STANDARD 3 – UPLAND VEGETATION HEALTH

Upland vegetation on each ecological site consists of plant communities appropriate to the site which are resilient, diverse, and able to recover from natural and human disturbance.

Vegetation in the Upper Colorado River Basin watershed in this assessment area is a mix of a variety of habitat and range types, interspersed within and between, and/or transitioning from one to another. An assortment of environmental factors influence the location(s), extent, seral stage(s), and/or types of vegetation found throughout the area. Elevation, precipitation zone, topography, soils and underlying parent materials, slopes, and exposures all contribute to the general vegetation composition throughout the watershed. In order to simplify the overall descriptions of vegetation types, this analysis will address vegetation types in relation to the elevation and topography in which they occur (and additionally closely tie to the associated precipitation zones), beginning at the highest portions of the watershed and descending to the bottom of the analysis area.

1) Characterization:

As mentioned in the background section, the most common vegetation type within the watershed is the sagebrush-grass type, which occurs to varying degrees (and with varying composition) throughout the elevation and precipitation ranges of the study area. Interspersed throughout the landscape are other assorted communities including sagebrush/mountain shrubs, saltbush steppe, greasewood lowlands, juniper woodlands, and aspen woodlands, as well as badland type communities containing limited vegetation. Additionally, various combinations of communities and limited inclusions within specific community types are common.

From the highest elevations analyzed in this document (around 8,500 ft) to a level of around 6,500 ft, the sagebrush-grass community is dominated by mountain big sagebrush (picture 46-1). The mountain big sagebrush-grassland community occurs throughout the foothills and bases of mountain ranges and is intermixed with and surrounds many conifer and/or aspen woodlands. Shrub heights range from 10 to 30 inches, and canopy cover can reach up to 50 to 60%. After removal, mountain big sagebrush is relatively quick to re-colonize, reaching predisturbance levels in as little as 20 to 30 years. Understory herbaceous species include buckwheat, larkspur, lupine, paintbrush, mulesear wyethia, yarrows, Oregon grape, and penstemons. Grasses found in these communities include green and Columbia needlegrass, elk sedge, mountain brome, king-spike and Idaho fescue, Kentucky and big bluegrasses, and slender, thickspike, bluebunch, and western wheatgrasses. In many instances within the sagebrush community at these elevations, a large percentage of the overall shrub community is comprised of various other mountain shrubs including serviceberry, snowberry, antelope bitterbrush, mountain mahogany, chokecherry, and rose. Lying in sandier sites at these higher elevations, the sagebrush-grassland community may be intermingled with bitterbrush shrub-steppe type communities, where antelope bitterbrush is either the dominant shrub species or is co-dominant with other mountain shrubs (picture 46-2). Along some of the higher, windswept ridges, limber pines can be found clinging to the shallow soil.

At these relatively high elevations and precipitation ranges, and limited to somewhat sheltered areas where more moisture is gathered and retained throughout the year (mostly in steep draws facing north and/or east and along the slopes immediately adjacent to and climbing out of perennial and/or ephemeral riparian bottoms), small stands of so-called “dark timber” can be found in isolated, scattered locations. These stands are limited to the highest and wettest pockets of the evaluation area, occurring along the high slopes between Savery Creek and Loco Creek and along the northern portion of the west Sierra Madre front, including slopes adjacent to and/or above Sandstone and Little Sandstone Creeks and Hell Canyon, and the slopes along Dirtyman, Hartt, and Mill Creeks (picture 46-3). Vegetation in these pockets is dominated by coniferous trees intermixed with aspens and various understory shrubs, grasses, and forbs which can withstand being shaded by the overstory. Overstory tree growth includes subalpine fir, lodgepole pine, and aspen. Although limited by litter and shading, understory species within these stands includes species such

as shrubby cinquefoil, currents, and woods rose. An additional vegetative community that occurs in limited abundance along the west slope of the Sierra Madres is a Gambel oak-dominated community which is extremely similar to the mesic upland shrub type, but dominated by dense thicket-like stands of Gambel's oak. The overstory ranges in height from small shrubs of around five to six feet to mature trees as tall as 15 feet. Understory species are similar to those found in aspen stands and mesic shrubs stands such as dense serviceberry or chokecherry stands. As the southern portion of the Sierra Madre Mountains in Wyoming is the northernmost extent of this vegetation type, and since this vegetation type occurs at higher elevations and wetter areas than are found throughout most of the analysis area, it is relatively scarce, occurring (on BLM-managed rangelands) only along the south (north-facing) slopes of Little Sandstone canyon.

