MOOSE MANAGEMENT PLAN

DATA ANALYSIS UNIT M-5

Grand Mesa and Crystal River Valley

Photo courtesy of Phil & Carol Nesius

Prepared by Stephanie Duckett
Colorado Division of Wildlife
711 Independent Ave.
Grand Junction, CO 81505

M-5 DATA ANALYSIS UNIT PLAN
EXECUTIVE SUMMARY

GMUs: 41, 42, 43, 411, 421, 52, and 521 (Grand Mesa and Crystal River Valley)

Land Ownership: 35% private; 65% public

Post-hunt population:

Previous objective: NA

2008 estimate: 125

Recommended: pending

Composition Objective:

Previous objective: NA

2008 estimate: 60 bulls: 100 cows

Recommended: pending

Background:

The M-5 moose herd was established with translocated Shiras moose from Utah and Colorado in 2005 – 2007. The herd has exhibited strong reproduction and has pioneered into suitable habitat in the DAU. At this time, it is anticipated that there are approximately 125 moose in the DAU. The herd already provides significant watchable wildlife opportunities throughout the Grand Mesa and Crystal River Valley areas and it is anticipated that it will provide hunting opportunities in the near future.

Significant Issues:

Several significant issues were identified during the DAU planning process in M-5. The majority of people who provided input indicated strong interest in both hunting and watchable wildlife opportunities. There was less, but still significant, concern about both competition with livestock for forage and the possibility of habitat degradation, primarily in willow and riparian zones.

The majority of stakeholders favored increasing the population significantly while staying below carrying capacity. There was strong support for providing a balance of opportunity and trophy antlered hunting in this DAU, and most respondents indicated a desire for quality animals.

Management Alternatives

The following post-hunt population objectives were presented during the DAU planning process in M-5:

1) 100 – 200 moose, maintaining the population;

2) 200 – 300 moose, doubling the population size;

3) 300 – 400 moose, tripling the population size.

Three composition alternatives were presented, all of which would maintain a minimum bull: cow ratio of 50: 100. The three alternatives were:

1) opportunity, no minimum 5-year average antler spread measurement;

2) quality, 5-year average antler spread measurement of 35 inches or greater and;

3) trophy, 5-year average antler spread measurement of 40 inches or greater.

Preferred Alternatives

Population size objective #3, 300 – 400 moose was selected as the preferred population size alternative. This reflects significant public demand for a larger moose population, while still remaining below estimated carrying capacity. Eighty-two percent of questionnaire respondents identified a preference for this alternative, and it was also selected by multiple land management agencies as the preferred alternative.

Composition alternative #2, quality bull harvest, was selected as the preferred composition alternative. This alternative would balance demand for opportunity and high quality antlered harvest and would base antlered license numbers on maintaining a 5 year average spread measurement of 35 inches or greater. Sixty-nine percent of questionnaire respondents selected this alternative, as did many other interested stakeholders and CDOW personnel.

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INTRODUCTION, DAU PLANS & MANAGEMENT BY OBJECTIVE

The Colorado Division of Wildlife (CDOW) manages wildlife for the use, benefit, and enjoyment of the people of the state within the guidelines set forth in the CDOW's Strategic Plan, Five-Year Season Structures, and mandates from the Wildlife Commission and Colorado legislature. Colorado's wildlife resources require careful and increasingly intensive management to accommodate the many and varied public demands, as well as increasing impacts from a steadily growing human population. The primary tool that the CDOW uses to manage game wildlife within the state is annual hunting seasons. Historically, big game seasons have been set as a result of tradition or political pressures. Often, the seasons that resulted did not adequately address big game population dynamics or current habitat conditions and pressures.

More recently, big game herds within the state are managed at the herd level, called a Data Analysis Unit (DAU). DAU boundaries are drawn so that they approximate an area where most of the animals are born, raised, and die with as little ingress or egress from other herds as possible. DAUs are often comprised of several game management units (GMUs). Within these DAUs, the herd is managed using the guiding principles set forth in the comprehensive DAU plan.

These DAU plans are typically updated at ten-year intervals through a public planning process that incorporates big game management principles and the many and varied public interests associated with Colorado's wildlife, as well as the mandates of the Wildlife Commission and state legislature. As many interested parties as possible are involved in the planning process, including the U.S. Forest Service, Bureau of Land Management, sportsmen, guides and outfitters, farmers, ranchers, the business community, outdoor recreationists, anglers, and the wildlife viewing public. All these groups have a vital interest in the size and composition of the state's big game herds.

The DAU plan establishes two primary management objectives: the approximate post-hunt population size objective and composition objective (size/quality of antlered animals harvested). They are referred to as the DAU population and composition objectives, respectively. These two objectives determine the overall size and structure of the population and influence the management strategies used to reach the goals. The DAU plan also collects and organizes most of the important management data for the herd into one planning document, determines relevant issues through a public scoping process, identifies alternative management strategies to resolve these issues, and finally selects the preferred management objective alternative.

Once these population and composition objectives are set through the DAU planning process, the CDOW has the responsibility to work to achieve these goals on a yearly basis. The population objective drives the most important decision in the establishment of the annual big game hunting seasons: how many animals need to be harvested to maintain or achieve the population objective. To reach these objectives, the CDOW uses a method called "Management by Objectives" approach (Figure 1).

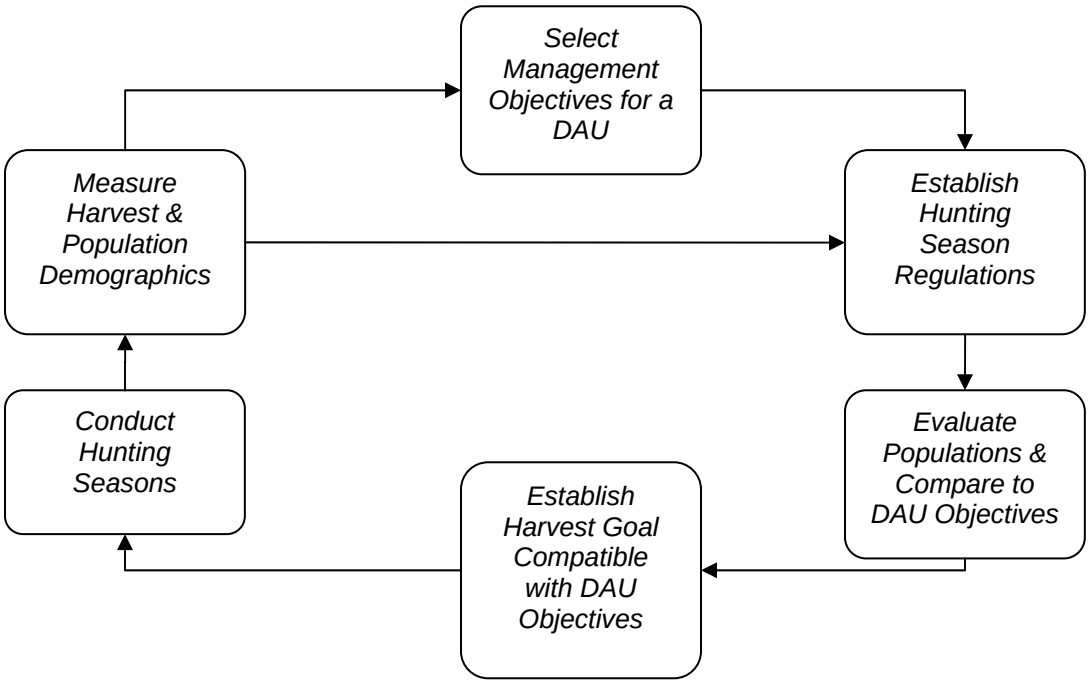

Figure 1. CDOW's Management by Objective Process

To collect and analyze harvest estimates and survival estimates, CDOW biologists use ongoing research projects, post-hunt aerial classification surveys and computer models. The data collected during annual aerial surveys are used in these computer models and allow biologists to estimate population size and structure. These estimates are then used to generate harvest recommendations that will align population estimates with the herd population objectives generated by the DAU planning process.

DESCRIPTION OF DAU

Geography

This DAU is comprised of game management units (GMUs) 41, 42, 43, 411, 421, 52, and 521. The main topographic features of this DAU are the high, flat-topped Grand Mesa and the steep, rugged Elk Mountains. Elevations vary from the Colorado River at approximately 4,600 feet near Grand Junction to over 14,265 feet at Castle Peak. The Colorado River forms the northern boundary of the DAU.

Interstate 70 parallels the Colorado River, forming a significant barrier which restricts most moose movements across the northern boundary of the DAU. Along the western boundary and west portions of the southern boundary the desert-like open terrain acts as another natural barrier that restricts moose movements into and out of the DAU.

Battlement Mesa (The Battlements) located south of Rifle and Parachute is another outstanding feature. The Battlements are a relatively narrow ridge of mountains running east to west. The western portion of this area contains steep, open shale slopes that are recognizable due to their white color.

Hundreds of streams, rivers, and natural and man-made lakes and reservoirs are found throughout the DAU. The water provides excellent wildlife habitat, myriad recreational opportunities, agricultural irrigation, and domestic water supplies. Major drainages include the Colorado River, the Roaring Fork River, the Crystal River, Plateau Creek, the Divide Creeks, Kannah Creek, Surface Creek and Muddy Creek.

Climate

The climate in this DAU varies dramatically across the elevation ranges. Grand Junction is relatively temperate, with hot summers and cool winters. The upper elevations are characterized by long cold winters and short cool summers.

Annual precipitation ranges from approximately 40 inches on the Grand Mesa to about 8 inches in the desert country near Grand Junction and Delta. Much of the annual precipitation is in the form of snow.

Land Ownership

The M-5 moose DAU contains a mixture of public and private lands (Figure 2). Approximately 65% of the lands within this DAU are public property. Of the overall range, 47% is managed by the United States Forest Service (USFS) and about 16% by the Bureau of Land Management (BLM). A small percentage is owned by the state of Colorado. Two National Forests manage lands within the DAU: the White River and the Grand Mesa Uncompahgre and Gunnison National Forests. The BLM lands are managed by the Grand Junction, Glenwood Springs and Montrose Resource Areas. Privately-owned lands make up 35% of the total.

