Platte Valley Habitat Partnership's (PVHP) Mule Deer Habitat Plan

August 7, 2013

Table of Contents

Executive Summary

The Platte Valley Habitat Partnership (PVHP) formed in May 2012 is a result of the Platte Valley Mule Deer Initiative (PVMDI) that the Wyoming Game and Fish Department (WGFD) implemented in July 2011. The PVHP was developed to establish effective partnerships in order to maintain and improve mule deer habitat throughout the Platte Valley. The PVHP is comprised of private landowners, concerned citizens, hunters, outfitters, members of the Saratoga-Encampment-Rawlins Conservation District (SERCD) and the staffs of the WGFD, Bureau of Land Management (BLM), University of Wyoming Extension, the U.S. Forest Service (USFS) and Non Governmental Organizations (NGOs).

One of the outcomes of the Partnership includes this comprehensive habitat management plan designed to be implemented collaboratively between all interested stakeholders. This "source" document provides an explanation of the PVHP's collaborative process, mule deer ecology, objectives and desired habitat conditions of the Platte Valley, indirect benefits to society by improving the mule deer herd, and details regarding project funding and implementation.

The attributes and considerations of mule deer habitat in the Platte Valley are discussed by season. Mule deer fawn production and survival is paramount to mule deer population stability and recovery. Efforts to improve habitat on summer and fall ranges are especially important to ensure maximum fawn production and survival is attained.

This Plan outlines the work that has been, will be, and is planned to be completed to improve habitat conditions for mule deer in the Platte Valley. Proposed habitat improvement projects in some portions of the Platte Valley will require extra planning and consideration in sage-grouse core and lynx analysis areas. Habitat improvement projects have been on-going in the Platte Valley and these projects will be considered when designing new projects. Habitat improvement focus areas for mule deer have been delineated but do not preclude beneficial project development for mule deer anywhere in the Platte Valley.

To best plan future projects, the PVHP identified important vegetation and habitat attributes, including desired conditions, specific to enhancing mule deer habitat and they are:

1. **Shrub Nutritive Quality**
    a. Improve digestibility and protein content of browse
    b. Increase young age class of preferred browse species
2. **Vegetation Production and Utilization**
    a. Increase herbaceous production

b. Increase shrub production
c. Adequate size/scale of treatment to minimize impact of grazing ungulates

3. **Species Diversity**
    a. Increase diversity of plant types, ages, and sizes preferred by mule deer
    b. Increase desired forb cover/diversity
    c. Establish diverse shrub size, age, species, and density within that community type
    d. Increase native shrub and herbaceous cover in beetle kill and lodgepole stands
    e. Decrease/minimize invasive species
4. **Species Density**
    a. Increase density of species preferred by mule deer
5. **Aspen Regeneration**
    a. Create more young age class aspen stands
    b. Increase aspen density
    c. Increase aspen acreage
    d. Maintain healthy aspen stands
6. **Riparian Habitat**
    a. Improve stream health
    b. Increase stream stability
    c. Improve watershed hydrology
7. **Animal Barriers and Disturbance**
    a. Increase wildlife-friendly fences
    b. Decrease motorized disturbance

The Wyoming Game and Fish Commission (WGFC) committed $500,000 as seed money for the future funding of PVHP projects. These monies will require matching funds and will be tied to the identified desired conditions agreed upon by the PVHP. PVHP planning documents and project development and implementation will be changed as necessary to accommodate changing conditions, new information, opportunities, and issues.

Chapter 1: Introduction to the Platte Valley Habitat Partnership

Jessica Clement

Introduction to the Plan

This Habitat Plan is the culmination of a year's worth of work by diverse stakeholders and scientists and serves as the foundational document that fully explains the PVHP's origins, the collaborative and decision-making processes used, the decisions made and the science explored to create the desired conditions and monitoring methods outlined in Table 1 on page 43. This table and the maps outlining the areas where deer and their required nutritional needs are located, form the heart of this document. Those sections are the methods PVHP has created to determine the appropriateness of future projects for the WGFD to fund with their seed money, and for others to contribute matching funds. This table, maps, short explanations, the flow chart of the method WGFD will use to connect PVHP to the WGFD funds which in turn will be applied to the Platte Valley mule deer habitat improvements, and the application form, are combined into a second document, "the PVHP Working Document". The Working Document is a summary of the information presented here and is therefore the adaptable, hands-on document to be used to guide project development and implementation.

The PVHP is founded on the principles of collaboration, science, and adaptive management. As the Partnership learns more about methods to improve mule deer habitat, and increases efficiencies and the efficacy to do so, both the Plan and the Working Document will change. These documents are living documents that will change as the Partnership learns more about mule deer habitat, mule deer, and any subjects it decides to embrace.

However, behind the creation of that Working Document is the learning done by the PVHP. This and the processes used to go through it collaboratively are documented in this Plan. After a short introductory section to the PVHP and its origins, the collaborative process and decision making methods used are explained in Chapter 2. Chapter 3 borrows heavily from the Western Association of Fish and Wildlife Agencies (WAFWA) Intermountain West Guidelines (Cox et al. 2009) to provide biological information regarding mule deer needs in the West and in the Platte Valley.

Chapter 4 explains what vegetative conditions are in the Platte Valley, what types of treatments have been and are envisaged to improve mule deer habitat, and the locations where those efforts should be focused. Chapter 5 is a

brief description of the social and economic benefits PVHP associates with mule deer habitat improvements and Chapter 6 outlines funding mechanisms that have been designed to facilitate those improvements. Chapter 7 summarizes the adaptive management process and the role of monitoring and project proposals. This Plan and the Working Document contain the vision, knowledge and decisions of the PVHP. They are both living documents that will undoubtedly change over time as PVHP learns about more about mule deer and their habitat, and effective ways to improve mule deer habitat. Through collaboration and adaptive management, PVHP will continue to improve the plan over time.

Each chapter has been written by one or more partners, which speaks to the collaborative nature of this effort. A fully integrated and collaborative effort by many stakeholders requires different stakeholders to take on some responsibility based on a common vision between them. This Plan and the Working Document embody both the vision and the efforts by the many different PVHP partners.

Introduction to the Partnership

The PVHP exists because of the deep concern and real action by local residents and landowners, as well as non-profit and governmental partners around the State of Wyoming. For one long year, stakeholders met almost every month for a whole day or more, to find ways to stabilize and improve mule deer habitat in the beautiful Platte Valley of Wyoming. Step by step the participants in this process found ways to work together to define the geographical, institutional, ecological and other issues, explore solutions and implementation strategies, and ways to measure success. Without the considerable amount of work behind the scenes by private landowners, concerned citizens, hunters, outfitters, members of the SERCD and the staffs of the WGFD, BLM, University of Wyoming Extension, USFS and NGOs, no project work to realize these strategies on the ground this very summer could be started. All this hard work has culminated in this first iteration of a PVHP Plan. The WGFD convened the Partnership and made a considerable amount of seed money available to initiate the proceedings. But without the consistent support and hard collaborative work of all the Partners (see page 79 for a list), this Plan would not have been developed, and the outlook for healthier and more numerous mule deer in the Valley would not be as hopeful.

Before the PVHP was convened, other efforts took place first, indicating the need for the partnership to exist. In 1998 it had become increasingly apparent to wildlife agencies around the western United States mule deer populations were once again declining. The decline was also of great concern to these agencies' constituents, including those in Wyoming. In 2007, it was decided to

embark on collaborative processes with stakeholders in two key regions of Wyoming.

The first was the Wyoming Range in western Wyoming, where the agency went through a collaborative process with local residents to assess what the issues were that impacted mule deer populations in participants' opinions and then asked participants what solutions they thought would be most effective, WGFD and stakeholders went through the Plan and finalized its contents. This Wyoming Range Mule Deer Initiative (WRMDI) completed the first iteration of its mule deer management plan in 2011, and a habitat plan was finalized in 2012. The WRMDI collaborative process is ongoing and its plan is being adapted over time to include new data, new tools and new learning from ongoing management.

In the meantime, the second mule deer initiative the agency had identified for this approach in 2007, the Platte Valley in south central Wyoming, was initiated as residents increasingly voiced their concerns regarding declining mule deer numbers. The local community organization Voices of the Valley (VoV) approached the agency with increasing insistence the issue needed to be addressed. The agency responded by escalating the timing of their second initiative, which became the PVMDI. This Initiative followed the same collaborative process that had been designed for WRMDI, and it too resulted in a first iteration of a mule deer management plan in early 2012.

The solutions that local hunters, outfitters, residents, NGOs from the area and elsewhere, and many government agencies had discussed with WGFD during the PVMDI and which were addressed in the PVMDI plan could be broadly slotted into two categories: mule deer management and habitat. While the PVMDI collaborative process is ongoing and will continue to focus on the effectiveness of such measures as limited quota hunting and predator controls on mule deer populations, the agency could not improve the habitat needs of Platte Valley mule deer without some type of ongoing cooperation with private landowners and public land managers.

Any effort to improve mule deer habitat in the Valley needed to be a long-term effort, one that allowed landowners, public land management agencies, WGFD, non-profit organizations, and many other stakeholders to learn together from the successes and failures along the way, and address the entire landscape in an ecologically, economically and socially comprehensive manner. The wellbeing of the mule deer herd in the Platte Valley is not a single, isolated issue but is dependent on and interdependent with such factors such as weather conditions, range conditions, beetle killed trees, hunting regulation strategies and success, economic conditions allowing hunters to recreate or agencies to allocate staff time, hunting related income from hunters and outfitters, competition and predation with other animals and many other factors.

The PVMDI process clearly indicated to WGFD how much interest there was among many different types of local stakeholders, including VoV, to improve mule deer habitat. WGFD Director Scott Talbott and his staff, with the support of the WGFC, then took measures to be able to go to the next step. Funding was allocated to use as seed money for habitat work over the long term and to hire a collaboration practitioner to design and facilitate this landscape scale effort. WGFD announced and initiated the PVHP process on May 17, 2012.

During the months leading up to that first meeting, I was awarded the work as the collaboration practitioner and immediately started by conducting a situation assessment for which I interviewed 22 individuals who were each members of different stakeholder groups and would represent different viewpoints. The interviews explored stakeholders' thoughts on root problems related to mule deer habitat, what would happen if they were not addressed, whether they would be willing to participate and whether creating a habitat plan would be beneficial and other questions. All interviewees said they were willing to participate in this collaborative process (more detail regarding this assessment is in Chapter 2) and all recognized improving mule deer habitat in the Platte Valley would need to be a long-term effort. One of the best possible outcomes of a PVHP process mentioned most often in this assessment was all stakeholders would still be at the table after a year.

The collaborative process started in May of 2012 and as of writing this Plan, all stakeholders are still at the table, and more have joined. The group has been exploring the complexities of land management regulations, policies, budgets and possibilities, mule deer nutritional needs, vegetation conditions, the latest science regarding mule deer habitat requirements, creating a vision, goal and objectives which were unanimously agreed to and decision-making methods were found that are fair, transparent, inclusive of all opinions and information and yet fit agency decision-making space. Federal, state, landowner and non-profit partners have stepped up to table to contribute time, effort and money to create monitoring methods that are effective and yet within their means. The dedication to this effort has been consistent and focused by all stakeholders. This Plan represents evidence of how more good can be achieved by different stakeholders working together than can be achieved separately, given time and motivation. All the partners of the PVHP are demonstrating together the power of place-based, landscape scale collaborative approaches. Although there are still significant issues yet to be addressed and much work to be done, the Platte Valley now has a better chance than ever of seeing its mule deer numbers rise and this Plan provides the foundation on which to build that effort.

Chapter 2: The Collaborative Process, Decision-making and Decisions

Jessica Clement

Results of the Situation Assessment

Before the PVHP was initiated, I conducted a situation assessment to explore whether stakeholders were prepared to engage in this collaborative effort. Below is a summary, with the complete results in Appendix A.

What are in your opinion the main issues regarding the mule deer herd habitat in the Platte Valley?

- Habitat protection in all its many forms (need undisturbed areas; better monitoring of plant species; land fragmentation)
- Animal population dynamics, including elk numbers, predators, and whitetail deer.
- Adequate forage especially in transition zones.
- Periods of drought and hard winters – weather related.

What would be the consequences of not addressing mule deer habitat?

- Mule deer herd would decline.
- Some stakeholders are not convinced habitat focus would make a difference to deer/fawning numbers.

Would you be willing to participate in this collaborative effort?

Yes (all stakeholders)

What would be your reasons for participating in PVHP?

- Love of place and wanting to keep its wildlife populations viable for future generations.
- Feeling that mule deer are an essential species in the Platte Valley.
- If you're concerned about the problem, don't sit out on the process.

What would be the best possible outcome after one year?

- Have everyone still at the table.
- Improved communication and finding common ground.
- Habitat plan (90%).
- Identify uncertainties.
- Find measures to track change in habitat conditions and mule deer population.

- Other

What would be the best possible after ten years?

- Identify real problems and doing something about them (plan and action).
- Land management agencies, WGFD and private landowners find ways to cooperate on a large scale.
- Improved forage conditions.
- A ten percent improvement rate in overall fawn survival.

What would be worst possible outcomes?

- Important stakeholders leave the table.
- We become another Pinedale.

What are necessary factors for an effective process in your opinion?

- Stakeholders remain at the table.
- Stakeholders' willingness to be open, listen and learn.
- A strong learning component and looking at all the science.
- A leader/moderator who ensures the process stays on track and everyone is heard.
- Transparency is important.

Who needs to be at the table?

- Private landowners.
- All local, state and federal agencies directly related to mule deer habitat and populations (WGFD, USFS, BLM, Conservation districts, USFWS).
- Sportsmen of all stripes
- Outfitters
- Stockmen, woolgrowers
- Conservation and environmental groups of all stripes (Audubon, Wyoming Outdoor Council, RMEF)
- Energy companies
- Tourism
- Governor's office

Process design

Using the information from the situation assessment, I drafted a process that:

- Strategically took the group from creating a process, finding an initial decision making method, gathering and learning different sets of

information related to mule deer, their habitat, vegetation conditions past, present and future and many other subjects.

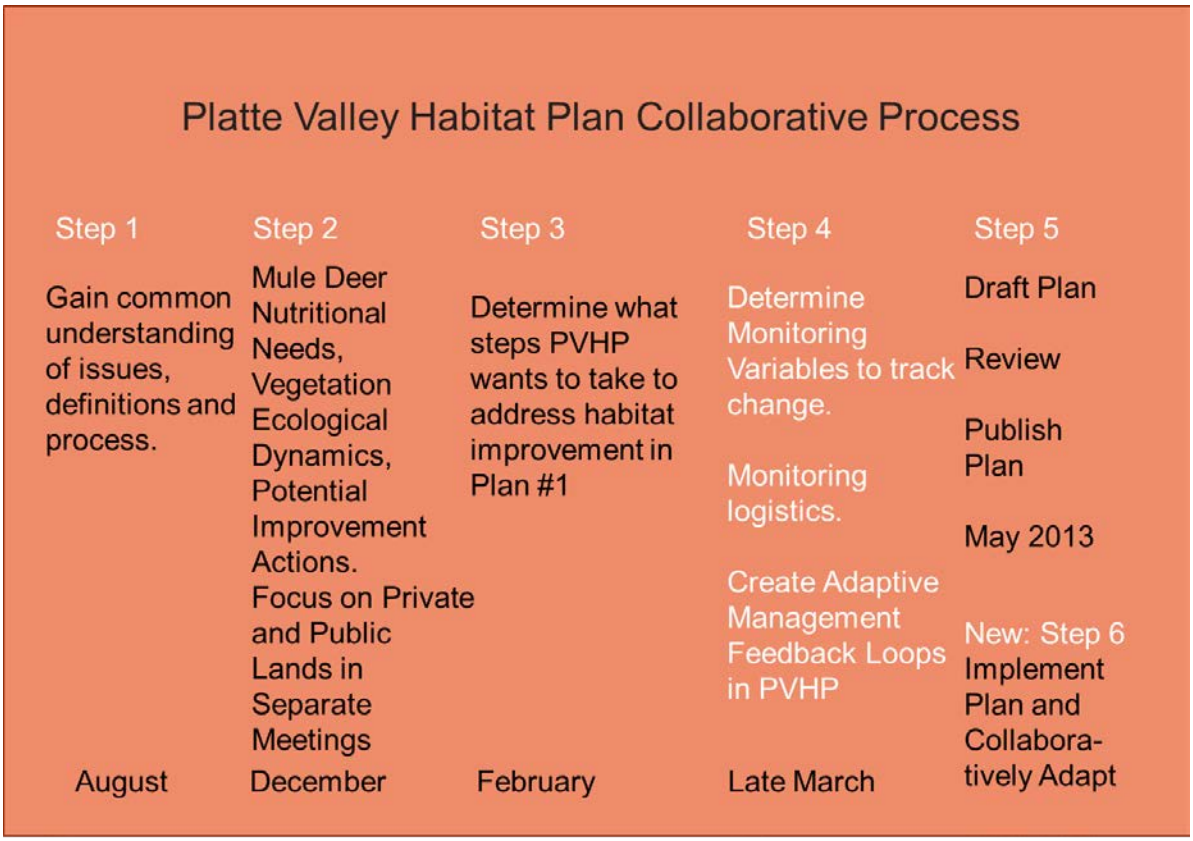
- Would allow for an enormous amount of work to be achieved by a set date (May 2013), by a very large and diverse group of stakeholders, using iterative deadlines to accomplish each step.
- Included enough flexibility for the group to change tack somewhat, or respond to new information, and still complete the process by May 1, 2013. (E.g. the group voted unanimously to postpone meetings through October and November for hunting season).
- Was unbounded: any stakeholder was able to join the process whenever schedules allowed and be able to learn and provide meaningful input.
- Created as much transparency as possible. The website that WGFD generously created for the posting of presentations, articles, meeting notes and other relevant information was an important tool.

The draft process was presented to the Partners on May 17, 2012, deliberated and agreed to unanimously. It has since altered somewhat due to e.g. timing issues, and any changes would be discussed by the Partners and decided on by them.

The first decision making method was simply using thumbs (up = agreed to, down = disagreed, middle = need more information). As the group progressed, the Five Finger Scale decision making method was adopted that:

1. Encourages consensus but does not demand it.
2. Uses a majority vote that is dependent on thorough deliberation and contingent on the facilitator and the Partners attempting to achieve consensus.
3. Is contingent on the use of adaptive management for Partners to learn about the effectiveness of their decisions, consensus or majority vote.

Figure 1: The PVHP Collaborative Process



Five Finger Scale:

A more precise indication of support for a decision that is visible to everyone. Participants show their level of agreement by the number of fingers they hold up:

1 Finger: Complete Support (I like it very much)
2 Fingers: Support (I'm very comfortable with this)
3 Fingers: Agreement with Reservations (I can live with it)
4 Fingers: Mild Agreement (I don't like this, but my reservations are not enough to hold up the process)
5 Fingers: Disagreement (I don't support the proposal)

If all members of the group present express approval at levels 1, 2, 3 or 4, then the proposal is agreed to and constitutes a PVHP consensus recommendation. The challenge to the group is to try to move people present from a higher to a lower number. If some members present continue to disagree (level 5) after the group has tried to address their concerns, then consensus has not been reached and objections will be documented for future discussion. If 2/3rds of the group present agree at a level 3 or better, the proposal moves forward.

Vision, Goals, Objective and Benefits

Foundational work that needs to be conducted for a group of diverse stakeholders is to stay on task for a long term process such as this must address the group's goals and objectives, as difficult as this may be. This is where the complexity of the issue and tasks becomes evident, where decision-making space is defined, where the group laboriously finds its common ground and where frustrations rise to the surface quickest. Nevertheless, taking an iterative approach over two sessions, the group unanimously decided on the following Vision, Goal, Objectives and Criteria for the Platte Valley Habitat Partnership.

Vision

The Platte Valley Habitat Partnership considers the quality and quantity of the mule deer population in the Platte Valley important to its landscape and communities to preserve biodiversity, economic, recreational, cultural, and aesthetic values.

Goal

The Platte Valley Habitat Partnership's goal is to improve wildlife habitat with emphasis on sustainable mule deer populations.

Prime Objective and Criteria: Biodiversity Value of the Mule Deer Herd

Prime Objective: To improve habitat conditions to increase the population size and health of mule deer

Proposed Criteria:

- Monitor species diversity of flora
- Age Class Diversity of Shrubs
- Browse Class
- Shrub and herbaceous productivity
- # of acres treated
- Shrub recruitment
- Pregnancy rates of mule deer (WGFD)
- Fat reserves of mule deer (WGFD)
- Population #'s of mule deer (WGFD)
- Doe-fawn ratios (WGFD)
- Mortality ratios (WGFD)

Benefit and Criteria 1: Economic Value of the Mule Deer Herd

Objective: To enhance economic benefits to landowners, communities and dependent interests by improving habitat to increase the population size and health of mule deer.

Proposed Criteria:

- # of hunters and other mule deer related recreationists (work with WGFD)
- Outfitter revenues (work with Chamber)
- Hospitality revenues (work with Chamber)
- Livestock AUM's (work with Conservation District)
- # of license applicants (work with WGFD)

Benefit and Criteria 2: Recreational Value of the Mule Deer Herd

Objective: To enhance recreational benefits by improving habitat to increase the population size and health of mule deer

Proposed Criteria:

- Hunter Satisfaction Surveys (WGFD)
- Revenue
- Visitor Surveys (USFS)
- Field personnel contacts (BLM and USFS)
- Increase in political support
- Increase in support from more groups and funders (attendance and money)
- Types of Chamber of Commerce Requests (Chamber)

Benefit and Criteria 3: Cultural and Aesthetic Value of the Mule Deer Herd

Objective: To maintain the character of the Platte Valley landscape, culture, and aesthetics by improving habitat to increase the population size and health of mule deer.

Proposed Criteria:

- Modify existing USFS visitor use surveys to address C and A values
- Modify WGFD hunter satisfaction surveys to address C and A values
- Look at BLM public perception surveys
- Develop Community Survey for Platte Valley, baseline and changes
- Develop landowner survey
- Look at WGFD's PVMDI survey

Benefit and Criteria 4: Mission Compatibility for State and Federal Agencies

Objective: To facilitate state and federal agencies to serve their constituents in a manner compatible with their missions by working to improve habitat for mule deer and other species and purposes.