Limited to sites that are inherently wetter or retain moisture for longer periods (mostly north and east facing bowls and slopes which trap more winter snow and suffer less from evaporation), aspen woodlands are scattered throughout the high-to-mid-level elevations in the area (picture 47-1). Obviously dominated by aspens, understory species include snowberry, serviceberry, Scoulers willow, creeping juniper, rose, Oregon grape, geranium, bluebells, elkweed, columbine, licorice-root, sweet cicely, aster, elk sedge, Columbia needlegrass, blue wildrye, mountain brome, and slender wheatgrass. Forage is limited by litter/leaf cover and shading of the floors of the stands. Aspen stands are limited to the eastern portion of the watershed, carpeting the foothills of the Sierra Madre Mountains along its entire west front, and continuing in scattered locales to the west slopes of Muddy Mountain and along the higher portions of the Deep Creek, Cherokee Creek, Wild Cow, Cow Creek, and Deep Gulch drainages. West of Highway 789, only rare, tiny, remnant aspen patches are encountered at high, wet locations (several instances on the Flat Top Mountains) and contain aspen overstory sparse enough that it would be more correctly classified as a mesic upland shrub type. Common at the higher elevations, and in many cases surrounding and/or intermingled with aspen stands, the mesic upland shrub steppe vegetation type is widespread. It is dominated by serviceberry and/or chokecherry and occurs on moderately-deep to deep soils. The dominant shrubs in this type can reach heights of ten to fifteen feet and occur in open to dense stands. Understory species include snowberry, rose, and currants, along with basin wildrye, green and Columbia needlegrass, Kentucky bluegrass, bluebells, columbine, aster, violets, elkweed, chickweed, and stinging nettle. Both aspen and mesic shrub types respond well and quickly to disturbances.

As elevation is lost and the corresponding moisture regime drops, mountain big sagebrush begins to intermingle with and give way to Wyoming and basin big sagebrush stands and big sagebrush/grass/mountain shrub mixtures. Mountain shrub vegetation types encountered throughout this zone on shallow soils and/or shallow rocky sites include relatively monotypical and intermingled xeric upland shrub steppe sites. This vegetation type contains true mountain mahogany, in some cases as the dominant shrub species, but more often intermixed with other mountain shrubs including bitterbrush, snowberry, serviceberry, and basin big sagebrush (picture 47-2). Dependent on soils, precipitation, and browsing levels, the dominant shrubs may reach up to five to seven feet in height. Common understory species are green needlegrass, needleandthread, bluebunch wheatgrass, Indian ricegrass, Sandberg's and mutton bluegrass, and mat forbs such as phlox, buckwheat, locoweed, and goldenweed. Wetter sites nestled within the rolling terrain are dominated by stands of basin wildrye. A relatively unique, shrub-dominated vegetation community is located in the Sand Hills/Doty Mountain region of the analysis area, influenced heavily by the sands soil type in which it occurs. This vegetation type occurs within the 10 to 14-inch precipitation zone and is dominated by a mixture of antelope bitterbrush and basin big sagebrush, silver sagebrush, rabbitbrush, needleandthread, prairie sandreed, and Indian ricegrass. This vegetation type also includes a high occurrence of a "berry" group, including snowberry, serviceberry, chokecherry, and rose.

As the transition to lower elevation progresses, Wyoming big sagebrush takes the place of mountain big sagebrush on the shallow to moderately-deep soil sites, and basin big sage dominates shallow draws and swales where deeper soils occur within the sagebrush-grass communities (picture 47-3). The xeric upland shrub steppe type is found at these elevations, where mountain shrubs tend to become dominated by mountain mahogany and bitterbrush that tolerate drier conditions. In wetter areas (draws, areas near seeps, north and east-facing slopes), instances of the previously-described mesic upland shrub steppe vegetation type can be found. Throughout the sagebrush-grassland communities at these elevations, rubber

rabbitbrush, winterfat, and low rabbitbrush, as well as shadscale and gray horsebrush, are interspersed with the sagebrush (picture 48-1). Grasses in the understory include slender, bluebunch, and western wheatgrasses, needleandthread, prairie junegrass, Indian ricegrass, Sandberg bluegrass, and bottlebrush squirreltail (picture 48-2). Forbs that thrive in the understory include phlox, penstemons, Hookers sandwort, buckwheat, locoweed, and cryptantha. Additionally, greasewood begins to appear in the more saline areas.

Juniper woodlands tend to become the predominant vegetation type (other than sagebrush-grass) at middle-to-lower, drier elevations and are comprised of Utah juniper, which ranges from a dense to relatively open overstory (pictures 48-3, 48-4). They lie over terrain as varied as the (relatively) flat surfaces of plateaus, along rolling hills and ridgelines and up steep slopes, along the knife-edges of rimrock cliffs, and into rocky breaks and broken draws. Understory shrubs continue to be dominated by Wyoming big sagebrush on deeper soils, (and some basin big sage). Although scattered throughout the mid-to-lower elevations of the analysis area, the heaviest concentrations of this vegetation type are found along Wyoming Highway 789 between Muddy Creek and Baggs (the Dad junipers, Wild Horse Peak), along the Colorado border from Savery to Baggs, the Red Creek drainage south of the Flat Top Mountains, and along the length of Powder Rim. Xeric upland shrub steppe communities are intermingled with this vegetation on shallower soils, including true mountain mahogany, bitterbrush, and winterfat. This combination of Utah juniper and true mountain mahogany is most pronounced in the area between Poison Basin west of Baggs and the easternmost extents of Powder Rim. On sandier soils, the bitterbrush shrub steppe occurs, usually dominated by low-growing antelope bitterbrush at these elevations. Lupine, cryptantha, paintbrush, penstemons, sego lily, onion, and prickly-pear cactus are common forbs. Indian ricegrass, needleandthread, and Canby bluegrass are represented in the herbaceous understory, as well as the ever-present thickspike, bluebunch, and western wheatgrasses.

