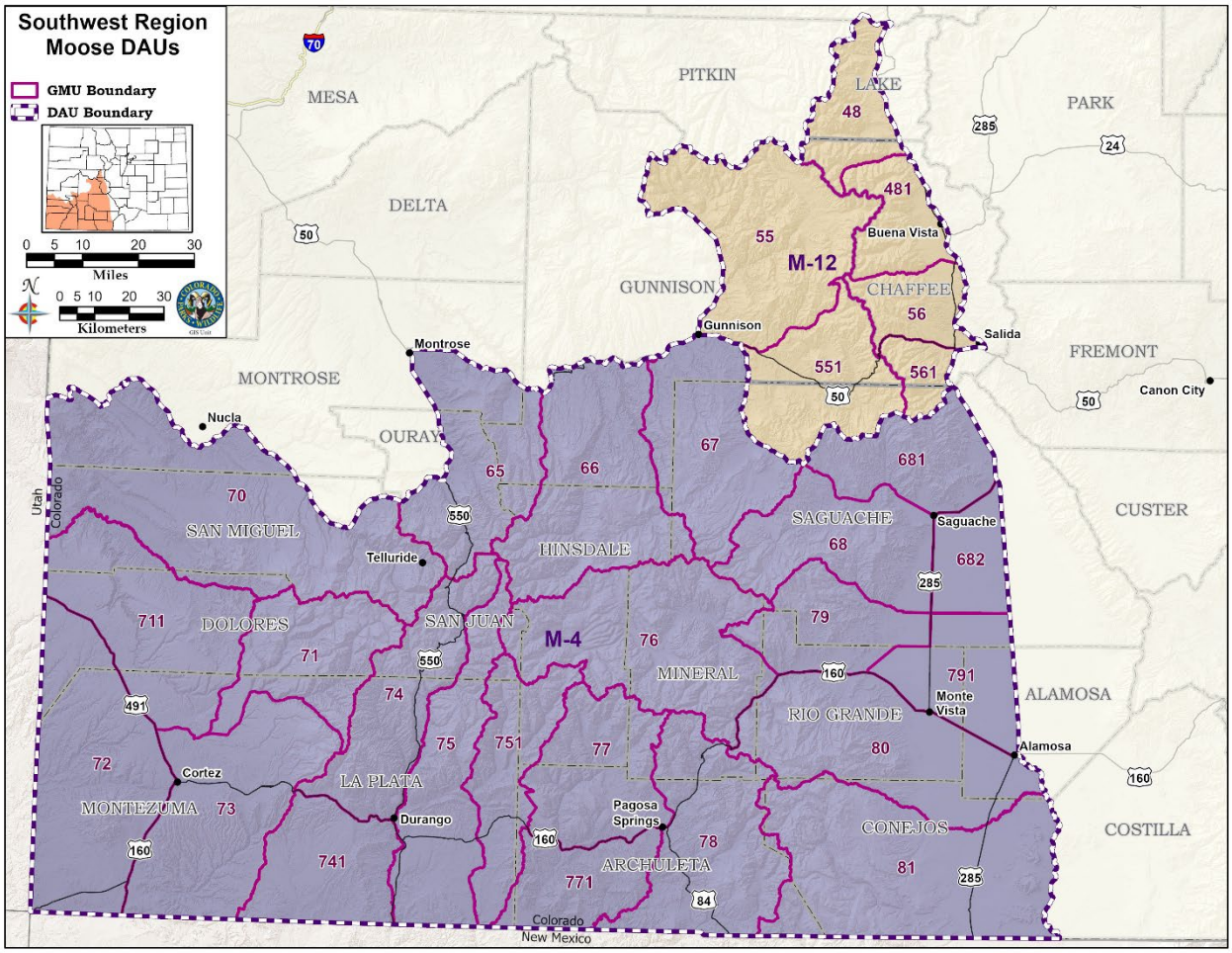
Moose (*Alces alces shirasi*) Herd Management Plans

Colorado Parks and Wildlife

Southwest Region



PREPARED FOR
COLORADO PARKS AND WILDLIFE

BY
SOUTHWEST REGION WILDLIFE BIOLOGISTS

This plan was approved by the Colorado Parks and Wildlife Commission on XXXX XX, 2026

Executive Summary

Moose (*Alces alces*), the largest member of the deer family and Colorado's largest mammal, can weigh between 800 and 900 pounds. The Shiras moose subspecies (*Alces alces shirasi*), the smallest subspecies of moose, inhabits Colorado and the broader southern Rocky Mountains.

There is recent evidence suggesting moose are native to Colorado (Taylor et al., 2026), though they likely occurred in low densities and were fundamentally absent by the turn of the 20th century until the late 1970s, when restoration efforts began. They were reintroduced to the northern tier of the state, where they likely made historic incursions from what is now WY and UT, and introduced to the southern tier of the state, where they likely never or rarely historically occurred. The first successful translocation occurred in 1978 with 24 moose relocated from Utah and Wyoming. Additional releases followed in 1987, when an additional 12 moose were relocated to the Laramie River Valley, and from 1991 – 1993, when 93 moose from Wyoming, Utah, and Northern Colorado were released in the Upper Rio Grande River Valley near Creede. Since 1993, moose populations have expanded across the state, with an estimated population of 3,500 individuals currently established in many densely forested parts of the state, drawing respect and admiration from residents, tourists, wildlife watchers, and big-game hunters alike.

Wildlife biologists, researchers, landowners and land management agencies, hunters, and wildlife watchers have put considerable resources and effort into establishing moose populations in Colorado. However, moose populations face significant threats, including habitat loss and fragmentation due to development on public and private lands, increasing recreation and the associated infrastructure, highways and fencing bisecting movement corridors, reduced forage quality due to invasive weeds, a warming and drying climate, disease, and the potential future impacts of gray wolf recolonization in Colorado. These threats are compounded by rapid human population growth across the state, complicating the task of ensuring healthy moose and other wildlife populations, resilient ecosystems, and functional wildlife habitats for generations to come.

Hunting and angling, and other wildlife-related recreation, contribute over $5 billion annually to Colorado's economy. Funds generated by big game hunting license sales are used in the conservation of Colorado's wildlife in numerous ways, including habitat improvement and conservation projects that benefit a diversity of species. In addition, Colorado Parks and Wildlife (CPW) and partnering organizations have initiated thousands of conservation easements to protect private lands from future development. CPW and partner organizations are also continually engaged with federal and state land management agencies and private landowners to promote habitat-improvement projects that benefit moose and other wildlife species. These ongoing efforts help ensure a future for moose and other wildlife in Colorado. Conservation of Colorado's big game herds and overall wildlife habitat protection are among CPW's highest priorities[1].

This document outlines Herd Management Plans (HMPs) for the two moose populations in Colorado's Southwest Region. Together, these herds represent approximately 650 animals (19% of the statewide moose population). This document will guide the management of the two moose populations occurring in the Southwest Region for a 10-year period, through 2036.

[1] https://cpw.state.co.us/Documents/About/StrategicPlan/CPWStrategicPlan.pdf

The primary purpose of HMPs is to establish management objectives for each herd in terms of a desired population size range and management metrics such as sex ratios or average age of harvested animals. Management objectives established in these plans must abide by statutes and policies set forth by CPW's Big Game Season Structure, CPW's Strategic Plan, the Parks and Wildlife Commission, and the Colorado State Legislature. The management alternatives selected in these plans will drive annual moose license-setting decisions. License-setting and the resultant annual harvest modulate moose population numbers to meet population and management objectives. Each plan also describes additional strategies and techniques that will be used to achieve the desired herd objectives. The goal for the 10-year term of these plans is to manage to the most appropriate population level within the objective range based on climatic patterns, habitat conditions, forage availability, and public desires. CPW may consider revisiting an HMP prior to the end of the 10-year term of the plan if outstanding circumstances arise and a revision is deemed necessary.

Local CPW staff have conducted extensive public and stakeholder outreach to inform the various proposed management objective alternatives for each HMP. Evaluation of newly available optional hunter satisfaction data from annual hunter harvest surveys, as well as meetings with the public, local governments and organizations, and other stakeholders, have guided the development of these plans and management alternatives. In addition, the draft plan was posted on the CPW website and advertised with press releases from July 10, 2025 – August 31, 2025, for another public comment period to evaluate the proposed objective alternatives. The draft plan was presented to the Parks and Wildlife Commission on July 17, 2026, for final review and comment, and was formally approved on Month Date, 2026.

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Introduction and Purpose

Colorado Parks and Wildlife (CPW) manages big game for the use, benefit, and enjoyment of the people of the State following CPW's Strategic Plan (2026), as well as mandates from the Colorado Parks and Wildlife Commission (PWC) and the Colorado Legislature. As human populations and land-use pressures increase, the effective management of Colorado's wildlife requires increasingly careful and adaptive strategies. CPW uses a "Management by Objective" approach to managing the State's big game populations (Figure 1).

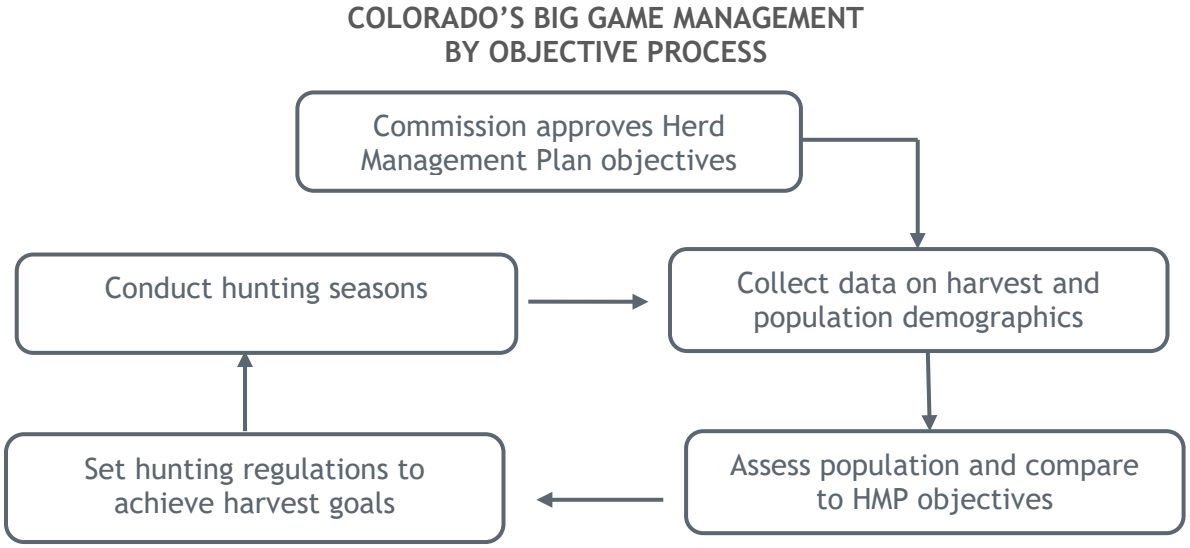


Figure 1. Management by Objective process used by Colorado Parks and Wildlife to manage big game populations by Data Analysis Unit (DAU).

Each big game herd in Colorado is managed within a Data Analysis Unit (DAU), a defined geographic area that encompasses the year-round range of a herd, including where most animals are born, live, and die. DAUs are delineated to minimize movement between neighboring herds and are often subdivided into Game Management Units (GMUs) to better distribute hunters and manage harvest pressure.

The primary purpose of an HMP is to establish long-term management objectives for each DAU, including population size targets and management metrics such as the average age or size of harvested bulls. HMPs also outline the strategies and tools CPW will use to meet these objectives. During the HMP planning process, CPW solicits and collects public input through questionnaires, public meetings, and comments to CPW staff and the PWC. CPW's mission as wildlife stewards is integrated with the concerns and ideas of various stakeholders, including the United States Forest Service (USFS), the Bureau of Land Management (BLM), the State Land Board (SLB), Southern Ute Indian Tribe (SUIT), the Ute Mountain Tribe (UMT) the Habitat Partnership Program (HPP), city and county governments, local chambers of commerce, private landowners, agricultural producers, hunters, guides and outfitters, and the public. In preparing an HMP, agency personnel attempt to balance the biological capabilities of the herd and its habitat with the public's demand for wildlife recreational opportunities. HMPs are approved by the PWC and are reviewed and updated approximately every 10 years.

The purpose of these HMPs is to set estimated population and management metric objectives for moose populations in southwest Colorado from 2027-2036, with the expectation that they will be reviewed and updated in 2036.

Collaboration with Stakeholders

Wildlife management is affected by many environmental and external anthropogenic factors, often with no easy solutions, and requires collaboration, compromise, and shared stewardship. CPW will remain engaged with various stakeholders, including local and Tribal governments, federal land management agencies, private landowners, local land conservancies, conservation organizations, hunters and wildlife enthusiasts, and others, to proactively manage Colorado's natural resources and wildlife habitats. These relationships and collaborations ensure big game and other wildlife remain across Colorado's landscapes for generations to come.

Colorado would not be the same without its iconic big game herds, and it is incumbent upon the citizens of Colorado to altruistically work together to promote the continued existence of big game and other wildlife. By protecting and enhancing big game habitats, we ensure a future for many other wildlife species and maintain some of the wild places and spaces that make Colorado unique.

