

**MOOSE DATA ANALYSIS UNIT PLAN  
DAU M-1, NORTH PARK  
GAME MANAGEMENT UNITS  
6, 16, 17, 161, 171**

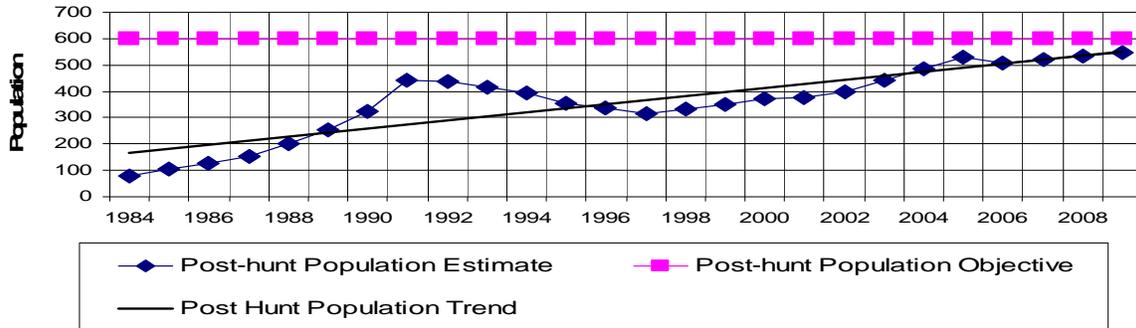
Prepared by Jeff Yost - Terrestrial Biologist  
Colorado Division of Wildlife  
Steamboat Springs, CO 80487  
Spring 2008



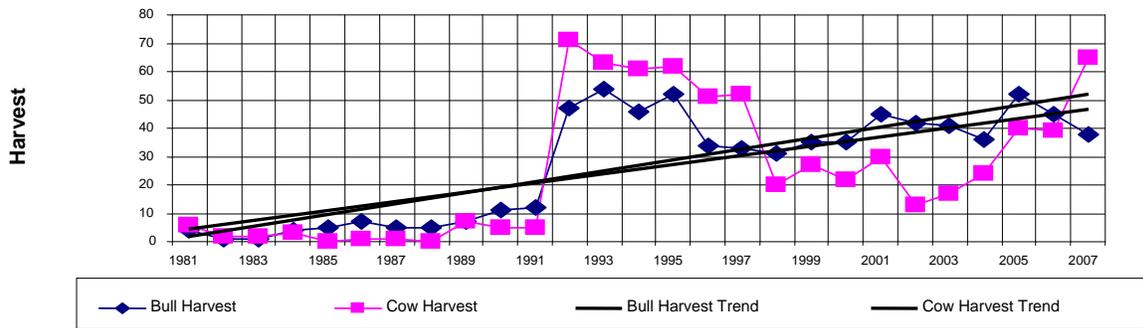
# DAU M-1 (North Park) EXECUTIVE SUMMARY

GMU's: 6, 16, 17, 161, 171  
 Land Ownership: 35.9% Private, 31.9% USFS, 18.2% BLM, 1.7% ANWR, 12% State  
 2007 Model Estimate 522 moose, 2007 Observed Sex Ratio 49:100 2007 Modeled 49:100  
 Old Posthunt Population Objective: 500-600, **New Approved Population Range 500 - 600 moose**  
 Old Posthunt Sex Ratio 50-60 Bulls:100 Cows, **New Approved Sex Ratio 60 - 70 bulls:100 cows**

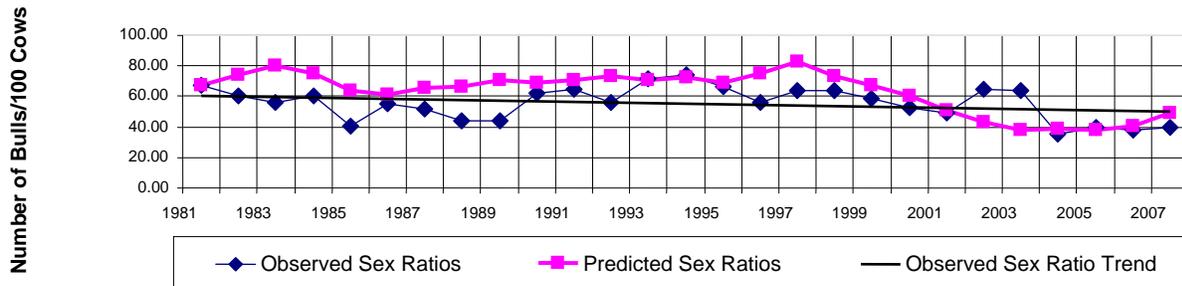
**M-1 NORTH PARK MOOSE POPULATION ESTIMATE**



**Figure 2. M-1 NORTH PARK MOOSE HARVEST**



**Figure 3. M-1 NORTH PARK POST HUNT MOOSE SEX RATIO**



## M-1 Background

Moose DAU M-1 is located in northcentral Colorado in an area known as North Park. Although moose had occasionally been seen in North Park for over 120 years there was not an established resident population until March of 1978 when 12 moose from the Uintah Mountains of Utah (4 bulls, 7 cows, 1 calf) were released in the Big Bottoms area of the Upper Illinois River drainage southeast of Rand, Colorado. A second release occurred in January of 1979 with 12 additional moose (1 adult bull, 6 adult cows, 3 yearling cows, and 2 calves) captured near Moran Junction, Wyoming released on the same site as the first 12.

Since that time the moose population has continued to expand ranging into most of the available moose habitat found in North Park with individual animals moving into Middle Park to the south, the Laramie River Valley to the east, and the Yampa Valley to the west. The 2007 post-hunt population size estimate is approximately \*500 moose (**Note the population estimate in the first draft and the number used for the public meetings was erroneously listed as 700 due to an addition error in the 2005 population estimate**). The current post season population objective is 500-600 moose. The post-season sex ratio objective is 50-60 bulls per 100 cows post-season with a predicted 2007 post hunt ratio of 49 bulls per 100 cows. The long term trend has been a decreasing sex ratio. Bull license numbers have been reduced over the past several years in order to bring the ratio back up and maintain quality in the size of bulls harvested.

The first hunting season for moose in Colorado occurred in 1985 when the North Park herd reached a population level of approximately 100 animals. During this inaugural season a total of five bull licenses were issued for GMU's 6, 17 and portions of 171. The season ran from November 16-24 with any legal method of take allowed (firearm, archery, or muzzleloader).

As the moose population continued to grow north and west GMU's 16 and 161 were opened for hunting. Cow moose licenses were issued beginning in 1992 with 25 antlerless licenses. Since that time there have been cow moose licenses issued annually with numbers varying from a low of 17 in 2002 to a high of 81 in 2007. Correspondingly bull license numbers increased to 32 in 1992 sharply up from the 7 issued in 1991. The highest number of bull licenses was issued in 2002 with 57.

## M-1 Significant Issues

Prior to bringing moose into North Park meetings were held and input was requested from agencies and the public to see what their concerns might be. Several major issues were brought up. The first was what impact adding another ungulate to the landscape would cause to the riparian willow zone. The second was moose/livestock competition for forage and potential game damage from moose. To address these issues the original population goals were set minimally at 100 animals then increased to 300 with a bull to cow ratio of 50:100 when the

first DAU plan was written in 1987. After a series of interagency meetings in 1992 the post-hunt population objective was raised to 500 – 600 animals based on minimal game damage and riparian impacts caused by moose.

Kufeld and Steinert (1990) initiated a study to estimate the moose carrying capacity for North Park based on willow forage production for eight main species of willow present in the Park. Results from their study indicated that willow forage production in North Park could support an estimated 1,860 moose. At a population level of 1,860 moose over 15,224 acres of willow the density of moose would be approximately 78 moose per square mile. Populations of wild moose typically don't exceed a population density greater than 10 moose per square mile. Thus moose over use of willow habitats is unlikely to occur except possibly in localized areas of higher moose concentrations.

Still willow over browsing by moose and other wild ungulates is a major concern for both private and public land managers as they seek to find the proper balance of grazers and browsers on the landscape. Zimmerman (2001) attempted to develop methodology to monitor willow communities in northcentral Colorado. In a three year study exclosures were used to test three different conditions: exclusion of all ungulates, exclusion of cattle only, and no exclusion or treatment. Browse measurements were then made on willows to determine the extent of willow use by herbivores and fecal pellet groups were analyzed to determine composition of ungulate diets on the study area. Results found that even the favored willow forage species of moose in North Park, Plainleaf willow (*Salix planifolia*), was not being excessively browsed.

### **M-1 Management Alternatives**

Three post-hunt population objectives were proposed (1) decrease the population to **400 - 500**, (2) hold the population stable **500 - 600** and (3) increase the population to **800 - 1,000 moose**. The moose population is doing well at its current level and has been increasing slowly over time. A higher population level will result in increased hunting and viewing opportunities in the future.

Three post-hunt sex ratio objectives were proposed (1) **Sex Ratio, 50 to 60 bulls/100 cows** - this is the current sex ratio alternative (2) **Sex Ratio, 60 to 70 bulls/100 cows** – slightly higher number of mature bulls in the population (3) **Sex Ratio, Greater than 70 bulls/100 cows** - this level of males in the population would produce trophy bull hunting with the goal of the average antler spread of harvested bulls greater than 40”.

**Through the DAU planning process and public input the preferred alternative for post-hunt population size and sex ratio objectives for M-1 were selected as a population range of 500 – 600 moose and sex ratio objective of 60 - 70 per 100 cows with the goal of increasing age and antler spread of harvested bull moose.**

*Approved by the Colorado Wildlife Commission September 2008*

**MOOSE DATA ANALYSIS UNIT (DAU) M-1, NORTH PARK  
GAME MANAGEMENT UNITS  
6, 16, 17, 161, 171**

**TABLE OF CONTENTS**

PLAN SUMMARY.....	2
INTRODUCTION AND PURPOSE.....	6
BIG GAME MANAGEMENT BY OBJECTIVE.....	7
DESCRIPTION OF DAU.....	9
Location.....	9
Physiography.....	9
Land Use.....	11
Land Ownership.....	11
MANAGEMENT HISTORY .....	13
Habitat Acres.....	13
Moose Distribution.....	14
Population Size.....	10
Herd Composition.....	15
Adult Sex Ratios.....	16
Age Ratios.....	16
Harvest.....	17
Hunters.....	17
License Numbers.....	18
CURRENT MANAGEMENT.....	19
HABITAT RESOURCE.....	19
Vegetation Map.....	20
The Habitat Partnership Program.....	22
ISSUES AND STRATEGIES.....	22
Issue Identification.....	23
Public Comments.....	23
MANAGEMENT ALTERNATIVES.....	24
Management Implications.....	24
PREFERRED ALTERNATIVE.....	25
(Management Recommendations)	
LITERATURE CITED.....	26
APPENDICES.....	27

## **INTRODUCTION AND PURPOSE**

The Division of Wildlife (DOW) is responsible for the maintenance of Colorado's big game herds at population levels that are established through a public review process and approved by the Colorado Wildlife Commission. For planning and management purposes the various big game "herds" throughout the state are divided into Data Analysis Units (DAU's). The DAU Plan is a strategic plan that addresses two primary decisions, the number of animals the DAU should contain and the desired sex ratio. The geographic area of each DAU is drawn to encompass the year-round range of the majority of the animals of that species. A typical DAU encompasses several Game Management Units (GMU's) that divide the DAU into workable sub-units, primarily for harvest management.

The DAU Plan is also a collection of important management data of a particular wildlife population. This document includes alternate strategies, evaluation of those strategies, and a preferred alternative. The DAU Plan process is designed to examine public desires and balance them with biological capabilities. The population objective is established for a ten-year period. The population objective drives the decisions related to annual license numbers that will determine the number of animals that need to be harvested to meet population objectives.

