Approved by the Colorado Parks and Wildlife Commission July 2011

BLACK BEAR DATA ANALYSIS UNIT MANAGEMENT PLAN

Bear's Ears - North Park

DAU B-4

GAME MANAGEMENT UNITS

4, 5, 6, 14, 16, 17, 161, 171, 214, and 441

NW Region

Prepared for:
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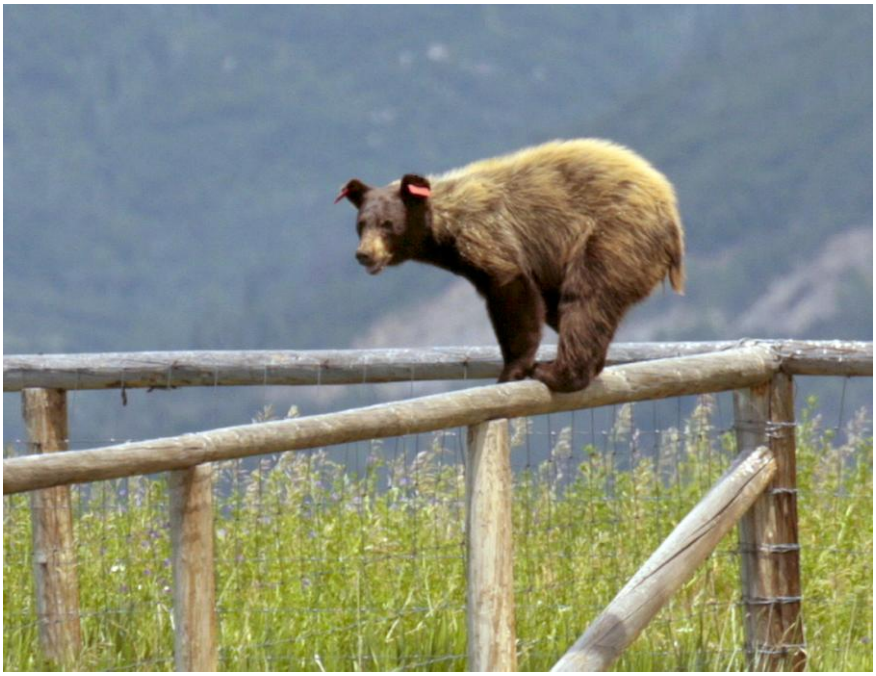
Date: March 2011



Cover Photo Courtesy of Bruce Roemmich

DATA ANALYSIS UNIT PLAN FOR B-4
EXECUTIVE SUMMARY

GMU's: 4, 5, 6, 14, 16, 17, 161, 171, 214, 441

Land Ownership: 40% Private, <1% Land Trust, 38% USFS, 12% BLM, 1.7% ANWR, 4% State Parks, 4% State Land Board, 1% Colorado Division of Wildlife

Current Objective: To maintain a recreational harvest and reduce property damage and human-bear conflicts

Current Mortality Objective: Harvest objective - 30, Total mortality objective - 45 to 55 bears

New Strategic Goal: Decrease population for 5 years, then stabilize population at new level by monitoring harvest criteria on 3-yr running average and adjusting licenses to maintain that trend, minimize game damage from bears to the extent possible.

Total Annual Mortality Objective: 167 total bears for 5 years, then 119 bears to maintain stable population trend (assumes 25 "other" bear mortalities annually).

Total Annual Harvest Objective: 142 harvested bears for 5 years, then 94 bears as long as stable trend indices are met.

Annual mortality objectives are derived and monitored through review of the age structure of the bear mortality, the composition of male and female bears in harvest, annual forage conditions, and from bear density estimates where available.

Black bear (*Ursus americanus*) DAU B-4 is found in the north central part of the state and encompasses portions of northeastern Moffat and northern Routt counties. It also includes all of Jackson County (Figure 1). A combination of ten Game Management Units (GMU's 4, 5, 6, 14, 16, 17, 161, 171, 214, and 441) makes up the DAU. B-4 is bounded on the north by the Colorado/Wyoming state line, on the east by the Jackson/Larimer County line, on the south by the Grand/Jackson County line and Highway 40, and on the west by Highway 13. Major towns within the DAU include Clark, Craig, Hahn's Peak, Hayden, Steamboat Springs, and Walden. The major roads include highways 13, 14, and 40. The Continental Divide splits the DAU north to south from the Colorado-Wyoming state line near Hog Park south to Rabbit Ears Pass. The total land area of the DAU covers 8,333 km^2 with 5005 km^2 of that total being black bear habitat.

West of the Continental Divide, Craig in Moffat County and Steamboat Springs in Routt County are the largest and most populated cities. Craig is made up of mostly local year-round residents with a strong agricultural base and a fairly high percentage of construction and energy field workers, with a huge influx of big game hunters in the fall. Steamboat Springs is a major ski resort attracting tens of thousands of visitors each winter and is a mixture of full time residents and second home owners. Steamboat is not just a winter destination but is also a very popular destination in summer and fall offering world class fishing and excellent big game hunting. East of the Divide is North Park, with Walden being the largest town. North Park is a large intermountain park and includes all of Jackson County. Walden has a mostly year-round permanent resident population centered on ranching and tourism attracting year-round visitors for gold medal trout fishing, big and small game hunting, waterfowl hunting, snowmobiling and ice fishing.

Bears often forage in and around Steamboat Springs, which sometimes leads to conflicts when they get into trash cans, garages, and occasionally houses. Some out of town visitors may be frightened when a bear unexpectedly shows up on a bike path, at a condo, in a crab apple tree, or is foraging in garbage containers. Others may consider the experience a highlight of their vacation. As more bear habitat becomes developed for tourism and residences, conflicts between bears and humans will only increase, especially in years of poor natural food production. Current and future bear management around Steamboat should focus on minimizing these conflicts. Only occasionally do bear show up in the other municipalities of B-4, and thus are a minor factor of urban bear management in other parts of the DAU. In rural portions of B-4, agricultural conflicts with bears can be substantial, especially when black bears kill livestock (particularly domestic sheep).

B-4 SIGNIFICANT ISSUES

There are two major types of bear/human conflict in B-4. The first and most important financially is game damage to agriculture. In Moffat and Routt counties, sheep losses to black bears can be in the tens of thousands of dollars annually with great variability between years. Jackson County, having a lower density of bears and domestic sheep, rarely has livestock game damage claims. The second major conflict is bears damaging property and occasionally breaking into private homes, mainly in and around Steamboat. Public safety is always a consideration in human-bear conflicts, but rarely have black bears been a serious threat to people. Yet, the possibility exists for bears to injure or kill people.

The frequency and intensity of conflicts varies annually, with higher incidences reported in years of poor natural forage production when bears seek alternate food sources. In years of high mast crop failures, the Steamboat Springs DOW office may receive 15-20 reports of bears in town per day for several weeks or months. In most years, bear calls average 2-3 per day. In good years, the office only receives bear reports from the public a few times per week or less. The same trend goes for agricultural conflicts, but even in good food production years bears will kill domestic sheep.

B-4 MANAGEMENT ALTERNATIVES

Current management is geared towards maintaining a recreational harvest while minimizing bear conflicts and damage. At the current bear mortality level, management indices point to an increasing bear population in B-4. Three post-hunt population alternatives are considered in this DAU plan. Several of these options could be combined in order to achieve the desired future condition, such as increasing or decreasing the population to a certain level then stabilizing it.

Increasing Population: Mortality objectives, most monitored data, indices, and modeling are designed to allow for population growth and dispersion within and outside the DAU. The annual harvest goal would be 71 total bears with a 3-year running average of adult males in the harvest >35%, total females <30%, and % adult females in female harvest <45%. Not every management index must be in complete agreement, but most should point toward an upward trend. It is unrealistic to assume the population could be managed for a continually increasing trend, after 5 years of applying this strategy management would move toward stabilizing the population.

Stable Population: Mortality objectives, most monitored data, indices, and modeling are designed to provide for population stability within the DAU. The harvest goal would be 119 total bears with a 3-year running average of adult males in the harvest 25-35%, total females 30-40%, and % adult females in female harvest 45-55%. Not every management index must be in complete agreement, but most should point toward a stable trend.

Suppression (Decreasing) Population: Mortality objectives, most monitored data, indices, and modeling are designed to reduce the population within the DAU. The harvest goal would be 167 total bears with a 3-year running average of adult males in the harvest <25%, total females >40%, and % adult females in female harvest >55%. Not every management index must be in complete agreement, but most should point toward a population being held below biotic and defined human social tolerance thresholds. It is unrealistic to assume the population could be managed for a continually decreasing trend; after 5 years of applying this strategy, management would move toward stabilizing the population.

Public input received at the public meeting in Craig, Colorado and from returned questionnaires during the 30-day public comment period were split 50/50 on the alternative to maintain a stable population (8) and the alternative to decrease the population (8). Many written comments mentioned human safety and/or livestock depredation by bears as major concerns. The majority of respondents were from rural parts of the county (87%) with most being involved in livestock operations. Most respondents, including those seeking a reduction in the bear population understand the need for the right balance in management of black bears. After reviewing input from the public and all pertinent background and population information available for the B-4 DAU the following preferred alternative was selected.

PREFERRED ALTERNATIVE

New Strategic Goal: Decrease population for 5 years, then stabilize population at new level by monitoring harvest criteria on 3-yr running average and adjusting licenses to maintain that trend, minimize game damage from bears to the extent possible.

Total Annual Mortality Objective: 167 total bears for 5 years, then 119 bears to maintain a stable population trend (assumes 25 of these are "other" bear mortalities annually).

Total Annual Harvest Objective: 142 total bears for 5 years, then 94 bears as long as stable trend indices are met.

Approved by the Colorado Parks and Wildlife Commission July 2011

BEAR DATA ANALYSIS UNIT (DAU) B-4
GAME MANAGEMENT UNITS
4, 5, 6, 14, 16, 17, 161, 171, 214, and 441

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INTRODUCTION

The Colorado Division of Wildlife (CDOW) manages wildlife for the use, benefit and enjoyment of the people of the state in accordance with the CDOW's Strategic Plan and mandates from the Colorado Wildlife Commission and the Colorado Legislature. Colorado's wildlife resources require careful and increasingly intensive management to accommodate the many and varied public demands and growing impacts from people. CDOW is responsible for the maintenance of Colorado's big game at population levels that are established through a public review process and approved by the Colorado Wildlife Commission.

DAU PLANS AND WILDLIFE MANAGEMENT BY OBJECTIVES

To manage the state's big game populations, the CDOW uses a "management by objective" approach (Figure 1). Big game populations are managed to achieve objectives established for Data Analysis Units (DAUs).

DAUs are geographic areas that typically contain an individual big game population. For large mobile carnivores like black bears DAUs are primarily administrative constructs with generally similar habitats and/or human social considerations. DAUs are composed of smaller areas designated as game management units (GMUs), which provide a more practical framework where the management goals can be refined and applied on a finer scale, typically through hunting regulations.

The DAU plan process is designed to balance public demands, habitat and big game populations into a management scheme for the individual DAU. The public, hunters, federal and local land use agencies, landowners and agricultural interests are involved in the determination of the plan objectives through input given during public meetings, the opportunity to comment on draft plans and when final review is undertaken by the Colorado Wildlife Commission.

The strategic goals and specific mortality objectives defined in the plan guide a long term cycle of annual information collection, information analysis and decision making. The end product of this process is a recommendation for numbers of hunting licenses for the DAU (Figure 1). The plan also specifically outlines the management techniques that will be used to reach desired objectives. CDOW intends to update these plans as new information and data become available, at least once every ten years.

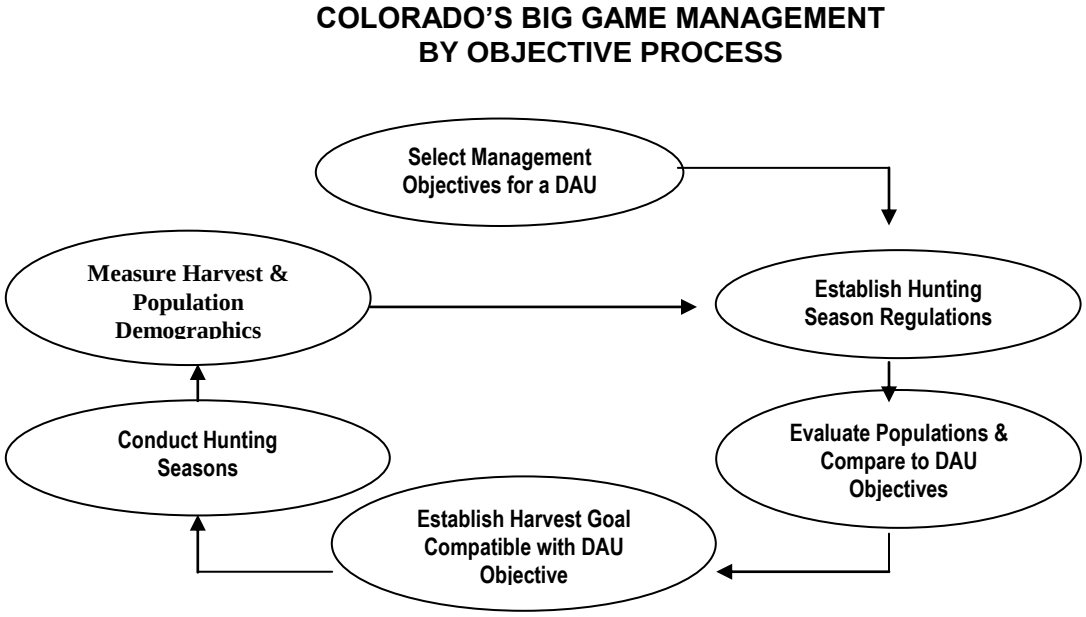

Figure 1. Management by Objectives Process Used by the CDOW to Manage Big Game Populations on a DAU Basis

DATA ANALYSIS UNIT DESCRIPTION

Location

Black bear (*Ursus americanus*) DAU B-4 is found in the north central part of the state and encompasses portions of northeastern Moffat and northern Routt counties. It also includes all of Jackson County (Figure 1). A combination of ten Game Management Units (GMU's 4, 5, 6, 14, 16, 17, 161, 171, 214, and 441) makes up the DAU. B-4 is bounded on the north by the Colorado/Wyoming state line, on the east by the Jackson/Larimer County line, on the south by the Grand/Jackson County line and Highway 40, and on the west by Highway 13. Major towns within the DAU include Clark, Craig, Hahn's Peak, Hayden, Steamboat Springs, and Walden. The major roads include highways 13, 14, and 40. The Continental Divide splits the DAU north to south from the Colorado-Wyoming state line near Hog Park south to Rabbit Ears Pass. The total land area of the DAU covers 8,333 km^2 with 5005 km^2 of that total being black bear habitat.

