields, 100 acres	173

For comparison, brome in the DAP Tract T had an RFV of 101.

Control of the noxious grass bluejoint reedgrass without the use of chemical herbicides was tested with 2 methods. The first and most successful was repeated disking of infested acreage. The acreage was disked annually for about 7 years to expose the root systems to overwinter desiccation, which reduced overwinter survival. After disking, this acreage was also planted with oats to reduce wind erosion of the exposed soil and to provide additional bison forage as described above. When bluejoint infestation was reduced by >75%, the acreage was replanted with perennial grass. In 2004, 6 acres immediately north of the water well and tanks in the Panoramic Fields were replanted with nugget bluegrass at a seeding rate of 6 lb/ac.

The second method of bluejoint control tested was repeated mowing of infested acreage. The principle of control by mowing is that the plant will be repeatedly stressed and thus eventually be reduced or eliminated. Also, mowing increases forage quality of the regrowth, which may make it more palatable to bison. However, our anecdotal observations during recent years indicate that we cannot mow bluejoint sufficiently to control it or make it sufficiently palatable to be quality bison forage with current funding and staffing. This year was the eighth year of repeatedly mowing the same 160 acres. Bluejoint was mowed only 1 time (16–17 July) because of time limitations and the low level of confidence we now have with mowing as a control technique. The plants were 16–32 inches tall with 0–3 tillers when mowed. Bluejoint regrowth had an RFV of 86 when sampled on 30 August. During years when this acreage was mowed 2-3 times/year, some reduction in bluejoint was observed but not enough to allow replanting to perennial grass. However, in years when it was mowed only one time, little reduction was observed.

Other forage management activities included disking an additional 300 acres for bluejoint reedgrass control and leaving it fallow. Woody regrowth with a basal diameter ≤3 inches was retarded on 625 acres by mowing with a brush mower. Woody regrowth was also mowed on the trail connecting the Gerstle and Panoramic Fields. This was the first time the trail had been mowed since constructed in 1988.

Test planting of timothy and brome were monitored to determine their suitability as an alternate forage crop to nugget bluegrass. Timothy mowed on 16–17 July had RFV of 95 compared to unmowed timothy, which had RFV of 90. Brome mowed on 16–17 July had RFV of 87. Neither of these forage crops was as high quality as nugget bluegrass, which had RFV's ranging from 93 to 107.

In addition to managing bison forage, water and minerals were also supplied as bison attractants on the DJBR. The Panoramic Fields water tanks were used extensively. Bison drank 12,222 gallons from the date of their arrival until freeze-up. This was the highest water consumption in recent years. Trace-element mineral blocks with and without selenium were placed in the fields and were used extensively by bison. This was the first year we supplied selenium blocks and the bison seemed to prefer them to blocks without selenium.

2003 DJBR Habitat Management

Approximately 820 acres of nugget bluegrass and 50 acres of arctared fescue were fertilized at a cost of $23,177. Grasses were fertilized in the Panoramic Fields during 13–28 May and in the Gerstle Fields during 28 May–5 June.

Approximately 300 acres of Derby oats were planted in the Panoramic Fields and 120 acres in the Gerstle Fields. The following oat seeding dates, acreages, and RFVs were achieved:

Date	Location/Acres	RFV
15 May	Panoramic Fields, 80 acres	103
15 June	Panoramic Fields, 80 acres	130
17 June	Panoramic Fields, 35 acres	162
25 June	Panoramic Fields, 80 acres	123–149 (2 different planting locations)
1 July	Gerstle Fields, 100 acres	168
9 July	Gerstle Fields, 20 acres	157

Bluejoint reedgrass was mowed on 23 and 28 July to test mowing as a long-term control technique for this noxious grass. When mowed, the grass was approximately 8–28 inches tall with a RFV of 96.

Sixteen acres in the Panoramic Fields near the water tanks were planted with nugget bluegrass on 21–22 July to reestablish bluegrass in this area. Test plantings of alternate forage species were planted in the Panoramic Fields. Five acres were seeded with carton brome and 4 acres with alsike clover.

Approximately 255 acres were disked on the Panoramic and Gerstle Fields to kill unwanted grasses and trees. An additional 330 acres were mowed with a brush mower to control noxious vegetation. Old berm piles were removed from 80 acres in the Panoramic Fields to eliminate a source of bluejoint seeds.

Aerial Observations of Habitat Selected by Aggregations with Radiocollared Bison. Bison censuses were flown on the DJBR on 18, 19, 25, 27, and 28 August, 10 September, and 1 October 2003. Eighteen aggregations were located that contained a radiocollared bison. Mean aggregation size was 57 bison and 1031 bison were observed. Most bison (66%) were observed in oats, 21% were observed in other habitats, 11% in bluegrass, and 2% in browse habitats (Fig 1).

Aerial Observations of Habitat by Aggregations without Radiocollared Bison. Twelve aggregations were observed without radiocollared bison. Mean aggregation size was 17 bison and a total of 200 bison were observed. Most bison (51%) were observed in bluegrass, 34% were observed in oats, 15% in other habitat types, and 0 were seen in browse habitats.

Ground Observations of Habitat Selection by Bison. Thirty-four aggregations were observed from the ground from 16 July–1 October 2003. Eight aggregations were observed in July, 18 in August, 6 in September, and 1 in October. Mean aggregation size was 58 bison, with a cumulative sample of 1969 bison observed. Most bison (67%) were observed in oats, 26% were in bluegrass, 7% were in other habitats, and 0% was in browse.

Cumulative Observations of Habitat Selection by Bison on the DJBR. Pooling all observations resulted in 64% of bison observed in oats, 23% in bluegrass, 12% in other habitats, and 1% in browse types.

Bison observed on the DJBR from 16 July–1 October 2003 showed strong habitat selection for oats with 64% of all observations occurring there even though oats were planted on only about 420 acres (15%) of the fields. Planting oats is an important part of the DJBR bison management program. The 2000–2005 Delta Bison Management Plan was developed with public input from the Delta Bison Working Group and approved by the Alaska Board of Game to meet the DJBR legislative mandate and states that the department will "Manage the DJBR to encourage the Delta bison herd to remain south of the Alaska Highway, and out of private agricultural land as late in the fall as possible." An important part of the DJBR management program is planting oats to prevent soil erosion on exposed soil and to provide high quality forage to attract bison to the DJBR.