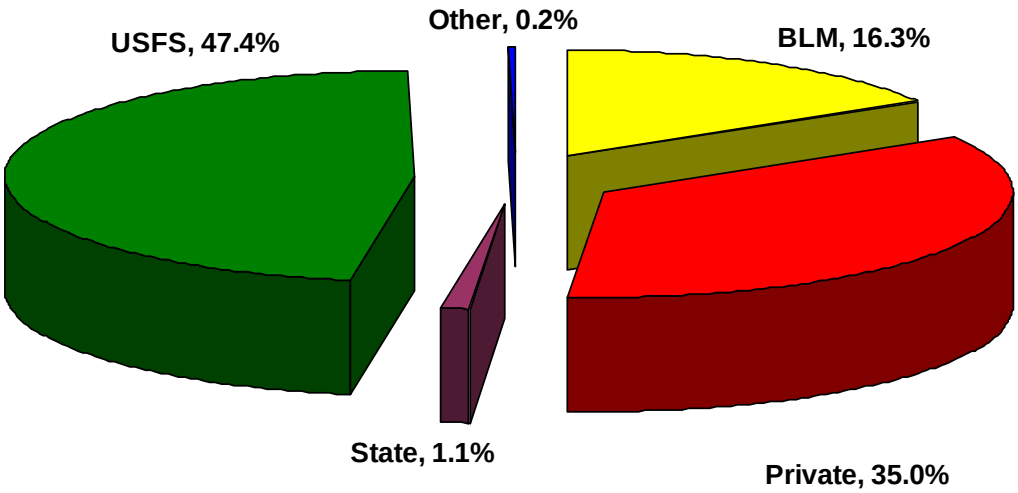

Figure 2. Land Ownership in DAU M-5.

Metropolitan areas are found around the periphery of the DAU. Major residential areas include the Grand Junction area, Glenwood Springs, Aspen, Rifle, Parachute, Delta and Paonia. The towns of Mesa, Collbran, Carbondale, Hotchkiss, and Cedaredge are also found in this DAU.

Like many areas in western Colorado, public lands are generally found at higher elevations and private lands are found at lower elevations where the land is more suitable for farming, ranching and communities. M-5 is 3,222 square miles in size. The USFS manages approximately 1,527 square miles and the Bureau of Land Management manages about 525 square miles. The CDOW manages small areas of land on State Wildlife Areas, including Garfield Creek State Wildlife Area and Plateau Creek Wildlife Area. There are 1,128 square miles of private land in the DAU.

Land Use

Because of the DAU's wide range in elevations, there are a variety of uses occurring on the lands. These range from livestock production to some of the best big game hunting in Western Colorado and the Western United States.

- **Agriculture:**

Agricultural crops, including corn, various small grains, and hay for livestock, are grown on private lands throughout the DAU. Much of the private land in the DAU is used to graze livestock during the spring, fall, and winter. Cattle and sheep ranchers graze livestock on USFS and BLM land during various seasons of the year. On USFS lands, livestock are grazed on allotments during the summer and ranchers move the livestock to home ranches and/or BLM allotments for the winter.

- **Timber Harvest:**

Commercial timber is harvested from and sold on private land and on the National Forests in the DAU. Spruce/fir timber is cut to provide wood for the construction industry. Aspen is also harvested primarily for the construction of wafer board for the building industry. Some firewood is harvested both commercially and privately.

- **Residential Housing and new Development**

The DAU has several population centers that primarily occur along the major river drainages. The Grand Valley, which borders this DAU to the west, has the largest population concentrations. Grand Junction is the largest town and is surrounded by other growing populations (Table 1). Other significant population centers include Glenwood Springs, Aspen, Rifle, Collbran, Paonia, and Cedaredge.

There has been a great deal of population growth in recent years, primarily along Interstate 70, near Carbondale, Collbran and Mesa, and in the Paonia, Hotchkiss, and Cedaredge areas.

The majority of new housing developments has occurred at lower elevations, fragmenting former sagebrush and agricultural lands that are vital as winter range to many species. Although moose generally do not migrate to lower elevations in mild winters, these areas that could support wildlife during severe winters are being lost throughout the DAU.

County	City/Town	Population
Pitkin	Aspen	5,914
	Snowmass Village	1,822
	Pitkin Co. Total	15,000
Mesa	Grand Junction	41,986
	Collbran	388
	Palisade	2,579
	Mesa Co. Total	116,000
Garfield	Glenwood Springs	7,736
	Carbondale	5,196
	Rifle	6,784
	Parachute-Battlement Mesa	4,503
	Garfield Co. Total	53,000
Delta	Paonia	1,497
	Delta	6,400
	Cedaredge	1,854
	Delta Co. Total	28,000

Table 1. Human Population Estimates within DAU D-11.

- **Recreation:**

Outdoor recreation is probably one of the most visible and extensive uses occurring on public lands in this DAU. The large number of rivers, lakes, reservoirs, and streams are used by fishing recreationists throughout the year. Both the Roaring Fork and Crystal Rivers offer high quality fishing opportunities. Rafting companies offer trips down the Colorado River, and the Roaring Fork, Crystal, and Colorado Rivers provide kayaking opportunities. Excellent backcountry hiking, biking, and off highway vehicle (OHV) trails provide numerous days of recreational activity for a large number of visitors. Several roadless and wilderness areas provide exceptional backcountry hunting, camping, hiking, fishing, and observing wildlife opportunities. During the fall, big game hunting is a major event in the DAU. Nearly 15,000 elk hunters and 7,000 deer hunters hunt in this DAU each year. Hunting and fishing activities in Mesa County alone generated an economic impact of $76.1 million and created 813 jobs (BBC Research & Consulting 2008).

Skiing and ski area development is a significant land use, particularly in the east end of the DAU. There are four ski resorts in the DAU, three of which are in GMU 43. Originally used primarily during winter months, these ski areas recently have been encouraging year-round use through gondola rides, mountain biking, horseback riding and other summer recreational opportunities.

There is also increasing winter backcountry recreation across the DAU. Cross country skiing and snowmobiling are rapidly increasing in popularity. Snowmobile activity can affect moose behavior (Colescott 1996) and it is likely that at some level backcountry and cross country skiing also have the potential to disturb moose (Rudd 1986).

- **Mining and Oil & Gas Development:**

Natural gas and oil exploration is occurring throughout this DAU, although it is primarily concentrated on the Grand Mesa. Extensive reserves of natural gas have been discovered in the area from Debeque to New Castle and around the Muddy Creek and Collbran areas. It is

anticipated that the drilling, piping and production of gas and oil is in the beginning stages and the forecasts call for extensive future development. Both oil and gas well locations, access roads, and pipeline corridors are expected to increase dramatically in the next 10 years.

The Bull Mountain pipeline and many other, smaller, pipelines are under construction at the time of this draft. Although many pipelines will cross moose habitat, the Bull Mountain pipeline will impact high quality, heavily used areas from the Muddy Creek drainage on the south end of the Grand Mesa all the way to the lower end of West Divide Creek. Additionally, in the summer of 2008, initial drilling of well pads on Hightower Mountain was begun. Although only six well pads have been approved, it is anticipated that there will be much more extensive activity if those wells produce as anticipated.

The aforementioned oil and gas activities are only a few of the myriad developments planned across DAU M-5 and in moose range within the DAU. Although very little research has been completed on the impacts of oil and gas development on moose, avoidance of pipeline developments and rights-of-way have been documented (Morgantini 1985). Rudd documented moose avoidance of trucks involved in oil and gas work (1996).

Active coal mining is also occurring on the south end of the DAU near the town of Somerset.

Vegetation

Nearly all the vegetation types found in Colorado can be found in DAU M-5, including alpine tundra, spruce/fir forest, aspen, mountain shrub, sagebrush meadows, oakbrush, pinyon-juniper woodlands, riparian willow, and salt desert. Aspen forest/woodland and Gambel oak/mixed montane shrublands each make up roughly 20% of the overall habitat types in M-5. Pinyon-juniper woodlands account for nearly 15% of the landscape. Nearly 10% of the land is in agricultural use. Approximately 8% of the land is dominated by sagebrush. Riparian zones and coniferous forests each account for roughly 2% (4% total) of the habitat. Less than 1% of the land has been developed.

HERD HISTORY

Prologue

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 referring to the size of a population of moose. In this manner CDOW has established a reference point and can eliminate confusion when referring to populations.

Moose population objectives are determined by taking into account many different variables. Some important variables include biological data, social, political and economic considerations, recreational interests, domestic livestock concerns, and vegetative capabilities. Population objectives are often set at a level consistent with the herd's maximum sustained yield (MSY). However, it is very difficult to determine the MSY and carrying capacity for any given area and herd. In the case of the Grand Mesa-Crystal River Valley herd, a vegetative assessment of a portion of the DAU was completed prior to introduction. This assessment provides a good foundation on which we can base carrying capacity (see Habitat Assessment & Estimated Carrying Capacity).

Population Assessment Procedure Overview

Estimating populations of wild animals over large geographic areas is an extremely difficult and inexact science. The population numbers for this herd have been determined based on individuals released, known mortality, projected survival rates, and projected and observed reproduction.

For other populations, the primary method of determining population size is based upon population models, which integrate measured biological factors into a computer generated population simulation. The biological factors used include post-hunt sex and age ratios data taken from helicopter surveys in December, ground observations, and hunter harvest information. The surveys provide baseline information which is used to align the models. Other data requirements include winter survival for different age classes and sexes, wounding loss and emigration or immigration. As better information becomes available, such as improved estimates of survival rates, wounding loss, density estimates, or new modeling techniques and programs, the CDOW will use the most current information and biological techniques.

Making these changes may result in significant changes in the population estimate. It is recommended that the population estimates presented in this document be used only as an index or as trend data. They represent CDOW's best estimate of populations at the time they are presented.

Grand Mesa Moose Introduction Project

In the spring of 2001, the Colorado Division of Wildlife was approached by interested Grand Valley citizens with a proposal to establish a moose population on the Grand Mesa. Both internal and external deliberations led the CDOW to investigate the feasibility of such a project. The successful establishment of viable moose populations in other locations in Colorado provided incentive to explore the possibilities of such a project.