Public Involvement

There are two moose DAUs in southwest Colorado, M-4 and M-12. The following section comprises the individual moose Herd Management Plans for these two populations with proposed objectives and justification. Meetings and stakeholder outreach have occurred throughout southwest Colorado to collect input on the status of local moose populations and management concerns and provide direction for future management. The plan has been presented to the Southern Ute and Ute Mountain Ute Tribes, county commissioners, local Habitat Partnership Program (HPP) committees, and federal agencies for additional input. All input is collected and provided in the following Appendices. The draft plan was posted and accompanied by press releases for the public to provide additional comments on the proposed objectives for each DAU from July 10, 2025 to August 31, 2025 (Appendix B, on page 33). The final draft plan was presented to the Colorado Parks and Wildlife Commission in July 2026 and formally approved in September 2026.

The Brunot Agreement of 1873

In 1873, the confederated bands of Utes ceded a large portion of their 1868 reservation to the federal government under a treaty commonly known as the "Brunot Agreement." This ceded area – or "Brunot Area" – is approximately 3.7 million acres of the San Juan Mountain region of southwest Colorado and overlaps with the M-4 moose population (Figure 2). Contained within the 1873 Agreement was an important provision reserving for the Utes the right to "hunt upon said land so long as the game lasts and the Indians are at peace with the white people." Despite the continued loss of lands, the corresponding reduction in the size of the Ute reservation, and the relocation of certain Ute bands outside of Colorado – this reserved right within the Brunot Area has remained undiminished to this day.

In 2008, the Southern Ute Indian Tribe entered a new agreement – this time with the State of Colorado – addressing the Tribe's exercise of its long-held Brunot Area hunting and fishing rights. The Ute Mountain Ute Indian Tribe entered into a similar agreement with the State of Colorado in 2013. These agreements – or Memorandums of Understanding (MOUs) – detail how the Tribes and State approach Brunot Area hunting, fishing, and wildlife law enforcement,

and expresses the intent of Tribal and State governments to work cooperatively towards the long-term conservation of wildlife within the Brunot Area. With the completion of the MOUs, Tribal Members can exercise the Tribe's long-held rights to hunt and fish within the Brunot Area in accordance with regulations established by the Tribes and State.

Working in tandem with our Tribal neighbors is of utmost importance to CPW as we cooperatively manage wildlife species, including moose. Annual meetings, harvest reporting, and open communication have allowed CPW and the Tribes to collaborate on population and harvest monitoring in the co-managed Brunot Area. The partnership between CPW and the Tribes is critical for future wildlife conservation in southwest Colorado (see Appendix A: Southern Ute Indian Tribe Comment Letter, on page 31).

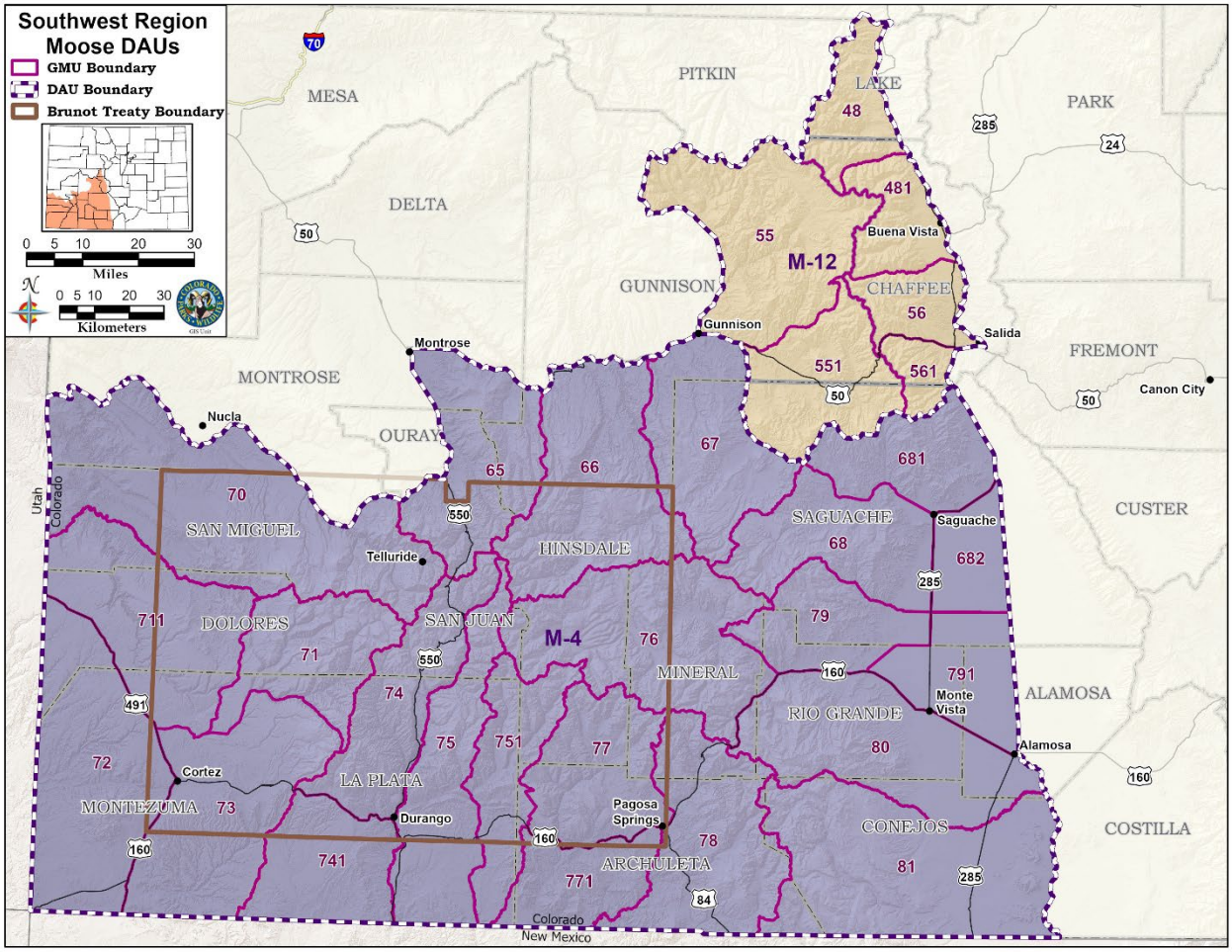
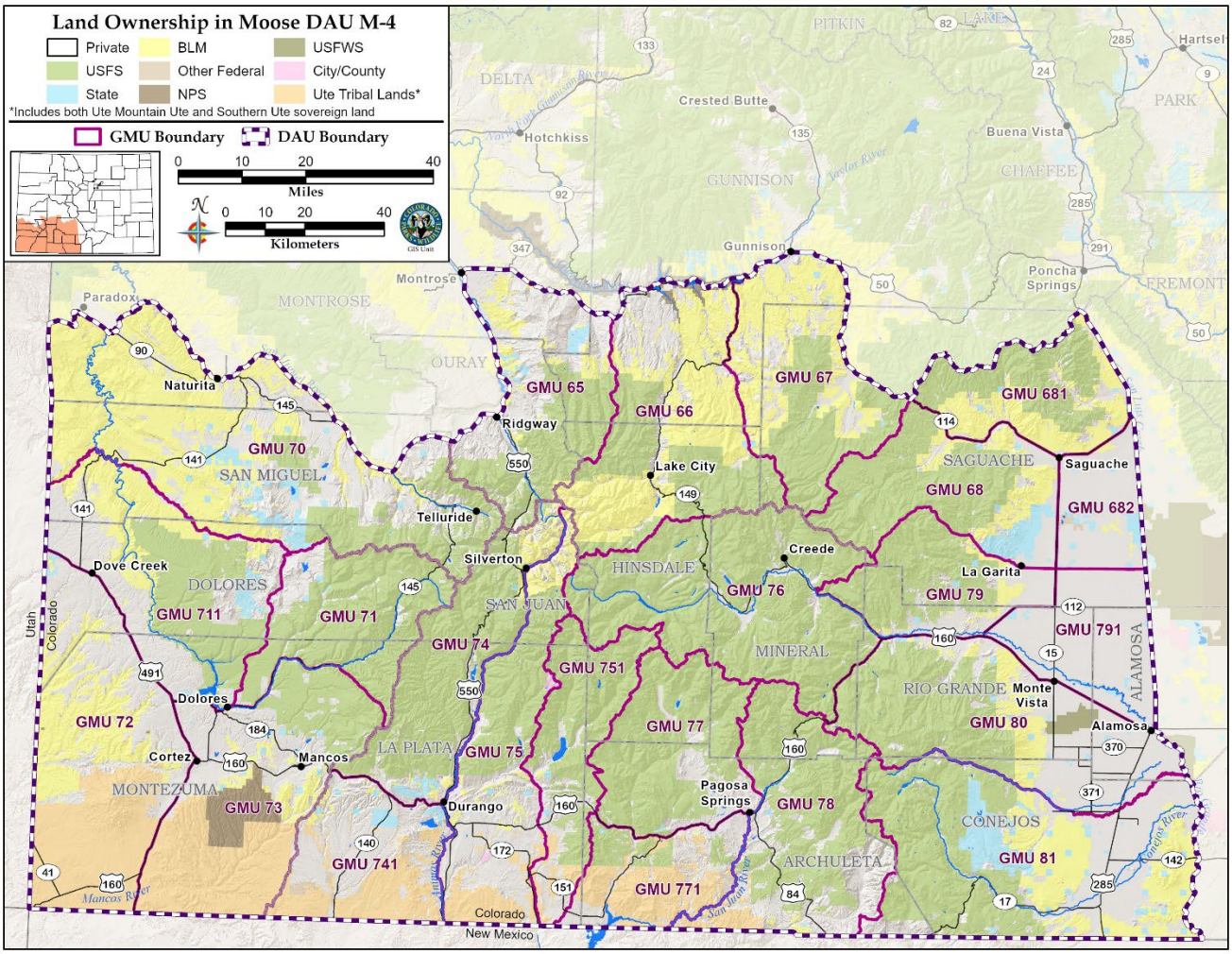


Figure 2. The Brunot Treaty area, established in 1873 as an agreement between the Southern Ute Indian Tribe, Ute Mountain Ute Indian Tribe, and the US Government preserving hunting and fishing rights for Ute tribal members.

SOUTHWEST COLORADO MOOSE HERD MANAGEMENT PLAN
DATA ANALYSIS UNIT M-4
Brent Frankland, Wildlife Biologist, Monte Vista

GMUs: 65, 66, 67, 68, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 681, 682, 711, 741, 751, 771, and 791 **Last HMP Approved Year: 2005**
Post-hunt Population: Previous Objective: 350-500; 2025 Estimate: ~500 moose. **Preferred Alternative: Maintain an increasing population, currently estimated at approximately 500 moose.**
Preferred Alternative for the Age Structure of Harvested Bulls: 4 to 6 years of age and Antler Spread exceeding 40 inches.



Current Population Estimate: The M-4 moose population is currently estimated at approximately 500 animals throughout all the Game Management Units (GMUs) in the M-4 Data Analysis Unit (DAU).

Population Objective: Currently, there are no efficient inventory methods available for moose in Colorado, and Colorado Parks and Wildlife (CPW) does not conduct modeling efforts on the M-4 herd. Thus, lacking the usual ungulate management procedures, this population will be managed to (1) Maintain a healthy and viable population of moose while avoiding excessive damage to riparian areas; (2) allow for hunting opportunities for bulls and cows, while simultaneously maintaining high productivity in the herd; and, (3) provide adequate opportunities for recreational viewing. CPW proposes maintaining an increasing population while simultaneously working collaboratively with federal partner agencies to monitor human social tolerance and habitat conditions to avoid conflicts and ecological degradation. Management flexibility around a population of more than 500 moose (post-hunt) in M-4 should allow CPW to achieve the preferred objectives. An upper population objective number is unknown, as moose continue to expand throughout the DAU. Nonetheless, CPW will assess the upper objective constraint based on indications from various sources. The most significant source pressures are likely to come from human social tolerances of moose and reductions in habitat quality, indicating limitations in carrying capacity. CPW will provide additional hunting licenses as moose populations continue to expand into GMUs that are not already hunted within the DAU. CPW may adjust the population objective for the socially tolerable and habitat-conducive numbers suitable for the DAU's estimated carrying capacity.

Average Age of Harvested Bull and Average Antler Spread Objective: Moose hunting opportunities in M-4 are generally considered "once-in-a-lifetime" opportunities, and CPW exerts a conservative approach to allocating these licenses for bulls and cows in the different GMUs where hunting is permitted within the DAU. CPW proposes maintaining an average age of four to six years for harvested bulls based on a three-year rolling average. In combination with age, CPW also proposes maintaining an average antler spread greater than 40 inches in harvested bulls for hunter desires and satisfaction, thereby resulting in a mature bull population. The objective will be to sustain the harvest of mature bulls with high-quality hunting opportunities by maintaining an average age of harvest, conjointly with the average antler spread. CPW will implement cow licenses or adjust current cow license numbers accordingly when the population is believed to be increasing, the hunting opportunities can be sustained, or rising human conflicts occur. During mandatory checks of harvested moose, CPW staff collect a tooth sample for aging and antler measurement data to build a repertoire of scientific data over time. CPW will not have a sex ratio objective for this HMP, as the data is not accurately collected or available since the agency does not model the M-4 moose herd.