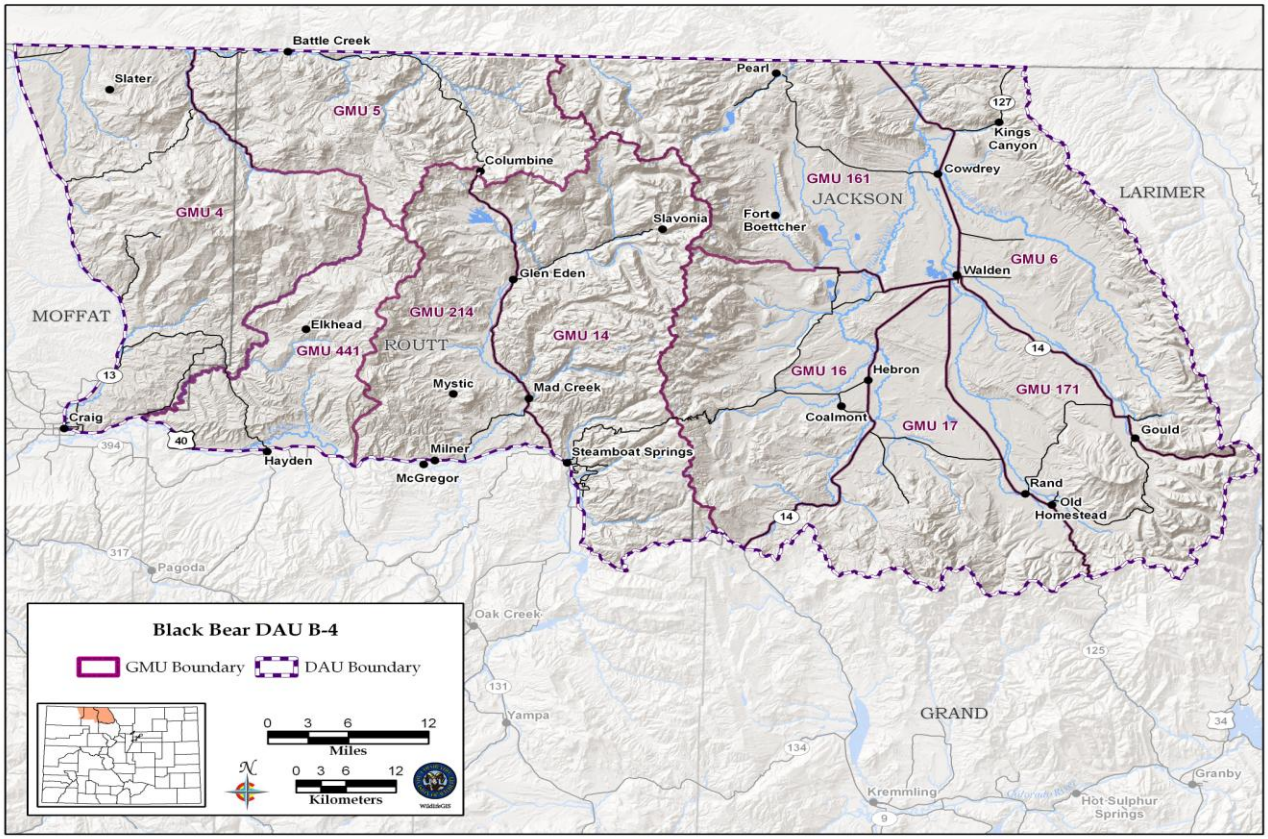

Figure 2. B-4 Location Map

West of the Continental Divide, Craig in Moffat County and Steamboat Springs in Routt County are the largest and most populated cities. Craig is made up of mostly local year-round residents with a strong agricultural base and a fairly high percentage of construction and energy field workers, with a huge influx of big game hunters in the fall. Steamboat Springs is a major ski resort attracting tens of thousands of visitors each winter and is a mixture of full time residents and second home owners. Steamboat is not just a winter destination but is also a very popular destination in summer and fall offering world class fishing and excellent big game hunting. East of the Divide is North Park, with Walden being the largest town. North Park is a large intermountain park and includes all of Jackson County. Walden has a mostly year-round permanent resident population centered on ranching and tourism attracting year-round visitors for gold medal trout fishing, big and small game hunting, waterfowl hunting, snowmobiling and ice fishing.

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Topography

West of the Continental Divide (GMU's 4, 5, 14, 214, and 441) the DAU is characterized by high-elevation mountainous terrain that descends to a high desert plateau with rolling hills and sagebrush on the lowest levels. Prominent features in the west include the Park Range, Sierra Madre Range, and the Elkhead Mountains, which include Bears Ears Peaks and Black Mountain. Elevations range from 12,180 ft. on Mount Zirkel to 6,185 ft. Near Craig. The major drainages here include the Yampa River and the headwaters of the Little Snake River.

East of the Divide (GMU's 6, 16, 17, 161, and 171), elevations in North Park range from 7,800 feet at Northgate to 12,951 feet at Clark's Peak. The average elevation of the open, sagebrush-grassland park is 8,000 feet. North Park is a relatively flat, sagebrush grassland with numerous wetlands interspersed with wide, willow dominated drainages. The mountains that surround the park rise rapidly to the alpine zone above timberline. The North Park watershed begins at the headwaters of the North Platte River. Major tributaries that make-up the headwaters of the North Platte drainage are Grizzly Creek, the Illinois River, the Michigan River, the Canadian River, and the North Fork of the North Platte. Popular fishing lakes in the area include Delaney Buttes, Lake John, and Big Creek Lakes, among others.

Vegetation

Bear DAU B-4 has two totally different types of bear habitat. North Park (Jackson County) is poor bear habitat, due to the lack of shrubs that produce a mast crop. The upper Yampa drainage (Moffat and Routt counties) is excellent bear habitat, because of the large amount of oakbrush and aspen habitat found there. Given these conditions, the DAU description is broken down into two sections to reflect those differences.

Vegetation varies throughout Jackson County with sagebrush, mixed sage, and irrigated grass hay fields lining the valley floor, a variety of willow species along stream courses, and mountain shrub, lodgepole pine, aspen, and spruce-fir at higher elevations. The montane zone is dominated by lodgepole pine stands, and to a lesser extent aspen and spruce-fir stands. Aspen and mountain shrub are the only high value bear habitat in North Park.

Vegetation patterns in Moffat and Routt counties follow a general elevational gradient across the DAU, beginning with high-elevation subalpine zones in the east, to mid-elevation mountain shrub zones, and then to low-elevation desert/basin zones in the west. High value forage areas include Gambel Oak dominated mountain shrub and aspen.

Climate

The climate varies greatly east to west across the DAU. Generally, mean precipitation increases with elevation while temperature decreases. Mean annual precipitation at 10,000 ft. in the Routt National Forest is about 40 inches, while approximately 12 inches fall at 6,185 ft. near Craig. This high level of precipitation on the west side of the divide produces tremendous amounts of mountain shrub which provides an excellent forage base for black bears. In North Park winters are windy, cold, and snowy. The summers are short, cool, and dry. The average temperature measured at Walden is 37.8 degrees F, with a temperature range between -50 degrees F and 90 degrees F. The growing season averages 33 days, mostly in the month of July with between 15 and 45 frost free days annually. The

average annual precipitation is 10 inches, which includes fifty inches of snowfall that comes in a few large snowstorms. Moderate to severe winds are common in North Park prevailing to the northeast. These conditions are not conducive to producing high volumes of bear forage or high densities of bears.

Human Conflict Areas

There are two major types of bear/human conflict in B-4. The first and most important financially is game damage to agriculture. In Moffat and Routt counties, sheep losses to black bears can be in the tens of thousands of dollars annually with great variability between years. Jackson County, having a lower density of bears and domestic sheep, rarely has livestock game damage claims. The second major conflict type is bears damaging property and occasionally breaking into private homes mainly in and around Steamboat. Public safety is always a consideration in human-bear conflicts but rarely have black bears been a serious threat to people. Yet, the possibility exists for bears to injure or even kill people.

The frequency and intensity of conflicts varies annually with higher incidences reported in years of poor natural forage production when bears seek alternate food sources. In years of high mast crop failures, the Steamboat Springs DOW office may receive 15-20 reports of bears in town per day for several weeks or months. In most years, bear calls average 2-3 per day. In good years, the office only receives bear reports from the public a few times per week or less. The same trend goes for agricultural conflicts, but even in good food production years bears will kill domestic sheep.

Land Use

The main industries in this part of Colorado are farming, ranching, tourism, and energy extraction. Ranching is spread throughout the DAU, including both private and public lands. In Moffat and Routt counties, both cattle and sheep are the mainstays of the ranching industry. Land development for primary residences and second homes or summer cabins is most prominent near Steamboat Springs and Craig and has not been prevalent in North Park yet.

Fall hunting seasons for antelope, bear, deer, elk, moose, mountain lion, small game and waterfowl are extremely popular among residents and non-residents. Many landowners and local businesses depend on hunting dollars for a substantial portion of their annual income. It is estimated that hunting directly contributes $45 million annually to the economies of Moffat and Routt counties (BBC Research and Consulting 2008). Winter recreation is centered in and on the Routt National Forest and the Steamboat Springs Ski Area, where skiing, snowmobiling, snowshoeing, and other winter activities such as ice fishing are extremely popular. Spring and summer recreation primarily consists of fishing, camping, and tourism.

Lands administered by the USFS and BLM are managed for multiple uses that include livestock grazing, timber harvest, energy exploration/mining, camping, hunting, fishing, hiking, biking and other forms of outdoor recreation. State trust lands are managed by the state land board to generate revenue for the public school system with those having high wildlife value under recreational leases with the CDOW to allow public access for fishing and hunting. Other public lands managed for public recreation include state wildlife areas, state forest, state parks, and the US Fish & Wildlife Service Arapaho National Wildlife Refuge. Various land trusts hold smaller parcels under conservation easements to protect the land and resources from development.

Land Status

B-4 covers a total of 8,333 km^2. Private land comprises 40% (3,325 km^2), land trusts <1% (4 km^2), Colorado Division of Wildlife (CDOW) 1% (70 km^2), State Parks 4% (302 km^2), State Land Board (SLB) 4% (365 km^2), Bureau of land Management (BLM) 12% (997 km^2), US Fish & Wildlife Service (USFWS) 1% (94 km^2), and U.S. Forest Service (USFS) 38% (3176 km^2) (Table 1). Land status for the entire DAU is also shown broken down by land manager for the Upper Yampa and North Park portions of the DAU (Table 2).

OWNER	PERCENT OWNERSHIP
Private	40%
Land Trust	<1%
CDOW	1%
State Parks	4%
State Land Board	4%
BLM	12%
USFWS Refuge	1%
USFS	38%
	Total 100%

Table 1. Land Ownership in DAU B-4 by Percent Owned

GMU	PRIVATE	LAND TRUST	CDOW	STPARKS	SLB	BLM	USFW	USFS	Total
Upper Yampa	45%	<1%	1%	1%	3%	6%	0%	44%	100%
North Park	35%	0%	1%	7%	5%	18%	2%	32%	100%

Table 2. Land Management by GMU for Each Land Manager in Western and Eastern Portions of DAU B4

MANAGEMENT HISTORY

Administrative

The DAU has included the previously described GMUs and boundaries for over 10 years. Management of those lands varies greatly based on whether ownership is public or private and by the habitat type. There has been significant conversion of agricultural lands and big game winter range to housing development in the Yampa Valley for several decades, but other land management practices have changed little in those years.

Public Lands

The USFS (Routt National Forest) administers 78 grazing allotments on two ranger districts within B-4, the Hahn's Peak/Bear's Ears District and the Parks District. The Hahn's Peak/Bear's Ears District contains 58 grazing allotments (34 sheep, 13 cattle, 3 both sheep and cattle, 2 pack and saddle stock, 6 vacant). The Parks District has a total of 20 grazing allotments consisting of 18 cattle and 2 for pack and saddle stock. The period of utilization varies, but usually occurs July through September. One hundred ten allotments are administered by the two BLM Field Offices within B-4, the Little Snake office in Craig and the Kremmling office located in Kremmling. The Little Snake office manages 57 allotments including 36 cattle, 7 sheep, 5 cattle and sheep, 3 cattle and horse, 2 cattle horse and sheep, with 3 currently vacant. The Kremmling District oversees a total of 53 allotments with most permitted for cattle grazing. That makes a total of 188 grazing allotments in B-4 on BLM and USFS lands.

Management of the Arapaho National Wildlife Refuge focuses on creating and maintaining habitat for migratory birds and waterfowl through habitat manipulation and water management. The refuge also provides important habitat for Greater Sage-grouse, pronghorn, deer, moose, and elk, with 800 – 2,000 elk typically wintering on the refuge.

The State Land Board manages its land to generate revenue for public education and some of the state's institutions. The Board generates this revenue primarily through agricultural grazing leases, crop land leases, mineral development, leasing lands for recreational activities, and interest on invested funds.

Colorado State Parks manages its properties for outdoor recreation and stewardship of Colorado's natural resources. The Colorado State Forest State Park in Jackson County is a major destination for big game hunters in the fall. Well known state parks in the area include the Colorado State Forest State Park, Elkhead Reservoir, Stage Coach Reservoir, Steamboat Lake, and Yampa River State Park.

The Colorado Division of Wildlife manages wildlife on both public and private land. On Division owned properties the focus is on providing high quality wildlife habitat and public access for hunting and fishing recreation.

Various Land Trusts found throughout this area focus on protecting, preserving and enhancing wildlife habitat for future generations while also maintaining working farms and ranches and the western lifestyle their owners enjoy.

Private Lands

The use and management of private lands is as varied as the owners, and ranges from complete preservation or non-use, to extreme over-use. Generally, private lands in this region are managed in accordance with good land stewardship and with sound principles. Comprising approximately 40% of the DAU land mass, private lands are extremely important in big game management in this area.

Hunting Seasons

Prior to 1935, black bears were not considered a game animal, which afforded them no protection from being shot on sight if they were encountered, or preyed on livestock. In 1935, they were awarded some protection by being classified by the state legislature as a game animal. This established limits on the annual harvest and on the number of licenses that an individual could possess. From 1935 to 1963, bears were hunted in the fall, usually concurrently with the annual deer and elk seasons. In 1964, a spring hunting season was established with unlimited licenses available. This continued until 1986, when licenses for the spring season were limited (Beck 1991). The fall hunting seasons occurred concurrently with the established deer and elk seasons and licenses were unlimited until the limited September rifle seasons were established in 1989. Hunters wishing to hunt bears during the established deer and elk season still had access to unlimited licenses until 2005 when license caps were established for these licenses.

In 1992, a citizen's petition was passed that changed bear hunting within the state by preventing bear hunting prior to September 1st and outlawing the use of bait and dogs as aids for hunting black bears. Since 1992, the black bear hunting season has begun on September 2nd annually.

Since 2000, hunting seasons have started with an early, limited, rifle season that runs from September 2nd through September 30th each year, along with overlapping Archery and Muzzleloader seasons. Additional rifle seasons occur concurrent with the 1st, 2nd, 3rd and 4th deer and elk rifle seasons. Under the current season structure, these 4 concurrent seasons are 5 days, 9 days, 9 days, and 5 days in length. Harvest is concentrated in the limited September rifle season, as it is concurrent with the initial phases of the bear hyperphagia period. Harvest and success rates decline as hunting seasons progress through the fall months (October-November) due to bears entering the initial stages of hibernation. Private Land Only (PLO) bear licenses were first offered in B-4 in 2008.

License Allocation History

The ten year bear hunting license allocation history from 2001-2010 is found in Table 3. Note that up through 2004 bear archery, muzzleloading, and rifle licenses during the four rifle deer and elk seasons were unlimited. However, the September rifle season has been limited since that season began in 1989. Beginning in 2005, all bear licenses became limited, including "over the counter with a cap" licenses.

GMU	HUNT CODE	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
DAU Wide	Archery	unlimited	unlimited	unlimited	unlimited	75	60	60	60	60	100
DAU Wide	Muzzleloader	unlimited	unlimited	unlimited	unlimited	30	25	25	25	25	25
14	PLO	NA	NA	NA	NA	NA	NA	NA	10	10	10
DAU Wide	Sept. Lmtd	125	150	150	150	195	150	150	150	150	150
DAU Wide	1st Concrnt	unlimited	unlimited	unlimited	unlimited	85	65	65	65	65	65
DAU Wide	2nd Concrnt	unlimited	unlimited	unlimited	unlimited	135	110	110	110	110	110
DAU Wide	3rd Concrnt	unlimited	unlimited	unlimited	unlimited	25	25	25	25	25	25
DAU Wide	4th Concrnt	unlimited	unlimited	unlimited	unlimited	15	15	15	15	15	15
	TOTALS:	125	150	150	150	560	450	450	460	460	500

Table 3. B-4 2001-2010 License Allocation History

Mortality-Harvest and Non-Harvest

The bear mortality trend has been increasing in B-4 for both harvest and non-harvest mortalities. Total bear mortality in B-4 over the past 10 years (2000-2009) has ranged from a low of 14 bears in 2000 to a high of 42 bears in 2008, with the recent 3-year average (2007-2009) being 37 bears. The harvest trend shows an average of 14 bears killed by hunters per year 2000-2004 and an average of 20 bears killed by hunters from 2005–2009. The current 3-year average is 21 hunter killed bears (Figure 3).