Public meetings and discussions with local citizens andUSFS personnel revealed substantial issues and concerns regarding the various impacts such a project may have on the natural environment and social infrastructure of the area. Impact to natural vegetation and conflict with both other wild ungulates and livestock were significant issues during the input solicitation process.

The feedback from the initial discussions indicated to the CDOW that an assessment of the habitat would be appropriate and a study should be completed to determine if there was sufficient forage to support a viable, self-sustaining moose population on Grand Mesa.

Habitat Assessment & Estimated Carrying Capacity

In early 2002, a team of CDOW and USFS personnel was formed to supervise the comprehensive vegetative assessment and feasibility study (Graham 2004). The goal of the habitat assessment was to provide measurements of the quantity of vegetation that could provide forage for moose in the Grand Mesa area. These data would then be used to calculate estimates of potential moose numbers that could be sustained on a long-term basis and in balance with human and other wildlife needs in the area.

Field work began in July 2002. The study area for this assessment included most of the area commonly known as Grand Mesa, from east of Grand Junction and extending eastward approximately 50 miles, almost to the Crystal River drainage, comprising roughly 550,000 acres. Since time and fiscal constraints limited the size of the area that could be evaluated, the study team selected a smaller portion of the study area as a core area for detailed study and sampling; the Core Area had over 370,000 acres, about 2/3 of the study area. Results of the sampling were then projected to the anticipated moose range in the rest of the study area. At the time of the habitat assessment, it was not anticipated that the moose would pioneer into the Crystal River drainage, so that entire area (GMU 43) was not included in the analysis.

Current annual growth of willow was manually clipped within sampling units, bagged, and weighed after air drying. Willow sample weights were converted to total pounds of forage available to moose, and from that the total number of moose potentially supported was calculated.

The number of moose supported on a given range can be calculated but requires certain assumptions and the estimate can fluctuate based on the different variables considered. Essential elements include the percentage of the current annual growth consumed by moose and the amount of willow in the annual diet as compared to other plant species. The habitat assessment provided a range of potential moose numbers rather than a single number due to the many variables that can affect an estimate.

The variation in these numbers was created by varying forage consumption rates; the low number represents 30% moose use of the annual forage production and the high number represents 50% use. These estimates assume that willows will comprise 85% of the introduced moose's diet.

Typically, in Colorado, the number of wild ungulates a given habitat can support is more limited by winter range than summer range due to excessive snow accumulation that reduces the size of the total available range. Therefore, it is necessary to calculate both summer and winter carrying capacities.

The results of the habitat assessment estimated that during winter months, the Grand Mesa project area could support between 278 and 464 above 7000' in elevation. Summer habitat could support nearly 5 times that many, approximately 1,147 to 1,912 animals during the summer months. This large range illustrates the difficulty in estimating carrying capacity, and the necessity of using a range to manage population size.

The habitat assessment estimated a winter carrying capacity of 278 – 464 moose and was used as the basis for the alternatives offered during the DAU planning process.

Translocations

In January 2005, the first three moose were moved to the Grand Mesa and released on Harrison Creek east of Collbran. The moose, two young bulls and an adult cow, were translocated from near Creede, Colorado. During the next two years, a total of 91 moose, 56 cows and 35 bulls, were moved to the Grand Mesa. There were three primary release locations, Skyway/Powderhorn on the west end; Harrison Creek/Hightower Mountain on the east end; and

the Muddy Creek area on the southeast side. The majority of the moose were translocated from Utah, generally on the Wasatch Front near Salt Lake City and Ogden. Only five moose were translocated from within Colorado. The last moose was released on the Grand Mesa in May 2007. No further translocations are planned.

CURRENT HERD MANAGEMENT

Current Population Size

There are approximately 125 moose in DAU M-5. This estimate is based on known transplants, mortalities, survival, and reproduction and projected survival and recruitment from known individuals.

Of the 91 moose moved to M-5, there have been 18 mortalities. Of these, six were directly related to capture. One was hit by a vehicle, one was mistakenly shot a by hunter, one died of old age, one starved during the winter of 2007-2008, and in eight instances, the cause of death was undetermined.

As of August 2008, thirty-eight calves have been documented in M-5, and it is likely that another twenty calves since 2006 have not been observed.

Current Sex/Age Composition

Using known releases and estimated survival rates, it is estimated that there are approximately 60 bulls: 100 cows in this DAU. Annually, the calf: cow ratio has varied, but has averaged 40 calves: 100 cows, which is well within other documented ranges (Olterman 1998). In 2008, there were 23 calves observed from the 33 cows that were checked, resulting in a calf: cow ratio of 85:100.

Harvest

There has been no legal harvest of moose in DAU M-5, but an antlered-only season was approved by the Wildlife Commission in January 2009. It is anticipated that a very small number of antlered licenses will be issued for the first few years, and that license numbers will be reviewed annually based on current antlered harvest measurements compared to objectives. If the preferred composition objective alternative (quality: 5 year average spread of 35" or greater) is selected, it is anticipated that a small number of licenses will be issued during the first 5 years to monitor the quality and success of harvest.

Antlerless harvest will be used for managing the population size and will be based on population size in relation to the population size objective. If the preferred population size alternative (300 - 400 moose) is approved, it is anticipated that antlerless harvest will begin when the population has reached the lower end of that objective, in an effort to proactively manage the population size.

Although only one instance of illegal moose harvest has been documented, it may become a more significant occurrence as the population expands and legal hunting opportunities are available. The Grand Mesa and Crystal River Valley are managed for elk hunting opportunity and there are thousands of hunters in the field each year. Since 2005, efforts have focused on educating hunters in the area about the presence of moose and distinguishing moose from elk. Letters have been sent to hunters, signs have been posted warning hunters of moose in the area and volunteers visited hunting camps during rifle seasons to provide information and fliers. It appears that these efforts have been largely successful, since only one known moose has been mistakenly killed.

HABITAT

Generally, the limiting factor for moose throughout Colorado is suitable habitat. Moose rely primarily on browse species for forage and prefer mixed subclimax communities, boreal forests and riparian habitats. Throughout Colorado, moose rely heavily on willow for forage. Typical moose habitat usually includes a mixture of riparian, aspen, and forested components. Particularly in M-5, moose are also often associated with mountain mahogany, oakbrush, and mountain shrub communities. These habitat types are abundant and in generally good condition throughout M-5.

The vegetative assessment completed prior to the introduction of moose provides a strong foundation for establishing a reasonable carrying capacity for moose in M-5. Although it focused on a smaller, core area and assumed almost exclusive utilization of willow forage, it is by far the most relevant data available at this time. However, it does not appear that the moose in M-5 have selectively utilized the willow component of the available habitat.

There is a great deal of concern among ranchers that over-utilization of willow and riparian habitat by moose will result in lowered AUMs available on USFS allotments. During the initial public scoping meetings, the CDOW made the commitment that CDOW personnel would not base any recommendations for a decrease in AUMs on any grazing allotments on the Grand Mesa on moose riparian habitat needs. This commitment continues and the CDOW will not recommend any decrease in AUMs in M-5 as a result of this moose introduction.

Moose Range

Since introduction, moose in DAU M-5 have generally been found at elevations higher than 7,000 feet throughout the DAU, during both summer and winter. Although shifts in seasonal use have been documented elsewhere in Colorado (Kufeld & Bowden 1996), no significant, widespread seasonal migrations have been documented, despite the severe winter in 2007 – 2008.

The moose were released in three primary areas in DAU M-5, the Hightower Mountain/Harrison Creek area, the Muddy Creek area, and the Skyway/Powderhorn area. Through summer of 2008, the main concentration areas are close to the initial release sites (Figure 3). The moose have, however, pioneered into other regions including the West Divide Creek area south of Rifle and the Three and Four Mile Creek areas southwest of Carbondale. There is significant suitable habitat across the DAU, and expansion into these areas will most likely continue as a result of readily available forage and unoccupied habitat.

There is a significant portion of DAU M-5 at the top of the Grand Mesa that has been little used by moose. Much of this area is characterized by wetlands and mixed spruce/fir and aspen forests, what was expected to be ideal moose range. It is likely that these areas will be used more heavily as the moose population grows and the range of the moose expands to incorporate all usable habitats.

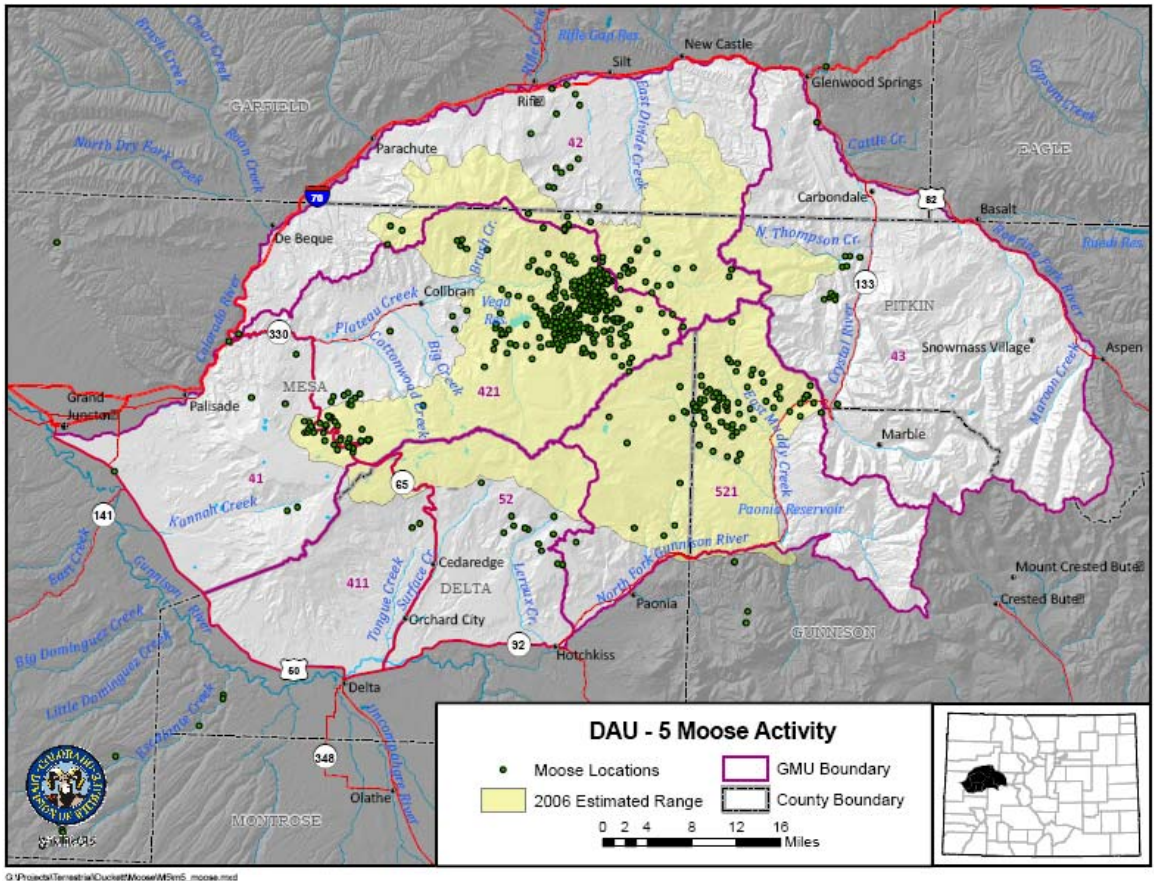

Figure 3. All Moose Locations 2005 – July 2008.

