Bison
Management Report
of survey-inventory activities
1 July 2005–30 June 2007

Patricia Harper, Editor
Alaska Department of Fish and Game
Division of Wildlife Conservation

Photo by Stephen DuBois, ADF&G

Funded through
Federal Aid in Wildlife Restoration
Grants W-33-4 and W-33-5, Project 9.0
September 2008

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

Cover Photo: A bull from the Delta bison herd in September 2008. *Photo by Stephen DuBois.*

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BISON MANAGEMENT REPORT

From: 1 July 2005
To: 30 June 2007

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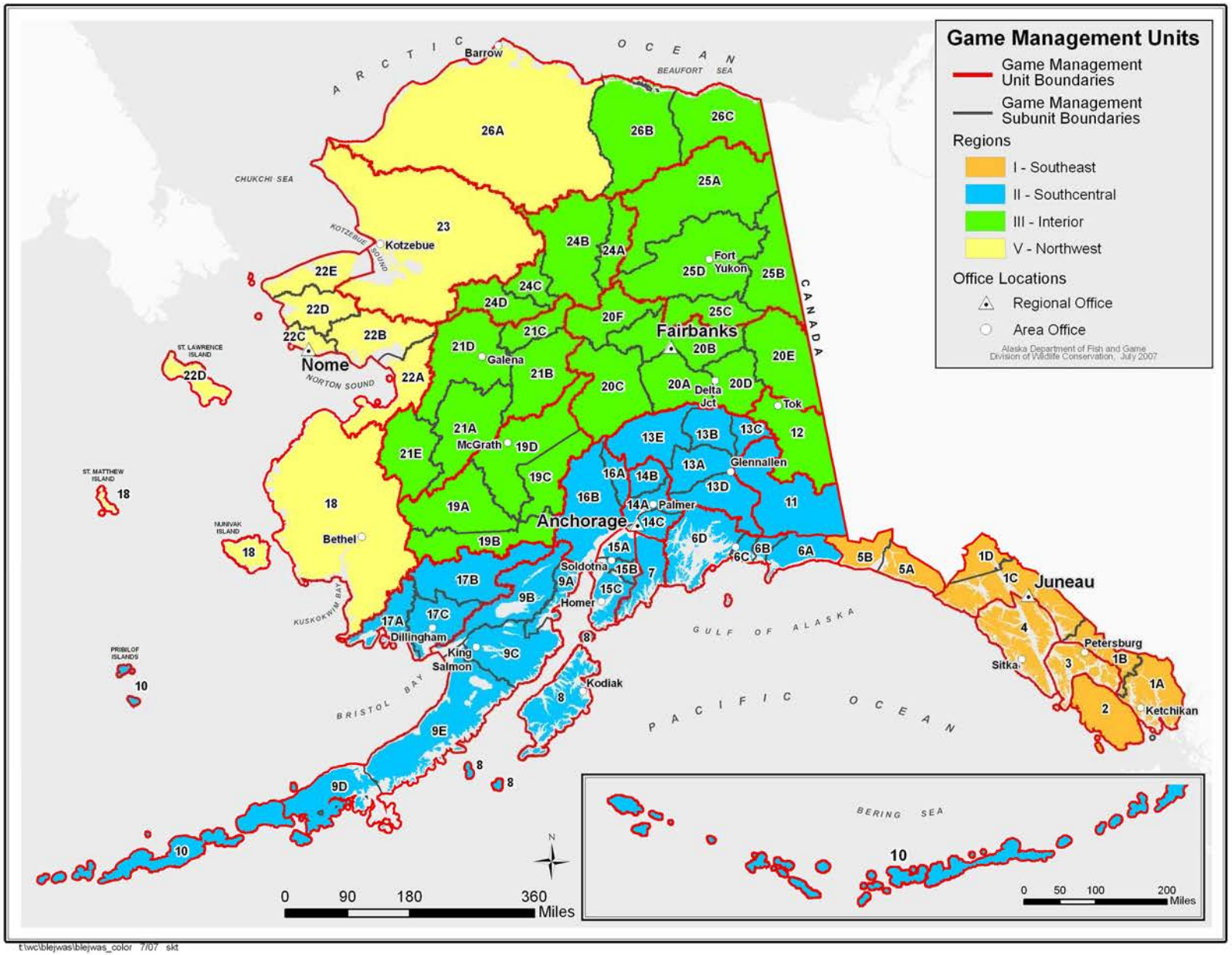
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WILDLIFE

MANAGEMENT REPORT

Alaska Department of Fish and Game
Division of Wildlife Conservation
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JUNEAU, AK 99811-5526

BISON MANAGEMENT REPORT

From: 1 July 2005
To: 30 June 2007

LOCATION

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

HERD: Copper River herd

GEOGRAPHIC DESCRIPTION: 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 (GMU) 11. These bison moved away from the release site, and by 1961 they had moved into the Dadina and Chetaslina Rivers, where they remained. Throughout the years, herd estimates have varied between a low of 51 bison in 1967 and a high of 125 in 2005. The most important known factors controlling herd size are snow depth and hunter harvest.

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

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

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

METHODS

Aerial surveys were conducted to determine composition of the herd following the spring calving period. Between 1984 and 1992, radio collars were used to help locate 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 2007 count of 110 total bison is down 12% from the 2005 count of 125.

Population Composition

Aerial surveys showed 92 adults and 18 calves in 2007 (Table 1). Current calf production and survival counts are down 31% from the record number of 26 calves observed in 2004. The calf count is well above the 10 calves per year average (range = 3–14) observed between 1988 and 1992, when the herd declined. The 2007 count of 92 adults is down 14% from the 2005 count of 107 adult bison which was the highest ever observed in the Copper River herd. The number of adults in the herd has exceeded the overwintering minimum population objective of 60 adults since 1997.

Distribution and Movements

The Copper River bison herd inhabits a home range bounded by the Nadina 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 were seldom observed north of the Dadina River until recently and this range extension coincides with the increase in herd size. The herd's seasonal distribution includes intensive use of the Copper River floodplain and bluffs along the Copper River during winter and spring. During summer, the bison move to higher elevations along the Dadina and Chetaslina Rivers to feed on vegetation as it greens up later in the season. During the late 1970s and the 1980s, there were only occasional reports of bison along the western bank of the Copper River in Unit 13. We surmised that 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. Bison in the Kenny Lake area have been almost entirely harvested under recent hunts, which reduced animal damage to crops on the Kenny Lake farms.

MORTALITY

Harvest

Season and Bag Limit. The season for residents and nonresidents in Units 11 and 13D is 1 September–31 March. The hunt area includes that portion of GMU 11 east of the Copper River, south of the Nadina River and Sanford Glacier, 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 north 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 to a drawing permit hunt, and the hunt area was enlarged to include a portion of GMU 13D.

Hunter Harvest. Hunters took 4 bison (2 bulls, 2 cows) during the 2005 season and 11 bison (8 bulls, 3 cows) during the 2006 season (Table 2).

Permit Hunts. The Copper River bison hunt is administered through drawing permits (DI 454). Between 1999 and 2001, 12 permits were issued annually. The number of permits issued annually increased to 20 in 2002, then to 24 in 2004. The interest in this hunt has increased (92%) from 678 applicants in 1999 to 1304 in 2005 then declined slightly (19%) to 1058 in 2006. 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 received detailed maps of the hunt area, including land ownership patterns. This gave us the opportunity to identify private property and emphasize the need to respect private property rights. Successful hunters reported to the Glennallen office within 1 day of leaving the field.

Hunter Residency and Success. Three local residents reported taking a bison in 2006 and 1 nonresident was successful in 2005. Nonlocal Alaska residents made up the majority of all permittees during this 2-year report period (Table 3). Historically, the hunt was popular with local residents, and during the 1988 registration hunt, 40% of the hunters were local residents. Changing from a registration to a drawing hunt reduced the levels of local resident and nonresident participation.

Harvest Chronology. During 2006, hunters took 6 bison in September, 1 in November, 1 in February and 3 in March (Table 4). During the last 8 seasons, September has been the most important harvest period, accounting for 26 (45%) of reported kills, with March accounting for the second most with 14 kills (24%). The 2006 season provided approximately 210 days of hunting opportunity.

Transport Methods. Riverboats and snowmachines have alternated as the most important method of transportation for successful hunters, followed by aircraft (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 winter classified as severe was recorded in 1994, the year before the population bottomed out. Snowfall in 1996 was deep enough for the winter to be classified as moderate, but every winter since has been mild. Snow depth appears to be a critical factor in overwinter bison survival. In years with deep snow, bison mortality increases and calf production and survival declines. Mild winters undoubtedly have been a factor in the herd increase observed during the last few years.

Field observations of the Copper River herd suggest accidental death may be an important source of natural mortality to bison. 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 researched predation rates on Copper River bison.

HABITAT

Assessment

Habitat conditions have not been studied 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, reached a 30-year high in 2004, then declined slightly by 2007. Calf production and survival the last 5 years has been high, with 18 or more calves observed each year. The number of adult bison has exceeded the minimum management objective of 60 overwintering bison for the last 9 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 the hunt was administered by registration permit, hunt conditions were poor due to a very small accessible hunt area and overcrowding during the short season. With heavy hunting pressure, the harvest quota was often reached in 1–3 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 by changing the hunt to a drawing hunt when the season was opened in 1999. As a result, hunters receiving a permit were assured a long season.

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 which opened to hunters in 2006 under a permit system where a fee is charged. Most of the bison are on this private land and permittee success is higher if an access permit is purchased. Farmers in the Kenny Lake area have also responded favorably to this hunt, because it reduces crop loss from bison.