Criticism of the oat plantings was based on anecdotal observations by a few members of the public of bison browsing on aspen, willows, and forb species such as fireweed. Therefore, critics of the DJBR forage management program claimed that oats were not preferred bison forage and that DJBR management practices to control and eliminate browse species should be discontinued.

Delta bison do forage upon shrub and forb species. Berger (1996) studied Delta bison forage in late summer (26 Jun–18 Aug) along their Delta River summer range and stated "although a substantial portion of bison diets was browse, they are predominantly grazers." I have also observed Delta bison foraging on shrub and forb species on the DJBR. Shrub and forb browse species are abundant on the DJBR in the 1987 Granite Creek burn and the 1994 Hajdukovich Creek burn; however, Delta bison continue to prefer grazing to browsing.

DJBR forage management requires a high quality forage to attract and hold bison on the DJBR during late summer and fall months to keep them out of private agricultural land on the north side of the Alaska Highway. Based on forage quality analysis, oats grown on the DJBR are some of the highest quality forage available to Delta bison in the fall. Bluegrass grown on the DJBR is also high quality but lower than oats and similar to brome grass hay crops on private land. Bison showed strong preference for oats, the highest quality forage available during observations of bison habitat selection.

Therefore, we will continue to use oats as an important part of the DJBR bison forage management program to prevent soil erosion and provide a high quality forage. Although Delta bison consume browse species, only 1% of all bison observed on the DJBR from July–September 2003 were found in this habitat type. Bison showed a strong preference for oats on the DJBR.

Aerial Observations of Moose Habitat Selection on the DJBR. Surveys were flown on the following dates: 19 August morning and evening, 27 August morning, 28 August evening, 4 September morning, 10 September morning and evening, and 16 September morning and evening. Only 1 survey was flown on 4 September because poor flying weather prevented an

evening flight. The comparative survey was flown during the evening of 28 August before the hunting season so it would not interfere with hunters.

The 4 September survey was the only one flown during a BRYHMA hunt period. Because one hunter may still have been hunting in the Panoramic Fields at the time, I maintained a survey altitude of 500 feet AGL (instead of 300–500 feet AGL) to avoid disturbing moose. Therefore, composition data was only collected from cows with calves during that survey. No hunters were hunting in the Gerstle Fields and composition data was collected there.

Mean survey time was 34 minutes (range 28–45) in the Panoramic Fields and 24 minutes (range 19–31) in the Gerstle Fields. The Hajdukovich Creek burn comparative survey was 30 minutes in duration.

Number of Moose Seen. Figure 2 illustrates the number of moose seen in both the Panoramic and Gerstle Fields during BRYHMA surveys. The number of moose seen in August prior to the hunting season ranged from 29 to 39 for a density of 7–9 moose/mi^2 in the fields. Bull composition averaged 8 bulls:100 cows (range 0-15). A total of only 7 bulls were seen in the fields during August (Fig 3), of which only 1 would have been legal based on general hunting season antler restrictions.

The comparative survey on 28 August resulted in more moose seen outside the BRYHMA than inside. We surveyed the Hajdukovich Creek burn for 30 minutes from 1950 to 2020 hours and saw 49 moose including 14 bulls. The BRYHMA survey resulted in 29 moose with no bulls seen. The Panoramic Fields survey took 28 minutes from 2042 to 2110 hours with 21 moose and no bulls. The Gerstle Fields survey was 26 minutes from 2114 to 2140 hours with 8 moose and no bulls.

The number of moose seen in the fields increased during September surveys. The highest number seen was during the 16 September morning survey with 143 moose observed in the 2 fields for a density of approximately 33 moose/mi^2. During September, the bull:cow ratio averaged 7:100 (range 0-13), with 23 total bulls seen (Fig 3). Seven bulls seen in September had forked antlers and would have been legal to hunt under antler restrictions; however, I think several of these bulls were seen repeatedly and thus counted several times. No other legal bulls were seen in the BRYHMA.

Habitat Selection by Moose in the BRYHMA. Moose use of the DJBR fields and the oats planted in the fields increased from mid August (29%; range 21-40%) through mid September (51%; range 36–64%; Fig 4). However, based on habitats selected by observed moose, they are not attracted to the fields solely because of oats. Moose selected non-oat habitats more frequently than oats in August. During September surveys, moose selected oats on average only about one-half of the time. The DJBR fields have many acres in woody regrowth. Moose were frequently observed in low shrub and tall shrub habitats. Therefore, it is apparent that the portions of the fields that were cleared but regrown to low and tall shrubs provide excellent moose habitat. Moose would probably occur in this area whether oats were planted or not. The increased use of the DBJR oats in September appeared to correspond with willow and aspen dropping their leaves. As leafy browse became less available, moose increased their use of oats.

Based on the 28 August comparative survey, use of the BRYHMA by moose prior to the hunting season, and possibly early in the hunting season, may have been lower than outside of the fields in the surrounding burns. The number of moose in the fields increased during September. However, most were cows. Bulls were not attracted to the fields in numbers disproportionately higher than their composition in the winter population. During a 2001 winter population estimate of southwest Unit 20D, the bull:cow ratio was estimated to be 15:100 (90% CI = 9–20). The lower limit of this estimate is similar to ratios observed during BRYHMA surveys. However, if bull moose were attracted to the fields disproportionate to their numbers in the population, I would expect the bull:cow ratio in the BRYHMA survey to be higher than observed. As moose pre-rut and rutting activity increased in September, the bull moose attracted to the BRYHMA were probably attracted to the large numbers of cow moose as much as to the oats.

The moose habitat selection survey in the BRYHMA indicates that DJBR forage management does not appear to attract bull moose away from areas generally open to hunting. Therefore, criticism that moose hunters in the area of the DJBR fields have fewer bull moose to hunt because of DJBR bison forage management and BRYHMA regulations is not justified.

DELTA BISON WORKING GROUP ACTIVITIES

The Delta Bison Working Group (DBWG) met and reached the following conclusions:

15 May 2002 Meeting

- Late migratory bison (bison that remain in the DAP after most of the herd migrates to the Delta River in spring):
    - The DBWG will submit a regulation proposal for an earlier hunting season.
    - The DBWG recommends radiocollaring and tracking bison in the late migratory group.
    - The DBWG will write a letter to farmers requesting documentation of bison in the fields in summer.
    - The DBWG recommends ear tagging late migratory bison and making them available during an either sex hunt.
- Bison Range Youth Hunt:
    - The DBWG will submit a letter to the Board of Game to support the need for limiting moose hunting on the DJBR to protect the range.
- Military Representative:
    - The “Military Representative” position should be refilled with Mr. Jeff Mason.