Non-harvest bear mortalities (control kills and other mortality besides hunter kills) have increased for the period 2000-2009, with the majority of those being control kills related to domestic sheep damage. This trend is apparent in both male and female bear mortality. Nearly three times more male than female bears are killed in control actions, which is typical in bear versus livestock situations. Only in 2002 and 2004 were more females killed than males for damage purposes.

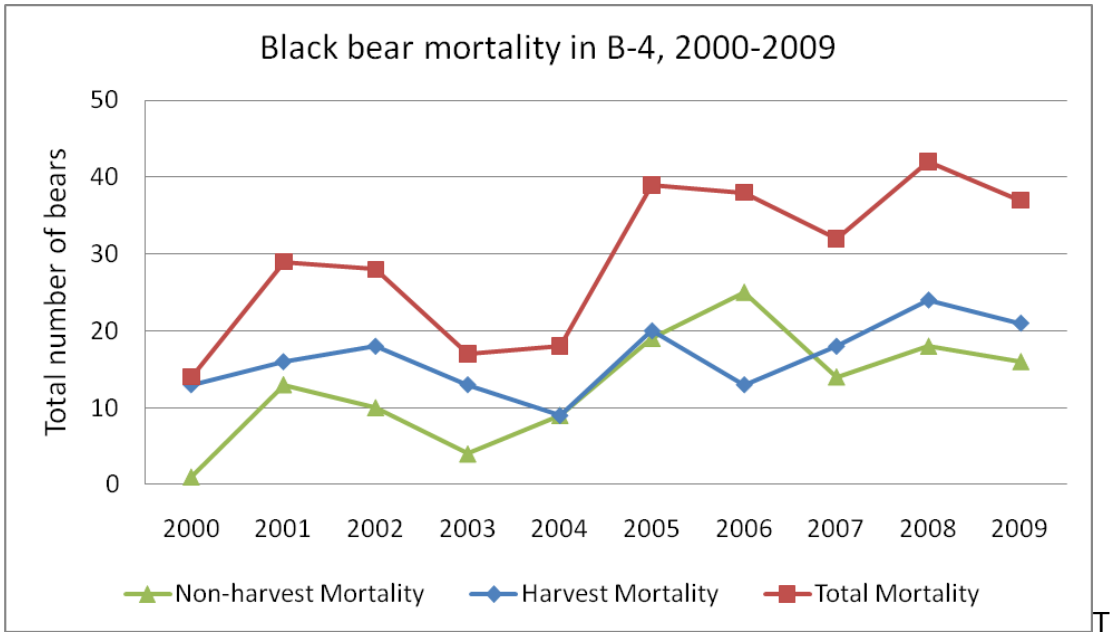

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Figure 3. Total Black Bear Mortality in B-4

Harvest mortality and total mortality vary significantly by GMU, but are proportionally consistent across the last 10 years. Game Management Unit 4 has the highest level of harvest and total mortality in the DAU, followed by GMU 14; unit 441 has the least (Figure 4). Areas west of the Continental Divide make up two thirds of mortality (Table 4). Harvest levels appear to be roughly proportional to the amount of fall bear habitat and hunting access levels. Total mortality contributions per GMU roughly

follow the same ranking order as harvest mortality.

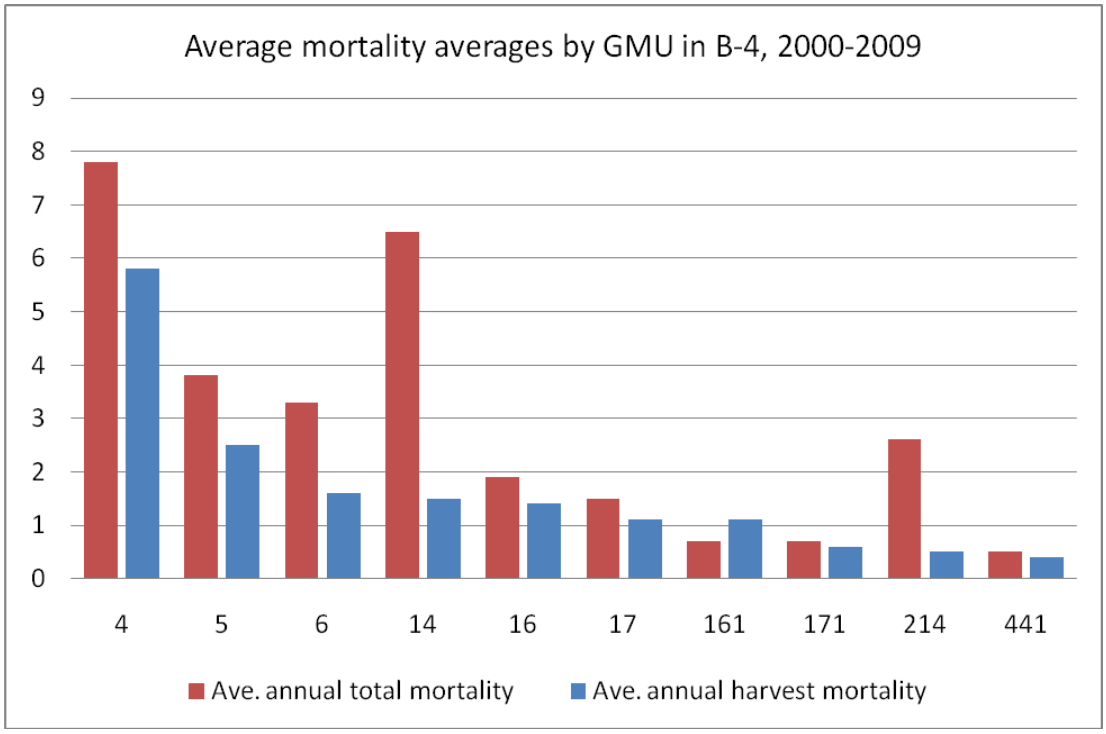

Figure 4. Annual Average Hunting and Total Mortality by GMU (2000-2009)

B-4 % Harvest Mortality by GMU 2000-2009

East VS West of Continental Divide

East of the Continental Divide

GMU	Harvest	% Mortality
6	16	10%
16	15	9%
17	11	7%
161	5	3%
171	6	4%
	53	33%

West of the Continental Divide

GMU	Harvest	% Mortality
4	11	7%
5	14	8%
14	58	35%
214	25	15%
441	4	2%
	112	67%

B-4 % Non-Harvest Mortality by GMU 2000-2009

East VS West of Continental Divide

East of the Continental Divide

GMU	Non-Harvest	% Mortality
6	4	3%
16	2	2%
17	1	1%
161	1	1%
171	1	1%
	9	7%

West of the Continental Divide

GMU	Non-Harvest	% Mortality
4	67	52%
5	24	19%
14	17	13%
214	7	5%
441	4	3%
	119	93%

Table 4. East vs. West Annual Average Harvest and Non-Harvest Mortality by GMU (2000-2009)

The long-term proportion of female bears in hunter harvest (years 1985–2009) averaged 38% while the mid-term (2000–2009) proportion of females in harvest also averaged 38% (Figure 5). The recent 3-year average for proportion of females in harvest (years 2007-2009) is 35%.

The long-term proportion of female bears in non-harvest mortality (years 1985–2009) averaged 32% while the mid-term (2000–2009) proportion of females in non-harvest mortality averaged 34%. The recent 3-year average for female proportion in non-harvest mortality (years 2007-2009) is 28%. The long-term trend shows the proportion of females in non-harvest mortality increasing while the mid-term and short-term trend is decreasing (Figure 5). This illustrates a male bias in non-hunt mortality typical for areas with high livestock losses to bears (older males are more likely to regularly kill livestock than younger or female bears). If non-hunt mortality of bears was totally random we should see a more even distribution of mortality between sexes.

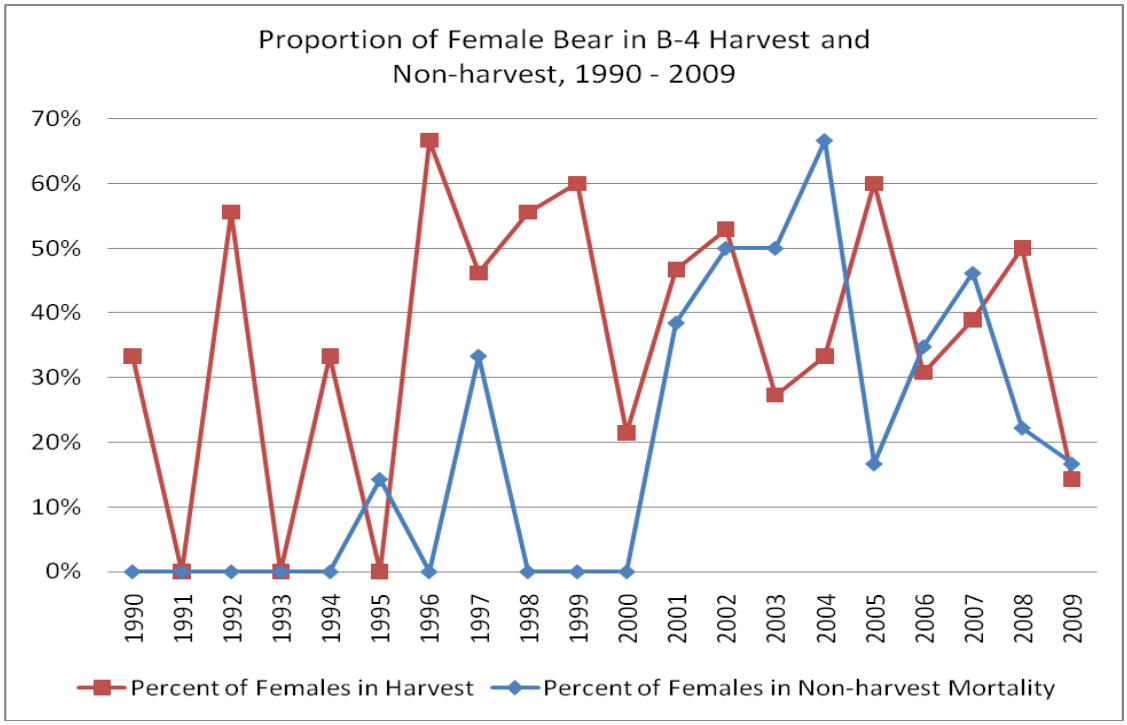

Figure 5. Proportion of Females in B-4 Harvest and Non-harvest Mortality

Mortality- Method of Take

Just as bear vulnerability to harvest changes with hunter effort or pressure, hunter success rates vary depending upon bear vulnerability due to natural forage failures. Colorado data show direct correlation of increases in hunter success rates in years when there is some form of natural food failure. If one can account for variation due to food failure, then increases in hunter success in average to good forage years should be due to increases or decreases in either bear densities or changes in hunter effort. Averaged over time and the natural range of hunter ability, knowledge, and hunting competence, overall hunter effort should be relatively static and the remaining annual change in hunter success should have a crude correlation to bear density, excluding food failure years.

The mean September and fall concurrent season success rates can be used as a simple baseline indicator of population trajectory. Censoring food failure years, the annual September and fall concurrent rates can be compared to the baseline (Table 5). As a subjective benchmark, the standard deviation from the foregoing DAU baseline mean should establish the range within which hunter success would tend to indicate a more or less stable population. Success above the range of standard deviation would indicate an increasing bear population, whereas success below the deviation would indicate a decreasing bear population. Note that while September rifle hunting seasons have been relatively constant since 1999, archery and muzzleloading seasons went from statewide and unlimited to limited by DAU in 2005, and bear seasons concurrent with rifle deer and elk seasons were unlimited until 2005 when they were limited by DAU.

B - 4 Success Rates 1995 - 2009		YEAR															Mean Success
HUNT		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Rate
Archery	Licenses Sold	Valid Statewide				Unlimited						72	57	54	58	59	
	Total Harvest	0	0	1	0	4	3	4	7	8	5	3	1	5	3	5	
	Success Rate											4%	2%	9%	5%	8%	6%
Muzzle	Licenses Sold	Valid Statewide				Unlimited						29	25	25	25	22	
	Total Harvest	0	0	0	0	0	2	0	1	0	0	1	2	1	1	0	
	Success Rate											3%	8%	4%	4%	0%	4%
PLO	Licenses Sold	No PLO Season													10	10	
	Total Harvest	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	
	Success Rate														10%	10%	10%
September	Licenses Sold	Valid Statewide				96	125	124	147	148	149	192	148	148	147	147	
	Total Harvest	3	2	11	4	3	5	6	8	5	3	11	7	11	13	14	
	Success Rate					3%	4%	5%	5%	3%	2%	6%	5%	7%	9%	10%	5%
1st Rifle	Licenses Sold	Unlimited										63	61	55	46	54	
	Total Harvest	3	1	1	1	1	1	3	1	0	1	0	1	0	0	1	
	Success Rate											0%	2%	0%	0%	2%	1%
2nd Rifle	Licenses Sold	Unlimited										106	85	104	99	92	
	Total Harvest	0	0	0	3	2	2	3	1	0	0	5	2	1	5	0	
	Success Rate											5%	2%	1%	5%	0%	3%
3rd Rifle	Licenses Sold	Unlimited										24	25	22	25	22	
	Total Harvest	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	
	Success Rate											0%	0%	0%	4%	0%	1%
4th Rifle	Licenses Sold	Unlimited										5	4	11	3	8	
	Total Harvest	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Success Rate											0%	0%	0%	0%	0%	0%

Table 5. Black Bear Hunting Success Rates 1995-2009

With only 5 years of success rates for archery, muzzleloading and concurrent rifle seasons available under the current season structure, long term trends in success rates are just being established. PLO bear licenses were established in 2008 and only have two years of success history. Assuming season structures remain similar these means will become even more indicative of population trends. The September season success rate has been increasing steadily since 2005 and indicates an increasing population trend.

Mortality-Age and Gender

The technique of counting annual rings in cementum of bear teeth is a reliable method for determining ages of black bears (Harshyne et al. 1998, Costello et al. 2004). This is especially true for bears less than five years of age. For bears five years of age or older, errors increased with the age of the bear (McLaughlin et al. 1990, Harshyne et al. 1998, Costello et al. 2004). Since most female black bears in Colorado do not reproduce until their 5th year, classification of females into sub-adult (non-reproducing) and adult (reproducing) age classes using cementum annuli is quite reliable. Therefore, all female black bears age five and over are considered adults for the purposes of harvest data analyses.

Beginning in 2007, a premolar was extracted from harvested bears and other deceased bears handled by CDOW. These teeth were collected and submitted annually for aging via cementum annuli sectioning. Since bear age data have only been collected for 3 years, the sample sizes, particularly when broken into classes, are small.

Bear teeth collected from the B-4 DAU, whether hunter harvest (Figure 6) or total mortality (Figure 7), show a relatively young age structure in the mortality data, with sub-adults (under 5 years) making up nearly three quarters of harvest. This index alone would indicate a heavily harvested bear population (based on small sample size).