Limiting factors on the size of the herd include snow depth, hunter harvests, habitat, accidental deaths, and possibly predation. In years with good calf production and survival, hunter harvests have been sustainable and were used to control the herd growth when necessary. In years with deep snow, survival and production declined and hunter 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 and survival is high enough to maintain 60 overwintering bison. Current harvests appear to have halted herd growth. Yearly harvest rates for future harvests will be determined yearly and will depend on herd size and productivity. Harvest levels should be higher in years with low snow pack. No changes in season

length or bag limit are recommended at this time, and unless private land closures are lifted, the maximum number of permits that can be issued should be kept at 24 and the actual number issued each year based on herd size and productivity.

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TOBEY, R.W. 2008. Unit 11 Copper River herd bison management report. Pages 1–8 *in* P. Harper, editor. Bison management report of survey and inventory activities 1 July 2005–30 June 2007. Alaska Department of Fish and Game. Project 9.0. Juneau, Alaska.

TABLE 1 Copper River bison spring aerial composition counts and estimated population size, 1999–2007

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
2004–2005	99	26	(21)	125	125
2005–2006	107	18	(14)	125	125
2006–2007	No count				
2007–2008	92	18	(16)	110	110

[a] Fixed-wing aircraft survey – no composition other than adults and calves.
[b] Estimate reflects aerial count data.

TABLE 2 Copper River bison harvest data by permit hunt (DI454), 1999–2007

Regulatory Year	Permits Issued	Applications	Percent Did not Hunt	Percent Unsuccessful Hunters	Percent Successful Hunters	Bulls	(%)	Cows	(%)	Unknown	Total Harvest
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
2003–2004	20	1073	30	50	50	4	(57)	3	(43)	0	7
2004–2005	24	1283	25	47	53	6	(75)	2	(25)	0	8
2005–2006	24	1304	25	78	22	2	(50)	2	(50)	0	4
2006–2007	24	1058	13	42	58	8	(73)	3	(27)	0	11

TABLE 3 Copper River bison hunter residency and success, 1999–2007

Regulatory Year	Successful					Unsuccessful				Total hunters
	Local[a] Resident	Nonlocal Resident	Nonresident	Total	(%)	Resident	Nonresident	Total	(%)	
1999–2000	0	7	0	7	(70)	3	0	3	(30)	10
2000–2001	1	4	0	5	(56)	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
2003–2004	0	7	0	7	(50)	7	0	7	(50)	14
2004–2005	0	8	0	8	(53)	7	0	7	(47)	15
2005–2006	0	3	1	4	(22)	14	0	14	(78)	18
2006–2007	3	8	0	11	(58)	8	0	8	(42)	19

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

TABLE 4 Copper River bison harvest chronology, 1999–2007

Regulatory Year	Harvest Period							
	Sept	Oct	Nov	Dec	Jan	Feb	Mar	*n*
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
2003–2004	3	1	0	0	0	1	2	7
2004–2005	4	2	0	0	0	1	1	8
2005–2006	1	2	0	0	0	1	1	5
2006–2007	6	0	1	0	0	1	3	11

TABLE 5 Copper River bison harvest percent by transport method, 1999–2007[a]

Regulatory year	Percent of harvest								
	Airplane	Horse	Boat	3- or 4-wheeler	Snow-machine	ORV	Highway Vehicle	Unknown	*n*
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
2003–2004	0	0	14%	14%	57%	0	14%	0	7
2004–2005	14%	0	43%	0	43%	0	0	0	8
2005–2006	0	0	75%	0	25%	0	0	0	4
2006–2007	0	0	55%	0	45%	0	0	0	11

[a] Due to rounding, total percentages may not equal 100%

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BISON MANAGEMENT REPORT

From: 1 July 2005
To: 30 June 2007

LOCATION

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

HERD: Chitina River herd

GEOGRAPHIC DESCRIPTION: The Chitina River from the confluence of the Tana River and 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, then declined to a low of 25 in 2004 because of increased overwinter mortality in years with deep snowpack.

The first Chitina bison hunt was held by drawing permit in September of 1976. Permit hunts were held for 13 years, during which hunters took 58 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 and has remained open except for 2004 and 2005, when the season was closed due to a decline in the herd.

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 relatively stable for about 12 years between 1976 and 1987; the average herd size was 48. Starting in 1988, herd estimates declined and, except for a slight increase in 1996 and 1997, averaged between 30 and 35 bison until 1999. The Chitina herd increased for the next 4 years, peaking at 50 animals in 2003. A large die-off occurred during the spring of 2004 due to a deep snow conditions and only 25 bison were observed that summer. We counted 36 in 2007 (Table 1).

Population Composition

In 2007, we observed 32 adults and 4 calves during an aerial survey of the Chitina herd (Table 1). Calf production and survival has been stable at 4 calves observed per year for the last 3 years. Historically, calf production and survival are low after a severe winter with deep snow. 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, traditionally the herd could usually 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 on the north side of the river. Changes in the flow of the Chitina River during the last 15 years caused considerable erosion of bars and banks on the north side of the river. During the last 3 or 4 years, bison use on the south side of the river has increased as bison seek new feeding areas to replace those lost to erosion.

MORTALITY

Harvest

Season and Bag Limit. The Chitina bison herd hunting season for residents and nonresidents in Unit 11 is 6 September–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. The 2004–05 and 2005–06 seasons were closed by emergency order (EO) after the severe winter of 2003–04 resulted in increased overwinter mortality and low subsequent calf production and/or survival.

Hunter Harvest. Hunters killed 2 bulls during the 2006 season (Table 2). No bison were taken in 2004 or 2005 because of the season closure. A total of 9 bulls have been harvested since the season reopened in 1999.

Permit Hunts. Chitina bison are hunted under a drawing permit hunt (DI 450); up to 2 permits are authorized annually. In 2003 and 2006, 302 and 431 hunters respectively applied for the available permits. The hunt was not open for applications in 2004 or 2005.

Hunter Residency and Success. The hunter success rate was 100% for this reporting period (Table 3). All permittees were nonlocal Alaska residents (Table 4). The number of days hunted in order to take a bison has been highly variable, with successful hunts lasting between 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 the high costs of such a study and the remote nature of this herd.

Other Mortality. Deep snow over a prolonged period during the winter is 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 1990s. Deep snow was also recorded for the Upper Chitina Valley in 1997–98, which resulted in a similar decline in both population size and productivity. In the spring of 1998, 6 adult bison were found dead; the deaths were attributed to starvation because all the examined bison were emaciated and had low bone marrow fat, and there was no sign of predation. The Chitina bison herd was subjected to another severe winter in 2003–04, and field necropsies on 3 dead bison again resulted in a diagnosis of starvation.

Poaching was documented on the Chitina bison herd during the 1980s. Because of the remoteness of this herd, apprehending poachers is difficult. The extent or impact or poaching on this herd is unknown.

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 found that a bison herd of 50 animals had not damaged the habitat, and the management objective of 30 overwintering bison could be increased; however, he 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 washed away. Since 1991, flooding has occurred east of Bear Island, near Bryson Bar, and has extended upriver toward Hubert's Landing. Recent bison mortality during 2 winters with deep snow suggests this loss of critical river bar habitat may have reduced the carrying capacity until vegetation can be reestablished on the newly exposed bars. Habitat on the south side of the river is improving as vegetation is growing on bars that have dried out over the last 10 years.

CONCLUSIONS AND RECOMMENDATIONS

The Chitina bison herd increased between 1999 and 2003, peaking at 50 bison. The 2003 count of 50 animals was the highest count in 18 years, since 56 bison were seen in 1985. The winter of 2003–04 saw a prolonged and deep snowpack in the upper Chitina River valley. Observed mortality in the Chitina bison herd increased, and field necropsies determined the cause of death to be starvation. Since 2005, after a slight increase, the herd has remained stable. The current herd estimate of 35 is well below the 50 bison minimum objective.

Population estimates in the Chitina herd are based on a single yearly survey of all known bison habitat. Because bison can be missed during a survey, 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.

Hunts were closed by Emergency Order in 2004 and 2005, after the herd declined significantly. Hunting resumed in 2006, when herd size and productivity had increased. A low take of bulls has had minimal impacts on population size and productivity. Legal harvests will continue in those years when overwinter survival and calf production increase. A limited cow harvest will be initiated in 2008 to allow taking of old cows that are susceptible to overwinter loss.

Severe winters with prolonged, deep snows and lack of sufficient wind to clear river bars of snow are considered the most important limiting factors on the Chitina bison herd. Flooding of critical river bars and loss of vegetation cover has reduced traditional foraging areas and forced bison onto more marginal habitats. This loss of available foraging areas exacerbates the effect of deep snow conditions on foraging behavior of the Chitina bison herd. Some of the negative effects of bank and bar erosion may be temporary, because new bars were created and plant colonization should eventually provide additional foraging areas.

Wolves and bears are abundant and could also influence herd size, but a lack of research precludes documenting predation rates.

The channel changes in the Chitina River that destroyed bison habitat on the northern bank, thus lowering the carrying capacity of the range, present a management dilemma. It may be that the Chitina herd is and will remain more range-limited than observed during the 1980s study. The management objective of 50 overwintering bison was based on a range study conducted during the mid 1980s along river banks that no longer exist.

Incidental mortality during deep snow winters presents another management problem. The effect of deep snow on survival is probably 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. Calves of the year also probably 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.

Hunts were closed by Emergency Order in 2004 and 2005 after the herd declined. Hunting was resumed in 2006 and 2 bison were taken. Future management should focus on meeting the herd

objective and reducing the effect 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 each year, depending on herd size, thus reducing the number of animals in the "aged" class that are 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 should be instituted when the herd approaches 40 overwintering animals and when calf recruitment exceeds 6. 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 either-sex permits in 2008 if overwintering survival remains at the current level and there are 4 or more calves in the spring 2008 count.