- Reduced Hunter Success Rates:

    - The DBWG recommends working within parameters of the Delta Bison Management Plan and protecting the quality of the hunt by allowing the bull:cow ratio to rise in order to avoid issuing approximately 150 permits to meet the population objective.

24 February 2003 Meeting

- Membership:

    - The DBWG will write a letter to the Delta Chamber of Commerce asking for nominees to refill the Delta Business seat.

- Bison Hunt Drawing Permits:

    - The DBWG will investigate including the Alaska Farmers and Stockgrowers Association on the list of organizations eligible to receive a Governor's special bison permit.

- Moose Hunting on the DJBR:

    - The group reconfirmed that some restriction of moose hunting needs to occur on the DJBR and appointed a subcommittee to work with the Bison Range Youth Hunt Ad Hoc Committee.

ADF&G Ad Hoc Committee on Management of Moose Hunting on the Delta Junction Bison Range

The Bison Range Youth Hunt Management Area (BRYHMA) was created in the DJBR fields based on recommendations in part from the DBWG. Due to local concerns about the BRYHMA, the department created an ad hoc committee to review moose hunting on DJBR fields and the BRYHMA. Text from the final report of the ad hoc committee is reprinted below:

> *Background* — The 90,000-acre Delta Junction Bison Range was established by the legislature in 1979 to perpetuate free-ranging bison and to provide habitat to attract bison away from and reduce crop damage on private agricultural lands. ADF&G manages the range and must stay within the legal mandates of the legislation.

Levels of activity in the fields of the Delta Bison Range have increased over the past 10 years, prompting concerns about the effects of disturbance on bison movements onto and off of the range. In 2002 the Board of Game restricted moose hunting in the fields by a drawing permit limited to youth (age 10–17) for any bull moose and capped the harvest at 24. The Bison Range Youth Hunt was established to:

1. Reduce damage to bison forage crops.

2. Reduce disturbance to bison in the fields during moose hunting season.

3. Reduce safety hazards to ADF&G staff conducting necessary Bison Range fieldwork during moose hunting season.

A secondary benefit of the hunt was to introduce a limited number of youth to moose hunting in an area with a high chance of success. However, most hunters who had used the fields in the past were excluded. Concerns voiced about the youth hunt prompted ADF&G to review the situation and form the ad hoc committee.

Results of 2002 and 2003 Delta Bison Range Youth Hunts — In 2002, 24 permits were issued for any bull moose, and hunters killed 17 bulls. The youth hunt effectively limited the number of vehicles and hunters in the fields, reduced damage to bison forage crops, reduced disturbance to bison in the fields, and provided a safer working environment for ADF&G staff who accomplished substantially more work in the fields. Also, bison used the range more. In 2003, 24 permits were issued and 7 bulls were killed. Aerial surveys indicated significant use of vehicles in the fields, some relating to moose hunting, but more relating to other activities. Damage to crops was again reduced from 2001 (pre-youth hunt) levels, a safer work environment resulted, and more fieldwork was accomplished, but vehicular activity and disturbance to bison appeared to increase over 2002. Bison used the fields until a few days before moose hunting season and immediately after the moose hunting season, but only slightly during the season.

Meeting Schedule — The committee met once in April, twice in May, and once in October 2003, and was presented with information about forage management, hunting effort, an attorney general's opinion of whether the fields are "baited," Bison Range Youth Hunt history, and results of the Youth Hunt for the last 2 years. Members discussed issues relating to moose hunting on the fields and formulated management alternatives to address the concerns expressed by the public. They also circulated a Public Input Questionnaire to residents in the Delta Junction area and received 78 responses. Meeting notes from the 4 meetings are available from Cathie Harms, ADF&G Fairbanks (907-459-7231)

ADF&G appreciates the time and effort the ad hoc committee members have spent on this issue and is committed to working with the Delta Advisory Committee, the Delta Bison Working group, the Department of Natural Resources (DNR), and the Board of Game to further resolve public concerns and manage the Delta Bison Range within the legal mandates of legislation that established the range.

Recommendations for Hunting on the Delta Bison Range Fields Endorsed by the Ad Hoc Committee on 8 October 2003

1. Moose hunting should continue in the fields of the Delta Junction Bison Range under the following conditions:

   - Moose hunting should be regulated by a drawing permit. Harvest should not exceed 20 spike/fork or 50" bulls per year. Drawing permits should allow a 4-day block of time for each hunter during the first 3 weekends in September, and no more than 3 hunters should be allowed in each field per weekend (6 hunters per weekend total).
   - The ad hoc committee did not reach agreement on whether permits should be issued to youth only (defined in the current youth hunt as 10–17 yr old) or to any hunter. Five of

the 7 committee members supported limiting participation to youth, while 2 members supported allowing any hunter to apply. Feedback from the questionnaire circulated in the community was split about evenly between limiting the hunt to youth and allowing any hunter to apply. The ad hoc committee decided to forward this information to the Delta Advisory Committee for consideration.

- ❖ If a hunt is limited to youth, 1 successful hunt per lifetime should be allowed.

2. Motorized transportation should not be allowed within the fields for hunting any species of wildlife between 1 July and 30 September. (This is a change from current regulations, which allow a motorized vehicle to be used to retrieve a moose carcass during the youth hunt.)

3. Motorized transportation should not be allowed within the fields for nonhunting related uses between 1 July and 30 September. ADF&G and the Delta Bison Working Group should work with DNR to restrict all DJBR field access to nonmotorized transportation. Hunting for other species and nonhunting related uses are likely causing as much or more disturbance than moose hunting.

4. If disturbance levels remain high once motorized access to the fields is restricted, ADF&G, the Delta Bison Working Group, and DNR should work to reduce or eliminate human activities in the fields through whatever methods are necessary, but hunting should be the last activity to be eliminated.

5. Poaching in the Delta Junction area is perceived to be significant and on the increase. Additional enforcement is needed and should be obtained.