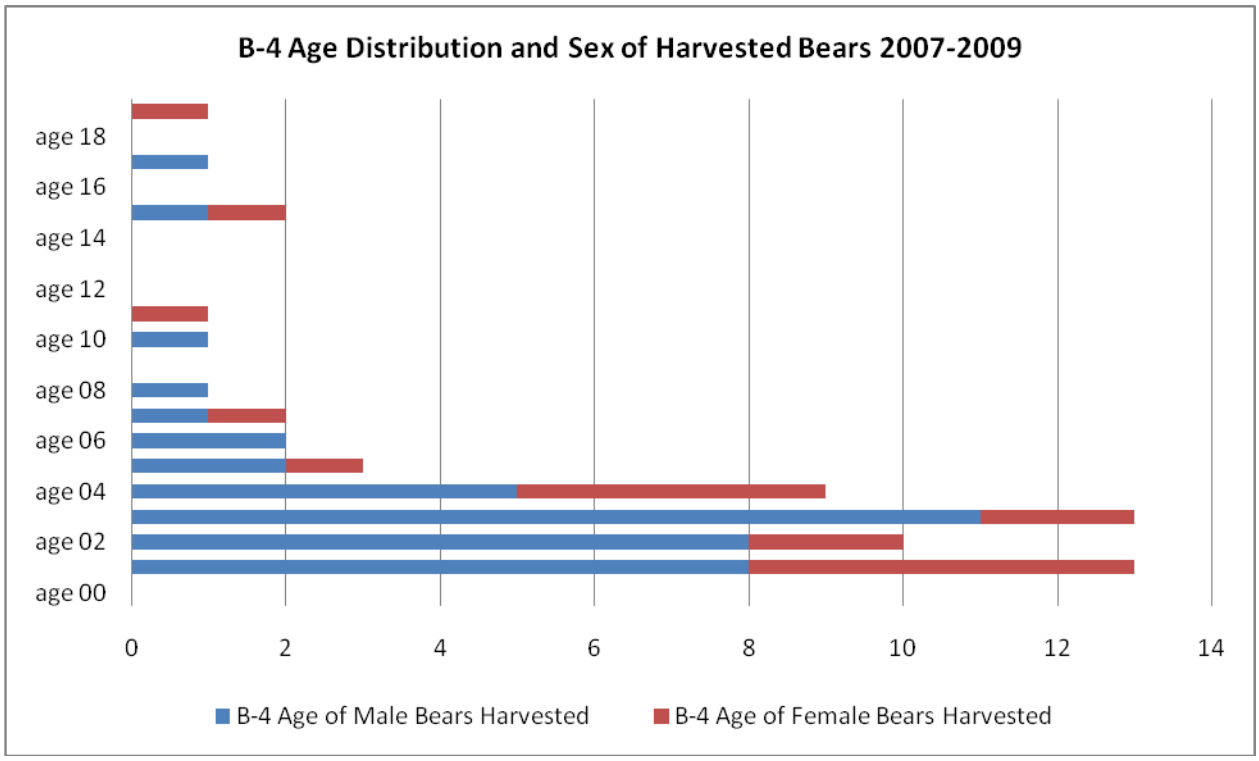

Figure 6. B-4 Age and Sex Distribution in Harvested Bear Mortality (from teeth) 2007-2009

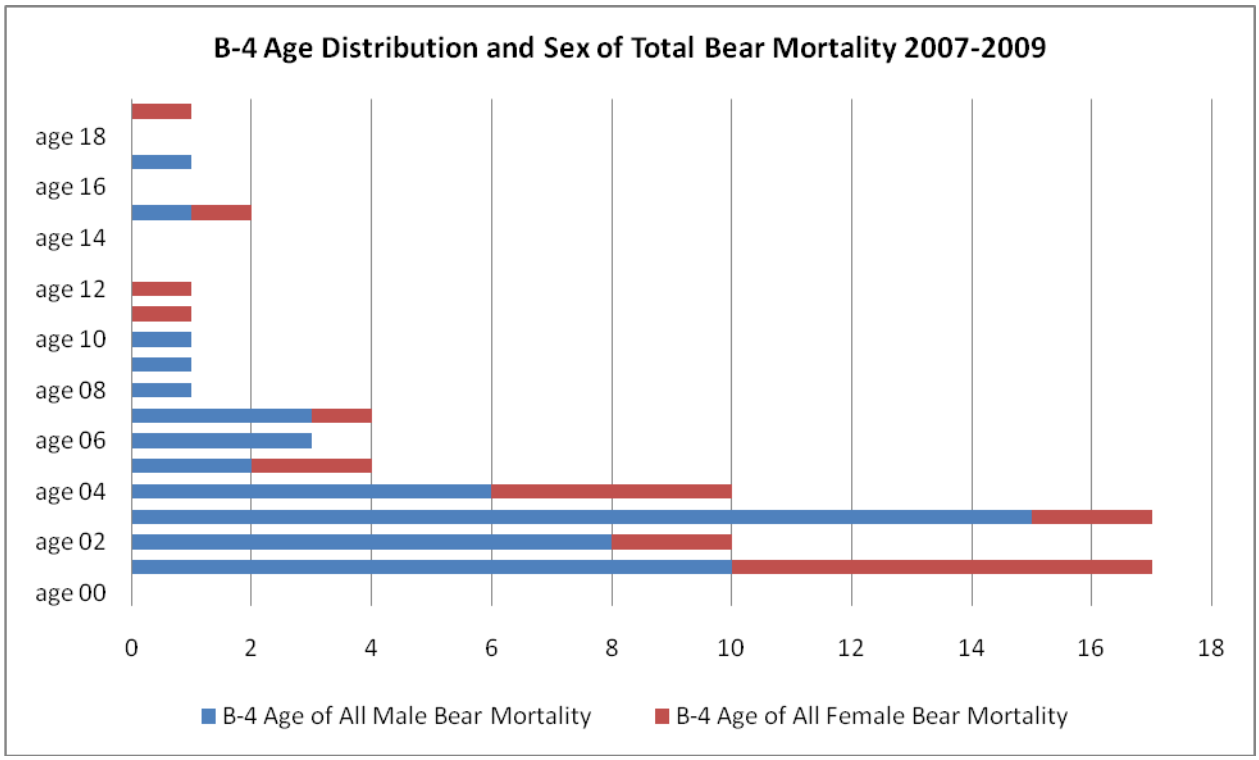

Figure 7. B-4 Age and Sex Distribution in Total Bear Mortality (from teeth) 2007-2009

Harvest and non-harvest mortality is not evenly distributed across the DAU but is skewed towards units 4, 5, and 14 due to higher bear densities and game damage issues in these units that are heavily grazed by domestic sheep. It should also be noted that a high percentage of damage bears are males, including a substantial number of male bears older than those typically killed in hunter harvest.

Male bears, particularly the older males, tend to be a little bolder and more aggressive than females making them more susceptible to both hunter and non-hunter harvest.

Current Harvest and Non-Harvest Mortality Objective

Current harvest and non harvest mortality objectives are 30 and 25 respectively, for a total bear mortality objective of 55 bears. Three year averages for this DAU rank it 13th in the state for total harvest (averaging 21 bears 2007-2009), and 10th for total mortality (37 bears) for the same period. The majority of harvest (62%-3 yr ave) currently comes from the limited September season. In 2010, archery licenses were increased to 100 licenses (a 25% increase) to increase harvest of bears in the month of September. Harvest and tooth data suggest that total female mortality is less than 36%, with female harvest mortality less than 37%. Age data indicates that past mortality may have reduced the adult male population segment. Greater than 43% (3 year ave) of all mortality for the DAU is non-hunter caused.

Game Damage and Human Conflict Management

Colorado is liable for damage caused by big game, with certain limitations and restrictions. From 1972 until 2001, CDOW paid for damage by black bear to any real or personal property. Along with livestock, this included vehicles, buildings, grills, appliances, hot tub covers, etc. In 2001, state liability was limited to agricultural products and property used in the production of raw agricultural products. Liability also changed so that the state is not liable for more than $5,000 per animal.

Over the ten-year period of 2000-2009 there were a total of 83 bear damage claims in B-4. Routt County had 63 claims, Moffat 18 claims, and Jackson had 2 claims. Total dollar value of claims over this period was $272,022.43. Of this total Routt County had the highest dollar amount at $180,700.94 or an annual average of $18,070.09. Moffat County had the second highest amount at $173,222.93 or an average of $17,322.29 annually. Jackson County totaled $2,652.67 or an average of $265.27 annually. The total dollar value of bear damage claims in B-4 over the past ten years has risen from an average of $22,905.75 for years 2000-2004 to an average of $31,498.74 for the period of 2005-2009 (Figure 9).

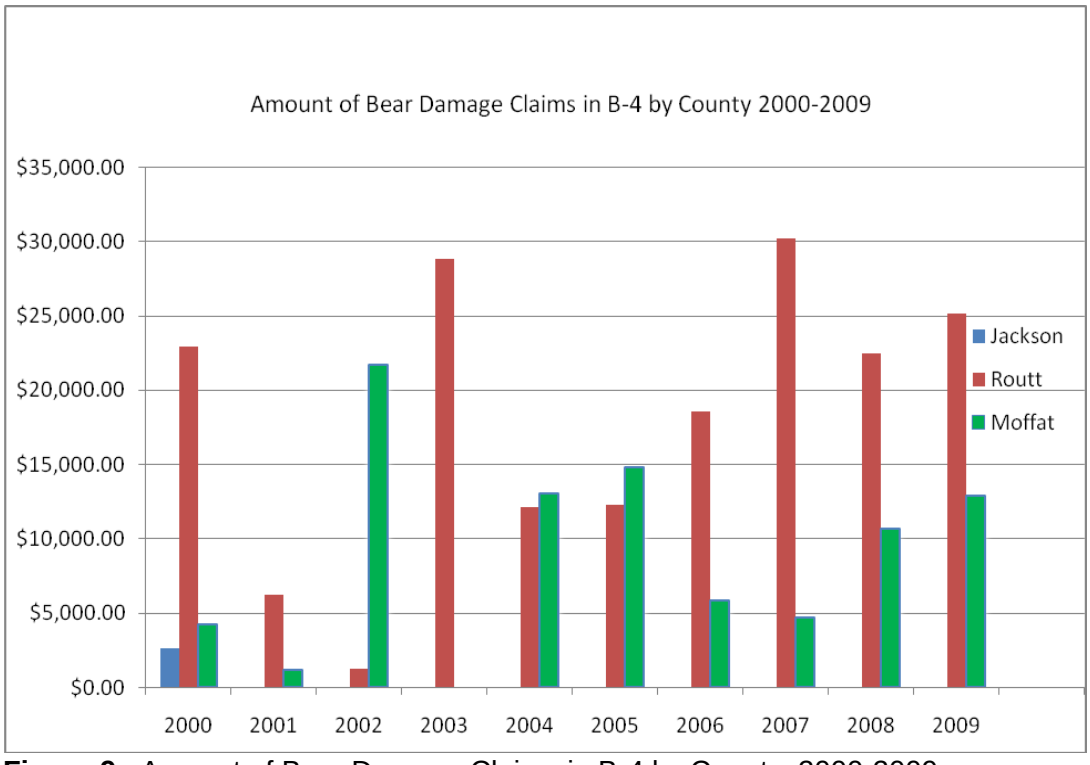

Figure 9. Amount of Bear Damage Claims in B-4 by County, 2000-2009

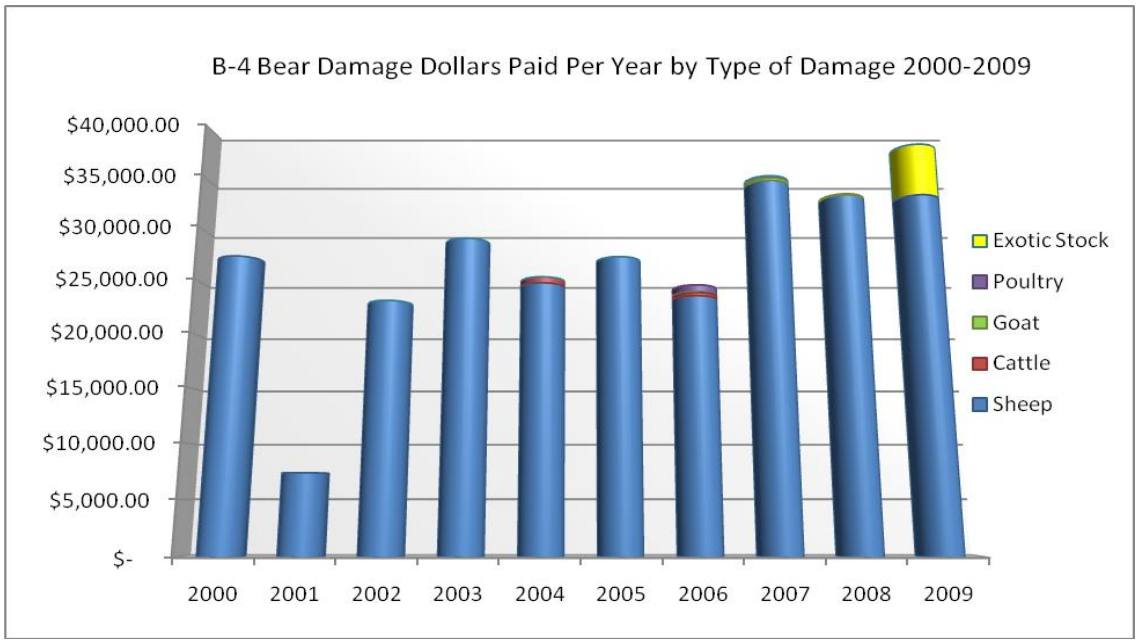

Figure 10. Total Bear Damage Claims Per Year in B-4, 2000-2009

Domestic sheep damage claims caused by black bears far exceeded any other type of damage claim accounting for 96% of total claims in the DAU and 100% of the claims in Moffat County. Cattle, goats, poultry, and exotic domestics accounted for the rest. Moffat and Routt counties have a high percentage of sheep damage claims due to large numbers of domestic sheep grazing on both public and private land in excellent black bear habitat during the lambing season. Jackson County has few domestic sheep and thus almost no lamb predation by bears (Figure 10).

Domestic sheep loss to bears has been a huge concern in this DAU, as have urban bear conflict issues in and around urban areas (mainly Steamboat Springs). Most of the urban bear conflicts are the result of bears getting into trash, but they also occasionally get into homes, causing property damage and scaring residents. Both of these issues are major factors in bear management considerations in B-4.

MANAGEMENT CONSIDERATIONS

Bears are primarily solitary, and their survival strategies do not lend themselves to easy or inexpensive inventory methods. Consequently, managers must rely upon indirect information and indices to population status and trajectory. Therefore, rather than relying on a few indices, a suite of indices is used to inform management decisions. These include: age class and gender composition in harvest, mortality density, hunter success rates, human-bear conflicts, game damage, habitat models and forage condition monitoring, and population modeling.

Habitat

Habitat found in B-4 is diverse, ranging from sagebrush flats on the valley floors and lower elevations to spruce-fir in the subalpine. The diversity of habitat is not limited strictly by elevation but also by where it is found geographically. On the east, North Park (Jackson County) is poor bear habitat due to the lack of shrubs that produce a mast crop. On the west, the upper Yampa drainage (Moffat and Routt counties) is excellent bear habitat having large amounts of aspen and mast producing oakbrush preferred by bears (Figure 11). Bear use of specific vegetation type changes throughout the year depending on elevation and plant morphology along with seasonal bear needs (Figure 12).

Habitat Description and Value to Bears

The subalpine/montane zone occurs in both the east and west sides of the DAU and is characterized by spruce-fir and aspen (*Populus tremuloides*) vegetation types. Engelmann spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*) regularly occur in uneven-aged stands at high elevations (9,000-11,000ft.). Aspen stands are usually found in areas with high soil moisture content and are often associated with diverse, productive grass and forb understories. This zone provides year long, high value bear habitat

Vegetation of the mid-elevation (6,500-8,500 ft.) zone is characterized by mountain shrubs, dominated by Gamble oak (*Quercus gambelii*), west of the Continental Divide only, and interspersed with sagebrush (*Artemisia spp.*), serviceberry (*Amelanchier alnifolia*), snowberry (Symphori*carpos sp.*), mountain mahogany (*Cercocarpus montanus*) and chokecherry (*Prunus viginiana*) are also common. Those areas dominated by oakbrush and/or serviceberry, with a mixture of other mesic shrubs, provide excellent high value bear habitat. Areas at this elevation dominated by sagebrush interspersed with serviceberry provide medium quality fall edge habitat within 1km of the edge and within 5km of primary vegetation. Areas at this elevation in North Park dominated by sagebrush interspersed with rabbitbrush along with irrigated grass hay meadows provide little value to black bears.