Changes from recent management: Moose in southwest Colorado have been dispersing and increasing in population size following a series of transplants in the early 1990s. The southwest Colorado transplants occurred subsequent to the success of the moose transplants occurring in northern Colorado beginning in the 1970s, with hunting first permitted in the current M-4 GMUs in 1999. CPW and land management agencies established an initial population goal of approximately 350 moose in the Upper Rio Grande Basin. Since then, moose numbers have increased, and they are now distributed throughout the DAU.

Description of Data Analysis Unit (DAU)

The Data Analysis Unit (DAU) M-4 moose population comprises twenty-three Game Management Units (GMUs): 65, 66, 67, 68, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 681, 682, 711, 741, 751, 771, and 791. Eleven of the GMUs are open for hunting (65, 66, 67, 68, 74, 75, 76, 77, 79, 681, and 751) while the rest remain unhunted. The DAU encompasses a large portion of southwest Colorado on both sides of the Continental Divide, totaling approximately 16,050 square miles, with roughly 2,400 square miles of suitable moose habitat (Figure M4-1). Moose habitat was determined using habitat selection models with GIS software. Portions of Gunnison, Hinsdale, Mineral, Rio Grande, Saguache, and San Juan counties make up the entire area. Approximately 62% of the DAU is public land, about 3% is owned by the Southern Ute Indian Tribe, roughly 4% by the Ute Mountain Ute Indian Tribe, and 30% is privately owned. The DAU includes the Rio Grande, San Juan, and Gunnison National Forests.

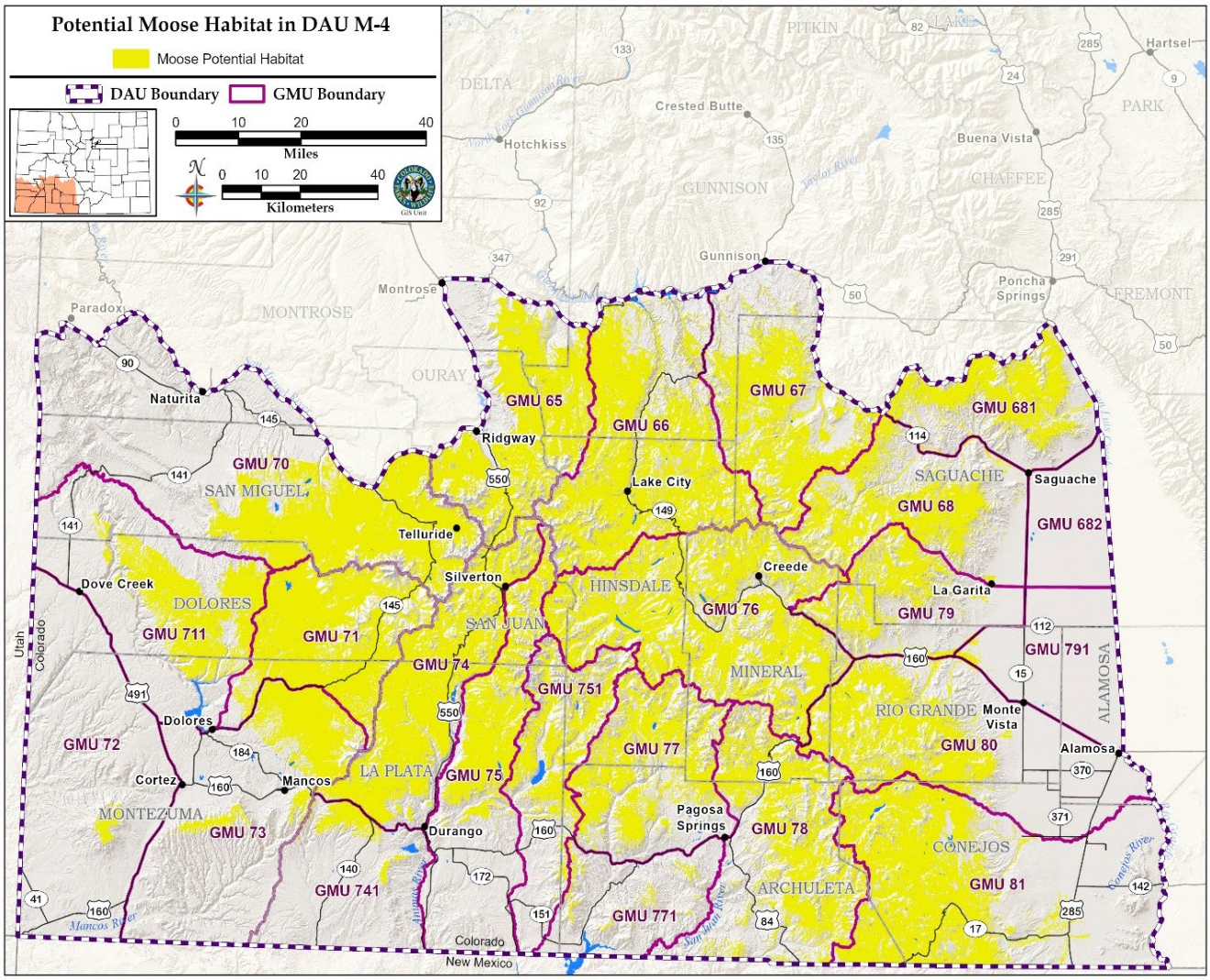


Figure M4-1. Potential moose habitat throughout DAU M-4.

Background Information

There is recent evidence suggesting moose are native to Colorado, though they likely occurred in low densities and were fundamentally absent by the turn of the 20th century (Taylor et al., 2026). Moose sightings in Colorado have been observed anecdotally for the last 100 years or more, primarily along the borders with Wyoming and Utah. Moose populations in southern Wyoming and northern Utah likely contributed to some natural immigration into Colorado in the past. The first intentional moose transplant into Colorado occurred in 1978 when 12 moose were released in the North Park area of Jackson County. A second transplant, consisting of 12 moose, occurred in 1979 in the same region. Following these releases, the moose began to disperse and increase in number. By 1985, CPW estimated the North Park herd had grown to approximately 100 animals, prompting the issuance of hunting licenses for the area.

The introduction of moose to southwest Colorado was initially proposed in 1976 for the Gunnison Basin area, but it was deferred due to objections from local livestock managers. Subsequently, in the early 1990s, following the success of the North Park moose population, CPW and land management agencies approved the transplant and release of approximately 100 moose from North Park, Colorado, as well as from Utah and Wyoming, to the South San Juan Mountains. In addition, the preliminary population objective was set at 350 or more moose at that time.

In 1999, CPW introduced limited hunting of the M-4 herd in GMUs 76 and 66, with high demand for these licenses. In 2003, the agency established a specific hunt code for the Weminuche Wilderness Area (extending into GMUs 77 and 751) to enhance backcountry hunting and improve hunter distribution. In 2015, CPW issued the first bull moose license for GMU 65 to address increased moose numbers and distribution changes, partly due to the 2013 West Fork Complex wildfire near Creede, CO, which led to moose dispersing to new habitats. In 2020, the bull license in GMU 65 was converted to an either-sex, season-choice license to expand hunting opportunities when locating bull moose during rifle seasons is challenging.

The Southwest Colorado moose herd offers unique wildlife viewing opportunities for both residents and visitors to the state. While the exact economic impact is still being assessed, CPW anticipates that it will have significant fiscal benefits for local businesses.

Moose typically inhabit willow, mountain brush, aspen, or coniferous forests and habitats, making classification surveys challenging, unreliable, and expensive due to their low density, extensive range, and rugged terrain. Instead, population modeling using data collected from 1992 to 1997 from radio-collared moose in North Park, supplemented by recently updated opportunistic anecdotal data, may be an alternative option. The 1990s study reported an average of 52 calves per 100 cows, which may decrease with higher population densities. Like other wildlife, moose exhibit density-dependent characteristics (Ferguson et al. 2000). Survival rates were 94% for adult males and 84% for adult females, encompassing all mortality types, including illegal kills, roadkill, and natural causes.

Initially, within M-4, moose were transplanted only into the Upper Rio Grande drainage area in GMU 76. Following their release, they dispersed into neighboring GMUs, including 66, 75,

751, 77, and 79. Today, moose are located throughout south-central Colorado, on both sides of the Continental Divide, and now inhabit most of the GMUs within M-4.

The Brunot Agreement of 1873

In 1873, the Confederate bands of Utes ceded a large portion of their 1868 reservation to the Federal government under a treaty commonly known as the "Brunot Agreement." The ceded area, referred to as the "Brunot Treaty Area," spans approximately 5,957 square miles, with roughly 5,846 square miles situated within the DAU M-4 of the San Juan Mountain region in southwest Colorado, encompassing 36% of the DAU (Figure M4-2). Contained within the 1873 Agreement was a necessary provision reserving for the Utes the right to "hunt upon said land so long as the game lasts and the Indians are at peace with the white people." Despite the continued loss of lands, the corresponding reduction in the size of the Ute reservation, and the relocation of certain Ute bands outside of Colorado – this reserved right within the Brunot Area has remained undiminished to this day. In 2008, the Southern Ute Indian Tribe entered a new agreement – this time with the State of Colorado – addressing the Tribe's exercise of its long-held Brunot Area hunting and fishing rights. The Ute Mountain Ute Indian Tribe entered into a similar agreement with the State of Colorado in 2013. These agreements – or Memoranda of Understanding (MOUs) – detail how the Tribes and State approach hunting, fishing, and wildlife law enforcement in the Brunot Area and express the intent of the Tribal and State governments to work collaboratively towards the long-term conservation of wildlife within the Brunot Area. With the completion of the MOUs, Tribal Members can exercise the Tribe's long-held rights to hunt and fish within the Brunot Area in accordance with regulations established by the Tribes and State.

Collaboration with Tribal neighbors is crucial for CPW in managing wildlife species, including moose that migrate across political boundaries. Through annual meetings, harvest reporting, and open communication, CPW and the Tribes work together on population monitoring, radio-collaring, habitat improvement, and wildlife connectivity. Tribal lands offer vital winter ranges and other critical seasonal habitats, making this partnership essential for the future of wildlife conservation in southwest Colorado. (see Appendix A: Southern Ute Indian Tribe Comment Letter, on page 31).

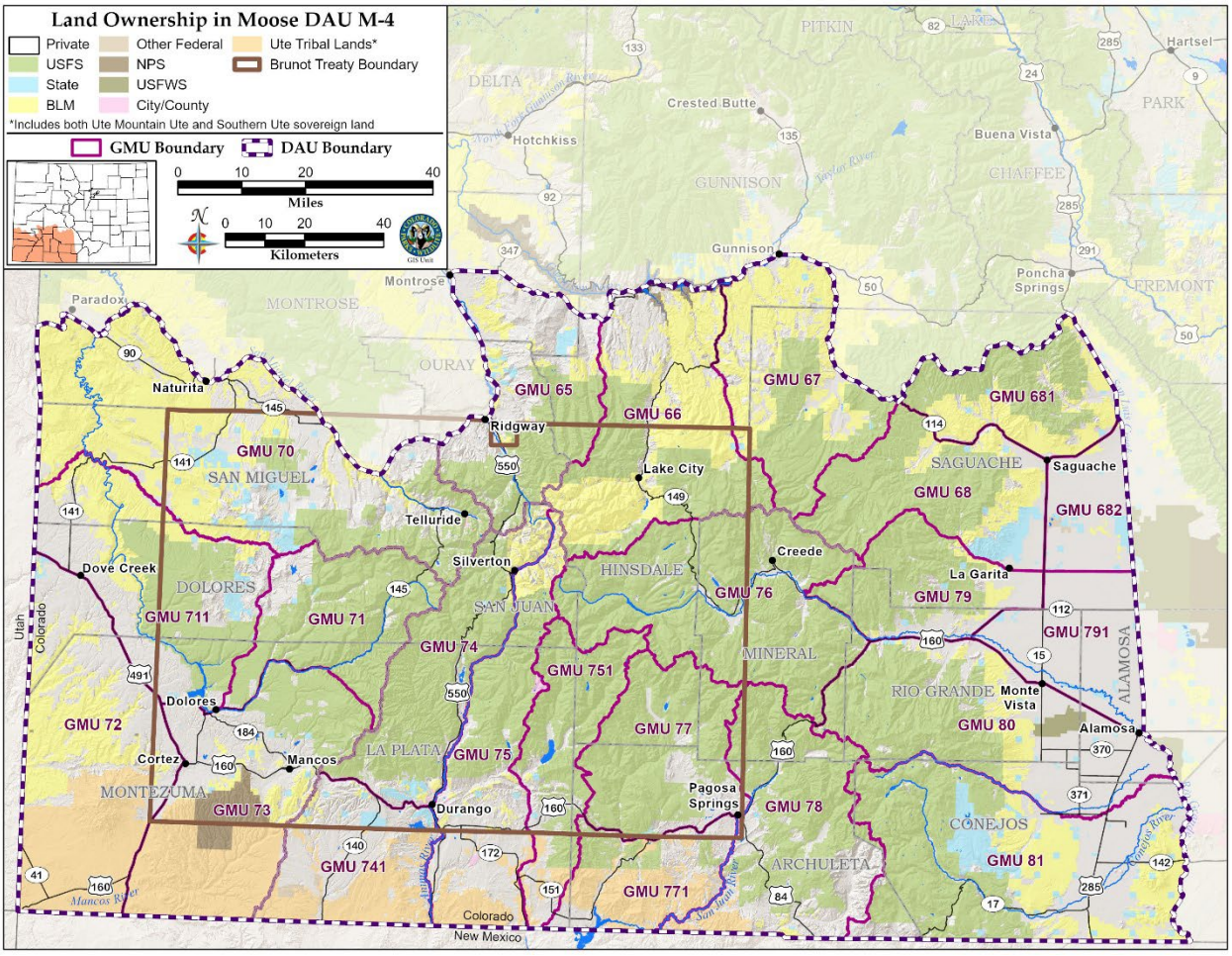


Figure M4-2. The Brunot Treaty area within M-4 was established in 1873 as an agreement between the Southern Ute Indian Tribe, Ute Mountain Ute Indian Tribe, and the U.S. Government, preserving hunting and fishing rights for Ute tribal members.