At the lowest elevations in the (analyzed) watershed area, sagebrush-grass vegetation types continue to be typified by Wyoming and basin big sagebrush, interspersed with lowland shrubs including greasewood, horsebrush, spiny hopsage, and rabbitbrush (picture 48-5). An upland silver sagebrush-grassland vegetation type can be found in some areas at this elevation interspersed with the Wyoming and basin types where deep sand soil types underlay the vegetation. Typified by silver sagebrush either singly or mixed with basin big sage and/or green or Douglas rabbitbrush, it can reach heights of three to five feet, with a relatively high canopy cover of up to 50%. Understory species are typical of those found in sandy soils: needleandthread, prairie sandreed, Indian ricegrass, sand dropseed, scurfpea, cryptantha, and/or prickly-pear cactus. Another community influenced by sandy soils is associated with the lower elevations of the analysis area, appearing on slightly-raised, stabilized sand dune features scattered throughout saline uplands and lowlands and shale-type flats (picture 48-6). Relative to the surrounding flats, these communities are extremely productive and are dominated by big sagebrush and spiny hopsage and include associated species such as needleandthread, Indian ricegrass, sandhill muhly, greasewood, rabbitbrush, and thickspike wheatgrass. These low-precipitation stabilized sand dune sites are located west of Sand Creek towards the Adobe Town badlands and above the western edges of Adobe Town across the flats to the base of Kinney Rim to the west. As soils become more saline, salt-tolerant species tend to dominate, and the sagebrush-grass type is replaced and interspersed with the saltbush steppe-type community, dominated by Gardner's saltbush, bud sagewort, shadscale, winterfat, and birdsfoot sagebrush (picture 48-7). Birdsfoot sagebrush is also found on more alkaline soils with higher pHs. On flats with higher pHs, it is found in mostly pure stands and along slopes or ridges and/or as the pH drops, it becomes mixed with species such as Nuttall's saltbush and other grasses and forbs. Understory species that are found in these communities include winterfat, western wheatgrass, Sandberg's bluegrass, Indian ricegrass, bottlebrush squirreltail, threadleaf sedge, phlox, hooker sandwort, buckwheat, and other mat forbs. Within the analyzed watershed area, these sites occur primarily west of Muddy Creek and north/northwest of the Red Creek drainage. Greasewood flats become more common (although scarce relative to sagebrush-dominated communities in this area), occurring on lowland flats where, for one reason or another, the vegetation is influenced by high salinity and seasonal water (sometimes standing), where other, higher shrubs tend to be excluded (picture 48-8). In some cases, these sites are interspersed with Nuttall's saltbush. The understory herbaceous component contains phlox and asters, Indian ricegrass, Sandberg bluegrass, needleandthread, western wheatgrass and squirreltail. Another low sage type found at these elevations and precipitation zones is the alkali sagebrush type, which occurs in clay soils (picture 48-9). It occurs in relatively pure stands and

grows to between six and eighteen inches in height. Intermingled vegetation species found within these communities are very similar to those found in the other low precipitation, low sagebrush communities. This vegetation community is most prominent to the north/northeast of Baggs in the lower Cherokee and Deep Creek drainages.

Finally, interspersed throughout mostly the middle and lower-elevation portions of the system, badland-type sites are spread haphazardly, consisting of relatively low-production vegetation types with very little soil accumulation and/or ground cover (picture 49-1). The soils and underlying parent materials in badland sites are very soft and highly erosive, and the landscape is cut with a large number of drainage channels. Vegetation in these sites, although sparse, contains species ranging from Wyoming big sagebrush and antelope bitterbrush to scattered bunchgrasses (including Indian ricegrass and needleandthread). Although scattered throughout the analysis area, badlands primarily occur west of the Flat Top/Red Creek drainage area and become concentrated and extensive from Sand Creek to the Adobe Town area east of Cow Creek Reservoir and Kinney Rim.

Principal human uses throughout the area, which impact the vegetation resource, tend to center around allocations of forage for livestock and wild horse grazing (in some cases and/or areas, forage is not specifically allocated to either, and may by used by wildlife), removal of native vegetation during the course of mineral exploration and extraction, and recreation uses. Additionally, vegetation in the watershed is directly influenced by human activity through the application or repression of intentional and/or naturally occurring "vegetation treatments," including wildfire, prescribed fire, chemical, and mechanical vegetation removal.

Livestock use at higher elevations is comprised of cattle and/or sheep grazing. Seasons of use at these elevations is restricted to late spring, summer, and early fall, during which time the area can be accessed and the vegetation utilized by grazing ungulates – snow usually precludes year-round use. Cattle operations vary between grazing of cow-calf pairs, yearling steers, and yearling and/or second-year heifers. Grazing use occurs during various portions of the spring/summer/fall seasons, ranging from season-long to deferred and/or rotational use. Sheep use of the higher portions of the watershed consists mostly of late-spring and early summer use for lambing grounds and as holding areas for use prior to trailing the bands on to the forest. Early-to-mid-fall use is made as bands of sheep are dropping from the forest and on the way to winter grounds at lower elevations. At the mid-to-lower portions of the watershed, summer cattle use is made either seasonally or through rotation of livestock through use areas. Summer cattle use in various configurations is made throughout the majority of the watershed at mid-to-low elevation levels. Although summer cattle use occurs in many of the lowest allotments in the watershed, perhaps more predominantly, winter sheep use is made throughout many of these grazing allotments, rotated through the use areas by herding. In some scattered allotments, cow-calf pairs make winter use of the forage.