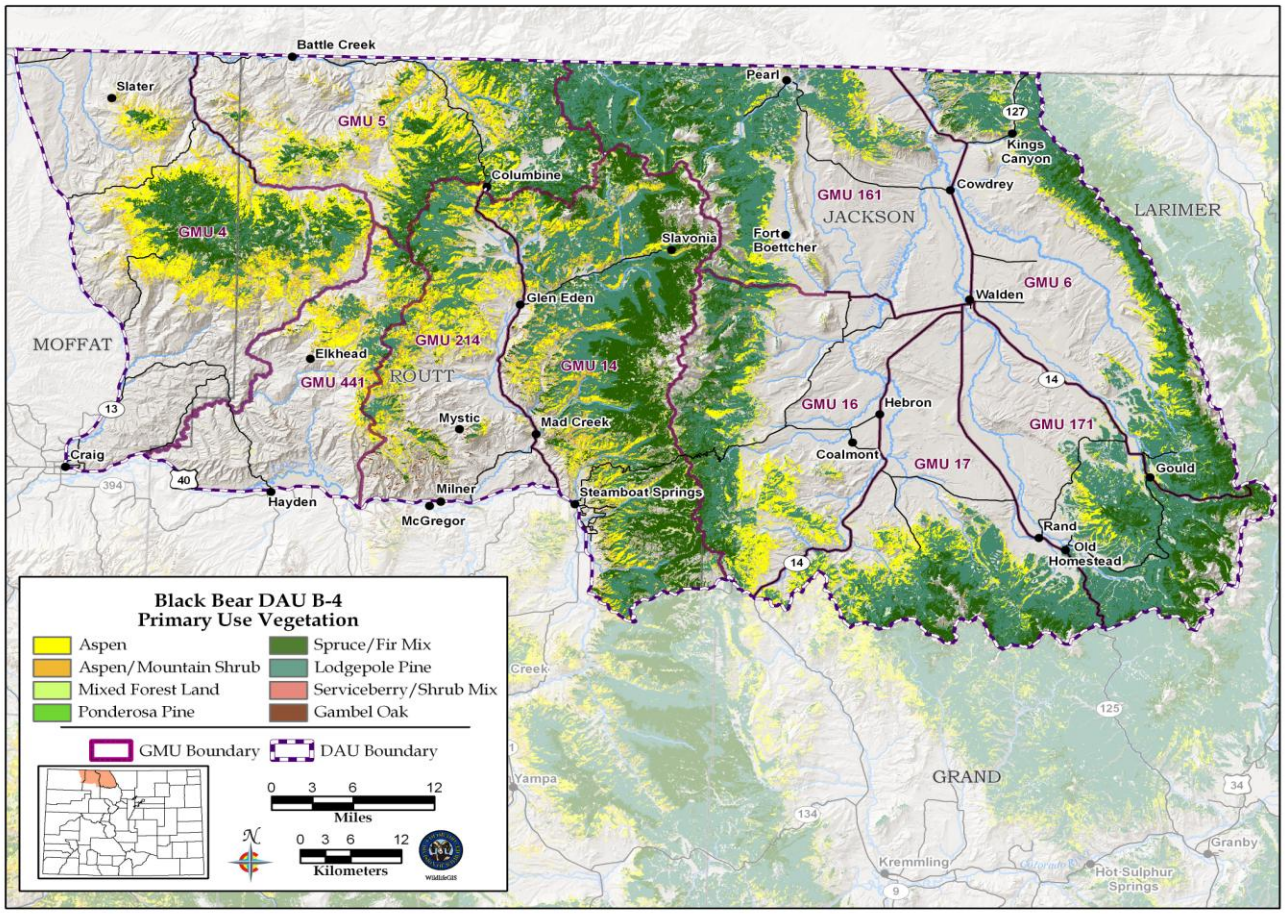

Figure 11. Vegetation Types Important for Black Bear in B-4

The desert/basin zone generally occurs below the 6500 ft. and is dominated by sagebrush steppe and grasslands providing little to no value to bears. A north aspect of high ridges throughout this zone, and extending into the mountain-shrub zone, is pinyon-juniper which can provide medium to low value bear habitat along the edge in summer and fall. In areas where sufficient irrigation water exists, native vegetation has been converted for hay production of alfalfa or native grasses such as timothy or smooth brome. Much of the native vegetation near Craig has been converted to agricultural fields which bears rarely use but may travel through.

Wetland/riparian vegetation types are found along the river bottoms and associated irrigated meadows. Most notable is the Yampa River corridor running east to west across southern portions of the DAU. This area is dominated by narrow leaf cottonwood and willow. While extremely valuable as wildlife habitat and supporting the greatest abundance and diversity of wildlife, this habitat type on the western slope is only used lightly by bears unless it is a coniferous dominated riparian area, in which case it provides secondary, year long, habitat with a medium to low value.

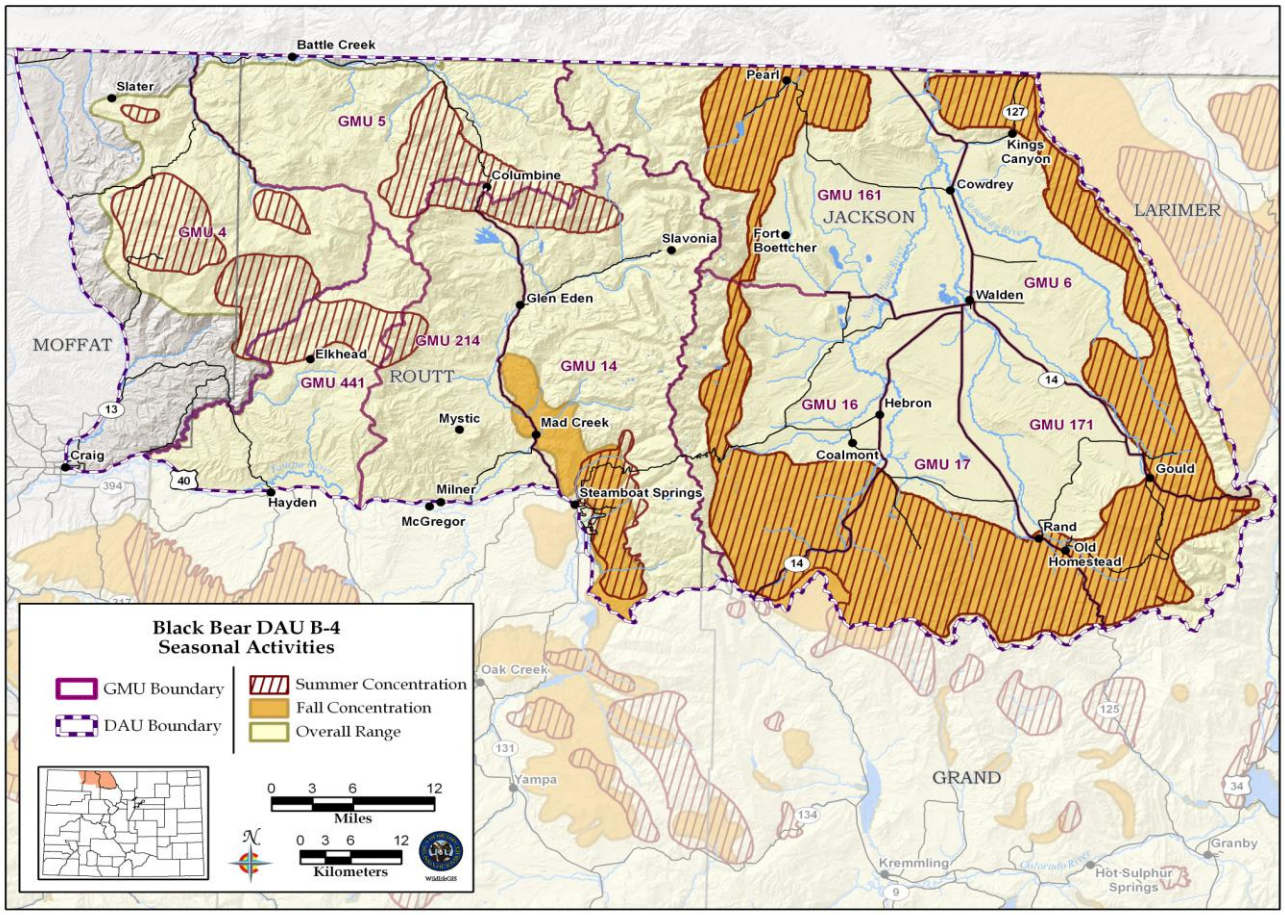

Figure 12. Black Bear Seasonal Activity Areas Found in B-4

Habitat Models

Two different habitat models have been used to evaluate bear use, occupancy, and forage value, and to project possible populations by extrapolating bear densities. The first model was developed by Gill and Beck (1991) in an unpublished report to the Colorado Wildlife Commission and was modified by Apker (2003) in an internal DOW report. This model applies subjective probable black bear densities for different vegetation types to the amount of land area of those vegetation types in the various GMUs. The vegetation type amounts for this model were derived from landsat GAP project coarse vegetation types. This vegetation/density model provides a snapshot extrapolation of possible bear population size in Colorado in the early 1990s. This model and its subsequent 'density to land mass' extrapolation yields a projected early 1990s bear population estimate in B-4 of about 830 black bear (Table 6). This equates to a density of about 17.5 bears/100 km2 within those vegetation categories deemed important for black bears.

Common Name	*Square Miles in DAU*	*Percent of DAU*	*Bear Density as 1 bear/X mi²*	*Bear Numbers*
Aspen	*533.98*	*16.62%*	*1*	*534*
Douglas fir	*8.00*	*0.25%*	*8*	*1*
Forest dominated wetland/riparian	*23.84*	*0.74%*	*10*	*2*
Gambel oak	*184.00*	*5.73%*	*1*	*184*
Juniper woodland	*9.83*	*0.31%*	*20*	*0*
Lodgepole pine	*566.40*	*17.63%*	*10*	*57*
Lodgepole pine clearcut	*27.13*	*0.84%*	*10*	*3*
Mesic upland shrub	*13.35*	*0.42%*	*6*	*2*
Mixed forest	*2.65*	*0.08%*	*6*	*0*
Shrub dominated wetland/riparian	*6.34*	*0.20%*	*10*	*1*
Spruce fir	*393.60*	*12.25%*	*10*	*39*
Subalpine meadow	*63.47*	*1.98%*	*10*	*6*
TOTAL	***1832.57***	***57.05%***		***830***

Table 6. B-4 DAU Wide Black Bear Density Estimate Based on Vegetation

The second, more recently developed model (2008) uses DOW Basin-wide GIS Vegetation Classification project data. DOW managers ranked each vegetation type for its utility as basic bear habitat (use/occupancy) and then what its relative forage value was. This results in a two tiered habitat ranking system. Use/occupancy is defined at 4 levels; primary, secondary, edge, and out. Relative forage value was rated for primary, secondary, and edge habitat at 3 levels; high, moderate or low based upon the perceived potential of those habitats to provide forage for black bears. Use/occupancy terms are defined as follows:

Primary – cover types that bears typically and normally are found in at various times of year.
Secondary – cover types that bears occasionally use but do not prefer.
Edge – cover types infrequently used, but that bears may be found in when adjacent to Primary cover types.
Out – cover types that are not black bear habitat or those in which bears would only travel through.

The results of this analysis provide an assessment of bear habitat in terms of its relative use and state of occupancy and then, for occupied habitats, what their potential forage value may be. This results in a matrix for assigning habitat quality and subsequently for assigning bear densities to different habitat quality to extrapolate a potential population. The population results can be incorporated into population modeling or used as a comparison to independent population model runs.

The habitat model and GIS capability have additional benefits. Black bear mortality point locations are recorded during the mandatory check as Township, Range, Section or UTM coordinates. Although the data from 2005 forward is most reliable, point location data from 1995 forward provide as many as 13,000 mortality locations statewide. These point locations can be plotted and, by categorizing mortality types, can be used to help confirm primary, secondary, and edge habitats, human conflict areas, game damage conflict areas, and highway crossing/movement corridors; (2000-2004) Figure 13, (2005-2009) Figure 14. Of the 5005 km^2 of bear habitat within the DAU, 3,536 km^2 is considered primary habitat, 298 km^2 is secondary habitat and 1,170 km^2 is edge habitat (Table 7).

