



Mule Deer  
Habitat  
Requirements  
&  
Management  
in Wyoming

B-965  
February 1992

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Department of Renewable Resources

# UNIVERSITY OF WYOMING

*Issued in furtherance of cooperative extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Glen Whipple, director, Cooperative Extension Service, University of Wyoming, Laramie, Wyoming 82071.*

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**Mule Deer Habitat Requirements and  
Management in Wyoming**

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## Introduction

Mule deer (*Odocoileus hemionus*) in Wyoming provide recreational, aesthetic, and economic values to hunters, wildlife enthusiasts, and local business throughout the state. More than 100,000 hunters annually pursue this species in Wyoming, spending an average of more than 336,000 days in the field to harvest more than 60,000 animals. Local businesses such as motels, grocery stores, gas stations, and sporting goods stores receive considerable revenue each year as do landowners who charge access fees for mule deer hunting.

## Habitat Requirements

Mule deer are mostly active during late afternoon, early evening, and early morning hours. The rest of their day is spent resting in heavy sagebrush draws, rocky outcrops, or juniper/aspen thickets. Hiding or resting locations are selected to provide concealment, a view of the surrounding terrain, and easy access to escape routes. Steep and rugged topography that provides brush-like vegetation is preferred habitat.



Figure 1 – Steep and rugged topography that provides heavy sagebrush draws, rocky outcrops, a view of surrounding terrain, and easy access to escape routes comprises ideal mule deer habitat in Wyoming.

Mule deer are highly mobile for short periods such as the fall and spring during migration between winter and summer ranges. However, for most of the year they establish “home



Figure 2 – Draining permanent water sources and dewatering springs degrades mule deer habitat by eliminating watering areas and essential food and cover growing on these moist sites.

ranges,” which may vary from a few hundred acres to more than a square mile depending on the arrangement and abundance of essential food, cover, and water. Deer densities depend on adequate and well-distributed food, cover, and water.

In Wyoming, mule deer ranges may support a population all year (year-long range) or only during a portion of the year (seasonal ranges such as winter, summer, or transitional

spring-fall). The ideal combination of essential habitat components (food, cover, and water) to support maximum deer densities will vary with the type of range. For example, escape cover may not be as important on winter range as in fawning areas, water is more important on late summer and fall ranges than on winter range, and certain evergreen shrubs are more important as cover on winter range than on summer and transitional ranges. On year-long range, all three essential habitat components must be present to support deer populations.

## **Water Requirements**

Mule deer obtain much of their required water from foods such as vegetation growing near water. When native vegetation and temporary ponds dry up in late summer and early

fall, deer depend on permanent streams, springs, and seeps for daily water intake. The best way to ensure adequate water on deer range is to avoid the destruction of habitat around permanent water sources. Dewatering of springs and seeps not only eliminates a source of water in late summer and fall, but it also removes essential food and cover growing in these moist areas.

## Cover Requirements

Mule deer cover requirements fall into two major categories: hiding cover (also known as escape or security cover) and thermal cover. Unlike antelope, deer do not have the ability to escape predators through extended, high-speed maneuvers. Typically, mule deer rely on bursts of energy to seek security in rough terrain with dense vegetation for protection. Feeding deer rarely venture far from a draw of tall sagebrush, a pile of rocks, or a thicket of large shrubs or trees.

Hiding cover, defined as “any vegetation capable of hiding 90 percent of deer from human view at a distance equal to or less than 200 feet,” is needed throughout the year. Scattered patches of relatively dense vegetation from 10-30 acres in size are adequate for hiding if the patches are not more than 0.25-0.5 miles apart. Rough and rocky terrain complements vegetation used as hiding cover. Varied topography alone does not provide suitable hiding cover.

Thermal cover is necessary to protect deer from cold temperatures, high winds, and winter snows as well as from heat and insects in summer. For example, dense juniper stands in winter decrease body-heat loss in mule deer by providing protection from bitter cold winds and reducing heat loss due to exposure and radiation. This protection allows mule deer to conserve energy for body maintenance and reproduction.



Figure 3 – Coniferous trees and shrubs on winter range provide necessary thermal cover by protecting mule deer from cold temperatures, high winds, and winter snows.