6. This final report with recommendations and a summary of public input received from the community is to be sent to members of the Delta Advisory Committee and the Delta Bison Working Group.

AD HOC COMMITTEE MEMBERS PRESENT:

Dick Bishop	Mike Schultz	Don Quarberg
Mike Bender	Glen Wright	Dean Cummings
Lee "Skip" Olsen	Tim Webb (alt)	Jack Morris (alt)

CONCLUSIONS AND RECOMMENDATIONS

The DBH continued to do well, despite an unexplained reduction in herd size in RY03. Herd size will be monitored to determine if further herd size reductions are observed. Good herd productivity and calf survival continued with calf:cow ratios ranging from 45 to 59:100 during this reporting period. The herd size objective was met during RY01 and RY02, but precalving herd size was below the objective in RY03. The bull:cow ratio objective was met with ratios ranging from 60 to 87 bulls:100 cows, which is a little higher than in recent years.

Herd movements showed a problematic trend with some bison appearing to spend the summer in the DJBR/DAP area rather than migrating to the Delta River. Some of these cows calved in the DAP and DJBR. It may be advisable to consider harvesting those bison that remain in the

DAP late in the spring or move there early in the fall. However, extending the bison hunting season into these times will have an impact on farming operations. Private landowners should reach a consensus that this action is worthwhile and to date that consensus has not been reached.

Herd health objectives were met by testing bison sera and feces for infectious diseases. Although several diseases were detected, no management actions were required. The serologic health of the DBH continued to be jeopardized by close contact with domestic livestock in the Delta Junction area and by the potential for domestic bison to escape captivity and join the wild herd. Interagency efforts should continue to encourage regulatory changes that provide greater oversight of domestic bison to assure they do not escape captivity and are disease-free. Lungs will be collected from bison killed by hunters to look for clinical signs of parainfluenza-3 and malignant catarrhal fever. At this time there are no infectious diseases thought to be limiting herd productivity.

The objective to investigate methods and funding sources other than bison permit fees to improve bison viewing opportunities for the public was not met. Permit application fees continued to fund management of the DJBR.

The 4 bison conflict management objectives were met. The DJBR met the legislative intent to reduce conflicts between bison and agriculture and continued to benefit farmers by delaying and/or reducing bison movements into the DAP; however we continue to strive to improve. Implementation of the Bison Range Youth Hunt Management Area may have contributed to bison spending more time on the DJBR in the fall. The bison hunt was administered in a manner that minimized conflicts with private landowners. No progress was made toward enhancing summer range to delay the herd's migration toward the DJBR. It was not necessary for the department to provide assistance to the public experiencing bison conflicts because there were no requests.

The greatest challenges to DJBR management continued to be 1) controlling the native grass, bluejoint reedgrass (*Calamagrostis canadensis*), and woody regrowth with nonherbicidal techniques; 2) developing more cost-effective forage management techniques; and 3) holding bison on the DJBR as late in the fall as possible. Controlling bluejoint reedgrass and woody regrowth is a particular challenge in the Gerstle Fields with current funding and staffing levels. We will continue work to improve these aspects of DJBR management.

Hunter success remained low relative to earlier years, ranging from 59 to 78% for permit recipients. This requires issuing more permits to maintain herd size and there may be an upper limit to the number of permits that should be issued to administer the hunt.

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Please cite any information taken from this section, and reference as:

DuBois, S.D. 2004. Unit 20D bison management report. Pages 28–71 *in* C. Brown, editor. Bison management report of survey and inventory activities 1 July 2001–30 June 2003. Alaska Department of Fish and Game. Project 9.0. Juneau, Alaska.

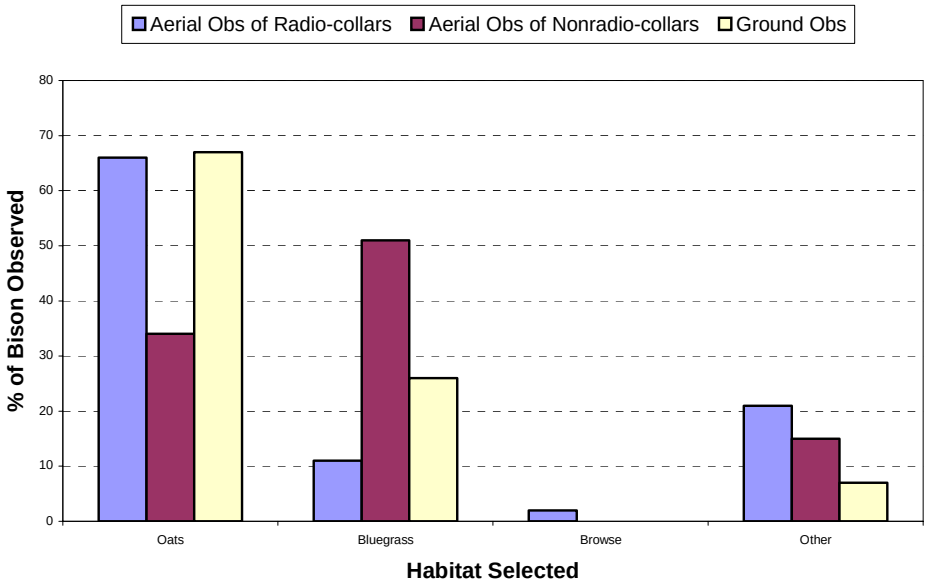

FIGURE 1 Aerial and ground observations of habitat selected by bison in aggregations containing radiocollared and nonradiocollared bison observed on the Delta Junction Bison Range, July–October 2003