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TABLE 1 Chitina bison spring aerial composition counts and estimated population size, 1999–2007

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
2004–2005	23	2	(08)	25	25
2005–2006	31	4	(11)	35	35
2006–2007	29	4	(12)	33	33
2007–2008	32	4	(11)	36	36

[a] Fixed-wing aircraft survey – no composition other than adults and calves.
[b] Estimate reflects aerial count data.

TABLE 2 Chitina bison harvest and accidental death, 1999–2007

	Hunter Harvest										
	Reported						Estimated				
Regulatory year	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
2003–2004	1	(100)	0	0	0	1	0	0	0	0	1
2004–2005	No Hunt										
2005–2006	No Hunt										
2006–2007	2	(100)	0	0	0	2	0	0	0	0	2

TABLE 3 Chitina bison harvest data by permit hunt (DI450), 1999–2007

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
2003–2004	2	302	0	50	50	1	(100)	0	1
2004–2005	No hunt								
2005–2006	No hunt								
2006–2007	2	431	0	0	100	2	(100)	0	2

TABLE 4 Chitina bison hunter residency and success, 1999–2007

	Successful					Unsuccessful					
Regulatory year	Local[a] resident	Nonlocal resident	Non-resident	Total	(%)	Local[a] resident	Nonlocal resident	Non-resident	Total	(%)	Hunters
1999–2000	0	2	0	2	(100)	0	0	0	0	(0)	2
2000–2001	1	0	0	1	(100)	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
2003–2004	0	1	0	1	(50)	0	1	0	1	(50)	2
2004–2005	No hunt										
2005–2006	No hunt										
2006–2007	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, 1999–2007

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
2003–2004	100	--	--	--	--	--	--	--	2
2004–2005	No Hunt								
2005–2006	No Hunt								
2006–2007	100	--	--	--	--	--	--	--	2

WILDLIFE MANAGEMENT REPORT

Alaska Department of Fish and Game
Division of Wildlife Conservation
(907) 465-4190 PO Box 115526
Juneau, AK 99811-5526

BISON MANAGEMENT REPORT

From: 1 July 2005
To: 30 June 2007[1]

LOCATION

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

HERD: Farewell

GEOGRAPHIC DESCRIPTION: All of the drainages into the Kuskokwim River upstream from Lower Kalskag. Bison inhabit only the Farewell area of Units 19C and 19D

BACKGROUND

A translocation of 18 bison from the Delta bison herd in 1965 established the Farewell bison herd. The Alaska Department of Fish and Game (ADF&G, the department) translocated an additional 20 bison from Delta in 1968 to supplement the herd. The original stock was transported to Delta Junction in 1928 from the National Bison Range in Montana. During 1968–1999, the Farewell herd flourished, reaching a population size of approximately 350 animals. The herd has since declined, and during recent surveys conducted in April 2007 we found only 79 animals and it is unlikely there are more than 100–150 bison remaining in the herd. The first hunt for Farewell bison was held in 1972 and it has been managed under a drawing permit since that time. The number of permits issued annually ranged from 40–80 during 1972–2005, but have declined to 20 since 2006 due to declining herd size. Approximately 2100 drawing permit applications were received for regulatory year (RY) 2007 (RY07 = 1 Jul 2007 through 30 Jun 2008) for the combined fall and spring hunts, indicating there is still strong hunter interest in remote bison hunts. In 1998 a big game permit system was initiated, commonly referred to as the Governor's permit. Under this program an additional Farewell bison permit can be issued to a sportsman's group that auctions the permit, with 90% of the proceeds returned to the department. Additional governor's permits will not be issued until a larger herd is documented.

MANAGEMENT DIRECTION

The Farewell bison harvest is managed for optimal sustained yield of animals based on herd size and trend, while providing uncrowded and aesthetic hunting conditions.

[1] At the discretion of the reporting biologist, this unit report may contain data collected outside the report period.

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 up to 40 drawing permits, 20 for the fall season and 20 for the spring season.

METHODS

We conducted aerial surveys during April or August 2005–2007 to estimate herd size and composition. Surveys were flown using fixed-wing aircraft and we used both visual search and radiotelemetry to locate groups of bison. We obtained a minimum herd size by surveying all known bison habitat in the Bear Creek burn and along the South Fork Kuskokwim River and counted all bison observed. During surveys we classified bison as adults, yearlings, or calves.

To assist in locating groups of bison, 8 adult cows were radiocollared 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, CO, USA) and 60 mg xylazine hydrochloride (Anased®, Lloyd Laboratories, Shenandoah, IA, USA). By June 2007, 7 of the radio collars remained on bison in the field and 1 radio collar had been cut off and mailed to us with no explanation. Six other radio collars were deployed in 1998 and 2000, however they are now 8–10 years old and the batteries are likely dead. Additional collars are scheduled to be deployed in 2008.

During May or June 2005–2007, survey flights were conducted using fixed-wing aircraft within the traditional range of the herd to monitor overwinter mortality and spring calving. We flew known wintering areas, to search for evidence of kill sites and to check for mortality among radiocollared bison.

During 6–7 April 2006 we conducted a more intensive survey by systematically searching 660 mi^2 along transects 1–2 miles apart depending on terrain, vegetation, snow, and sightability conditions. Of the 8 bison radiocollared in 2003, 7 remained active and were located and counted. The survey area was bounded on the south by 62°26'N latitude, on the north by 62°50'N latitude, on the west by 154°10'W longitude, and on the east by 153°20'W longitude. Some areas, particularly those dominated by stunted black spruce, within this boundary were omitted to save money and because of the lower likelihood of finding bison. In addition, we searched south

along the South Fork Kuskokwim River to 61°54.500'N latitude. Surveying beyond these areas was prevented due to budget limitations. Survey conditions were nearly ideal with 3–6 inches of fresh, undisturbed snow, and good to bright light. Fresh tracks were readily apparent, and there was a high degree of confidence that all large groups of bison within the area searched were detected.

On 25 April 2007 we conducted a survey with a PA-12 in the flats north of Farewell Lake, westward to Sheep Creek, and eastward up to 15 miles east of the South Fork Kuskokwim River, depending on habitat. Transects were flown east–west, approximately 1.5 miles apart. Although there was no snow, except near Rohn and south into the mountains, light conditions were favorable and the survey was rated very good.

ADF&G and Department of Natural Resources (DNR)–Division of Forestry staff are currently working on a burn plan, and if funding and burn conditions are available, intend to conduct a burn in the Farewell area during summer 2009.

Permit hunt reports included harvest date, location, chronology, transportation type, and effort. Harvest data were summarized by regulatory year.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Estimated annual herd growth between 1968 (when aerial surveys were initiated) and 1988 was about 10%. During 1988–2003 herd numbers stabilized (Table 1) possibly due to hunting, predation, weather, and habitat decline. In RY91, RY92, and RY95 the number of drawing hunt permits was reduced from 80 to 50, then to 40 in an attempt to cause a slow increase in the bison herd. In RY06 the number of permits was further reduced to 20 due to concern over the low number of bison observed in recent surveys.

Recent genetics studies (N. Halbert, Texas A&M, personal communication) have found that the Farewell bison herd may have importance for bison conservation in North America. The Farewell bison genome appears to be free of domestic cattle gene introgression which is rare in bison herds throughout North America. Additional genetic samples will be collected during an upcoming capture and from samples obtained by hunters to further investigate this observation.

Population Size

The most bison counted during a survey was 276 animals in 1996. The most bison observed on a single day survey was 265 on 30 May 2000. We did not conduct a full census of the Farewell bison herd during 1988–2005, 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 2000–2005 were not successful because of unpredictable movements and the small number of bison with radio collars. In August 2005, when we attempted to locate 14 radiocollared bison, we located 7 bison with active radio collars and 1 mortality. At that time 163 bison were seen and an additional nonfunctioning radio was located (Table 1). A census on 6–7 April 2006 indicated that the population may have decreased to 94–107 bison from approximately 350 in 1999. Six radiocollared bison were located within 660 mi^2 of bison range

that was systematically surveyed in Unit 19, and the seventh radiocollared bison was not found. Fewer bison were found than were observed during a less intensive survey in August 2005, leading to the conclusion that the Farewell bison population within the management area had declined. The April 2007 survey yielded similar results, and the population is currently estimated at approximately 100–150 individuals.

Population Composition

We conducted a precalving survey on 6–7 April 2006 and located 82 adults, 11 short yearlings (12%), indicating poor production, poor survival or a combination of both for the 2005 cohort, and 1 newborn calf. On 25 April 2007, 64 adults, 11 newborn calves (14%), and 4 yearlings were observed.

Distribution and Movements

Historically, in the winter the herd was typically scattered in small groups (10–40 animals) on the Bear Creek burn and surrounding habitats, taking advantage of windswept grass and sedge forage. However, this burn is now over 30 years old and has senesced in terms of habitat quality for bison. We intend to investigate whether this has changed distribution of bison during winter. Several small groups also use a large burn caused by lightning in 1991 on the east side of the South Fork Kuskokwim River. In spring 1998, 150 bison were found in that area, indicating herd range expansion. This range expansion could be indicative of declining habitat quality in the old Bear Creek burn and a collaring effort is planned to better assess current bison distribution. In summer, the Farewell herd moves onto the South Fork Kuskokwim River floodplain, generally moving in a southerly direction toward the headwaters of that drainage. In recent years bison have been seen as far upriver as Sled Pass (Hartman River and Stony River headwaters) and into Ptarmigan Valley (South Fork Kuskokwim River and Happy River headwaters). Bison also were reported as far west as the Windy Fork and north to within 20 km of Nikolai on the South Fork Kuskokwim River.

MORTALITY

Harvest

Seasons and Bag Limits.

Unit and 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 RY05–RY06. However, the department utilized its permit authority and reduced the number of permits available to 10 in the fall and 10 in the spring for RY06 and 5 in the fall and 5 in spring for RY07. At the March 2008 meeting, the board passed a proposal that will put a new limit on all bison permits statewide, effective in RY08. This regulation will restrict residents to 1 bison permit every 10 years and to 1 permit per lifetime for nonresidents.