Proposed Criteria:

- Number of projects that cross ownership and jurisdictional boundaries
- Mix of funding to complete projects

Chapter 3: Habitat Requirements of Mule Deer in the Platte Valley

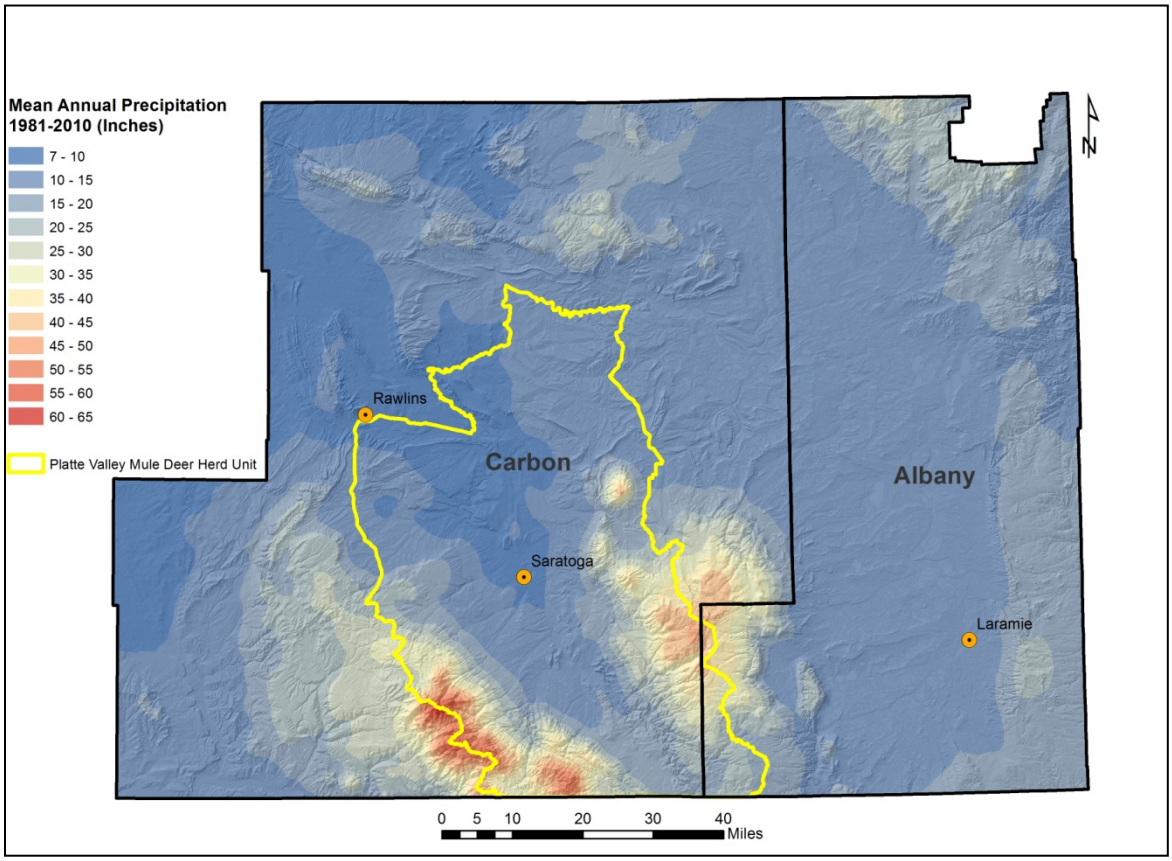
Ryan Amundson and Will Schultz

Introduction

Regardless of where you are in the West, including the Platte Valley, there are several key habitat components all mule deer require: food, cover, and water, and space. In addition to these components, their arrangement on the landscape is also important to be effectively utilized by mule deer.

Seasonal migrations are common, with mule deer moving great distances from higher elevation summer ranges receiving more annual precipitation, falling mostly in the form of snow. Lower elevation winter ranges nearly always receive less annual precipitation. Average precipitation in the Platte Valley ranges from 5-10 inches annually (Figure 2).

Figure 2. Average Precipitation in the Platte Valley



Humans, primarily to improve forage for livestock, have manipulated historic transitional and winter ranges. Agricultural and urban conversions are common

in the Platte Valley. Mule deer in mountain-foothill environments contend with long duration winter energy deficits. Environmental extremes, forage quality and quantity, and the resulting condition of animals are key factors in mule deer population dynamics in the Platte Valley, in Wyoming, and throughout the West.

Mule Deer Habitat Basics

Mule deer are primarily browsers, with the majority of their diet being comprised of forbs and browse. Because deer have a smaller rumen than cattle in relation to their body size, they are forced to be much more selective and specific in their dietary intake. Plant communities consisting of a variety of species are more beneficial for deer than single species communities. Plant age is inversely correlated to plant forage value, so younger and more diverse plant communities are most beneficial to foraging deer. Mixtures of age classes of plant communities are also important, as some plants are utilized as forage resources, while others provide hiding and thermal cover.

Instead of eating large quantities of low-quality feed like mature grass, mule deer must select the most nutritious plants and parts of plants. The presence and condition of the shrub component of the landscape influences many factors affecting mule deer populations. Shrubs occur mostly in early successional habitats; that is, those recently disturbed and going through the natural processes of maturing to a climax state. This means disturbance is a key element to maintaining high quality mule deer habitat. In the past, different fire cycles and human disturbance, such as logging, resulted in higher mule deer abundance than we see today. Although weather patterns, especially precipitation, drive mule deer populations in the short-term, only landscape-scale habitat improvement will likely result in long-term gains in mule deer abundance.

Periodic disturbance is usually necessary to stimulate plant productivity. Disturbance can be achieved through mechanical, chemical, or biological means, including but not limited to: controlled grazing, prescribed or natural fire, herbicide applications or mechanical methods (i.e. brush mowing).

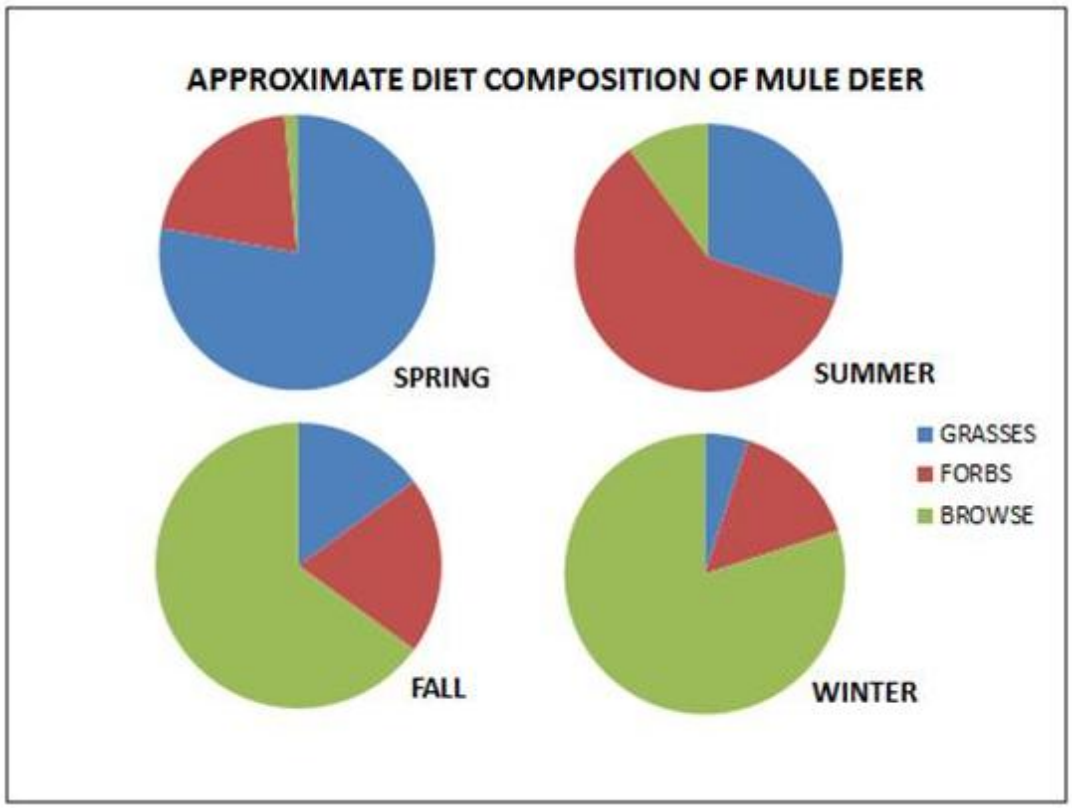
As forage plants mature, their cell walls thicken. Parts contained within cells are up to 98% digestible (Short and Reagor 1970). Some of the cell wall constituents can be broken down by microbes in the rumen, while others cannot. Lignin, a non-carbohydrate polymer that binds the cell together, is indigestible. The older a plant becomes, the more cell wall material it contains, therefore rendering it less digestible. Additionally, older age plants typically possess greater amounts of secondary compounds that negatively affect taste or odor of the plant in order to protect it from herbivory. Finally, many of the preferred browse species lose vigor and production with age. Not only does the lack of annual leaders present obvious problems for foraging mule deer, but the lack of seed

production significantly reduces a plant's ability to replace itself or recruit new plants.

Food availability is the main limitation on daily intake at low food abundance, whereas digestive processing capacity limits intake at high food abundance when food quality is low or metabolic demands are very high. At high food abundance and quality, surplus energy intake beyond the immediate metabolic needs of the deer may be successfully stored for later use and is a key for overwinter survival of deer as well as production and survival of fawns.

The seasonal deer diet varies from a growth promoting (high protein and phosphorous) diet in spring to a fattening (high carbohydrate, fat, and energy) diet in fall, to a maintenance (low protein and energy) diet in winter (Dietz and Nagy 1976). Seasonal use of plant types varies from high grass use in spring, high forb-use in summer and fall to high shrub use in winter (Figure 3). Variability among seasons, deer ranges and years is exceedingly high.

Figure 3. Diets within each season of the year can vary substantially depending on available moisture, vegetative species presence/absence in each seasonal range, and individual plants' stage of growth.



Habitat Selectivity

Mule deer are mostly active during late afternoon, early evening, and early morning hours. The rest of their day is spent resting in protected and well covered environments such as 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 comprised of browse vegetation is often preferred. 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 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. A mosaic of plant communities providing hiding cover, thermal cover, fawn-rearing habitat, and foraging areas intermixed are more valuable than a habitat that is lacking one or more habitat components.

Many of the deer in the Platte Valley migrate between relatively moist higher elevation, summer range habitats and lower, drier, foothill or basin wintering areas. In most of the Platte Valley, this movement primarily occurs in April and May and again in October and November. There is an ongoing mule deer telemetry study that will provide further insight into mule deer movements and habitat use throughout the Platte Valley and this information will assist in prioritizing future habitat projects in the Valley.

In many areas, deer making seasonal movements will use mid-elevation, mountain shrub transitional ranges that can provide high quality forage. During mild winters (i.e. minimal amounts of snow), deer will use transitional ranges for extended periods. Transition ranges provide abundant, high quality forage that can improve the condition of deer prior to arriving on winter ranges and help deer regain condition more quickly in the spring.

Cover Requirements

One third to half of a deer's use area should be comprised of cover (thermal and hiding), while the remaining area made up of foraging habitat. Inadequate cover may result in increased predator efficiency and rates, particularly when compounded with environmental stresses.

Thermal cover is necessary to protect deer from cold temperatures, high winds, and winter snows as well as from heat and insects in summer. Adequate cover, regardless of season, allows mule deer to conserve energy for body maintenance and reproduction.

There are four kinds of cover habitat: escape/hiding, loafing, thermal and fawning. Three of the four cover types are required, regardless of seasonal range. Fawning cover is only required on spring and summer ranges.

1. **Hiding/Escape Cover:** Escape cover is used by mule deer whenever an immediate threat is perceived. Escape cover should be interspersed throughout the habitat, providing deer with maximum security. 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. (Thomas et al. 1979)
2. **Loafing Cover:** Loafing cover is where mule deer spend most of their time, including time spent sleeping, resting and ruminating between periods of feeding and traveling. Loafing areas are close to escape cover and provide seclusion from human disturbance.
3. **Thermal Cover:** Thermal cover is very important to mule deer habitat, protecting deer from cold winter temperatures and summer heat and insects.
4. **Fawning Cover:** Fawning cover contains areas of escape cover and hiding cover closely interspersed, along with water sources and high quality forage. High quality riparian habitats can provide conditions for improved growth rates and survival during the first year of life.

Development and Habitat Fragmentation

Fences, roads, subdivisions, and energy development sites may all negatively affect mule deer daily or seasonal movements and migrations, and may ultimately preclude use of important habitats (i.e. crucial winter range). Efforts should be made to mitigate these impacts whenever possible. The human population of the Platte Valley is slowly increasing. With continued population increases, subdivision of land, residential development, road and infrastructure development, and further fragmentation of habitats is likely. In addition to residential development on private lands, reserves of oil and natural gas, as well as opportunities identified for wind energy development, also occur in the Platte Valley. Energy development and extraction on public and private lands will potentially occur. Lower elevation winter range areas will likely be most impacted by this type of development. In addition, an increasing number of people are recreating on public lands in the Platte Valley in multiple seasonal ranges utilized by mule deer. This disturbance may result in the loss of habitat effectiveness in key habitats that may otherwise be suitable.

Physiological stresses occur when energy expenditures by an animal are increased due to alarm or avoidance movements. These are generally attributed to interactions with humans or activities associated with human presence (traffic, noise, pets, etc.). During winter months, this stress could be

particularly important because animals are typically operating at a negative energy balance. In addition, the diversion of an animal's energy reserves can be detrimental for other critical periods during the life cycle, such as gestation and lactation.

Seasonal Ranges

Because mule deer food varies seasonally, important mule deer range requires a mixture of trees, shrubs, (woody, perennial plants of low heights), forbs (herbaceous, broadleaved flowering plants), and grasses. Locations where food, cover, and water occur together are preferred feeding areas. 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 forages. 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 early-greening grasses and other palatable, succulent, and nutritionally rich herbaceous plants. In late spring, their diet includes a variety of grasses and forbs with a few shrubs. By following snowmelt patterns to higher elevations, animals access high-quality emerging plant shoots, capitalizing on high protein levels found in plants at that particular growth stage.

For mule deer does, energy costs are highest during the period of lactation. Energy requirements increase exponentially for does during the first month following parturition, and are higher than requirements of bucks or yearlings during this time period. The highest energy cost for does occurs from late winter to mid-summer.

Delayed snowmelt increases winter mortality of deer if body reserves are depleted long before new plant growth resumes. Late spring storms may have detrimental effects on the deer's ability to recover their body condition leading up to parturition. Following winters with deep snows, deer may give birth to smaller fawns due to the doe's high nutritional demands in their last trimester of pregnancy.

In some years, high protein requirements associated with lactation may be poorly timed depending on the level of green-up occurring in the Platte Valley. These added levels of animal stress caused by environmental factors may be detrimental to the fawn(s), doe, or both. Timing of parturition, body size of fawn(s) at birth, and early survival of fawns are closely linked to winter and spring nutrition. However, Tollefson et al. (2010) makes it clear quality of forage

during summer and fall is very important when concerned about mule deer fawn productivity.

Body fat is the major energy reserve of the body. Carry-over effects of previous nutritional deficiency may ultimately affect pregnancy rates if animals are unable to replenish reserves following severe winters or successive years of producing young. Higher fat levels in does likely increases the rate of pregnancy, twinning, and size of fawns at time of parturition. Winter and spring body fat levels buffer the effects of declining food supplies when energy demands cannot be met by the forages mule deer are choosing on the landscape.

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. In summer, cool shaded slopes or an area with a breeze to deter biting insects will be most attractive. The idea of attractiveness can also include seclusion or protection from wind. 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. The remaining 60 percent of the mule deer range should be feeding areas (Olson 1992).

Riparian areas comprise a small portion of the landscape but are of high importance for mule deer. Thermal and screening cover and year-round forages for deer are found in this habitat type. With access to moisture, these areas can support a higher diversity of plants (grasses, forbs and shrubs). Extended green periods due to water table access result in improved succulence of vegetation and elevated nutritive content for longer periods of time. Riparian habitats are desired by domestic livestock for the same reasons, resulting in potential competition for forage, cover, and space.

High elevation habitat types in the Platte Valley utilized by mule deer as summer range include coniferous forests (lodgepole pine, Douglas fir, spruce, other spp.) and smaller inclusions of deciduous forest, mainly aspen, in the Snowy Range and Sierra Madre mountain ranges in the Medicine Bow National Forest. Mature forests are used for thermal and hiding cover and open meadow or shrub habitats are utilized for foraging. Availability and quality of forage in late summer and early autumn, a time when mule deer does face multiple energy demands, is critical to reproduction. The reproductive success of mule deer does can be strongly correlated to the nutritional quality of diets ingested and body condition. Poor diet quality can result in a lower probability of becoming

pregnant, reduced twinning rates, as well as a later onset of estrous. Focusing efforts on assessing and improving the quality and quantity of forages available in summer and fall will likely result in improved mule deer populations and productivity of the herd (Tollefson et al. 2010).

Highest intakes of digestible nutrients by mule deer occur in summer. Metabolic and nutritional requirements may preclude animals from feeding in areas with low forage abundance or low nutritive value. As forage plants mature and their quality (including energy) declines in July and August, mule deer does experience the stress of lactation and bucks require greater nutrient levels for antler growth. Therefore, energy may be limiting during late summer, and can be further exacerbated by drought.

Regaining body mass lost during winter is critical for adults in the population. Mule deer does will continue to lose body mass for several weeks following fawning because of the high demands of lactation. In normal years, does are able to regain body mass quickly during the summer. Heavier females are more likely to reproduce and to produce a greater number of fawns (i.e. higher twinning rates) and have earlier fawning periods than lighter weight females (Tollefson et al. 2010).

Summer foraging conditions and the body mass of does in the fall are two key factors that ultimately determine whether a fawn(s) will be carried to term or not. Nutritional resources available in summer and autumn are used by juveniles to increase the likelihood of attaining a body mass and condition that enable them to survive the upcoming winter.

Although hiding, thermal, and fawning cover are important to deer, habitat quality on forested landscapes (Summer Range) usually is considered in terms of forage quality and quantity. Mule deer require habitats comprised of multiple seral stages to meet their habitat requirements in high elevation forest environments.

Fall – With fall frosts, mule deer shift dietary intake to predominantly shrubby vegetation. Forbs still receive moderate use if available and may still account for a significant portion of the diet. As mule deer descend in elevation in fall, their diets shift and contain a higher percentage of mixed mountain shrub species such as true mountain mahogany, antelope bitterbrush, currant, and a declining amount of herbaceous forages as those plants senesce. Until snow levels impede movement, mule deer will typically reside at this elevation through the breeding season. Within the Platte Valley transition ranges are comprised of private lands, State of Wyoming owned lands, fringe areas of USFS lands, and lands administered by the BLM (Rawlins Field Office). Shrubby vegetation such as antelope bitterbrush, while requiring more energy to process

but is high in carbohydrates, is preferred by mule deer as they gain condition and fat stores in preparation for winter.

In winters without adequate snow cover, mule deer will remain on transitional ranges, where forage quality and diversity of plants (i.e., forbs and shrubs) is often higher than lower elevation basin habitats. Deer may also be forced to stay on transition ranges longer in spring based on snowpack levels in the higher elevations.

For bucks, energy requirements are typically highest during the fall rut due to increased activity levels and decreased time spent foraging. This activity results in loss of body weight and shrinking of important fat reserves. In late fall, they feed primarily on the current year's growth of leaves and stems of key shrub species. Females often allocate more time than males to foraging during the breeding season, but males increase their foraging times significantly post-rut.

Bucks are typically in best condition in early autumn before the onset of the rut and in worst condition in late winter. By comparison, timing of highest and lowest body condition is delayed for reproductive females. Females are typically in best condition at the onset of winter when their nutritional demands are lowest and in worst condition in the month following parturition.

Deer fawns with access to higher nutritional levels reach larger body sizes at the time of weaning, and the larger their individual body mass at the beginning of winter, the higher the likelihood of survival and subsequent recruitment into the herd. Transitional range habitats play a critical role in assisting fawns reach these important levels.

Body fat levels of mule deer does depend largely on summer and fall nutrition. Mule deer does are fairly effective at accruing body fat if late summer and fall forage quality is adequate, and can regain body fat prior to the onset of winter.

Winter – During this period, shrubs comprise the bulk of the deer diet because other kinds of food are dead and usually covered by snow. Important species on winter range in the Platte Valley include Wyoming big sagebrush, mountain big sagebrush, antelope bitterbrush, true mountain mahogany, and winterfat. Energy expenditures to reach these short-statured forage resources under snow are often higher than the nutritional gain from consuming them. Mule deer may also rely on hay field leftovers or stored forages as agricultural fields comprise some of the winter range in the Platte Valley.

During winter, mule deer prefer open-timbered, west-facing exposures and shrub-covered, south-facing exposures where warmer temperatures exist and snow depths are minimal. Thermal cover requirements increase on winter

range, but feeding areas and other types of cover are still necessary. Persistent snow cover greater than 12 inches deep generally results in deer moving to suitable winter range at lower elevations.

In the Platte Valley, snow depths directly influence the choice of traditional wintering areas as deer search for areas where energy costs are lower and food availability, specifically exposed shrubs, is higher. There several areas which have been traditionally selected by mule deer to serve as winter range. These are the Encampment River Canyon, Beaver Hills, Bennett Peak, Baggot Rocks, Cedar Hills, Savage Meadows, and Fort Steele Breaks winter ranges. The lowest elevation vegetative communities in the Platte Valley are comprised of sagebrush spp., bitterbrush, rabbitbrush, and small inclusions of other shrub species. During the heart of the winter and early spring when there is little ground forage available due to snow in the Platte Valley, mule deer are on a starvation diet of twigs and branches from browse species. Woody vegetation is more difficult to digest than grasses and forbs, and often lacks enough nutritional value to maintain body condition. The presence of volatile oils in evergreen and semi-evergreen shrubs such as sagebrush, juniper, and pine can greatly affect species use by deer on Platte Valley winter ranges.

During periods of inadequate nutrition and high environmental stress, mule deer use stored body fat and body protein (if necessary) to survive. Adult deer may lose 20% or more of their body weight while on winter ranges (Stewart 2011). Winter survival for deer residing in the Platte Valley depends on the weather, levels of stored fat reserves, and the deer's ability to conserve energy. In environments with prominent seasonal changes such as the Platte Valley, food resources are commonly limited during dormant seasons. Dietary quantity and quality are highly variable, with significant declines in digestible nutrients during the winter. Due to the poor forage quality available in winter months, it is often not possible for bucks to recover to pre-rut body mass levels. Regardless of habitat type, quality of typical winter range diets is inadequate to prevent high energy expenditures and weight loss in mule deer. However, the rate of weight loss can be reduced by improving winter range forage conditions. Winter and spring body fat levels buffer the effects of declining food supplies when energy demands cannot be met by the forages mule deer are choosing on the landscape.

In some cases, noxious or invasive species have infiltrated into native plant communities, replacing native shrub communities with a perennial herbaceous understory to nonnative grasslands dominated by invasive plants (i.e. cheatgrass). Low elevation, arid rangelands in the Platte Valley have been most susceptible to these invasions. Disturbances to these habitat types, particularly aggressive mechanical treatments and hot natural or prescribed fire, may result in expansion or invasion by nonnative species.