Small evergreen trees and shrubs on winter ranges and deciduous trees and shrubs on summer and transitional ranges provide excellent thermal cover for deer. For example, deciduous trees such as cottonwood or aspen provide

overhead shade and open under stories to allow passage of cool breezes during summer. Ideal summer thermal cover consists of sapling trees or shrubs at least 5 feet tall with 75 percent closure of the canopy.

Winter thermal cover in a forest vegetation type should include evergreen trees of pole size or larger with at least 60 percent closure of the crown. Optimum patches of winter or summer thermal cover should be 2-5 acres in size and comprised of vegetation at least 3-5 feet tall. Juniper communities are important to mule deer for summer and winter thermal cover as well as for providing cover for daily movement patterns.

Topographical features such as scattered boulders, gullies, and draws and leeward sides of ridges and rim rocks enhance the cover value of plant communities commonly used by deer. During summer, deer often lay in shaded spots on rim rocks overlooking the surrounding terrain.

## Food Requirements

Because mule deer food varies seasonally, important mule deer range requires a mixture of trees, shrubs, (woody, perennial plants of low heights), forbs (herbaceous, broad-leaved flowering

plants), and grasses. Locations where food, cover, and water occur together are preferred feeding areas. For example, optimum mule deer winter range is comprised of approximately 45 percent scrubland and 45 percent coniferous forest, with the remaining 10 percent in forbs/grassland. Mule deer generally will not use feeding areas farther than 0.5-1 mile from suitable hiding and escape cover.

Mule deer select foods that are palatable, succulent, and nutritious. However, seasonal availability of various plants and seasonal metabolic requirements of deer also influence the selection of food materials. Generally, the seasonal food habits of mule deer include the following:

*Spring* – As early greening grasses and forbs emerge, mule deer stop eating shrubs of relatively low nutritional value and start consuming palatable, succulent, and nutritionally rich herbaceous plants. In late spring, their diet includes a variety of grasses and forbs with a few shrubs.



Figure 4 – Optimum mule deer winter range is comprised of approximately 45 percent shrublands, 45 percent coniferous forest, and 10 percent forbs/grassland.

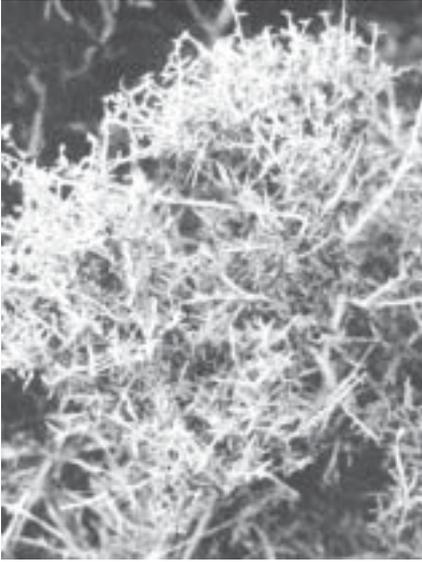


Figure 5 – Curlleaf mountain mahogany is considered an “ice cream” food plant for mule deer diets.

*Summer* – During this period, mule deer use a wide variety of habitats and consume many different foods. However, as grasses dry and cure, consumption decreases to a very low level. At this time, forbs sometimes comprise as much as two-thirds of the diet. In late summer, deer begin to replace forbs in their diet with shrubs.

*Fall* – With fall frosts, mule deer shift to predominately shrubby vegetation. Forbs still

receive moderate use if available and may account for up to 25 percent of the diet.

*Winter* – During this period, trees and shrubs comprise 75 percent or more of the deer diet because other kinds of food are dead and usually covered by snow.

Plants comprising mule deer diets in the summer and winter are listed in Table 1. However, studies conducted in Wyoming indicate that the following plants are especially important to mule deer in winter: sagebrush (*Artemisia spp.*), antelope bitterbrush (*Prushia tridentata*), mountain mahogany (*Cercocarpus spp.*), and rabbit brush (*Chrysothamnus spp.*).

Important summer plants include willow (*Salix spp.*), huckleberries (*Vaccinium spp.*), shrubby cinquefoil (*Potentilla fruitcosa*), buffalo berry (*Shepherdia Canadensis*), and a variety of forbs previously mentioned.

Table 1. This is a partial list of plant species and their relative value as food and cover for mule deer in Wyoming.