Recreation primarily takes place during the late-summer and fall months as hunting (mid-August through November), although limited summer use occurs throughout the area, and springtime recreational uses such as shed-antler hunting continue to increase at an accelerated pace. Associated with this use are an ever-increasing number of roads, trails, and tracks, which wind through all of the vegetation types and are restricted only by topographical impediments.

Vegetation in the western two-thirds of the watershed area is also impacted by extensive oil and gas field development, and an ongoing exploratory development for coalbed methane extraction is located east of Highway 789. Associated with this mineral extraction are networks of (mostly) improved access routes.

Additional human uses of the watershed include commercial seed collection, off-highway vehicle use not associated with the previously-mentioned activities, the collection of moss-rock for commercial decorative purposes, and removal of wood products (almost exclusively juniper) for firewood, fenceposts, and furniture. All of these activities influence the vegetative component of the watershed where they occur, either indirectly via associated changes, or directly by contact with and/or removal of vegetation.

2) Issues and Key Questions:

Removal of vegetation in the form of grazing forage for large ungulates has been and continues to be the principal factor affecting vegetation throughout the Little Snake River watershed. Domestic livestock grazing tends to provide the most impacts to the vegetation of the watershed, throughout its area, although localized portions of the watershed (or specific vegetation communities and/or species) may by more influenced by grazing by wild horses or wildlife.

Through varied management processes, including rangeland inventories, management agreements and grazing plans, and implementation of various "best management practices," stocking rates have been adjusted to fit available livestock forage on public lands throughout the watershed since inception of the Taylor Grazing Act. Because of these adjustments, livestock management issues relate to the season, duration, and distribution of use rather than stocking rates (although limited exceptions exist.) These issues are primarily directed at impacts to sagebrush/grassland and sagebrush-mountain shrub/grassland vegetation types in the form of the following impacts:

- Uneven use patterns (heavier grazing use associated with reliable water sources as opposed to light to nonexistent forage utilization in other, more isolated locations). Heavy historic use along Muddy Creek probably led to an expansion of prickly-pear cactus (picture 50-1).

- Shifts in vegetation species types that favor increaser forage species (e.g., western wheatgrass) and aggressive warm-season annuals over cool-season, perennial vegetation types (such as bunchgrasses) where uninterrupted, season-long livestock grazing occurs (picture 50-2).

- Variations in herbaceous vegetation availability where season long and/or growing season livestock use has pushed more desirable forage species from open, "easily accessible" locations (spaces between shrubs) to more protected, "sheltered" spots (e.g., under and within sagebrush and other shrubs.) This allows less desirable species such as rhizomotous, single-stalked grasses (e.g., western wheatgrass) to colonize and spread, thus lowering overall ground cover and forage value.

The key question that arises from these impacts focuses on implementation and refinement of best management practices for livestock grazing. What opportunities exist to implement or refine best management practices for livestock grazing or other actions that will maintain and/or improve the overall health and value of upland vegetation and meet desired resource conditions and allow for grazing of the vegetation resource use by domestic livestock as called for under the Bureau's multiple use mandate?

Vegetation use by wild horses occurs in a large portion of the watershed unit, west of Wyoming State Highway 789, and is managed only to the extent that the population of horses should be maintained at an AML. In areas where wild horse populations exist within the watershed, impacts to vegetation from their grazing can be considered as important as those from livestock grazing to the health of the resource. Because wild horse populations are restricted to only a portion of the analysis area, they could be considered to have less impact than the livestock grazing which occurs throughout the watershed. However, the herd management area encompasses many soils that are highly erodible, which may contribute additional sedimentation into the upper Colorado River if vegetative vigor and cover are not maintained. Impacts to vegetation from wild horses are similar to those from livestock grazing in that they relate to season, duration, and distribution of use, but also include stocking rates. Due to the Bureau's inability to achieve AML for the Adobe Town HMA and surrounding area, year/season-long forage utilization has occurred on vegetation within this area for the last several years at levels far in excess of that deemed appropriate. Impacts from horse use are primarily to sagebrush/grassland, saltbush shrub steppe, and juniper woodland vegetation types, resulting in heavy utilization levels, uneven distribution patterns, shifts in species types, and variations caused to species diversity, location, availability, and distribution. The key questions to ask in order to deal with these impacts include finding how to manage the distribution and seasonal use of an ungulate species that utilizes vegetation throughout its range in an uncontrolled, yearlong manner. Additionally, how can the BLM mitigate political and logistical problems that have prevented it from meeting its management responsibilities for these animals and the rangeland resource?

Policies that govern the use of vegetation treatments and the suppression of such vegetative community alteration, have played and continue to play an important role in the existing make-up and continual

alteration of vegetation in the watershed (picture 51-1). Aggressive wildfire suppression, and an inability to successfully implement manipulation of shrubland communities within the watershed at the level which is required, has led to a predominance of uniform, older age-class shrub stands throughout the analysis area. Additionally, aspen woodlands appear to be declining in health and abundance, and conifer/juniper encroachment into these and other shrub stands appears to be increasing with time. A large percentage of sagebrush and mixed sagebrush/mountain shrub stands have reached a level of overly mature to decadent, leading to lower herbaceous ground cover, species diversity, plant vigor, forage, and nutritional value (for livestock and many big game wildlife species.) Additionally, large, uninterrupted expanses of vegetation allow for large-scale losses of key habitat types if and when natural disturbances occur. The key question is how do the BLM and other natural resource management agencies and partners determine the level of vegetation treatment which should occur in order to promote better overall vegetation health while balancing the need for diversified habitat requirements of many user species? To what extent should portions of key vegetation types and habitats be temporarily altered in order for the overall health of the vegetation/habitat/watershed be maintained or improved? At what level of vegetation alteration does temporary habitat loss outweigh long-term vegetation health maintenance and/or improvement?