Expansion and maturation of juniper woodlands in the absence of disturbance in lower elevation transition and winter ranges may decrease understory diversity and productivity, resulting in less forage for mule deer (Bender et al. 2007, Cox et al. 2009). Increasing woody cover in some cases decreases the amount and diversity of herbaceous and browse species.

Winter snow accumulation in the Medicine Bow and Sierra Madre mountain ranges can be significant and is essential to assure perennial flows in springs and streams. Winter snow pack is also critical in providing soil moisture necessary for production and maintenance of high quality mule deer forages on all seasonal ranges.

Nutritional Demands/Requirements

Changes in the nutritional requirements of deer that occur with gestation, lactation, breeding and antler growth should be coordinated with seasonal changes in nutrient availability from forage plants. Nutritional requirements of deer are generally separated into five categories: protein, energy, minerals, vitamins and water. Research on deer nutrition has primarily focused on protein, energy, and minerals (phosphorus and calcium). These requirements are most often the ones that limit growth, reproduction and antler development.

Protein - Protein is very important for body growth in deer, especially for fawns and yearlings. Inadequate protein intake in a given year has also been shown to reduce antler development. Periods of inadequate nutrition for buck fawns may have adverse effects on antler development for several succeeding years. A deer must obtain at least a 6 to 7 percent crude protein diet to maintain rumen function, but a protein diet in the 13 to 16 percent range is required for successful growth, antler development and reproduction (Richardson 2013).

Protein requirements are typically highest during body growth, which usually coincides with periods of when highest forage protein levels are found in plants, the active growing season. If mule deer does can fulfill protein requirements for body maintenance, the remaining protein is used for milk production to support a fawn(s). Buck mule deer rapidly lose protein stored in the body during the rut and continue to lose body protein through the winter months. Green, succulent, and palatable grasses and forbs that start growth in early spring are important to replenish protein reserves. Similar to energy demands, high-protein demands also can occur when the nutrient content of food resources is low. Protein requirements increase during fetal growth, particularly during the third trimester, when fawns are growing rapidly in the does' uterus. Unfortunately, protein levels in available forages are at their lowest levels during this time of year as well. During lactation, protein requirements increase. Deer may be able to distinguish

differences in the protein content of individual plants and increase foraging rates on browse species exhibiting the highest protein content during winter months.

To meet protein demands, dietary protein usually is used before body protein, but intake of very low-protein foods may require the use of additional body protein. The use of body protein by a female in late winter and early spring may have negative impacts on fetal growth and result in decreased body size of fawns at birth and post-parturition.

Energy - Energy demands may be affected by weather conditions and the physiological state of deer. Energy deficiencies can result in slowing or stopping of growth, weight loss, reproductive failure and impaired rumen function.

High-energy and protein diets of spring and summer allow mule deer to regain mass and condition lost in the previous winter, as well as provide energy for lactation. Nutrient availability in summer drives replenishment of body reserves and subsequent reproductive success. Over the winter, fat deposits and protein stored from summer and fall forage intake determines whether animals survive, reproduce, or both.

Mule deer reduce activity and daily food intake in winter when food quantity and quality are limited. Under extreme environmental conditions, deer can reduce the amount of body reserves utilized by limiting all other activities besides eating and resting. Using less fat reserves to meet energy demands spares the use of body protein. Failure to conserve these body resources can ultimately lead to unsuccessful fawning.

Minerals - A phosphorus intake level of approximately 0.35 percent of dry matter intake is necessary to provide maximum weight gain, bone growth and antler development in yearling bucks (Richardson 2013). With the exception of a few plants in early spring, few forage species contain this level of phosphorus. Therefore, phosphorus may be a limiting nutrient for maximum antler growth. Diets containing 0.40 percent calcium and 0.28-0.30 percent phosphorus are required for acceptable growth and development in deer (Richardson 2013). The ratio of calcium and phosphorus in the diet is equally important as ratios ranging from 1:1 to 2:1 are ideal for proper absorption and metabolism (Robbins 1994). Some research in southeast Wyoming has shown calcium in forages to be 30 times higher than that of phosphorus (J. Freeburn, personal communication). Sodium, potassium, chlorine, zinc, iron, magnesium and other minerals are important, but most are needed in very small amounts and are usually supplied in native forages found in the Platte Valley's habitats. Again, diversity of vegetation is necessary to meet these specific nutritional demands.

Vitamins - Vitamins A, D and E are among the more important vitamins for proper growth and development in deer. Native forages and the deer's natural environment should contain adequate levels of vitamins to meet requirements of mule deer. Green, leafy forages contain adequate levels of Vitamin E and A, and sunlight is a natural provider of Vitamin D. Fawns receive a higher concentration of vitamins when receiving colostrum and milk from their mothers. Vitamin A is known to affect growth of antlers in males.

Water - Water requirements for deer vary with climate, type of food, physiological state and amount of activity. The amount of free water consumed is inversely proportional to the concentration of water in food. Forage plants, particularly during periods of active growth, often contain significant amounts of water. Water availability can be critical during drought situations when forbs and other succulent vegetation are scarce. Proximity to water is particularly critical to mule deer does nursing fawns. Long travel distances to water sources may result in increased rates of predation and reduced rates of gain for fawns and use of valuable energy resources by does. Management of plant communities associated with riparian sites is important from a diet and water supply standpoint.

Adding water to sites where all other critical habitat elements are found may result in increases in occupied deer habitats. Careful consideration when planning water developments is necessary, as water can greatly influence wildlife and livestock concentrations. If the additional water opens up previously inaccessible areas to livestock or large numbers of wildlife (i.e. elk), the added competition could ultimately be detrimental to mule deer.

Precipitation regulates and recharges water availability, and is a key influence on the distribution and relative abundance of mule deer. Free water sources are either snowmelt fed streams, springs recharged by annual precipitation that leak from subsurface ground waters, or manmade features (i.e. stock tanks, guzzlers). Many of the streams and springs in the Platte Valley can be ephemeral during drought years and dry during the heat of summer. Within higher elevation summer ranges of the Medicine Bow and Sierra Madre mountain ranges, water is not typically a limiting factor for mule deer. Late summer ranges and transitional ranges in mid-elevation shrub dominated communities may be water limited during prolonged drought cycles and where water sources have been depleted due to manmade diversions, juniper encroachment, and over use by livestock.

Wintering deer on low elevation sagebrush and mixed mountain shrub habitats are typically not constrained by water because snow is often available and low evaporation rates persist, which allow deer to meet their low water demands during this time of year.

Chapter 4: Biological Objective Implementation/Strategies and Monitoring

Heather Halbritter with contributions from Mike Murry, Wendy Haas, and Steve Loose

PVHP Objective: To improve habitat conditions to increase the population size and health of mule deer.

The PVHP objective identified by the PVHP for this habitat plan addresses the biodiversity value of the mule deer herd in the Platte Valley. This objective focuses primarily on the desired habitat conditions of the Platte Valley along with the tools and methods designed to help accomplish them. Habitat improvement projects have been completed throughout the Valley by Federal, State, NGO partners, as well as by private landowners, often in cooperation with each other. Projects will continue in the Valley and it is the desire of the PVHP to see these projects continue in a collaborative manner, designed at a landscape level scale whenever possible, and involve multiple stakeholders/partners.

The Platte Valley mule deer herd unit as managed by the WGFD and identified in the PVMDI remains the analysis area for the PVHP habitat plan. The Platte Valley has a mixed landownership incorporating lands primarily managed by the BLM, FS, State of Wyoming, and private landowners (Figure 4). Landownership consists of 26% BLM, 26% FS, 5% State, and 42% private lands. Landownership patterns vary from blocked public lands, checkerboard along the railroad right-of-way, to various mixtures of public and non-public lands.

Habitat types within the Platte Valley vary from high elevation forests to sagebrush and desert shrub environments with irrigated croplands throughout the Valley floor (Figure 5). Wyoming big sagebrush is the dominant habitat covering approximately 33% of the Valley, followed by lodgepole pine (19%), Mountain big sagebrush communities (9%), and irrigated croplands (7%).

Figure 4. Landownership in the Platte Valley

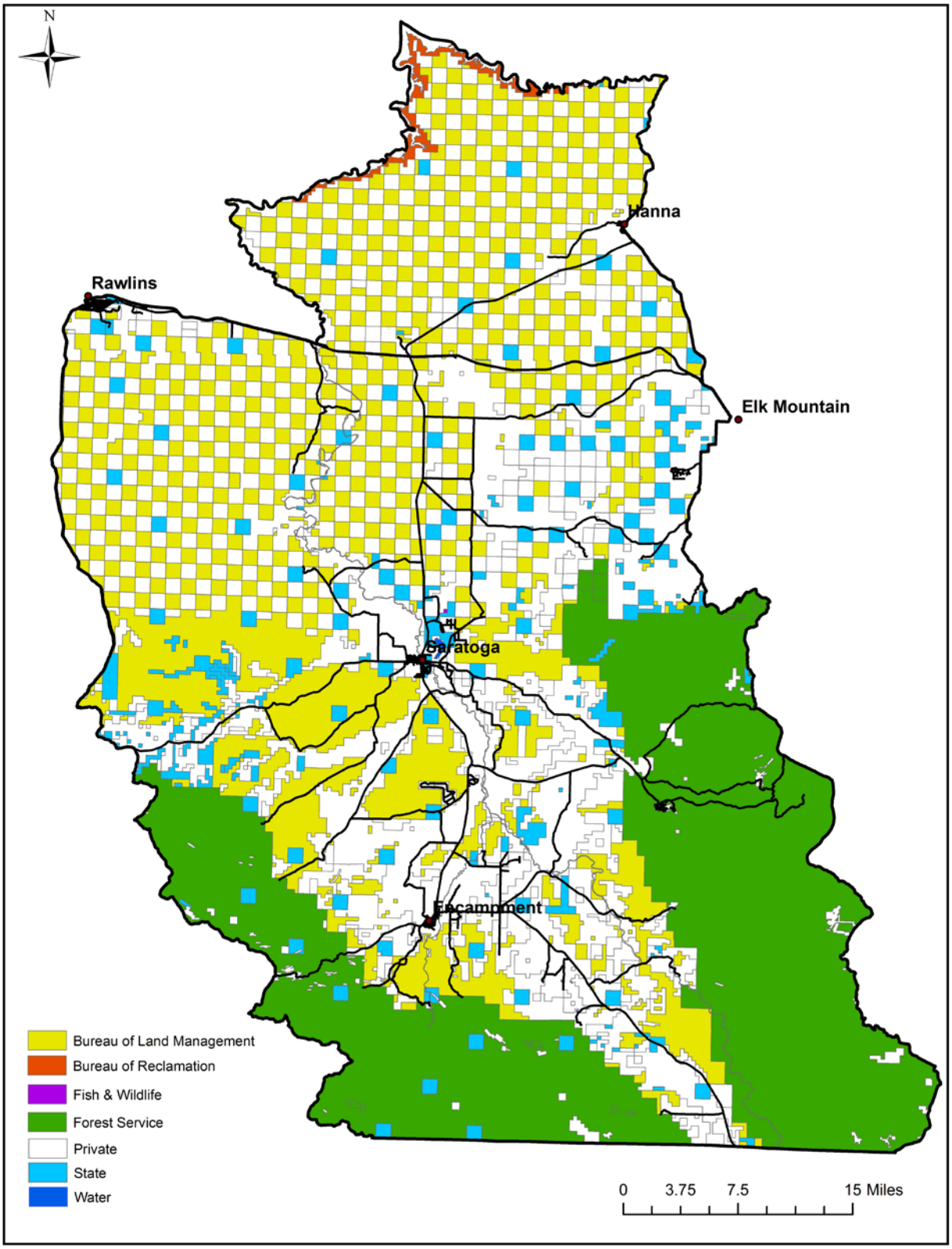
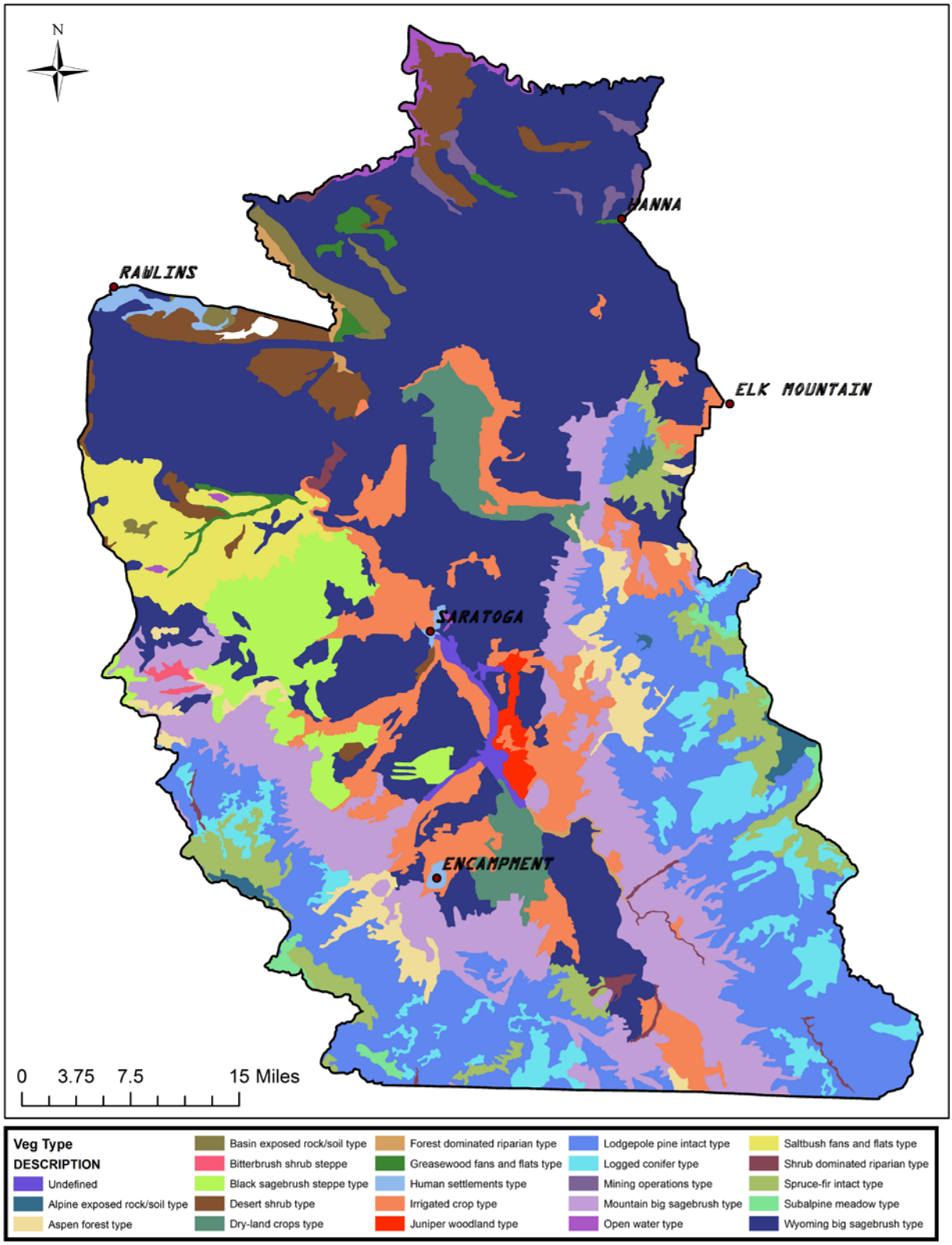


Figure 5. Vegetation types in the Platte Valley (Source: USGS GAP Analysis data)



In order to effectively address the PVHP Objective, the Platte Valley was separated into focus areas identified as important to mule deer (Figure 6). Two special management areas within the Valley were also identified, i.e. sage grouse core areas and lynx analysis units, both of which can impose limitations on the type and timing of habitat improvements conducted. Habitat enhancement throughout the entire Platte Valley is desired, however, mule deer seasonal ranges will be the initial focus areas where PVHP decided treatments would make the most positive impact to mule deer. As discussed previously, summer, transitional, and winter ranges are all important areas crucial to mule deer productivity and habitat enhancements will be designed according to the desired objectives as identified by the PVHP.

Sage grouse core area

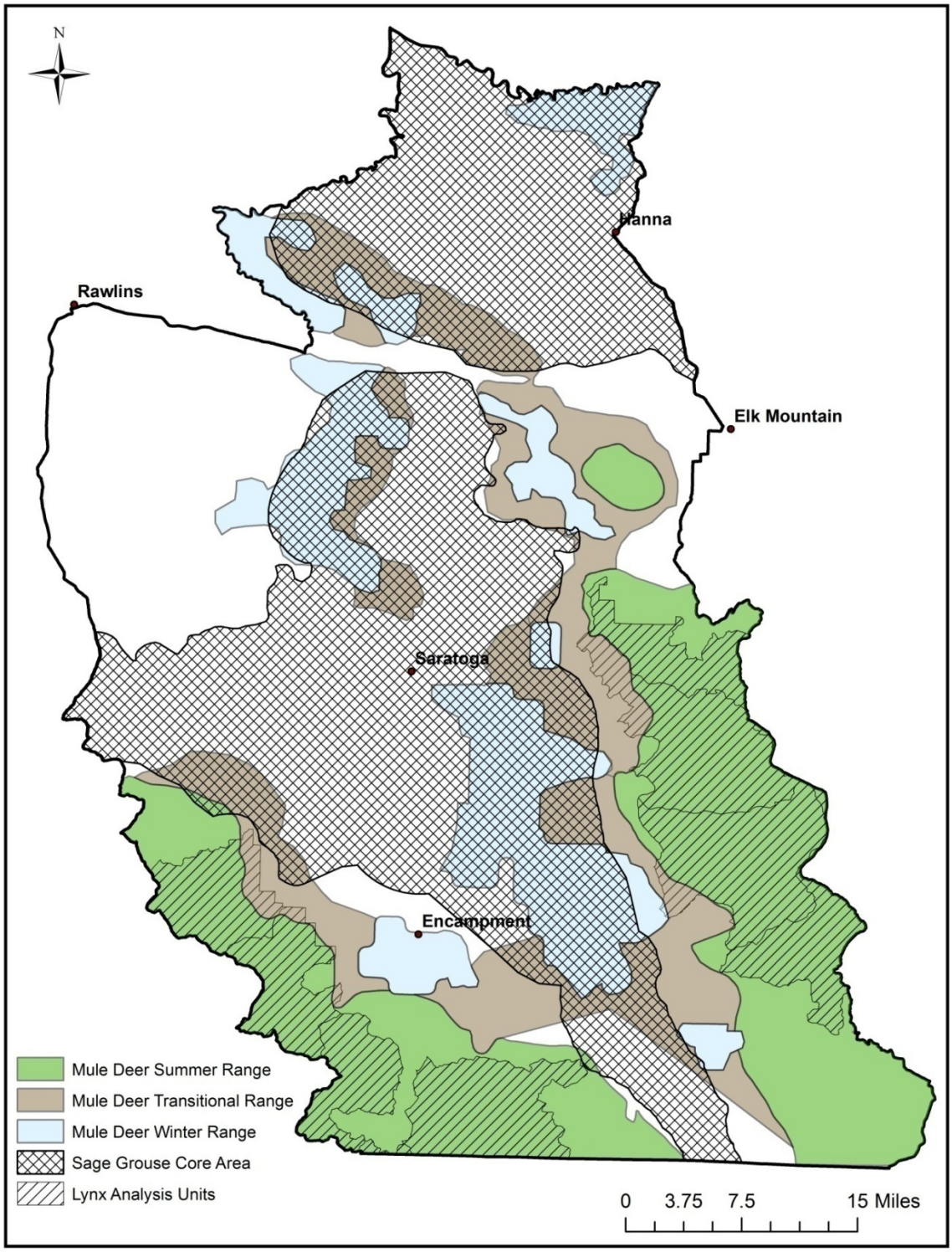
Sage grouse core areas, as identified through the Governor's Sage Grouse Executive Order, are found within mule deer winter and transitional ranges. This designation may affect/limit habitat enhancement techniques that may be applied, or the size and design of some treatments that may otherwise be beneficial to mule deer. While viewed as an impediment to many, core area designation does not prohibit habitat enhancement, but will require additional planning, coordination, and careful design and project implementation, as well as added requirements for habitat monitoring pre- and post-treatment.

For more information please refer to the Wyoming Greater Sage-Grouse Conservation Plan (Wyoming Sage-Grouse Working Group 2003) and the Wyoming Governor's Executive Order (Executive Order 2011-5 Greater Sage-Grouse Core Area Protection).

Lynx habitat area

The Forest Service has established a Lynx Management Direction for the National Forests in Colorado and Southern Wyoming to provide management direction that contributes to the conservation of the Canada lynx, which is listed as threatened under the Endangered Species Act, while at the same time allowing management and use of other natural resources (USFS 2008). There are several lynx analysis units within the Platte Valley in the Medicine Bow National Forest, all occurring within mule deer summer range. Specific management activities can directly affect lynx habitat, therefore, the utility of some habitat treatment methods may be limited in these areas. Specific guidelines will need to be adhered to within these units when developing habitat enhancement projects for mule deer.

Fig. 6 Mule deer seasonal habitats in the Platte Valley and sage-grouse core and Lynx analysis units.



1. Available Tools and Methods for Habitat Improvements in the Platte Valley

Numerous tools are available to improve habitat in the Platte Valley to reach the desired goal of a landscape scale mosaic to benefit mule deer and ecosystem function. Periodic disturbance is often necessary to maintain healthy and vigorous vegetative communities within shrubland and forested ecosystems. Vegetative species composition, diversity, and productivity can all be manipulated to enhance habitat using a variety of management techniques. The success of each method is highly dependent on site specific characteristics such as topography, soil and vegetation characteristics, precipitation, and livestock management flexibility. Also the applicability of some tools and methods may be limited due to restrictions within sage grouse core area or lynx management areas. Regardless of treatment type, areas with high densities of rabbitbrush should be treated with caution to avoid further increasing rabbitbrush density. The ability to manage livestock pre and post treatment will have an impact on the desired outcome of the habitat treatment. For all of these reasons, it is critical for landowners to partner with habitat professionals.

Mechanical Methods

Various pieces of equipment are available to treat rangelands and their use is dependent upon the objective of the desired range and wildlife habitat conditions. Whether the goal is to improve forage quality and quantity, enhance vegetation cover for wildlife, or to manage for invasive weeds, there is different equipment available to treat specific circumstances. Mechanical methods can be effective in the removal of live plants and seeds and can be used to selectively remove target species. The timing of treatments can have varying impacts on key vegetative species as well. It is important to identify the specific goals and objectives of a habitat project before deciding which method to use for treatment.