Management Considerations

CPW estimates the current moose population in M-4 at approximately 500 animals, primarily concentrated in GMUs 66 and 76, based on incidental observations by agency personnel, the public, harvest information, and observations gathered during big game helicopter surveys. Accurately estimating free-ranging wildlife populations across extensive geographic areas is inherently problematic, particularly in regions where species occur at low densities. Empirical studies have demonstrated that aerial and ground surveys have consistently yielded counts significantly below the actual population figures, even in controlled scenarios involving known populations of large ungulates confined within sizable, naturally vegetated enclosures. (Bartmann et al. 1986; Bowden and Kufeld 1995; Unsworth et al. 1994).

In North Park, Colorado, CPW developed a moose population estimate using winter helicopter surveys, but this method is unsuitable for the M-4 DAU due to differences in animal concentration, topography, and vegetative cover. Given the large area, budget constraints, resource limitations, and time restrictions, obtaining an accurate population estimate is currently impractical. Instead, data collected from wildlife observers, hunters, agency personnel, and federal land managers through random sightings can help indicate population

trends. Spreadsheet modeling may assist in evaluating population estimates. While the 1992-1997 radio-collaring study provided some population parameters, it was insufficient for long-term accuracy in modeling. CPW and other researchers have spent many years attempting to develop alternative management objectives for moose populations; however, they have mostly been unsuccessful. Bergman et al. (2025) stated that resource allocation towards managing different species is rarely uniform, and with moose being less abundant and more widespread than other big game ungulate species (i.e., elk, deer), investment in moose population management tends to be lower. Many methods do not account for sightability accuracy and may underestimate moose density, and detection of herds could be site-specific (Moll et al. 2023). The future use of GPS collars, drones, and other camera technology, combined with improved development of surveying techniques and integrated population modeling, could enhance population models for more precise management within the DAU's predetermined objective range.

CPW anticipates continued dispersal among younger moose within this population. Given the expansive nature of the DAU, incorporating multiple GMUs into a broader management area facilitates greater dispersal, resource availability, and flexibility in management.

Relative density is best assessed through habitat utilization and interspecific competition for forage resources within the habitat. Monitoring the impact of moose on plant communities, especially in riparian areas and willow or mountain brush stands, is likely essential for long-term herd sustainability. Nonetheless, to achieve herd recruitment sustainability and resiliency, the reproductive success of moose would likely be critical. Cook et al. (2013) assert that the reproductive success of all ungulates, though, is closely linked to nutritional intake. For moose, willow stands are an important forage source (Hayes et al. 2022). Hayes et al. (2022) also revealed that sites with higher willow nutrition, increased height, and cover had higher calving success on a population level, possibly resulting from simultaneously having food resources and protection from predators. Although willow habitat degradation and moisture retention are crucial for managing the M-4 moose herd, land management agencies have not consistently monitored these factors or had the necessary resources to do so.

In North Park, Colorado, post-release monitoring of radio-collared moose revealed mortalities in spring and summer, likely due to disease issues. In August 1998, a bull moose died from *Elaeophora schneideri*, a parasite that obstructs blood flow to the brain by infecting the carotid artery. Although Elaeophorosis is most commonly associated with mule deer, which are considered the predominant nonpathogenic carriers (Hibler 1982), it also affects elk and moose. Horseflies transmit the parasite, releasing the Elaeophorosis larvae on the head of the host animal, from where they migrate to the carotid arteries (Hibler and Metzger 1974). CPW has identified this pathogen in moose statewide; however, there is no evidence of higher prevalence in the north compared to the south (LeVan et al. 2013). The disease's impact on moose populations is uncertain but could influence population dynamics. If trained staff personnel are available during mandatory reporting, CPW collects carotid artery samples from harvested moose for Elaeophorosis testing.

Since their introduction to North Park in the 1970s and 1980s, illegal moose killings have been a statewide issue. In Middle Park (DAU M-3), illegal kills exceeded legal harvests from 1995 to 1999 (68 vs. 56). This problem is also prevalent in other western states. Hunters occasionally mistakenly identify moose as elk, especially when vegetation or shadows cast by trees

partially conceal the animals. Despite CPW's efforts to enhance hunter education through information campaigns and target identification programs, illegal killings continue.

Conflicts can occur when moose enter human habitats or when humans encounter moose in their natural areas. Bull moose can be aggressive during the rut, and cows with dependent young are also potentially dangerous. CPW cautions people to view moose from a distance and keep dogs restrained. If any moose displays unusually aggressive behavior without provocation, decisive action may be deemed necessary to immobilize and transport the animal, or remove it from the population; nonetheless, all cases will be handled individually. Moose are also known to damage ornamental shrubs around private homes. While CPW is responsible for big game damage to livestock and agriculture, the agency is not liable for damage to personal property.

Managing cow moose harvests may be necessary to control population size and balance demographic parameters. Since moose rarely form large groups, orphaned calves can face significant challenges. In Colorado, calves can generally avoid predation and secure adequate forage by four months of age, but orphaning can hinder their ability to reach the winter range, which may reduce calf survival rates. Maintaining a conservative number of bull licenses to support the breeding population can minimize late parturition and ensure cows are bred during optimal cycle periods.

The recolonization of wolves into Colorado could pose future management challenges for moose populations. Wolves are natural predators of moose, and their local presence could exert increased predation pressure, potentially impacting moose population dynamics and distribution. Consequently, CPW will monitor and evaluate hunting license allocation to ensure the ecological sustainability and viability of both species.

Habitat Conditions and Capability

Moose primarily inhabit forested and riparian areas within the DAU, but they have been observed across diverse habitats, including sagebrush lowlands in the north, oakbrush in the southwest, and alpine zones above 12,000 feet. Moose movement in the DAU remains more exploratory and is likely driven by resource availability. Although CPW initially thought moose would follow seasonal elevational migratory movements similar to deer and elk, the agency has since documented their presence at all elevations throughout the year.

Moose primarily forage in riparian areas, particularly willow-dominated drainages or hill sides, but they can be located in diverse habitats. Nonetheless, moose preferentially select willow over other forage when available (Renecker and Schwartz 2007). While they are occasionally seen in meadows during spring seeking fresh herbaceous growth, they usually avoid open areas and creek bottoms with high livestock use.

CPW and public land management agencies believe southwest Colorado has sufficient forage to sustain a significant moose population. Ensuring adequate forage and conserving sensitive moose habitat are important in maintaining population viability and managing density dependence. If moose become overly concentrated in smaller areas, CPW cautions of potential habitat degradation, especially in willow-bottom riparian areas.

Strategies for Addressing Issues and Achieving the Objectives

Although the direct inventory of the M-4 herd is generally impractical, CPW collects trend information through various means, including during big game helicopter surveys, volunteer ground counts, camera trap images, and anecdotal reports from hunters and recreationists. Additionally, mandatory harvest reporting, observations of bulls during hunting season, and recorded animal numbers and sizes provide insights into rudimentary age structure trends.

Effective modeling strategies for managing moose herds are limited, making it challenging to use population parameters effectively for management objectives. Therefore, anecdotal reports and winter survey observations are usually the most reliable sources of information on the moose population's status. Advancements in GPS and remote monitoring technologies are expected to enable more precise, real-time tracking of moose populations in the future, thereby enhancing CPW's understanding of their spatial distribution and seasonal movements and providing improved management.

Public Outreach

CPW Service Centers and Federal Land Agency Offices regularly receive reports from moose viewers, providing valuable information on sightings and viewer satisfaction. These facilities also offer educational materials to inform the public and address inquiries about moose behavior, population parameters, and ecology. Sometimes conflicts may arise among stakeholders, so CPW focuses on educational outreach to mitigate these potential disputes. Moreover, with limited moose licenses, CPW is able to send informational mailings to hunters who draw licenses.

CPW distributed a draft of the HMP document to federal land management agencies for their review and comments. The agency also sent the draft HMP to the Southern Ute and Ute Mountain Ute tribes for their assessment. Additionally, all Habitat Partnership Program (HPP) committees associated with the M-4 population evaluated the draft document and were given the opportunity to provide input. Furthermore, CPW made the draft HMP available online for more than 30 days to solicit public comments.

Management Recommendations

Given CPW's current limitations in conducting statistically robust monitoring and the potential inaccuracies of computer-generated population models for the Southwest Colorado Moose DAU, mandatory harvest reporting will remain vital in the management strategy. CPW intends to manage the M-4 moose herd according to realistic and feasible objectives based heavily on harvested animal data and reliable anecdotal observations. As part of the annual permit allocation process, CPW will consult with stakeholders to evaluate management objectives and adjust license quotas accordingly. The Colorado Parks and Wildlife Commission will provide final approval of these objectives.

If moose numbers become too high or the herd is not in balance with its habitat, several negative issues could arise, including reduced herd productivity, increased moose distribution into less desirable areas, and greater interspecific competition leading to habitat degradation

and forage depletion. Bergman et al. (2025) hypothesized that herd-level nutritional stress from degraded forage coincides with the capability of mature females' breeding success. Similarly, Boertje et al. (2019) established that moose populations with low nutritional availability are associated with delayed maturation and pauses in reproduction, which was later confirmed in Colorado (Bergman et al. 2025). To address these concerns and ensure sustainability, CPW will maintain the M-4 moose herd through adaptive management techniques. The most notable techniques the state agency will monitor collaboratively with land management agencies are human social tolerances and habitat quality. Population estimates will be based on public reports, hunter-harvest data, interagency cooperation, and annual habitat monitoring reports. Techniques such as habitat surveys, browse transects, exclosures, and tracking moose distribution and concentration should help assess and sustain desired moose numbers, thereby mitigating potential concerns.

Herd Objectives

In the early 1990s, CPW and land management agencies established an initial population objective of 350 moose for the upper Rio Grande drainage (GMU 76). By 1999, CPW determined that the population in GMUs 76 (Rio Grande National Forest) and 66 (Gunnison National Forest) had reached huntable levels and began issuing hunting licenses. GMUs 77 and 751, along with GMUs 66 and 76, form the current core units within the DAU. As moose distribution expands, increasing numbers have been observed in neighboring Game Management Units. While some riparian areas may experience high moose usage, excessive use is limited to localized regions. CPW proposes a managed population increase while collaborating with federal partner agencies to monitor social tolerance and habitat conditions, thereby mitigating potential conflicts and ecological impacts. While no definitive upper population objective has been established, **CPW's primary objective is to sustain a minimum of 500 moose** within the DAU, balancing consumptive and non-consumptive demands with habitat capacity and social public acceptance. The upper population objective constraint will be informed by ongoing assessments, with key limiting factors expected to include human-moose coexistence thresholds and habitat quality degradation, which may ultimately define carrying capacity.

Secondarily, CPW proposes a management objective **to maintain a sustainable harvest of mature bulls that balances ecological needs with high-quality hunting opportunities**. To achieve this, the agency will **manage for a harvested bull age structure of four to six years (based on a three-year rolling average) while ensuring that harvested bulls exhibit an antler spread exceeding 40 inches**. These combined metrics serve as indicators of population health, breeding success, and hunt quality, and they will guide adaptive license allocation decisions. If harvested bulls consistently fall below the four- to six-year objective or result in an antler spread of less than 40 inches for three or more consecutive years, CPW may reduce overall bull licenses or restrict bull hunting in specific GMUs where the metrics are suboptimal while maintaining opportunities in regions that meet the objectives.

Moose require a higher bull-to-cow ratio than other ungulates for optimal breeding, and hunters prioritize opportunities to harvest mature bulls. While precise sex ratio metrics are still being refined, antler spread serves as a reliable indicator of maturity. By integrating age and antler criteria into management objectives, CPW aims to balance ecological sustainability with the exceptional hunting experiences that define moose harvests in Colorado.