The next most important factor relating to upland vegetation health throughout the watershed is use of varied vegetation resources by native wildlife, in particular, ungulate big game species. The principal issues that should be addressed regarding big game management relate to seasonal habitat forage requirements for mule deer, elk, and pronghorn antelope. Although transitional, winter/yearlong, and crucial winter ranges for all species have traditionally been the habitats of concern (limiting the populations), relatively recent research has elevated the importance of quality spring/summer/fall habitat to healthy individual and population conditions. Key questions to be addressed include how to manage vegetation resources on key seasonal habitats to provide adequate quality forage for wildlife species, yet continue to provide forage for seasonal, managed livestock use. How can the mix of uses of the vegetation resource in the watershed be managed so that vegetative health is maintained or enhanced? Additionally, how do the principal players involved in the management of vegetation and wildlife within the watershed balance the sometimes necessary impacts of multiple use management (and/or livestock management) activities with habitat requirements on seasonal big game ranges?

Another influence on vegetation health in the watershed is the presence and expansion of oil and gas field development, which, although existing in parts of the watershed for a rather long time period, has been relatively recently introduced to other portions (but is increasing extremely quickly across the region.) Short-term vegetation losses occur with every pad and access road that is constructed, but can be mitigated comparatively quickly with adequate reclamation after the initial activity subsides, sometimes to the point of increasing vegetative production over predisturbance levels. This can also be an opportunity to beneficially impact species composition and age class diversity. Good reclamation practices are abundant throughout the watershed, but poor, or unsuccessful reclamation attempts are also plentiful. When reclamation is unsuccessful or not attempted, impacts to vegetation are not limited only to direct changes (loss of vegetation on pad and road locations), but can expand to indirect impacts, including shifts in species composition and community diversity which appear in the form of increaser and/or invader species such as annual cheatgrasses along road and pipeline right-of-ways and the spreading of halogeton in oilfield road complexes. Additionally, seismic exploration has increased dramatically in the region. Although this exploration is supposed to be low impact, these activities do create new roads, which are then used and made more permanent by recreationists. The key question that should be addressed in regards to these impacts is how to elevate levels and enforcement of reclamation standards in order to mitigate long-term impacts to the vegetation. Oil and gas activities have also caused damage to cattleguards, braces, and fences, much of it either not timely or properly repaired. This results in unwanted wild horse and livestock use in adjacent allotments and increased maintenance and management costs to livestock operators. How can timely and proper construction techniques be enforced?

Finally, a dramatic increase in the expansion of unimproved roads and trails, and an obvious increase in the amount of off-highway vehicle (OHV) use, is apparent throughout the watershed. This use is most associated with general recreational activities by the public and is not usually associated with development actions described previously (although those actions may alter the landscape in ways that encourage further OHV expansion.) The popularity and affordability of small, all-terrain vehicles leads to their use farther

and farther into previously remote and unroaded areas, creating or "pioneering" unauthorized and illegal trails through the vegetation wherever possible, which are then repeatedly traveled until vegetation is lost along the route, and it becomes a road for all practical purposes. As the only barriers to this travel are terrain and rules governing off-highway travel (which are difficult to enforce), only vegetation in the roughest topography is currently or potentially free from this disturbance. This disturbance leads to vegetation shifts and losses similar to those associated with the expansion of oil and gas exploration and extraction, but extend into much longer-term time frames as there is no reclamation of the disturbance unless a pioneered road or trail is left to naturally revegetate through a lack of use (which, with ever-increasing recreational use of these lands, rarely, if ever, happens). Additionally, recreational OHVs are not subject to minerals management stipulations designed to mitigate the spread of weed seeds, and so have the potential to add weed infestation to their impacts. The key questions which should be addressed center around the need for the Bureau to decide if limits should be set which regulate off-highway vehicle use, what they should be, and how to effectively enforce these limits. Additionally, what educational tools should be employed to reduce impacts from recreational uses of public lands?

3) Current Conditions:

The entire watershed area is allotted to some form of livestock grazing use during various periods of the year and is also utilized for wildlife grazing use in its entirety (although in most cases, significant wildlife use is seasonal.) Additionally, grazing use from wild horse herds occurs throughout the western half of the watershed area, within and immediately surrounding the Adobe Town HMA. Impacts to vegetation from grazing can, therefore, be expected to occur to measurable extents throughout the analysis area.

Quantifiable data about current vegetation conditions, health, and trends throughout the watershed varies as to availability, content, and quality. Upland monitoring information is available for varied grazing allotments and sub-basins within the watershed in the form of photo-points, aerial and basal cover transects, utilization studies, shrub belt density transects, and other, more species and/or impact-specific studies. Studies vary by amount, type, and content throughout the watershed in relation to the relative priority of the area/allotment, the level of management that was or is implemented, and/or the urgency of determining specific impacts. In the past, monitoring efforts focused on the collection of utilization information (what animals do to the plant), rather than on trend information (what the plant response is to animal use).