In order to achieve the desired level of harvest for males, females, and total post hunt population objectives multiple seasons and methods of take are employed. Season options range from archery and muzzleloading to rifle hunting. Average harvest success rates are used to determine the number of licenses of various types needed to achieve the desired harvest.

Management by objective (Figure 1) is a process based on an annual cycle of information collected from sex and age ratio flights, survival studies, and harvest data. Analysis of the data results in recommendation of harvest objectives to meet the population objectives for that DAU. Harvest objective recommendations culminates each year with the Colorado Wildlife Commission adopting the number of limited hunting permits to issue in order to achieve the current DAU population objective.

Figure 1.

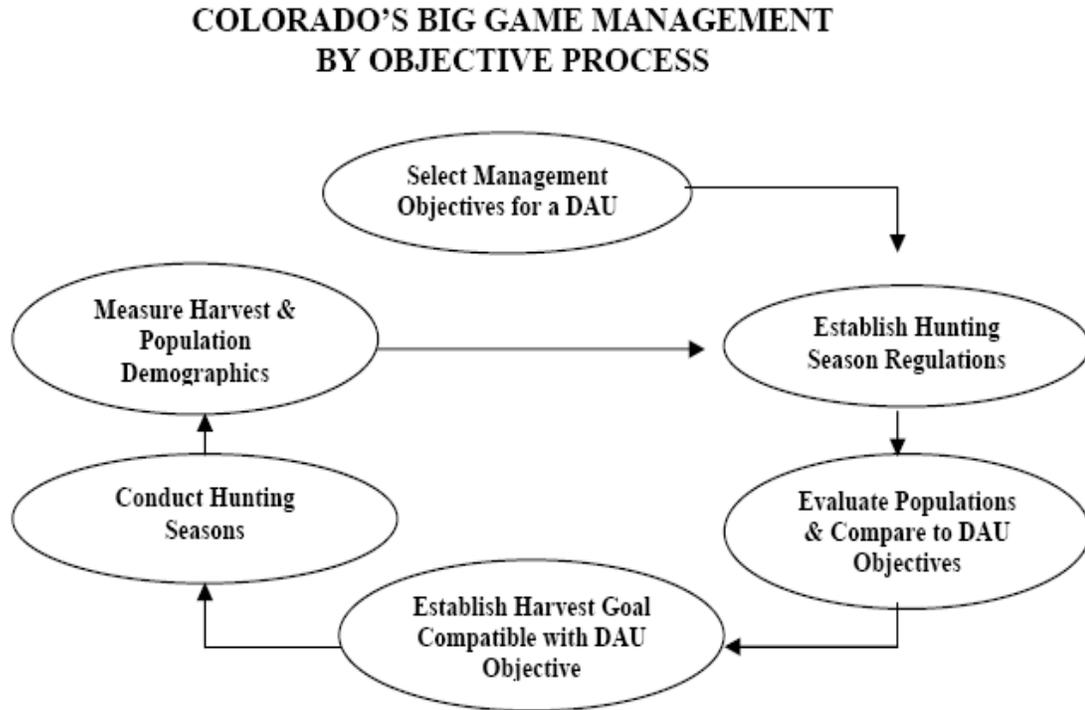


Figure 1. Management by objectives process used by the CDOW to manage big game populations on a DAU basis.

Estimating population size of wild animals over large geographic areas is an extremely difficult and inexact exercise. In several research projects, attempts have been made to accurately count all the known number of animals in large fenced areas. All of these efforts have failed to consistently count all of the animals. In some cases less than 50% of the animals can be observed and counted. High-tech methods using infrared sensing have also met with limited success. The DOW recognizes this is a serious challenge to our management. The DOW attempts to minimize this problem using the latest technology and inventory methodology available. Most population estimates are derived using computer model simulations that involve estimations for mortality rates, hunter harvest, wounding loss and annual production. These simulations are then adjusted to align on measured post-hunting season age and sex ratio classification counts. The DOW recognizes the limitations of the system and strives to do the best job with the resources available. If better information becomes available, such as new estimates of survival rates, wounding loss, sex ratio at birth, density estimates, or new modeling techniques and programs, the DOW will use this new information and the new techniques. This may result in significant changes in the population size estimates and management strategies. It is recommended that the

population estimates presented in this document be used only as an index or as trend data and not as an absolute estimate of the population in the DAU.

The total number of animals in a big game population fluctuates throughout the year. Normally, the population peaks in the spring just after birth of the young. Populations then decline throughout the year as natural mortality and hunting seasons take animals from the population. Traditionally the CDOW uses post-hunt populations (immediately after conclusion of the last hunting season) as a frame of reference when we refer to the size of a population. In this manner we have established a reference point and can eliminate confusion when referring to populations.

Realistically, population objectives are determined by a combination of variables woven tightly together and fashioned to satisfy all the demands to arrive at a final population objective. The major variables include biological data, economic impact, political considerations, recreational activities, livestock concerns, and habitat conditions. Population objectives are often set at a level consistent with herd's maximum sustained yield (MSY). However, it is very difficult to determine the range's MSY and carrying capacity (see Appendix A for a brief summary of the concept of MSY and carrying capacity).

## **DESCRIPTION OF DAU**

### **Location**

Moose DAU M-1 is located in North Central Colorado (Figure 2) and comprises all of Jackson County, commonly called North Park. The largest town in North Park and the county seat is Walden (population 734), Cowdrey, Gould, and Rand are much smaller but well known towns. M-1 consists of Game Management Units 6, 16, 161, 17, and 171. North Park is an intermountain park on the east side of the Continental Divide. The North Park watershed begins at the headwaters of the North Platte River. Major tributaries that make-up the North Platte drainage in Colorado 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.

The DAU is bounded on the west by the Park Range, on the south by the Rabbit Ears Range, to the east by the Medicine Bow and Never Summer Ranges, and Independence Mountain and the Wyoming border on the north. DAU M-1 encompasses 1.035 million acres or 1,618 square miles.

### **Physiography**

#### **Topography**

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 montane zone is dominated by lodgepole pine stands and to a lesser extent aspen and spruce-fir stands.

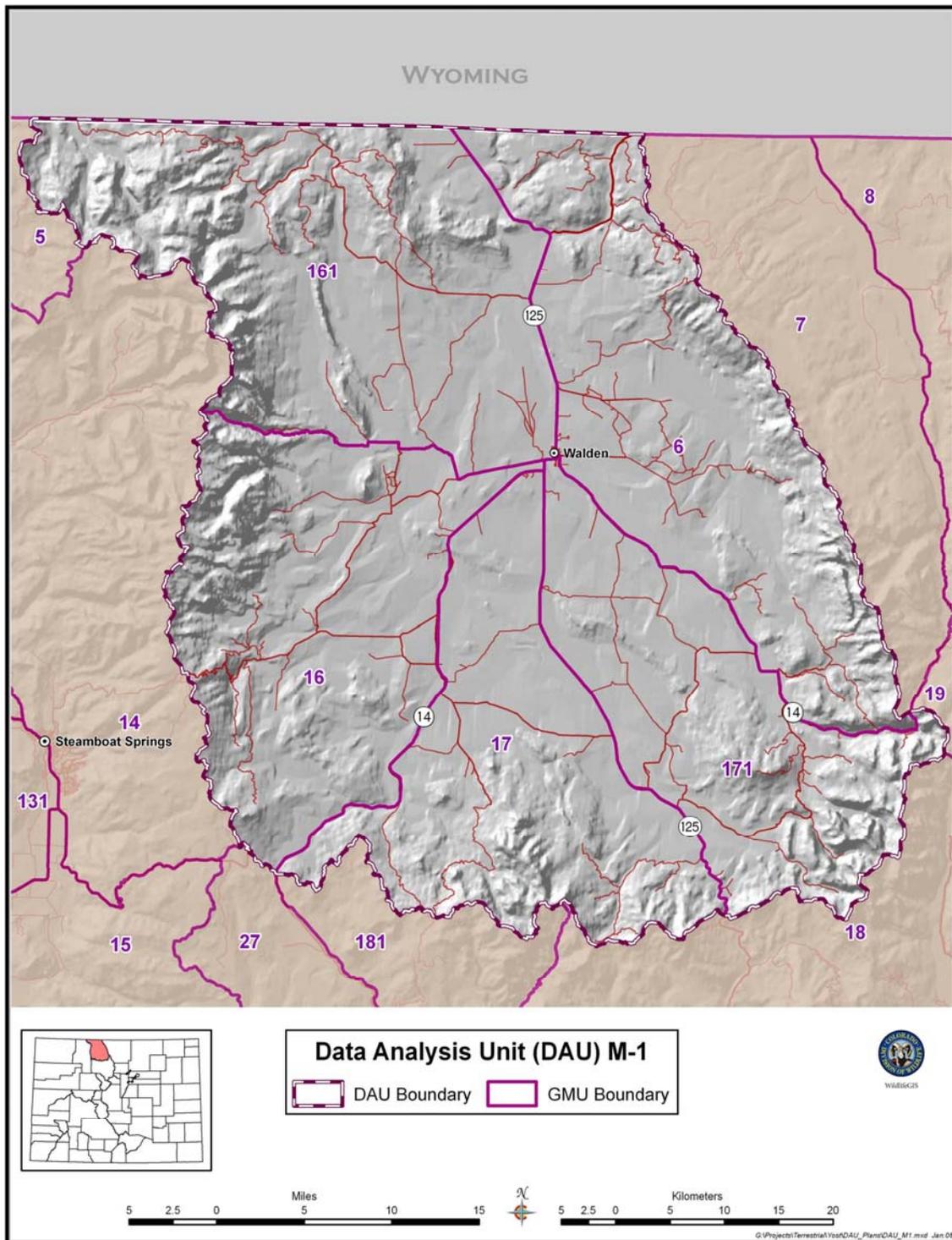
#### **Climate**

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 ten 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.

#### **Vegetation**

Vegetation varies throughout the Park with sagebrush dominating the valley floor, a variety of willow species along stream courses, and mountain shrub, lodgepole pine, aspen, and spruce-fir at higher elevations. Geographical Information System technology has been used by the CDOW to estimate the number of acres of the main vegetative types found in the Park, see Appendix B.

Figure 2. DAU M-1 Map



## Land Use

Historically cattle ranching and growing hay for cattle were, and continue to be, the primary land uses in North Park. This high, cold, semi-desert habitat has a strong agricultural base of irrigated hay meadows and cattle grazing. These conditions produce some of the most productive wildlife habitat in the state, especially for waterfowl. Timber harvest is still an important land use, although the lumber mill in Walden has closed. There currently is an abundance of beetle killed lodgepole pine renewing interest in wood products such as wood pellets. Hunting is an important part of the economy. Big game hunting brings in the largest number of hunters, but small game and waterfowl hunting also have a significant impact. Until now land development has not been prevalent in North Park but with land prices skyrocketing in Routt, Grand, and Larimer Counties more people may begin looking at Jackson County for affordable vacation homes and land.