	Summer Forage	Winter Forage	Hiding/Escape Cover	Thermal Cover	Fawning Cover
<b>Trees</b>					
Ponderosa Pine	Poor	Poor	Good	Excellent	Fair
Rocky Mountain Juniper	Poor	Fair	Excellent	Excellent	Good
Cottonwood	Fair	Fair	Fair	Good	Poor
<b>Browse</b>					
True Mountain Mahogany	Excellent	Excellent	Excellent	Good	Excellent
Curlleaf Mountain Mahogany	Excellent	Excellent	Excellent	Good	Excellent
Antelope Bitterbrush	Excellent	Excellent	Good	Good	Good
Big Sagebrush	Fair	Good	Good	Good	Excellent
Black Sagebrush	Fair	Fair	Poor	Poor	Poor
Rubber Rabbitbrush	Good	Good	Poor	Poor	Poor
Serviceberry	Good	Excellent	Good	Fair	Good
Currant	Good	Good	Poor	Poor	Fair
Willow	Good	Excellent	Good	Good	Excellent
Shrubby Cinquefoil	Good	Good	Good	Fair	Fair
Buffaloberry	Good	Good	Good	Fair	Fair
<b>Forbs</b>					
Red Clover	Good	Poor	Poor	Poor	Poor
Yellow Sweet Clover	Good	Poor	Good	Fair	Good
Dandelion	Fair	Poor	Poor	Poor	Poor
Buckwheat	Good	Poor	Poor	Poor	Poor
Fireweed	Good	Poor	Poor	Poor	Poor
Huckleberry	Good	Poor	Poor	Poor	Poor
Vetch	Good	Poor	Poor	Poor	Poor
<b>Grasses and Grasslike</b>					
Idaho fescue	Good	Poor	Poor	Poor	Poor
Bluebunch Wheatgrass	Good	Poor	Poor	Poor	Poor
Carex	Fair	Poor	Poor	Poor	Poor



Figure 6 – Sagebrush is especially important in the winter diet of mule deer.

In some areas of Wyoming, mule deer diets may include a variety of agricultural crops. This is particularly true where farmlands are adjacent to wintering areas or in areas of limited precipitation where crops are the only food

sources available. However, mule deer rarely subsist entirely on agricultural crops.

## Other Habitat Requirements

*Fawning habitat* – For fawning, mule deer select 1 to 5-acre areas with adequate water, cover, and succulent vegetation. Succulent plants and free-standing water are essential for does to produce milk for nursing. Ideal fawning habitat includes areas of low shrubs or small trees 2-6 feet tall, an overstory tree cover of approximately 50 percent, slopes less than 15 percent, and water within 600 feet. Lush, succulent vegetation should be available, especially in June during the peak of fawning. Riparian habitats offer quality fawning conditions for improved growth rates and survival during the first year of life.

*Special Seasonal Habitat Needs* – Adequate winter range in good condition is essential for mule deer populations. During winter, mule deer prefer open-timbered, west-facing exposures and shrub-covered, south-facing exposures where warmer temperatures exist, snow pack is minimal, preferred

Table 2. This is a summary of optimum habitat combinations for mule deer on summer/transitional range and winter range.

	Percent of habitat type			
	Foraging Areas*	Escape/ Hiding Cover	Thermal Cover	Fawning Cover
Summer/Transitional Range	60	22	11	7
Winter Range	60	15	25	0

browse (twigs or shoots of woody plants) is abundant and available, and food and cover are close together.

*Interspersed Habitat* – Studies indicate that the optimum combination of cover types required by deer on summer and transitional ranges includes: (1) 20 percent hiding cover, (2) 10 percent thermal cover, (3) 5 percent fawning cover, and (4) an additional 5 percent of combined hiding, thermal, or fawning cover, (Table 2). The remaining 60 percent of the mule deer range should be feeding areas. On winter range, there should still be 40 percent cover and 60 percent feeding areas with an increased percentage of thermal cover.