Disks and Plows

- Primarily designed to turn over soil and surface debris, kill existing vegetation, and prepare seed bed
- Specific equipment includes disk plow, brushland plow, disk-chain, off-set disk
- Leaves plant material at or near the soil surface
- Season for most effective plowing depends on the species concerned, precipitation patterns, and seeding practices to be followed

Anchor Chains and Cables

- Primarily used for uprooting trees and shrubs and are ideal for covering seed
- Useful practice when releasing suppressed understory species is desired
- Cables are about 1.5 to 2 inches thick and vary in length from 100 to 550 feet long
- Usually ensures enough sagebrush is left to satisfy wildlife requirements and maintains vegetation diversity
- Large acreages can be treated at a lower cost per acre
- Limitations include low kill of sprouting brush and understory species and double chaining often required with reseeding limited to broadcasting prior to final chaining

Roller Chopper

- Large steel cylindrical drum, equipped with several blades protruding 12-14 inches along the entire width pulled behind a crawler-type tractor
- Used to crush brush and small trees , suppress woody plants and kills non-sprouting plants
- Provides only temporary treatment of sprouting species since few plants are killed

Hydro-ax

- A 6-8 foot wide, boom-mounted mulcher, affixed to a reticulated tractor
- Mulches overstory vegetation which is retained as ground cover and facilitates establishment of desired seedlings
- Soil scarification can be minimized and ultimately reduce the potential for establishment of noxious weeds
- Treatments are usually more aesthetically pleasing to public

Dixie Harrow

- A combination of harrowing and broadcast seeding used to thin/reduce shrub density, diversify shrub age class and improve productivity
- Treatments should occur in the fall when damage to desirable plants is minimized, vegetative litter is maximized thus creating a better seedbed and the onsite existing seed is mature and viable and can be planted by the action of the harrow
- Allows areas to be treated or left untreated, thus creating a mosaic pattern on the landscape

Brush Mower

- Adjusting mower heights will create uneven aged stands of sagebrush and incorporate a mosaic pattern onto the landscape
- Promotes understory grass and forb growth and diversity in summer ranges
- Promotes leader growth on untreated sage or other shrubs intermixed

- Important to create a patchwork of small treated areas.
- Partial growing season deferment to promote health/vigor of desirable vegetation
- Does not kill sprouting plant species but can suppress them

Silviculture

From a mule deer perspective, a mosaic landscape is most beneficial because it provides forage, cover, and fawning grounds. However, as some stands have developed, the more crowded forests have a dense canopy and reduced understory forage productivity. Removing trees and decreasing canopy cover reduces competition for nutrients and moisture and opens up the canopy for sunlight allowing the release of preferred forage for mule deer and other wildlife.

Aspen forests are some of the most productive habitats in the western forests and provide high quality forage and adequate cover for mule deer. They are considered seral to coniferous forests and with advancing succession conifers eventually become dominant resulting in a decline in aspens. Removal of conifers (e.g. pine, spruce, juniper) from deciduous shrub or aspen plant communities is important for setting back succession and improving mule deer habitat. Mechanical harvesting of conifers encroaching within aspen stands serves to open up the canopy and provide favorable growing conditions for aspen regeneration. One of the challenges with managing aspen stands is excessive herbivory can impede the successful establishment of aspen sprouts. Therefore the scale of the treatment and the intensity, duration, and frequency of grazing needs to be considered to reduce impacts to aspen sprouts after treatment. Jackstrawing or hinging aspen trees and constructing brush piles may be necessary to limit wild ungulate browsing on sprouting aspen (Seager et al. 2013 – in press).

The Medicine Bow Forest Plan's recommended desired condition for aspen structural stages is:

- 3% in the grass/for/seedling stage (0-10 years old)
- 8% in sapling stage (11-30 years old)
- 38% in pole-sized trees (31-70 years old)
- 26% in mature trees (71-90 years old)
- 25% in overmature/decadent/encroached stands (90+ years old)

The type of silvicultural technique will depend largely on the topography, soil type, and season while minimizing soil disturbance and economically accomplishing forest management objectives. Forestry management can be accomplished through a variety of tree removal methods whether through using chainsaws or mastication equipment and treatments should consider benefits to mule deer whenever applicable.

The following techniques and recommendations are adapted from Cox et al. 2009:

Selection harvesting

Selection harvesting is often applied as an uneven-aged timber stand management strategy and is accomplished thru either single tree selection or group selection. Both methods maintain some level of canopy cover while increasing forage and providing cover for mule deer. Group selections should be incorporated to establish early successional shrub species important as mule deer forage and adequately spaced to result in a mosaic of openings throughout the stand.

Clearcuts

Clearcut harvesting removes all trees in a specified area and is often applied in an even-aged timber stand management strategy. Clearcuts generally result in an increase of early seral species after harvest and the benefits of forage production can last years after treatment. A certain proportion of trees within the harvest unit should be retained in order to provide a valuable microhabitat for deer.

Thinning

Thinning is a commonly used technique in forestry management that reduces the density of trees in overstocked forests. Thinning will space trees further apart thereby increasing soil moisture and open the canopy allowing more sunlight to reach the understory, thus increasing forage production. Maintaining clusters of dense vegetation within the thinned stand and leaving portions adjacent to riparian areas untreated will provide hiding cover for deer in important habitats. Leaving some slash provides for various wildlife habitats and promotes nutrient recycling.

Chemical Treatments

Chemical control of weeds and brush on rangelands can be an effective and environmentally sound tool to improve wildlife habitat. There are numerous herbicides developed for rangeland use, each with their own purpose and application specific to certain plant species. Several factors influence the type of chemical treatment and how it is applied including site accessibility, vegetation type, presence of non-target species, topography, weather, and soil characteristics. Soil samples are required to determine site characteristic and soil organic matter content in order to prescribe the correct rate of application. Various degrees of thinning brush as determined by the goals and objectives of a project can be achieved based on the application rate. For example at low rates, complete elimination of brush canopy is avoided while maintaining neutral or positive responses in herbaceous plants. Noxious vegetation such as

thistle and leafy spurge can be spot sprayed to reduce impacts on non-targeted vegetation species.

Sagebrush treatments

- Teburthiuron (trade name: Spike) is a slow release herbicide activated by moisture frequently used to manage sagebrush
- It is in a granular or pellet form typically applied at a rate of .5-1.5 lb/acre in most cases to thin sagebrush to allow for response of understory grasses/forbs or promote growth and vigor of other shrubs (i.e. antelope bitterbrush) present on site
- Reduces shrub density and removes sagebrush without harming the understory
- Can be applied aerially by a helicopter or fixed winged aircraft allowing for a mosaic pattern amongst the landscape
- Normally applied in early fall
- Requires approximately ½ inch of precipitation to absorb into the soil and the pellet can remain on the ground for years
- It may take up to 3 years for full effects to be seen
- Little to no change in livestock grazing required in the first year following treatment, but partial to full growing season livestock grazing deferment may be prescribed in the second or third year following treatment
- Long term, partial growing season rest opportunity may be necessary to promote health and vigor of understory species
- Acres treated with spike cannot be seeded for at least 3 years following treatment

Cheatgrass treatments

- Cheatgrass treatments should be a high priority for prevention and management in shrubland sites since cheatgrass tends to increase the fire frequency and decrease the abundance and productivity of native perennial herbaceous species
- Imazapic (trade name: *Plateau*) is a broad-spectrum herbicide often used to control cheatgrass and other undesirable weeds such as leafy spurge and foxtails on rangelands throughout the west
- Imazapic is highly selective and allows for native grasses and forbs to re-establish after treatment
- Application recommended when cheatgrass is in the pre-emergent stage during late summer and early fall prior to measurable fall precipitation
- If applied at other times of the year, may require an addition of glyphosate (trade name: *Roundup)* for the control of emerged cheatgrass seedlings
- Application rates range between 2-8oz/acre and is often combined with glyphosate to control cheatgrass post-fire or in areas with high composition absent fire

- Typically areas that are unburned or have heavy litter accumulations may require 6-8 oz/acre rates
- Prior to herbicide application, heavy livestock grazing may be required to reduce the litter accumulations to allow for direct soil contact for the herbicide
- Herbicide is applied via ground or aerially (fixed-winged or helicopter) and is based primarily on topography of the site
- Post-application treatment may require a full growing season deferment of livestock to allow for perennial plant recovery
- In the second year post-treatment a growing season deferment is recommended until July 15 and beyond that a partial growing season deferment is recommended to promote native plant health and vigor
- Two years of effective control of cheatgrass are normally seen following treatment. Control varies greatly in year 3 and 4 and is largely dependent on the response of native grasses and forbs in the first 2 years following treatment. The potential may exist for a follow-up application once certain pre-determined cheatgrass composition thresholds have been exceeded.

Other noxious weeds (leafy spurge, musk thistle, houndstongue, knapweeds, toadflaxes)

- Weeds such as knapweeds, leafy spurge, and the toadflaxes should be high priority to control
- Glyphosate (trade name: Roundup) is a less selective herbicide that will kill most foliage however, it can be applied selectively
- Picloram (trade name: Tordon) is a selective herbicide effective on leafy spurge, Russian knapweed and several shrub species
- 2, 4-D (several trade names) is an effective herbicide as foliage spray on numerous broadleaf herbaceous plants and some shrubs

Seeding/Planting

Often after rangeland has been treated mechanically or chemically, there is a desire to follow up the treatment by seeding or planting more desirable/native forages. Other times, mechanical or chemical treatment is needed prior to seeding in order to prepare the seedbed or set back perennial plants if the percent bare ground cover is low. Brush mowing or other ground disturbances used to reduce above ground litter will provide a good seed to soil contact with a grass drill or other implement. Glyphosate is used to reduce vegetative cover, but perennials must be actively growing in order to get a good kill. Heavy livestock grazing can also be used to reduce ground litter and prepare an area for seeding.

Interseeding can be accomplished through mechanical methods such as utilizing a rangeland drill, or by simply broadcasting seed. Interseeding

introduced legumes such as alfalfa, milkvetch, and trefoil, not only improves mule deer fawn rearing habitats, but also sage grouse brood-rearing habitats. Ideally, interseeding is best implemented in spring prior to the start of irrigation, during late summer following haying and grazing (approximately 6-8 weeks before the first hard frost), or late fall prior to the ground freezing (usually mid Oct-Nov).

There are numerous mixes for seeds including native and non-native vegetation. Seed selection will depend heavily on soil type, existing vegetation community, and moisture regime. Seeding native vegetation tends to be more costly and will limit the amount of acreage that can be treated if resources are limited. However, when seeding on USFS lands, native species must be used.

Fence Management

Miles of fences across rangelands can create hazards and barriers for wildlife. Although they are necessary for livestock management and for marking property boundaries, there are ways to modify fences so they are less detrimental to wildlife species. Fences are often installed to allow for better control of livestock grazing, timing, duration, and intensity of use and also to keep wildlife and livestock off of road-ways. By controlling livestock use, vegetation will have longer grazing recovery periods during the growing season, providing increased and improved forage for resident and seasonal big game. Deferred grazing is recommended after or before many habitat treatments and fencing provides the infrastructure to allow for more control. Fencing out important riparian corridors or installing exclosures for spring developments are also justification for installing fences.

There is support in the Platte Valley from the BLM, SERCD, and WGFD to examine existing fences on the landscape and make recommendations for conversions to wildlife friendly fences. Multiple fences throughout the Platte Valley are in disrepair and are a significant barrier to various species of wildlife, often times resulting in injury/death. Re-construction of fencing in the pastures/allotments would continue to allow for the control of livestock use on surrounding upland and riparian areas, managing the season, timing, and duration of use on vegetation by providing reliable, physical control measures during periods of domestic grazing use.

Recommendations for wildlife friendly fencing:

- Various types of wildlife friendly fences can be utilized depending on the purpose of the fence and topography of the area
- Visibility and the ability to jump over and crawl under fences are important aspects to making fences wildlife friendly

- Typically wildlife friendly spacing requires that the top wire does not exceed 42" with 12" between the top and second wire. The bottom wire needs to be at least 16" off ground level.
- The top and bottom wires should be smooth wire when possible
- Fence posts should be placed at 16.5' intervals
- Fences can be modified in areas or passages where wildlife concentrate and cross frequently by leaving gates open or installing portions of drop-down fences

For more detailed information on specific wildlife friendly fence designs please refer to: "A Landowner's Guide to Fences and Wildlife: Practical Tips to Make Your Fences Wildlife Friendly".

Water Development

Water is a key habitat requirement for wildlife and is often a limiting factor in the arid West. Water development is an important tool for improving rangeland conditions and often allows wildlife to utilize habitats that they previously could not as long as there is suitable habitat and adequate forage available. In landscapes where historic water sources have been degraded or lost and if productive mule deer forage still exists, enhanced water sources are crucial for maintaining productive deer herds. Strategically placed water developments influence mule deer distribution and it is recommended to maintain a distance of < 3 miles between water developments so that mule deer habitat is within 1.5 miles of a permanent water sources (Cox et al. 2009).

Spring developments

- Involves enhancing a current water source (spring or seep) by fencing it off and usually piping water to a nearby tank
- Exclusion fence around the spring is installed to protect the source from trampling effects from livestock and will remove compaction and sloughing which results from concentrated hoof action
- Wildlife escape ramps will be installed in water tanks and fence exclosures will be wildlife-friendly
- Water should be allowed in the tanks during frost free periods to allow for wildlife use, even if cattle are not in the pasture
- Riparian vegetation species richness, diversity, density, and abundance will increase following development and protection

Guzzlers

- Designed to collect and store rainwater in suitable wildlife habitats
- Typically consists of a metal structure that involves a precipitation catchment apron and a wildlife accessible tank or drinker
- Generally installed in remote areas typically in places with long travel distances to perennial water sources (> 1 mile minimum)

- Reduced travel distances may improve mule deer fawning ratios and also reduce predation during travel
- Wildlife escape ramps will be installed in water tanks

Riparian area enhancement

- The lack of seasonal livestock grazing patterns on and around spring sites can degrade riparian habitat and water quality
- Fencing off riparian areas may be necessary in some situations and allowing some access openings for livestock may be beneficial
- All fencing should meet wildlife-friendly standards
- Fencing is not always a practical option so developing off stream water sources, attracting livestock away from sensitive areas using salt or minerals, or adjusting the timing of livestock grazing may also prove useful in protecting riparian areas
- Riparian areas can also be enhanced through stream manipulation which can benefit mule deer riparian habitats by adjusting stream boundaries to allow for more water to reach adjacent riparian zones and thus increasing vegetation potential
- There is not a one-size-fits-all approach and stream manipulations need to be designed on a site specific scale in order to effectively improve riparian habitat

There are currently on-going projects in the Platte Valley to develop springs and seeps by creating off-site watering for livestock and wildlife from original sources. There is also ongoing work on the Encampment River within the Platte Valley that is focusing on restoring proper dimension, pattern, profile, and streambank stability. This will allow for flood waters to access the floodplain and improve the cottonwood gallery and riparian health. Grazing management and vegetation management alone would not have helped riparian habitat in the long-term without addressing the issues of water, sediment, and unstable channel dimensions. These water developments and especially riparian enhancements will improve vegetation and forage for livestock, mule deer, and other wildlife species.

Prescribed Fire

Fire is a natural occurrence on rangelands and forested lands and serves as the primary agent to set back succession. Prescribed burning is designed to mimic the natural process of fire and is used to enhance vegetation by removing old, dead material and increasing palatability of forages, and promote nutrient cycling. It has the ability to improve habitat diversity and forage quantity and quality for wildlife and livestock alike. There are several advantages of prescribed burning as a tool for habitat improvements: it is usually more cost-effective, can be used in terrain where mechanical treatment is not feasible, and can be applied at a larger scale more efficiently than other treatment methods. In addition to enhancing rangeland/forest productivity, prescribed burning also prevents litter accumulation and fuel buildup thereby reducing the risk of catastrophic wildfires. Unfortunately the risks involved in prescribed burning make it a tool that is not always applicable due to proximity to cities and towns or other rural developments.

Depending on the objective/goal of a project the following recommendations should be considered:

- Fine fuels are required to carry fire in understory of mixed shrubs or sagebrush communities. Grazing must be reduced prior to burning on some sites to allow sufficient fine fuel to accumulate to carry the planned burn. Grazing deferment or reduction in grazing utilization levels prior to burning may be necessary to build fine fuel levels.
- The timing and season of burning for habitat improvements are crucial and will depend on the site and objective for the treatment.
- Spring burns are preferred to enhance shrubs that respond by sprouting and late summer and early fall burns are preferred for grass and forb enhancement.
- Spring burns typically provide a better mosaic pattern in a landscape.
- Grazing deferment will be necessary following the burn to allow for vegetation recovery.
- Burning can facilitate the spread of invasive species so the presence of invasives needs to be determined in areas planned to be burned. Mapping to either exclude those sites from prescribed fire or plans need to be implemented to treat invasives with herbicide post-fire.

Wildfires

In some situations wild land fires started naturally could be allowed to burn to accomplish habitat objectives in a specific area. Areas where natural ignitions would be allowed to burn could be identified, mapped, and planned before a wildfire starts. Full suppression or containment may be necessary when pre-determined boundaries are reached due to public safety or in situations where

fire behavior or weather conditions are likely to result in a negative habitat response. A resource management team comprised of agencies, landowners, and resource professionals could be established to determine if goals are being met. All wildfires on federal land managed for resource objectives must conform to current fire management plans, otherwise full suppression would be enacted.

Prescribed Grazing

Livestock grazing can impact mule deer, especially in arid environments where heavy grazing can remove much of the herbaceous cover critical for doe nutrition and fawning cover. Shrubs can also be overgrazed further intensifying poor nutritional condition. However, grazing can be done in a manner compatible with wildlife and proper grazing management can be a useful tool to enhance wildlife habitat. Grazing management plans should seek to maintain or increase density, diversity, and overall productivity of forage species crucial to mule deer habitat whenever feasible.

Management plans need to be developed on a site-specific basis and should consider the following recommendations:

- Distribution of cattle and the timing, frequency, and intensity of grazing are the most important aspects of a grazing management plan
- Rotational and/or deferred grazing systems will enhance forages used by mule deer in spring and early summer
- Short duration, high intensity use should be conducted during the active growth period in spring
- Livestock grazing can be used specifically as a method for dispersing and planting seed by trampling
- Growing season rest and recovery for perennial plants is required to provide health and vigor of perennials
- Minimize grazing on particular shrubs such as bitterbrush, by adjusting livestock use patterns and dates

Targeted grazing

- Usually involves grazing to achieve a specific objective such as reducing noxious weeds
- High intensity, short duration grazing can be utilized to manage cheatgrass
- Cheatgrass can be nutritious forage in its early growth stage and it should be targeted for grazing in the vegetative stage prior to the formation of seedheads
- Grazing needs to be monitored closely to ensure it does not begin to negatively impact the native and desirable forage
- Alternative livestock such as goats and sheep can be used to control noxious weeds such as leafy spurge and spotted knapweed, however use

of goats and sheep within inhabited bighorn sheep ranges is not recommended due to risk of potential disease transmission

Biological Control for weed management

Complete eradication of noxious weeds is often difficult to achieve and when the long term goal is to reduce weed densities, biological control can often be applied. By reuniting noxious weeds with their natural controls (insects, pathogens) that restrict them in their native range, it is possible to achieve a balance between the control agent and the weed. Weed bio-control can be useful in environments where other control methods are not feasible, for instance in areas sensitive to chemical controls or near streams and rivers. Bio-control is also useful in terrain that is inaccessible for other control methods and it requires little or no disturbance to the ground or other vegetation. It can be a valuable tool to improve grazing and wildlife habitat as it controls noxious vegetation while still allowing the native vegetation to thrive.

In the Platte Valley, musk thistle has been successfully controlled in some areas using a weevil as a control agent. Insects have also been used on leafy spurge with some success.

For more detailed information contact the local Carbon County Weed and Pest Office.

Conservation Easements

Increased development is a threat to mule deer habitat. Conservation easements can be used as a tool to preserve habitat on private lands with willing landowners. Conservation easements are a voluntary legal agreement between landowners and a land trust in which the owner sells or donates their right to residentially or commercially develop their property in order to conserve the lands' agricultural and natural values into perpetuity. In return, landowners receive tax benefits or cash in agreement not to develop their property. Conservation easements are individually tailored for each landowner and stipulations such as the ability to build a certain number of homes/structures on the property, retaining the right to sell the land, and whether or not to allow public access for recreation/hunting purposes are often negotiated. Ultimately, the benefits to landowners, wildlife, and the land as a result of an easement can be priceless.

For more information on conservation easements contact organizations like the Wyoming Stock Growers Land Trust, Rocky Mountain Elk Foundation, and the Nature Conservancy.

2. Vegetation/Habitat Attributes, Associated Desired Conditions, and Monitoring Methods

The PVHP identified several important vegetation and habitat attributes specific to enhancing mule deer habitat:

1. Shrub Nutritive Quality
2. Vegetation Production and Utilization
3. Species Diversity
4. Species Density
5. Aspen Regeneration
6. Riparian Habitat
7. Animal Barriers and Disturbance

Within each attribute, there are desired conditions that PVHP collaboratively identified to help guide habitat enhancements and project designs for the Platte Valley. Desired conditions were designed to focus on the seasonal range where it would have the greatest impact on mule deer.

The ability to monitor habitat treatments to achieve the desired condition of the habitat and ultimately improving the mule deer herd is a crucial aspect of this plan. Monitoring the effectiveness of habitat improvements is essential to adaptive management. A list of potential monitoring methods were identified and included various methods employed by our federal partners and methods available to private landowners as well (Table 1). Methods chosen to monitor for a specific desired condition will vary depending on the project objective, available personnel, and desired results. There is a need to monitor precipitation data and correlate with the success of habitat treatments. Available time and personnel for monitoring must be considered when choosing methods and whenever possible monitoring should be conducted in a cooperative manner.

Table 1. Habitat features with examples of desired conditions and methods to monitor success of the project in meeting the prime objective. Full descriptions of techniques can be found in the respective references.
(S=Summer Range, T=Transition Range, W=Winter Range).