A significant proportion of moose locations have been on USFS land. The high, forested lands generally owned by the USFS provide year round habitat for the moose, and there has been less use of private and/or BLM lands.

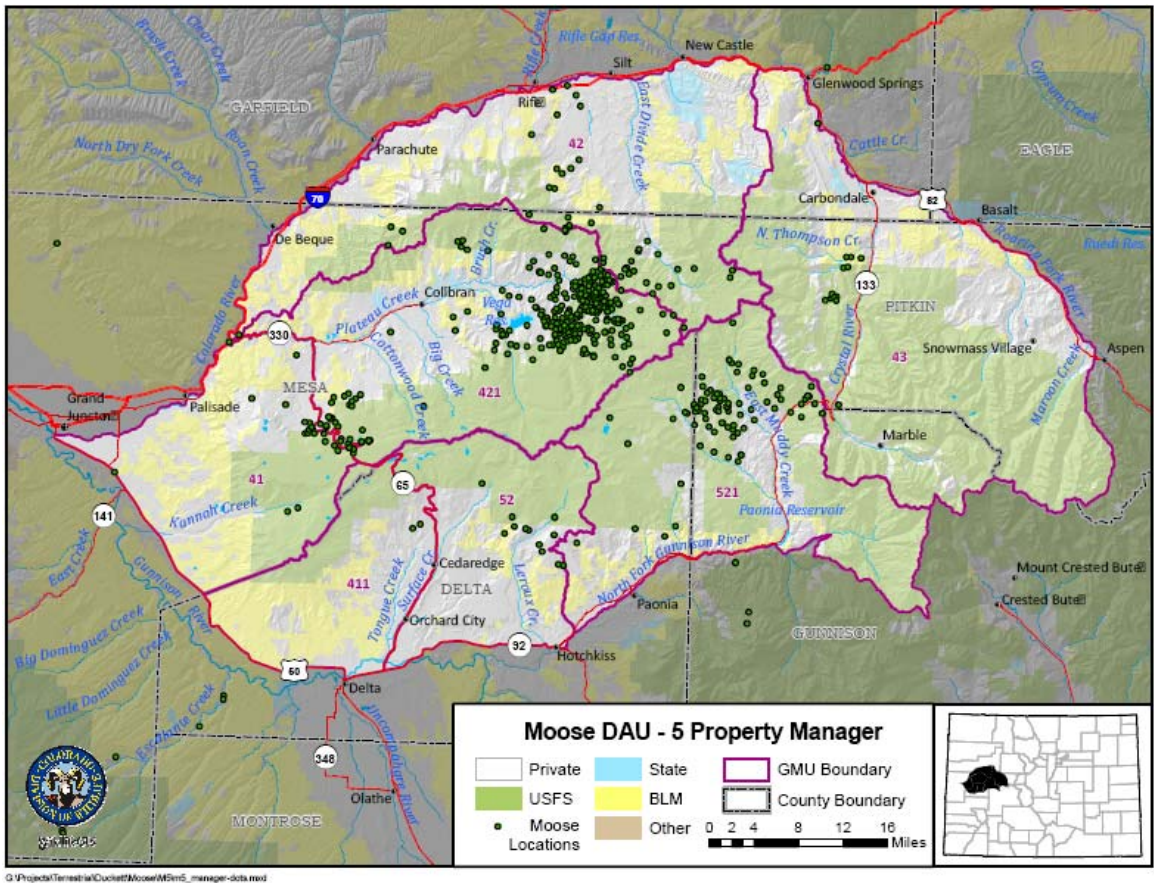

Figure 4. Landownership in DAU M-5 in relation to moose locations.

Moose Habitat Selection

The moose in DAU M-5 have been found in all available habitat types. They have been observed in oakbrush, mountain shrub communities, aspen stands, spruce/fir, and willow habitats with great frequency. The majority of the moose were transplanted from the Wasatch Front in Utah, where oakbrush stands are the primary habitat type used by moose. When the moose were initially released, the majority of animals were found in this type of oakbrush habitat. Since that time, there have been more moose located in other habitat types, particularly mountain shrub and aspen. Riparian habitat, with the complementary willow component, has been less frequently used than would normally be expected for Shiras moose. It is likely that, as this population pioneers throughout the DAU, habitat selection may shift to more typical Shiras moose habitats such as riparian areas and spruce/fir forests.

CONFLICTS, NUISANCE, AND DAMAGE

Currently, there have been no significant reports of conflict, nuisance, or game damage by moose in M-5. However, it is possible that an increased population size may result in complaints of this nature.

Some nuisance incidents have been reported, primarily caused by young bulls causing conflicts in towns on the northeastern side of M-5, including Carbondale and Glenwood Springs. Moose have been relocated in these instances as necessary and future nuisance situations will be handled on an individual basis dependent upon the circumstances.

Moose, as browsers, rarely compete directly with livestock or other ungulates for forage. There is very little dietary overlap between cattle and moose and, assuming moose will forage primarily on willow, it is unlikely there will be significant forage competition between the two species. No complaints of game damage or competition with livestock and moose have been documented in M-5.

It is not anticipated that habitat degradation by moose will occur in M-5. The vegetative assessment completed in 2002 indicated that the willow habitat alone could support 278 – 464 moose. No population size objectives presented at this time would allow the population size to be over 400 moose, well below the projected carrying capacity. Additionally, that carrying capacity is based entirely on the willow forage component on the Grand Mesa. Not only are moose pioneering into areas not included in the vegetative assessment (Crystal River Valley, West Divide Creek), they use many other habitat types heavily.

As this population grows, the CDOW is committed to working with the USFS on National Forest lands to monitor the health of willow habitat and moose range as a whole. Care will be taken to ensure that there is no habitat degradation as a result of the moose introduction in M-5.

Landowners, if faced with damage or livestock competition on public or private lands, have the recourse of the Habitat Partnership Program (HPP). In 1989, the CDOW created the HPP to address fence and forage damage conflicts, directly, and with local input, on private and public land. The committee is comprised of local landowners, sportsmen, and federal land management personnel to ensure public involvement in identification and solutions to conflicts.

The program is funded by 5% of the net sales of deer, elk, pronghorn and moose l licenses in the GMUs represented by the local HPP committee. Three committees work within M-5: the North Fork Committee (est. 1989), the Lower Colorado River Committee (est. 1993) and the Grand Mesa Committee (est. 1995). All are an integral part of the big game management efforts in M-5.

ISSUES & STRATEGIES

Issue Solicitation Process

One of the most important aspect of the DAU planning process is obtaining input from all segments of the affected public, including USFS, BLM, HPP, and outdoor recreationists.

Four meetings were held in an effort to inform the public of the DAU planning process and to gather recommendations and input on the final population objectives. These meetings were held in Glenwood Springs, Grand Junction, Collbran, and Cedaredge during August of 2008. Fewer than twenty individuals attended the combined meetings.

A questionnaire was made available at these public meetings and on the CDOW website to encourage input into the DAU planning process. Thirty-four questionnaires were returned.

Local personnel from the USFS and the BLM as well as the Boards of County Commissioners from Mesa, Delta, Gunnison, Pitkin, and Garfield counties were invited to attend the public meetings and their written input was actively solicited.

Presentations were made to the local HPP committees to solicit each committee's input and recommendations. Letters were received from all three committees (see APPENDIX B HPP COMMITTEE INPUT).

Significant Issues

- **Hunting Opportunities**

The most frequently identified issue throughout the DAU planning process has been moose hunting opportunity in M-5. Moose are highly valued for sport hunting and, since this introduction was funded with sportsmen's monies, it is a very important aspect of this herd.

Most hunters wanted a quality hunt and were willing to sacrifice more frequent opportunities to hunt and the opportunity to harvest a trophy antlered animal in the interests of balancing the two.

- **Watchable Wildlife Opportunities**

There is strong public demand for increased watchable wildlife opportunities that moose in M-5 provide. Both sportsmen and non-hunters identified wildlife viewing as a primary concern in M-5.

There is less, but still significant, concern regarding conflicts between hunters and wildlife viewers. It is possible that, especially in the vicinity of Highway 65 on the west end of the DAU, there will be moose that will be readily available to both hunting and viewing.

Additionally, there is a desire to educate wildlife viewers about the unique safety issues associated with viewing moose. USFS personnel have offered to provide informational signage in areas where moose/viewer conflicts might occur.

- **Competition with Livestock**

There is concern, primarily from ranchers and from land management agencies, that there could be damage to riparian zones and willow habitats if moose numbers increase above carrying capacity. This is a possibility. However, all the population size alternatives are below the estimated carrying capacity derived from the Habitat Assessment & Estimated Carrying Capacity completed in 2004. Research in southwest Montana also suggests that moose and cattle have very little dietary overlap (Dorn 1970). The CDOW has committed to working with the USFS to monitor willow and riparian habitats to prevent habitat damage by moose.

- **Commitment to not lower AUMs**

During the initial planning stages of the introduction project and during the public input stage of the DAU planning process, there has been significant demand from landowners and ranchers that

the CDOW not recommend decreases in AUMs on USFS grazing allotments as a result of moose use of willow and riparian habitats.