Colorado Parks and Wildlife will implement strategic adjustments to cow moose license allocations based on careful evaluation of biological and social factors. When population monitoring data demonstrates sustainable growth that can accommodate additional harvest pressure without compromising long-term herd viability, CPW will authorize increased cow-hunting opportunities. Similarly, in areas where rising human-moose conflicts necessitate active population management to maintain community safety and social tolerance, targeted cow license provisions may be implemented. These decisions will be informed by rigorous population assessments, habitat carrying capacity analyses, and stakeholder engagement, ensuring all adjustments align with CPW's adaptive management framework and broader conservation objectives. License modifications will be evaluated proportionally to anecdotally observed population trends and conflict mitigation needs, balancing ecological sustainability with responsible hunting opportunities.

Public Satisfaction

Moose viewing enriches visitor experiences and serves as a key motivation—whether primary or secondary—for many recreational visitors to Colorado, bolstering local economies. Although Colorado Parks and Wildlife (CPW) does not directly profit from non-consumptive users, such as wildlife watchers and hikers, these activities are essential to CPW's Mission and legislative mandate. CPW is committed to "perpetuating the wildlife resources of the state while providing enjoyable and sustainable outdoor recreation opportunities that educate and inspire current and future generations to act as stewards of Colorado's natural resources" (https://cpw.state.co.us/hunting/big-game/moose/conservation-and-management). The agency's mission directly supports both consumptive and non-consumptive recreation, ensuring diverse public engagement with wildlife.

Additionally, CPW manages moose hunting opportunities through the Colorado Big Game license drawing process (https://cpw.state.co.us/hunting/big-game/moose). Over the past decade, hunters have achieved high success rates, harvesting mature bulls and cows at rates exceeding 80%. To maintain a balanced approach, CPW evaluates public satisfaction through feedback from both hunters and non-consumptive recreational users gathered at CPW Service Centers and federal agency offices. This dual focus ensures that wildlife management aligns with the needs and values of all stakeholders.

Implementation

Hunting occurs across much of the M-4 DAU, but success rates may vary depending on the distribution of moose. The majority of the licenses are currently available in GMUs 66, 67, and 76, but this could change as moose continue to disperse and establish throughout the DAU. CPW will issue the appropriate number of hunting licenses to meet the herd management objectives outlined in this management plan. License numbers will be adjusted based on biological performance, forage pressure, and social considerations. CPW will collaborate with partner agencies and organizations to manage moose and conserve important habitats, such as riparian zones and willow stands. If the M-4 moose population continues to increase and expand, CPW anticipates offering more hunting opportunities.

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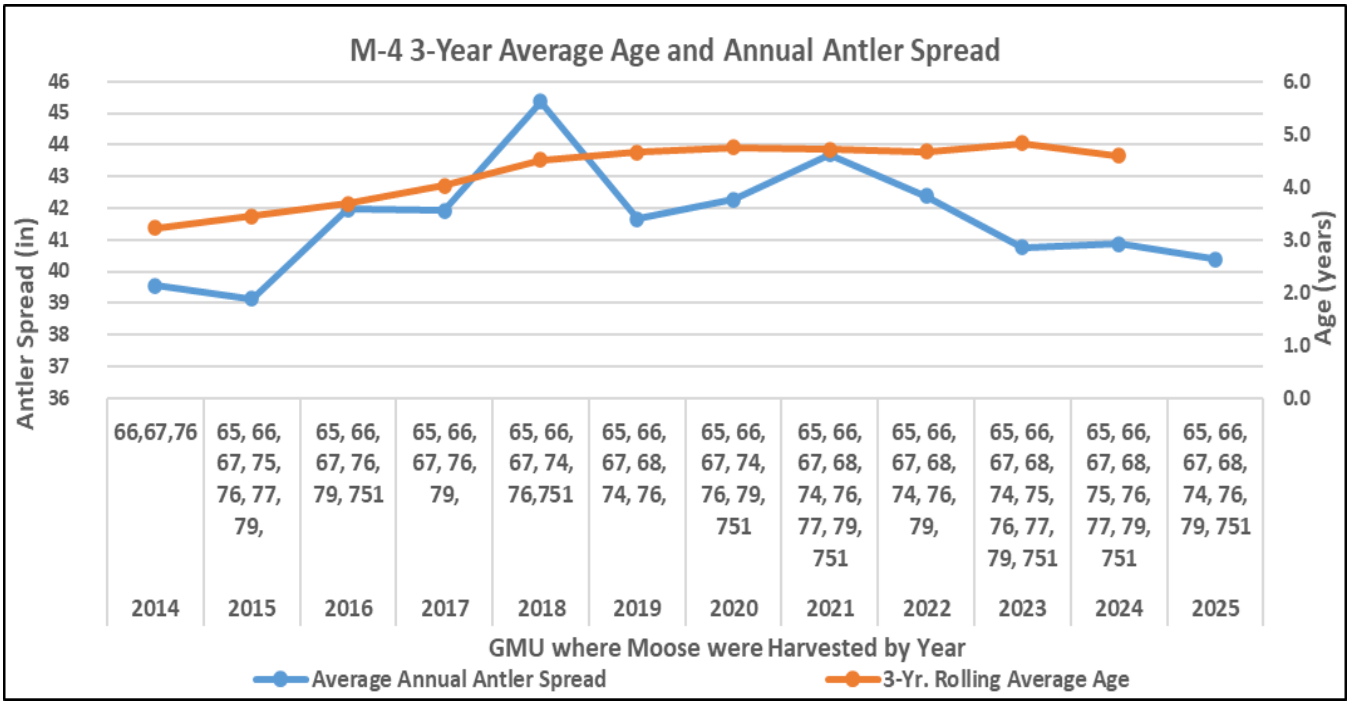
Appendix M4-A. Moose Capture and Releases in the M-4 geographic area.

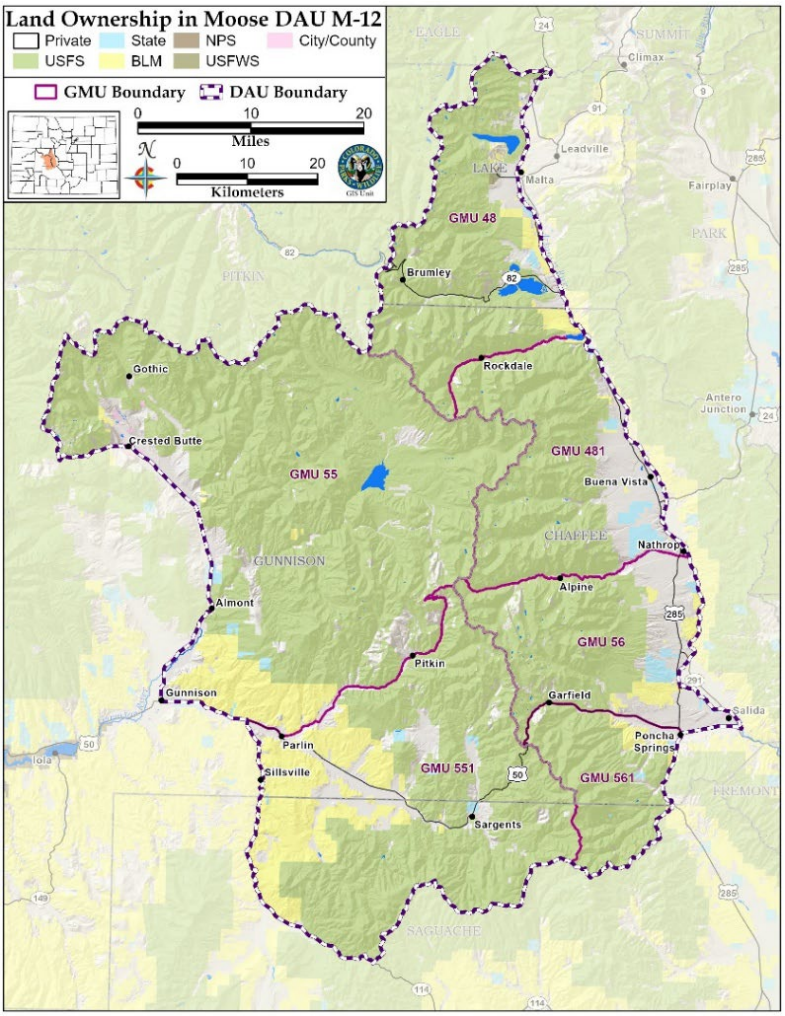
Appendix A M-4 Moose Trap and Release Locations, 1991-1993																
Year	Date	Subsp	Trap Site	Trap Region	Trap GMU	Trap DAU	Release Site	Release Region	Release GMU	Release DAU	Mature Bulls	Cows	Yrlng Bulls	Yrlng Cow	Calves	Total
1991	12/10-11/1991	Moose	North Park, CO	NW		1	North Clear Creek	SW	76	4		4			1	5
1992	1/1/1992	Moose	Utah				Willow Creek	SW	751	4		1				1
1992	1/28-30/1992	Moose	Utah				Willow Creek	SW	751	4	3	11	5		3	22
1992	1/30/1992	Moose	Utah				South Clear Creek	SW	76	4			1			1
1992	12/9/1992	Moose	North Park, CO	NW		1	Bellows Creek	SW	76	4	1	1	1		1	4
1992	12/9/1992	Moose	North Park, CO	NW		1	Miner's Creek	SW	76	4		2			3	5
1993	1/15/1993	Moose	Wyoming				Miner's Creek	SW	76	4		1			1	2
1993	1/12/1993	Moose	North Park, CO	NW		1	Goose Creek	SW	76	4		3			5	8
1993	1/12-13/1993	Moose	North Park, CO	NW		1	Spar City	SW	76	4	2	5	3		2	12
1993	1/13/1993	Moose	North Park, CO	NW		1	Bristol View	SW	76	4		2			1	3
1993	1/13/1993	Moose	North Park, CO	NW		1	Hogsback	SW	76	4		2			2	4
1993	1/13/1993	Moose	North Park, CO	NW		1	River Hill	SW	76	4	2	2			2	6
1993	1/13-15/1993	Moose	North Park, CO	NW		1	Browns Lake	SW	76	4	1		2			3
1993	1/13-15/1993	Moose	Wyoming				Browns Lake	SW	76	4		1			1	2
1993	1/15/1993	Moose	Wyoming				North Clear Creek	SW	76	4	4	7		1	3	15
1993	1/15/1993	Moose	Wyoming				South Clear Creek	SW	76	4	1	1	1			3
1993	1/15/1993	Moose	Wyoming				Santa Maria Reservoir	SW	76	4	2	2				4
1993	2/26/1993	Moose	Rifle, CO	NW		6	Santa Maria Reservoir	SW	76	4			1			1

Appendix M4-B. 3-Year Average Age and Average Annual Antler Spread of Bulls Harvested in DAU M-4. 2025 age report still pending.



SOUTHWEST COLORADO MOOSE HERD MANAGEMENT PLAN
DATA ANALYSIS UNIT M-12
Alyssa Meier, Wildlife Biologist, Gunnison

GMUs: 48, 55, 56, 481, 551, and 561 **Last HMP Approved Year: N/A**
Post-hunt Population: Previous Objective: (1) keep the population small enough to avoid excessive damage to willow stands; (2) maximize hunting opportunity for cows and mature bulls by maintaining high productivity in the herd; and (3) provide adequate opportunities for viewing. Estimate: between 100 to 150 moose. **Preferred Alternative: Maintain an increasing population, currently estimated at 125-175 moose.**
Preferred Alternative for the Age Structure of Harvested Bulls: 4 to 6 years of age and Antler Spread of or exceeding 40 inches.



Current Population Estimate: Approximately projected to be between 125 and 175 moose, with the Taylor River drainage containing the higher concentration of the western units of the DAU and more varied distribution throughout the eastern units.

Population Objectives: No efficient inventory method currently exists for moose in Colorado, and no modeling is conducted on this herd. Lacking those traditional management objectives, this population will be managed to: (1) keep the population small enough to avoid excessive damage to willow stands; (2) maximize hunting opportunity for cows and mature bulls by maintaining high productivity in the herd; and (3) provide adequate opportunities for viewing. CPW will provide additional hunting licenses as moose populations continue to expand into alternative GMUs within the DAU that are not already hunted. CPW may adjust the population objective for the socially tolerable and habitat-conducive numbers suitable for the DAU's estimated carrying capacity.

Average Age of Harvested Bull and Average Antler Spread Objective: Moose hunting opportunities in M-12 have been increasing over the years as moose populations have increased. In the early to mid-2010s, the Taylor River drainage (GMU 55) provided the main source of hunting opportunity within the DAU. However, as the population has expanded in the late 2010s, hunting opportunity became available in all GMUs within the DAU, with eastern units (GMUs 48, 56, 481, 561) providing additional opportunities for moose harvest. CPW proposes maintaining an average age of 4 to 6 years for harvested bulls based on a three-year rolling average of available harvest data. In combination with age, CPW also proposes maintaining an average antler spread of or exceeding 40 inches in harvested bulls for hunter desires and satisfaction, resulting in a more mature bull population. During mandatory checks of harvested moose, CPW staff collects teeth and antler measurement data to build a repertoire of scientific data over time. CPW will implement cow licenses or adjust current cow license numbers accordingly when the population is believed to be increasing and the hunting opportunities can be sustained, or when increasing human-moose conflicts occur. CPW will not use sex ratio objectives for these herds, as that data is not currently reliably inventoried or available.