Hunt History. The first legal harvest from the Farewell 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, and during RY85–RY88, 40 permits were issued annually. The first spring bison hunt was held in March 1990 (RY89). During RY89–RY90, 70 drawing permits were awarded annually, 40 for fall hunts and 30 for spring (Mar) 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 were no changes in the seasons or bag limits during RY99–RY06. However, in RY06, only 20 permits were issued (10 fall, 10 spring) and during RY07 only 10 permits were distributed (5 fall, 5 spring). Ten permits will be issued in RY08.

Harvest by Hunters. Annual harvest of bison was 20–28 during RY02–RY05 (Table 2). Reduced harvest in RY06 (11) was because only 20 permits were issued that year. The proportion of bulls harvested during RY02–RY06 was 50–76% (Table 2). Hunters prefer to take bulls because they are larger and have both more meat and trophy potential. In fall hunts (DI351), 64–100% of all bison taken were bulls. However, misidentification and low numbers of bison sighted per hunter can result in substantial female harvest. During the spring hunt (DI352) the harvest of females was greater than males in 3 of the last 5 years and averaged 53% (Table 2). This high harvest of females may be contributing to the declining bison population.

Governor's Permits. The first Governor's Permit was issued in 1998 for auction. The sportsman's group awarded the permit, kept 10% of the proceeds, and returned the remainder of the money to the department. Permits were sold to the highest bidder and went for $8100 in RY98 permit, $7500 in RY99, $5500 in RY01, $3500 in RY03, $1300 in RY04, and $2500 in RY06. We stopped offering the Governor's permit in RY07 and will not issue these permits again until the herd can sustain higher levels of harvest.

Harvest Chronology. Harvest chronology prior to RY99 was determined by the deliberate distribution of permittees throughout the season. However, beginning in RY99 permittees were allowed to choose when to hunt during their respective season. In general, there is no peak harvest period during the fall season. During the spring season, most harvest occurs during the first week (Table 3).

Hunter Residency and Success. Historically, and during RY02–RY06, the vast majority of applicants and permittees for the Farewell bison hunts were Alaska residents (Table 4). Of the permit winners who hunted during RY02–RY06, 13 were nonresidents, 7 were local residents (permittees who resided in Unit 19) and 157 were nonlocal residents (Table 4). The chance of drawing a Farewell bison permit has ranged from 0.4 to 3.4% during RY93–RY07.

The average success rate for the September hunt (DI351) during RY02–RY06 was 68%, (Table 2). Hunter success rate in the March hunt (DI352) during RY02–RY06 averaged 82% (Table 2). The higher hunter success rate in March is likely due to better access opportunities using snowmachines and ski-equipped airplanes. Overall, 27% of all permit winners did not hunt

during RY02–RY06 and a mean of 75% of permit winners who hunted were successful (Table 2).

Transport Methods. This hunt is in a remote area that is difficult to access, and during RY02–RY06, most hunters used airplanes or snowmachines (Table 5). During the September hunt (DI351), initial access to the Farewell area was typically by aircraft. Some September hunters have used all-terrain vehicles as a secondary access method, although in RY04 one successful hunter used horses. During the March hunt (DI352), the primary access method was airplane. However, access by snowmachines was also popular among permittees during some years (Table 5). 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 after bison introduction. Since 1995 we have found some evidence of possible wolf and bear predation. In RY01 we had one report that a moose hunter took a grizzly bear found on a buried cow bison carcass. Other instances of bison that were stalked and killed by wolves were noted during wolf and bison surveys in RY05 and RY06. During the 2006 bison census, evidence of 3 wolf packs hunting bison was found. Additionally, a guide who specializes in Farewell bison hunts reported multiple wolf kills during March 2006.

HABITAT

The herd generally ranged over the 1977 Bear Creek burn (also know as the Farewell Burn) until recent years; however, as this burn has senesced bison have begun expanding into new areas such as along the South Fork and Windy Fork to locate forage. Summer range was investigated by Waggoner and Hinkes (1986) and bison were found primarily along the rivers and floodplains within the Alaska Range. The summer diet was found to be 94% willow with a fall diet of 60% willow and 40% silverberry (*Elaeagnus commutata*) and buffalo-berry (*Shepherdia canadensis*). While the summer habitat tends to be iced over in the winter, they believed that in general summer habitat was not limiting. Campbell and Hinkes (1983) investigated winter diets and habitat use after the Bear Creek burn in 1977. They found sedges to be an important component of the winter diet and the post fire habitat was rich in this type of forage. Additionally open sedge/grasslands hold less snow and encourage bison movements. The 1977 burn expanded available winter habitat considerably, and they estimated the pre-burn carrying capacity of the area to be approximately 100 animals (Campbell and Hinkes 1983). Sedge/grassland habitats require a frequent fire regime of approximately every 10 years and the Farewell burn is now 31 years old. The senescing of this burn has likely had a large impact on bison numbers and distribution. In addition Campbell and Hinkes (1983) pointed out the importance of contiguous winter and summer habitats across which bison can easily move and this also may have changed.

Although no current estimate of carrying capacity is available, a cursory examination of selected areas in summer 1995 by University of Alaska graduate student Maria Berger (M. Berger, UAF/Alaska Cooperative Fisheries and Wildlife Resources Unit, 1995 unpublished report, Fairbanks) and an additional aerial evaluation by Robert Stephenson (ADF&G, unpublished report, Fairbanks) in spring 1998 indicated adequate summer forage availability, with unused

range to the north, east, and west. At this point winter habitat may be a factor limiting this population (M. Berger, 1995 unpublished report).

In an effort to improve winter forage availability, DNR–Division of Forestry and ADF&G planned a spring burn in a portion of the 1977 Bear Creek burn where grass and sedge habitat is being replaced by black spruce. This effort was intended to provide increased forage for bison as well as moose. The prescription was met in spring 2000; however, the burn failed because conditions were too wet. Much was learned from this effort and ADF&G and DNR–Division of Forestry are currently rewriting the 2000 burn plan to include a larger area, as well as provisions to conduct the burn in the summer.

CONCLUSIONS AND RECOMMENDATIONS

We met our objective to maintain harvest of ≤40 bison, however we believe the herd has declined from its estimated high of 350 bison in the late 1990s to possibly as low as 100–150 bison. Based on current surveys we are no longer meeting the objective to maintain a minimum population of 300 bison. A thorough survey was conducted in spring 2006 and only 94 animals were observed with 6 of 7 radiocollared bison located. This extensive survey, as well as a good survey in 2007, lends confidence to the assessment that the Farewell bison herd has declined and likely numbers around 100–150 animals. There are at least 4 possible factors contributing to this decline: predation, harvest of cows (especially in the spring), habitat quality, and reduced genetic diversity. This evaluation makes it prudent to decrease the number of drawing permits available to hunters, based on the known minimum number of 79 bison. In RY06, 20 permits were issued and in RY07 the number was lowered to 10.

By the beginning of RY05, only 7 radio collars were functional and in 2006 only 6 of these were located. Therefore, we plan to deploy an additional 25 collars to better enumerate the population as well as determine distribution and movements. During RY05–RY06 we promoted habitat diversification by working with DNR and other landowners to allow wildfires to burn. We also administered the drawing permit hunt, which continues to attract many hunters to this unique hunting experience.

We recommend more frequent herd monitoring during the next report period to track the new collars that will be deployed. We will evaluate the effects of reduced hunting effort that began in RY06 (20 permits) and continued in RY07 (10 permits). Additional restrictions may be proposed if the herd does not begin to increase or if new data indicate the number of bison is well below the population objective. This herd is important not only because of the unique hunting opportunity that it provides, but it has also taken on additional importance from a bison conservation perspective. A minimum viable population for bison may be as high as 400–500 individuals, with smaller populations having lower heterozygosity and fitness as well as being at greater risk of inbreeding depression and genetic drift. Therefore, maintaining a minimum population of at least 300 animals now may be important not only to allow a harvestable surplus, but also to maintain the genetic integrity of the population. We recognize, however, that habitat improvement, through a controlled burn, may be necessary to maintain a herd of this size and a population of 400–500 may not be possible due to habitat constraints.

The following management goals and objectives will be implemented for the next reporting period:

MANAGEMENT GOALS

GOAL 1: Maintain a population of sufficient size to reduce the genetic risks associated with small populations.

GOAL 2: Maintain a sustainable harvest.

GOAL 3: Maintain and enhance bison habitat in cooperation with other land management agencies.

MANAGEMENT OBJECTIVES AND ACTIVITIES

- OBJECTIVE 1: Maintain a population of at least 300 bison.

Activities

- Deploy and maintain enough radio collars on bison to monitor the herd distribution, movements, and population size.
- Conduct aerial surveys of bison to assess herd distribution, population status and herd composition.

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

Activity

- Issue up to 40 drawing permits, distributed during fall and/or spring hunts.
- Adjust the number of drawing permits and sex ratio of the harvest using discretionary permit authority to achieve a harvest lower than recruitment until the population objective is achieved.

- OBJECTIVE 3: Maintain at least 50% of the bison winter range in sedge/grasslands and shrubs.

Activity

- Conduct a controlled burn in cooperation with other agencies to reset bison habitat to an early successional stage every 5 to 10 years.
- Assessment of habitat will be made during aerial surveys.

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TABLE 1 Farewell bison aerial composition surveys and estimated population size, 1992–2007

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	(20.9)	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	(19.1)	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	(11.7)	265	350
6/18/01	157	31	(16.5)	188	350
1/30/02	34	1	(2.9)	35	350
9/3/02	32	6	(15.8)	38	350
5/7/03	130	15	(10.3)	145	350
11/16/03	109	n/a	n/a	109	350
8/05				163	
4/6–7/06	82	12[a]	(1)[b] (11.7)[c]	94	94–107
4/25/07	68	11	(13.9)	79	100–150

[a] Eleven short-yearlings and 1 newborn calf.
[b] Percent calves.
[c] Percent short-yearlings.