## Habitat Improvement Techniques

### *Water Development and Management*

Strategically placed water developments influence mule deer distribution, particularly during hotter periods of the year when deer need more water. Contact the Wyoming Game and Fish Department, Bureau of Land Management, U. S. Forest Service, or Soil Conservation Service in the area for assistance in designing and/or constructing watering devices



Figure 7 – Water developments such as livestock troughs are important for mule deer, particularly during the summer and early fall when water consumption demands are greater. Watering troughs should be low enough for fawns.

for mule deer. Following are general development and management specifications:

- Maintain a distance of 2.5 to 3 miles between water developments and locate water developments within 0.5 to 1 mile of mule deer cover and feeding areas.
- Where feasible, develop a number of small watering ponds rather than one or two large lakes. Ensure that ponds have a source of fresh water to avoid water-quality problems.
- Strip-mining operations often make water available from underground springs and water tables. These additional water developments will help protect riparian areas that provide valuable mule deer habitat.
- Maintain water in cattle troughs and spring-fed ponds even if livestock are not using them and ensure that troughs are low enough for fawns to use.
- If mule deer are not using a water source, have University of Wyoming scientists or the state hydrologist analyze a water sample for mineral content. Mule deer will not use water containing high salt concentrations. Water with a total soluble salt content of less than 1,000 parts per million is best for mule deer use.

- Avoid concentrating cattle in riparian habitat or near other sources of water where degradation of riparian vegetation and water quality may occur. Judicious livestock grazing management or fencing may be needed to avoid habitat degradation for mule deer.

### *Tree and Brush Management*

Coniferous forests and juniper stands provide excellent hiding and winter thermal cover while deciduous trees such as aspen and cottonwood provide thermal cover on summer and transitional ranges. Extensive clear-cutting in coniferous forests where thermal cover patches are reduced to less than 10-acre blocks should be avoided. Likewise, extensive brush control in juniper stand should be avoided to preserve the integrity of the stand for winter cover, summer cover, and daily travel routes for mule deer. Following are specific tree and brush management ideas:

- Selective thinning of decadent juniper can be accomplished by bulldozing or cutting individual trees as long as a canopy cover of at least 40 percent is maintained.
- Chain or bulldoze small, widely scattered clearings to open up extremely dense juniper stands. This can be beneficial to mule deer if the resulting efforts do not leave islands of juniper among large patches of cleared brush. Clearing should be long and irregular in shape, less than 20 acres in size, less than 200 feet in width, at least 0.5 miles apart, and screened from roads by at least 600 feet of brushy vegetation.
- Stimulate sprouting and regrowth in decadent aspen patches from summer thermal cover by clear-cutting or burning selected stands over a prescribed interval of 10 to 20 years.

- If water manipulation is possible on cottonwood-dominated areas, periodic flooding over a prescribed interval in selected locations will enhance summer thermal cover within this community type.
- Extensive brush control on key winter ranges dominated by shrubs important in the winter diet of mule deer should be avoided. However, prescribed burning and/or mechanical treatments such as rotobearing can be implemented on small, selected patches within the winter range every few years to maintain browse condition and production. Rotobearing to stimulate shrub production is most successful in areas receiving at least 12 inches of precipitation annually.

### *Prescribed Burning*

Prescribed burning encourages grass and forb production on summer and transitional ranges, removes rank dead grass residue, and stimulates sprouting of browse plants such as true mountain mahogany, chokecherry, serviceberry, rabbit brush, snowberry, and aspen on winter range. However, burning can temporarily eliminate browse plants such as sagebrush, antelope bitterbrush, and curl leaf mountain mahogany, especially if the burn gets too hot. Follow these guidelines for burning:

- Prescribed burning should follow detailed prescriptions for the intended management goals and should be conducted only in years with average or above-average precipitation. Adequate soil moisture is essential for vegetative growth following burning.
- Late summer and early fall burns in 50 to 100-acre patches are ideal for grass and forb enhancement while spring burns are preferred to enhance shrubs that respond by sprouting.

- Where live-stock grazing is present, burn only where live-stock can be excluded for at least two growing seasons following the burn to allow for plant reestablishment.



Figure 8 – Prescribed burning can benefit mule deer by stimulating grass and forb production on summer and transitional ranges, removing rank dead grass residue, and encouraging the sprouting of true mountain mahogany, chokecherry, serviceberry, rabbitbrush, snowberry, and aspen on winter ranges.

- Do not re-burn grass/forb areas for at least 5 to 7 years and shrub areas for at least 10 to 12 years. This interval can vary depending on the site-specific moisture regimes, soil conditions, and climatic factors.
- Contact the Wyoming Game and Fish Department, Bureau of Land Management, U. S. Forest Service, and/or Soil Conservation Service for assistance and planning prior to burning.