Vegetation and forage inventories of the watershed area have occurred periodically during the relatively recent past, the last of which, the Soil Vegetation Inventory Method (SVIM) occurred during the early 1980s. Data from this one-time inventory suggested that rangeland health conditions throughout the watershed fell into the acceptable range, mostly rated as "good" condition, but including "excellent" and "fair" condition rangelands. To a far lesser degree, isolated incidences of varied vegetation types were categorized as "poor" condition or unsuitable for livestock grazing (such as badlands and/or igneous outcrop types.) It should be noted, however, that these inventories and associated conditional assessments were one-time snapshots of the vegetation communities and did not and/or have not been altered or updated to take into account trends in ecological vegetation conditions. They also tended to undervalue shrub communities, resulting in mule deer habitat rated as fair, which should have been found to be good to excellent.

In general, varied livestock uses have resulted in assorted impacts to vegetation throughout the watershed. In many grazing allotments, summer grazing by cattle is the best-suited use by domestic livestock due to environmental, topographical, and climatic limitations, and vegetation is impacted (to various extents) during its growing period. This type of use also tends to primarily impact the herbaceous component of the vegetation community, except where young, available, palatable shrub seedlings are abundant. Where winter use is made by nomadic bands of sheep, the vegetation is impacted during dormancy, and the species that are impacted shift towards a mixture of shrubs and available herbaceous material. Where bands of wild horses are concentrated, their grazing impacts the vegetation throughout the year, removing vegetation prior to, during, and after peak growth periods. Wildlife use in the watershed, usually seasonal, tends to impact different components of the vegetation communities than does domestic livestock use. Mule deer use concentrates primarily on shrub or "browse" species and is most pronounced on winter ranges where the animals concentrate for extended periods. Elk use impacts both the herbaceous and

browse components of the communities, usually at higher elevations throughout the year (dependent on the severity of winter weather). Pronghorn use impacts tend to be most noticeable in the lower elevation sagebrush and saltbush steppe, where they may be extremely concentrated during the winter, but more nomadic than other species (somewhat mitigating their impacts.) These differences in impacts tend to affect vegetation communities as species are favored or shunned in various management/use scenarios, leading to shifts in overall community make-up. Vegetative traits such as species abundance, vigor, diversity, and age/structure classes are all affected. These trends occur in addition to those which are influenced as a function of natural conditions (e.g., wetter to dryer sites, slope, aspect, soil depth, and material).

In many cases (dependent on the specific situation), best management practices for livestock grazing have been implemented on a case-by-case basis throughout the majority of the watershed. In some cases, multiple practices and improvements were necessary to maintain or improve overall vegetative health, and in others, only minor adjustments to grazing management have been or are required. Direct changes to grazing timeframes, including adjustments to duration, intensity, and season of use, have been implemented to remove constant, repetitive pressure on key forage communities during the heart of their growth period. Rotational grazing schedules that include deferment and recovery periods allow for preferred vegetation species to concentrate energy reserves towards vegetative growth. Upland water developments, including small stockponds and reservoirs, water wells, spring developments, and pipeline systems have led to better overall distribution of livestock use and facilitate grazing rotations and pasture systems. Fencing has been implemented to control livestock movement, allowing rotational grazing systems, and better distributing livestock use. Finally, vegetation treatments have been applied to limited areas within the watershed in order to introduce, or in some cases accelerate, the rate at which vegetation communities evolve and develop towards different seral stages. Very seldom (if ever) are vegetation treatment projects initiated with the objective of *converting* vegetation permanently to another type, but instead are intended to set the existing community back to an earlier seral stage and stratify the overall age class and structural variation (picture 53-1). Treatment of (mostly) shrub stands can also be used to improve livestock distribution, diversify shrub age classes and structure, and increase forage quality and herbaceous content (through the removal of competition for nutrients and moisture) (pictures 53-2, 53-3). Overall, livestock management throughout the watershed has been improved through the use of rangeland improvements and more intensive management without resorting to grazing exclusion, complete rest, or reducing permitted use.

At the higher elevations within the watershed, specifically the upper Muddy Creek and Savery Creek watersheds, livestock grazing occurs primarily as managed, summer/fall cattle use, with a small amount of seasonal sheep use thrown into isolated areas. Wildlife grazing occurs primarily as spring/summer/fall use, although much of the area is considered extremely important as transitional range for migrating big game. During milder years, the higher elevation may be used by wildlife well into or through the winters, primarily by herds of elk. In the majority of the grazing allotments within these areas, BMPs are in place to one extent or another, which mitigate negative grazing impacts and accentuate the positives. In many cases, grazing is rotated between pastures or use areas in order to lower the pressure placed upon desirable herbaceous forage species. Where these grazing management practices are employed, bunch grasses are abundant between shrubs, and herbaceous forage quality, including diversity, vigor, and density, is considered to be good to excellent. Utilization of upland forage vegetation tends to only become heavy or severe immediately around or adjacent to water developments or natural water sites. Examples of this can be found in the Loco Creek, Grizzly, and Beaver Dams allotments, which have all experienced some form of rotational grazing, upland water development, pasture fencing, and/or vegetation treatments. Conversely, pastures or allotments in which season-long livestock use takes place during the summer exhibit symptoms of degraded upland vegetation conditions to varying extents. One example is the Cherokee allotment, which has received spring sheep use and season-long cattle use on a continuing basis and where desirable upland bunchgrasses, although still present, are found mostly where they are not available to grazing animals, such as within or under shrubs. Most of the higher elevations in the allotment do not exhibit high amounts of invader species, but contain high percentages of less desirable and/or palatable increaser grasses and forbs such as western wheatgrass and Kentucky bluegrass. Browse species at higher elevations tend to be utilized through their growth period by (mostly) big game wildlife species, primarily mule deer and elk, but the use is dispersed to the point that specific instances of over-utilization

(characterized by shrubs with a hedged appearance, and upon closer examination, vegetation removed far past the woody portion of previous year's growth) are rare on upland species.