TABLE 2 Farewell bison harvest data by permit hunt, regulatory years 2002–2003 through 2006–2007

Hunt number	Regulatory year	Permits issued	Permittees not hunting (%)	Unsuccessful hunters[a] (%)	Successful hunters[a] (%)	Bulls (%)	Cows (%)	Unk	Total harvest
DI351	2002–2003	20	6 (30)	3 (21)	11 (79)	7 (64)	4 (36)	0	11
(Fall)	2003–2004	20	5 (25)	8 (53)	7 (47)	5 (71)	2 (29)	0	7
	2004–2005	20	9 (45)	3 (27)	8 (73)	8 (100)	0 (0)	0	8
	2005–2006	20	5 (25)	3 (20)	12 (80)	8 (73)	3 (27)	1	12
	2006–2007	10	3 (20)	3 (43)	4 (57)	3 (75)	1 (25)	0	4
	Subtotal	90	28 (31)	20 (32)	42 (68)	31 (76)	10 (24)	1	42
DI352	2002–2003	20	7 (35)	4 (31)	9 (69)	4 (44)	5 (56)	0	9
(Spring)	2003–2004	22	4 (18)	4 (22)	14 (78)	6 (43)	8 (57)	0	14
	2004–2005	20	5 (25)	2 (13)	13 (87)	8 (62)	5 (38)	0	13
	2005–2006	20	3 (15)	1 (6)	16 (94)	6 (38)	10 (63)	0	16
	2006–2007	10	1 (10)	2 (22)	7 (78)	4 (57)	3 (43)	0	7
	Subtotal	92	20 (22)	13 (18)	59 (82)	28 (47)	31 (53)	0	59
Year	2002–2003	40	13 (33)	7 (26)	20 (74)	11 (55)	9 (45)	0	20
totals	2003–2004	42	10 (24)	12 (38)	20 (63)	10 (50)	10 (50)	0	20
	2004–2005	40	14 (35)	5 (19)	21 (81)	16 (76)	5 (24)	0	21
	2005–2006	40	8 (20)	4 (13)	28 (88)	14 (52)	13 (48)	1	28
	2006–2007	20	4 (20)	5 (31)	11 (69)	7 (64)	4 (36)	0	11
Totals	2002–2007	182	49 (27)	33 (25)	100 (75)	58 (59)	41 (41)	1	100

[a] Successful/Unsuccessful hunter information includes only those who hunted.

TABLE 3 Farewell bison harvest chronology by month/day, regulatory years 2002–2003 through 2006–2007

	Harvest chronology by month/day					
	Fall			Spring		
Regulatory	9/1–10	9/11–20	9/21–30	3/1–10	3/11–20	3/21–31
year	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)
2002–2003	7 (64)	1 (9)	3 (27)	7 (78)	0 (0)	2 (22)
2003–2004	0 (0)	5 (71)	2 (29)	9 (64)	2 (14)	3 (21)
2004–2005	1 (13)	3 (38)	4 (50)	8 (62)	3 (23)	2 (15)
2005–2006	4 (33)	4 (33)	4 (33)	8 (50)	6 (38)	2 (13)
2006–2007	0 (0)	2 (50)	2 (50)	1 (14)	3 (43)	3 (43)

TABLE 4 Farewell bison hunter residency and success, regulatory years 2002–2003 through 2006–2007

	Successful						Unsuccessful						
Regulatory year	Local[a] resident	Nonlocal resident	Non resident	Unk	Total	(%)	Local[a] resident	Nonlocal resident	Non resident	Unk	Total	(%)	Total hunters
2002–2003	2	11	3	0	16	(40)	0	24	0	0	24	(60)	40
2003–2004	0	19	1	0	20	(49)	1	19	1	0	21	(51)	41
2004–2005	0	20	1	0	21	(53)	0	17	2	0	19	(48)	40
2005–2006	3	21	4	0	28	(70)	0	12	0	0	12	(30)	40
2006–2007	1	9	1	0	11	(69)	0	5	0	0	5	(31)	16
Totals	6	80	10	0	96	(54)	1	77	3	0	81	(46)	177

[a] Local residents are hunters who live in Unit 19.

TABLE 5 Farewell bison harvest by primary transport method, regulatory years 2002–2003 through 2006–2007

Regulatory year	Harvest by transport method				
	Airplane (%)	3- or 4-wheeler (%)	Snowmachine (%)	Unknown or other (%)	*n*
2002–2003	11 (69)	0 (0)	5 (31)	0 (0)	16
2003–2004	12 (60)	0 (0)	7 (35)	1 (5)	20
2004–2005	16 (76)	0 (0)	4 (19)	1 (5)	21
2005–2006	28 (100)	0 (0)	0 (0)	0 (0)	28
2006–2007	13 (81)	0 (0)	3 (19)	0 (0)	16
Totals	80 (79)	0 (0)	19 (18)	2 (2)	101

WILDLIFE MANAGEMENT REPORT

Alaska Department of Fish and Game
Division of Wildlife Conservation
(907) 465-4190 PO Box 115526
Juneau, AK 99811-5526

BISON MANAGEMENT REPORT

From: 1 July 2005
To: 30 June 2007[1]

LOCATION

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

HERD: Delta

GEOGRAPHIC DESCRIPTION: Central Tanana Valley near Delta Junction

BACKGROUND

The ancestors of modern bison first colonized North America after migrating from Asia to Alaska over the Bering Land Bridge (Reynolds et al. 1982). Subsequently, 2 subspecies developed: 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, most likely wood 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.

[1] At the discretion of the reporting biologist, this unit report may contain data collected outside the report period.

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.

The Bison Range Youth Hunt Management Area was created in 2002 to regulate moose hunting in the fields of the DJBR. This is a drawing permit hunt that was implemented to reduce the impact of moose hunting on bison and bison forage management on the DJBR.

MANAGEMENT DIRECTION

MANAGEMENT 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.

MANAGEMENT OBJECTIVES

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.

In addition to the management objectives above, the 2000–2005 Delta Bison Management Plan is still the current management plan for Delta bison herd management and has the following goals and objectives, which were treated as activities during this report period.

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.

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

HERD MANAGEMENT

Population Status and Trend

We used aerial censuses to monitor 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 March–September. Bison aggregations were counted visually if possible. Aggregations difficult to count visually were photographed with a digital single lens reflex 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 count for the previous fall. In recent years, precalving population estimates were also verified by flying aerial surveys in late March near the end of the hunting season, and through early May before the peak of calving (excluding neonates). If the aerial surveys resulted in a higher precalving population count it was used rather than the estimate.

Population Composition

Sex and age composition surveys were conducted from the ground by locating groups containing radiocollared bison. To obtain the best composition data we attempted to locate and count every bison group during the end of rut when the entire herd tends to be aggregated together. We usually conducted multiple surveys and the survey that resulted in the largest sample size was used to calculate composition data. We determined the sex and age of bison by observing them with 8–10×40 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. 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 and reported in a future management report. We summarized composition data by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY06 = 1 Jul 2006–30 Jun 2007).

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. Most bison locations were obtained from fixed wing aircraft, however, we also obtained some locations by ground tracking.

To attach radio collars, we usually captured bison from a Robinson R-22 helicopter by immobilizing them with darts from a Cap-Chur™ rifle or short-range pistol. Occasionally bison were darted from the ground 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). Once immobilized, bison were fitted with radio collars, and 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.

In summer 2007 we tested a new ground based method to immobilize bison at salt licks. A salt lick was created on the U.S. Army's Texas Range of Donnelly Training Area East by placing 50-pound trace element mineral blocks at the selected location. The salt lick location was monitored by a web-based video camera and a blind was constructed at the salt lick. When bison were observed at the salt lick, ADF&G staff traveled to the lick site and immobilized bison from the blind.

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. Hunters also 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 killing a bison. They completed a questionnaire including 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, Montana, USA) 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.

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/acre. 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/acre of N60-P20-K0-S10 by broadcasting fertilizer onto the fallow soil with a broadcast spreader. Approximately 100 lb/acre 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 in 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 for the bison in the Panoramic and Gerstle Fields and water in stock water tanks was supplied by a well in the Panoramic Fields. We monitored rain gauges in both the Panoramic and Gerstle Fields.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

RY05. The prehunt population size was 402 bison (Table 1), which was the lowest herd size recorded since 1987 and substantially below the anticipated herd size based on the number of hunting permits issued. The precalving population of 353 in spring 2006 was only 7 bison below the objective and an increase from the previous 2 years (Table 1).

RY06. The prehunt herd size was 430 bison (Table 1) which is an increase from RY05. The count was based on 2 aerial surveys conducted on 12 May 2006 and 20 September 2006 which both resulted in 430 bison being observed. The precalving population of 397 in spring 2007 was higher than anticipated based on the known mortality during the RY06 hunting season, but was based on an aerial survey on 5 March 2007 during which 405 bison were counted minus bison harvested after the 5 March survey.

Population Composition

RY05. I estimated sex and age composition from a sample of 321 bison counted during 21–23 September 2005. Calf survival was 47 calves:100 cows and calves composed 22% of the sample. Adult and yearling cows composed 46% of the sampled population (Table 2).

The bull:cow ratio was 71:100, which met the objective, and bulls ≥1 year old composed 23% of the sample, with a yearling bull:cow ratio of 20:100. We observed 105 bulls during composition surveys and classified 103 based on horn size and shape. The sample consisted of 29% yearlings, 16% small bulls, 46% medium bulls, and 10% large bulls (Table 3).