Prime Objective: To Improve Habitat Conditions to Increase the Population Size and Health of Mule Deer		
Shrub Nutritive Quality		
Desired Conditions	**Monitoring Methods**	**References**
• Improve digestibility and protein content of browse (T, W) • Increase young age class of preferred browse species (S, T, W)	• Fecal Analysis • Lab analysis of nutritive content (forage analysis) • Browse Production/Utilization Transects • Shrub Stand Age Classification	• Wyoming Game and Fish Department 2007
Vegetative Production and Utilization		
Desired Conditions	**Monitoring Methods**	**References**
• Increase herbaceous production (S, T) • Increase shrub production (S, T, W) • Adequate size/scale of treatment to minimize impact of grazing ungulates (S, T, W)	• Harvest Method • Ocular Estimation • Browse transect (Fall production surveys; spring utilization surveys) • Exclusion cages • Robel Pole • Hedging Class	• Interagency Technical Reference 1999 • Wyoming Range Service Team 2008 • Wyoming Game and Fish Department 2007
Species Diversity		
Desired Conditions	**Monitoring Methods**	**References**
• Increase diversity of plant types, ages and sizes preferred by mule deer (S, T, W)	• SamplePoint • Photo Point • Line-Intercept (cover by lifeform,	• Interagency Technical Reference 1999 • Wyoming Range Service Team 2008 • Booth et al. 2006

• Increase desired forb cover/ diversity (S, T) • Establish diverse shrub size, age, species and density within that community type (S, T, W) • Increase native shrub and herbaceous cover in beetle kill and lodgepole stands (S, T) • Decrease/minimize invasive species (S, T, W)	age, species) • Daubenmire Plots • 3 x 3 Plot • Pace Frequency • Sage Grouse Protocol Transect • Rooted/Nested Frequency Transect • Sample Pollinator Monitoring Protocol	• www.xerces.org/pollinator-conservation • Stiver et al. 2010
Species Density		
Desired Conditions • Increase density of species preferred by mule deer (S, T, W)	**Monitoring Methods** • Belt Transect • Rooted/Nested Frequency • SampleFreq • Pace Frequency	**References** • Interagency Technical Reference 1999 • Wyoming Range Service Team 2008 • Booth et al. 2006
Aspen Regeneration		
Desired Conditions • Create more young age class aspen stands (S, T) • Increase aspen density (S, T) • Increase aspen acreage (S, T) • Maintain healthy aspen stands (S, T)	**Monitoring Methods** • Aerial photography • GIS mapping • Aspen Density measurement (stems/acre) • Ocular assessments documenting disease • Age Class	**References** • Wyoming Game and Fish Department 2007

Riparian Habitat		
Desired Conditions • Improve stream health (S, T, W) • Increase stream stability (S, T, W) • Improve watershed hydrology (S, T, W)	**Monitoring Methods** • Proper Functioning Condition • Greenline Stability • Macroinvertebrate Sampling • Channel Cross-section Mapping • Aerial Photos • Photo Points • Live-Dead Index	**References** • Winward 2000 • Prichard et al. 1998 • Barbour et al. 1999 • Clemmer 1994 • Rosgen 2008 • Keigley et al. 2001
Animal Barriers and Disturbance		
Desired Conditions • Increase wildlife-friendly fences (S, T, W) • Decrease motorized disturbance (W)	**Monitoring Methods** • GIS Mapping and Effectiveness Monitoring Record number of miles of fences removed, converted and constructed • Record effectiveness of closures with periodic inspections • Recording highway mortalities	**References** • Paige 2012

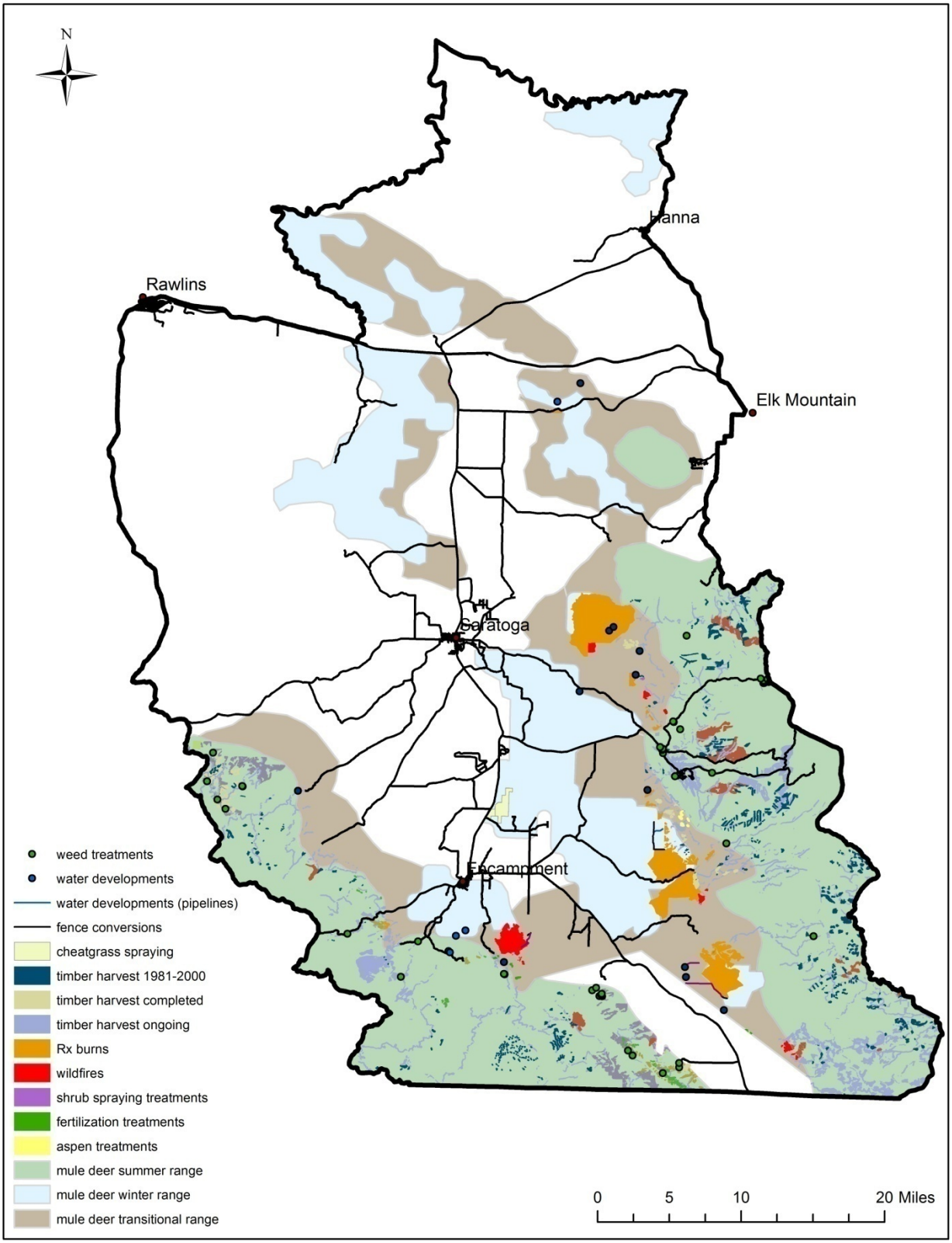
3. Previous and Ongoing Habitat Projects in the Platte Valley

Historically, Land Management Agencies and private landowners have completed numerous habitat improvement projects throughout the Platte Valley designed with various goals and objectives in mind. Before planning future projects, it is important to recognize what has already been done in the Platte Valley. Past and current habitat projects were mapped according to important mule deer seasonal ranges, recognizing past treatments may not have initially been designed with improving mule deer habitat as a primary goal (Figure 7). Still it is important to identify those areas treated in the past in order to make recommendations for future projects. The PVHP seeks to coordinate these ongoing efforts and design projects with goals of improving mule deer habitat.

Water developments, weed treatments, fence conversions, timber harvests, and prescribed burns are common habitat improvement projects that have spanned across all important mule deer seasonal ranges. Less common across the seasonal ranges were shrub spraying and fertilization treatments throughout rangelands. Wildfires were also mapped, although not planned, they still have a significant impact on the landscape that will affect future land management.

Recognizing a majority of habitat projects are completed with cooperation and coordination from multiple agencies and landowners, past habitat projects are described below according to the landownership or the lead agency on the project. For complete project descriptions lead by the BLM see Appendix B.

Figure 7. Mule Deer Seasonal Ranges with Past and Current Habitat Improvements



Summer Range

Mule deer summer range in the Platte Valley is largely managed by the USFS and past habitat improvements have focused on a variety of goals and objectives as the USFS is tasked with managing for multiple uses. However, habitat treatments often benefit mule deer even if not originally designed to do so. The majority of historic summer range habitat improvements have focused on timber management (Figure 7).

Forest Service Habitat Improvements

Summer range for the Platte Valley Mule Deer Herd on the National Forest is largely forested and includes approximately 376,637 acres on the Brush Creek/Hayden and Laramie Districts. Vegetation treatments and wildfires within this area have included:

- 5,805 acres burned by wildfire between 1937 and the present (mostly coniferous forest, some shrubland and aspen). About 3,500 of those acres were burned before 1970 and so the beneficial effects on forage quantity and quality are no longer in effect.
- 1,282 acres of prescribed burning (primarily shrublands) 1980-2012
- 5,769 acres of sagebrush spraying with 2,4-D herbicide (all shrublands) 1959-1981
- 554 acres of fertilizer application (primarily shrublands) 1985-1994
- 34 acres of conversion of conifer forest to grass/forb/shrub meadow 1988
- 2,394 acres of noxious weed treatment 2001-2012
- 42 acres of aspen treatment to promote regeneration 1990's
- 500 acres of clear cuts seeded with grass/forb mix 1980's

The purpose and results of the wildfires, prescribed burning, aspen treatments, sagebrush spraying, fertilizer application and noxious weed treatment are the same as described below for transitional range. The project which converted a small area from coniferous forest to meadow was designed to improve summer range for bighorn sheep, as it was located adjacent to a primary lambing area on the Sierra Madre. The project involved removing young conifer regeneration from clear cuts, then fertilizing the area. Though the target species was bighorn sheep, this project also provided additional forage for mule deer and elk.

Seeding in clearcuts was done in the 1980s to increase forage in transitory range for both livestock and cattle. Clear cuts in lodgepole pine can provide herbaceous forage and browse for 10-15 years before sapling conifer trees create enough shade to discourage understory growth. The seed mix was predominantly grasses, but also included some alfalfa and/or alsike clover. No shrub species were included in the seed mix. Success of the seeding was not monitored, but observations indicated success was mixed. Common timothy

and alsike clover seemed to be the most successful at establishment, but many areas primarily exhibited native vegetation such as elk sedge, trisetum and native forbs and shrubs that had not been in the seed mix. Today, owing to Forest Service policy that requires the use of native species, common timothy, alsike clover and alfalfa would not be used.

In addition to the treatments listed above, 1.5 miles of fence was removed, providing some benefit to mule deer, elk and pronghorn antelope.

Summer range is dominated by conifer forest, predominantly lodgepole pine and Engelmann spruce/subalpine fir. Since 2000, there have been 1637 acres of timber management in this seasonal range on the Snowy Range and Sierra Madre Range. Currently, several timber management projects are occurring in summer range on both mountain ranges. The largest of these is the Forest-wide hazard tree removal project. This project will remove 11,532 acres of predominantly beetle-killed conifers from along open roads over the next 10 years. Other on-going projects are treating an additional 7546 acres of timber stands.

There are currently several projects that include timber management in summer range for which the environmental analysis process has been completed but no treatment has yet occurred. These projects will treat 8520 acres of conifer stands on both mountain ranges over the next few years.

Road decommissioning has occurred recently on summer range on both mountain ranges. Decommissioning has occurred on 605 routes totaling 218 miles between 2005 and 2012.

BLM Habitat Improvements

Within the mule deer summer range designation the BLM has developed two springs providing benefits on a 4,600 acre grazing allotment (Table 2). Riparian protection/development projects are designed to promote riparian health, as a result of failures identified during the BLM "Standards and Guidelines Assessment" process. During the "Lower & Upper North Platte Valley Assessments (2003-2004) all riparian areas, on BLM lands, were evaluated for riparian health and condition. Riparian areas not meeting the "Standards for Healthy Rangelands", with an undetermined or downward trend, are identified to receive mitigation from the degrading impacts. The most common influence to degraded riparian habitats (i.e. spring/seeps) are those resulting from large ungulate use during summer months. As a result, a number of identified spring/seep/riparian areas have been fenced to prevent large ungulate influences resulting from hoof impacts and/or over utilization of riparian vegetation during summer months.

Table 2: BLM Summer Range Projects

BLM Projects Within Platte Valley		
Project Name	**Project Size (Allotment/Pasture/Project Boundary/Miles)**	**Seasonal Range**
Miner Creek - Cabin Spring Protection/Development	4,617 acre grazing allotment	Summer
Miner Creek - Cow Camp Spring Protection/Development	4,617 acre grazing allotment	Summer

Transitional Range

Mule Deer transitional range contains a variety of habitat types and vegetation species. USFS, BLM, and the State are responsible for managing lands within this important seasonal range. Private landowners also have a considerable amount of ownership within this range and are instrumental in improving habitat for mule deer. Water developments, timber treatments, and several large burns have occurred throughout transitional range in the Platte Valley (Figure 7).

Forest Service Habitat Improvements

Transitional range delineated for the PVHP includes about 68,193 acres of National Forest System land. It is mostly located on the Brush Creek/Hayden District, but also includes part of the Laramie District. A variety of habitat improvement projects have been implemented within this area, as well as some wildfire events. They include:

- 646 acres burned in wildfires (some shrublands, some coniferous forest) 1976-2011
- 2,603 acres of prescribed burning (primarily shrublands) 1987-2010
- 72 acres of shrub seeding (true mountain-mahogany and serviceberry) 1995
- 1,283 acres of sagebrush spraying with 2,4-D herbicide 1964-1981
- 211 acres of fertilizer application (primarily shrublands, but also a few lodgepole pine clear cuts) 1984-1994
- 17 acres of sagebrush mowing 1998
- 3,560 acres of noxious weed treatment (includes re-treated acres) 2001-2012
- 63 acres of aspen treated to promote regeneration (cutting of mature aspen trees) 1990's

The spraying of sagebrush with 2,4-D was done primarily to increase forage for cattle in shrublands, however, some wildlife species (particularly elk) , also benefitted from the increase in grass production. The herbicide kills broad-leaved forbs and many shrubs, however, so there were few immediate benefits to mule deer. Native shrubs and forbs did recolonize the treated areas within 10 or more years, so mule deer eventually benefit from the young age class of

shrubs and re-established of perennial forbs. Most of the spraying was conducted over 30 years ago and the effects on the targeted plant communities are no longer visible. Some of the sprayed sites were subsequently treated with prescribed burns after big sagebrush had again become the dominant shrub.

The prescribed burning was done to improve forage quantity and quality for both cattle and wildlife and to maintain some diversity in structure and age class of shrublands. Effects of the prescribed burn program on shrubland plant communities are also described above. The wildfires had similar effects to the prescribed burns, in that they provided early successional plant communities with productive forb, grass and shrub components. Herbaceous forage establishment after wildfires, however, has often been somewhat slower than after prescribed burns due to the mortality of more of the perennial plants from greater fire intensity.

The seeding project was located in the Six Mile area and was unsuccessful. Seeds of true mountain-mahogany and serviceberry were broadcast into big sagebrush or big sagebrush/bitterbrush shrub communities, but there is no evidence that any shrubs successfully established as a result. The purpose of this project was to benefit browsing wildlife species, particularly mule deer.

The 211 acres that were fertilized were primarily shrublands, but also included some clear cuts in lodgepole pine. The purpose was to increase forage production and nutritive content of forage for elk and deer. There are no monitoring data to indicate whether this objective was realized. In some fertilized locations, such as in the Holroyd Park/Cunningham Park and at Six Mile, dense stands of cheatgrass have become established at or near the fertilization sites. Prescribed burning and/or application of fertilizer, combined with a period of severe drought in 2000-2005, are likely to have contributed to the dominance or co-dominance of cheatgrass on these sites.

Noxious weed control has been carried out within this transitional range area since 2001 or earlier. A total of about 3,560 acres have been treated, mostly with herbicide, but also including some hand-pulling and biological control. This total includes re-treatment of some acres. Despite an annual noxious weed treatment program, many weed populations continue to increase in size and new infestations appear every year. The budget and manpower available for noxious weed treatment plus standard prevention measures in place are inadequate, at present, to achieve a net reduction in weed populations on the Brush Creek/Hayden and Laramie districts.

Only about 63 acres of aspen within transitional range have been treated to promote regeneration. This represents less than 1% of the estimated 7,255 acres

of aspen within the transitional range. These treatments consisted of cutting the mature aspen and leaving them in place to discourage browsing on the young aspen regeneration. Aspen regeneration projects benefit both livestock and wildlife, but were primarily done for the benefit of deer and elk.

Other projects within transitional range that have had some benefit to mule deer include removal of 1.4 miles of fence (2009-2012), creation of two small riparian exclosures to allow for accelerated recovery of riparian vegetation (1996, 2006), and improvement of 5 spring developments to reduce use in riparian zones and improve livestock distribution (2007-2013).

Transition range includes more extensive stands of conifers, particularly lodgepole pine, than winter range. Since 2000, 682 acres of timber management have occurred within this seasonal range on the Snowy Range and Sierra Madre Range.

Currently, several timber management projects are occurring in transition range on both mountain ranges. The largest of these is the Forestwide hazard tree removal project. This project will remove 1,823 acres of predominantly beetle-killed conifers from along open roads over 10 years. Other on-going projects are treating an additional 497 acres of timber stands.

There are currently no projects that include timber management in transition range for which the environmental analysis process has been completed or is currently occurring. Therefore, there is no timber management planned to occur in transition range in the immediate future.

Road decommissioning has occurred recently on transition range on both mountain ranges. Decommissioning has occurred on 118 routes totaling 33 miles between 2005 and 2012.

BLM Habitat Improvements

Spring Developments, fence conversions, and prescribed burns are some of the improvements the BLM has focused on within mule deer transitional ranges (Table 3). Fence lines have been converted to improve wildlife passage and migration, and decrease wildlife entrapment/entanglement. Fence lines identified for conversion have included old 5-6 wire fences or woven wire fence, most associated with historical domestic sheep use, that have been documented as restricting wildlife passage. Identified fence lines are converted to 3-4 wire (bottom smooth), rail top, or buck/pole types, to improve wildlife passage and prevent loss resulting from entanglement or entrapment.

Spring Rx fires have been implemented for the purpose of improving vegetative health as a result of increased age class diversity and species composition.

Spring burns are designed around cooler seasonal temperatures and elevated soil moisture levels. These conditions allow for an increase in mosaic treatment patterns and favor the treatment of mountain shrubs (i.e. Antelope bitter brush, Mtn. mahogany) that re-sprout post treatment. Post burning response also results in increased herbaceous cover (decreased bare ground), including a release of various forb species.

The Pennock Mountain wildfire occurred August 2011, and burned approximately 500 acres. The fire re-burned approximately 300 acres that had been Rx treated the spring of 2004. Site visits to the area document mostly native species re-establishing post fire. Cheat grass establishment is a concern in re-treated areas, and sites continue to be monitored.

The Blackhall Mountain wildfire occurred during August of 2000, and burned approximately 1700 acres. The fire established in mainly sagebrush communities, however, some timber stringers were also burned. As a result of the wildfire, areas of impacted grazing allotments were fenced to prevent livestock disturbance for two growing seasons post fire. Increases in cheat grass and musk thistle, have been documented as a result of the 2000 wildfire.

The Romios Ranch fence removal project was associated with the Blackhall wildfire August 2000. Fences were constructed to rest areas burned by the 2000 wildfire, and 1.4 miles of fence constructed post fire was removed in 2010.

The Rattlesnake Creek riparian Rx burn was designed to reduce the encroachment of sagebrush along Rattlesnake Creek. The reduction of sagebrush from riparian banks allows willows and other riparian obligate plant species, capable of dissipating energy and maintaining bank stability during high flow events, to re-establish.

Table 3: BLM Transitional Range Projects

BLM Projects Within Platte Valley		
Project Name	**Project Size (Allotment/Pasture/Project Boundary/Miles)**	**Seasonal Range**
Aspen Pocket Spring Protection/Development	8,853 acre grazing allotment	Transitional
Hidden Springs Seep Protection/Development	12,195 acre grazing pasture	Transitional
Jeep Trail Spring Protection/Development	8,853 acre grazing allotment	Transitional
Stove Pipe Spring Protection/Development	1,694 acre grazing pasture	Transitional
West Prospect Mountain Protection/Development	1,615 acre grazing pasture	Transitional
North Cedar Creek Spring Protection	1 acre riparian protection exclosure(s)	Transitional
Romios Ranch Spring Protection/Development	1,051 acre & 2,474 acre grazing allotment	Transitional
Wolf Allotment Riparian Protection Fence and Water Gap	13.5 area riparian protection exclosure	Transitional
Rattlesnake Creek Riparian Protection Fence	95 acre riparian protection exclosure	Transitional
Big Creek Fence Conversion Phase II	1.3 miles	Transitional
Prospect Mountain Fence Conversion	1.55 miles	Transitional & Winter
Romios Ranch Fence Removal	1.4 miles	Transitional
Romios Ranch Fence Conversion	.15 miles	Transitional
Beaver Hills Rx Burn	2,473 acre project perimeter	Transitional & Winter
Prospect Mountain Rx Burn	2,670 acre project perimeter	Transitional & Winter
Pennock Mt Rx Burn	7,818 acre project perimeter	Transitional & Winter
West Barrett Rx Burn	5,619 acre project perimeter	Transitional & Winter
Rattlesnake Creek Rx Burn	113 acre project perimeter	Transitional
Large Wildfires within PVHP Boundary		
Pennock Mt Wildfire (Aug 2011)	500 acres	Transitional
Blackhall Mountain Wildfire (Aug 2000)	1630 acres	Transitional

Winter Range

The majority of the Valley floor consists of prime winter range habitat for mule deer and primarily consists of BLM, State, and private lands, with a portion managed by the USFS. Winter ranges can be highly impacted by energy and residential development and can be limited spatially causing overutilization of important browse species mule deer rely on for overwinter survival. Past habitat improvements within winter ranges have focused on rejuvenating vegetation, and improving distribution and ease of wildlife movement (Figure 7).

Forest Service Habitat Improvements

There are about 7,369 acres of winter range within the Forest Boundary, all located on the western fringe of the Snowy Range. Treatments within winter range have included approximately 420 acres of prescribed burning in shrublands and approximately 50 acres of noxious weed treatment. There are no records of wildfires within winter range delineated for this project. District wildfire records generally go back to the 1960's.

Prescribed burning was carried out from 1991 to 2004 in big sagebrush and mixed mountain shrub plant communities. Timing of the burns was early spring or late fall. The majority of treated acres were burned in 2004 on Pennock Mountain. The purpose of shrubland burns was to increase herbaceous forage production for big game and to create young age classes of shrubs and increase nutritive value of all forage species. The response of native herbaceous plant species, particularly grasses and early seral forbs, was good; however an increase in cheatgrass has been observed on some burned sites. Shrub species such as bitterbrush, serviceberry, rabbitbrush and snowberry were able to re-sprout from the root crown post burn, though some of these shrubs were killed by fire. Their rate of growth and vigor vary by browsing pressure, insect/disease conditions, and abiotic factors such as precipitation. Big sagebrush, which is killed by fire and must re-establish from seed, has exhibited variable rates of recovery depending upon site conditions and competition from other plant species.