Although the CDOW holds no regulatory authority over grazing allotments, the CDOW has committed that moose utilization of willow and riparian habitats will not be the basis for recommending a decrease in AUMs on grazing allotments in M-5.

- **Moose/vehicle collisions**

Concern was expressed by the USFS and by interested individuals that measures be taken, through signing and education, to prevent moose/vehicle collisions. The main highways of concern are Highway 65 from Mesa to Cedaredge, and Highway 133 from Carbondale to Paonia. One bull moose from M-5 was struck and killed by a vehicle on I-70 in 2005. Although there were no injuries to the occupants of the vehicle, moose/vehicle collisions often result in human injuries or death. As the population size of moose in M-5 increases, the likelihood of collisions increases. CDOW will work with the Colorado Department of Transportation (CDOT) to implement signing where necessary.

- **Oil and gas development**

There was some public and significant internal concern regarding the impacts of oil and gas development within M-5 on the moose. Monitoring efforts are ongoing within M-5 as oil and gas development escalates. Although CDOW has no regulatory authority in the governance of oil and gas, all recommendations from CDOW will take moose into account. Adaptive management of this moose population will be necessary as the population size increases and the oil and gas activity in moose range intensifies.

With the implementation in 2009 of HB 1298, the CDOW will have new opportunities to review oil and gas facility permits and to make recommendations to avoid, minimize and mitigate impacts to wildlife. This statute and the resulting rules will assist in the minimization and mitigation of negative results.

MANAGEMENT ALTERNATIVES DEVELOPMENT

The following management alternatives were presented during the public input stage of the DAU planning process.

Population Size Objective Alternatives:

Alternatives relate to the overall size of the population. All the following alternatives are below the estimated carrying capacity for this DAU.

- **100 – 200 moose**

This alternative would *maintain the population at current levels*, allowing for some growth in the near future. The herd would be managed with hunting licenses, both antlered and antlerless. This alternative would support the lowest levels of hunter and watchable wildlife opportunity. Issues such as nuisance animals or conflicts with recreationists would be lowest.

- **200 – 300 moose**

This alternative would *increase the population size*. This would offer moderate levels of hunting opportunity and watchable wildlife opportunity while remaining below carrying capacity. Issues such as nuisance animals or conflicts with recreationists would be low.

- **300 – 400 moose**

This alternative would *increase the population size significantly*. This would offer the highest levels of hunting opportunity and watchable wildlife opportunity while remaining below carrying capacity. Issues such as nuisance animals or conflicts with recreationists will be highest, but will most likely remain at low levels. Income to the DOW and local communities would likely increase with more hunters and other wildlife-centered recreation.

Population Composition Alternatives:

These alternatives relate to the overall quality of antlered hunting opportunities in DAU M-5. Hunting quality can be correlated to larger antler spread and is often associated with higher hunter satisfaction.

- **Opportunity**

This alternative reflects sportsmen's desire to maintain opportunity despite decreased quality. This alternative would maintain license numbers when the 5-year average spread of all harvested antlered animals falls below 40 inches. Regardless of the size of harvested animals, the CDOW would manage this population to maintain a sex ratio of 50 – 60 bulls: 100 cows.

- **Quality**

This alternative reflects sportsmen's desire to balance opportunity and trophy quality. This alternative would decrease license numbers when the 5-year average spread of all harvested antlered animals falls below 35 inches. License numbers would decline in response to smaller harvested animals and reductions in license numbers would be generally proportional to the scale of the decrease in the size of animals harvested. Regardless of the size of harvested animals, the CDOW would manage this population to maintain a sex ratio of 50 – 60 bulls: 100.

- **Trophy**

This alternative reflects sportsmen's desire to maintain the size and quality of harvested animals at the expense of overall opportunity. This alternative would decrease license numbers when the 5-year average spread of all harvested antlered animals falls below 40 inches. License numbers would decline in response to smaller harvested animals and reductions in license numbers would be generally proportional to the scale of the decrease in the size of animals harvested. Regardless of the size of harvested animals, the CDOW would manage this population to maintain a sex ratio of 50 – 60 bulls: 100 cows.

Summary of Public Input

- **Public Questionnaires**
  - Thirty-four questionnaires were submitted either by attendees of the public meetings or interested parties who downloaded the questionnaire from the internet
  - 82 % of respondents selected 300 – 400 moose
  - 69% of respondents selected quality antlered harvest management
- **Colorado Bowhunters Association**
  - 300 – 400 moose
  - antlered harvest management should be left to local stakeholders
- **Farm Bureau**
  - 200 – 300
  - Opportunity
- **USFS GMUG**
  - 300 – 400
  - Quality
- **USFS GMUG-Grand Valley Ranger District**
  - 300 – 350 (or 300 – 400 moose)
  - Quality
- **USFS White River**
  - 300 – 400
  - no antlered harvest management input
- **HPP Grand Mesa**
  - 200 – 300
  - Trophy
- **HPP Lower Colorado River**
  - 200 – 300
  - Trophy
- **HPP North Fork**
  - 200 – 300
  - Opportunity

PREFERRED ALTERNATIVES

Population Size Objective

Population size alternative #3, 300 – 400 moose, was selected as the preferred population size alternative for DAU M-5. This alternative was selected based on public input, the vegetative assessment of the carrying capacity of the DAU, and field staff opinion. This population size will offer the highest levels of hunting opportunity and watchable wildlife opportunity while remaining below carrying capacity. Income to the DOW and local communities would likely increase with more hunters and other wildlife-centered recreation.

There was strong public demand for this population size objective, particularly from sportsmen and other recreationists. Sportsmen's groups and land management agencies also supported this alternative. Eighty-two percent of all questionnaire respondents selected this alternative. There was strong field support with the CDOW for this alternative as well.

Composition Objective

Composition alternative #2, a 5-year average antler spread of 35 inches or greater, was selected for DAU M-5. This will balance opportunity and trophy quality. Regardless of the size of harvested animals, the CDOW would manage this population to maintain a sex ratio of 50 – 60 bulls: 100. This alternative received strong support (69%) from questionnaire respondents. CDOW field staff supported this as a good start to antlered harvest in the DAU.

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APPENDIX A FEDERAL LAND MANAGEMENT AGENCY INPUT

USDA United States Department of Agriculture
Forest Service
White River National Forest

Supervisor's Office
900 Grand Avenue
P.O. Box 948
Glenwood Spgs., CO 81602-0948
(970) 945-2521
TTY (970) 945-3255
FAX (970) 945-3266

File Code: 2610
Date: August 28, 2008

Stephanie Duckett
Terrestrial Biologist
Colorado Division of Wildlife
711 Independent Ave.
Grand Junction , CO 81505

Dear Ms. Duckett,

I appreciate the opportunity to comment and provide input on the proposal to develop a Data Analysis Unit plan for moose on the Grand Mesa and in the Crystal River Valley. Keith Giezentanner and Phil Nyland of my staff attended a presentation by your office outlining this proposal on August 11, 2008. Several issues important to the White River National Forest were discussed.

I support Population Objective Alternative Number 3, 300-400 moose. I expect that either harvest alternative will provide adequate sex ratios to maintain a healthy population. Therefore, I do not favor one alternative over the other. I do have the following comments for your consideration:

- I encourage the Colorado Division of Wildlife to collaborate with WRNF and the GMUG in monitoring willow vegetation so that triggers for changes in DAU management can be identified, if willow vegetation is adversely affected either locally or across the DAU. As this herd increases in size, there is a chance of localized overuse that may need to be addressed.
- Potential for vehicle collisions are an important safety management issue in areas with moose populations. I encourage CDOW to develop a thorough education component to warn people of the potential for collisions. The Forest would be happy to discuss cooperative strategies for informing the public of this new wildlife species on the Forest.
- I encourage CDOW to coordinate with the appropriate local tribes concerning this planning effort.
- I expect that as this population increases in size, there will be a corresponding increase in "nuisance animal" complaints associated with moose showing up in areas where they are not welcome. This may expand the need for the CDOW to respond to these nuisance complaints on private lands across the DAU.

United States Department of Agriculture | Forest Service | Grand Mesa, Uncompahgre and Gunnison National Forests | 2250 Highway 50
Delta, CO 81416
Voice: 970-874-6600
TDD: 970-874-6660

M.S. Duckett
J.T.
Riggs
cy: Velarde

File Code: 2610
Date: August 27, 2008

Note recommendation to close Hwy 65 for 1/4 1/2 mile

RECEIVED RV
AUG 28 2008
Northwest Reg. DOW

Ron Velarde
Northwest Region Manager
Colorado Division of Wildlife
711 Independent Ave.
Grand Junction, CO 81505

Dear Ron:

Thank you for the opportunity to comment on the Data Analysis Unit (DAU) M-5 Management Plan for Moose on the Grand Mesa and the Crystal River Valley. The Grand Mesa, Uncompahgre, and Gunnison National Forests support Population Objective Alternative 3 which would allow the moose population within the DAU to increase to a population level of between 300 and 400 moose. This number is still well below the original carrying capacity estimate that was developed as a result of the willow vegetation study that was completed prior to the re-introduction. This carrying capacity estimate was for willow only and, as we are finding out the moose are utilizing oak to a high degree and other mountain shrub species as well. Hunting can always be used as a management tool to adjust this population level downward if necessary. Vegetation monitoring can also be initiated in any area if the habitat shows signs of heavy utilization.

The Forest would support Antlered Harvest Alternative #2 Quality. This alternative is a fair balance between opportunity and trophy quality. The goal of maintaining 50-60 bulls per 100 cows should maintain a healthy population in the Data Analysis Unit.

Since 2009 may be the first year of a very limited bull moose hunting season in the DAU, the Forest would like to recommend that a moose hunting closure area be considered within ¼ to ½ mile, depending on forest cover, along Highway 65 across the Grand Mesa on National Forest lands. We feel that there are already a couple areas along this route above Mesa Lakes where moose frequent and is becoming a popular area for moose viewing. Since the Highway is heavily traveled by watchable wildlife viewers it would not be compatible for moose hunting to occur where large numbers of people are out viewing wildlife. The Forest would also like to assist, where we can, in signing that would caution travelers of potential moose-vehicle collisions and also signing in popular viewing areas about the inherent risks of approaching moose on foot.