Changes from recent management: Moose in the Sawatch Range of Colorado have been allowed to increase and disperse following a series of transplants to the south (Upper Rio Grande, in the early 1990s) and to the west (the Grand Mesa, in the mid 2000s). Recent population projections have ranges from 125-175 moose in the DAU with no previous population objective set for the unit by CPW or other land management agencies.

Description of Data Analysis Unit (DAU)

This Data Analysis Unit (DAU) includes six Game Management Units (GMUs): 55, and 551 in the Gunnison Basin, and GMUs 48, 481, 56, and 561 in the upper Arkansas Basin. These GMUs are located in central Colorado in the Upper Arkansas drainage on the east side of the Continental Divide in Chaffee and Lake Counties, and in the northern portion of the Gunnison Basin in Gunnison County. Generally, the DAU runs from Salida to Leadville west to Crested Butte and Gunnison (Figure M12-1). It encompasses 2,383 square miles, affording roughly 356 square miles of suitable moose habitat. It takes in portions of the Gunnison and Arkansas River drainages. The DAU encompasses two national forests, including the Gunnison District of the Gunnison/ Uncompahgre/Grand Mesa National Forest and the Pike/San Isabel National Forest. Land ownership composition in the entire DAU is 14% private, 76% U.S. Forest Service, 9% BLM, 1% Colorado State Lands, and approximately 2% other ownerships.

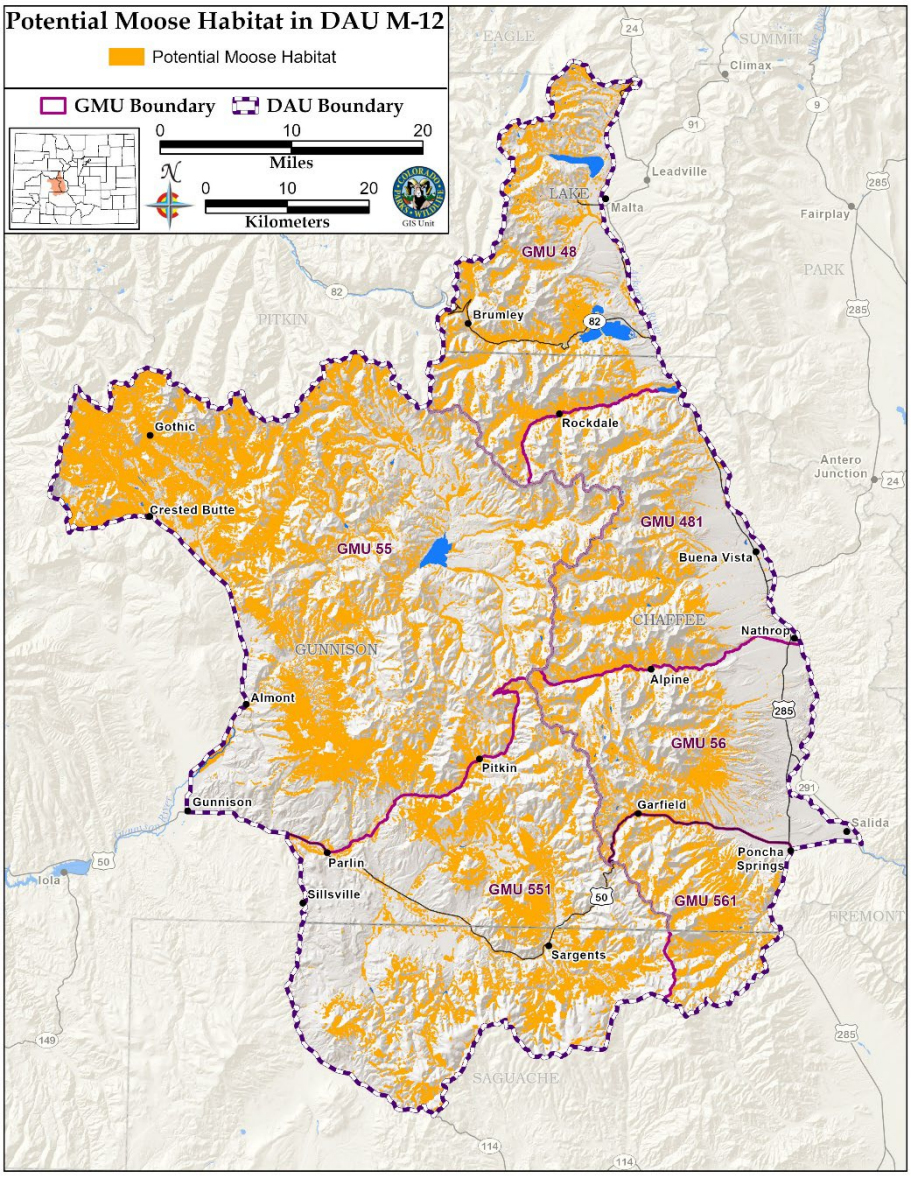


Figure M12-1: Potential moose habitat throughout DAU M-12.

Background Information

The main geographic feature in the DAU is the Sawatch Mountain range, which runs north-south along the Continental Divide and rises to more than 14,300 feet in elevation. Elevation in the DAU drops to about 7,700 feet along the Gunnison and Arkansas Rivers.

The climate is highland or montane with cool summers and cold winters, combined with heavy snows. Higher elevations of the Sawatch Mountains receive 25-35 inches of precipitation annually (350 inches of snowfall yearly at Monarch Ski Area), while the foothills receive 12 to 16 inches, and the Gunnison Valley about 11 inches. At higher elevations, about 75% of the

precipitation comes in the form of snow, with as much as 250 to 300 inches of accumulation, while at lower elevations the percentage of precipitation in the form of snow drops to 30%.

Lower elevations are grassland\shrub with some agricultural lands along the valley bottoms. As elevation and precipitation increase, the vegetation shifts from pinyon-juniper, to ponderosa pine and lodgepole pine, then to Douglas fir and white fir combined with extensive stands of aspen. Between 9,500 and 12,500 feet in elevation, stands of Engelmann spruce and subalpine fir predominant. Riparian areas which occupy less than 1% of the landscape provide the most important habitat for moose. Many species of willow are found in these riparian areas and are presumed to make up a major component of the moose diet. Moose also frequent small ponds within the forest. Coniferous forest is important thermal cover for moose, providing shade in the summer and protection from the wind during the winter. Large areas of alpine occur above 12,000 feet and moose in this DAU will utilize low stands of willow near tree line.

It is estimated that over half of all the moose in the DAU occur in the Upper Taylor River in GMU 55. However, moose are continuing to distribute more evenly across the DAU and occur throughout suitable habitat in all GMUs.

Moose are likely native to northern Colorado (Taylor et al., 2025), but historically existed in low densities. In 1978-1979, moose were transplanted into the North Park area of northern Colorado. It is conceivable some of these moose (or their progeny) moved to the Upper Arkansas River Basin. During 1991-1993, 106 moose were captured in north-central Colorado, northeast Utah and southwest Wyoming for transplant to the upper Rio Grande river basin in southwestern Colorado. Some of these moose dispersed into the northern Gunnison Basin. Finally, in 2005-2007 more moose were transplanted to the Grand Mesa to the west of this DAU; the Grand Mesa DAU is contiguous and provides continuous habitat for moose to access this DAU.

The Sawatch Range moose herd provides unique watchable wildlife opportunities for many Colorado residents and visitors to the state. The economic impact of this activity is unknown but appears to have some local importance.

Moose spend much of the day under conifer overstory. Traditional classification counts in this DAU would be unreliable and cost-prohibitive due to this factor, which is further compounded by the rugged topography of the area and low density of moose. No surveys specific to moose have occurred in this DAU and only anecdotal and harvest information is available. In deciding which GMUs should be included in this DAU, CPW field personnel considered the currently occupied area and tried to anticipate which units had the highest potential for biological connectivity, as well as potential to be opened for hunting within the 10-year period covered by this plan.

Management Considerations

The current M-12 population is estimated at between 100 and 200 animals in the entire geographic area, based solely on incidental observations of agency personnel, the public, and harvest information. CPW anticipates moose to continue to increase and disperse throughout the DAU.

Inventory: It is extremely difficult to estimate numbers of free-ranging wildlife over large

geographic areas, especially where animals occur at low densities. Even when aerial and ground counts have been conducted with a known number of large ungulates confined in large enclosures having natural vegetation, tallies have been anywhere between 20% and 40% below actual numbers. The timing and execution of survey efforts can impact the estimates produced as moose life history affect the probability of detection, particularly with calf-at-heel surveys (Bergman et al. 2020).

In North Park, Colorado, sightability of moose during winter helicopter surveys has been investigated and a ratio developed to provide a population estimate of that herd, but this technique would not be applicable to this DAU due to differences in animal concentration, terrain and vegetation. Because of budget and time constraints, obtaining a reasonably accurate estimate of population size in the field will not be realistic with these methods. Information gathered from watchable wildlife enthusiasts, hunters, agency personnel and federal land management agencies in the way of incidental sightings may be useful in providing an indication of current population trends. Future development of surveying techniques and the application of radio or GPS collars could provide more accurate data to enhance population modeling for the management of the DAU's objective range.

Relative density is probably most meaningful when viewed from a habitat utilization standpoint. Habitat should be monitored to determine if the moose population is having undesirable effects on the plant community, particularly stands of willows. This will be a key consideration in the management of this herd. Additional surveys using camera trapping and pellet counts techniques may help to cross-validate density estimates of the moose population.

In lieu of suitable, annual survey efforts, the use of harvest reports and incidental sightings compiled by CPW staff, other agencies, and members of the public are sufficient to monitor trends in the population. Hunter harvest has been utilized as a viable index of population status across Rocky Mountain States with available moose hunting opportunities, including Colorado (Nadeau et al. 2017).

Disease: Some mortality of moose in the state has been determined to be due to a proliferation of the arterial worm, *Elaeophora schneideri*, a parasite that invades the carotid artery and restricts blood flow to the brain. Elaeophorosis is most common in the southwest U.S., with mule deer being the nonpathogenic carrier. It is transmitted to deer, elk and moose by the horse fly, the intermediate host, and it is generally accepted that Elaeophorosis is more prevalent in the southern part of the state; however, Elaeophorosis has also been documented in moose in North Park, Colorado. It appears moose are highly susceptible to this parasite. The impact this disease is having on the moose population is unknown at this time, but could be substantial. It may be possible to screen harvested animals for this parasite when carcasses are brought to CPW offices for mandatory checks.

Chronic Wasting Disease (CWD) is a fatal neurological disease caused by one or more strains of prions (abnormally shaped proteins) found in deer, elk and moose. The disease results in the early death of an infected animal and, over time, decreases survival rates of infected herds. About half of Colorado's deer herds and one-third of its elk herds are known to be infected with the disease with varying prevalence in individuals. CWD has yet to be detected within the Gunnison Basin in deer, elk or moose accounting for GMUs 55 and 551 of the DAU. However, in 2024, the first positive case of CWD was detected in mule deer in DAU D-15, which also contains GMUs 48, 56, 481, and 561. While prevalence within D-15 remains low, it

is important to continue monitoring for CWD, as once the disease is established in a herd, it is usually impossible to eradicate.

An additional new concern in Colorado is the expanse of meningeal worm (*Parelaphostrongylus tenuis*) into the East Slope. White-tailed deer are the obligate host of *P. tenuis* and can carry the nematode parasite without exhibiting negative effects, thereby spreading the parasite easily. While white-tailed deer may survive with *P. tenuis*, the parasite is fatal in all other cervids including moose, causing neurological and behavioral symptoms sometimes results in paraplegia. *P. tenuis* was recently detected in Colorado in 2024 and CPW will continue to monitor the spread across the state.

Illegal kill: Illegal kill of moose has been a problem statewide since their first introduction to North Park during the early 1980s. In Middle Park, Colorado (DAU M-3) documented illegal kill exceeded legal kill for the initial five years of established hunting from 1995-1999 (68 illegal vs. 56 licenses). This is common to other western states where moose occur. Most often moose are confused with elk, usually when partially obscured by vegetation, or when standing in the shadows of dense overstory. Even experienced hunters have been known to make this mistake. Most often, the accident occurs when hunters are unaware of moose being in the area. Although CPW attempts to better educate hunters through information campaigns and by making a special point to discuss the importance of identifying your target in hunter education programs, the problem will likely never be completely eliminated. Instances where a hunter maliciously kills or wounds a moose also occur. These cases are handled much more severely by CPW Officers than the accidental incidences.

Conflicts between user groups: Because moose are such a large animal, hunters are often reluctant to hunt any distance from where they have motor vehicle access. For this reason, highly visible moose tend to be more vulnerable to harvest than those inhabiting the backcountry. This tends to produce situations where there may be conflicts between watchable wildlife enthusiasts and moose hunters. In North Park, a hunting closure was instituted around the moose viewing area near Gould. Hopefully, significant conflicts can be avoided in the Sawatch Range. Hunt codes specific to various wilderness areas can be used to direct more harvest into the backcountry. Hunters can also be sensitized to the values of other users through CPW information efforts.

Habitat Condition and Capability

Moose generally occupy forested portions of the DAU, but have been observed throughout the unit from the sagebrush lowlands to oakbrush, up to alpine ranges above 12,000 feet. Moose movements in this DAU appear to be mostly elevational, with animals moving to lower elevations with the snows of fall and winter, and moving to higher elevations in spring and summer. This movement may be a few miles to up to 20 miles, depending on snow patterns. Significant movements also occur during breeding season when both sexes search for suitable mates.