## Land Ownership

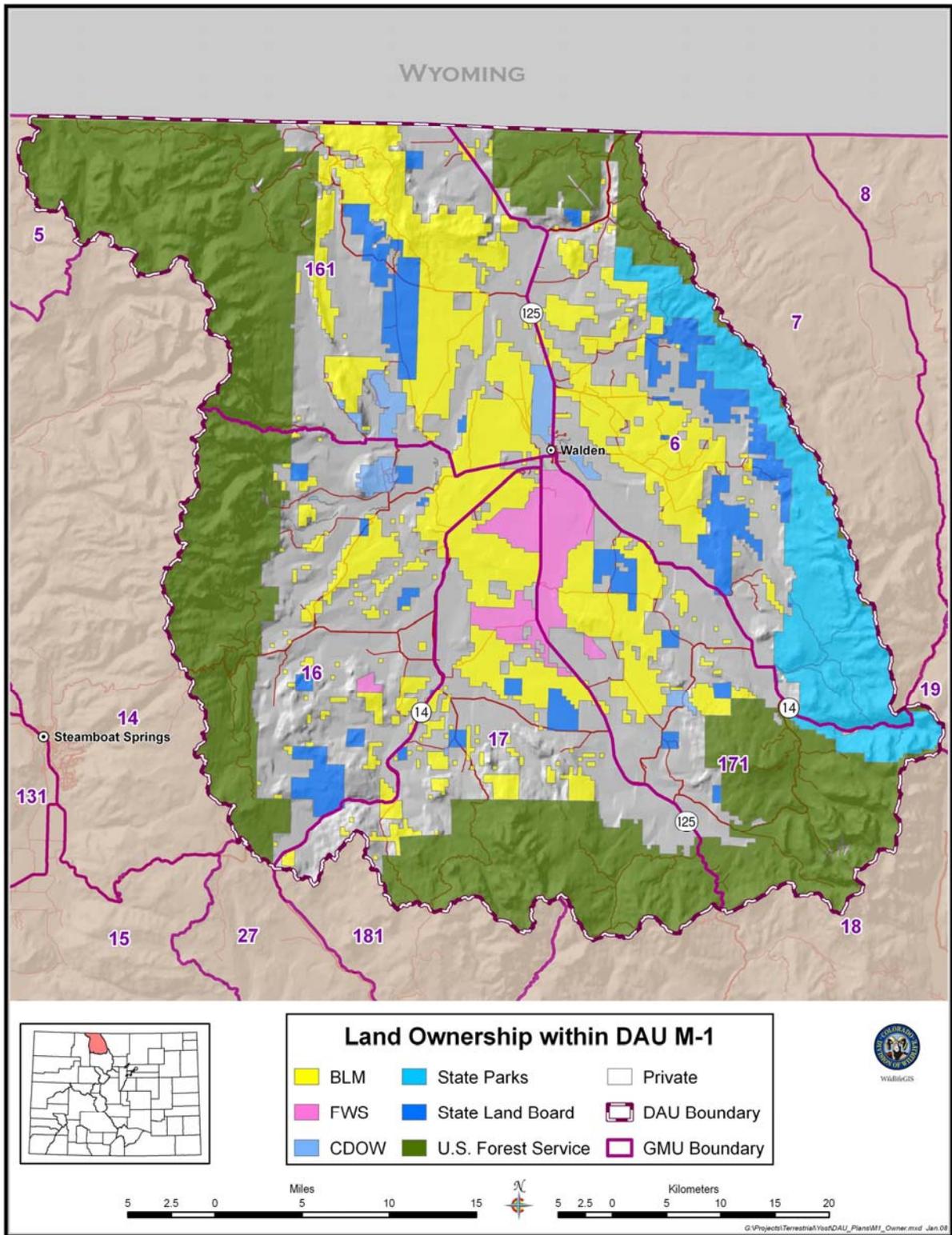
Land ownership (Table 1) and (Figure 3) in DAU M-1 is 36% private land, 12% state land and 52% federal land. The Routt National Forest covers 32% of the DAU and most of the mountainous areas that surround the park. The Bureau of Land Management property, 18.2%, is primarily sagebrush habitat in the center of the park where a majority of the private land is also located. The Colorado State Forest, 6.8%, is found on the east side of the park. The Arapaho National Wildlife Refuge, 1.7%, manages important moose habitat in the center of the park. State Trust Lands, 4.9%, are primarily in sagebrush habitat.

**Table 1. North Park Land Ownership**

<b>OWNER</b>	<b>MANAGER</b>	<b>ACRES</b>
BLM	BLM	189,221.66
BLM	*CDOW	11,167.93
FWS	FWS	23,457.71
PRIVATE	PRIVATE	357,294.86
SLB	SLB	52,080.41
SLB	STPARKS	69,760.43
USFS - ARNF	USFS - ARNF	2,112.71
USFS - ROUTT	USFS - ROUTT	330,971.47
	Total	1,036,067.19

\* CDOW is listed as manager for some BLM land where stocked waters occur or the CDOW has facilities such as restrooms, parking lots, etc. This does not necessarily mean the CDOW has exclusive management of those acres listed.

Figure 3. Land Ownership Map



## HERD MANAGEMENT HISTORY

Historically moose have been sighted in North Park off and on for over 120 years but there was not an established resident population until 1978 and 1979 when moose were brought in from Wyoming and Utah in an effort to establish a viable moose population here. Prior to this time it is theorized moose venturing into North Park likely came from populations to the north that had slowly been working their way southward establishing new populations in southern Wyoming and Utah. It was just a matter of time until they populated North park on their own.

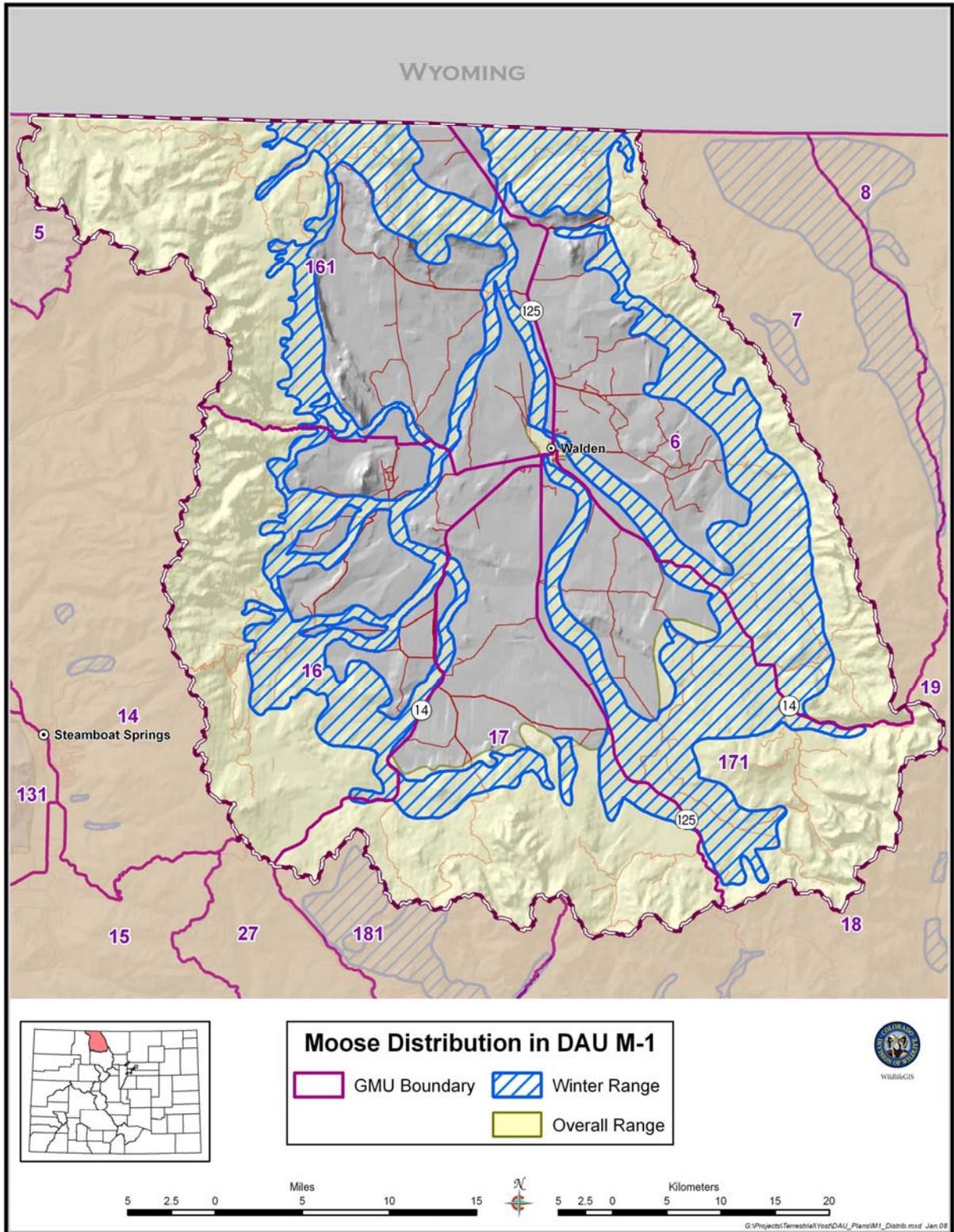
The first transplant occurred in March of 1978 with the release of 12 moose from the Uintah Mountains of Utah (4 bulls, 7 cows, 1 calf) in the Big Bottoms area of the Upper Illinois River drainage southeast of Rand, Colorado. The second release occurred in January of 1979 consisting of 12 additional moose (1 adult bull, 6 adult cows, 3 yearling cows, and 2 calves) captured near Moran Junction, Wyoming and released on the same site as the first 12.

Since that time the moose population has continued to grow and expand their range into most of the available moose habitat found in North Park (Table 2) with individual animals moving into Middle Park to the south, the Laramie River Valley to the east, the Yampa Valley to the west, and Wyoming to the north. While the highest concentration of moose in North Park occur on the east and south ends (GMU's 6, 17, and 171) it appears the population is still spreading and increasing to the west in units 16 and 161 (Figure 4).

**Table 2. M-1 Acres of Moose Habitat**

<b>Moose DAU M-1 Area</b>			
<b><u>GMU</u></b>	<b><u>DAU</u></b>	<b><u>ACRES</u></b>	<b><u>SQ MILES</u></b>
6	M-1	226457.80	353.84
16	M-1	204534.16	319.58
17	M-1	180180.02	281.53
161	M-1	260937.19	407.71
171	M-1	<u>163969.34</u>	<u>256.20</u>
	Total	1036078.51	1,618.87
<b><u>M-1 Moose Activities</u></b>			
Winter Range		281,365.40	
Overall Range		692,659.02	

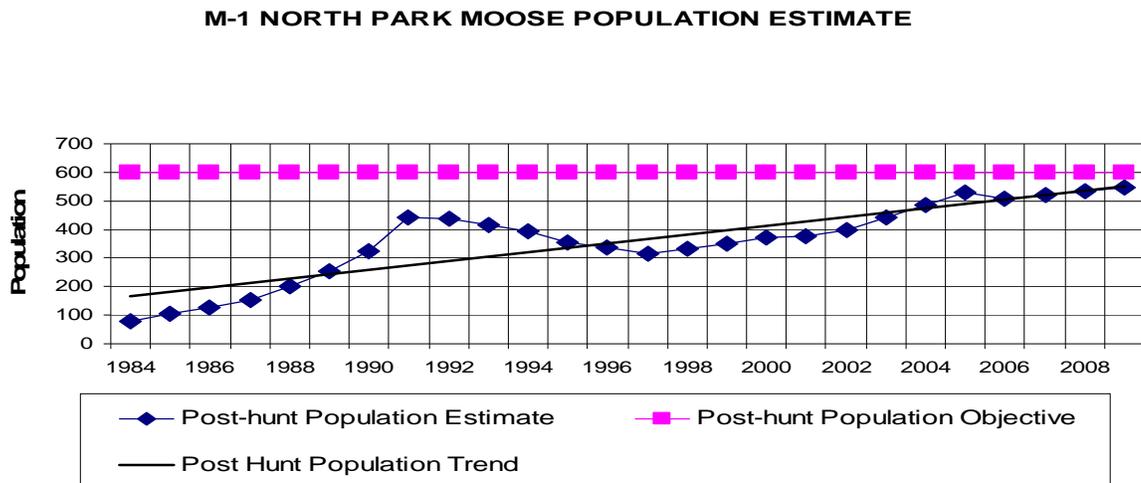
Figure 4. M-1 Moose Distribution Map



## Post-hunt population size

The current post-hunt population size estimate taken from computer models is approximately 500 moose (**Note the population estimate in the first draft and the number used for the public meetings was erroneously listed as 700 due to an addition error in the 2005 population estimate**). The model incorporates a method to estimate moose population sizes developed by Bowden (1985) in North Park based on a sight-ability factor of 1.73 multiplied by the total number of moose observed on post-season flights and using observed classification data. The current post season population objective is 500 - 600 moose. The five-year post hunt population mean is 497 and the ten-year post hunt mean is 471 moose (Figure 5).