### ***Browse Establishment***

Browse can be enhanced on winter ranges by drilling or broadcast seeding of mountain mahogany, antelope bitterbrush, winter fat, and four-wing saltbush, provided moisture and soil conditions are suitable for germinations. Following are specific recommendations:

- Do not seed browse plants where livestock may disturb newly seeded areas or utilize emerging growth. Seedings

should be deferred from livestock grazing for at least two growing seasons to allow establishment of seeded shrubs.

- While planting depth varies, a general rule is to plant 2.5 times deeper than a seed is wide (about 0.25-.05 inches). The seeding rate is roughly 1 to 3 pounds per acre for most browse plants.
- Newly seeded areas should be covered with soil or mulch to preserve moisture.
- Scraping, spraying, or disking may be required to reduce competition from established plants prior to seeding.
- Consult seed companies and the Soil Conservation Service for assistance in recommended seeding rates, depth, soil adaptations, and species selection prior to seeding.

### *Planting and Propagating Food Patches*

Where climatic conditions are favorable, the establishment and propagation of cereal grains (wheat, barley, or oats) and/or legume food patches (alfalfa, yellow sweet clover, red clover, or vetches) may enhance mule deer nutrition. Strategically located food patches adjacent to cover are essential for deer use. The following recommendations are for food patches designed for mule deer.

- Food patches should be located within 0.5 mile of mule deer cover or access routes like canyon rims or ravines.
- To provide adequate supplemental forage there should be 0.5 acre of wheat, barley, or oats per deer.
- Several strategically located 20-acre fields are more desirable than one 100-acre field to avoid concentrations and ensure access by more deer.

- For spring, summer, and fall foraging, legume plantings are preferable. Cereal grains are better for fall and winter foraging where there is not too much snow accumulation.



Figure 9 – Spring and early summer grazing by livestock can enhance winter browse for mule deer by providing a competitive growing advantage for some shrubs when herbaceous plants are grazed at this time of the year.

- Avoid deer hunting on or near food patches to avoid discouraging deer use of the patches.
- Postpone livestock grazing on cereal grains until after deer have moved onto newly emerged spring vegetation and on legumes until after deer have started browsing shrubs.

### *Livestock Grazing Management*

Although cattle and mule deer generally do not compete for the same forage, livestock grazing can be managed to enhance rangeland vegetation for mule deer. Following are specific recommendations for livestock grazing to enhance mule deer forage:

- To enhance winter browse for mule deer, studies indicate that spring and early summer grazing of herbaceous plants by livestock that prefer grasses and forbs provides a

competitive advantage to shrubs competing with herbaceous plants for soil water, nutrients, and minerals. Alternatively, to enhance herbaceous plants for spring and early summer use by mule deer on transitional and summer ranges, sheep grazing in late summer and early fall will provide a competitive advantage to grasses and forbs over shrubs such as sagebrush.

- Moderate to light stocking of cattle will stimulate rangeland vegetation and improve overall range condition. Consider reducing stocking rates in areas adjacent to mule deer cover, particularly riparian habitat.
- Rotational and/or deferred grazing systems will enhance rangeland vegetation, especially herbaceous plants, used by mule deer in spring and early summer.
- Avoid concentrating cattle in juniper stands, especially during the winter when mule deer are concentrated in the same areas.

With just a little knowledge about mule deer habitat requirements, landowners and wildlife enthusiasts alike can adopt management practices to benefit mule deer that are compatible with other uses. For more information on mule deer habitat management, contact a University of Wyoming Cooperative Extension Service educator or visit a local Wyoming Game and Fish Department district office.

## Acknowledgements

Information presented in this bulletin was extracted primarily from the following references:

Wyoming Game and Fish Department. 1976. *Considerations for Wildlife in Industrial Development and Reclamation*. Cheyenne: Wyoming Game and Fish Department.

Wyoming Game and Fish Department. 1978. *The Mule Deer of Wyoming*. Bulletin No. 15, Cheyenne: Wyoming Game and Fish Department.

## References for Further Reading

Bryant, F. C. and B. Morrison. 1985. *Managing Plains Mule Deer in Texas and Eastern New Mexico*. Management Note No. T-9-414. Lubbock: Texas Tech University, Range and Wildlife Management Department.

Strickland, D. 1975. *Mule Deer in the Medicine Bow Mountains, Southeastern Wyoming*. Wildlife Technical Report No. 2. Cheyenne: Wyoming Game and Fish Department.

Soil Conservation Service. 1986. *Mule Deer*. Technical Note No. 110. Casper: Wyoming State Office, U. S. Department of Agriculture.