Moose prefer to use riparian areas for foraging, especially willow bottoms, but may be found feeding in a wide variety of habitats. Occasionally they may be seen in meadows in the springtime, seeking tender herbaceous growth, but normally don’t stray far into open areas. In the Grand Mesa area, moose have been documented using logged forest stands a couple years post cut for forage and cover purposes, especially during hotter periods of the summer. Available willow forage can be the main limiting factor in moose population growth;

additionally, willow height and density are positively related to calving success increase in moose. While they are occasionally seen in meadows during spring seeking fresh herbaceous growth, they usually avoid open areas and creek bottoms with high livestock use. However, in areas of free-ranging cattle operations such as Union Park and Taylor Park in GMU 55, moose and cattle may interact more frequently.

In 2008, a survey conducted by CPW in conjunction with USFS determined abundant forage existed in the Upper Gunnison Basin for moose, including the Taylor Park area (Johnston 2008). Noted habitat limitations to the expansion of moose in the area include damage to willow stands, moose-human conflicts, and conditions of wetlands. Conducting a follow-up habitat survey to assess current forage availability and conditions nearly 20 years later would be an important comparison to assess current conditions, as the same limitations still exist. With the expanded moose population throughout the DAU, it is important to monitor changes in habitat conditions that may prevent further population growth or otherwise hinder the population.

Issues and Strategies

Inventory: Although direct inventory of this moose herd is impractical, general trend information can be gathered from opportunistic observations, during deer and elk classification surveys done by helicopter, during volunteer ground counts, and on established survey routes using fixed-wing aircraft. Additionally, the implementation of survey forms available at major trailheads through the Crested Butte area has provided recreators with the opportunity to report sightings of moose. The use of citizen science has become a useful tool for managers to gather information in certain areas without the cost and time of large survey efforts. Until more meaningful methods of robustly monitoring and modeling moose populations are developed and available, simple surveys provide CPW with basic information about demographics, population trends, and human-moose interactions.

Effective modeling strategies for managing moose herds are limited, making using population parameters effectively for management objectives challenging. Therefore, anecdotal reports and winter survey observations are usually the most reliable information on the moose population's status. Developing GPS and monitoring technology may allow for more detailed spatial and temporal monitoring of moose herds in the future.

Habitat use: CPW will assist USDA Forest Service in developing monitoring techniques for habitat impacts from moose browsing. As land managers, the USFS should have the lead in designing monitoring techniques and designating key sites. Rather than intensively monitoring a few sites, it may be more practical to assess habitats over a broader area, using less intensive monitoring.

Public Outreach

CPW Service Centers and USFS District Offices frequently have contact with wildlife watching enthusiasts. This provides an opportunity to gather information on moose sightings and assess satisfaction with the viewing experience. Educational materials can also be made available at these sites. Successful hunters have a mandatory check by CPW personnel. Comments about the quality of hunt can be entered on the hunter survey form and can be noted by the employee conducting these checks.

Conflicts between user groups can be minimized through educational efforts. Since moose licenses are extremely limited, informational mailings can be made to individual license holders. Hunters frequently seek advice from CPW personnel prior to hunting and this provides another avenue to alert license holders about the need to be sensitive toward wildlife viewers.

Because of the species' unique nature, the public may have difficulty understanding CPW's management efforts. For example, people may not recognize the importance of maintaining a high sex ratio in the population for breeding purposes and consequently may have trouble accepting a high proportion of cow licenses. Or they may not recognize the limited carrying capacity of the habitat. Public outreach efforts in the form of news releases or informational meetings may be helpful in this regard.

Management Decisions

Because of CPW's current limitations in conducting feasible monitoring efforts and the potential inaccuracies of computer-generated population models for the Sawatch Range moose herd, mandatory harvest reporting will remain vital in informing management strategies. CPW intends to manage the M-12 moose herd according to realistic and feasible objectives based on harvested animal data. As part of the annual license setting process, CPW personnel will consult with appropriate personnel from federal land management agencies to determine whether management objectives are being met and whether changes in license numbers are needed. License recommendations developed on the local level will be passed up through CPW channels for final approval by the Colorado Parks and Wildlife Commission.

Management Recommendation

Herd Objectives: Given the absence of a reliable population model or population inventory methods, CPW will not establish a population objective for M-12. Instead, the population will be managed to maintain high quality habitat, high hunter satisfaction, and abundant watchable wildlife opportunities. **CPW's primary objective is to maintain a stable or increasing herd of 125 to 175 moose throughout the DAU** to maintain consumptive and non-consumptive opportunities within habitat availability and social carrying capacity. Since moose have been reliably expanding throughout the DAU for the last decade, it is important to monitor changes in habitat quality and undesirable increases in negative human-moose interactions. Should these factors begin exceeding ecological and social tolerance, management actions may need to be taken to address concerns, such as increasing antlerless licenses or redistributing hunters to encourage changes in movement and habitat occupation patterns in moose.

Moose require a higher male:female ratio than deer, elk or antelope for successful breeding, since bulls do not form harems. Furthermore, since bull moose have been classified as a once-in-a-lifetime trophy by the Colorado Wildlife Commission, it is highly desirable to have older bulls in the population. Archery and muzzle-loading hunting occurs early in the rut, and rifle season occurs later in the rut.

Hunters harvesting bull moose are required to have their animals checked at a CPW office. Measurements of the antlers are taken at this time. Our goal is to harvest a small percentage of the bulls in the population during any one year in order to maintain this level of quality over time. If too many bulls are harvested, significant recovery time will be needed since it

typically takes 4-5 years to produce a bull of objective size following birth. Therefore, **CPW recommends setting an age structure objective of four to six years for harvested bulls (based on a 3-year rolling average) and for the average antler spread to meet or exceed 40 inches.**

Public Satisfaction: Moose have high value for both consumptive and non-consumptive users. Although CPW derives no income from non-consumptive use, watchable wildlife is an important component of the Long-Range Mission and is also a provision of CPW's legislative mandate. Moose viewing provides an added attraction for visitors, and in some cases may be the primary motivation for a visit, which benefits local economies. CPW's mission is to "perpetuate wildlife resources of the state and provide enjoyable and sustainable outdoor recreation opportunities that educate and inspire current and future generations to serve as active stewards of Colorado's natural resources" (https://cpw.state.co.us/hunting/big-game/moose/conservation-and-management).

Moose hunting opportunity is provided only through the license drawing (https://cpw.state.co.us/hunting/big-game/moose). Bull moose hunts are generally once-in-a-lifetime opportunities. Given this limited opportunity, it is important that hunters are afforded a quality hunting experience. Moose hunters desire a quality hunt and this can be delivered through proper management.

The objective will be monitored using 3-year rolling averages of available harvest data and licenses will be adjusted accordingly to address changes or concerns. Lowering licenses for bull may be used to address decreases in average antler spread and age class of harvested bulls. Additionally, certain GMUs may be subdivided and managed to encourage hunter distribution across the landscape to match moose distribution to assure that all segments of the population experience hunting pressure and hunters are aware of all available opportunity. Increasing cow licenses may be used to address social concerns and increases in human-moose conflict.

In the case of habitat quality, additional monitoring performed in conjunction with federal partners is necessary to assess current habitat quality and availability. Decreases in habitat quality and availability may be indicative of the population reaching carrying capacity, in which case an increase in both cow and bull licenses would be necessary to decrease the population to a more sustainable size.

CPW will assess public satisfaction through feedback given at public meetings, comments received at Service Centers and by individual employees, and input derived from public meetings and survey forms.

Implementation

Hunting occurs across most of the DAU with success rates varying depending on moose distribution. CPW will issue the appropriate number of licenses to meet the management objectives outlined in this management plan. License numbers will be adjusted based on biological performance, forage pressure, and social considerations. CPW will collaborate with partner agencies and organizations to manage moose and conserve important habitats, such as riparian zones and willow stands. As the moose population increases, CPW anticipates offering more hunting opportunities.

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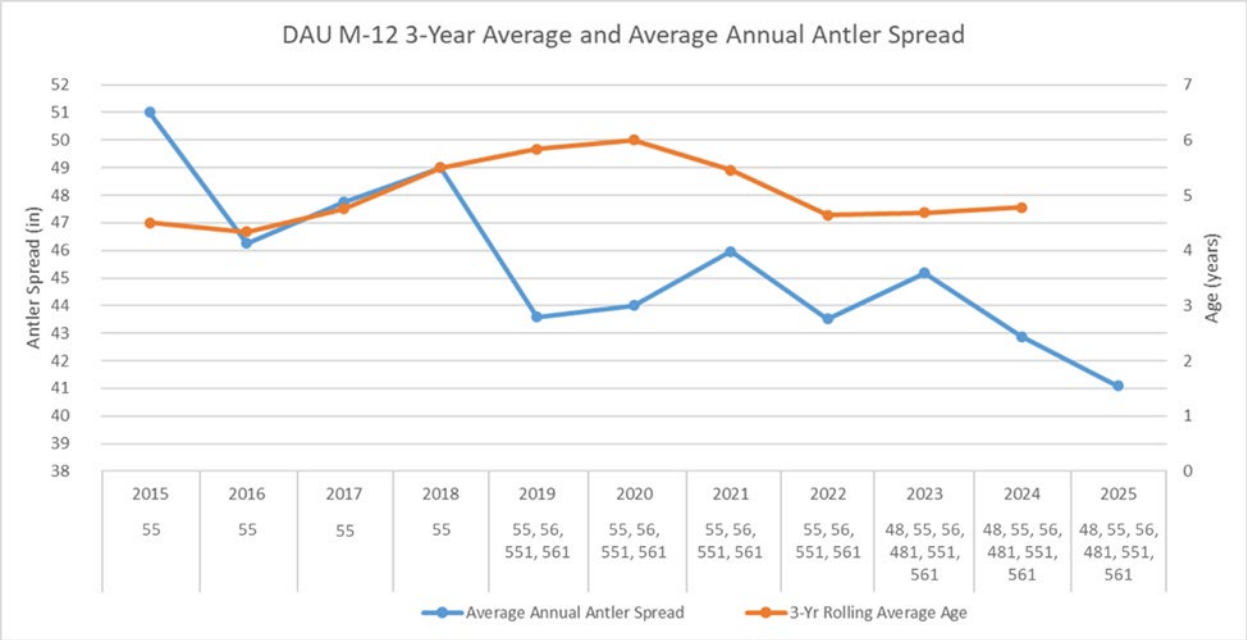

Appendix M12-A. 3-Year Average Age and Average Annual Antler Spread of Bulls Harvested in DAU M-12. 2025 age report still pending.

Appendix A: Southern Ute Indian Tribe Comment Letter

SOUTHERN UTE DIVISION OF WILDLIFE RESOURCE MANAGEMENT

10 July 2025

Jamin Grigg
Senior Terrestrial Biologist
Colorado Parks and Wildlife
415 Turner Drive
Durango, CO 81301

Mr. Grigg,

Thank you for the opportunity to comment on the draft Southwest Region Moose Herd Management Plans (HMPs). The wildlife resources in southwest Colorado are jointly managed by the State and the Colorado Ute Tribes who continue to inhabit their ancestral homelands. The federal Brunot Agreement and the Tribe/State Brunot Memorandum of Understanding ensure that tribal consultation occurs for wildlife management concerns in this region.

Of the two moose HMPs addressed in the draft, only one, Data Analysis Unit (DAU) M4, overlaps the Brunot Area. Accordingly, my comments will focus there. The overall recommendation of the HMP is to continue to allow the M4 moose herd to grow and to manage for older age class bulls. I support those recommendations, and they are consistent with maintaining tribal member access to moose within the Brunot Area.

I do however have concerns with the general lack of data that Colorado Parks and Wildlife (CPW) collects on moose. Moose are a unique and highly valued species, and decades ago, the state of Colorado made immense efforts to reintroduce them in both the northern and southwestern regions of the state. Fortunately, those efforts paid off and now Colorado has one of the healthiest moose herds in the lower 48 states. Given that history, I believe CPW should take a more proactive role in collecting on-the-ground biological data to inform long-term management.

Currently, CPW relies on a combination of anecdotal data, hunter harvest surveys and reports, opportunistic agency observations, and *citizen scientists* to inform the status of the M4 moose herd. This type of information offers useful context, but I would argue that it's only marginally acceptable when the herd is doing well. Without more robust and standardized monitoring, there is a real risk that warning signs of population decline and stressors could go unnoticed until recovery becomes more difficult.

Shiras moose herds in other western states are showing variable population trends with declines generally attributed to habitat degradation, disease impacts, and pressure from predators. Moose in

P.O. Box 737 ✦ Ignacio, CO 81137 ✦ Phone:970-563-0130

southwest Colorado are not immune to these impacts. Snowpack in the high country is dwindling, which will undoubtedly impact the effectiveness of riparian habitats for moose. Mean annual temperatures in the high country are rising, which may further impact habitat quality and exacerbate disease concerns like Elaeophorosis. The HMP references opportunistic sampling for Elaeophorosis, but a larger effort should be made to obtain samples from harvested animals; there is a mandatory check on those animals after all, which gives CPW hands-on opportunity. Establishing base-line information on Elaeophorosis prevalence may be important to reference if/when the M4 moose population starts to decline.