Where portions of sub-basins at the higher elevations have been treated with prescribed burns, monitoring has shown that (with managed post-treatment use) the overall health of herbaceous vegetation is higher, with higher plant densities and increased species and cover diversity. Because most treatments are conducted to obtain a mosaic pattern, shrub age classes are diversified between older, mature-to-decadent shrub stands interspersed within and around areas set back to an early seral stage, which include many juvenile to young plants (picture 54-1 thru 54-3). Examples of these mixed vegetation communities, achieved through the recent application of treatments, include portions of the Morgan-Boyer allotment and uplands surrounding Loco Creek, which were treated during various periods of the last decade. Another specific example of a relatively large-scale vegetation treatment is the Sand Hills area that burned in wildfires in 1990 and 1993 (picture 54-4). Previously-dominated by extremely heavy, continuous stands of mature to decadent mountain shrubs, the fire set a large portion of the area back to early seral stage. Through the interim, vegetation within the burned area has shifted and developed, dominated at this point by bunchgrasses, but continually supplanted by juvenile, developing stands of silver sagebrush, snowberry, chokecherry, and serviceberry. Through the majority of these sub-basins, intentional treatments or natural events have been precluded or suppressed prior to gaining significant acreage, and the sagebrush and mixed sagebrush/mountain shrub stands contain plants of a uniform age and structural class, in almost all cases ranging from older-mature to decadent with a large proportion of dead individual plants. Although aerial canopy cover from shrubs can be quite high, the nutritional value and production drops, and overall ground cover percentages remain low and continue to decline over time as the understory is shaded by the larger shrubs and out-competed for nutrients and water. These areas exhibit lower species diversity and lower herbaceous cover, production, and nutritional value for livestock and wildlife forage.

The lack of treatments and aggressive suppression of all natural fire within these sub-basins has also affected the health of aspen stands by allowing them to over-mature and/or become decadent, diseased, and increased encroachment of understory shrubs and coniferous vegetation (fir and pine at the highest elevations, juniper at lower sites) within the stands (picture 54-5). Bleeding rust is present in most stands, primarily affecting larger trees, but spreads through the root systems to younger trees in the same clone (picture 54-6). Removing these larger, diseased trees can prevent the bleeding rust from spreading to young trees. It is estimated that less than half of the aspen stands that were present during the early half of the 20th century continue to exist today. As the older trees die or fall to wind events, they are not replaced by juveniles or suckers, and eventually, the stand dies or is reduced to a few remnants, dominated by big sagebrush, serviceberry, or other mountain shrubs. Of course, historical season-long livestock grazing has concentrated use on the seedlings in the past, but relatively recent implementation of rotational use and other upland grazing management tools currently mitigates these impacts, leaving a lack of stand replacement events as the missing element to enhanced aspen health. Prescribed burns have been planned and implemented to restore aspen health by stimulating sucker regeneration and removing other plant species that compete with aspen. Sites in the Beaver Dams and Hartt Creek allotments, burned in 1992 and 1996, show good vegetative response with light browsing use (picture 54-7). However, conditions required to burn shrub-lands, the most common type of vegetation treated, are often not hot enough to burn through aspen stands within the burn perimeter.

As elevation is lost in the watershed, the sub-basins, including the Barrel Springs Draw area, Lower Muddy Creek, and portions which drain directly into the Little Snake River, continue to be utilized for spring/summer/fall cattle grazing and are also grazed seasonally by bands of sheep, mostly in the spring and fall in higher (eastern) portions and during portions of the winter at lower locations. Wildlife use consists of yearlong habitat utilized by resident populations (predominantly mule deer and pronghorn antelope) and areas of winter range (primarily the area from the Dad junipers south to Baggs and along the Wyoming/Colorado border east and west of Baggs), which fill rapidly during late fall and early winter with migratory herds of deer and elk dropping below deep snow levels. Although the majority of the Adobe Town HMA is located at lower elevations west of these areas, wild horses inhabit portions of the area throughout the year (primarily in the portion of the HMA along the Flat Top Mountains and Red Creek and within allotments surrounding the HMA in this area, where unauthorized horse bands remain). Where they

occur, bands of horses utilize vegetation in somewhat of a nomadic nature, although they remain tied to limited water sources.