A study conducted in the Platte Valley in the 1990s (Cook et. al. 1994) revealed the following short-term improvements in forage for wildlife in prescribed burn and wildfires in shrubland areas:

- Production of perennial herbaceous vegetation on burned sites averaged twice that of controls 2-3 years post burn
- Burn-induced mortality of serviceberry was ≤ 15%, but a 6-fold increase in twig production more than compensated for plant losses
- Mortality of true mountain-mahogany and bitterbrush averaged 25% and 55% respectively, but these losses generally were compensated by increase in browse production
- Crude protein content of perennial grasses and forbs from late spring through early fall was significantly higher on burns for 2 years post-burn.
- Burning in spring minimizes damage to shrubs and perennial herbaceous species and minimizes first-year increases in weedy annual species.

Noxious weed treatment has been carried out within winter range from 1991 through 2012 and includes re-treatment acres, so the actual land area treated is somewhat less than 50 acres. The primary treatment method is by herbicide, but some hand-pulling and biological control (insects that target specific weed species) have also been used. Weed treatment benefits both wildlife and livestock, by preventing weeds from crowding out native forage plants.

There are generally few timber management projects in big game winter ranges since these areas are dominated by juniper, sagebrush, or mixed mountain shrublands. However, there have been a few harvest units in timber management projects that have occurred in small conifer stands or have overlapped winter and transition range. Since 2000, 107 acres of timber were

harvested in winter range. This harvest occurred with the West Barrett timber sale on the Snowy Range.

Currently, only the Forestwide roadside hazard tree project is removing trees in winter range. This project is focused on removing dead, dying, and hazardous trees resulting from the pine beetle outbreak from along open roads. This project is removing 65 acres of trees from among several winter ranges. Since hazard tree removal occurs along roads open to motorized travel, the potential benefits to mule deer are reduced. While vegetation responses will be similar to areas treated away from roads, motorized traffic can create disturbance that would reduce the use of these roadside areas.

There are currently no projects that include timber management in winter range for which the environmental analysis process has been completed or is currently occurring. Therefore, there is no timber management planned to occur in winter range in the immediate future.

Older stands of lodgepole pine often develop an understory that lacks much grass, forb, or shrub cover. Timber management, particularly regeneration harvest, will create an early successional stage. This disturbance, reduced competition from live trees, increased sunlight to the forest floor, greater moisture availability, and greater soil nutrient availability can promote a flush of productivity in grasses and forbs, some shrubs, and, often, aspen shoots. These plants are usually an easily digestible and highly nutritious component of summer mule deer diets.

The Forest has been decommissioning roads as part of its travel management process for the last few years. The majority of decommissioned routes were user-created routes or routes developed for timber management that were inadvertently never decommissioned or were reopened by the public after original decommissioning. Decommissioning involves removing the road bed with a dozer, restoring natural contouring and drainage, and reseeding with native grasses. Road decommissioning will restore native vegetation over time and reduce motorized traffic over unauthorized routes. Decommissioning included 0.13 miles of a single unauthorized route in winter range on Pennock Mountain in 2002.

The pine beetle outbreak affected approximately 75,000 acres on the Forest through 2006. By 2012, approximately 500,000 acres of pine beetle infestation were mapped across the Forest. The outbreak has killed 40% to 90% of the pines greater than 6" dbh within stands. This event has created some changes to forested mule deer habitat. With a dead pine overstory, understory productivity has increased in some stands. Lodgepole stands with higher mortality in the overstory and near riparian areas, especially, have experienced increased

ground cover and higher productivity of grasses, forbs, some shrubs, and aspen sprouting. These changes are generally most pronounced in summer ranges which have higher annual precipitation, less pronounced on transition range, and generally limited on forested winter range where annual precipitation is lower.

BLM Habitat Improvements

Riparian development/protection, fence conversions, and prescribed burning are habitat improvements that have been completed by BLM on mule deer winter ranges (Table 4).

A juniper/conifer removal project was implemented from 2006-2009, and continued in 2013. This project is designed to improve riparian habitat by removing encroached conifers and junipers from riparian flood plains and adjacent habitats in School and Moores Creek drainages. Trees are mechanically cut with chainsaws and piled for burning. The reduction of juniper/conifer in riparian type habitats helps to increase herbaceous vegetation, and release additional water from the system. Riparian areas (water and vegetation) have extended further down drainage and bare ground has been decreased as a result of the 2006-2009 work.

In the 1980s two wildlife guzzlers were constructed to improve watering opportunities for wildlife on both sides of the Encampment River. These guzzlers were associated with the population augmentation of Big Horn sheep into the Encampment River area.

Table 4: BLM Winter and Transitional Range Projects

BLM Projects Within Platte Valley		
Project Name	**Project Size (Allotment/Pasture/Project Boundary/Miles)**	**Seasonal Range**
Chad Allotment Infrastructure (Well/Pipeline/Tanks)	4,128 acre grazing allotment	Winter
West Dana Seep Protection/Development	12,195 acre grazing pasture	Winter
Encampment River/Minor Creek Wildlife Guzzlers	4,617 acre & 3988 acre grazing pastures	Winter
Lone Willow Bush Spring Protection/Development	1,358 acre grazing allotment	Winter
Corral Creek Fence Conversion	1.03 miles	Winter
Corral Creek Fence Conversion Phase II	1.7 miles	Winter
Prospect Mountain Fence Conversion	1.55 miles	Winter & Transitional
Beaver Hills Rx Burn	2,473 acre project perimeter	Winter & Transitional
Prospect Mountain Rx Burn	2,670 acre project perimeter	Winter & Transitional
Pennock Mt Rx Burn	7,818 acre project perimeter	Winter & Transitional
West Barrett Rx Burn	5,619 acre project perimeter	Winter & Transitional
School & Moores Creek Juniper/Conifer Removal	3 miles of riparian drainage	Winter

WGFD Habitat Improvements

During the fall of 2012, WGFD with the assistance of BLM, SERCD, and State Land Board (SLB), completed a project designed to control the spread and prevalence of cheatgrass on crucial winter range for mule deer. Just over 1,000 acres were aerially sprayed with Plateau herbicide. Cheatgrass response to the herbicide will be monitored and the need for future treatments will be evaluated.

WGFD also granted money to improve wildlife movement across HWY 130 by converting the right-of-way fence to pole-top along the first ½ mile on both sides from County Road 209 to the east.

1. Future Projects in the Platte Valley

Given known mule deer habitat use, habitat improvement focus areas have been delineated to provide direction for future habitat projects (Figure 8). It is emphasized projects focused on mule deer habitat throughout the Platte Valley are appropriate and DO NOT have to occur within these delineated "focus" areas. Rather, PVHP intends the use of these areas to focus mule deer habitat work in the Platte Valley. They will be changed and refined as new data and information is made available.

Several projects are already in the works and the PVHP would like to assist in developing these projects to ensure habitat enhancement for mule deer is considered whenever feasible.

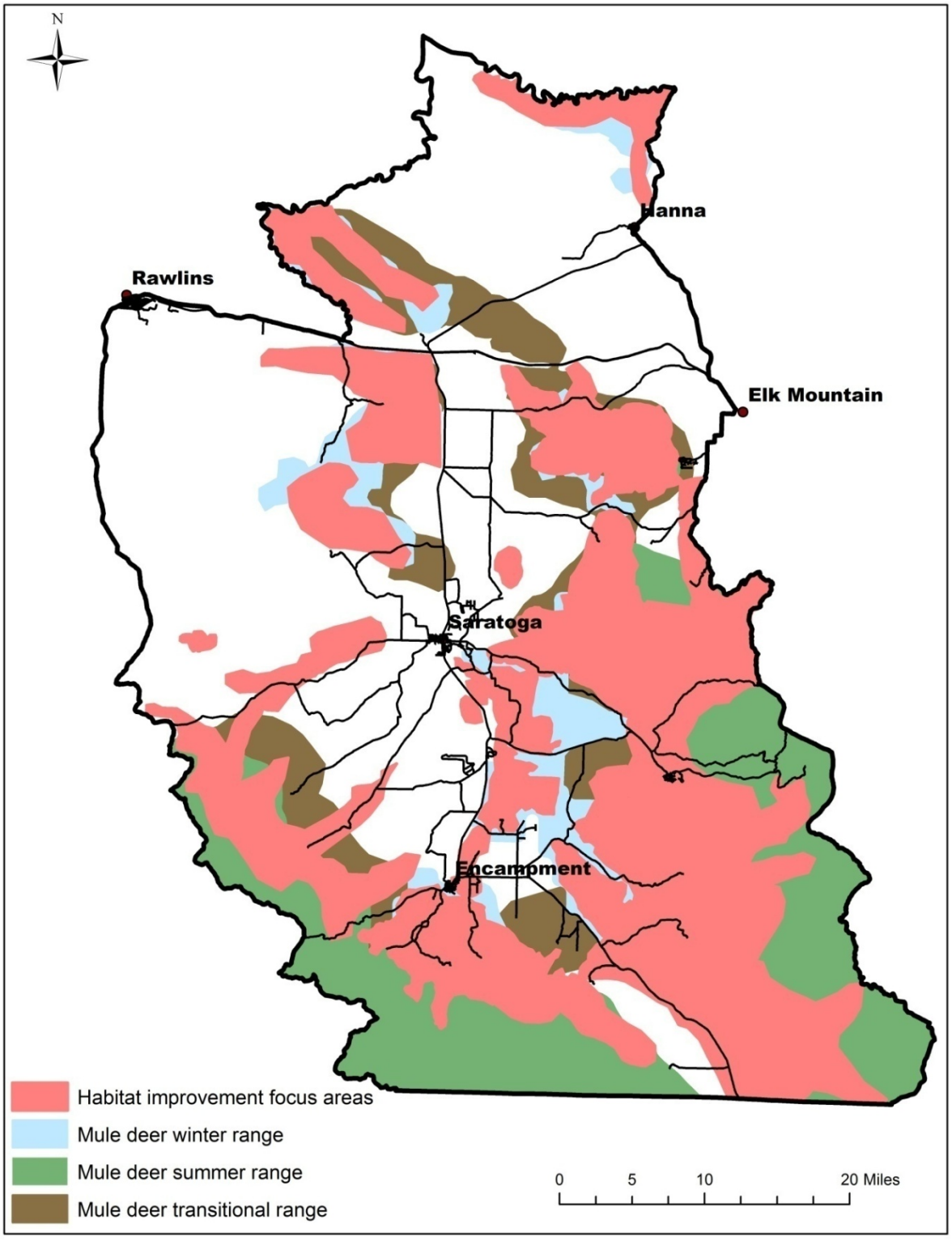
BLM Proposed Projects

BLM Chad Allotment Grazing Infrastructure development

The Chad allotment (4128 acres) is identified as a major use area for wintering Platte Valley mule deer. In 2011 the local WGFD biologist approached the BLM, and area landowner, to discuss projects that could be accomplished within the allotment to improve wildlife habitat. It was determined that an increase in livestock grazing infrastructure (i.e. watering and pasture fencing) within the BLM Chad allotment, would result in an increase in livestock management flexibility, thus, allowing for a livestock rotational use pattern. Livestock grazing utilizing a pasture rotation system would allow pastures to be deferred, and/or rested from seasonal livestock use annually. The development of interior pasture fencing would also provide needed flexibility to rest implemented vegetative treatments, should they require rest, from livestock utilization. The water developments and fencing will be completed this spring and habitat

improvement projects are projected to occur as a result of the improved infrastructure.

Figure 8: Habitat Improvement Focus Areas for Future Projects



Cedar Ridge Thinning & Riparian Enhancement

This project includes the removal/thinning of approximately 100 acres of conifer encroachment from along Wood Draw, located on the private land. This project would provide a learning opportunity for future juniper/conifer removal/thinning projects in the Platte Valley. This project would include the mechanical thinning and removal of juniper; harvested trees would be piled so they could be burned the following winter. A masticator may also be used to shred trees and disperse biomass. Some treatment areas will be seeded, and/or treated chemically to reduce cheatgrass establishment.

Chad Allotment sagebrush thinning

This project would include the reduction of sagebrush within portions of pastures of the BLM Chad grazing allotment. Sagebrush would be mowed in a mosaic pattern, or treated with a thinning chemical (i.e. Spike) to reduce sagebrush canopy cover. A reduction of canopy cover, combined with an increase in livestock management, would increase the current herbaceous understory within the treatment units and improve forb production.

Aspen Regeneration Rx Burn – BLM Methodist Allotment

This project is proposed to enhance aspen community health along the BLM/USFS boundary within the BLM Methodist allotment. Existing aspen clones within this allotment have become decadent, encroached by conifers, and show sign of disease. Introducing fire in to decadent aspen communities helps stimulate aspen suckering post fire, while reducing vegetative competition from sage brush and conifers within and around the edge of old aspen clones.

FS Proposed Projects

Within the next 5 years the USFS has proposed several habitat projects within the PVHP focus areas:

Transitional Range

- 66 acres of aspen treatment to promote regeneration using prescribed fire
- 0.9 miles of fence removal
- Between 0.25 and 1 miles of Forest Boundary fence conversion (change a 5 wire 46” high fence to 4 wire 40” fence)

Summer Range

- 258 acres of aspen treatment to promote regeneration using prescribed fire
- 174 acres of shrubland treatment using prescribed fire
- 1.5 miles of fence removal

Future Considerations for Projects

- Coordinate with BLM to help meet their needs with Standards and Guidelines
- Coordinate with USFS to develop habitat projects that assist the agency with achieving their desired conditions within FS lands as identified in the Medicine Bow USFS Management Plan
- Any existing projects should consider improving mule deer habitat whenever feasible

Chapter 5: Project Funding, Selection and Implementation

Ryan Amundson, Jim States, and Jennifer Doering

In the PVMDl the WGFD states:

> "*The WGFD will support the PVHP to develop a plan to improve mule deer habitats on a broad scale to sustain and ultimately increase mule deer numbers. Though left to the PVHP, the WGFD will encourage this plan is developed by June, 2013. WGFD will encourage and assist federal agencies to streamline processes to react to events or opportunities to enhance mule deer habitats.*"

To help ensure the success of the PVHP and its' habitat work, the WGFC has provided $500,000 to start the funding of landscape-scale habitat improvement projects. At the same time, the WGFD requested the PVHP use this money to leverage other sources of funding at a minimum of a 5 to 1 ratio.

In order to minimize the time and complexity involved in securing matching funds, the PVHP suggests the following:

1) The application for WGFC funds should be as straightforward and brief as possible.
2) The process must be flexible enough to accommodate differences in funding requirements and cycles among multiple funding sources. Even with a streamlined application process, the variation in funding cycles among participating organizations and individuals may require long lead times between the development of the project and its implementation.
3) Allow in-kind contributions (people's time and material resources) to be counted toward the match requirement for WGFC commission funds.

Although there may be considerable benefit to combining funds from several sources, the funds from each source comes with its own strings attached, by which the funding source can ensure to its members the funds will be well spent. Requirements may include advance identification of matching funding and in-kind resources, periodic reporting on actual versus planned progress in both expenditures and schedule, final reports and even reports on the monitoring of results following project completion.

Given the above complexities associated with funding projects from multiple sources, including real dollars and in-kind contributions, from both government and private sources, it is not reasonable to expect any single participant on any single project would know and be able to integrate all the functions necessary to ensure successful project completion. Consequently, the WGFD and the

WGFD's Saratoga Habitat Biologist (SHB) will provide the necessary administrative support and functions to plan, coordinate, and complete habitat improvement projects. In addition, the WGFD's SHB will also report the results at project completion and during subsequent monitoring of project results over time.

Following the completion and adoption of PVHP's Habitat Plan, PVHP will proceed with developing an organizational structure to support that plan over the long-term. Options under consideration include developing PVHP as an independent organization, with its own by-laws and policies, or having an existing organization (i.e., VoV) take on PVHP as one of its primary functions.

PROJECT DEVELOPMENT AND WGFC FUNDING

Proposed projects using the WGFC funding will be required to go through the WGFD's SHB. The SHB will provide technical expertise with regard to project identification, habitat inventory, treatment practice recommendations, project application for funding, and oversee implementation (Figure 9). The SHB will also be responsible to either fill out the PVHP project application or ensure, if filled out by others, it is complete and accurate.

PVHP project development and funding using the WGFC money will be required to go through a series of steps for WGFD project approval and funding (Figure 10). This process will ensure WGFC money is matched and allocated appropriately and will help ensure project success (Figure 10). All projects seeking WGFC funding are required to focus on mule deer habitat and address the "desired conditions" outlined in Table 1. Certainly, the more "desired conditions" addressed the more likely the project will be funded. In addition, the WGFD has established a goal of matching WGFC PVHP funds with other funds at a minimum of 5 to1 to ultimately generate up to $2.5 million for "on-the-ground" habitat work.

Figure 9: PVHP Project Development

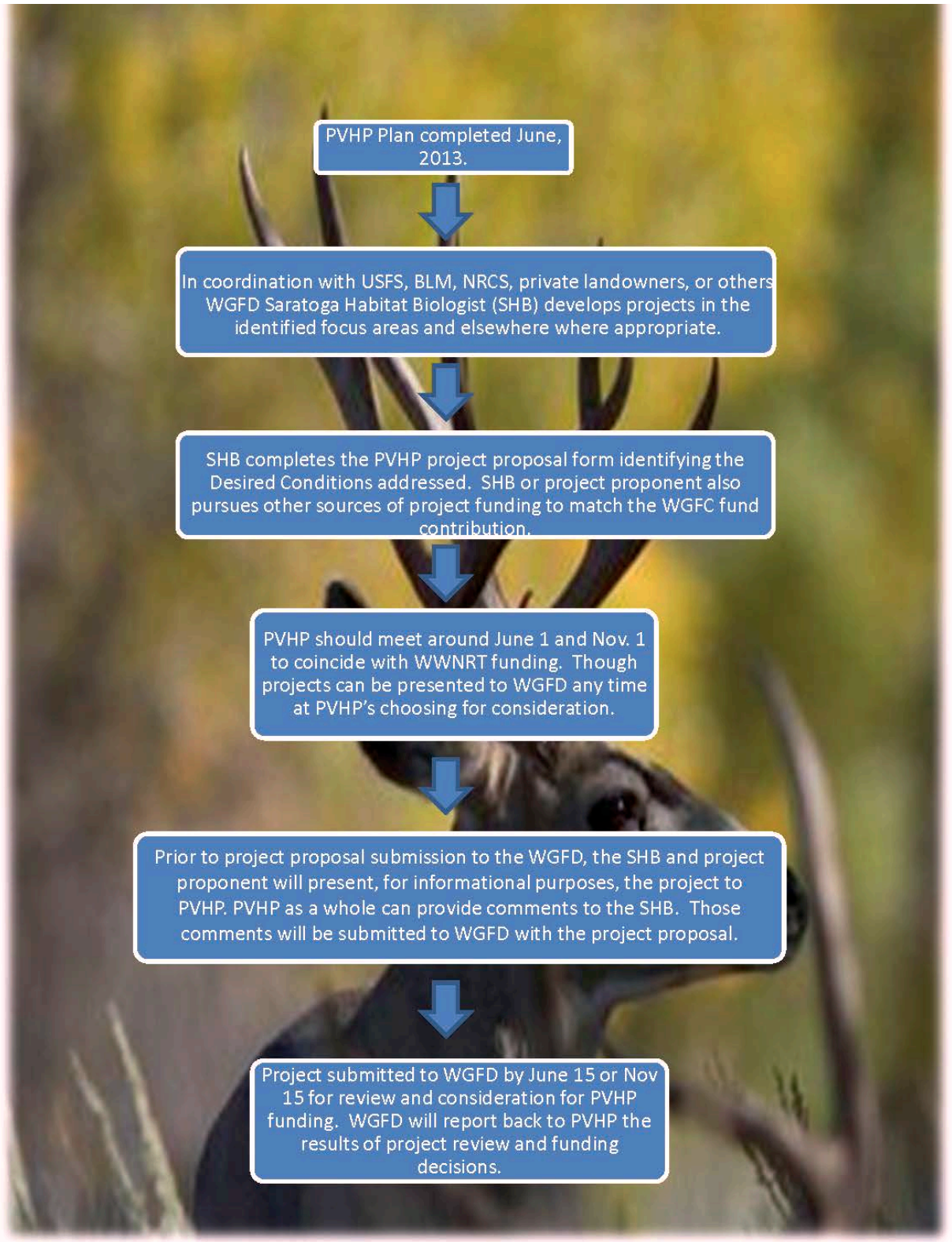
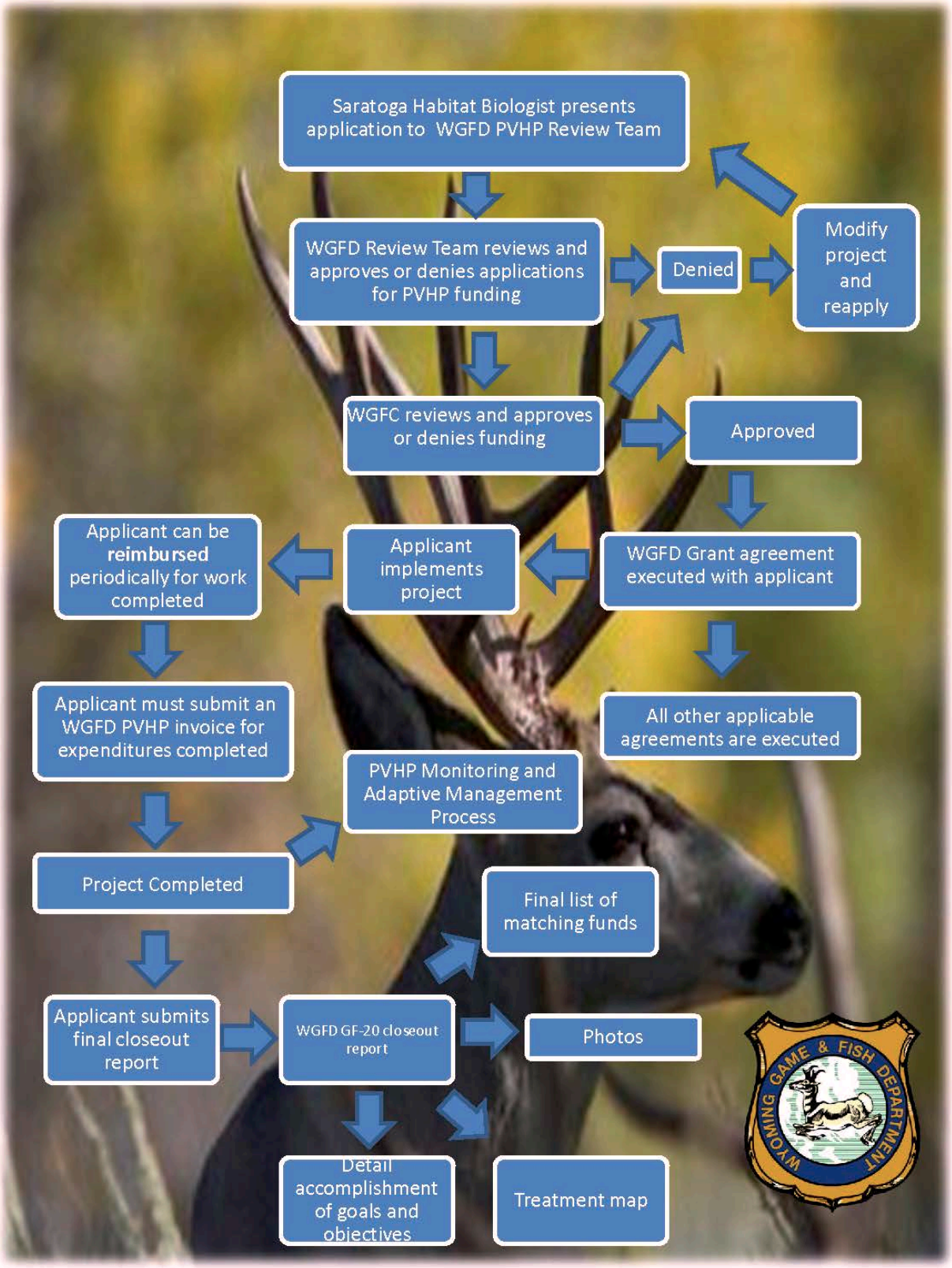


Figure 10: WGFCs PVHP Funding Process



OTHER FUNDING SOURCES

In addition to the PVHP funding ($500,000) provided by the WGFC, there are numerous federal, state, and local government agencies and private, non-profit conservation groups available to assist with on-the-ground conservation projects. Some are listed below:

Federal:

- USFS
- BLM
- USDA Natural Resources Conservation Service (NRCS) /Farm Service Agency (FSA)
- Wyoming Landscape Conservation Initiative (WLCI)

State:

- Wyoming Wildlife and Natural Resource Trust (WWNRT)
- WGFD
- Wyoming State Forestry

Local:

- SERCD

Private Conservation NGOs:

- Rocky Mountain Elk Foundation (RMEF)
- Mule Deer Foundation (MDF)
- Wyoming Wild Sheep Foundation (WYWSF)
- Water For Wildlife Foundation (WFWF)
- Bowhunters of Wyoming (BOW)
- Wyoming Governor's Big Game License Coalition (WGBGLC)
- private individuals / donors

Numerous non-profit conservation groups are found in Wyoming and surrounding states, and may be of local, state, or national affiliation. These groups may be able to grant funds to governmental entities, private landowners, contractors, individuals or organizations. Most non-profit conservation groups have simple grant application forms to submit at varying times throughout the year. The ability to match funding at least 1:1, agreement to follow a project management plan, and submittal of a project closeout report and occasional project status updates is usually required by each entity.