Figure 5.

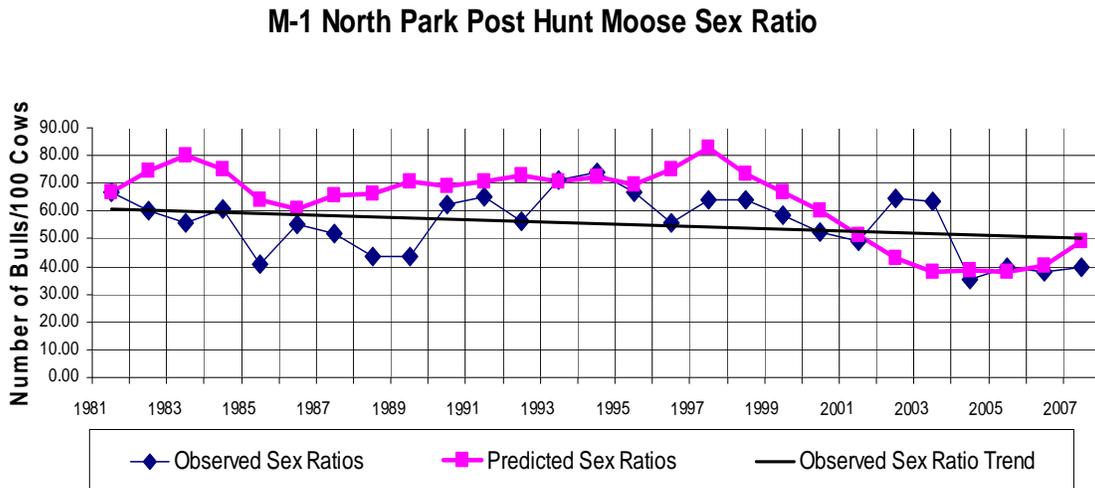


## Post-hunt Herd Composition

### Sex Ratios

The modeled post-season sex ratio is 49 bulls:100 cows. The current adult sex ratio objective is 50-60 bulls per 100 cows, post-season. The lowest sex ratio estimate occurred in 2004 with 35 males per 100 females and the highest occurred in 1998 with 83 males per 100 females. The long term trend has been a decreasing sex ratio. Bull license numbers have been reduced over the past several years in order to bring the ratio back up and maintain quality in the size of bulls harvested (Figure 6).

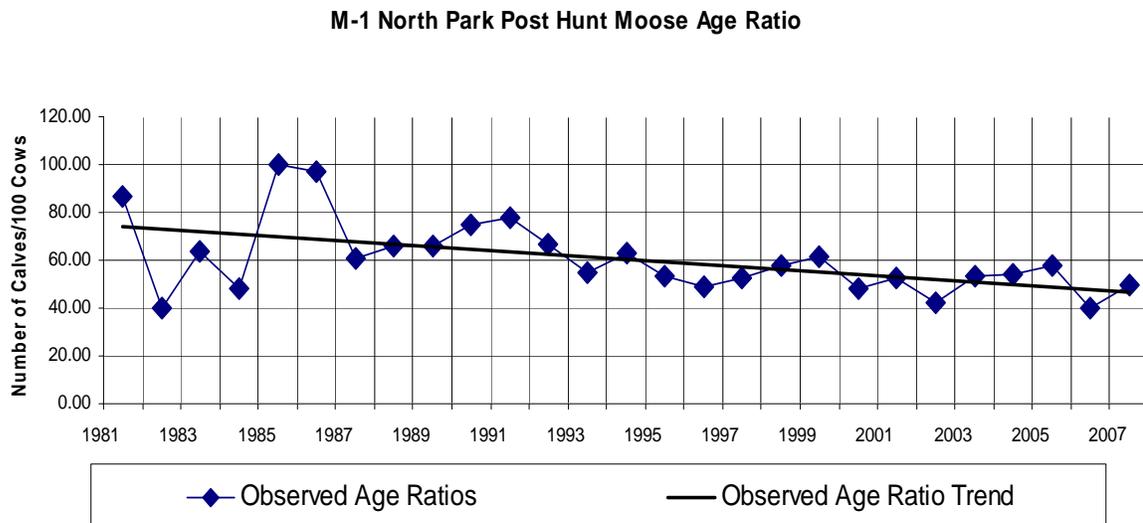
Figure 6.



Age Ratios

The current age ratio objective is 60 calves per 100 cows, post-season. The 2007 modeled post-season age ratio is 50 calves per 100 cows. The lowest age ratio estimate occurred in 2006 with 40 young per 100 females and the highest occurred in 1985 with 100 young per 100 females (post hunt population 108 and first year of hunting season). The long term trend has been a decreasing age ratio (Figure 7).

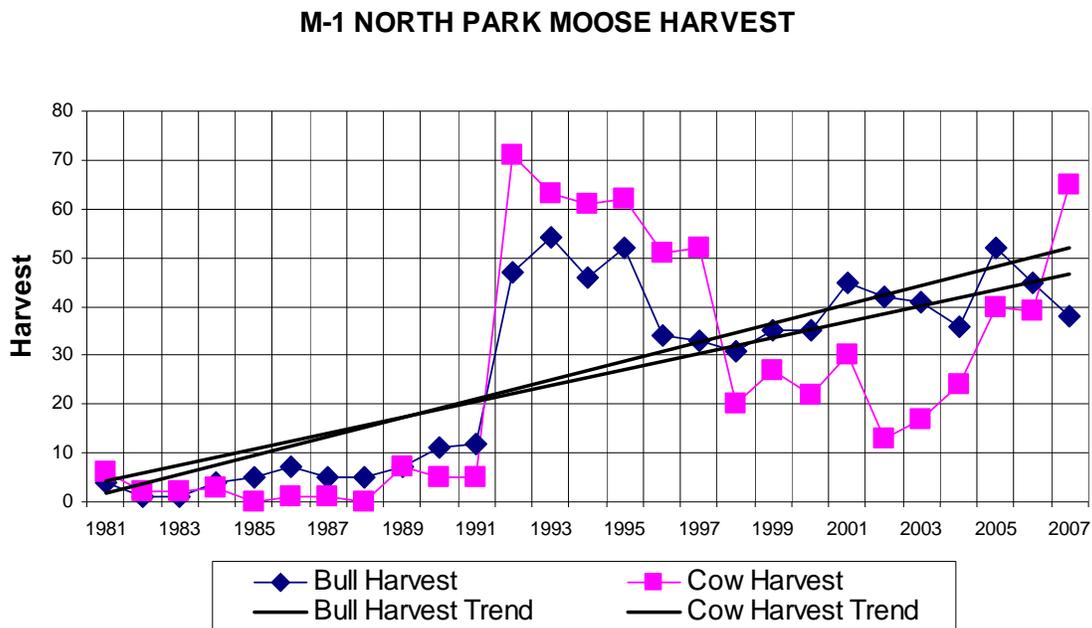
Figure 7.



## HARVEST

Harvest success rates have been relatively high in M-1 since the first seasons were established generally being over 75% for all methods of take for bull and cow. The major factor affecting harvest is the distance of the animal from the nearest road access. Many hunters are unwilling or unable to hunt far off roads due to the effort required to pack out such a large animal over steep, boggy, or heavily timbered terrain. Another but minor factor is trophy hunters not finding a large enough bull to shoot. Access to good public land moose hunting is available in all units. While there are many moose on private property where hunters don't have access this is not a significant issue (Figure 8).

**Figure 8.**



## Hunters

The first hunting season for moose in Colorado occurred in 1985 when the North park herd reached a population level of approximately 100 animals. During this inaugural season a total of five bull licenses were issued for GMU's 6, 17 and portions of 171. The season ran from November 16-24 with any legal method of take allowed (firearm, archery, or muzzleloader).

As the moose population continued to grow north and west GMU's 16 and 161 were opened for hunting. Cow moose licenses were issued beginning in 1992 with 25 antlerless licenses. Since that time there have been cow moose licenses issued annually with numbers varying from a low of 17 in 2002 to a high of 81 in 2007. Correspondingly bull license numbers increased to 32 in 1992 sharply up from the 7 issued in 1991. The highest number of bull licenses was issued in 2002 with 57.

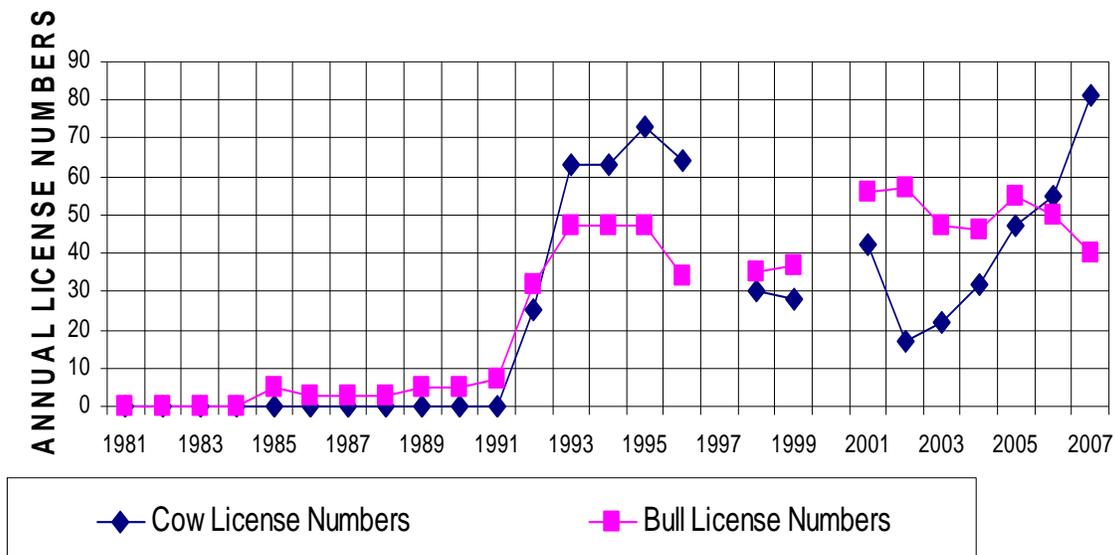
Moose licenses in Colorado are issued 90% to resident hunters and 10% to non-resident hunters. The preference point system used for moose is the same as the one used for bighorn sheep and mountain goats with hunters accumulating up to 3 regular preference points and then drawing one “weighted” point each year after they accumulate the initial 3 points and are unsuccessful in the drawing. The number of people applying for moose licenses in M-1 has increased annually with 3,700 people applying for a total of 121 licenses, 40 bull and 81 cow licenses in 2007 (Table 3). While moose are considered trophy animals in Colorado and North Park does have the highest moose population of any area in the state the number of licenses allocated annually is not high enough to have a large economic impact to the area (Figure 9).

**Table 3. M-1 Applications and License Numbers for 2007**

<b>Bulls</b>				<b>Cows</b>		
GMU	Applications	Licenses		GMU	Applications	Licenses
6	1129	14		6	137	23
16	227	3		16	31	7
17	546	5		17	83	12
161	220	3		161	33	9
171	1122	15		171	172	28
<b>Total</b>	<b>3244</b>	<b>40</b>		<b>Total</b>	<b>456</b>	<b>81</b>

**Figure 9.** (Note data missing for years 1997 and 2000)

**M-1 NORTH PARK MOOSE LICENSE NUMBERS**



## **CURRENT HERD MANAGEMENT**

The current population objective is 500 - 600 animals and the sex ratio objective is 50 bulls per 100 cows, post-season. Current management strategies seek to provide quality bulls for trophy hunters while offering as many licenses for cows as necessary to keep the population near the long term post hunt objective. Hunters apply for the method of take they prefer (archery, muzzleloader, rifle) and the GMU where they want to hunt. The number of licenses for each method of take is "floating" meaning that there is not separate quotas for each method of take, rather all the licenses for a GMU are pooled so that everyone who applies regardless of method has the same chance of drawing a license.