RY06. I estimated sex and age composition from a sample of 241 bison counted during 19–26 September 2006 (Table 2). Calf survival was 59 calves:100 cows and calves composed 25% of the sample. Adult and yearling cows composed 43% of the sample.

The bull:cow ratio was 63:100, which met the objective, and bulls ≥1 year old composed 27% of the sample, with a yearling bull:cow ratio of 13:100. We observed 76 bulls during composition surveys and classified 43 based on horn size and shape. The sample consisted of 30% yearlings, 28% small bulls, 14% medium bulls, and 28% large bulls (Table 3).

Distribution and Movement

RY05. The first RY05 aerial surveys were flown on 6 and 15 July 2005 when the DBH was located along the Delta River with most bison on military land. The first group of bison observed to migrate from the Delta River to the DJBR were 20 bison seen on the DJBR on 21 July. On 22 July, 2 aggregations of 125 bison were observed in the Gerstle Fields of the DJBR, and 1 aggregation of 12 bison was observed in the Panoramic Fields (R. Swanson, personal communication). On 24 July, 25 bison were still on the Delta River as far south as Black Rapids Glacier.

The first observed movement north of the Alaska Highway occurred 18 August when tracks were seen where bison crossed the highway. By 25 August, when the next aerial survey was flown,

most bison were on private and state agricultural lands north of the Alaska Highway. On 29 August and on 4 and 19 September the entire herd was located north of the Alaska Highway on and near private agricultural land. During a 26 September survey, 85 bison were observed in the Panoramic Fields of the DJBR, with the remainder of the herd north of the Alaska Highway.

Two spring surveys were flown on 22 and 27 March 2006. During the 22 March survey, most bison were located in the DJBR Panoramic Fields and on private agricultural land, however, 2 aggregations of 70 bison were located on Delta River military land near Big Lake, and 1 aggregation of 18 bison was located on military land near 33-mile loop road, and was moving west toward the Delta River. On 27 March, 5 aggregations totaling 130 bison were located on military land between the Richardson Highway and Granite Creek, moving west toward the Delta River.

In May 2006, most bison had returned to the Delta River area, but some bison delayed migration and calved on the DJBR and private agricultural land. During a 12 May aerial survey, 92 bison, including 62 adults and 30 neonates, were located on private agricultural land and the DJBR, while the remainder of the herd was located along the Delta River. On a 19 May aerial survey, the number of bison remaining on the DJBR and private agricultural land had declined to 17, consisting of 12 adults and 5 neonates.

During aerial surveys on 27 and 30 June 2006, all bison were located on the Delta River military land.

No bison were radiocollared during FY05 because the U.S. Army restricted access to the Delta River locations where we radiocollared bison in the past. I began negotiating with the U.S. Army to resolve this issue.

RY06. No aerial surveys were flown in July 2006. The first bison seen on the DJBR were observed 13 July when 60 bison were spotted in the Panoramic Field. On an 8 August aerial survey, 3 aggregations containing 208 bison were located in the Panoramic Fields of the DJBR, 1 aggregation that could not be seen was on private land south of the Alaska Highway (Tract A-3), and the remainder of the herd was located on military land in the general Texas Range area. During the 14 August aerial survey, I observed that most of the herd had migrated from the Delta River and the first signs of bison moving to private agricultural lands were observed, however, 52 bison remained on Washington Impact Area military land in 2 aggregations, 32 were on the DJBR Panoramic Fields, 8 were in the DJBR Gerstle Fields, and the remainder of the herd was scattered throughout private agricultural lands.

Four aerial surveys were flown in May 2007. On 12 May, 6 aggregations containing 91 bison were located on private agricultural land and the DJBR. The remainder of the herd was located in the vicinity of the Delta River on 13 May when the northernmost groups were on Texas Range and the southernmost group of 27 bison was on the Delta River near the mouth of McGinnis Creek. Seven small aggregations containing 38 bison were located west of the Delta River in the Buffalo Dome burn. Eighteen percent of bison counted on 12–13 May were calves. During an aerial survey on 19 May, only 17 bison were observed on private agricultural land and the DJBR, and distribution on the Delta River was similar to 12–13 May except that the southernmost aggregation on 13 May had moved back north. On 30 May, all bison were observed in the

vicinity of the Delta River with the northernmost groups near Big Lake and the southernmost group in the Delta River near Ruby Creek.

During 27 and 30 June, the herd was located in the vicinity of the Delta River with the northernmost groups near Big Lake and the southernmost group near Black Rapids Glacier.

During September, bison migrated between private agricultural lands and the DJBR. During an 11 September survey, 107 bison were observed in the Panoramic Fields and the remainder on private agricultural land. Distribution was similar on 13 September when 65 bison were observed in the Panoramic Fields and the remainder on private agricultural land, and on 20 September when 141 bison were observed in the Panoramic Fields and the remainder on private agricultural land. During a 23 September aerial survey, all bison were seen on private agricultural land, and during a 28 September aerial survey 39 were seen in the Panoramic Fields.

On 5 March 2007, during an aerial survey, 158 were located on the DJBR Panoramic Fields and the remainder on private agricultural land. On 13 March, approximately 107 bison were located in the Panoramic Fields, and one group of 15 bison was seen west of Panoramic Fields, possibly starting migration to the Delta River. The remainder of the herd was on private agricultural land.

During the 26 May 2007 ground-based survey, all signals from the radiocollared bison were heard from the Black Rapids communication tower on the Delta River and approximately 100 bison were visually located at Black Rapids. During an aerial survey on 27 May, the Delta River was searched south of military land and 360 bison were located, with 122 at Black Rapids. Because military air space was restricted, I could not search the Texas and Washington Range areas.

During the 6 June aerial survey, calving was in progress, and 21% of 480 bison observed were calves. The herd was located in the vicinity of the Delta River with the northernmost group on Texas Range and the southernmost group near McGinnis Creek. Seventeen bison were located in the Buffalo Dome burn. An 11 June aerial survey found the herd distributed near the Delta River with most of the herd on the Texas Range and Washington Impact Area, Buffalo Dome Flats, and with only 5 in the Buffalo Dome burn. A 22 June aerial survey found the herd still distributed along the Delta River but with the northernmost groups in the Mississippi Impact Area and the southernmost group north of McGinnis Creek. During the 27 June aerial survey, significant numbers of bison were located south of Buffalo Dome nearly to Black Rapids and on 29 June 175 bison were located at Black Rapids with the remainder of the herd distributed along the Delta River as far north as Texas Range.

No bison were radiocollared during RY06 because the U.S. Army restricted access to the Delta River locations where we have historically radiocollared bison in the past. I continued negotiating with the U.S. Army to resolve this issue.

RY07. During the 8 July aerial survey, the bison were still located along the Delta River from Mississippi Impact Area to the north and near McGinnis Creek to the south. On 26 July, much of the herd had migrated to the DJBR and approximately 325 bison were observed from the ground in the Panoramic Fields.

During a 4 August aerial survey, bison were scattered from the Delta River to private agricultural lands. However, due to turbulence from high wind speeds we were not able to search along the Delta River. Most bison were located on the DJBR with 292 bison in the Panoramic Fields and 14 in the Gerstle Fields, and an additional 50 were located on private agricultural lands. During a 21 August aerial survey, all bison were located on either private agricultural land, where most of the herd was located, or on the DJBR where approximately 30 were located in the Panoramic Fields and 41 were located in the Gerstle Fields. However, the Delta River was not searched due to turbulence from high winds.

During the 19 September aerial survey, no bison were located on the Delta River. One hundred forty-nine bison were located in the Panoramic Fields and the remainder on private agricultural lands. During aerial surveys on 24 and 25 September, all bison were located north of the Alaska Highway on private agricultural lands.

On 8 July 2007, a female bison was radiocollared from a ground blind on the Texas Range of Donnelly Training Area East where the bison had been attracted to salt blocks. The temperature was approximately 70^{o}F. The bison was immobilized 4 minutes after being darted. Recovery time was 5 minutes 14 seconds after administration of the antagonist. The time from initial darting to complete recovery was 14 minutes. The ground-based darting worked well. However, bison destroyed our first blind, which was a free-standing hunting blind. We replaced the free-standing blind with a plywood blind.

MORTALITY

Harvest

Season and Bag Limit. The resident and nonresident bison hunting season was 20 July–31 March during the RY05–RY06 hunting seasons; however, hunting does not routinely begin until 1 October each year so farmers in the DAP could finish harvesting their crops before the hunt started. The 1 October starting date was arrived at because farmers wanted to finish harvest so that bison being pursued by hunters would not damage crops.

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 issue special permits some years, which are 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 2006 Board of Game meeting, the bag limit for the Bison Range Youth Hunt Management Area (BRYHMA) was changed to include 1 antlerless moose, excluding a calf or a cow accompanied by a calf. The department also notified the Board of Game that the number of drawing permits for the youth hunt was reduced from 24 to 10 by ADF&G's discretionary permitting authority based on an agreement with the Delta Fish and Game Advisory Committee to limit cow moose harvest in the BRYHMA to no more than 10 cows and continue to maintain limited impact on bison use of the Panoramic and Gerstle Fields.

Human-Induced Mortality.

RY05 — Human-induced mortality was estimated to be 52 bison (Table 4). Hunters killed 45 bison (27 bulls and 18 cows), and estimated wounding loss was 5 (7% of the number of permits issued). Hunters with bull-only permits (DI403) killed 24 bulls and hunters with cow-only permits (DI404) killed 18 cows and 3 bulls (Table 5). The reported illegal harvest rate was 7%.

Successful hunters with bull permits (DI403) hunted a mean of 6.9 days and unsuccessful hunters hunted a mean of 21.7 days. Successful hunters with cow permits (DI404) hunted a mean of 11.2 days and unsuccessful hunters hunted a mean of 13.6 days (Table 6).