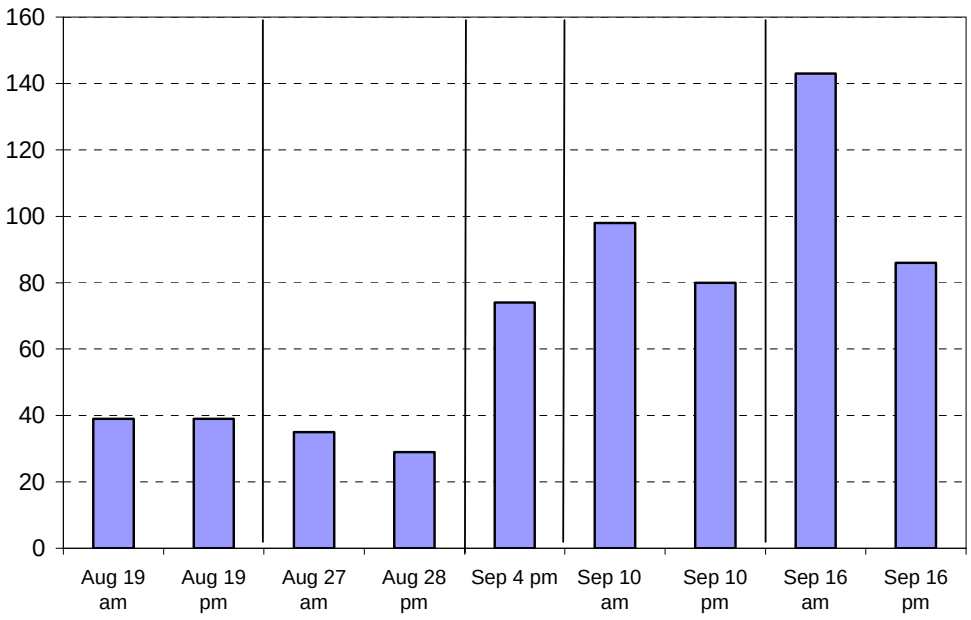

FIGURE 2 Total moose seen in the Bison Range Youth Hunt Management Area during August–September 2003 aerial surveys

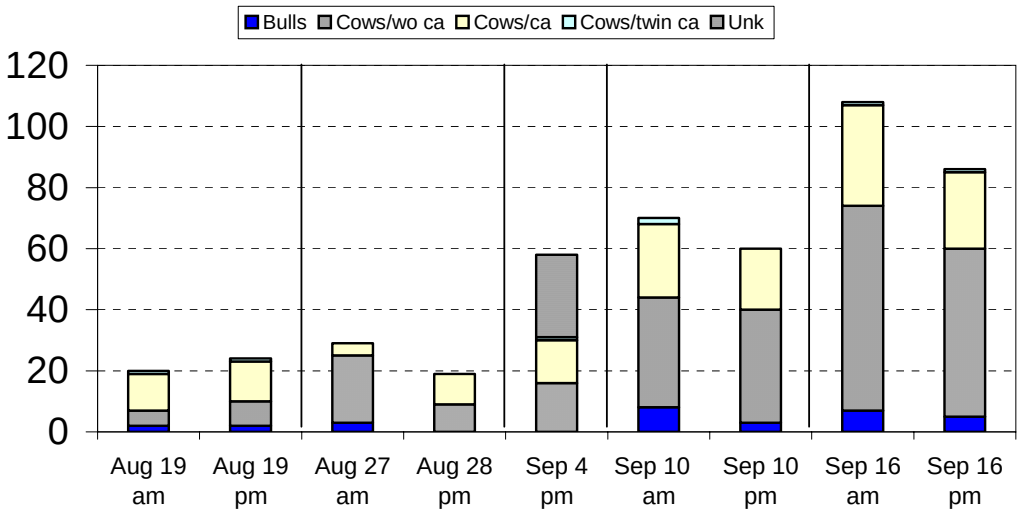

FIGURE 3 Adult moose seen in the Bison Range Youth Hunt Management Area during August–September 2003 aerial surveys

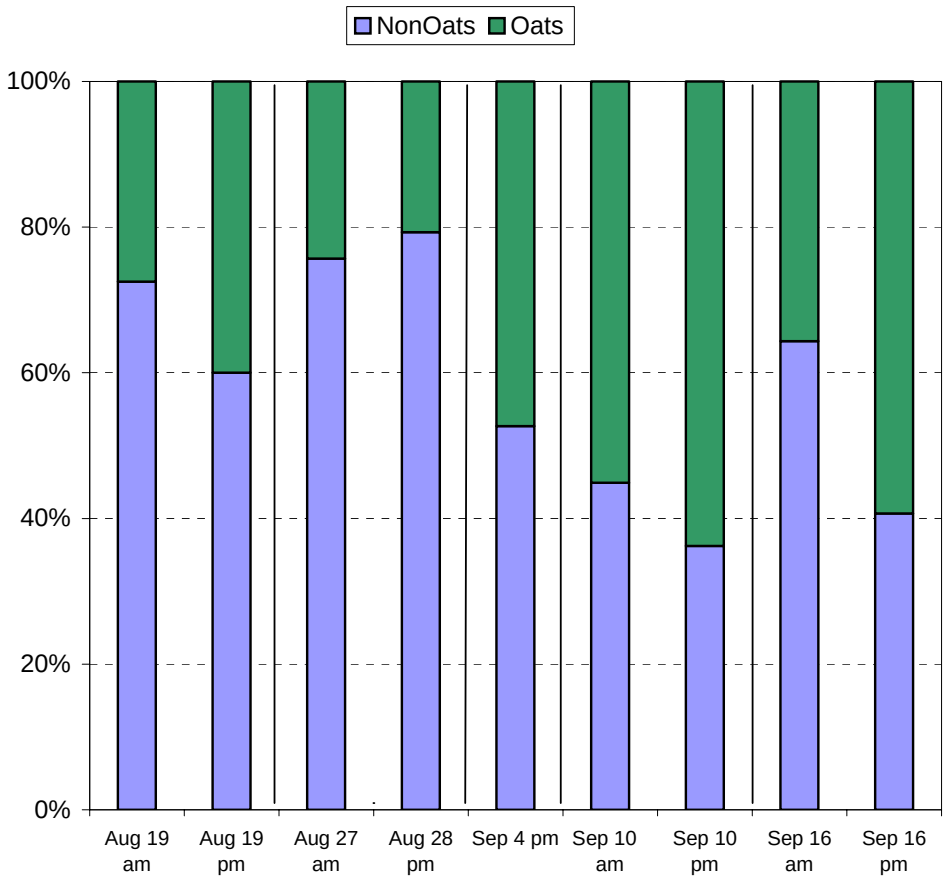

FIGURE 4 Adult moose observed in oat and non-oat habitats within the Bison Range Youth Hunt Management Area during August–September 2003 aerial surveys

TABLE 1 Delta bison precalving and postcalving population estimates, 1983–2004

Year	Spring precalving[a] population estimate	Fall prehunt population estimate
1983	355	360
1984	300	356
1985	285	378
1986	300	361
1987	275	396
1988	337	426
1989	366	432
1990	373	440
1991	378	484[b]
1992	384	482
1993	392	465
1994	340	446[c]
1995	397	485
1996	375	496
1997	381[d]	474
1998	349	414–471
1999	335–393	434
2000	359	453
2001	361	471
2002	373	476
2003	365	407
2004	327	

[a] Calculated by subtracting known mortality from previous prehunt population estimate.
[b] Includes 17 domestic bison that escaped and were incorporated into the herd.
[c] Includes 15 domestic bison that escaped and were incorporated into the herd in May 1994.
[d] Includes 6 domestic bison that escaped and were incorporated into the herd in April 1997.