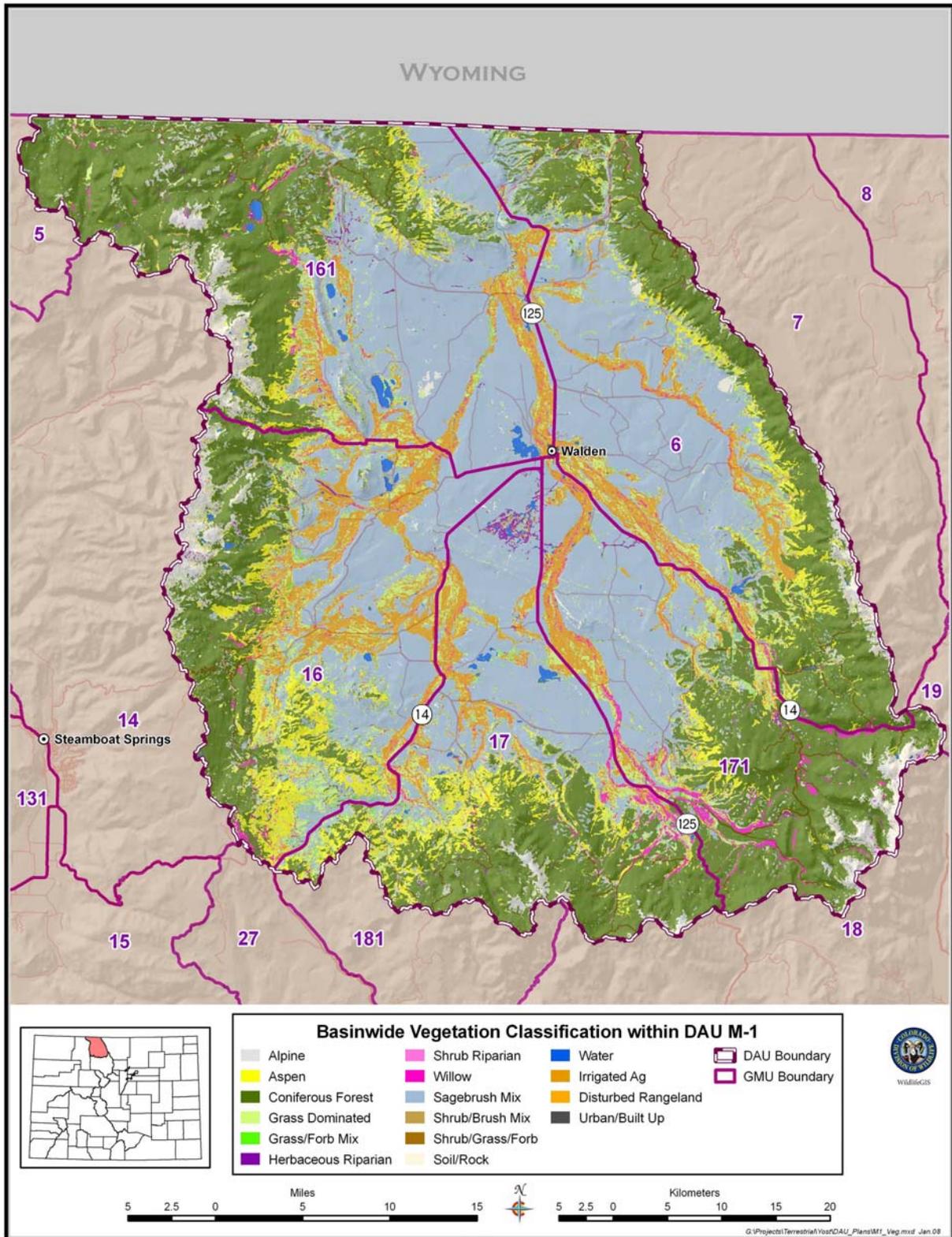
There currently are not any significant management problems occurring with moose. Since moose typically do not herd up in large groups for the winter like elk and deer do game damage to agriculture is slight. The most significant impact from moose can occur to willows and riparian areas but tend to be localized in nature. Several studies have been completed in North Park looking at moose forage in riparian willow stands (See Kufeld and Zimmerman references below).

## **HABITAT RESOURCE**

Land ownership in North park can be generalized as mostly private, BLM and National Wildlife Refuge on the valley floor with national forest lands occurring higher. As such, the majority of moose summer range in North Park occurs on public lands at higher elevations such as the Arapaho National Forest on the south, the Routt National Forest on the west, and the Colorado State Forest on the east. Moose do summer on private land and the Arapaho National Wildlife Refuge where there are willow lined drainages at lower elevations however, the valley floor is dominated by sagebrush and grass hay meadows not preferred by moose (Figure 10). North Park contains 21,477 acres of willows (Appendix B), of those acres Kufeld and Steinert (1990) estimate 15,224 acres to be moose winter range, with 4,788 of those acres found on the national forest. In other words less than one-third of willow moose winter range occurs on national forest lands.

Moose rely heavily on various willow species as a major forage component in their diets. Out of concern for potential willow over browsing by moose Kufeld and Steinert (1990) initiated a study to estimate the moose carrying capacity for North Park based on willow forage production for eight main species of willow present in the Park. Results from their study indicated that willow forage production in North Park could support an estimated 1,860 moose assuming each animal consumes 17.5 lbs. of air dry weight willow per day. At a population level of 1,860 moose over 15,224 acres of willow the density of moose would be approximately 78 moose per square mile. Typical populations of wild moose never exceed a population density equal to or greater than 10 moose per square mile due to territorial behavior of moose. Thus it is very unlikely the population of moose will ever reach the maximum carrying capacity based on willow forage production alone.

Figure 10. Vegetation Map



This does not mean that willow over browsing by moose and other wild ungulates are not a concern for North Park. It is in fact a major concern for both private and public land managers as they seek to find the proper balance of grazers and browsers on the landscape. To address this issue Zimmerman (2001) attempted to develop methodology to monitor willow communities in northcentral Colorado, specifically the south east end of North Park. In this three year study exclosures were used to test three different conditions: exclusion of all ungulates, exclusion of cattle only, and no exclusion or treatment. Browse measurements were then made on willows to determine the extent of willow use by herbivores and fecal pellet groups were analyzed to determine composition of ungulate diets on the study area.

Six species of willow were identified on the study area: *Salix planifolia* – Plainleaf willow, *Salix wolfii* – Wolf willow, *Salix drummondiana* – Drummond willow, *Salix geyeriana* – Geyer willow, *Salix bothii* – Booth willow, and *Salix monticola* – Mountain willow.

Results of the browse study indicated combined use by cattle and wildlife in the no treatment areas (no exclosures) was not significantly different than use by wildlife alone on any no cattle treatment sites. There was a slight upward trend in use of all willow communities in the no treatment areas but the Sawo/Mefo willow type. Sawo/Mefo is browsed very little by ungulates due to low palatability and has a low structured growth form with low hiding and thermal cover value. Combined use by cattle and wildlife at Sapl/Caut was significantly higher than combined use in all other willow types and in the poorest condition of the willow species found in the study area. *S. planifolia* is highly palatable to ungulates. Even so the current level of use was not considered excessive. Willow heights were significantly taller in ungulate exclusion treatment plots than in plots ungulates could access.

Willow species were found to comprise 4% of the study area but 90% of moose summer diets were comprised of willow. However, this study used relatively small fecal sample sizes taken mainly in summer/fall and may not be indicative of true ungulate use by species or intensity. In addition to small sample sizes many pellet groups were obtained when vegetation was green and succulent which can make amount and type of forage consumed by animals difficult to differentiate especially the forbs and grasses. From the diet analysis of fecal material it was found the diet overlap between species to be: cattle/moose 7%, cattle/deer 1%, cattle/elk 14%, moose/elk 91%, moose/deer 89%, elk/deer 87%.

## **HABITAT PARTNERSHIP PROGRAM**

In 1990 the Colorado Division of Wildlife (CDOW) created the Habitat Partnership Program (HPP) to address fence and forage damage conflicts on private and public land caused by big game. The North Park HPP Committee was formed in 1991 and the Wildlife Commission in 1992 approved the Big Game Distribution Management Plan. The CDOW has received very few damage complaints caused by moose. HPP is now an integral part of big game management efforts in North Park and one of the most successful HPP Committees in the state. The locally run program is funded by 5% of the big game license revenues generated in the state.

In 1993 the North Park HPP Committee applied for and received a grant from "Seeking Common Ground." The grant funds were used to form the Owl Mountain Partnership (OMP). OMP is an ecosystem management partnership that involves cooperation among private landowners, and all the government agencies. The OMP has accomplished many on-the-ground projects to improve habitat for both wildlife and livestock. The original boundaries of the OMP were the southeast section of North Park, but in 1997 the OMP Steering Committee expanded the program to include all of Jackson County. The partnership can also do work in the Colorado counties of Grand and Larimer, as well as, Albany County and Carbon County in Wyoming.

## **ISSUES AND STRATEGIES**

In order to gather public input on moose management in M-1 several multiple methods were employed ranging from soliciting ideas from individuals to public meetings to comments via the CDOW website. Public meetings were held in Walden on January 29<sup>th</sup> 2008 and in Fort Collins on January 30<sup>th</sup>, 2008 to obtain comments on both moose and elk management in North Park. Local and state agricultural groups, sportsmen, government agencies, and citizens were notified of the meetings and other opportunities to provide input through local media, mailings, the CDOW website, and direct contact by CDOW employees.

Public attendance at the Walden meeting consisted of thirteen individuals representing a mix of sportsmen, business owners, ranchers, county commissioners, USFWS, USFS, loggers, and local media. Public attendance at the Fort Collins meeting consisted of eleven individuals representing a mix of sportsmen, landowners and hunting guides.

Questionnaires (see appendix C) were provided on the internet and to those attending meetings. From the questionnaires and issues brought up and documented at the public meetings the following were identified as being important to North Park moose management. A total of 13 questionnaires were received from individuals who read the plan on the internet.

## **Issue Identification**

**A)** Written comments received on the questionnaire from the public meetings in Walden and Fort Collins included the following ranked in order of number received:

1) Antler size minimum or restriction on shooting yearling bulls – Two respondents indicated they would like to see a regulation that would require bull moose harvested by hunters to have a minimum antler spread or restriction on harvest of yearling bulls.

2) Habitat Damage - One respondent indicated habitat damage to willows from moose “eating a lot of willows”.

3) See Appendix C for the questionnaire and responses (includes all questionnaire responses received from public meetings and internet).

**B)** Written comments received from the questionnaire and on the DOW website included the following:

1) Want larger bulls - 47% of public (9 of 19) and 60% (3 of 5) of agencies

2) Want more moose - 65% of public (13 of 20) but only 20% (1 of 5) of agencies

\*\* See Appendix C for the questionnaire and responses (includes all questionnaire responses received from public meetings and internet).