Moose are a valuable wildlife resource and provide an exciting viewing opportunity to many Forest visitors. I look forward to the increase in the watchable wildlife and hunting opportunities as this herd expands. Please feel free to contact Keith Giezentanner at (970) 945- 3244 with any questions or comments relating to this effort.

Sincerely,

Mary G Morgan

MARY G. MORGAN
Acting Forest Supervisor

USDA United States Department of Agriculture | Forest Service | Grand Mesa, Uncompahgre and Gunnison National Forests | 2250 Highway 50, Delta, CO 81416
Voice: 970-874-6600
TDD: 970-874-6660

File Code: 2610
Date: August 27, 2008

Ron Velarde
Northwest Region Manager
Colorado Division of Wildlife
711 Independent Ave.
Grand Junction, CO 81505

RECEIVED
AUG 29 2008
Northwest Reg. DOW

Dear Ron:

Thank you for the opportunity to comment on the Data Analysis Unit (DAU) M-5 Management Plan for Moose on the Grand Mesa and the Crystal River Valley. The Grand Mesa, Uncompahgre, and Gunnison National Forests support Population Objective Alternative 3 which would allow the moose population within the DAU to increase to a population level of between 300 and 400 moose. This number is still well below the original carrying capacity estimate that was developed as a result of the willow vegetation study that was completed prior to the re-introduction. This carrying capacity estimate was for willow only and, as we are finding out the moose are utilizing oak to a high degree and other mountain shrub species as well. Hunting can always be used as a management tool to adjust this population level downward if necessary. Vegetation monitoring can also be initiated in any area if the habitat shows signs of heavy utilization.

The Forest would support Antlered Harvest Alternative #2 Quality. This alternative is a fair balance between opportunity and trophy quality. The goal of maintaining 50–60 bulls per 100 cows should maintain a healthy population in the Data Analysis Unit.

Since 2009 may be the first year of a very limited bull moose hunting season in the DAU, the Forest would like to recommend that a moose hunting closure area be considered within ¼ to ½ mile, depending on forest cover, along Highway 65 across the Grand Mesa on National Forest lands. We feel that there are already a couple areas along this route above Mesa Lakes where moose frequent and is becoming a popular area for moose viewing. Since the Highway is heavily traveled by watchable wildlife viewers it would not be compatible for moose hunting to occur where large numbers of people are out viewing wildlife. The Forest would also like to assist, where we can, in signing that would caution travelers of potential moose-vehicle collisions and also signing in popular viewing areas about the inherent risks of approaching moose on foot.

The moose re-introduction has already proven to be a great success and will provide valuable opportunities for both wildlife viewing enthusiasts and hunters alike in the years ahead.

Sincerely,

CHARLES S. RICHMOND
Forest Supervisor

cc: Tom Holland, Connie Clementson, Levi Broyles

USDA United States Department of Agriculture | Forest Service | Grand Valley Ranger District | 2777 Crossroads Blvd Unit 1 Grand Junction, CO 81506 970-242-8211

File Code: 2610
Date: August 26, 2008

STEPHANIE DUCKETT
TERRESTRIAL BIOLOGIST
COLORADO DIVISION OF WILDLIFE
711 INDEPENDENT AVE.
GRAND JUNCTION, CO 81505

Dear Stephanie:

Thank you for the opportunity to have input into the DAU planning process for the moose herd on the Grand Mesa. We have been very pleased by the positive response from the public, as well as internally, regarding the opportunities to view moose. So far, there has been no noticeable grazing impact to the habitats they frequent, as they are somewhat solitary and do not seem to concentrate in one area. They also do not seem to be in conflict with livestock at this time, as the moose are using oakbrush habitats, primarily, and not concentrating in the riparian areas.

The area which is being managed for the M-5 herd is very large, approximately 3200 square miles, with 1085 square miles of actual moose range. As such, we believe the habitat can easily sustain the numbers of Alternative 2 or 3, while providing good wildlife viewing opportunities. the Grand Valley Ranger District of the Grand Mesa, Uncompahgre and Gunnison National Forests would recommend for Population Objective either Alternative 2 or Alternative 3, preferably in the middle, ie: approximately 300-350 moose. As it may be difficult to monitor specific numbers, it may be the conservative approach to stay under 400 animals.

As wildlife viewing opportunities will most likely reach more forest visitors than hunting opportunities, we would also recommend Alternative 2 of the Antlered Harvest alternatives, ie: the alternative that encourages more large antlered bulls, not only for "quality" hunting, but also for "quality" viewing and photography opportunities.

We also encourage the CDOW to continue to collaborate with the Grand Mesa, Uncompahgre and Gunnison and White River National Forests in monitoring willow vegetation, to ensure that carrying capacity within riparian areas is not being exceeded.

Moose are a valuable wildlife resource and provide an exciting wildlife viewing opportunity to many Forest visitors. We look forward to more moose viewing and hunting opportunities for the public in the future. If you have any questions or concerns, please contact Julie Grode, at (970) 263-5828 or (970) 242-8211.

Sincerely,

CONNIE CLEMENTSON
District Ranger

APPENDIX B HPP COMMITTEE INPUT

COLORADO DIVISION OF WILDLIFE
HABITAT PARTNERSHIP PROGRAM

Lower Colorado River Habitat Partnership Program
PO Box 1452
Rifle, CO 81650

Stephanie Duckett, Terrestrial Biologist
Colorado Division of Wildlife
711 Independent Ave.
Grand Junction, CO 81505

September 9, 2008

RE: Moose DAU Management Plan – M-5 (GMU 41, 42, 43, 411, 421, 52, 521)

Dear Stephanie,

After reviewing and discussing the information that was presented regarding the Moose DAU Management Plan, it is the consensus of the Lower Colorado HPP Committee that for the upcoming DAU Plan, we support a population level of 200-300 Moose in the DAU planning area. For the opportunity vs. quality issue, this committee would like to see quality animals harvested that do not fall below the 40 inch spread measurement.

If you have any further questions, please feel free to contact me by phone at (970) 260-0147 or by e-mail at danielles@willowwisp.net , I will be happy to help. Thank you.

Sincerely,

Danielle Smith

Danielle Smith
Lower CO River HPP,
Committee Administrative Assistant

COLORADO DIVISION OF WILDLIFE
HABITAT PARTNERSHIP PROGRAM

Grand Mesa Habitat Partnership Program
PO Box 1452
Rifle, CO 81650

Stephanie Duckett, Terrestrial Biologist
Colorado Division of Wildlife
711 Independent Ave.
Grand Junction, CO 81505

September 9, 2008

RE: Moose DAU Management Plan – M-5 (GMU 41, 42, 43, 411, 421, 52, 521)

Dear Stephanie,

Thank you for coming and presenting the information about Moose in DAU M-5. We appreciate you taking the time to involve us.

After reviewing and discussing the information that was presented regarding the Moose DAU Management Plan, it is the consensus of the Grand Mesa HPP Committee that for the upcoming DAU Plan, we support a population level of 200-300 Moose in the DAU planning area. For the opportunity vs. quality issue, this committee would like to see quality animals harvested that do not fall below the 40 inch spread measurement.

If you have any further questions, please feel free to contact me by phone at (970) 260-0147 or by e-mail at danielles@willowwisp.net , I will be happy to help. Thank you.

Sincerely,

Danielle Smith

Danielle Smith
Grand Mesa HPP,
Committee Administrative Assistant

North Fork Habitat Partnership Program

To: Stephanie Duckett

From: North Fork HPP Committee

Re: Recommendations on Grand Mesa Moose DAU Plan

The following are the alternatives that the North Fork HPP committee is recommending for the Grand Mesa Moose DAU plan.

For the total post-hunt moose population objective, the committee makes a recommendation of the 200 – 300 range for total numbers of moose.

For the antlered harvest recommendation, the committee recommends the Opportunity alternative.

One concern that the committee has is the effect of moose on aspen considering the sudden aspen decline (SAD) that is occurring in the Grand Mesa area.

Respectively submitted by:

Doug Homan, North Fork HPP committee chairman

APPENDIX C PUBLIC STAKEHOLDER INPUT

FARM BUREAU COLORADO

Colorado Farm Bureau
9177 East Mineral Circle
Centennial CO, 80112

Mailing Address:
P.O. Box 5647
Denver, CO 80217

(303) 749-7500
(303) 749-7703 fax

www.colofb.com

Mission:
The Colorado Farm Bureau, as the premier grassroots organization, promotes the future of agriculture and protects rural values.

September 5, 2008

Stephanie Duckett
Terrestrial Biologist
Colorado Division of Wildlife
711 Independent Ave.
Grand Junction, CO 81505

Dear Ms. Duckett,

Colorado Farm Bureau appreciates the opportunity to make comments in response to the issue of moose management on the Grand Mesa and Crystal River Valley. We have had members and staff in attendance at the local public meetings the past month and many of them have shared their concerns. Since the creation of this program in 2003, Colorado Farm Bureau has made it aware that we were very apprehensive about the introduction of moose. Top among our list of concerns has been population numbers and herd management. Additionally, it was our understanding that the moose were originally promoted as an animal that would simply forage on riparian areas, however, that has not proved to be true. This is causing a major conflict between grazing lands for livestock and wildlife.

We strongly believe that our ranchers would certainly prefer to keep the moose numbers as low as possible. The second alternative, 200-300 moose, may be acceptable for some ranchers and landowners as long as caution is exercised and increases are minimal. We would recommend managing the herd for "opportunity" hunt, not for trophy hunting, because this would be the best way to keep the animals more scattered and numbers better controlled. As an example, areas managed for trophy elk hunts seem to have more game damage from that species.

The biggest concern we have is the possibility of the U. S. Forest Service using moose as a reason to justify cutting livestock grazing numbers. The Forest Service has always used the forage use in riparian areas to evaluate grazing impact. The DOW representatives at the meeting in Colbran stated that they would put into their plan that they would never recommend a decrease in livestock grazing numbers to accommodate the moose, however, we were made aware that those decisions are made by the Forest Service and not from DOW, therefore we have no guarantee of that promise.