Matching funding for projects can come in the form of cash or in-kind services, and are usually itemized in project applications. In-kind services should be well documented throughout the project implementation phase.

In-kind services refers to labor provided to complete a project or donation of use of specialized equipment. A dollar value is assigned to this work. Rates for labor or equipment may be derived from several sources. Many funding sources have some sort of ranking criteria they follow when reviewing project proposals. Expected wildlife benefits, matching funding secured, commitment to post-treatment management and monitoring, how the proposed project fits into the agency's or organization's mission, goals, objectives, the value to public, etc. are often considered. Grant periods vary by group, but most rarely exceed 2 years from time of approval. Therefore, unexpended funds not utilized within the stated time frame are usually requested to be returned to the organization/agency or are not disbursed.

Chapter 6: Social and Economic Benefits of the Habitat Management Plan

Jim States

In developing the vision, goals and objectives set forth in Chapter 2, the Partners recognized the need to articulate not only how mule deer habitat could be improved to facilitate the increase in mule deer numbers in the Valley (Prime Objective) (Chapters 3 and 4), but also the social, economic, cultural and aesthetic benefits to humans that could result (Benefits 1 through 4 below). This chapter identifies those anticipated benefits, actions that could be taken to enhance benefits, and ways the success of such actions can be measured.

Benefit 1: Economic Value of the Mule Deer Herd

Improving mule deer habitat also has the potential to enhance recreational benefits by improving habitat to increase the population size and health of mule deer.

And

Benefit 2: Recreational Value of the Mule Deer Herd

Improving mule deer habitat also has the potential to enhance economic benefits to landowners, communities and dependent interests by improving habitat to increase the population size and health of mule deer.

1. Enhanced Benefits to Landowners

From a landscape perspective, it is recognized that most of the Platte Valley lies in an arid region where the availability of water is often the most significant factor affecting habitat productivity and most limiting to habitat improvement projects. In general, water is least limiting in mountain summer ranges and most limiting in the transitional foothills and wintering areas on the valley floor. These latter areas are largely under the joint control of the BLM and private landowners. Because they settled along the streams, the landowners also retain most of the water rights in the valley. Consequently, the involvement of landowners is critical to the success of landscape-scale habitat improvements.

Farming and ranching is a business; it is how landowners pay their bills and raise their families. And unless it is perceived by them as an economic benefit, their involvement in mule deer habitat improvement is likely to be piecemeal and inadequate for success of habitat improvement on a landscape scale. As part of "thinking outside of the box" to craft a successful habitat improvement program, it may be necessary for all stakeholder groups to help identify new

ways in which landowners can derive new revenue streams to supplement their business through participation in the program. The following actions and measurements are recommended to bolster their involvement and increase the chances for success of the overall program:

Actions

1. Establish an Education Component of the Habitat Improvement Plan to promote understanding among landowners and other stakeholders and identify new resources of mutual benefit

2. Identify and prioritize specific actions that can be taken to improve the utilization of existing habitat by both mule deer and livestock

3. Develop grazing schedules on public and private lands promoting rest rotation for habitat segments being recovered or reclaimed

Measurements to Monitor Results

1. Keep a record of meetings and seminars held, supplemental revenue streams identified, initiatives taken to tap those revenue streams and the results

2. Results of actions taken to improve habitat and/or utilization of existing habitat and recover or reclaim degraded habitat

3. Livestock Animal Unit Months (AUMs) adjusted by habitat improvement actions

2. Enhanced Benefits to Communities and Dependent Interests

Evidence that economic benefits of wildlife, including mule deer, are important and not independent of qualitative benefits, such as aesthetic values, in determining why people live, visit, and invest locally is contained in the Comprehensive Land Use Plan for Carbon County, adopted November 29, 2010. A survey used as the plan basis revealed that 60 percent of respondents living or owning property in the county included recreation opportunities, wildlife and wildlife habitat, scenic beauty and mountain views as reasons for doing so.

As further evidence, in its 2012 publication, Funding for the Future, the WGFD (Wyoming Game and Fish Department 2012) identifies wildlife as an economic engine for Wyoming, with wildlife-related recreational expenditures in Wyoming at $1.1 billion annually and tourism the second leading industry (and the only fall-back from number 1 fossil fuel industries). The report notes that spending by all domestic and international visitors in 2011 was $2.9 billion and that “viewing wildlife is one of the leading reasons people visit the state”. According to this report, 90 percent of the funding for WGFD, the agency responsible for

managing our wildlife resources, is attributable to big game animals (deer, elk, and antelope) and fish, with 25 percent attributable to deer.

The establishment of the PVMDI, and of the PVHP as two parallel collaborative processes, came about because the local deer herd was identified as one of two most valued herds known to be in decline within the State. Because valley communities like Saratoga and Encampment/Riverside are almost entirely dependent, directly or indirectly, upon wildlife related benefits, it is important they be considered as integral to this PVHP Plan. Benefits include readily quantified resources, such as revenues from tourists, and those more qualitative aspects of our local natural resources that draw those tourists in, such as the likelihood of observing deer while here.

Actions and monitoring measurements that could be taken within the context of this PVHP Plan to enhance economic benefits to communities and "dependent interests" (such as guides and outfitters, hotels and motels, shops and other businesses) are so intertwined that, for purposes of the following discussion, they are considered together:

Actions

1. Look into using Carbon County Comprehensive Land Use Plan to establish baseline conditions on public perceptions of trends in mule deer populations.
2. Establish baseline conditions and monitoring program for each of the following "dependent interests"
    a. Real Estate Values and Transactions
    b. Deer Hunting and Associated Recreation
    c. Wildlife Value to Motels and Hotels
    d. Wildlife Value to Guides and Outfitters
    e. Hospitality Revenues (Chamber of Commerce)
    f. Wildlife Value to Artists, Photographers, and Writers

Measurements to Monitor Results

1. Results of survey to monitor trends in resource values identified in the Carbon County Comprehensive Land Use Plan
2. Value of real estate transactions determined to be influenced by aesthetic and natural resource conditions in the area, including mule deer
3. Perceptions of residents and visitors as to the number and quality of deer observations in correlation with WGFD deer counts and observations
4. Number of hunters and recreationists and associated revenues associated with deer (work with WGFD to determine sources of information and baseline values)
5. Motel and hotel visitors and revenues associated with deer hunting and related recreational activities
6. Number of deer hunters hosted by ranchers/landowners and outfitters and cost per client (from their reports)

Benefit 3: Cultural and Aesthetic Value of the Mule Deer Herd

Improving mule deer habitat also has the potential to help maintain the character of the Platte Valley landscape, culture, and aesthetics by improving habitat to increase the population size and health of mule deer.

A major difficulty in measuring the success of actions taken to improve human benefits lies in the difficulty of placing a "value" on them. We all are familiar with placing a dollar value on a commodity, like a hunting license, but are often stumped when it comes to placing a comparable value on the pleasure we get from hunting or just the opportunity to be out in nature. Yet it is just these pleasures that have led people to live and vacation in the upper Platte Valley – one of the last of a diminishing number of places where open spaces, clean air, natural habitats and their wildlife can be found in such abundance. A writing of one of the Partners expresses this so well that it is included here in its entirety:

AN ARTIST'S THOUGHTS ON PVHP BENEFIT # 4

By Dawn Senior-Trask, Local Landowner and PVHP Partner

Benefit #4: To maintain the character of the Platte Valley landscape, culture and aesthetics by improving habitat to increase the population size and health of mule deer.

Since childhood, mule deer have played an important role in my art, writing and life. As a kid in the 1960s and early '70s, I thought our great herds of healthy mule deer would always thrive. As a teen, the "boom" and its changes and wild rumors of more (most of which, thankfully, never came to pass) made me fear for the future of my beloved home valley and mountains. I wondered what could drive me to leave it, and I thought to myself, "So long as the deer can flourish here, I will, also."

Last winter, when my son returned from five tours of combat aboard an aircraft carrier, he came home damaged in soul and body. Nothing calmed and healed him more than watching the mule deer drifting past the window. He gave them names inspired by their individual characteristics, and at times, despite the severe challenges he faced, he seemed to absorb their tranquility.

And for a prey animal, the mule deer is amazingly serene. I've watched them browse in seeming unconcern while watching a big pack of coyotes running in their direction. They didn't let the threat of danger disturb them until they knew for sure if the coyotes would target them or turn aside. From childhood this has been my mantra during any worrisome crisis: Be Like the Deer.

Sometimes an artist chooses to depict a deer in close-up detail without reference to its surroundings. But most of the time, the deer seen in the context of the unique beauty of this landscape makes the local artist's work, in turn,

unique, and thus more apt to generate attention and sales. For artists and other creative people, the qualities of the landscape and its creatures are a large part of what we depend upon to make a living. We need its beauty to remain as undisturbed and its wildlife to remain as varied and abundant as possible.

It seems obvious that historical and archeological sites that provide local people and visitors with knowledge should remain as undisturbed as possible. They, too, generate interest and income.

But what we mean by "landscape, cultural and aesthetic values" goes much deeper than that.

Exactly what do we mean by the "beauty" of a landscape?

Recently I was struck by the thanks a visiting artist made to the local audience. She said, "I have found such inspiration in this dramatic and beautiful place. Thank you for keeping it pristine."

Of course, we all know that most of it is not "pristine," which implies completely untouched by the hand of man. But what gave the artist that impression and led her to use that term?

When trying to define what we mean by the "beauty" of a landscape, I think of the Navajo people my family and I lived among in the early 1970s. In their extremely complex language, the Navajos have a word – hozho – which rolls many of our meanings into one. It means a combination of beauty, harmony, happiness, peace and blessedness.

This valley gives many of us who live here, and many visitors too, a sense of hozho because an overall balance and harmony between humanity and nature has been achieved and maintained here, to an extent unusual in an increasingly populous and developed twenty-first century. There aren't too many major sights that look like they don't belong.

For example, my neighboring rancher's Quonset hut was never part of the original landscape, but it doesn't disturb the overall sense of hozho because it belongs to the cultural history of this place – the ranching culture that has historically created the meadows and other aspects of flourishing and varied land that support wildlife as well as livestock; has kept the incursions of humans and their structures to a minimum; and has sustained us with food, a way of life, and all the art forms that have sprung from this culture. The rancher's fences may seem "ugly" enough to violate some people's sense of hozho, but most of us realize they are necessary to the rancher's survival. If they can be adjusted to be more wildlife-friendly while still doing the job the rancher needs done, that would be an example of increasing the feeling of hozho most people experience here.

When we look to the mountains, the old ruler-straight clear-cuts that square the forests into unnatural-looking blocks are some of the few things we

see here that look like they don't belong. They violate the artistic principal that is well expressed by the Korean aphorism, "Nature Hates a Straight Line." An art student can't make a "beautiful" drawing of a tree until he or she learns to see the subtle curves of the trunk and branches. Artists since the ancient Greeks have called this "The Line of Life." So, clear-cuts that flow ragged-edged and follow the curves of the terrain much as a natural clearing would, disturb our sense of hozho far less or not at all.

Our cultural backgrounds and economic interests color our view of what is beautiful. I'm sure the loggers who worked those old clear-cuts decades ago didn't see them as "ugly." Perhaps they thought them "neat and tidy." So, open discussion is important to understand different perceptions and strike a reasonable balance whenever possible.

Somehow, the mule deer, among all the incredible variety of life forms we experience here, holds a special place. Historically, most of our ancestors depended on deer – of one species or another in one part of the world or another – for their very survival. To paraphrase a poem I wrote: "I exist because ten thousand years ago one doe's ear flicked toward danger." We evolved in a complex relationship with deer and our feelings for them run deep.

When we watch, hear, scent, taste, sculpt, paint, photograph – or merely glimpse – a deer, we are taking into our souls and bodies the materialized essence of the earth and the forces of life itself. The deer is the Wyoming wind that brings the snow. Its hair is the grass and the leaves of wild shrubs. Its blood is the snowmelt that rushes down the creeks in early spring. Its hooves are the trails among the rocks, its fibers the bark of junipers where it shelters from storms. Its mind gathers up the faintest whispers, the subtlest glimmers, the most delicate whiffs, the most cryptic messages of this place.

The deer gives us its strength gained from millennia of meeting the challenges of lion and coyote and bear, of cold and drought and blizzard and famine. Observing the deer gives us insight into its rich life experiences – it knows and makes us aware of some of the mysteries and intricacies of the other lives with which it shares this world, from eagle to grouse to hummingbird, from ponderosa to wildflower.

If, with the passage of time and the workings of humans, the balance has become skewed so that this harmony and beauty is endangered here, causing the mule deer population to dwindle, then we must try to remedy this. We need to be careful to respect the wisdom of the earth and keep the well-being of other native species in mind so we don't, in an effort to help, inadvertently make mistakes that cause our children and grandchildren to suffer a diminished quality of life. We want our descendants to know the deer and this land as we do. We want the deer and all they represent to flourish in hozho for epochs to come.

It is necessary to include qualitative measures, such as those obtained through questionnaires, with quantitative measures, such as revenues from deer licenses, in measuring the relative success of actions taken to improve benefits to humans from the enhancement of local mule deer populations.

Anticipated benefits, proposed actions to increase those benefits, and measurements under consideration to monitor the success of such actions are listed and discussed starting on page 58 under Future Projects. It may be that some of these actions and measurements are best accomplished by cooperating organizations, like Voices of the Valley, which has as its mission "to foster the widest possible public engagement in learning, collaboration and discourse about economic, social and ecological factors shaping the future of the Upper North Platte Valley". These roles and responsibilities will be sorted out early during Plan implementation.

Benefit 4: Mission Compatibility for State and Federal Agencies

Improving mule deer habitat also has the potential to facilitate state and federal agencies in serving their constituents in a manner compatible with their missions by working to improve habitat for mule deer and other species and purposes.

Chapter 7: Adaptive Management

Jessica Clement

As mentioned in the introduction, this Plan and its Working Document are living documents that will change over time as the Partnership tackles new subjects, and continues its learning regarding mule deer habitat improvements and other subjects.

When this plan and the working document are completed, the Partnership needs to be able to:

- Learn about proposed projects and determine that they meet PVHP desired conditions.
- Learn whether the objectives of implemented projects related to PVHP efforts and others' efforts are achieved and benefits are attained based on project monitoring data.
- Be able to explore alternative strategies if objectives and benefits are not achieved.
- Convene to continue learning about new and additional science and methods.
- Be able to convene to re-examine the PVHP process and objective, and alter or expand its purpose and methods as it deems fit.
- Take on additional objectives in the future.
- Provide "a table" where anyone can present new information or seek input regarding mule deer habitat and/or other issues.

The PVHP is "the table" where all stakeholders can convene to revisit issues, continue learning and adapt. Where mule deer habitat improvements specifically are concerned, in relation to the funding allocated by WGFD for implementation projects, an adaptive management process was needed. Adaptive Management is possible when there are ongoing efforts to collect evidence to determine whether decided strategies are effective. In the PVHP context, the monitoring data that will be collected before and after implementation will be used for the group to collaboratively determine whether objectives are met or whether alternative methods should be used.

To create this adaptive management process, Figure 11 was created by PVHP to illustrate the continuous nature of its process and how it is integrated with projects on the ground. Figure 12 shows in more detail how adaptive management will be applied to PVHP project implementation. Table 5 was agreed to by the PVHP as the timing and purpose of the future meetings that will be needed to implement their adaptive management strategy.

In general the Partnership will need to take time to evaluate and decide on issues and appropriate steps forward (the What). Next, the group will need to

plan how to take those next steps forwards in ways that are realistic, efficient and effective (the How). After planning comes implementation, where the projects or other activities will be implemented. This is followed with monitoring to explore effects of projects implementation. These data will be analyzed to be evaluated and used for deciding next steps. The monitoring is critical and creates the cornerstone of any adaptive management process, in order to learn how to move forward, and what to measures to avoid. Hence the objectives, desired conditions and monitoring methods described in Table 1 are critical to PVHP's effectiveness at improving mule deer habitat conditions in the Platte Valley. Adaptive management is the wheel that allows learning to continue and the PVHP to be effective at achieving its objectives.

Figure 11: Adaptive Management as used by PVHP

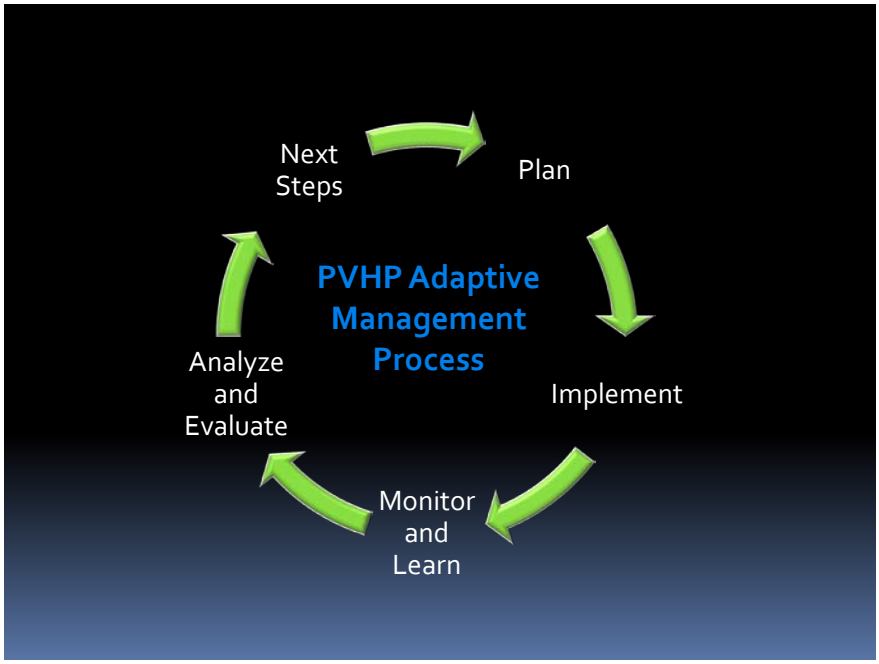


Figure 12: Adaptive Management for PVHP Project Implementation

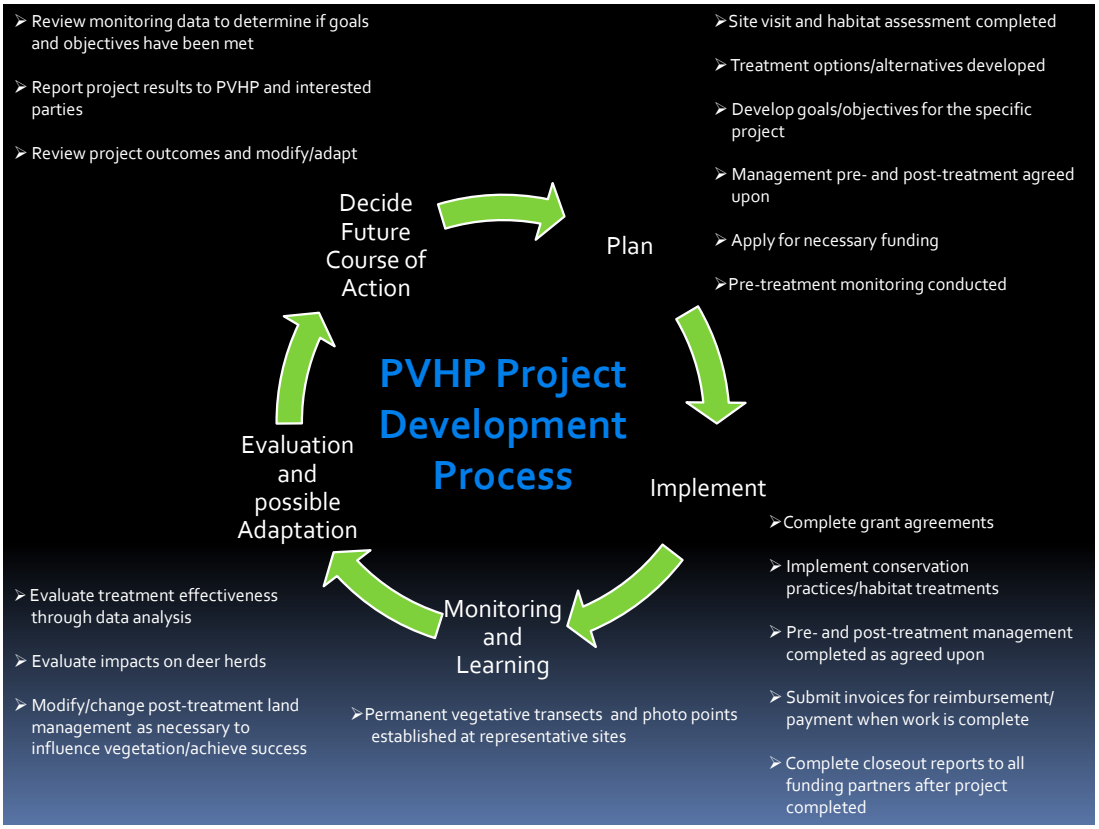


Table 5. Proposed Adaptive Management Schedule for 2013 – 2014.