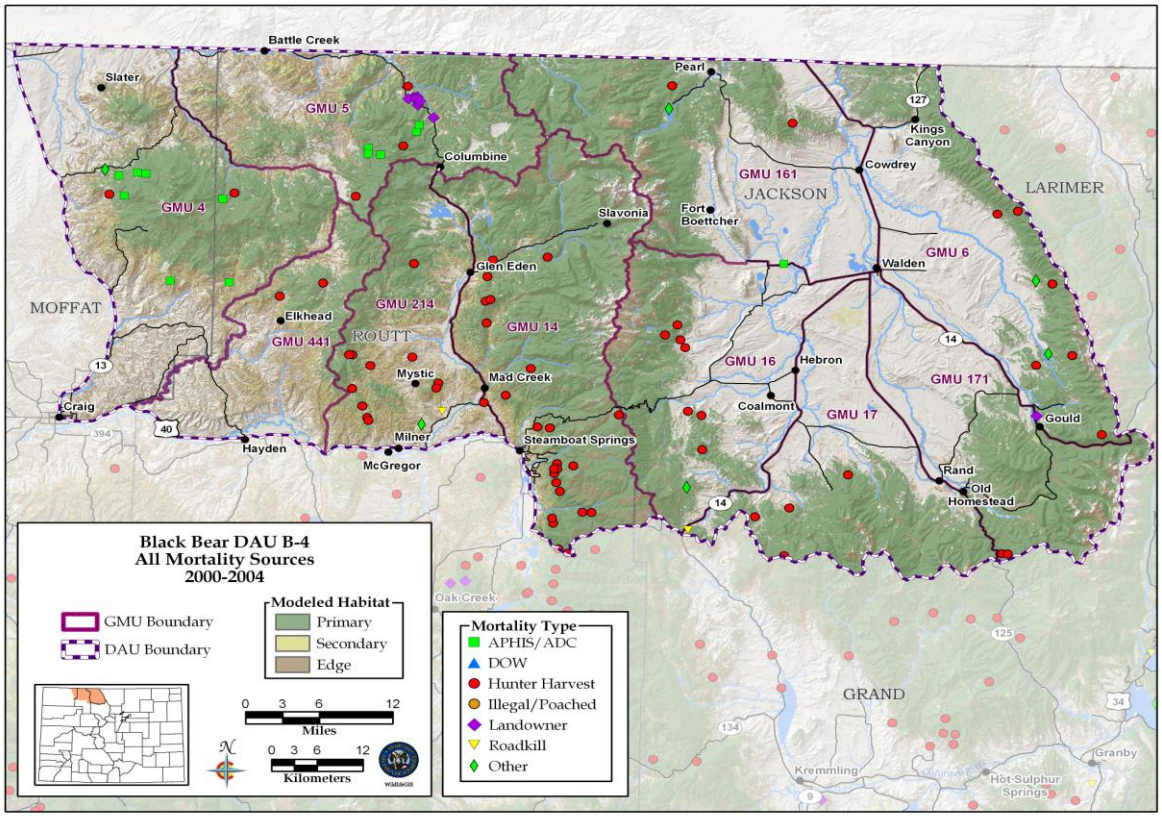

Figure 13. B-4 Black Bear Mortality Sources, 2000-2004

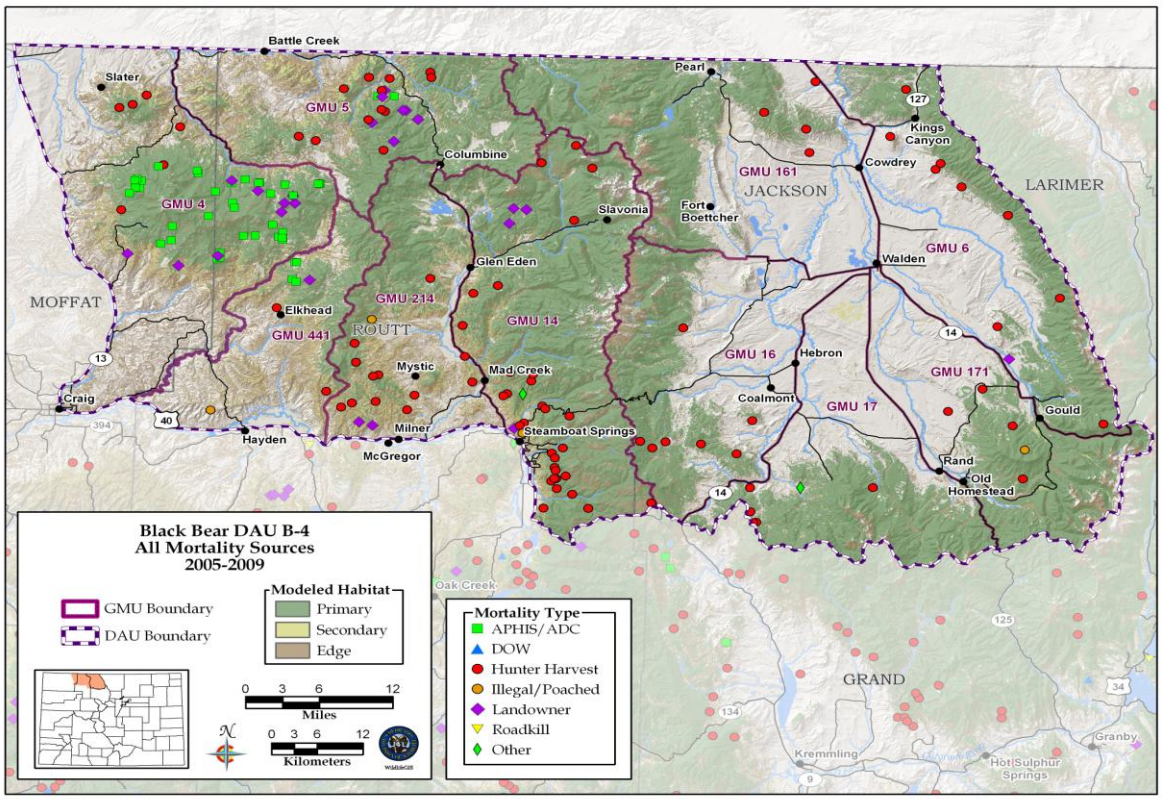

Figure 14. B-4 Black Bear Mortality Sources, 2005-2009

Modeled Bear Habitat by GMU (in km2)						
DAU	GMU	Non-habitat	Primary	Secondary	Edge	Total
B-4	4	505	385	61	260	1,211
	5	169	379	54	172	774
	6	529	346	2	39	916
	14	88	763	40	166	1,056
	16	465	287	5	70	828
	17	355	319	9	46	729
	161	545	435	8	67	1,055
	171	312	293	5	53	664
	214	156	220	66	156	597
	441	205	110	48	140	503
B-4 Total		3,328	3,536	298	1,170	8,333

Table 7. Total Land Area of B-4 and Modeled Bear Habitat by GMU

Hair Snag Studies

In 2009, two bear hair snag surveys were initiated to further estimate black bear densities in Colorado. One of the study sites was in the southern part of the state near Trinidad; the other was in the central part of the state near Glenwood Springs. Preliminary results indicate higher black bear densities than those found by most other Rocky Mountain area studies (Table 8). Although the methods by which density estimates were derived likely play a role in differences in densities, overall habitat

Location	Citation	Per 100km2
Colorado – SESA	Apker et al. 2010 unpublished	47 – 52
Idaho	Beecham and Rohlman 1994	31 – 77
Colorado – NWSA	Apker et al. 2010 unpublished	45 – 50
Idaho	Beecham 1980	43 – 47
Colorado – Uncompahgre	Beck 1995 unpublished Fed Aid Rpt	36
Idaho	Rohlman 1989	34
Arizona	LeCount 1982	33
Arizona	Waddel and Brown 1984	27.8
Colorado – BMSA	Beck 1991	17.9
New Mexico	Costello et al. 2001	9.4 – 17
Colorado – Middle Park	Beck 1997 unpublished Fed Aid Rpt	8.1
Arizona	LeCount 1987	6
Wyoming	Grogan 1997	2.5 – 2.8
Colorado - RMNP	Baldwin and Bender 2007	1.35

Table 8. Black Bear Densities in Rocky Mountain States

quality in the two 2009 study areas in Colorado is probably better than that found in most other study areas. It should also be noted that both the Colorado 2009 survey areas were selected in large part because they were considered among the highest overall quality habitat in Colorado, and the exact survey grid areas were structured to include mostly the highest quality cover and forage value habitat for the survey season. Although the density results are limited to one year, surveys will continue in these and several other locations to improve our understanding of bear densities in different habitats. Managers can use the habitat model to stratify habitat quality and then apply densities selected from other Rocky Mountain areas with (presumed) similar habitat quality to extrapolate a black bear

population estimate for the DAU.

The quality of black bear habitat found in B-4 is very good to excellent in some locations (GMU's 4, 5, 14, 214, 441) and mediocre to poor in others (GMU's 6, 16, 17, 161, 171). No black bear density estimate research has yet been conducted in this DAU. Thus, a combination of habitat based bear density estimates, data from the Colorado hair snag studies, and previous Colorado bear research are used to inform population projections. We assume that bear densities could be moderate to high in the primary and secondary habitat categories of GMUs 4, 5, 14, 214, 441, but probably don't reach the apex densities reported in Table 8 due to a long history of aggressive predator control in areas with high domestic sheep production. Thus, to estimate the black bear population in B-4, we used a density of 36 bears/100 km2 in primary and secondary habitat of the upper Yampa GMUs (2126 km2). We also used a relatively low density of 17 bears/100 km2 in primary and secondary habitat in North Park GMUs (1709 km2), acknowledging the poorer quality bear habitat in that portion of the DAU. Finally, we used an extreme low density of 1 bear/100 km2 in the edge habitats within the entire DAU (1170 km2). These areas probably do not contribute a great deal to overall bear populations in the DAU. Yet some edge habitats, such as human occupied resort communities, have been shown to increase bear reproductive rates at a cost of relatively high but periodic mortality (Beckmann and Berger 2003, Beckmann and Berger 2003). The result of these extrapolations is a projected population of about 1100 bears.

Forage Condition Monitoring

In the fall of 2008, DOW began inventory of mast production conditions. Following survey protocols developed by Costello et al. (2001), we made only slight modifications to provide a basic 5 point matrix of fall mast fruit productions for Gambel oak, juniper spp., chokecherry, and serviceberry. Forage condition results within DAUs can then be represented numerically to reflect annual forage conditions. These results can provide managers objective information about relative forage conditions over time that can be combined with professional judgment to influence management recommendations. Taking it a step further, the results are used as one of the many population model inputs, because forage conditions influence bear reproductive success as well as vulnerability to mortality (Beck 1991, Costello et al. 2001).

Mortality Density

The amount of human-caused mortality in relation to the amount of suitable habitat available can be another method to gauge impacts of human-caused mortality on black bear populations. This can be useful in illustrating impacts on a more local scale and standardizing mortality between DAUs with varying habitat suitability. The number of human-caused mortalities of independent age black bears in each DAU for the past 10 years can be divided by the area of primary and secondary habitat for each DAU.

Thus, B-4 with 3,834 km2 of primary and secondary habitat and an average of 29 bears killed per year over the past 10 years = a mortality density of 0.76 bears/100 km2. In the 1990's, bear density was estimated to be about 17 bears/100 km2 within the then documented important bear habitat. Using these figures to calculate percent mortality yields .76/17 = 4.4%. At a population of 830 bears the mortality density would suggest an increasing population. Higher bear populations would produce an even lower mortality percentage and provide greater potential for increasing harvest and other mortality.

It is likely that a substantial amount of unreported bear mortality occurs in B-4 as a result of conflicts with landowners and livestock operators. Assuming as many as 10 unreported bear mortalities occur annually, the mortality would still be well under 10%, resulting in an increasing population. Miller (1990) demonstrated that under optimal conditions of reproduction and survival, maximum sustainable mortality for black bears could be as high as 14.2%. Beck and White (1996 unpublished) conducted black bear population simulation analyses which, given their assumptions, produced stable bear populations with annual mortality at up to 15%. This range may be useful in gauging current human-caused mortality levels. If we assume a prolonged 10-15% harvest is possible for the above density estimates then it should be possible to project possible ranges of mortality density for the DAU for different management objectives. The actual value of the mortality density thresholds will vary based

upon the habitat quality within the DAU and results from the habitat model analysis, but the following guidelines could be used to develop threshold levels. In order to use this method we would have to be fairly certain of the accuracy of estimated population levels.

Increasing	5 - 10%
Stable	10 - 15%
Suppression	15 – 20%

Population Models

Deterministic population models were developed to test assumptions and project assumed populations using available data. We used a starting population taken from the early 1990s vegetation/density extrapolation (830 bears) and projected it to 2014. We used plausible values for age specific survival and number of cubs per litter. The model includes input values to account for changes to reproduction and mortality rates due to poor forage years. For years 2008 and 2009 we had actual forage condition monitoring data. For prior years, we used the relative amount of non-hunt mortality to provide an index of forage conditions. The models use mortality data with harvest as a direct model input and non-hunt mortality adjusted upward since we know our records do not document all non-hunt mortality. The amount by which non-hunt mortality is adjusted varies depending on the model type, any known reporting biases, and geographic area.

A suite of models is used with divergent assumptions and future year projections aimed to predict what harvest may be needed to stabilize the different modeled bear populations at roughly 2009 levels. Two models in B-4 are run; one projects a liberal population with attendant liberal, but plausible model parameters, the other is a conservative population projection with more conservative parameters.

Liberal Model

Assumptions used in the liberal B-4 model include: age specific survival & age of primipatry are unaffected by human food sources and are reasonable values compared to studied populations; survival rates are generally lower than primarily mast driven DAUs, but cub survival is less variable; mortality multipliers are lower than mast driven DAUs; the population estimate is stabilized at approximate 2009 levels.

Model parameters include:

- start population size is 830
- sex ratio at birth is 50%
- age of adult male and female = 5+
- litter size = 2
- cub survival – poor = 36%, average = 57%, good = 67%
- yearling female survival = 91%, subadult female = 93%, adult female = 94%
- yearling male survival = 90%, subadult male = 92%, adult male = 90%
- non-hunt mortality multiplier = 2 (increases actual reported non-harvest mortality)

Using the liberal model constraints yields a total 2009 black bear population estimate of 1,454 bears, consisting of 489 males, 784 females and 181 cubs. However, it makes more sense to base the population on “independent” bears which excludes cubs. At the end of 2009, the population of independent bears is estimated at 1,272 (489 males, 783 females). This model represents the level the population could reach under optimal conditions of habitat and reproduction. In order to constrain the population at a stable level, harvest of black bears would need to increase five-fold from the current 3-yr average harvest of 21 bears to near 100, assuming no future variability in forage conditions and non-hunt mortality. This model likely predicts a higher population in the DAU than actually exists because it reflects optimum conditions which do not occur every year.

Conservative Model

Assumptions used in the conservative B-4 model include: age specific survival & age of primipatry are unaffected by human food sources and are reasonable values compared to studied

populations; survival rates are generally lower than primarily mast driven DAUs, but cub survival is less variable; mortality multipliers are lower than mast driven DAUs; the population estimate is stabilized at approximate 2009 levels; age and gender specific survival rates are 1-3 percentage points lower than the liberal model; forage conditions have a larger influence on cub survival.

Model parameters include:

- start population size is 830
- sex ratio at birth is 50%
- age of adult male and female = 5+
- litter size = 2
- cub survival – poor = 36%, average = 55%, good = 65%
- yearling female survival = 90%, subadult female = 92%, adult female = 93%
- yearling male survival = 89%, subadult male = 91%, adult male = 87%

non-hunt mortality multiplier = 2 (increases actual reported non-harvest mortality)Using the conservative model constraints yields a 2009 total black bear population estimate of 1,080 bears, consisting of 328 males, 610 females and 142 cubs. At the end of 2009, the population of "independent" bears is estimated at 938 (328 males, 610 females). This model represents the level that the population could reach under average conditions of habitat and reproduction. In order to constrain the population at a stable level, harvest of black bears would need to triple from the current 3-yr average harvest of 21 bears to nearly 60, assuming no future variability in forage conditions and non-hunt mortality. This model predicts a population that seems more reasonable than the liberal model and aligns very closely to the population estimate of 1,100 bears supported by the recent use/occupancy data from the hair snag studies.

Harvest Composition Indices

Black bear vulnerability to harvest and other mortality factors varies depending upon differences in habitat, hunter effort or pressure, access, and forage conditions. Bears are less vulnerable where cover is dense over large geographic areas. They are more vulnerable where vehicle access is good. The greatest influence in annual variation in bear vulnerability is forage conditions. When natural forage quality or availability is poor, bears must become much more mobile in search of food, especially during fall hyperphagic periods. Increased mobility tends to result in bears being more visible to hunters, more likely to encounter human food sources, more frequently found along or crossing roads, and more concentrated in areas where there may be relatively more forage available. All of these tendencies can result in increased hunter harvest, increased human conflict mortality, and more roadkills and other forms of mortality.

Not all segments of bear populations are equally vulnerable, regardless of other influences. Hunting pressure affects harvest rate, which affects age structure, sex ratios, and densities of black bear populations. Adult males are typically most vulnerable because they are bold, often use open areas, and have larger home ranges. Sub-adult males are slightly less vulnerable. Consequently, the adult male segment of a population is the first to be reduced under hunter pressure. **As harvest rates increase, the proportion of sub-adult black bears (those less than 4 years old) in the harvest typically increases, whereas the proportion of adult males declines. A low percentage of adult males (≥5 years old) in the harvest may be an indication of over-harvest**. This criterion is a more sensitive indicator of black bear population levels than median age (Idaho Dept. of Fish and Game 1998). The mean percentage of adult males in the harvest in relatively stable populations in Idaho (Beecham and Rohlman 1994) and New Mexico (Costello et al. 2001) under moderate to high harvest levels was 30% and 28%, respectively. Studies of black bear populations in Alaska, Virginia, and Arizona showed similar relationships between lightly and heavily hunted populations. **Therefore, 25% to 35% adult males in the harvest could indicate a stable black bear population** (Table 9). **Levels lower than 25% may indicate a higher level of harvest, which has reduced the adult male segment of the population, whereas levels higher than 35% may indicate much lighter harvest and an increasing population.**

As harvest levels increase and additional adult and sub-adult males are removed from an area, the proportion of females in the harvest begins to increase (Fraser et al. 1982, Kolenosky 1986, Beecham and Rohlman 1994), because female are least vulnerable, especially if accompanied by cubs. The average percentage of females in the harvest of black bear populations under moderate and high hunting pressure in Idaho (Beecham and Rohlman 1994) and New Mexico (Costello et al. 2001) was 35% and 40%, respectively. Beecham and Rohlman (1994) suggest a desired proportion of female harvest of 35% to maintain a stable population, whereas Beck (1991) suggested maintaining <40% females in harvest. **Therefore, a range of 30% to 40% females in the total harvest could indicate a stable black bear population** (Table 9). **Proportions higher than 40% may suggest reduction of the number of females in the population and a decreasing population trend.** Monitoring this criterion helps ensure a stable reproductive portion of the population and the ability of the population to rebound in the event of a decline. Data Analysis Unit B-4 appears to be in an increasing to stable trend using this indicator, with 31% of the harvest being females over the last 3 years (Figure 15).