**C)** Written comments received from other agencies and interest groups who have reviewed the draft included the following:

United States Forest Service  
Bureau of Land Management  
Jackson County Commissioners  
North Park HPP Committee  
State Land Board

\*\* See Appendix E for complete copy of written responses

## **MANAGEMENT ALTERNATIVES**

### **Population Objective Alternatives (Post-Season Observed)**

- 1. 400 to 500 moose** – This level would allow more moose for harvest in the short term but would reduce the population below maximum sustained yield reducing hunting and viewing opportunities in the future.
- 2. 500 to 600 moose** – This alternative is the current population level and the current population objective. This population level would insure that maximum resources would be available for moose and recruitment levels remain high.
- 3. 800 to 1,000 moose** – The moose population is doing well at its current level and has been increasing slowly over time. A higher population level will result in increased hunting and viewing opportunities in the future. Due to territoriality of moose it is not likely this level of population increase will lead to significant browse issues but rather, moose will continue to disperse and fill unoccupied habitat or fill in gaps in existing occupied habitat.

### **Sex Ratio Objective Alternatives (Post-Season Observed)**

- 1. Sex Ratio, 50 to 60 bulls/100 cows** - This is the current sex ratio alternative. At this level, adequate bulls would be available to harvest, but there will be only a few exceptional bulls.
- 2. Sex Ratio, 60 to 70 bulls/100 cows** - This alternative could be maintained at the current harvest rate. Adequate numbers of mature bulls would be in the population.
- 3. Sex Ratio, Greater than 70 bulls/100 cows** - This alternative would take longer to achieve and would require a reduction in bull licenses. This level of males in the population would produce trophy bull hunting with the goal of producing an average harvested bull antler spread greater than 40”.

## **MANAGEMENT IMPLICATIONS**

Regardless of the management alternative chosen there will be minimal change in the overall number of ungulates currently in North Park. If the minimum population level (400) is chosen there will be a decrease of approximately 300 moose spread over 1,082 square miles of overall moose habitat, a density of one moose per 2.7 square miles. If the highest population level (1,000) is chosen there will be an increase of 300 moose spread over 1,082 square miles, a density of one animal per 1.1 square miles of overall moose habitat or one moose per 0.44 square miles of moose winter range. Note: 1,628 square miles is the total size of M-1 and includes all habitat types found in North Park, 1,082 square miles is the estimated overall range of North Park moose habitat. Moose winter range is estimated at 440 square miles.

Moose typically do not group up in large herds near livestock feed as elk do in winter so game damage should be minimal at all population levels. However, greater potential exists for willow damage on moose winter concentration areas at higher moose population levels.

Because moose are managed as trophy animals in Colorado and total population levels will never be large the impact of moose hunters on the local economy is minimal no matter which population size and herd composition level is chosen. Hunting experience and harvest can be negatively impacted with increased numbers of licenses as many moose hunters hunt near roads leading to hunter crowding. To address this increased numbers of hunters may need to be distributed over multiple seasons or separated geographically by sub-units within established GMU's or through restrictions on hunting within specified distances of public roads, etc..

## **PREFERRED ALTERNATIVE**

**Through the DAU planning process the preferred alternative selected for post-hunt population size is a population range of 500 – 600 moose with a sex ratio objective of 60 - 70 bulls per 100 cows and the goal of increasing age and antler spread of harvested bulls.**

\* Please note that the public DAU meetings and requests for agency comments occurred in January of 2008 well before 2007 harvest information and 2008 population modeling data was available.

## LITERATURE CITED

Bowden, D. C, and R. C. Kufeld. 1995. Generalized mark-sight population size estimation applied to Colorado moose. *Journal of Wildlife Management*. 59(4):840-851.

Kufeld, R. and S. Steinert. 1990. An estimate of moose carrying capacity in willow habitat in North Park Colorado, 1990. Unpublished Colorado Division of Wildlife report.

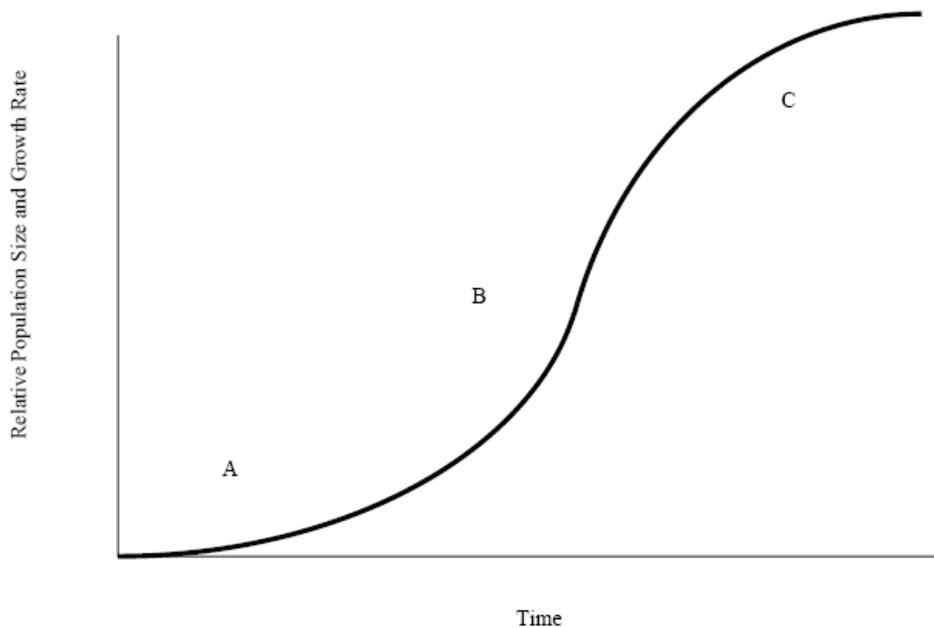
Zimmerman, M. L., W. Leininger, and R. C. Kufeld. 2001. A method for monitoring moose habitat in montane willow communities. CDOW Report

## **APPENDICES**

- A. Elk Populations Dynamics
- B. GIS Vegetative Data
- C. Questionnaire
- D. Written Public Comments
- E. Agency and Interest Group Written Comments
- F. Public Meetings Announcement
- G. Final DAU Plan Approval / Signature Page – separate file

## APPENDIX A: ELK POPULATION DYNAMICS

Numerous studies of biological populations of such species as bacteria, mice, rabbits, and white-tailed deer have shown that animal populations grow in a mathematical relationship that biologists refer to as a “sigmoid growth curve” or “S” curve (Figure 12). There are three distinct phases to this cycle. The first phase occurs while the population level is still very low and is characterized by a slow growth rate and a high mortality or death rate (see A in Figure 12). This occurs because the populations may have too few animals and the loss of even a few of them to predation or accidents can significantly affect the population. In other words, there appears to be some truth to the old saying “There’s strength in numbers”.



**Figure 12. Sigmoid Growth Curve.**

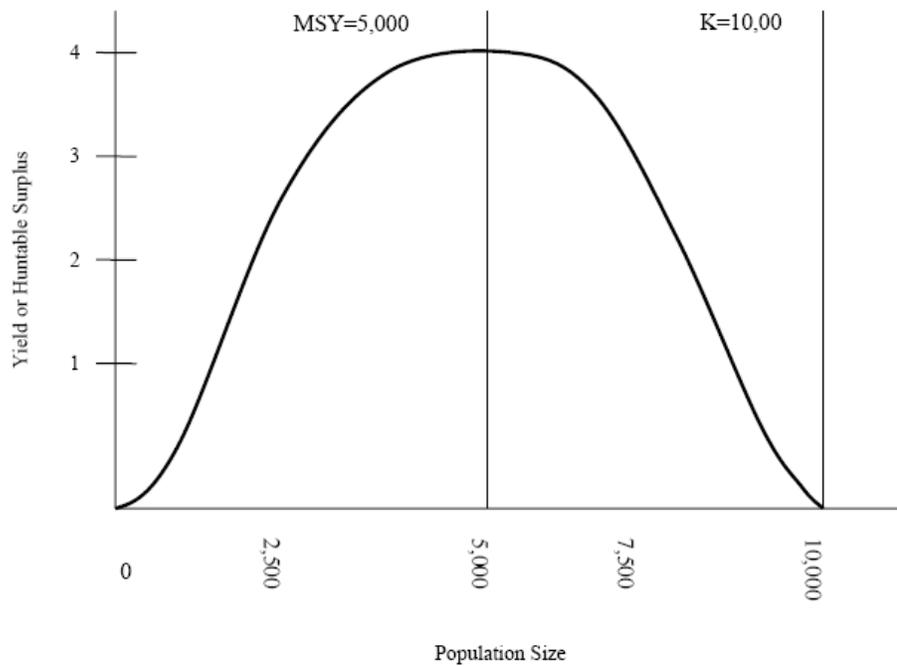
The second phase occurs when the population number or density is at a moderate level. This phase is characterized by a very high reproductive and survival rate (see B in Figure 12). During this phase, food, cover, water, and space (habitat) is optimal and abundant. These high reproductive rates during this phase can be seen in white-tail deer, when does may breed successfully at 6 months of age and produce a live fawn on their first birthday. Older does have been known to produce 3-4 fawns that were very robust and healthy. Survival rates of all deer (bucks, does, and fawns) are at maximum rates during this phase.

The third and final phase occurs when the habitat becomes too crowded. The quality and quantity of food, water, cover, and space become scarce and poor due to the competition with other members of the population. This phase is characterized by

decreased reproduction and survival (see C in Figure 12). For example, white-tail deer fawns can no longer find enough food to grow to a critical minimum weight to reproduce; adult does will only produce 1-3 fawns, and survival of all deer (bucks, does, and fawns) decreases. During severe winters, large die-offs can occur due to overcrowding and lack of forage. The first to die in these situations are fawns, followed by bucks, finally followed by adult does. Thus, severe winters affect future buck: doe and fawn: doe ratios by favoring more does in the populations. Additionally, since buck's antlers are dependent upon nutrition, antlers are stunted during this phase.

If the population continues to grow, it will eventually reach the maximum carrying capacity, or "K" (Figure 13). At this point, the population reaches a dynamic equilibrium with the habitat. The number of births each year equals the number of deaths, therefore, maintaining the population at this level would not allow for any "hunnable surplus." The animals in the population would be in relatively poor condition and when a severe winter or other catastrophic event occurs, a large die-off is inevitable. Thus, another old expression, "the bigger they are the harder they fall" may be appropriate here. A recent example of such a population die-off occurred in the relatively unhunted Northern Yellowstone elk herd during the severe winter of 1988-89. This winter followed the forest fires of 1988 that raged in the National Park.

What does all this mean to the management of Colorado's big game herds such as deer and elk? It means that if we attempt to manage for healthy big game herds, we should attempt to hold the populations at about the middle of the "sigmoid growth curve." Biologists call this "MSY" or "maximum sustained yield." At this level, which is exactly half the maximum population size or "K", the population will display the maximum production, survival and available surplus animals for hunter harvest (Figure 13). Also, at this level, range condition and trend should be good to excellent and stable, respectively. Game damage problems should not be significant and economic return to the local and state economy should be at the maximum. This population level should produce a "win - win" situation to balance sportsmen and private landowner concerns.



**Figure 13. Maximum Sustained Yield and Maximum Carrying Capacity.**

A graph of a hypothetical deer population showing sustained yield (harvest) potential vs. population size is shown above. Notice that as the population increases from 0 to 5,000 deer, the harvest also increases. However, when the population reaches 5,000 or "MSY", food, water and cover becomes scarce and the harvest potential decreases. Finally, when the population reaches the maximum carrying capacity or "K" (10,000 deer in this example), the harvest potential will be reduced to zero. Also, notice that it is possible to harvest exactly the same number of deer each year with 3,000 or 7,000 deer. This phenomenon occurs since the population of 3,000 deer has a much higher survival and reproductive rate compared to the population of 7,000 deer.