Period	Action	Subjects	Result
Fall and Winter 2012, Spring 2013	Plan	Vision, Goal, Objectives, Criteria for Success, Adaptive Management, Decision Making Process, Funding Methods, Habitat Strategies, Monitoring Strategies, Next Steps.	PVHP Plan and Working Document
Summer 2013	Do	• Project Implementation • Base line and project monitoring • Project Development for Private and Public lands • Transition of facilitation/leadership	• Monitoring data • New Projects based on PVHP Strategies.
Fall 2013	Evaluate and Analyze	• Monitoring Data • Project Proposals (PVHP and WGFD) • Project Implementation Experiences • New Research	• New Projects for 2014 • Adjusted (if necessary) Implementation based on Experience and Research.
Spring 2014	Plan	• Funding and Implementation of new Projects for inclusion in next Plan. • Adjusted Monitoring methods.	• Revise the Working Document as needed
Fall 2014	Evaluate and Analyze	• Monitoring Data • Project Proposals (PVHP and WGFD) • Project Implementation Experiences • New Research	• New Projects for 2015 • Adjusted (if necessary) Implementation based on Experience and Research.
Ongoing	Planning, Evaluating , Analyzing	• PVHP can meet whenever it feels a need to convene and discuss any issue.	• Deliberations will improve methods and results will be included in the plan

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Jessica Clement

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Andrew Coulter	Wyoming Wildlife-The Foundation
Biff Burton	WGFD
Bill Alldredge	Wyoming Wildlife Federation
Bill Baer	USFS
Bill Brinegar	WGFD
Bill Clay	XH Ranch
Bill Gerhart	WGFD
Bobby Yach	Mule Deer Foundation
Brad Weatherd	USFS
Brent Lathrop	TNC
Brian Mealor	UW Extension
Brian Trautwein	Saratoga Sun
Charlie Morton	BLM
Chris Otto	BLM
Chris Williams	ZN Ranch
Christina Barrineau	WGFD
Clay Sondgeroth	Wyoming Wildlife Federation
Cody Waldrip	SERCD
Colin Tierney	WGFD
Courtney Amerine	Wyoming Wildlife Federation, UW
Daryl Lutz	WGFD
Dave Moody	Wyoming Wildlife Federation
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Doug Campbell	J-J Ranch
Duane Short	Biodiversity Conservation Alliance
Erik Molvar	Biodiversity Conservation Alliance

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Glen Leavengood	SERCD
Greg Hiatt	WGFD
Greg Ryan	Ryan Ranch
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Heath Cline	BLM
Heather Halbritter	WGFD
Ian Tator	WGFD
Jack and Diana Berger	Berger Ranch
James Sewell	TA Ranch
Jeb Steward	State Representative
Jeff Streeter	Trout Unlimited
Jerry Paxton	State Representative
Jim Schell	Outfitter
Jim Blocker	TA Ranch
Jim Freeburn	UW/Outfitter
Jim States	Voices of the Valley
Joe Elder	Saratoga Sun
Joe Parsons	SERCD
Joel Humphries	BLM
Josh Peterson	Rancher
Kal Herring	Herring Angus Ranch
KayCee Alameda	Voices of the Valley
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Matt Kerbs	Bigfoot 99 (radio station)
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Melodee Marinthal	Wyoming Wildlife - The Foundation
Michael Crimmins	Kelley Cattle Co
Mike Condict	Condict Ranch
Mike Murry	BLM
Mike Rahe	Local Landowner
Monty Lane	NRCS
Neil Thagard	Theodore Roosevelt Conservation Partners
Pat Rollison	Land Owner and Conservationist

Pete Taylor	Cozy Canyon Ranch
Phil Cruz	USFS
Rachel Mealor	UW Extension
Richard King	WGFD
Robert Worthington	Landowner
Roger Cox	Outfitter
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Ryan Kenneda	WGFD
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Shelby Perry	Biodiversity Conservation Alliance
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Steve Loose	USFS
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Terry Creekmore	WGFD
Tim Novotny	BLM
Tom Arthur	Cedar Creek Ranch
Tom Ryder	WGFD
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Appendix A. Situation Assessment

Results from the Platte Valley Habitat Partnership Interviews for Situation Assessment.

May 2012

Assessment conducted by telephone and in person by Jessica Clement, Ph.D. April 2012

Twenty-two people interviewed. Stakeholder types:

- Private Landowners
- Federal land management agencies USFS and BLM
- Wildlife conservation NGOs
- Wyoming Environmental NGOs
- National wildlife/conservation NGOs
- Outfitters and guides
- Local government
- Conservation district
- Local community organizations

1. What is the problem regarding mule deer habitat in the Platte Valley in your opinion? (Joint problem statement formation).

- Winter range: reduce juniper, more sagebrush, not Anticline.
- Overgrazing on public lands. Drought. Lack of coordinated habitat improvement - so far very limited work done. We need coordination among landowners and agencies on a large scale. This is not a short term issue.
- Re-establish primary vegetation types, e.g. bitterbrush. Don't wait to reseed.
- Agencies don't think of including the public in monitoring efforts but a lot could be gained by including the public.
- Lack of collaboration and thinking outside the box.
- Habitat is very important but don't think winter range is any different from 30. 40 years ago. We only have a little cheatgrass. We have pine beetle but they may be a good thing for deer because it mimics timber treatments.
- Areas need to be left alone and quiet so animals are not disturbed e.g. private property.
- Invasives and cheatgrass – don't control with spraying but more natural methods. Use test plots with new species.
- Not sure about removing junipers, not they take anything away.

- We need to be aware of insects, mice, coyotes, etc. Don't look only at mule deer, also look at the whole picture. Don't think the predators are the problem but a symptom. Limit some human traffic like motorcycles.
- There are some things we can do but it would have to be more than just on individual ranches. Not sure the problem is habitat. I'm all for doing everything we can to help but I feel that there are other issues that are just as important. You can address habitat
- Fluctuation in weather influences deer movement. They're on irrigated land. Predation. Disease. Not sure it's about habitat – there are so many other factors. We don't have much development that affects habitat.
- We don't have a habitat problem, the real problem is predators.
- Can only speak for winter range. We have good habitat in the winter range.
- Shrubs are heavily used. Tree cover could use work e.g. regeneration of new aspen. Could also use some regeneration work in lodgepole pine to speed recovery up. Several projects are on the way to do this.

2. If there was no effort made to address habitat issues, what do you think would happen?

- Continued decline in mule deer numbers (2x).
- Habitat needs to be addressed but it won't have a huge impact on deer numbers.
- Without habitat the deer are stressed. If they have habitat, they can deal with other challenges. But can't say there's a whole lot less habitat than in the 1980's.
- Not sure addressing habitat would make a significant improvement. It's about weather. It's more about weather and factors such as hunting season length, what sex is affected. Forty-one years ago we had a 2-season. Most ranchers aware of habitat issues since it's in their best interest to maintain habitat because they are outfitters too.
- Can spend a lot of $ on habitat and mule deer would not come back. A lot of work has already been done but we did not get more deer or fawns. Weather is an issue and predators.
- Not sure addressing habitat is a good thing, habitat is not the problem.
- We won't see the improvement we want to see for see for mule deer unless we address habitat. Also have to consider the effects of other species and on other species e.g. elk, bighorn sheep, sage grouse, song birds.

3. Would you be willing to participate in this collaborative process?

Yes (x 22)

4. Why?

- Desire to get the herd to a healthy level for future generations.
- It's not fair to sit back and not give something and then complain about it later.
- We can't be unaware of what's going on in nature. Whether it's pollinators or grass, it's all connected. The best thing we can do is find a balance between what we do and nature. A strong mule deer population is indicative of strong nature.
- I grew up here and love this place. We are all dependent on sustainable use of natural resources.
- I would if I had time.
- I want to see this process heads in the right direction, so the landowners don't get hit. I think our habitat is fantastic so it needs to be demonstrable that this will bring back the mule deer or sage grouse. We have predators out of our ears.
- Want WGFD to address seasons.
- USFS needs to cooperate with other agencies to make conditions better.
- PVHP provides an opportunity to improve mule deer and big horn sheep habitat.

5. What would be the best possible outcome of this process after a year?

- Still having everyone at the table. Also address juniper, consider experimental feeding, need more presentations on what is working around the State.
- If the stakeholders realize that you cannot manage habitat for one species without affecting other species. If everyone walks away with a different perspective. If people are willing to listen and be open-minded.
- A habitat plan is a good idea (2x).
- Some kind of partnership with landowners.
- Curtaining hunting seasons – want quality hunt in three years.
- Predation issues such as mountain lion is a bigger issue.
- We need a taskforce and a plan in place with objectives and timelines.
- We need to see that ranchers are respected.
- Improvement in communications with WGFD.
- A habitat plan would be great. Expecting polygons on the ground to be drawn after one year might be a bit much but building trust and understanding would be good.

6. What would be the possible outcome after ten years?

- Find balance between habitat and big game numbers. See big changes in transition zones including aspen regeneration.

- Bringing the deer numbers back, identify the real problems and hit it in a big way.
- See more deer anywhere.

7. What would be the worst possible outcome of this process?

That some stakeholder groups will not return to the table.

8. What factors need to be in place for this process to be effective?

- A strong moderator to keep the group on track.
- Get science in the discussions and agreement in the group that decisions will be based on science. A strong learning component.
- People need to listen, be open-minded, all interests need to be represented, including the green point of view, people need to feel they are heard. Need to compromise. Not fair if process is disrupted if they have no real knowledge.
- All entities need to be at the table. There has to be a willingness to be open. Maintain interest around the table.
- Ask: are we breaking new ground regarding habitat improvement for mule deer? Sometimes improvements have different outcomes e.g. sagebrush work allowed non-desirables to come in e.g. rabbit brush which is not good for deer but is good for antelope.
- WGFD needs to commit resources, staff, oversee the partnership, collect information in the field. USFS can share shrub and timber information on USFS land. It can take between 15 and 60 years for sage to return, depending on the type of shrub. We will need shrub monitoring data to find ways of getting faster responses.
- Everyone needs to learn needs to learn how to work together and include others' views.
- Include all stakeholders. It's necessary to invite everyone, even those who are not "our" friends.
- The time is right. We have seen so much deterioration of the resources. People are tired of fighting and are more interested in cooperation. PVMDI made the time ripe.

9. Who needs to be at the table?

- Private landowners e.g. Big Creek, Silver Spur
- Conservation District
- WGFD
- USFS
- BLM
- NRCS

- Sportsmen
- WYDOT
- Energy development companies.
- RMEF
- Counties and towns
- Wyoming Outdoor Council
- Outfitters and guides
- Women
- Environmental organizations
- Younger stakeholders.
- Anybody who has in interest in wildlife
- Everyone in the Valley has something at stake, everyone has something to contribute.

10. Anything else?

- Lost trust when we reviewed the draft, we did what they wanted and didn't talk about the 2012 season but was blindsided by biologists who proposed short seasons.
- There is a study being carried out by collaring elk to explore whether beetle kill is changing their movements. Bark beetle is changing habitat: opening of forest, more grass, when weather gets warmer, water comes off the forest faster – USFS needs to be there. If we have fire, change habitat, might endanger deer.
- If we spend dollars on habitat, then we should spend dollars on predators.
- Something like this was tried 10 years ago with Rick Straw of WGFD, a long-term shrub treatment approach; bulk of the work needs to be done by WGFD. This effort needed more nurturing.

Appendix B. BLM Project Information

BLM Project Information - PVHP Boundary						
	Location					Project Description
Project Name	Township N	Range W	Section	Project Size (Allotment/Pasture/Project Boundary/Miles)	Seasonal Range	Notes 1-7
Aspen Pocket Spring Protection/Development	13	81	24	8,853 acre grazing allotment	Transitional	3
Chad Allotment Infrastructure (Well/Pipeline/Tanks)	17 , 16	82, 83	multiple	4,128 acre grazing allotment	Winter	4
Hidden Springs Seep Protection/Development	20	82	8	12,195 acre grazing pasture	Transitional	3
Jeep Trail Spring Protection/Development	13	81	3	8,853 acre grazing allotment	Transitional	3
Miner Creek Cabin Spring Protection/Development	14	84	35	4,617 acre grazing allotment	Summer	3
Miner Creek - Cow Camp Spring Protection/Development	14	84	35	4,617 acre grazing allotment	Summer	3
Stove Pipe Spring Protection/Development	13	81	24	1,694 acre grazing pasture	Transitional	3
West Dana Seep Protection/Development	20	83	24	12,195 acre grazing pasture	Winter	3
West Prospect Mountain Protection/Development	13	81	10	1,615 acre grazing pasture	Transitional	3
Encampment River/Minor Creek Wildlife Guzzlers	14	84	25, 26	4,617 acre & 3988 acre grazing pastures	Winter	8
Lone Willow Bush Spring Protection/Development	15	81	17, 18	1,358 acre grazing allotment	Winter	3
North Cedar Creek Spring Protection	17	82	15	1 acre riparian protection exclosure(s)	Transitional	3
Romios Ranch Spring Protection/Development	14	83	27, 26	1,051 acre grazing allotment & 2,474 acre grazing allotment	Transitional	3
Wolf Allotment Riparian Protection Fence and Water Gap	20	84	14	13.5 area riparian protection exclosure	Transitional	3
Rattlesnake Creek Riparian Protection Fence	20	83	24	95 acre riparian protection exclosure	Transitional	3
Big Creek Fence Conversion Phase II	13	81	3	1.3 miles	Transitional	1
Corral Creek Fence Conversion	15	81	18, 19	1.03 miles	Winter	1
Corral Creek Fence Conversion Phase II	15	81	18, 19, 30, 29	1.7 miles	Winter	1
Prospect Mountain Fence Conversion	13	81	11, 12, 13	1.55 miles	Winter & Transitional	1
Romios Ranch Fence Removal	14	83	26, 27, 34	1.4 miles	Transitional	6
Romios Ranch Fence Conversion	14	83	34	.15 miles	Transitional	1
Beaver Hills Rx Burn	14	81	multiple	2,473 acre project perimeter	Transitional & Winter	2
Prospect Mountain Rx Burn	13, 14	80, 81	multiple	2,670 acre project perimeter	Transitional & Winter	2
Pennock Mt Rx Burn	17, 18	82, 83	multiple	7,818 acre project perimeter	Transitional & Winter	2
West Barrett Rx Burn	14, 15	81	multiple	5,619 acre project perimeter	Transitional & Winter	2
Rattlesnake Creek Rx Burn	20	83	24	113 acre project perimeter	Transitional	9
School & Moores Creek Juniper/Conifer Removal	15	81	29, 30, 32	3 miles of riparian drainage	Winter	13
Large Wildfires within PVHP Boundary						
Pennock Mt Wildfire (Aug 2011)	17	82	16, 17, 21	500 acres	Transitional	11
Blackhall Mountain Wildfire (Aug 2000)	14	83	22, 21, 27, 28, 29, 32, 33, 34	1630 acres	Transitional	12
Proposed Projects						
Chad Allotment Sage Brush Thinning	16, 17	82	31, 32, 5, 6	820 acres	Winter	10
Chad Allotment Pasture Fencing	16, 17	82. 83	multiple	3 miles	Winter	4
Cedar Ridge Juniper Treatment/Riparian Enhancement	16	83	11, 14	100 acres	Winter	5
Methodist Allotment Rx Burn - Aspen Regeneration	16	86	23, 26, 27	350 acre project perimeter	Transitional	7
Beaver Hills Fence Conversion (Phase I)	14	82	12, 13, 14, 15, 23	5.25 miles	Winter	1
Corral Creek Fence Conversion Project (Phase III)	15	81	18, 31, 32	1.70 miles	Winter	1
Big Creek Fence Conversion (Phase III)	13	81	2, 11, 13, 24, 25	3.5 miles	Transitional & Winter	1
Severson Flats Fence Conversion Project (Phase I)	20	85	17	1	Winter	1
Beaver Hill Riparian Protection/Development	14	82	4, 9, 14, 22, 23	8 Potential Riparian Protection(s), 3 Developments	Transitional & Winter	3
Big Creek Riparian Protection/Development	13	80, 81	11, 30	2 Potential Riparian Protection/Developments	Transitional	3
School Creek Juniper/Conifer Removal	15	81	31	.40 miles of riparian drainage	Winter	13

Additional Descriptive Notes regarding the Rawlins BLM PVHP Project

1: Fence Conversions

Fence lines converted to improve wildlife passage and migration, and decrease wildlife entrapment/entanglement. Fence lines identified for conversion have included old 5-6 wire fences or woven wire fence, most associated with historical domestic sheep use, that have been documented as restricting wild passage. Identified fence lines are converted to 3-4 wire (bottom smooth), rail top, or buck/pole types, to improve wildlife passage and prevent loss resulting from entanglement or entrapment.

2: Spring Rx Burning Shrub/Vegetative Health

Spring Rx fires have been implemented for the purpose of improving vegetative health as a result of increased age class diversity and species composition. Spring burns are designed around cooler seasonal temperatures and elevated soil moisture levels. These conditions allow for an increase in mosaic treatment patterns and favor the treatment of mountain shrubs (i.e. Antelope bitter brush, Mtn. mahogany) that re-sprout post treatment. Post burning response also results in increased herbaceous cover (decreased bare ground), including a release of various forb species.

3: Riparian Protection/Development

Riparian protection/development projects are designed to promote riparian health, as a result of failures identified during the "Standards and Guidelines Assessment" process. During the "Lower & Upper North Platte Valley Assessments (2003-2004) all riparian areas, on BLM lands, were evaluated for riparian health and condition. Riparian areas not meeting the "Standards for Healthy Rangelands", with an undetermined or downward trend, are identified to receive mitigation from the degrading impacts. The most common influence to degraded riparian habitats (i.e. spring/seeps) are those resulting from large ungulate use during summer months. As a result, a number of identified spring/seep/riparian areas have been fenced to prevent large ungulate influences resulting from hoof impacts and/or over utilization of riparian vegetation during summer months.

4: Grazing Infrastructure Chad Allotment (Pasture Fencing & Water Development)

The Chad allotment (4128 acres) is identified as a major use area for wintering Platte Valley mule deer. In 2011 local WGFD biologist approached the BLM, and area landowner, to discuss projects that could be accomplished within the allotment to improve wildlife habitat. It was determined that an increase in livestock grazing infrastructure (i.e. watering and pasture fencing) within the BLM Chad allotment, would result in an increase in livestock management flexibility, thus, allowing for a livestock rotational use pattern. Livestock grazing utilizing a pasture rotation system would allow pastures to be deferred, and/or rested from seasonal livestock use annually. The development of interior pasture fencing would also provide needed flexibility to rest implemented vegetative treatments, should they require rest, from livestock utilization.

5: Cedar Ridge Thinning & Riparian Enhancement

This project would include the removal/thinning of approximately 100 acres of conifer encroachment from along Wood Draw, located on private land. This project would provide a learning opportunity for future juniper/conifer removal/thinning projects in the Platte Valley. This project would include the mechanical thinning and removal of juniper; harvested trees would be piled so they could be burned the following winter. A masticator may also be used to shred trees and disperse biomass. Some treatment areas will be seeded, and/or treated chemically to reduce cheat grass establishment.

6: Fence Removal

The Romios Ranch fence removal project was associated with the Blackhall wildfire August 2000. Fences were constructed to rest areas burned by the 2000 wildfire, and 1.4 miles of fence constructed post fire was removed in 2010.

7: Aspen Regeneration Rx Burn – BLM Methodist Allotment

This project is proposed to enhance aspen community health along the BLM/USFS boundary within the BLM Methodist allotment. Existing aspen clones within this allotment have become decadent, encroached by conifers, and show sign of disease. Introducing fire in to decadent aspen communities helps stimulate aspen suckering post fire, while reducing vegetative competition from sage brush and conifers within and around the edge of old aspen clones.

8: Wildlife Guzzlers

In the 80's two wildlife guzzlers were constructed to improve watering opportunities for wildlife on both sides of the Encampment River. These guzzlers were associated with the population augmentation of Big Horn sheep into the Encampment River area.

9: Spring Rx Burning Riparian Flood Plain – Rattlesnake Creek

The Rattlesnake Creek riparian Rx burn was designed to reduce the encroachment of sagebrush along Rattlesnake Creek. The reduction of sagebrush from riparian banks allows willows and other riparian obligate plant species, capable of dissipating energy and maintaining bank stability during high flow events, to re-establish.

10: Chad Allotment sagebrush thinning

This project would include the reduction of sagebrush within portions of pastures of the BLM Chad grazing allotment. Sagebrush would be mowed in a mosaic pattern, or treated with a thinning chemical (i.e. Spike) to reduce sagebrush canopy cover. A reduction of canopy cover, combined with an increase in livestock management, would increase the current herbaceous understory within the treatment units and improve forb production.

11: Pennock Mountain Wildfire August 2011

The Pennock Mountain wildfire occurred August 2011, and burned approximately 500 acres. The fire re-burned approximately 300 acres that had been Rx treated the spring of 2004. Site visits to the area document mostly native species re-establishing post fire. Cheat grass establishment is a concern in re-treated areas, and sites continue to be monitored.

12: Blackhall Mountain Wildfire 2000

The Blackhall Mountain wildfire occurred during August of 2000, and burned approximately 1700 acres. The fire established in mainly sagebrush communities, however, some timber stringers were also burned. As a result of the wildfire, areas of impacted grazing allotments were fenced to prevent livestock disturbance for two growing seasons post fire. Increases in cheat grass and musk thistle, have been documented as a result of the 2000 wildfire.

13: School & Moores Creek's Juniper/Conifer Removal

Juniper/confer removal project implemented from 2006-2009, and continued in 2013. This project is designed to improve riparian habitat by removing encroached conifers and junipers from riparian flood plains and adjacent habitats in School and Moores Creek drainages. Trees are mechanical cut with chainsaws and piled for burning. The reduction of juniper/conifer in riparian type habitats helps to increase herbaceous vegetation, and release additional water from the system. Riparian areas (water and vegetation) have extended further down drainage and bare ground has been decreased as a result of the 2006-2009 work.