We would like to encourage DOW to build a working relationship with landowners across Colorado. Issues such as this continue to increase the difficulty of a working relationship between the DOW and landowners. The better relationship DOW has with our landowners the more cooperation there can be with

local DOW staff. We ask that you carefully analyze the suggestions and comments from those living on the land, as the farmers and ranchers are the landowners facing the most severe effects from these moose management decisions.

Sincerely,

Alan Foutz
President, Colorado Farm Bureau

cc: Director Harris Sherman
Commissioner John Stulp
Robert Bray, Chair, Wildlife Commission
Ron Velarde, Northwest Region Manager

- Thanks Ron and other CDOW Staff, for the opportunity to comment on this moose management DAU plan.

  1. Population Objective Alternatives: The CBA recommends Alternative 3, 300-400 animals. The Plan states, "This alternative would increase the population size significantly. This would offer the highest level of hunting opportunity and watchable wildlife opportunity while remaining below carrying capacity. Issues such as nuisance animals or conflicts with recreationists will be higher but will most likely remain at low levels. Income to the DOW and local communities would likely increase with more hunters and other wildlife centered recreation."

  What effect gas and oil development will have on the moose habitat and future moose populations needs to be considered as a top priority if the herd in to increase to this size.

  If quality habitat becomes an issue as gas and oil development expands in the areas or if CWD is detected in the area, then Alternative 2 can be developed, i.e., 200-300 animals.

  2. Antlered Harvest Alternatives: The CBA recommends that bull moose antler size/width as a method to determine, "whether to maintain or decrease license numbers" should be left up to the local stakeholder groups. We realize that in a few other moose DAU plans, local hunters have expressed, in favor of larger antlered bulls, thus fewer licenses allocated.

  The CBA has contacted our Regional Reps. and suggested they and other local CBA members, attend these meeting and voice their opinions.

  Regards, Paul Navarre, CBA/CDOW Liaison, for the CBA Board of Directors.

APPENDIX D PUBLIC QUESTIONNAIRE

OPPORTUNITY FOR PUBLIC COMMENT

MOOSE MANAGEMENT

GRAND MESA AND THE CRYSTAL RIVER VALLEY

For Wildlife-

For People

DATA ANALYSIS UNIT (DAU) M-5

GAME MANAGEMENT UNITS 41, 42, 43, 411, 421, 52, and 521

The Colorado Division of Wildlife is currently developing a moose management plan for the Grand Mesa and the Crystal River Valley and is requesting your input. Comments must be received in written form to be incorporated into the management plan. Your opinion will help shape the future of moose management in this area. Please fill out the following questionnaire and mail or return to:

Stephanie Duckett, Terrestrial Biologist
Colorado Division of Wildlife
711 Independent Ave.
Grand Junction, CO 81505
COMMENTS MUST BE RECEIVED BY SEPTEMBER 15, 2008

Please answer the following questions about moose management in DAU M-5, Grand Mesa and the Crystal River Valley, GMUs 41, 42, 43, 411, 421, 52, & 521.

Meeting Attended (Check all that apply)

_____Internet Only – did not attend a public meeting
_____August 11, 2008 Glenwood Springs
_____August 13, 2008 Grand Junction
_____August 14, 2008 Collbran
_____August 25, 2008 Cedaredge

Which group(s) best represent your interests in moose management in GMUs 41, 42, 43, 411, 421, 52, and 521? *(Check all that apply)*

_____Rancher/Farmer
_____Business owner
_____Landowner
_____Guide/Outfitter
_____Hunter/Sportsperson
_____Environmental/Conservation
_____Other, please explain _____

What are your primary concerns/interests regarding moose management on the Grand Mesa and the Crystal River Valley (GMUs 41, 42, 43, 411, 421, 52, and 521)? *(Check all that apply)*

_____Hunting opportunity
_____Watchable wildlife opportunity
_____Game damage
_____Moose/vehicle collisions
_____Moose competition with deer and/or elk
_____Moose competition with livestock
_____Other, please explain _____

Which of the above concerns would cause you to consider requesting an increase or decrease in the overall number of moose in the area? *(Check all that apply)*

_____Hunting opportunity
_____Watchable wildlife opportunity
_____Game damage
_____Moose/vehicle collisions
_____Moose competition with deer and/or elk
_____Moose competition with livestock
_____Other, please explain _____

Of the options presented for the total post-hunt moose population objective, which do you prefer? (*Please circle one)*

a) 100 – 200 moose

This alternative would maintain the population at current levels, allowing for some growth in the near future. The herd would be managed with hunting licenses, both antlered and antlerless. This alternative would support the lowest levels of hunter and watchable wildlife opportunity. Issues such as nuisance animals or conflicts with recreationists would be lowest.

b) 200 – 300 moose

This alternative would increase the population size. This would offer moderate levels of hunting opportunity and watchable wildlife opportunity while remaining below carrying capacity. Issues such as nuisance animals or conflicts with recreationists would be lower.

c) 300 – 400 moose

This alternative would increase the population size significantly. This would offer the highest levels of hunting opportunity and watchable wildlife opportunity while remaining below carrying capacity. Issues such as nuisance animals or conflicts with recreationists will be higher but will most likely remain at low levels. Income to the DOW and local communities would likely increase with more hunters and other wildlife-centered recreation.

d) Other: (*please explain on next page)*

Of the antlered harvest alternatives presented, which do you prefer? (*Please circle one)* (Under all three alternatives, the CDOW will manage the population to maintain a minimum sex ratio of 50 – 60 bulls: 100 cows).

a) Opportunity

This alternative reflects sportsmen's desire to maintain opportunity despite decreased quality. This alternative would maintain license numbers when the 5 year average spread of all harvested antlered animals falls below 40 inches. Regardless of the size of harvested animals, the CDOW would manage this population to maintain a sex ratio of 50 – 60 bulls: 100 cows.

b) Quality

This alternative reflects sportsmen's desire to balance opportunity and trophy quality. This alternative would decrease license numbers when the 5 year average spread of all harvested antlered animals falls below 35 inches. License numbers would decline in response to smaller harvested animals and reductions in license numbers would be generally proportional to the scale of the decrease in the size of animals harvested. Regardless of the size of harvested animals, the CDOW would manage this population to maintain a sex ratio of 50 – 60 bulls: 100

c) Trophy

This alternative reflects sportsmen's desire to maintain the size and quality of harvested animals at the expense of overall opportunity. This alternative would decrease license numbers when the 5 year average spread of all harvested antlered animals falls below 40 inches. License numbers would decline in response to smaller harvested animals and reductions in license numbers would be generally proportional to the scale of the decrease in the size of animals harvested. Regardless of the size of harvested animals, the CDOW would manage this population to maintain a sex ratio of 50 – 60 bulls: 100 cows.

d) Other: (*please explain on next page)*

WRITTEN COMMENTS:

Please use the space below for any additional comments you would like to make about moose management on the Grand Mesa and the Crystal River Valley areas (GMUs 41, 42, 43, 411, 421, 52, and 521).

APPENDIX E QUESTIONNAIRE ANALYSIS AND PUBLIC WRITTEN INPUT

Questionnaire Analysis

Thirty four questionnaires were submitted to the CDOW following the public meetings and after the questionnaire was posted on the internet.

Twenty four of the thirty four respondents identified themselves as hunters/sportspersons, six each identified themselves as rancher/farmers, or landowners or other (mainly associated with HPP committees). Eight respondents identified themselves as environmentalists, and one each identified themselves as either business owners or guides/outfitters.

Thirty one of the thirty four respondents identified hunting as their primary concern or interest regarding moose management in M-5. Twenty five respondents identified watchable wildlife opportunity as a primary concern. Four or fewer people identified the other issues presented (game damage, vehicle collisions, competition with other game species, competition with livestock, or other) as primary interests.

Twenty eight of the thirty four respondents indicated that hunting would be a reason for increasing or decreasing the size of the moose population in M-5, and twenty two said that watchable wildlife opportunity would also be a reason for increasing or decreasing the herd size. Between two and six respondents identified one or more of the following as a reason to increase or decrease the moose population in M-5 (game damage, vehicle collisions, competition with other game species, competition with livestock, or other).

Twenty eight of the thirty four respondents identified 300 – 400 moose as the preferred population size objective. Only one respondent selected 100 – 200 and five selected 200 – 300.

Twenty four of the thirty four respondents selected quality as the preferred method of managing antlered harvest, while five selected opportunity and six selected trophy.

Public Written Input

- I fear the DOW may move toward “single resource” management. The resulting management emphasis, ignoring existing uses and other resources is wrong. The DOW has a tendency to promote management of whatever is most favorable or politically advantageous. Please keep in mind that water development, logging and grazing have been actively pursued for over 100 years, and have helped provide the habitat you currently work with. The elimination of traditional uses to promote only wildlife will surely fail. The same issue applies to recreation, whether motorized or nonmotorized. Winter range for all big game species remains the critical factor. Unfortunately, this is the issue the DOW seems least willing to work on with land owners and the developers which are running all of us out.
- I think Colorado DOW does a great job maintaining the state’s wildlife!
- The Division of Wildlife seems to be doing a good job with establishing and growing a moose herd in this area. Most of the people I talk to are very excited about the moose and waiting to catch a glimpse of one and finally get to apply to hunt them. I think the Division of Wildlife has done a great job reassuring those opposed to moose. Even thought ranchers maybe will think they are [*illegible*] some grazing, it is the public [*illegible*] to honor the interests of sportsmen and especially wildlife watchers also. There is more to life than eating beef.