**APPENDIX B – GIS Vegetative Data (1993-1997 “Basin wide” version Land sat imagery)**

<b>CLASS_NAME</b>	<b>NPark_Veg</b>	<b>Acres</b>	<b>Sum Acres</b>
Alpine Grass Dominated	Alpine	1,120.92	100,685.92
Alpine Grass/Forb Mix	Alpine	11,142.56	
SubAlpine Shrub Community	Alpine	25.95	
Subalpine Grass/Forb Mix	Alpine	22,660.35	
Aspen	Aspen	65,433.01	
Aspen/Mesic Mountain Shrub Mix	Aspen	303.13	350,218.11
Douglas Fir	Coniferous Forest	1,851.70	
Englemann Spruce/Fir Mix	Coniferous Forest	82,119.19	
Limber Pine	Coniferous Forest	163.94	
Lodgepole Pine	Coniferous Forest	218,945.26	
Lodgepole Pine/Aspen Mix	Coniferous Forest	34,557.11	
Lodgepole/Spruce/Fir Mix	Coniferous Forest	1,466.37	
Mixed Forest Land	Coniferous Forest	1,444.21	
Spruce/Fir Regeneration	Coniferous Forest	9.42	
Spruce/Fir/Aspen Mix	Coniferous Forest	9,618.39	
Spruce/Fir/Lodgepole/Aspen Mix	Coniferous Forest	3.93	
Spruce/Lodgepole Pine Mix	Coniferous Forest	38.59	72,676.16
Grass Dominated	Grass Dominated	68,502.74	
Sparse Grass (Blowouts)	Grass Dominated	4,173.42	
Grass/Forb Mix	Grass/Forb Mix	10,507.76	10,507.76
Shrub/Grass/Forb Mix	Shrub/Grass/Forb	53.03	53.03
Herbaceous Riparian	Herbaceous Riparian	6,971.81	6,971.81
Willow	Willow	21,476.58	21,476.58
Shrub Riparian	Shrub Riparian	1.08	1.08
Sagebrush Community	Sagebrush Mix	289,878.88	357,873.35
Sagebrush/Grass Mix	Sagebrush Mix	67,209.97	
Sagebrush/Mesic Mtn Shrub Mix	Sagebrush Mix	48.97	
Bitterbrush Community	Shrub/Brush Mix	234.56	
Greasewood	Shrub/Brush Mix	486.68	
Upland Willow/Shrub Mix	Shrub/Brush Mix	14.29	
Water	Water	6,277.12	6,277.12
Rock	Soil/Rock	226.37	19,451.94
Snow	Soil/Rock	0.15	
Soil	Soil/Rock	2,992.01	
Talus Slopes & Rock Outcrops	Soil/Rock	16,233.41	
Residential	Urban/Built Up	268.40	268.40
Disturbed Rangeland	Disturbed Rangeland	203.59	203.59
Irrigated Ag	Irrigated Ag	86,355.57	86,355.57

1,033,020.42

Note – due to the “grid” size of GIS classification units the total acres of vegetation classes is approximately 3,000 acres shy of the total acres represented by the DAU due to overlap of “grids” between DAU boundaries.

**APPENDIX C – QUESTIONNAIRE**

**OPPORTUNITY FOR PUBLIC COMMENT ON MOOSE  
MANAGEMENT IN NORTH PARK, COLORADO**

**DATA ANALYSIS UNIT (DAU) M-1  
GAME MANAGEMENT UNITS 6, 16, 17, 161, 171  
WINTER 2008**



*For Wildlife-  
For People*

The Colorado Division of Wildlife is currently updating moose management plans for North Park and is requesting your input. Your opinion can help shape the future of moose management in this area. Please fill out the following questionnaire and mail or return it to:

**COLORADO DIVISION OF WILDLIFE  
DAU PLAN COMMENTS  
925 WEISS DRIVE  
STEAMBOAT SPRINGS, COLORADO 80487**

**COMMENTS MUST BE RECEIVED BY March 14, 2008**

## MOOSE DAU PLAN M-1 NORTH PARK QUESTIONNAIRE

Please answer the following questions regarding moose management in DAU M-1, North Park Game management Units 6, 16, 17, 161, and 171 by placing an X in the appropriate space next to your chosen answer.

**Please mark all that apply.**

### 1) Meeting Attended:

\_12\_ Internet Only – did not attend a meeting

\_4\_ Walden – January 29, 2008

\_3\_ Fort Collins - January 30, 2008

### 2) Are you?

\_3\_ LANDOWNER

\_1\_ LIVESTOCK OPERATOR

\_1\_ NORTH PARK BUSINESS OWNER

\_2\_ NORTH PARK GUIDE OUTFITTER

\_17\_ HUNTER

\_5\_ VIEWER

### 3) Have you experienced or have knowledge of any of the following caused by moose in North Park? If so explain.

\_1\_ HABITAT DAMAGE

1) - Eating a lot of willows

\_1\_ GAME DAMAGE

1) – Yes, Fence

\_0\_ COMPETITION WITH LIVESTOCK

## **PREFERRED ALTERNATIVE**

### **4) Of the options presented for the total post-hunt moose population objective which do you prefer?**

1 **1. 400 to 500 moose** – This level would allow more moose for harvest in the short term but would reduce the population below maximum sustained yield reducing hunting and viewing opportunities in the future.

6 **2. 500 to 600 moose** – This alternative is the current population level and the former population objective. This population level would insure that maximum resources would be available for moose and recruitment levels remain high.

13 **3. 800 to 1,000 moose** – The moose population is doing well at its current level and has been increasing slowly over time. A higher population level will result in increased hunting and viewing opportunities in the future.

### **5) Of the options presented for the post-hunt moose sex ratio objective which do you prefer?**

#### **Sex Ratio Objective Alternatives (Post-Season Observed)**

1 **1. Sex Ratio, 50 to 60 bulls/100 cows** - This is the current sex ratio alternative. At this level, adequate bulls would be available to harvest, but there will be only a few exceptional bulls.

9 **2. Sex Ratio, 60 to 70 bulls/100 cows** - This alternative could be maintained at the current harvest rate. Adequate numbers of mature bulls would be in the population.

9 **3. Sex Ratio, Greater than 70 bulls/100 cows** - This alternative would take longer to achieve and would require a reduction in bull licenses. This level of males in the population would produce trophy bull hunting with the goal of producing an average harvested bull antler spread greater than 40”.

#### **ADDITIONAL WRITTEN COMMENTS**

In the space provided please write down any additional thoughts, comments, or suggestions pertinent to moose management in North Park. (Use back if necessary)

**See Appendix D**

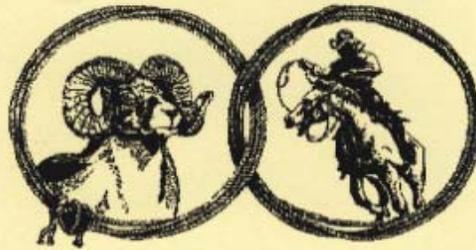
## APPENDIX D – ADDITIONAL WRITTEN PUBLIC COMMENTS

- 1) DOW needs an antler size minimum established. One and two year old bulls should be protected. It worked for deer and elk, didn't it?
  - 2) Maybe start to request moose hunters to try to harvest older mature bulls instead of yearlings. Then sometime in the future try to get a restriction on antler size (e.g. can't shoot yearlings)
  - 3) There are too many bull tags in unit 6 and 171. The quality has dropped considerably there used to be a lot more big bulls.
  - 4) I am very interested in the moose population in Colorado and I am a hunter. I did read through the moose management document on line and my thoughts are if we could carry the 800-1,000 without adverse effects we ought to do it but either way we ought to manage for bigger bulls since this is a once in a lifetime hunt! This is the reasoning behind my first choice. The 2<sup>nd</sup> option would be too bad especially if there is a significant number of hunters that are content with smaller bulls. One idea might be to have a higher license fee for bulls over 40" and a standard fee for a number of bulls under 30" (such as resident \$750 / \$250). This would accommodate both groups if necessary. Thank you for the opportunity to contribute to this decision.
  - 5) This is a great opportunity base on the information that I read on the internet this is a "win-win" for the DOW & people of Colorado (viewers & hunters alike). Here is what I see with this and the timing.
    - 1- Moose numbers can continue to increase w/out impact to carrying capacity.
    - 2- Moose population is growing, but can be reduced without getting out of hand in future if deemed too large.
    - 3- As moose population grows, animals will disperse, allowing new areas to absorb the herd or other existing areas.
    - 4- The DOW has a place to capture & relocate to re-introduce moose into other parts of Colorado; or add to such as the Grand Mesa.
    - 5- This will provide more animals I more locations for viewing and hunting.
    - 6- This will provide more revenue for the state, DOW & business owners in Colorado due to:
      - visitors to see moose in addition to the existing species
      - more hunters \$'s on licenses
      - the above two groups will spend \$, at businesses
- Overall - great job in Managing Colorado's Wildlife and Thank You very much.
- 6) Can the male sex increase w/out lower hunting license?

Why is the F license not one per lifetime as well. There seems to be enough hunting interest each year that this opportunity can be divided among the hunters until there are left over licenses. At that time someone that has harvested before could do so again.

- 7) If landowners need a bone thrown to them to tolerate more moose, then shoot down the elk herd. Elk are hard on everything.
- 8) I would like to see bigger bulls again.
- 9) Bigger bulls would be great to see again.
- 10) I miss seeing the big bulls I used to see.
- 11) Bigger bulls again. When my family is elk hunting, we are not seeing the big bull moose like we used to.
- 12) More mature bulls please

## APPENDIX E – AGENCY AND INTEREST GROUP COMMENTS



### North Park Habitat Partnership Program Colorado Division of Wildlife

Date: June 13, 2008  
To: Jeff Yost  
From: North Park Habitat Partnership Program Committee  
Re: Elk and Moose DAU management Plans

Thank you for the opportunity to comment on the Colorado Division of Wildlife's draft DAU plans for elk and moose for Jackson County. We take great interest in the management of these two species. After review of the plans we make the following comments:

We suggest that current population estimate of elk be used as an upper end of the management goal. Our committee has been very active in helping local landowners build permanent elk stackyards, which has significantly reduced damage issues to stacked hay. However, we have noticed an increase in conflicts with elk using agriculture lands with growing hay during the summer months. Therefore, we ask that adaptable hunting strategies be used to ensure that elk populations do not increase. We encourage the continuation of current four point antler restrictions as it appears to be producing higher numbers of larger bull elk that are attractive to hunters. We continue to have concerns with two issues regarding elk. One is what appears to be a change in elk distribution from public lands to private agricultural fields due to increases in recreational activities by people on the National Forest and on the Colorado State Forest. The second issue is with the concentration of elk in areas of "safe haven" such as private lands and the Arapaho National Refuge during hunting seasons that significantly impact elk harvest. Our committee is open to any suggestions or help in dealing with these issues.

The North Park HPP committee feels the existing number of moose within the DAU is adequate to provide high quality hunting experiences and the adequate non-consumptive watch able wildlife opportunities. We are not aware of significant damage issues with moose. Current Bull Moose licenses seem to be limiting the harvest to the extent that bull moose hunter satisfaction remains high. However, if there is a verifiable reduction in average antler size we suggest issuing fewer licenses to maintain more and therefore larger Bull Moose that would be available to hunters and wildlife viewers.

Sincerely,

A handwritten signature in dark ink, appearing to read "Mike Alpe".

Mike Alpe, Chairman  
For the NPHPP Committee

100 Main Street ♦ PO Box 737 ♦ Walden, Colorado 80480-0737  
Phone 970-723-0020 ♦ Fax 970-723-0021

JOHN C. RICH  
P.O. BOX 337

BOARD OF COUNTY COMMISSIONERS  
MICHAEL A. BLANTON, Chairman  
COUNTY OF JACKSON  
WALDEN, COLORADO 80480

LANNY R. WEDDLE  
FAX (970) 723-4706  
(970) 723-4660

June 13, 2008

Jeff Yost  
Colorado Division of Wildlife  
P.O. Box 775777  
Steamboat Springs, CO 80477

Re: Elk DAU E-3 (North Park) and Moose DAU M-1 (North Park)

Dear Mr. Yost:

The Board of County Commissioners of Jackson County has reviewed the executive summaries and management alternatives for Elk DAU E-3 and Moose DAU M-1 in North Park. The Board's preferred alternatives for these big game species are as follows:

Elk DAU E-3 (North Park)

Population Objective: Remain at the current objective of a population of 4,000 - 4,500 elk  
Sex Ratio Objective: 20 - 23 bulls/100 cow (Current sex ratio objective)

Moose DAU M-1 (North Park)

Population Objective: Hold the population stable at 500- 600 moose  
Sex Ratio Objective: greater than 70 bulls/100 cows to produce trophy bulls with an antler spread greater than 40"

If you have any questions regarding this letter, please do not hesitate to contact us.