TABLE 2 Delta bison fall ground composition count data and estimated population size, regulatory years 1986–1987 through 2003–2004

Regulatory year	Bulls:100 Cows	Yrlg bulls: 100 Cows	Calves:100 Cows	Adults		Percent yrlg bulls	Percent calves	Total sample size	Estimated prehunt population size
				% Bulls	% Cows[a]				
1986–1987	44	10	47	38	62	5	25	119	361
1987–1988[b]									
1988–1989	72	17	45	42	58	8	21	141	426
1989–1990	106	25	50	51	49	10	20	225	432
1990–1991	114	19	47	53	47	7	18	110	440
1991–1992	74	10	29	42	58	5	14	201	484[c]
1992–1993	87	14	46	31	43	6	20	381	482
1993–1994	67	21	62	20	44	9	27	308	465
1994–1995	70	21	53	24	45	7	24	172	446[d]
1995–1996	87	22	52	27	42	9	22	231	485
1996–1997	65	13	54	24	46	6	25	279	496[e]
1997–1998	53	3	47	25	50	2	24	200	474
1998–1999	48	9	53	19	50	5	27	354	414–471
1999–2000	54	8	43	22	51	4	22	270	434
2000–2001	63	18	58	15	45	8	26	272	453
2001–2002	68	11	57	23	45	5	25	278	471
2002–2003	87	19	59	27	41	8	24	229	476
2003–2004	60	26	45	16	49	13	22	266	407

[a] Includes yearlings and adult cows.
[b] No data.
[c] Includes 17 domestic bison that escaped and were incorporated into the herd.
[d] Includes 15 domestic bison that escaped and were incorporated into the herd.
[e] Includes 6 domestic bison that escaped and were incorporated into the herd.

TABLE 3 Percent Delta bull bison with different horn categories based on horn morphology, 1997–2003

		Horn Category			
Date	Yearling	Small	Medium	Large	Total
Sep 1997	6	45	37	12	49
Sep 1999	19	44	27	10	59
Sep 2000	36	12	25	28	61
Sep 2001	18	26	39	18	78
Sep 2002	23	23	34	20	79
Sep 2003	44	29	17	10	77

TABLE 4 Delta bison harvest and accidental death, regulatory years 1986–1987 through 2002–2003

Regulatory year	Hunter harvest								Other mortality	Total
	Reported						Estimated			
	M (%)		F (%)		Unk (%)	Total	Unreported[a]	Illegal	Total		
1986–1987	15	(24)	47	(75)	0 (0)	62	5	0	5	0	67
1987–1988	35	(76)	11	(24)	0 (0)	46	4	0	4	0	50
1988–1989	21	(47)	24	(53)	0 (0)	45	4	0	4	0	49
1989–1990	22	(37)	38	(63)	0 (0)	60	5	0	5	0	65
1990–1991	59	(67)[b]	27	(31)	0 (0)	86	6	0	6	2	94
1991–1992	50	(54)	43	(46)	0 (0)	93	7	0	7	0	100
1992–1993	62	(65)	33	(34)	1 (1)	96	7	0	7	3	106
1993–1994	51	(47)	58	(53)	0 (0)	109	8	0	8	0	117
1994–1995	20	(53)	18	(47)	0 (0)	38	3	0	3	4	45
1995–1996	60	(57)[b]	46	(43)	0 (0)	106	8	0	8	0	114
1996–1997	56	(54)	47	(46)	0 (0)	103	8	0	8	6	117
1997–1998	57	(48)	61	(52)	0 (0)	118	9	0	9	8	135
1998–1999	27	(38)[b]	44	(61)[c]	1 (1)	72	7	0	7	4	83
1999–2000	30	(45)[b]	37	(55)	0 (0)	67	7	0	7	3	77
2000–2001	36	(50)	35	(49)	1 (1)	72	7	0	7	0	79
2001–2002	51	(52)	47	(48)	0 (0)	98	9	0	9	0	107
2002–2003	54	(51)	51	(49)	0 (0)	105	9	0	9	0	114
2003–2004	43	(56)	34	(44)	0 (0)	77	9	0	9	0	86

[a] Estimated wounding loss equal to 7% of the permits issued.
[b] One bull was harvested via the Alaska Wildlife Safeguard Raffle.
[c] One cow was harvested via a Governor's permit.

TABLE 5 Delta bison harvest data by permit hunt, regulatory years 1986–1987 through 2001–2002