Potential gray wolf impacts on moose populations cannot be discounted. Wolves are actively being reintroduced into the state and have begun, and will continue, to migrate into the San Juan mountains including the core habitat of the M4 moose herd. It's unknown if wolves will have a significant impact on moose populations, but efforts should be made to investigate cause-specific mortality on moose while gray wolves are establishing themselves in M4. This could be accomplished through moose collaring efforts, or through cluster analysis on existing wolf collars and site visits to suspected kills sites in known moose habitat. In either case, CPW would gain knowledge on the moose herd and the prey base of gray wolves in M4 that you don't currently have.

I also recommend that CPW make greater efforts to collect moose specific data, including sex and age ratios and calf recruitment rates. I understand that this is easier said than done; however, CPW already makes additional effort to collect this information on other difficult-to-survey species, such as big horn sheep. Dedicating some flight hours each winter specifically to moose survey (during regularly scheduled deer and elk surveys) could pay dividends by increasing CPW's understanding of winter distribution and population statistics of the species.

In summary, I support allowing the moose herd to expand and to manage for older age class bulls. Additionally, I encourage CPW to increase efforts to collect more baseline data on the M4 moose population to reduce the amount of time it takes to detect a population decline and understand its cause. I'm concerned that current M4 moose monitoring efforts will not detect appreciable population declines in a timely manner, which could delay necessary changes in on-the-ground management.

Thank you for reaching out to the Southern Ute Division of Wildlife Resource Management for review and comment on the Southwest Colorado Moose HMP and on wildlife management issues of mutual interest to our agencies.

Aran Johnson

Aran Johnson
(970) 563-0130
ajohnson@southernute-nsn.gov

Appendix B: 30 Day Comment Period General Responses

July 25, 2025

Alyssa Kircher
Colorado Parks and Wildlife
2300 S Townsend Ave.
Montrose, CO 81401

RE: Uncompahgre Habitat Partnership Program Comments - HMP M-4 (GMU 65)

Dear Ms. Kircher,

One of the initial reasons for creating the Habitat Partnership Program (HPP) was to provide local landowners and other interests an opportunity for input into big game management in their areas. The diverse makeup of the local HPP committee (3 livestock growers, USFS, BLM, CPW, and sportsperson representatives) provides a good cross-section of local interests to review DAU proposals and respond accordingly for CPW consideration.

HPP exists to help reduce big game related agricultural conflicts, assist CPW in meeting big game management objectives, enhance big game migration corridors, and support conservation efforts on private lands as they relate to deer, elk, moose, and pronghorn. With this perspective in mind, the Uncompahgre HPP (UNCHPP) Committee has reviewed the GMU 65 draft alternatives regarding population range and sex ratio objectives and offer these comments for consideration.

The UNCHPP Committee supports the draft alternative to continue increasing the number of animals within this GMU and within our committee area. The UNCHPP committee does not believe this increase would create more conflicts and we also believe we have the resources necessary to address conflicts should they occur. Increasing the population objective will ultimately lead to more hunting licenses and sportsmen opportunities.

The UNCHPP committee also discussed the proposed sex ratio alternative. We believe the current sex ratio is a good balance and provides ample hunting opportunity while also providing for a reasonable number of mature animals for those hunters who want to take a larger bull.

As stated above, HPP is also directed by statute to assist the Division to meet game management objectives. The UNCHPP committee has worked with both public land managers and private landowners to improve the quality and quantity of the habitat in GMU 65. Adequate habitat is critical to meeting game management objectives and we remain committed to maintaining and improving habitat in this area. The UNCHPP Committee will continue to support management efforts in partnership with numerous local landowners and federal land managing agencies that place a high priority on implementing valuable habitat improvement projects and have expressed the desire to continue this work. Thank you for the opportunity to provide these comments.

Sincerely,

Bobby Gray, Sportsperson - Chair
Uncompahgre HPP Committee

COLORADO
Parks and Wildlife
Department of Natural Resources

Habitat Partnership Program
4255 Sinton Road • Colorado Springs, CO 80907

September 11, 2025

Brent Frankland
Colorado Parks and Wildlife
0722 S. Co. Rd 1 East
Monte Vista, CO 81144

Re: San Luis Valley Habitat Partnership Program Comments - DAU M4 and M12

Dear Brent,

One of the initial reasons for creating the Habitat Partnership Program was to provide local landowners and other interests an opportunity for input into big game management in their areas. The diverse makeup of local HPP committees (3 livestock growers, Forest Service, BLM, CPW, and sportsperson representatives) provides a good cross-section of local interests to review DAU proposals and respond accordingly for CPW consideration.

HPP has two purposes: to resolve conflicts with agricultural landowners regarding big game wildlife (deer, elk, pronghorn, moose) and to assist CPW in meeting game management objectives for those same species. From those perspectives, the San Luis Valley HPP committee has discussed your presentation, reviewed the draft alternatives, and offered these comments for consideration.

The San Luis Valley HPP committee agrees with the following comments regarding the proposals for the population range and sex ratio objectives for the above DAU plan.

The San Luis Valley committee supports the draft alternative to maintain an increasing population within this DAU and within our committee area. The committee does not believe this increase would create more conflicts, and we also believe we have the resources necessary to address conflicts should they occur. Increasing the population objective will ultimately lead to more hunting licenses and sportsperson opportunities.

The San Luis Valley committee also discussed the proposed sex ratio alternative. We believe the current sex ratio is a good balance and provides ample hunting opportunities while also providing a reasonable number of mature animals for hunters who want to take a larger bull or buck.

As stated above, HPP is also directed by statute to assist the Division in meeting game management objectives. The San Luis Valley committee has worked with both public land managers and private landowners to improve the quality and quantity of the habitat in DAU-M4 and M-12. Adequate habitat is critical to meeting game management objectives, and we remain committed to maintaining and improving habitat in this area.

Our committee is confident about CPW being able to achieve the proposed objectives due to:

- We have worked with numerous landowners who want to implement positive improvements for big game on their property.
- Federal land management agencies place a high priority on habitat improvement. They have worked successfully with our committee on valuable projects in the past and have expressed a desire to continue this.
- The San Luis Valley committee feels there is adequate habitat with adequate protections in place, such as seasonal closures and use restrictions, to achieve the desired objectives. While the committee has confidence in the plan's objectives over the next ten years, beyond that, they are concerned that residential growth and increased recreation demands could hinder future population objectives.

Thank you for the presentation and the opportunity to provide these comments.

Sincerely,

Dale Gomez, Chair
San Luis Valley HPP Committee

September 26, 2025

Jamin Grigg, Senior Terrestrial Biologist
Colorado Parks & Wildlife
415 Turner Drive
Durango, CO 81301

RE: Gunnison Basin HPP Committee comments on the Gunnison Basin Herd Moose Management Plan

Dear Mr. Grigg,

This letter is in response to your request for formal comment regarding the Colorado Parks & Wildlife Gunnison Basin Moose Herd Management Plan. The Habitat Partnership Program (HPP) was created to help resolve wildlife conflicts, particularly those associated with fence and forage issues; and to assist CPW in achieving game management objectives. The diverse makeup of local HPP committees (3 livestock growers, Forest Service, BLM, CPW and sportsmen representatives) provides a good cross-section of local interests to review DAU proposals and respond accordingly for CPW consideration. The Gunnison Basin HPP Committees has had the opportunity to review the management plan to comment on portions of M-12 (GMU's 55 and 551), and M-4 (GMU's 66 and 67) which are within the purview of this committee. It is understood that CPW intends to manage to objective to the best of their ability. After careful consideration, the committees will offer the following recommendations:

- The committee supports CPW's desire to manage towards a stable or increasing population taking into account practical constraints involved in determining population abundance. The Gunnison Basin moose herd is performing very well and continues to expand across much of the region with more habitat available to allow for an overall increase in population size. However, it is important that CPW maintain the ability to increase harvest rates should there be a decrease in habitat quality due to overpopulation in the future.

- The committee agrees that the Basin's moose population creates an excellent "once-in-a-lifetime" hunting opportunity that can be sustained into the future with the proposed management strategies. The committee also supports maintaining the herd objective of 4-6 year old harvested bulls, based on a 3-year rolling average, with an antler spread of or exceeding 40 inches. This objective should allow CPW to continue to provide hunters with a high quality hunting experience while sustaining a mature bull population.

- The committee also acknowledges that moose provide watchable wildlife opportunities and draw non-consumptive users into the outdoors. With increased moose populations comes potential for increased conflict in high use areas. CPW should monitor changes on the

landscape of moose populations and concentrations to minimize potential conflicts for the safety of the public, and visitors of the State of Colorado.

- Finally, there is pending research and monitoring efforts which CPW is hoping to begin in the near future when funding becomes available. These studies are anticipated to yield data which can help inform HPP decision-making processes, and help drive CPW's management strategies within the Basin. The committees feel it is important to support these efforts to have the best possible information and data to inform managers on future management decisions.

On behalf Gunnison Basin HPP Committee, we thank you for allowing us to participate in this portion of the process and for the opportunity to comment.

Sincerely,

The Gunnison Basin HPP Committee

A PEAK EXPERIENCE
HINSDALE COUNTY
COLORADO

311 N. Henson St. Lake City, Colorado 81235 970-944-2225 www.hinsdalecountycolorado.us

July 30, 2025

Colorado Parks & Wildlife (CPW)
Attn: Jamin Grigg

To: jamin.grigg@state.co.us

Re: Comment letter related to Moose Herd Management Plans, Southwest Region

Hinsdale County appreciates the opportunity to comment on the proposed Moose Herd Management Plans in the Southwest Region of Colorado. Moose were transplanted into the Upper Rio Grande Valley in Hinsdale County in the early 1990s and our residents and visitors have enjoyed watching these animals survive and thrive throughout our County.

Hinsdale County commissioners support the goals of CPW to:

1) maintain a healthy, viable population of moose while avoiding excessive damage to riparian areas;
2) allow for hunting opportunities for bulls and cows, while simultaneously maintaining high productivity in the herd; and,
3) provide adequate opportunities for recreational viewing.

Hinsdale County covers management units 66, 65, 76, 751, 77, and 67. The M4 moose herd utilizes Hinsdale County land and the entirety of our county lies within the boundaries of the Brunot Agreement of 1873. This vast area of public land contains excellent wildlife habitat for moose populations with minimal housing developments. Extensive recreation occurs throughout our county and the possibility of moose/human interactions increases as populations of visitors/residents and moose increase. Hinsdale County encourages CPW to:

- Continue to monitor the M4 moose herd population using trend information
- Increase moose-human interaction education and outreach efforts to ensure public safety
- Continue selective, "once-in-a-lifetime" moose hunting practices for herd management health and adjust as outlined in the proposed plan
- Consider impacts to the M4 moose herd when planning wolf reintroduction locations
- Consider protection of free public-viewing opportunities for moose herd populations at the Deer Lakes Day Use Area and the inlet of Lake San Cristobal (viewing from the road)

Thank you for the opportunity to comment.

Respectfully,

Kristine Borchers, Chair Greg Levine, Vice Chair Robert Hurd, Commissioner

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Tres Rios Field Office
161 Burnett Drive Unit #4
Durango, Colorado 81301
www.blm.gov/colorado

In Reply Refer To:
6840 (LLCOS01000)

August 11, 2025

Dear Mrs. Kircher:

Thank you for the opportunity to comment on the Colarodo Parks and Wildlife M4 and M12 Moose Herd Management Plans.

We have reviewed the draft plans and do not have any comments.

Sincerely,

Digitally signed by DEREK PADILLA
Date: 2025.08.11 09:58:17 -06'00'

Derek Padilla
Field Manager

Comments on the Draft M-4 and M-12 Moose Herd Management Plans
9/5/2025

I have read the Draft Plans and support the preferred alternatives of both which is to maintain increasing populations (currently estimated at approximately 500 in M-4 and 125-175 in M-12) and manage for age structure of harvested bulls of 4-6 years of age and antler spread exceeding 40 inches.

Moose populations appear to be increasing and expanding into other adjacent areas where suitable habitat is available. Adjusting population objectives and available hunting licenses as more information is collected through improved inventory methods, social tolerance and habitat quality are good management techniques.

I have not noticed any unacceptable grazing upon willow communities that can be attributed strictly to moose.

The preferred alternatives for the age structure of harvested bulls – 4-6 years of age and antler spread exceeding 40 inches, is reasonable and provides hunters with an opportunity to harvest a trophy bull if they are willing to be patient. Most Colorado moose hunters are hunting moose for the first time and often harvest the first bull over 2.5 years of age that they encounter, but the opportunity exists in my opinion for a bull over 40 inches in just about every huntable GMU.

It will be interesting to see how the reintroduction of wolves into Colorado may impact moose distribution and numbers. A single moose is not much of a challenge for a pack of wolves. I worked north of Jackson, WY for several years and the number of moose in that area has decreased drastically with hunting licenses being reduced by about 75%. I guess time will tell whether this potential new management challenge will result in adaptive moose management in localized areas of Colorado or not.

Good job on the Draft Management Plans.

Dale Gomez
/s/ Dale Gomez