RY06 — Human-induced mortality was estimated to be 66 bison (Table 4). Hunters killed 60 bison (48 bulls and 12 cows), and estimated wounding loss was 6 (7% of the number of permits issued). Hunters with bull-only permits (DI403) killed 47 bulls and 5 cows. Hunters with cow-only permits (DI404) killed 7 cows and 1 bull (Table 5). The reported illegal harvest rate was 10%.

Successful hunters with bull permits (DI403) hunted a mean of 5.5 days and unsuccessful hunters hunted a mean of 10.6 days. Successful hunters with cow permits (DI404) hunted a mean of 5.1 days and unsuccessful hunters hunted a mean of 8.2 days (Table 6).

Permit Hunts.

RY05 — The department received 13,952 applications for 65 permits (Table 7) with 35 permits for the bull-only hunt (DI403) and 30 permits for the cow-only hunt (DI404) (Table 5).

RY06 — In RY06, because the Delta bison herd was below the population objective, initial plans were to issue only 65 permits for DI403, for which 8,762 applications were received (Table 7). After announcing the number of DI403 drawing permits to be issued, I located additional bison and decided to also issue 15 DI404 permits (Table 5) which were drawn from the DI403 applicants.

Hunter Residency and Success.

RY05 — Most Delta bison hunters continued to be nonlocal Alaska residents (96%). Permit holders that reported hunting in both DI403 and DI404 had a 76% overall success rate (Table 8). Success during this reporting period remained <90% as it has since RY97.

RY06 — Most Delta bison hunters continued to be nonlocal Alaska residents (96%). Permit holders for hunts DI403 and DI404 that reported hunting overall had a 78% success rate (Table 8). Success during this reporting period remained <90% as it has since RY97.

Harvest Chronology.

RY05 — Harvest chronology was similar to chronology in previous years, with most harvest (64%) in October and November and with harvest rate slowing during December–February and increasing during March (Table 9).

RY06 — Harvest chronology was similar to chronology in previous years, with most harvest (66%) in October and November and with harvest rate slowing during December–February and increasing during February and March (Table 9).

Transport Methods.

Highway vehicles and snowmachines continue to be the most common transport methods (Table 10). Hunters typically use highway vehicles most commonly in the early portion of the season before snow depth prohibits their use. Hunters use snowmachines more commonly once snow depth makes highway vehicles more difficult to use.

RY05 — Successful bison hunters used highway vehicles most commonly (74%), while 11% of successful hunters used 3- or 4-wheelers, and 6% used snowmachines (Table 10).

RY06 — Successful bison hunters used highway vehicles for 82% of successful hunts. Snowmachines were the second most common mode of transportation used with 12% successful hunters using them (Table 10).

Harvest Locations.

RY05 — Most bison (63%) were killed on private agricultural lands in the DAP (Table 11). Twenty-six percent of bison were killed on the DJBR and 12% were killed in other areas.

RY06 — Most bison (81%) were killed on private agricultural lands in the DAP (Table 11). Fourteen percent of bison were killed on the DJBR.

Other Mortality

Natural mortality is rarely documented for the DBH. Humans caused most nonhunting mortality through wounding, 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).

Results of disease testing during RY05–RY06 are not available at this time. Test results obtained in November 2003 indicated infection rates of 0% for brucellosis, infectious bovine

rhinotracheitis, and Johne's disease; 2.9% for bovine viral diarrhea; 12.2% for malignant catarrhal fever; 100% for bovine parainfluenza-3 and no results available for neospora. Fecal samples cultured for Johne's disease and *Mycobacterium avium paratuberculosis* were negative. Seven bison from the Farewell bison 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.

HABITAT

RY05 — Approximately 700 acres of nugget bluegrass and 50 acres of arctared fescue were fertilized at a cost of $18,456. Grasses were fertilized in the Panoramic Fields during 19–24 May and in the Gerstle Fields during 9–10 June.

Approximately 400 acres of Derby oats were planted in the Panoramic Fields and Gerstle Fields. No oats were planted in May; June plantings produce higher quality forage, but less quantity when bison migrate to the DJBR in the fall, which helps to accomplish the goal of reducing depredation to agricultural crops. The following oat seeding dates, acreages, and RFVs were achieved:

Date	Location/Acres	RFV
17 Jun	Panoramic Fields, 80 acres	87
21 Jun	Panoramic Fields, 35 acres	124
23 Jun	Panoramic Fields, 80 acres	n/a
25 Jun	Panoramic Fields, 20 acres	137
27 Jun	Panoramic Fields, 85 acres	n/a
30 Jun	Gerstle Fields, 100 acres	118

Bluegrass sampled from both the Panoramic and Gerstle Fields on 28 August had an RFV of 111.

Bluejoint reedgrass was mowed on 20 and 28 July on 100 acres of better quality nugget bluegrass to retard bluejoint reedgrass phenology, making it less competitive with bluegrass. Mowing the bluejoint reedgrass in July also improves its forage quality resulting in light to moderate use by bison.

Approximately 50 acres was disked and left fallow in the Panoramic Fields to control bluejoint reedgrass. Woody vegetation was mowed on approximately 630 acres on the Panoramic and Gerstle Fields to kill unwanted grasses and trees.

Rainfall collected on the DJBR totaled 10.85 inches on the Panoramic Fields and 4.35 inches on the Gerstle Fields.

RY06 — Approximately 700 acres of nugget bluegrass and 50 acres of arctared fescue were fertilized in spring at a cost of $26,415. Grasses were fertilized in the Panoramic Fields during 17 May–1 June and in the Gerstle Fields during 2–7 June. An additional 120 acres of bluegrass was fertilized on the Panoramic Fields on 2–3 July at a cost of $4850.

Approximately 400 acres of Derby oats were planted in the Panoramic Fields and Gerstle Fields. This spring was late and cold with a killing frost of 21°F on 5 June, which resulted in major damage to crops. No oats were planted in May, with plantings in June planned to produce higher quality forage, but less quantity, when bison migrated to the DJBR. The following oat seeding dates, acreages, and June late-summer RFVs were achieved:

Date	Location/Acres	RFV
14 Jun	Panoramic Fields, 80 acres	161
15 Jun	Panoramic Fields, 35 acres	141
17–19 Jun	Panoramic Fields, 135 acres	n/a
25 Jun	Panoramic Fields, 50 acres	163
29 Jun	Gerstle Fields, 100 acres	203

Nugget bluegrass sampled in the Panoramic and Gerstle Fields on 29 August had RFV values of 108 and 114 respectively.

Bluejoint reedgrass was mowed on 20 and 24 July on 100 acres of better quality nugget bluegrass to retard bluejoint reedgrass phenology thus making it less competitive with bluegrass. Mowing the bluejoint reedgrass in July also improves its forage quality resulting in light to moderate use by bison.

Approximately 125 acres was disked and left fallow on the Panoramic Fields to control bluejoint reedgrass. Woody vegetation was mowed on approximately 600 acres on the Panoramic and Gerstle Fields. Several old berm piles were removed.

Rainfall collected on the DJBR totaled 11.30 inches on the Panoramic Fields and 8.75 inches on the Gerstle Fields.

DELTA BISON WORKING GROUP ACTIVITIES

The Delta Bison Working Group (DBWG) met on 29 March 2007 to begin discussion about updating the 2000–2005 Delta Bison Management Plan and to resolve several membership issues. The DBWG reviewed goals and objectives in the 2000–2005 plan and made suggestions for review.

Member Don Quarberg reported that he did not feel he could adequately represent Delta agriculture since he had retired from the University of Alaska Cooperative Extension Service. DBWG members agreed to split the Delta agriculture interest from Quarberg's seat and agreed to fill the Delta agriculture seat with Phil Karpari, the current University of Alaska Cooperative Extension Service agent in Delta Junction. Members also agreed to solicit the Delta Chamber of Commerce for a new member to fill the vacant Delta Junction business seat.

CONCLUSIONS AND RECOMMENDATIONS

After several years of herd size being below the precalving population objective we met our precalving objective in spring 2006. Herd productivity and calf survival continued within the

normal range, with calf:cow ratios ranging from 47–59:100 and 22–25% calves in the herd during this reporting period. The bull:cow ratio objective was met with ratios ranging from 63–71 bulls:100 cows.

Herd movements showed no major changes with the majority of the DBH moving from the Delta River to the DJBR in mid to late July and moving into private agricultural lands in approximately mid August. Based on anecdotal observations, we feel that implementing the BRYHMA reduced hunter access. This increased use of the DJBR by bison in September, thus further reducing bison crop damage on private agricultural lands. During RY06, the problematic trend of some bison calving east of the Delta River continued when 30 neonates were seen on private agricultural land and the DJBR in mid May. It may be advisable to consider harvesting those bison that remain east of the Delta River in the late spring or those that move there early in the fall. However, extending the bison hunting season into these times will have an impact on farming operations. Before implementing a bison season opening prior to 1 October, private landowners should reach a consensus that this action is worthwhile. That consensus has not been reached.

The 4 bison conflict management objectives in the Delta Bison Management Plan 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 the situation. Implementation of the BRYHMA 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, 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 (<90%) relative to earlier years. If hunter success continues to remain low or trend lower, it may be necessary to adjust hunt administration to increase hunter success.

No regulatory changes are recommended at this time to adjust DBH management. The 2000–2005 Delta Bison Management Plan is still the current management plan for Delta bison herd management. The following objectives in the plan will be conducted as management activities in the next report period.

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.

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.