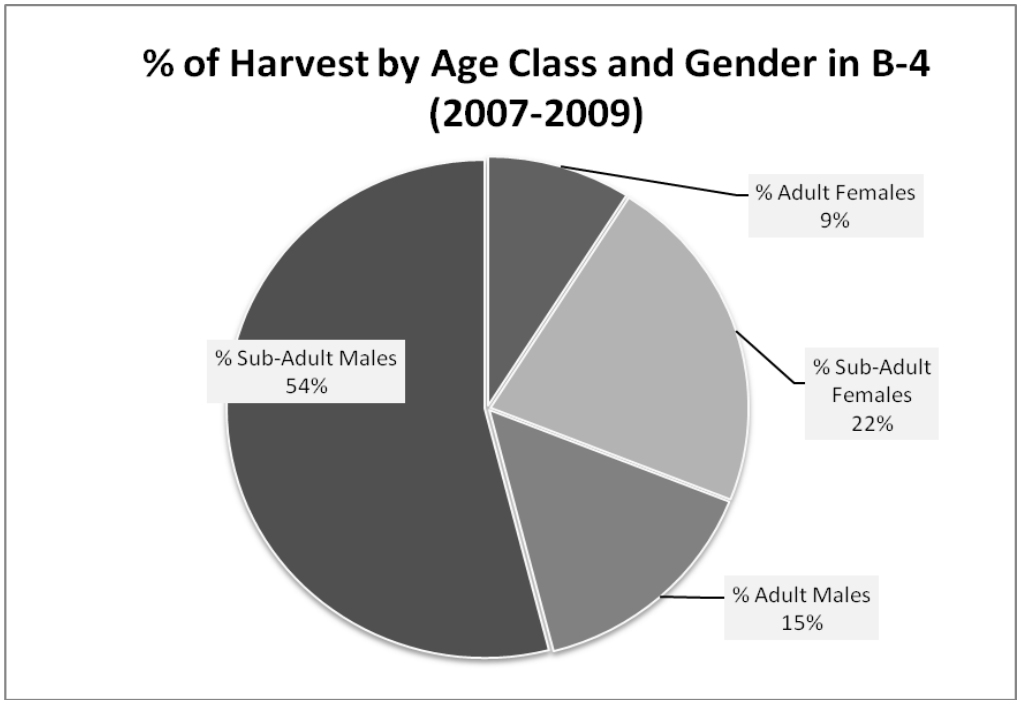

Figure 15. Bear Harvest in B-4 by Proportion of Age Class and Gender

With increasing harvest of a black bear population, younger females are removed and older females become more common in the harvest. Thus, the proportion of adults in the female harvest should rise with harvest rates, increasing mean age of females in the harvest (Kolenosky 1986, Beecham and Rohlman 1994). This phenomenon is especially important with late-reproducing species like bears, since removing adult females has the enhanced effect of not only reducing the number of bears in the population, but also decreasing reproductive potential of the population, and thus its ability to respond to declines. The delayed response of slow reproducing populations to reductions was noted by Harris (1984) and was demonstrated in modeling efforts by Miller (1990), who predicted that black bear populations reduced by 50% would take an average of 17 years to recover if hunting pressure was reduced by 25%.

The percentage of adults in the female harvest, rather than mean or median age of the females in the harvest, can be used to gauge the overall age of harvested females, and thus the presumed population trajectory. Averaged over a three-year period, this criterion provides a more meaningful measurement of the age structure of female harvest, especially in areas with small sample sizes. The mean percentage of adult females in the harvest of two New Mexico black bear populations under moderate and high harvest pressure was 55% and 70%, respectively (Costello et al. 2001). **The mean**

percent adult females in the Wyoming statewide female black bear harvest from 1994-2005 was 47%, with a range of 32% – 57%, suggesting that 45 – 55% adult female harvest provides a stable proportion of adult females (Table 9) (Wyoming Game and Fish Dept. 2007, Idaho Dept. Fish and Game 1998).

In B-4, adult females comprised 28% of the female harvest from 2007-2009, pointing to an increasing population under this criteria (Figure 16). Anything less than 45% adult females in the female harvest is indicative of an increasing population.

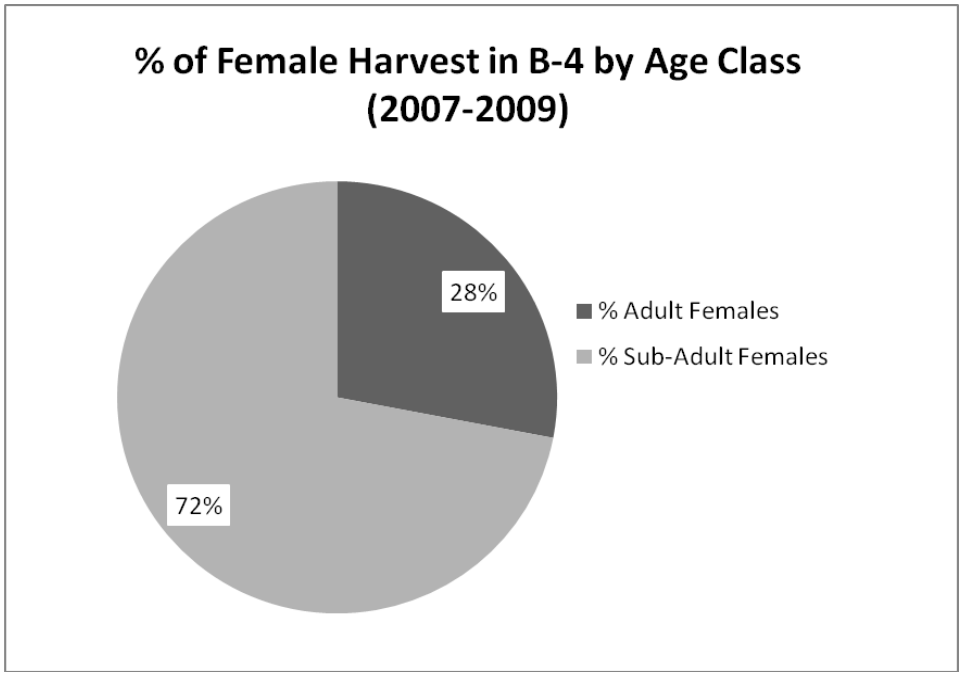

Figure 16. Proportion of Female Harvest by Age Class in B-4.

	Population Trend		
	Decreasing	Stable	Increasing
% of Adult Males in Total Harvest	< 25%	25 - 35%	> 35%
% of All Females in Total Harvest	> 40%	30 - 40%	< 30 %
% of Adult Females in Total Female Harvest	> 55%	45 - 55%	< 45%

Table 9. Harvest Criteria for Black Bear Management (criteria will be evaluated on a 3-year running average)

The foregoing analyses are meaningful only to the extent that the absolute amount of mortality actually impacts populations (e.g., if you are removing only 1% of the population, then there is no reason that 100% of that removal couldn't be all adult females). **In contrast, Miller (1990) demonstrated that with optimal reproduction and survival annual sustainable mortality could be as high as 14% of the population.** So, monitoring the amount of harvest in relation to projected population size can be important in deciding if mean age and relative proportions of age/gender classes should be important considerations in managing a specific population.

Moreover, looking at each criterion independently could give very different results than considering them together. For instance, looking only at a reduced percentage of adult males in the harvest may indicate a population is moving from light to moderate harvest. However, evaluating the other criteria may show an increased proportion of females and higher proportion of adult females in the harvest, indicating a much higher level of harvest than looking at males alone would suggest. Alternatively, a high percentage of adults in the female harvest, evaluated independently, would indicate a decreasing population. However, when the percentage of adult males and percentage of females in the harvest are both in the population increase or stable range, the population might actually be thriving,

even while adult female harvest remains high. This situation might occur when the DAU is receiving a large number of immigrating black bears. Source areas for immigration can be defined as areas of suitable habitat with little to no human-caused mortality that may provide dispersing bears to surrounding areas (Beecham and Rohlman 1994, Powell et al. 1996). Areas adjacent to sources may have a lower proportion of adults in the harvest due to immigrating sub-adults dispersing to occupy vacant home ranges of harvested bears. These areas may also be able to rebound more quickly from overharvest (Beecham and Rohlman 1994). Dispersing sub-adult males may also supplement surrounding populations and absorb much of the harvest, to the point where female harvest remains low and adult females comprise a higher proportion of the population. Thus, running averages and suites of indices will be used to inform bear management decisions.

In order to increase harvest data sample sizes and reduce the influence of abnormally high or low harvest rates due to environmental or other factors, three-year running averages will be used in harvest data analyses rather than analyzing annual data independently. We also prefer, but do not require, that harvest objectives and attendant license allocations be set for three-year periods at a minimum. This allows for a more complete analysis of the effects of harvest by holding dates and quotas the same for each three-year season cycle. While the evaluation of harvest criteria will occur every three years and will be analyzed on a three-year average, data from the previous 10 years (two black bear generations) or longer should be analyzed to illustrate longer-term trends in harvest and related population trends.

Harvest criteria will be assessed at the DAU level, with each DAU strategic goal set to achieve the criteria for reduced, stable, or increasing black bear numbers. Because of low reproductive rates, black bear populations cannot sustain high harvest levels over prolonged periods. Research has shown that high harvest levels can quickly reduce black bear populations to levels where severe reductions in harvest quotas and season lengths may be necessary for greater than 10 years for full recovery of a population (Miller 1990, Beecham and Rohlman 1994). Therefore, a failsafe mechanism in suppression areas will allow for bear population reduction to a lower density followed by stabilization to maintain viable bear populations. When the three-year average black bear harvest criteria for a DAU indicates heavy harvest (≥ 50% females in the total harvest and ≥ 60% adult females in the female harvest) on a three year running average basis, subsequent harvest objectives and license allocations should be formulated to reduce or stabilize harvest for the next regulation cycle.

Social Factors

There are several main social factors influencing bear management strategies in B-4. The first and most important is agricultural damage claims and public safety. The second is bear hunting opportunity, which can be closely tied to strategies to help reduce agricultural damage claims. Urban bear issues and human/bear conflicts that are not related to agricultural damage or public safety are important in local bear management but do not generally impact the overall bear populations except in extreme food failure years that lead to an inordinate number of bears being killed to alleviate public safety concerns.

All of northwestern Colorado has a rich history of ranching and livestock production. Local livestock producers have dealt with predator issues related to depredation on domestic stock as long as they have been on the land. In many cases, the most efficient way to deal with predators is to shoot, trap, or poison them. However, most trapping and poisoning of predators, including bears, by citizens has been outlawed by citizen initiatives. While livestock operators or their agents may kill bears caught harassing or killing livestock with no license or permit required to protect their property, the only other legal option is to use bear hunting season structure, including PLO bear licenses and AWM licenses, to legally kill bears.

STRATEGIC GOALS AND MANAGEMENT OBJECTIVES

Process for Developing Strategic Goals and Management Objectives

Public Process

Several methods were used to gather public input on bear management strategies. A public meeting was held in Craig on August 31, 2010 to provide basic information regarding black bear management at the state and local level as well as to provide the public an opportunity to ask questions and provide comment regarding the B-4 DAU plan. Announcements for the meeting were published in the Craig Daily Press, Jackson County Star, and the Steamboat Pilot and Today newspapers, as well as being posted on the CDOW website 2 weeks prior to the meeting. Five members of the public attended the meeting and four questionnaires were filled out and submitted by attendees.

Following the initial public meeting a draft B-4 DAU plan was written containing suppressed, stable, and increasing management options for the modeled bear population along with harvest and total mortality objectives. Local government agencies and organizations, including the Bureau of Land Management (BLM), United States Forest Service (USFS), State Land Board, Arapaho National Wildlife Refuge, Colorado Woolgrowers Association, Colorado Cattleman's Association, county livestock organizations, Jackson, Moffat, and Routt County Commissioners, etc were sent written notice of the draft plan and asked for their input regarding bear management in B-4. After the initial public outreach and internal review the draft plan was developed and posted on the CDOW website www.Wildlife.state.co.us for 30 days of public review and comment. The draft plan was also sent to impacted federal, county and local municipality land management and natural resource agencies for comment. A brief summary of public comments can be found below. See Appendices for the complete survey form and written comments.

Question	**Number of responses**
Preferred bear population management strategy for B-4.	Increase Population (0) Stabilize Population (8) Decrease Population (8)
Why is this your preferred option?	See Appendix for complete list of comments
Check all of the following that apply to you.	Landowner (13), Livestock operator (10), Bear hunter (8), Wildlife advocate (7), Citizen concerned with bear management (9)
My home is	In a rural area of the county (13) In or near an urban area (2)
Describe previous experiences with bears both negative and positive.	See Appendix for complete list of comments

Population modeling efforts were conducted to estimate population demographics expected to occur in the actual population using the best available data, including habitat conditions, known annual mortality, and previously studied bear populations. Population models for black bear are built on assumptions that are difficult to verify with actual data. The models should not be assumed to represent the actual population with 100% accuracy but should be thought of as a tool to be used to aid bear management. After assembling as much data as possible, the CDOW sought public input about what they desired for an overall DAU management strategy. The alternative strategies were presented as choices to the public during public input phases of DAU plan development.

Total mortality and harvest objectives are presented as a range of probable amounts necessary to achieve the strategic goal of the DAU. Annual monitoring of mortality amounts, gender and age structure, hair snag survey density/structure results, and annual mast production survey results are all incorporated into population modeling efforts. However, the models and their results have not been validated. Moreover, data collected for model inputs are relatively new efforts. We anticipate that models will change and be improved over time and at present must be viewed as fluid. Therefore, although the plan identifies mortality and age and gender objectives in a range of values, these are initial values. Modeling will be conducted every other to every third year, while other mortality data and demographics are collected and analyzed annually. Population extrapolations based on predicted

densities, range-wide or within vegetation associations, will be re-evaluated as new data is gathered via research or remote mark-recapture surveys. Objectives will be periodically adjusted in order to achieve the DAU strategic goals. Specific objectives will be documented in annual objective sheets approved by the Wildlife Commission. These objective sheets will also govern annual license levels to achieve the DAU strategic goals.

Strategic Goals

Our overall goal in bear management is to assure that the statewide status of black bears remains secure and to provide public use, recreation, and enjoyment within the bear population's biological capability to allow for such use. Within that context, DAU plans contain and describe their overall strategic goal. We define management strategies as follows:

Increasing: Mortality objectives, most monitored data, indices, and modeling are designed to allow for population growth and dispersion within and outside the DAU. The annual harvest goal would be 71 total bears with a 3-year running average of adult males in the harvest >35%, total females <30%, and % adult females in female harvest <45%. Not every management index must be in complete agreement, but most should point toward an upward trend. It is unrealistic to assume the population could be managed for a continually increasing trend; after 5 years of applying this strategy, management would move toward stabilizing the population.

Stable: Mortality objectives, most monitored data, indices, and modeling are designed to provide for population stability within the DAU. The annual harvest goal would be 119 total bears with a 3-year running average of adult males in the harvest 25-35%, total females 30-40%, and % adult females in female harvest 45-55%. Not every management index must be in complete agreement, but most should point toward a stable trend.

Suppression: Mortality objectives, most monitored data, indices, and modeling are designed to reduce the population within the DAU. The annual harvest goal would be 167 total bears with a 3-year running average of adult males in the harvest <25%, total females >40%, and % adult females in female harvest >55%. Not every management index must be in complete agreement, but most should point toward a population being held below biotic and defined human social tolerance thresholds. It is unrealistic to assume the population could be managed for a continually decreasing trend; after 5 years of applying this strategy, management would move toward stabilizing the population.