- I believe the Grand Mesa is a good location for a reasonable quantity of moose however; the Crystal River drainage is inviting much more risk of vehicle/moose collisions. Also "reasonable" is a relative term. Moose numbers should be held at a level where livestock grazing is not adversely affected by livestock grazing should more seriously be looked at too as there are many areas of the Grand Mesa that are heavily overgrazed in riparian areas and have been so for many years prior to the moose transplants.
- Need signing in moose areas warning of moose crossing Highways. Need signs "Do Not Approach Moose" in areas where moose are frequently seen. DOW does a great job of managing the state's wildlife resources using sportsman's dollar. "Bringing back the natives" is a great mission and bring back moose is a great start along with the lynx re-introduction. Hopefully the wolverine and other will come in the future! Contrary to some thinking around wildlife deserves a big chunk of the habitat out there and should be given priority. The public land should not be overgrazed by domestic livestock with wildlife getting whats left! I think the habitat can support about three times the moose that are out there now. I would like to see more elk in the DAU but roads/Ohvs are a problem. The Forest Service is trying to close roads to keep elk on the Public land on the Mesa. This should help increase the elk carrying capacity. Keep up the Good Work!
- How will females be managed when objectives are reached? Transplant stock? Will moose season occur along with normal deer and elk season or a special time? I would prefer that moose hunt would occur between archery and 1st rifle season. It would be nice for the few moose hunters to not need to deal with all the normal big game hunters. I prefer alternatives 5(c) and 6(b) plus the availability of a female (cow) harvest.
- Great to have them back, I started asking if this was planned 5-6 years ago. It is great to see a lot of moose near Flaming Gorge. Moose tags: Reduced out of state hunting opportunities when hunting is opened. We need to help the average sportsman/person who cannot spend 1-15K+ to hunt. Private land tag "black market" or resale 1-10x, needs to be stopped. Guides *[illegible*] are also driving away the regular sportsman/person while most guides are honest, they are there to [*illegible*] the success of their customers, and…
- I'm a hunter, and I want to know that if I've burned all my points and got a Grand Mesa bull moose tag, that I'll have a good chance at a trophy moose.
- Regarding maximum opportunity, I am torn between that and quality
- #5(d) I think that the carrying capacity on the Grand Mesa and Battlement Mesa is higher than 300 – 400 moose. This carrying capacity is closer to 500 700 as the moose move out of their relocation zones. I live on Kannah Creek (3.5 miles from the city intake) and have sighted moose on mine and my neighbor's property twice in the last 40 days. The animals are exploring the surrounding habitat and will soon define a suitable range greater than what's expected. Rick Dujay, PhD., Zoologist/Mammalogist, Mesa State College, Dept. of Bio.Sci.
- Opportunities to see wildlife encourage people to get outdoors. On our last camping trip to the Grand Mesa our group saw a moose and has not stopped talking about it. The mosquitoes were bad but the moose sighting made up

for it. I am a hunter but would not be interested in hunting moose. I am also not concerned about competition between elk, deer, moose, and cattle since moose seem to prefer feeds that differ from the others.

- We are residents and taxpayers in Mesa County. We are writing to express our support for Option C (300 – 400) moose on the Grand Mesa. We believe that an increase in the moose population would benefit all users of the Grand Mesa, from tourists to landowners/ranchers and hunters. We have camped and enjoyed spending time on the Grand Mesa for many years. An increase in the moose population would make our visits more enjoyable year round. Thank you for this opportunity to share our comments. Please pace our names on your list of interested parties and keep us informed of your progress. Thank you. Keith & Rachael Davis [*illegible*], 31962 Stone Tree Lane, Whitewater, CO 81527.
- I feel that CDOW has done an excellent job in managing the wildlife in Colorado. We have excellent elk and deer opportunities for both viewing and hunting and buck and bull a much larger than 20 years ago! I look forward to being able to view Moose on the Mesa! One problem I have with the DOW regulations or muzzleloading the inline or other muzzleloaders that use high ignition primers (shotgun) should be banned-the spirit of "going back" in [*illegible*] is what makes a "black powder" hunt fun - the modern and high tech primers (electronic and shotgun primers) take away from the sport- Again thanks for the opportunity.
- Looking forward to seeing Moose in the Crystal River Valley. The area around Redstone and Marble would offer excellent viewing opportunities.
- Great Job! Bring on more moose! Greg Wisener Aspen, CO.
- Enjoyed the meeting on the 25th-we like to get updates on our wildlife. We appreciate all that the DOW does-we love the wildlife that is around us. Thank you.
- Stephanie, My goal would be the maximum number of moose without game damage issue. Similar to North Park @ 2/3 of carrying capacity. I don't really have a strong feeling on the hunting approach-It should fit with your statewide plan/opportunities. Thanks for getting Moose on the Mesa. CDOW did a great job. Roger Shenkel.
- At first should try to carry moose @ near max. capacity then reduce herd size through hunting if need exists. I feel that moose are a wonderful addition to these areas. I am pretty familiar with all of these lands. Born and raised in Carbondale and have hunted all units except 41. The carrying capacity for moose should be a pretty large number because the competition with deer and elk is minimal and the areas contain good moose habitat. I think the DOW should aggressively pursue a large capacity of moose and try to start hunting opportunities ASAP. I will definitely be trying to draw yearly.
- STEPHANIE, MOOSE HUNTING WOULD BE A ONE TIME EVENT FOR ME. I WOULD PREFER TO BE HUNTING FOR QUALITY, NOT QUANTITY. THANKS, STEVE H. (*received via email*)

MESA STATE COLLEGE
Biological Sciences
1100 North Avenue • Grand Junction, CO 81501-3122
Phone (970) 248-1993 • FAX (970) 248-1700

August 22nd, 2008

Wildlife Commission
c/o Stephanie Duckett, Terrestrial Biologist
Colorado Division of Wildlife
711 Independent Avenue
Grand Junction, CO 81505

Dear Commission,

First of all, thank you for re-introducing moose to the Grand Mesa and the Crystal River Valley and for taking the time to consider the management of these spectacular animals so carefully. As a citizen who enjoys spending time outdoors hiking and camping, the greatest benefit for me from the re-introduction has been the chance to see moose thriving in this area—that is, the "watchable wildlife" aspect has been extremely valuable to me and to my family.

However, as an animal biologist who specializes in molecular genetics, my concerns have to do more with the long-term health of the animals from a population-genetics perspective. In other words, I believe that the survival of the moose for generations to come is dependent upon keeping the highest level of genetic diversity in the gene pools that have been introduced. High genetic diversity helps to ensure that moose populations will survive even if environmental pressures such as parasites rise in frequency in the populations. In other words, this variation would allow for some individuals to survive and reproduce successfully (those who, by chance, show greater resistance to pathogens such as parasites as determined by their genetics) while others may succumb to disease. As you probably know, if every individual in the population were genetically identical to one another, the entire population would perish in the face of such a pressure.

In addition to the question of survival, it is also important to consider the diversity of overall morphology. If a single size category of individuals (for example, large males) were routinely taken out of the population prior to breeding (due to hunting), they will not have a chance to contribute their genes to the pool. Over several generations, then, the average size of the individuals on the Mesa and in the Crystal River Valley would decrease dramatically. Similar phenomena have been documented for other organisms whose take has been limited to the largest individuals in the population, particularly in small populations. Small populations show higher rates of evolution and are far more vulnerable to loss of genetic diversity than are large populations due to genetic drift.

I realize that as you balance the concerns of the many citizen groups involved, it may be difficult to keep the maintenance of genetic diversity as a priority. So, I completely understand if you are not able to employ the following recommendations:

(1) In order to increase the number of actively breeding individuals and further insure against the loss of genetic diversity that occurs in small populations due to genetic drift, continue to allow the populations to grow to a larger size (approximately 300-350 individuals). Design a hunting policy that severely limits the take of breeding individuals until the population begins to exceed 300.

(2) In order to increase the breadth of genetic diversity and insure against catastrophic loss due to environmental pressures such as pathogens, introduce moose from populations that are not too genetically similar to ones already introduced (for example, moose from Alaska).

(3) In order to keep the breadth of morphological diversity, implement a policy that does not allow for take until animals have had a chance to breed over several seasons. And, if possible, do not allow for excessive take of a single size category of animals year after year (especially if it impacts breeding).

I realize that the recommendations that I have listed above may fall outside of the alternatives that you have outlined in your Opportunity for Public Comment form. In fact, they may not be realistic to implement. As such, I have also included with this letter a completed comment form. In reference to Question 5, I have circled choice "c" which specifies 300-400 moose. In regard to Question 6, I have circled choice "c" which allows for the growth and maintenance of large sized individuals in the population. However, I would prefer a focus on maintaining the breadth of diversity rather than the continual take of the largest members of the population.

Again, thank you so much for taking input from the public. Please feel free to contact me if you have any questions.

Sincerely,

Aparna D.~Nageswaran Palmer, Ph.D.

APN Palmer

encl: Opportunity for Public Comment form

Moose are wonderful and interesting not just because of their size, but also because of their interesting anatomy and behaviors. Testimony at meetings referred to carloads of visitors passing by herds of mating/fighting elk in Estes Park just to watch a single moose graze on willows. The general public wants to be able to see moose (watchable wildlife). I estimate 100,000+ people "in Grand Valley alone" would strongly support the increased opportunity to enjoy watching moose. As I understand it, around 7,000 hunters have taken the trouble to apply for the approximately 60 licenses available in Colorado. The hunters definitely want "significantly more" moose. Is it right to let only 20 or 30 ranchers have a major say in how many moose should be in the eventual management plan, when most of them (from the meetings) are simply mad about deer and elk population management in past years? Moose are an entirely different kind of critter, and the majority spend most of their time on public land. They are easy to hunt, and ranchers that don't want them on their private land can make thousands of dollars by letting hunters harvest them.

In short, I am sure that the majority of people in western Colorado want lots more moose. They also want one or two small "no hunting" zones in heavily used areas like Mesa Lakes, Cottonwood Lakes, and the Island Lake area, where moose could be regularly observed.

The extremely conservative carrying capacity (using "only" willows to estimate potential populations) which was used in developing this management plan, leads me to believe that the 300- 400 level of the moose population would be an appropriate target population at this time. It would not be too many, and would not stress any aspect of the ecosystem, from everything that I have read and studied.

I have considered this from both the perspective of my job as a professional ecologist, with 36 years of field experience in this area, as well as from the educational and recreational advantages for the community and tourism, and believe that it is the "best choice".

Of the antlered harvest alternatives, I believe that the choice b) "Quality" alternative is the one the wildlife commission should select. This would "somewhat" increase the number of older, larger moose in the population, while still providing more hunters with the opportunity for licenses. With this alternative, a few more of those oldest, largest, smartest, and best adapted individual moose could be maintained in the population, to give them time to pass on their excellent genes.....without seriously affecting hunting license numbers. This make good "genetic sense".

Thank you for considering my opinion, and thank you for re-introducing moose on the Mesa!

Dr. Bruce Bauerle
Professor of Biology and Ecology
Mesa State College
Grand Junction, CO 81501
970-248-1684

Bruce Bauerle