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TABLE 1 Delta bison precalving and postcalving population estimates, 1983–2007

Year	Spring precalving population estimate	Fall prehunt population estimate
1983	355[a]	360
1984	300[a]	356
1985	285[a]	378
1986	300[a]	361
1987	275[a]	396
1988	337[a]	426
1989	366[a]	432
1990	373[a]	440
1991	378[a]	484[b]
1992	384[a]	482
1993	392[a]	465
1994	340[a]	446[c]
1995	397[a]	485
1996	375[a]	496
1997	381[a,d]	474
1998	349[a]	414–471
1999	335–393[a]	434
2000	359[a]	453
2001	361[a]	471
2002	373[a]	476
2003	365[a]	407
2004	327[e]	421
2005	332[e]	402
2006	353[a]	430
2007	397[e]	516

[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 Apr 1997.
[e] Calculated based on maximum number of non-neonatal bison seen during late Mar through early May surveys.

TABLE 2 Delta bison fall ground composition count data and estimated population size, regulatory years 1992–1993 through 2006–2007

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]				
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[b]
1995–1996	87	22	52	27	42	9	22	231	485
1996–1997	65	13	54	24	46	6	25	279	496[c]
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	14	48	9	28	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
2004–2005	61	10	42	23	51	5	21	251	421
2005–2006	71	20	47	23	46	9	22	321	402
2006–2007	63	13	59	27	43	5	25	241	430

[a] Includes yearlings and adult cows.
[b] Includes 15 domestic bison that escaped and were incorporated into the herd.
[c] Includes 6 domestic bison that escaped and were incorporated into the herd.

TABLE 3 Percent[a] Delta bull bison with different horn categories based on horn morphology, 1997–2006

	Yearling	Horn Category (%)			
Month/Year	(%)	Small	Medium	Large	*n*
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
Sep 2004	19	22	49	10	69
Sep 2005	29	16	46	10	103
Sep 2006	30	28	14	28	43

[a] Percentages may not total 100% due to rounding.

TABLE 4 Delta bison harvest and accidental death, regulatory years 1986–1987 through 2006–2007

Regulatory year	Hunter harvest								Other mortality	Total
	Reported						Estimated			
	M (%)		F (%)		Unk (%)	Total	Unreported[a]	Illegal	Total		
1986–1987	15	(24)	47	(76)	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	(69)[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
2004–2005	33	(72)	13	(28)	0 (0)	46	5	0	5	2	53
2005–2006	27	(60)	18	(40)	0 (0)	45	5	0	5	2	52
2006–2007	48	(80)	12	(20)	0 (0)	60	6	0	6	0	66

[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 Reported Delta bison harvest data by permit hunt, regulatory years 1994–1995 through 2006–2007

Hunt no.	Regulatory year	Permits issued	Percent did not hunt	Percent unsuccessful permittees	Percent successful permittees	Bulls	(%)	Cows	(%)	Unk	Total harvest
403	1994–1995	20	5	0	95	19	(100)	0	(0)	0	19
	1995–1996	70	6	10	85	58	(97)	2	(3)	0	60
	1996–1997	70	4	9	86	53	(88)	7	(12)	0	60
	1997–1998	60	3	8	88	51	(96)	2	(4)	0	53
	1998–1999	45	2	29	69	26	(87)	4	(13)	1	31
	1999–2000	50	2	34	64	29	(91)	3	(9)	0	32
	2000–2001	50	10	16	74	35	(95)	2	(5)	0	37
	2001–2002	70	1	30	70	47	(96)	2	(4)	0	49
	2002–2003	70	3	23	74	51	(98)	1	(2)	0	52
	2003–2004	70	7	34	59	40	(98)	1	(2)	0	41
	2004–2005	50	10	26	64	32	(100)	0	(0)	0	32
	2005–2006	35	9	22	69	24	(100)	0	(0)	0	24
	2006–2007	65	2	20	80	47	(90)	5	(10)	0	52
404	1994–1995	20	0	5	95	1	(5)	18	(95)	0	19
	1995–1996	50	2	6	92	2	(4)	44	(96)	0	46
	1996–1997	50	0	12	86	3	(7)	40	(93)	0	43
	1997–1998	70	3	4	93	6	(9)	59	(91)	0	65
	1998–1999	55	5	24	71	0	(0)	39	(100)	0	39
	1999–2000	50	6	26	68	0	(0)	34	(100)	0	34
	2000–2001	50	8	20	70	1	(3)	33	(94)	1	35
	2001–2002	60	2	17	82	4	(8)	45	(92)	0	49
	2002–2003	65	3	15	82	3	(6)	50	(94)	0	53
	2003–2004	60	3	37	60	3	(8)	33	(92)	0	36
	2004–2005	25	12	32	56	1	(7)	13	(93)	0	14
	2005–2006	30	0	30	70	3	(14)	18	(86)	0	21
	2006–2007	15	7	53	54	1	(13)	7	(88)	0	8

Hunt no.	Regulatory year	Permits issued	Percent did not hunt	Percent unsuccessful permittees	Percent successful permittees	Bulls	(%)	Cows	(%)	Unk	Total harvest
405	1998–1999	2[a,b]	0	0	100	1	(50)	1	(50)	0	2
	1999–2000	1[a]	0	0	100	1	(100)	0	(0)	0	1
	2000–2001	2[a,b]	0	0	100	2	(100)	0	(0)	0	2
	2001–2002	1[a]	0	0	100	1	(100)	0	(0)	0	1
	2002–2003	0	0	0	0	0	(0)	0	(0)	0	0
	2003–2004	1[a]	0	0	100	0	(0)	1	(100)	0	1
	2004–2005	0	0	0	0	0	(0)	0	(0)	0	0
	2005–2006	0	0	0	0	0	(0)	0	(0)	0	0
	2006–2007	0	0	0	0	0	(0)	0	(0)	0	0
Totals for all permit hunts	1994–1995	40	3	3	95	20	(53)	18	(47)	0	38
	1995–1996	120	4	8	88	60	(57)	46	(43)	0	106
	1996–1997	120	3	10	86	56	(54)	47	(46)	0	103
	1997–1998	130	3	6	91	57	(48)	61	(52)	0	118
	1998–1999	102	4	26	71	27	(38)	44	(61)	1	72
	1999–2000	101	4	30	66	30	(45)	37	(55)	0	67
	2000–2001	102	7	18	73	38	(52)	35	(48)	1	74
	2001–2002	131	2	23	75	51	(52)	47	(48)	0	98
	2002–2003	135	4	19	78	54	(51)	51	(49)	0	105
	2003–2004	130	5	36	59	43	(56)	34	(44)	0	77
	2004–2005	75	11	28	61	33	(72)	13	(28)	0	46
	2005–2006	65	5	26	69	27	(60)	18	(40)	0	45
	2006–2007	80	2	25	75	48	(80)	12	(20)	0	60

[a] One permit was issued for an Alaska Fish and Wildlife Safeguard raffle.
[b] 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 2006–2007

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
2004–2005	7.2	13.2	5.6	6.9
2005–2006	6.9	21.7	11.2	13.6
2006–2007	5.5	10.6	5.1	8.2

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

TABLE 7 Delta bison hunts DI403 and DI404 applications received and permits issued, 1977–2006

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
2005	13,952	65
2006	8,762[b]	80[b]

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

[b] Only 65 DI403 bull permits were announced in the permit drawing supplement. After the drawing an additional 15 DI404 cow permits were drawn from the pool of DI403 applicants.

TABLE 8 Delta bison hunter reported residency and success for drawing permit hunts DI403 and DI404, regulatory years 1986–1987 through 2006–2007

	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	35 (92)	0	3	0	0	3 (8)	38
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)	115
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	67 (69)	2	27	1	0	30 (31)	97
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
2004–2005	1	46	0	0	47 (69)	0	21	0	0	21 (31)	68
2005–2006	2	42	0	0	44 (76)	0	14	0	0	14 (24)	58
2006–2007	2	57	1	0	60 (78)	0	17	0	0	17 (22)	77

[a] Local residents reside in Unit 20D.

TABLE 9 Delta bison percent harvest[a] by month, regulatory years 1994–1995 through 2006–2007

Regulatory year	Percent harvest by month							
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	*n*
1994–1995[b]	61	11	8	0	5	16	0	38
1995–1996[b]	42	25	8	5	8	14	0	106
1996–1997[b,c]	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[d]	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
2004–2005	52	15	2	7	13	11	0	46
2005–2006	44	20	4	9	9	13	0	45
2006–2007	47	19	5	5	10	12	2	60

[a] Percentages may not total 100% due to rounding.
[b] The hunting season opened on 7 Oct versus 1 Oct.
[c] The hunting season was extended by emergency order to include 1–30 Apr 1997.
[d] The hunting season was extended by emergency order to include 1–15 Apr 2000.

TABLE 10 Delta bison harvest percent[a] by transport method for Hunts DI403 and DI404, regulatory years 1991–1992 through 2006–2007

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
2004–2005	0	0	0	6	18	3	72	0	65
2005–2006	0	0	0	11	6	7	74	2	54
2006–2007	0	0	0	3	12	2	82	2	60

[a] Percentages may not total 100% due to rounding.

TABLE 11 Delta bison harvest percent[a] by kill location during permit hunts DI403 and DI404, regulatory years 1989–1990 through 2006–2007

Regulatory year	Location of kill			
	Delta Agriculture Project	Delta Junction Bison Range	Other	Unknown
1989–1990	95	5	0	0
1990–1991	91	9	0	0
1991–1992	77	23	0	0
1992–1993	78	17	5	0
1993–1994	75	24	1	0
1994–1995	86	14	0	0
1995–1996	68	26	6	0
1996–1997	56	32	12	0
1997–1998	70	21	4	4
1998–1999[b]				0
1999–2000	51	29	19	2
2000–2001	77	13	10	0
2001–2002	65	25	10	0
2002–2003	78	21	1	0
2003–2004	71	21	8	0
2004–2005	76	11	13	0
2005–2006	63	26	12	0
2006–2007	81	14	0	5

[a] Percentages may not total 100% due to rounding.
[b] 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 Stephen DuBois, ADF&G