DAUs that have an Increasing or Stable management strategy are not restricted from having certain areas with specific management approaches designed to mitigate or reduce human-bear conflicts. However, harvest objectives and management in other areas of the DAU must incorporate the impacts of more assertive approaches and maintain the overall strategic goal. Conversely, DAUs with a suppression strategy could have some smaller areas within the DAU managed to sustain relatively light harvest, provided that the DAU overall strategy and management actions accommodate lower harvest and total mortality in select areas.

In B-4, harvest management strategies will be the same throughout the DAU, but there will be increased emphasis on using hunters to harvest bears in areas of high damage claims and in years of increased domestic sheep loss to bears. This can be accomplished with AWM licenses issued when bears are causing damage and increased September Rifle bear tags for bears on public and private land. PLO licenses can be used, but the majority of damage by bears occurs on public lands where these licenses would not be valid. Additionally, domestic lamb loss typically occurs in summer prior to hunting season dates allowed by state statute. Conflict bears will be dealt with as necessary and to the extent possible to minimize livestock losses through AWM licenses and/or the Department of Agriculture Animal Damage Control Agents. Urban bear complaints will be dealt with on a case by case basis. If an individual bear or bears repeatedly cause conflicts in urban areas, they will be hazed as necessary to get them to move on. If necessary they will be trapped, tagged and relocated. If a bear or bears repeatedly break into houses or other living quarters or threaten humans, they will be relocated or euthanized depending on the seriousness of the incidents.

Monitored Data to Inform Management

All known dead black bear, from both harvest and non-harvest sources, are checked by DOW staff to obtain biological information. The quality of these data is being improved by further training of service center staff that may check bears. The proportion of total mortality of each gender will continue to be closely monitored on an annual basis to assure that female mortality rates are not contrary to the DAU strategic goals. Age structure in total mortality and reproductive history are derived from extraction of a premolar tooth from bears when bear harvest and non-hunt mortality is reported through the mandatory check.

The following 3 harvest criteria will be monitored annually, using a 3-year average in B-4.

Appropriate proportions and numbers will be shown based on preferred Strategic Goal

	Population Trend		
	Decreasing	**Stable**	**Increasing**
% of Adult Males in Total Harvest	**< 25%**	**25 - 35%**	**> 35%**
% of All Females in Total Harvest	**> 40%**	**30 - 40%**	**< 30%**
% of Adult Females in Total Female Harvest	**> 55%**	**45 - 55%**	**< 45%**

Starting in 2009, hair snag surveys were conducted in two locations in Colorado each year. Additional hair snag survey areas may be established in the future during the term of this DAU plan. Results about bear density, gender (and perhaps age structure) from these surveys may be incorporated into the habitat model/density extrapolations.

Annual mast production surveys are conducted in representative GMUs in DAU B-4. Results of these surveys are incorporated into population modeling efforts, as are mortality, age, and gender structure data.

A Colorado State University/DOW/USDA Research Center graduate research project began in 2006 to examine bear behavior, movement patterns, and use of human altered landscapes in the Roaring Fork valley. Results of this research are not yet published but will be incorporated in DOW management for black bear DAUs in the future, along with results of other relevant research.

Mortality Objectives

Using the 4 different models to predict bear population estimates in B-4 yields the following:
Liberal Population Model for 2009 = 1,454 bears (1,272 independent)
Conservative Population Model for 2009 = 1,080 bears (938 independent)
Use/occupancy model population extrapolation = 1,100bears (955 independent)
Habitat Based Model (# of bears by habitat type) = 830 bears (721 independent)

For purposes of calculating mortality objectives based on these models and average DAU mortality statistics, a reasonable total bear population of approximately 1,100 bears is used in this DAU plan. When comparing the various models, both the conservative model and the use/occupancy model derived estimates at or near 1,100 and both of these are near the median of the higher liberal model and the lower habitat based model. Additionally, the most recent (and probably best) bear density estimates in Colorado have come from the use/occupancy studies based on habitat type and quality. If we assume that the starting bear population was near 830 and that both the total number of domestic sheep and the corresponding amount of predator control in northwestern Colorado have declined while damage claims and total bear mortality has been increasing, these point to an increasing bear population in B-4, but not necessarily one at the top of the modeled estimates. The higher liberal population estimate is based on optimal habitat conditions, not the average of conditions over the long term. Furthermore, the harvest/mortality objectives are based on the population of independent bears since cubs are not legal for harvest in Colorado.

Total Mortality Objective

The total mortality objective using percent of estimated population as a guide (**Decreasing 15-20%, Maintaining 10-15%, Increasing 5-10%)** can be simplified to the median of these percentages

(**Decreasing 17.5%, Maintaining 12.5%, Increasing 7.5%**) to provide a mid-point of the range as the goal. In order to achieve the DAU strategic goals, in determining the total mortality objective for independent bears, it is estimated that the average total mortality goal based on the 3-year running average should be:

1. Decrease the population - 167 bears
2. Maintain the population - 119 bears
3. Increase the population - 71 bears

In order to achieve the DAU strategic goals using percent population segment in harvest as a guide in determining the total mortality objective and using the figures above from an estimated population of 1,100 bears (955 independent), it is estimated that the average total mortality based on the 3-year running average should be:

Population Goal	Decreasing	Stable	Increasing
# of Adult Males in Total Harvest	<24	24-41	>41
# of All Females in Total Harvest	>64	21-64	<21
# of Adult Females in Total Female Harvest	>92	31-92	<31

Hunter Harvest Objective

Annual hunter harvest objectives are determined by deducting the 3-year running average amount of non-hunter mortality from the total mortality objective. If the strategic goal is to increase or decrease the population, then hunter harvest objectives could be adjusted up or down to (presumably) increase or decrease the rate of population growth or decline.

Game Damage and Human Conflict

Even though game damage and human conflict have a big influence on management strategies in B-4, there are no specific triggers for game damage or human conflict. Standard CDOW management approaches are used to address these issues.

Hunting seasons are tailored to address various hunter demands and various interests such as muzzle loading, archery, and a September rifle season. Where and when possible, the hunting season dates, method of take, and license allocation are tailored to meet bear DAU goals for both the overall bear population, as well as damage and conflict objectives.

Urban bear management is a totally different story, as most conflicts are addressed by local law enforcement officers, including District Wildlife Managers for the CDOW, municipal police departments and/or animal control officers, and county sheriff's departments. Many efforts have been made to educate urban residents about how to coexist with bears in the urban environment and minimize conflicts (such as ways to keep bears from getting into garbage). Occasionally, urban bears are captured and relocated or killed if they have been causing property damage or if they are habitual offenders. Colorado has a "Two Strike" policy. A bear that gets into trouble and is caught and ear tagged and is subsequently found causing additional human conflict is euthanized.

CONCLUSION

The primary issue for black bear management in B-4 is addressing game damage issues to domestic stock and public safety while maintaining a healthy and hunt-able bear population. The overall trend in the population will continue to be monitored through mandatory checks, models, and habitat conditions. Management in B-4 will be geared toward the trend selected from the alternatives during the DAU planning process. As new bear information, models, and management techniques evolve, they will be incorporated whenever practical and possible into improving managing this bear population.

Public input received at the public meeting in Craig, Colorado and from returned questionnaires during the 30-day public comment period were split 50/50 on the alternative to maintain a stable population (8) or decrease the population (8). Many written comments mentioned human safety and/or livestock depredation by bears as major concerns. The majority of respondents were from rural parts of the county (87%), with most being involved in livestock operations. Most respondents, including those seeking a reduction in the bear population understand the need for the right balance in management of black bears. After reviewing input from the public and all pertinent background and population information available for the B-4 DAU, the following preferred alternative was selected.

PREFERRED ALTERNATIVE

<u>New Strategic Goal</u>: Decrease the population for 5 years, then stabilize the population at the new level monitoring harvest criteria on a 3-yr running average and adjusting licenses to maintain that trend. Minimize game damage from bears to the extent possible.

Total annual mortality objective: 167 total bears for 5 years, then 119 bears to maintain a stable population trend. (assumes 25 of these are "other" bear mortalities annually).

Total annual harvest objective: 142 total bears for 5 years, then 94 bears as long as stable trend indices are met.

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APPENDIX A

B-4 Data Analysis Unit (DAU) Questionnaire 2011 - Summarized with all Responses

Bear DAU B-4 Includes Game Management units (GMU's) 4, 5, 6, 14, 16, 17, 161, 171, 214, and 441

1) What is your preferred bear population management strategy for B-4? (Circle One)
(0) Increase Population (8) Stabilize Population (8) Decrease Population

2) Why is this your preferred option? (Please provide written comment, use back of page if necessary)

Put out more tags, not enough data available to answer, population at appropriate level problem bears are not wide spread, look at previous spring bear season, more and longer seasons, more licenses for hunters, 2 to 3 times more harvest would go a long way to decreasing bear numbers, too many bears around human areas do not fear man and have become pets, from growing up here in the 60's and 70's this is not bear management and we have become a joke to our neighbors to the north (Wyoming), leave unchanged bears are not causing any problems, # of rolled/destroyed logs sighted, destroyed berry patches, non season consumption of a mature cow (dead) in 4 days, photographs (trail camera) of 5 different bears (distinct color markings) in a 2 mile stretch in a two week period, numerous day time sightings, Please re-instate the spring bear hunt – it seems the problems that exist now with bears have increased as the number of animals has risen, After having lived in Routt County for over 30 years, I am well aware of the problems with wildlife, but the folks in the populated metro areas have no idea what we deal with in the remote areas of the State.(When all of the voters chose to cease with the Spring hunt). I think those decisions are best left up to the "experts" in wildlife management, and not to urban dwellers who have no clue about the impact on those of us living in these areas. Further, food issues stress the animals too, as we are witnessing now with the elk eating whatever and wherever they can due to a very "heavy" winter. Thank you—we need some action soon, I prefer decreasing the population because their eating habits are putting stress on the deer population, competing for berries in the fall, their presence alone puts stress on deer and elk as well as cattle on the local ranches, increasing methods (using bait etc.) would help harvesting. Here in Jackson County we are the recipients of the "troubled" bears from the Front Range, these animals tend to be brave and do not fear man. They will come into our yard and take down bird feeders, get into trash, or even break into buildings. Ever since the spring bear hunt was eliminated, the population has exploded. Some of it may be local bears increasing in number but more because we are the dumping ground for Front Range bears, back in 1995 we found some tracks that may have been brown bear (front paw 7" in diameter back paw 13" long). I took a cast and still have it at the ranch. Back in 1995 when we bought the ranch we occasionally saw a bear but they were shy and never came into the yard. Now we have to monitor all the time, particularly when our grand kids are here.

3) **Please check all of the following that apply to you.**

I am a:

13_____	Landowner
10_____	Livestock operator
8_____	Bear hunter
7_____	Wildlife advocate
9_____	Citizen concerned with bear management

My home is:

13_____	In a rural area of the county
2_____	In or near an urban area

4) **If you have had previous experiences with bears both negative and positive please describe below (use back of page if necessary).**

Sheep kills, cattle distribution and harassment issue not predation, see bears frequently, a few bears are good over diversified habitat but too many when they roam by hwy 40 and hang out at homes on the shoulder, seeing bears at a distance is enjoyable, bears coming to houses or killing sheep is a problem hunting can hopefully correct, have lost calves (not to be found) to bears recently, hardly never happened in the past, some bears tend to avoid people, favorite thing to do is spot bears, let's kill the boars and protect the sows, my hunting party (3-4) gentlemen, have found cattle and deer to be extremely nervous when bears are near, we have had 5 bear encounters during archery season unit 16 in last 5 years, so far we have escaped injury but it gets closer every year!

Yes, the division should increase bear tags, especially archery tags. While hunting in Steamboat I usually see at least two bears a day. It seems however that these bears most of the time have one or two cubs which make them not legal or they are juvenile which I won't kill (not saying other hunters won't). The big boars seem to be more nocturnal and sit on the best food sources away from humans which make them much harder to harvest. I believe this is the main reason success rates are so low. I don't believe tripling the amount of bear tags will hurt the population of bears at all and feel that the study's the division of wildlife is using is so hypothetical they shouldn't be used. I would like to see the harvest ratios on bears after first rifle I bet it is around 1%. The increase in tags should be given to archery hunters primarily because the bears will be more active and archery hunters should be able to see small cubs easier than rifle hunters from 100 yards or more away. Many times in Steamboat I have seen cubs so small that they are hidden in the ferns which could easily allow a rifle hunter to shoot the sow with cubs. (additional comments that were not included here had nothing to do with bear management so were omitted).

Thank you for providing input to help with black bear management in Colorado!

Please Return Completed B-4 Questionnaires by March 11, 2011 to:

Mail:
Colorado Division of Wildlife
B-4 DAU Plan
PO Box 775777
Steamboat Springs, CO 80477

Office:
Colorado Division of Wildlife
925 Weiss Drive
Steamboat Springs, CO 80487

APPENDIX B – Comments from Arapaho NWR

United States Department of the Interior

FISH AND WILDLIFE SERVICE
953 Jackson County Rd. #32
Walden, CO 80480
Phone: (970) 723-8202 Fax: (970) 723-8528

In Reply Refer To:
Arapaho NWR

March 10, 2011

To Jeff Yost
Colorado Division of Wildlife
Terrestrial Wildlife Biologist
Steamboat Springs, CO

Dear Jeff,

Thank you for your electronic mail notification of February 4, 2011, informing the Arapaho National Wildlife Refuge that the draft Black Bear Data Analysis Unit Management Plan DAU B-4 was available for review and comment.

I have reviewed the document, for the refuge, and don't have any concerns about the management recommendations put forth in the plan. From reading the plan it appears that it is based on scientific data and a significant amount of local harvest records.

The one small, non-management orientated, issue that I would like to see addressed in the plan is to word smith the few sentences about the refuge that appear on page 12. In particular the quote that reads, "The refuge also provides important habitat for Greater sage-grouse, pronghorn, deer, elk, and moose with several thousand elk wintering on the refuge." The quantification of "several thousand" is an inaccurate representation. I would suggest changing the wording to "….. with 800 to 2,000 elk typically wintering on the refuge.", in order to more accurately represent what happens on the refuge, currently.

Thanks again for the opportunity to review and provide comments to the Division's Plan.

Sincerely,

Mead L. Klavetter

Mead L. Klavetter
Assistant Refuge Manager
Arapaho National Wildlife Refuge

APPENDIX C – Comments from Kremmling BLM Field Office

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Kremmling Field Office
P.O. Box 68, 2103 East Park Avenue
Kremmling, Colorado 80459-0068
www.blm.gov/co/st/en/fo/kfo.html

TAKE PRIDE IN AMERICA

In Reply Refer To:
6521 (CON020)

MAR 10 2011

Jeff Yost
Terrestrial Biologist
Colorado Division of Wildlife
B-4 DAU Plan
P.O. Box 775777
Steamboat Springs, CO 80477

Dear Mr. Yost:

The Bureau of Land Management in Kremmling has reviewed the draft Data Analysis Unit (DAU) plan for B-4 on the bear population objectives for northwest Colorado. The Kremmling Field Office manages land within Jackson County (GMUs 6, 16, 17, 161 and 171) and supports the following bear population management strategies:

- Either a stable or increasing population trend within B-4.

We realize Jackson County has fewer conflicts than other parts of the DAU and could easily support an increase in population. However, a stable population strategy may be more appropriate overall given the issues identified within Moffat and Routt counties.

Thank you for the opportunity to provide comments for the future management of bears in the B-4 DAU, particularly in Jackson County. If you have any questions, please feel free to contact Megan McGuire at 970-724-3028.

Sincerely,

David Stout

David Stout
Field Manager