Hunt/Area	Regulatory year	Permits issued	Percent did not hunt	Percent unsuccessful permittees	Percent successful permittees	Bulls (%)	Cows (%)	Unk (%)	Total harvest
403[a]	1986–1987	10	0	0	100	9 (100)	0 (0)	0 (0)	9
	1987–1988	35	0	0	100	33 (100)	0 (0)	0 (0)	33
	1988–1989	20	10	0	90	18 (100)	0 (0)	0 (0)	18
	1989–1990	30	3	3	93	21 (81)	5 (19)	0 (0)	26
	1990–1991	70	0	3	97	59 (87)	9 (13)	0 (0)	68[b]
	1991–1992	70	0	6	94	50 (74)	18 (26)	0 (0)	68[c]
	1992–1993	80	4	1	95	62 (82)	13 (17)	1 (1)	76
	1993–1994	90	1	7	92	50 (60)	33 (40)	0 (0)	83
	1994–1995	20	5	0	95	19 (100)	0 (0)	0 (0)	19
	1995–1996	70	6	10	85	58 (97)	2 (3)	0 (0)	60
	1996–1997	70	4	9	86	53 (88)	7 (12)	0 (0)	60
	1997–1998	60	3	8	88	51 (96)	2 (4)	0 (0)	53
	1998–1999	45	2	29	69	26 (84)	4 (13)	1 (3)	31
	1999–2000	50	2	34	64	29 (91)	3 (9)	0 (0)	32
	2000–2001	50	6	16	76	35 (95)	2 (5)	0 (0)	37
	2001–2002	70	1	30	70	47 (96)	2 (4)	0 (0)	49
	2002–2003	70	3	23	74	51 (98)	1 (2)	0 (0)	52
	2003–2004	70	7	34	59	40 (98)	1 (2)	0 (0)	41
	2004–2005	50	NA	NA	NA	NA NA	NA NA	NA NA	NA
404	1986–1987	55	0	0	100	6 (11)	47 (89)	0 (0)	53
	1987–1988	15	0	0	100	2 (15)	11 (85)	0 (0)	13
	1988–1989	30	0	10	90	3 (11)	24 (89)	0 (0)	27
	1989–1990	35	0	0	100	1 (3)	33 (97)	0 (0)	34
	1990–1991	20	5	5	90	0 (0)	18 (100)	0 (0)	18
	1991–1992	30	0	17	83	0 (0)	25 (100)	0 (0)	25
	1992–1993	20	0	0	100	0 (0)	20 (100)	0 (0)	20
	1993–1994	30	3	10	87	1 (4)	25 (96)	0 (0)	26
	1994–1995	20	0	5	95	1 (5)	18 (95)	0 (0)	19

Hunt/Area	Regulatory year	Permits issued	Percent did not hunt	Percent unsuccessful permittees	Percent successful permittees	Bulls (%)	Cows (%)	Unk (%)	Total harvest
	1995–1996	50	2	6	92	2 (4)	44 (96)	0 (0)	46
	1996–1997	50	0	12	86	3 (7)	40 (93)	0 (0)	43
	1997–1998	70	3	4	93	6 (9)	59 (91)	0 (0)	65
	1998–1999	55	5	24	71	0 (0)	39 (100)	0 (0)	39
	1999–2000	50	6	26	68	0 (0)	34 (100)	0 (0)	34
	2000–2001	50	8	20	70	1 (3)	33 (94)	1 (3)	35
	2001–2002	60	2	17	83	4 (8)	45 (92)	0 (0)	49
	2002–2003	65	3	23	74	3 (6)	50 (94)	0 (0)	53
	2003–2004	60	3	34	62	3 (8)	33 (92)	0 (0)	36
	2004–2005	25	NA	NA	NA	NA NA	NA NA	NA NA	NA
405	1998–1999	2[bc]	0	0	100	1 (50)	1 (50)	0 (0)	2
	1999–2000	1[b]	0	0	100	1 (100)	0 (0)	0 (0)	1
	2000–2001	2[bc]	0	0	100	2 (100)	0 (0)	0 (0)	2
	2001–2002	1[b]	0	0	100	1 (100)	0 (0)	0 (0)	1
	2002–2003	0	0	0	0	0 (0)	0 (0)	0 (0)	0
	2003–2004	1[b]	0	0	100	0 (0)	1 (100)	0 (0)	1
	2004–2005	0	0	0	0	0 (0)	0 (0)	0 (0)	0
Totals for all permit hunts	1986–1987	65	0	0	100	15 (24)	47 (75)	0 (0)	62
	1987–1988	50	0	0	100	35 (76)	11 (24)	0 (0)	46
	1988–1989	50	2	8	90	21 (47)	24 (53)	0 (0)	45
	1989–1990	65	2	6	92	22 (37)	38 (63)	0 (0)	60
	1990–1991	90	2	2	96	59 (67)	27 (31)	0 (0)	86
	1991–1992	100	0	9	91	50 (54)	43 (46)	0 (0)	93[c]
	1992–1993	100	3	1	96	62 (65)	33 (34)	1 (1)	96
	1993–1994	120	2	8	91	51 (47)	58 (53)	0 (0)	109
	1994–1995	40	3	3	95	20 (53)	18 (47)	0 (0)	38
	1995–1996	120	4	8	88	60 (57)	46 (43)	0 (0)	106
	1996–1997	120	3	10	86	56 (54)	47 (46)	0 (0)	103
	1997–1998	130	3	6	91	57 (48)	61 (52)	0 (0)	118

Hunt/Area	Regulatory year	Permits issued	Percent did not hunt	Percent unsuccessful permittees	Percent successful permittees	Bulls	(%)	Cows	(%)	Unk	(%)	Total harvest
	1998–1999	102	4	26	71	27	(38)	44	(61)	1	(1)	72
	1999–2000	101	4	30	66	30	(45)	37	(55)	0	(0)	67
	2000–2001	102	7	18	73	38	(51)	35	(47)	1	(1)	74
	2001–2002	131	2	23	75	51	(52)	47	(48)	0	(0)	98
	2002–2003	135	4	19	78	54	(51)	51	(49)	0	(0)	105
	2003–2004	130	5	36	59	43	(56)	34	(44)	0	(0)	77
	2004–2005	75	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

[a] Hunt 403 was an either-sex hunt during regulatory years 1989–1990 through 1993–1994.
[b] One permit was issued for an Alaska Fish and Wildlife Safeguard raffle.
[c] One permit was issued for a Governor's permit.

TABLE 6 Delta bison mean number of days hunted for hunts DI403 and DI404, regulatory years 1991–1992 through 2003–2004

Regulatory year	Mean number of days hunted			
	Hunt DI403		Hunt DI404	
	Successful	Unsuccessful	Successful	Unsuccessful
1991–1992	3.8	4.3	3.5	15.6
1992–1993	2.2	1.0	1.9	0.0[a]
1993–1994	4.3	7.2	3.5	5.0
1994–1995	3.0	0.0[a]	3.0	2.0
1995–1996	5.1	10.1	3.8	5.0
1996–1997	6.1	14.8	4.3	6.8
1997–1998	5.6	9.0	4.4	9.7
1998–1999	6.0	9.4	7.0	10.4
1999–2000	7.0	14.1	6.7	22.8
2000–2001	4.2	9.5	7.7	19.0
2001–2002	7.6	14.6	5.9	7.7
2002–2003	5.2	11.3	5.8	11.1
2003–2004	4.7	11.1	8.1	10.5

[a] Zero days hunted indicates there were no unsuccessful hunters.