Board of County Commissioners  
Jackson County, Colorado

By:   
Michael A. Blanton, Chair

# STATE OF COLORADO

## BOARD OF LAND COMMISSIONERS

1313 Sherman Street, Room 621  
Denver, Colorado 80203  
Phone: (303) 866-3454  
Fax: (303) 866-3152

Department of Natural Resources



Managing  
State Trust Lands  
Since 1876

Bill Ritter, Jr.  
Governor

Harris D. Sherman  
Department of Natural Resources  
Executive Director

Britt L. Weygandt  
State Board of Land Commissioners  
Division Director

May 7, 2008

Jeff Yoast – Terrestrial Biologist  
Colorado Division of Wildlife  
PO Box 775777  
Steamboat Springs, CO 80477

Dear Jeff:

I appreciate the opportunity to comment on the DAU Elk and Moose numbers on the North Park DAU. From my experience, observation and lessee feedback, I would support the Alternative #2 of current population and continuance of maintaining the populations at the current level of 4000 head of elk and 600 head of moose. Maintaining this level is probably even more important for the elk population. Being less familiar with Moose requirements, but based on your discussion on the lower of competition with other wildlife and livestock, this population size may still be best alternative for the time being, because of their expanding population.

Distribution can sometimes be more of an issue than the actual numbers. I have not had much negative feedback on distribution issues. As usual in land management scenarios, allocation of the range vegetation to the various livestock and wildlife types is always an issue, which for the most part remains unanswered. Establishment of a baseline inventory of vegetation would help to resolve some of these issues.

Because the reproduction rate is usually greater than losses by hunting and/or natural causes, it is recognized that it is difficult to stay within target numbers. This would support holding numbers at the lower level.

Again thanks for the opportunity to comment on your DAU objectives.

Sincerely,

Lane Osborn  
Northwest District Manager  
P.O. Box 1094  
Craig, CO 81626  
Phone (970) 824-2850  
Fax (970) 824-3036

cc: Beverly Rave, Field Operations Section Manager SLB  
Peter Torma, Bureau of Land Management, PO Box 68, Kremmling, CO 80459

COMMISSIONERS: Michele A. Bloom, Richard L. Downey, Steve Holdren, Thomas R. Hoyt, Shirley W. Watson

United States Forest Service – Walden

File Code: 2200-3/2270-  
1/2610/2620-1  
Date: March 12, 2007

Jeff Yost  
Terrestrial Biologist  
Colorado Division of Wildlife  
925 Weiss Dr.,  
Steamboat Springs, CO 80477

RE: Scoping comments for Elk-Moose Data Analysis Unit Plans.

Dear Jeff:

After discussions with the Parks District Rangeland Management Specialists and Wildlife Biologist, I would like to offer the following response to the solicitation for comments on the Data Analysis Unit (DAU) Plans for Moose.

**Moose**

First, I wanted to point out a confusing statistic regarding willow community acreage. The Habitat Resource section on page 19 indicates that in 1990, moose winter range containing willows comprised 15,224 acres North Park – wide with approximately 1/3 of those acres occurring on national forest lands. Yet, the GIS Vegetation Data in Appendix B shows 21,477 acres of willow habitat. Does this mean that there are areas of willow that are not used by moose in the winter, and if so, is it consequential? Hypotheses are then carried forth through the document based on 1990 information. Is it reasonable to rely on vegetation information nearly 18 years old? Does this include only naturally occurring willow stands, or does it include willows that have established along irrigation ditches that may or may not be removed by the user? The Forest Service (FS) requests, if available, the representation of a current dataset as opposed to using data from 1990. There have been a variety of changes; such as drought, water use and yields, willow removal, mountain pine beetle epidemic, an increase in elk and moose numbers, and updated GIS systems and tracking that warrant the use of current data for effective resource related comparisons and hypotheses.

Also from the Habitat Resource section, results from a browsing study (Kufeld & Steinert, 1990) indicated that willow forage production in North Park could support and estimated 1,860 moose. This was based on the assumption that each animal consumes 17.5 lbs. of air dry weight willow per day. According to the Natural Resource Conservation Service's animal equivalency chart, a large ungulate such as a moose is approximately equal to a cow with calf. A cow/calf pair is expected to use approximately 26 lbs. air dry weight

forage per day. Approximately 6 of those lbs. are attributed to trampling, which probably wouldn't apply to moose. The point is that the moose consumption figure may be very conservative. When comparing overall forage consumption to the amount of willow acreage, it seems that a reasonable population objective for moose would be about half of the number proposed in the study mentioned above.

While the results from another browsing study (Zimmerman, 2001) indicate that combined use by cattle and wildlife in the "no treatment" areas was not significantly different than use by wildlife alone, willow heights were significantly taller in the ungulate exclusion treatment plots than in plots ungulates could access. This would indicate that no matter whether livestock or wild ungulates do the browsing, there has been an effect on willow growth.

The diet analysis presented in the draft indicates a considerable overlap between moose & elk, and between moose & deer. From this information, it would seem prudent to keep the moose, elk and deer populations to a reasonable number.

The language offered in the management alternatives infers that the highest moose population objective of 800 to 1,000 animals would not result in significant browse issues, but rather moose would continue to disperse and fill unoccupied habitat or fill gaps in existing occupied habitat. After our internal discussions, we feel that alternative three would raise the population objective above that which the habitat could support on a sustainable basis. The browse community in North Park, ie., willow, serviceberry, chokecherry, and bitterbrush communities, already receive considerable use from large ungulates and livestock. Increased use from higher numbers of moose and elk will only create more stress on critical winter range. From the information presented in the draft Moose DAU plan, I would prefer that the CDOW select alternative 2 for a moose population objective for North Park of 500 to 600 moose.

Sincerely,

*/s/ Michael A. Wright*  
MICHAEL A. WRIGHT  
District Ranger

cc: Mike J Alpe  
Marcia L Pfleiderer  
Ann Timberman

Bureau Of Land Management – Kremmling

**MOOSE DAU PLAN M-1 NORTH PARK QUESTIONNAIRE**

Please answer the following questions regarding moose management in DAU M-1, North Park Game management Units 6, 16, 17, 161, and 171 by placing an X in the appropriate space next to your chosen answer.

**Please mark all that apply.**

**1) Meeting Attended:**

- Internet Only – Did not attend a public meeting
- Walden – January 29, 2008
- Fort Collins - January 30, 2008

**2) Are you?**

- LANDOWNER
- LIVESTOCK OPERATOR
- NORTH PARK BUSINESS OWNER
- NORTH PARK GUIDE OUTFITTER
- HUNTER
- VIEWER
- AGENCY (BLM)

**3) Have you experienced or have knowledge of any of the following caused by moose in North Park? If so explain.**

HABITAT DAMAGE  
 None \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

GAME DAMAGE  
\_\_\_\_\_  
\_\_\_\_\_

COMPETITION WITH LIVESTOCK  
 None \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**PREFERRED ALTERNATIVE**

**4) Of the options presented for the total post-hunt moose population objective which do you prefer?**

\_\_\_\_\_ **1. 400 to 500 moose** – This level would allow more moose for harvest in the short term but would reduce the population below maximum sustained yield reducing hunting and viewing opportunities in the future.

\_\_\_\_\_ **2. 500 to 600 moose** – This alternative is the current population level and the former population objective. This population level would insure that maximum resources would be available for moose and recruitment levels remain high.

\_\_XX\_\_ **3. 800 to 1,000 moose** – The moose population is doing well at its current level and has been increasing slowly over time. A higher population level will result in increased hunting and viewing opportunities in the future.

**5) Of the options presented for the post-hunt moose sex ratio objective which do you prefer?**

### **Sex Ratio Objective Alternatives (Post-Season Observed)**

\_\_\_\_\_ **1. Sex Ratio, 50 to 60 bulls/100 cows** - This is the current sex ratio alternative. At this level, adequate bulls would be available to harvest, but there will be only a few exceptional bulls.

\_\_XX\_\_ **2. Sex Ratio, 60 to 70 bulls/100 cows** - This alternative could be maintained at the current harvest rate. Adequate numbers of mature bulls would be in the population.

\_\_\_\_\_ **3. Sex Ratio, Greater than 70 bulls/100 cows** - This alternative would take longer to achieve and would require a reduction in bull licenses. This level of males in the population would produce trophy bull hunting with the goal of producing an average harvested bull antler spread greater than 40”.

### **ADDITIONAL WRITTEN COMMENTS**

In the space provided please write down any additional thoughts, comments, or suggestions pertinent to moose management in North Park. (Use back if necessary)

BLM has not observed any habitat damage on BLM lands in riparian areas due to moose. This could be attributed to the fact that BLM has very little moose winter range in North Park when moose tend to concentrate.

## **APPENDIX F – PUBLIC MEETINGS ANNOUNCEMENT**

### **North Park Elk and Moose Management Meetings Scheduled**

The Colorado Division of Wildlife (DOW) is interested in hearing from the public about management of elk and moose herds in North Park. Public input is critical in helping revise management plans, called Data Analysis Unit or DAU plans. DAU plans establish population objectives and set goals for male-female ratios within populations.

Interested members of the public are invited to attend a DAU planning meeting in Walden on Tuesday, Jan. 29 or Ft. Collins on Wednesday, Jan. 30. The Walden meeting will be held at the US Forest Service office at 100 Main Street. The Ft. Collins meeting will be at the Ft. Collins Hilton at 425 West Prospect Road. Both meetings begin at 6:30 p.m.

Elk populations in North Park are guided by the E-3 DAU plan, which includes Game Management Units 6, 16, 17, 161 and 171.

Moose in North Park are managed under the M-1 DAU plan, which includes Game Management Units 6, 16, 17, 161 and 171.

DAU plans are based on wildlife management principles and public input and are revised approximately every 10 years. To aid the public in discussion, several management alternatives will be presented at the public meetings. The alternatives cover increasing or decreasing overall herd size and male-female ratios or leaving the populations and gender ratios at their current levels. The benefits and drawbacks to each alternative will be presented.

"Herd size is a function of biology and habitat, but management of those herd sizes involves understanding public tolerance and desires for species populations," said Jeff Yost, DOW terrestrial biologist for the Steamboat Springs area. "While the DOW is well suited to make biological decisions, we need public input to determine if larger or smaller herds are wanted."

Sportsmen, outfitters, business owners and landowners all have a vested interest in the big game populations in an area. Sportsmen may want larger herds for increased opportunity or male-female ratios that create bigger bucks but less hunting opportunity. Outfitters and hunting-tourism dependent businesses like hotels and restaurants may want increased hunting opportunity that brings hunters to an area. Landowners may want decreased herd sizes to limit damage to haystacks and fences. Large landowners may also want herd gender ratios that promote bigger bulls and result in more desirable private land bull licenses.

The Colorado Division of Wildlife is the state agency responsible for managing wildlife and its habitat, as well as providing wildlife related recreation. The Division is funded through hunting and fishing license fees, federal grants and Colorado Lottery proceeds through Great Outdoors Colorado.

**APPENDIX G – FINAL DAU PLAN APPROVAL/SIGNATURE PAGE  
SEPARATE FILE**