TABLE 7 Delta bison hunts DI403 and DI404 applications received and permits issued, 1977–2004

Year	Applications received	Permits issued
1977	2,121	20
1978	3,555	15
1979	3,970	25
1980	4,561	35
1981	5,237	55
1982	8,105	75
1983	7,889	75
1984	11,276	55
1985	666[a]	55
1986	6,585	65
1987	6,434	50
1988	9,705	50
1989	10,151	65
1990	11,822	90
1991	11,057	100
1992	12,387	100
1993	13,654	120
1994	13,977	40
1995	15,257	120
1996	17,895	120
1997	15,479	130
1998	16,188	100
1999	15,443	100
2000	16,178	100
2001	15,470	130
2002	15,817	135
2003	16,286	130
2004	14,519	75

[a] Eight thousand nine hundred thirty-one applications were received before Tier II regulations were implemented and applications were returned.

TABLE 8 Delta bison hunter residency and success for drawing permit hunts DI403 and DI404, regulatory years 1986–1987 through 2003–2004

	Successful					Unsuccessful					
Regulatory year	Local[a] resident	Nonlocal resident	Nonres	Unk	Total (%)	Local[a] resident	Nonlocal resident	Nonres	Unk	Total (%)	Total hunters
1986–1987	4	57	0	1	62 (100)	0	0	0	0	0 (0)	62
1987–1988	1	44	0	1	46 (100)	0	0	0	0	0 (0)	46
1988–1989	2	40	1	2	45 (94)	0	3	0	0	3 (6)	48
1989–1990	3	57	0	0	60 (98)	0	1	0	0	1 (2)	61
1990–1991	4	31	0	0	85 (97)	0	3	0	0	3 (3)	88
1991–1992	3	86	2	0	91 (91)	2	7	0	0	9 (9)	100
1992–1993	6	87	1	2	96 (99)	0	1	0	0	1 (1)	97
1993–1994	5	103	1	0	109 (92)	0	9	0	0	9 (8)	118
1994–1995	0	38	0	0	38 (97)	0	1	0	0	1 (3)	39
1995–1996	3	103	0	0	106 (91)	0	10	0	0	10 (9)	116
1996–1997	2	97	1	3	103 (90)	0	11	0	1	12 (10)	116
1997–1998	5	101	12	0	118 (94)	0	6	2	0	8 (6)	126
1998–1999	0	72	0	0	72 (74)	0	25	1	0	26 (27)	98
1999–2000	0	67	0	0	66 (69)	2	27	1	0	30 (31)	96
2000–2001	5	67	0	0	72 (80)	0	18	0	0	18 (20)	90
2001–2002	4	93	1	0	98 (76)	1	30	0	0	31 (24)	129
2002–2003	3	102	0	0	105 (80)	0	24	2	0	26 (20)	131
2003–2004	0	76	1	0	77 (63)	0	46	0	0	46 (37)	123

[a] Local residents reside in Unit 20D.

TABLE 9 Delta bison percent harvest by month, regulatory years 1994–1995 through 2003–2004

Regulatory year	Percent harvest by month							
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	*n*
1994–1995[a]	61	11	8	0	5	16	0	38
1995–1996[a]	42	25	8	5	8	14	0	106
1996–1997[a,b]	23	34	3	6	11	13	11	103
1997–1998	46	26	6	0	8	14	0	118
1998–1999	45	16	4	1	13	21	0	71
1999–2000[c]	39	19	2	5	14	14	9	65
2000–2001	55	23	3	1	10	8	0	74
2001–2002	37	24	8	3	10	16	0	98
2002–2003	44	22	5	2	9	19	0	105
2003–2004	31	30	8	4	8	20	0	77

[a] The hunting season opened on 7 October versus 1 October.
[b] The hunting season was extended by emergency order to include 1–31 April 1997.
[c] The hunting season was extended by emergency order to include 1–15 April 2000.

TABLE 10 Delta bison harvest percent by transport method for Hunts DI403and DI404, regulatory years 1991–1992 through 2003–2004

Regulatory year	Harvest percent by transport method								
	Airplane	Horse/ Dog team	Boat	3- or 4-wheeler	Snowmachine	Other ORV	Highway vehicle	Unknown	*n*
1991–1992	1	0	0	1	14	3	67	14	93
1992–1993	0	0	0	4	49	1	41	5	96
1993–1994	0	2	0	5	24	4	66	0	109
1994–1995	0	0	0	0	39	3	56	0	39
1995–1996	0	0	0	3	16	2	78	0	116
1996–1997	0	0	0	2	13	4	78	3	100
1997–1998	0	0	1	3	33	3	59	2	118
1998–1999	0	0	0	1	19	1	74	4	72
1999–2000	0	0	0	9	33	0	58	0	67
2000–2001	0	0	0	4	11	6	79	0	72
2001–2002	0	0	0	1	13	4	79	2	131
2002–2003	0	0	0	4	0	2	90	4	135
2003–2004	0	0	0	0	22	3	75	0	77

TABLE 11 Delta bison harvest percent by kill location during permit hunts DI403 and DI404, regulatory years 1989–1990 through 2003–2004

Regulatory year	Location of kill			
	Delta Agriculture Project	Delta Junction Bison Range	Other	Unknown
1989–1990	95	5	0	
1990–1991	91	9	0	
1991–1992	77	23	0	
1992–1993	78	17	5	
1993–1994	75	24	1	
1994–1995	86	14	0	
1995–1996	68	26	6	
1996–1997	56	32	12	
1997–1998	70	21	4	4
1998–1999[a]				
1999–2000	51	29	19	2
2000–2001	77	13	10	0
2001–2002	65	25	10	0
2002–2003	78	21	1	
2003–2004	71	21	8	

[a] Data not available.

The Federal Aid in Wildlife Restoration Program consists of funds from a 10% to 11% manufacturer's excise tax collected from the sales of handguns, sporting rifles, shotguns, ammunition and archery equipment. The Federal Aid program allots funds back to states through a formula based on each state's geographic area and number of paid hunting license holders. Alaska receives a maximum 5% of revenues collected each year. The Alaska Department of Fish and Game uses federal aid funds to help restore, conserve and manage wild birds and mammals to benefit the public. These funds are also used to educate hunters to develop the skills, knowledge and attitudes for responsible hunting.

Photo by Riley Woodford, ADF&G