As at higher elevations, impacts to vegetation vary dependent on implementation of BMPs and to what degree management practices have been implemented. Where long-duration, summer season grazing occurs as the primary livestock impact, desirable bunchgrasses have retreated to areas where they are unavailable to grazers and have been largely replaced in open areas between shrubs by increaser species such as western wheatgrass, annual forbs, and prickly-pear cactus. This is particularly evident along Muddy Creek at the confluences of lower Cherokee and Wild Cow Creeks and below Wild Horse Butte within the Cherokee allotment. Conversely, positive shifts in vegetation health conditions can be seen in even a relatively short timeframe when BMPs are emplaced, as evidenced by recent management changes implemented in the South Barrel allotment. In this area, the saltbush steppe flats surrounding South Barrel Springs Draw are steadily showing an increase in bunchgrass species such as Indian ricegrass and becoming more densely revegetated by a preponderance of squirreltail and Nuttall's saltbush where bare ground previously dominated (picture 55-1). These changes have been monitored after initiating a rotation of spring grazing use between two pastures where previously, only season-long grazing occurred throughout the allotment.

As vegetation at these elevations is usually available and relatively snow-free in all but the most severe winters, it is continuously used by wintering and/or migrating wildlife as transitional or crucial winter range. The area between the Dad junipers and Baggs, and along the Wyoming Colorado state line between Horse Mountain on the east and Poison Basin/Sand Creek to the west, provides the majority of winter forage and habitat for mule deer. Because vegetation communities in this area are used throughout the year by wildlife, and become heavily-used by concentrated populations during most, if not all, winter months, the preferred browse species are not only comprised of even-aged and structured, mature-to-decadent shrub stands, but are also severely impacted by season-long, intensive browsing, year after year. Specifically, severe hedging can be observed on Wyoming big sagebrush, antelope bitterbrush, and mountain mahogany almost anywhere within the Dad junipers, the Reader Cemetery area, and throughout the Poison Basin/Poison Buttes areas during spring months after the majority of animals have begun to migrate to higher summer habitat. Closer examination of hedged shrubs will, in many cases, reveal splintered woody material up to and above ¼-inch diameter, indicating that not only the current year's growth has been utilized, but in many cases, that of the year before also. Mature to decadent shrubs continue to dominate these areas, with little to no evidence of regeneration in the understory. In portions of the winter range where the vegetation is dominated by a juniper overstory, there is little recent evidence of use or "highlining" individual juniper trees, most likely due to the relative mildness of the recent winters (picture 55-2). In some areas, however, highlined juniper trees are common, most likely utilized during harsh winters during the last half of the 1900s. The area north of Poison Basin and over the northernmost escarpments of the Flat Top Mountains tends to receive snow, which precludes most wildlife use through the winter, but as the country opens up to the north, large numbers of pronghorn utilize the vegetation throughout the summer and winter months. Although high levels of grazing use from pronghorn can harm shrubs such as saltbush and sagebrush during the winter if animals are concentrated in a limited area for a long time period, it does not appear at this point that extreme impacts are occurring to vegetation from wintering antelope.

Similar to higher elevation shrub stands, vegetation within the mule deer and elk winter habitat zone has been largely untreated and natural treatment events have been aggressively suppressed before large acreages can be burned. As with higher elevation vegetation, this has allowed monotypic shrub stands to be dominated by mature-to-decadent, even-age classes of shrubs and/or juniper woodlands (picture 55-3). Overall vegetative productivity is lower than could be realized, and nutritional value of many of the plants is lacking compared to potential. The understories exhibit low density, vigor, and diversity of herbaceous material, and relatively high amounts of bare ground between plants. In most cases, the understory within juniper woodlands exhibits very low vegetative productivity and diversity, mostly dominated by bare ground with scattered monotypic shrubs and isolated bunchgrasses. At this point, many of the shrub stands within the area are treatable, given a reasonably wide array of application prescriptions and/or methods. Many of the juniper woodlands, however, are near or have progressed to the point that understory vegetation is suppressed and noncontinuous, precluding treatment by prescribed burning in all but an

(unacceptable) crown-fire scenario. Vegetation north of Baggs and west of Wyoming Highway 789 within the Barrel Springs drainage generally exhibits high vigor, plant density, and diversity where BMPs have been initiated. Some of the heavier stands of basin big sagebrush located within draws and swales, however, exhibit high levels of density in the shrubs themselves and suppressed understory herbaceous vegetation health.

Within the lowest and westernmost elevations of the watershed, impacts to vegetation occur mainly in the form of dual livestock use, consisting of summer (and in limited cases winter) cattle use, and/or late fall and winter sheep grazing. The Adobe Town HMA covers a large portion of this area, and significant use of vegetation also occurs outside and adjacent to the HMA from wild horse bands that inhabit these allotments on a yearlong basis. The summer cattle grazing is managed, for the most part, in a manner that allows either rotational growing season deferment, rest, or recovery periods or a combination thereof. This has led to increased occurrence and availability of more palatable and desirable bunchgrass species and a general increase in overall vegetative health. Winter sheep use (and limited winter cattle grazing) occurs during the dormant season, when energy is stored beneath ground, and so poses few negative impacts to the plant(s) as long as pressure is not reintroduced during early spring green-up or maintained on limited locations for long periods of time, removing most to all of the above ground biomass. The nomadic, herded nature of sheep use tends to preclude intensive, long-duration pressure on specific vegetation, although bedding grounds used for several consecutive years can be damaging to vegetation without periods (seasonally or even yearly) of recovery. Another vegetation type that receives more attention from herded sheep bands is the saltbush steppe, which is highly desirable to sheep due to high nutritional value prior to entering winter use periods or prior to introducing bucks into the band. Repeated, consecutive grazing use on specific areas of saltbush vegetation can lead to very low vigor and productivity, and inter-shrub bunchgrasses become less numerous and interspersed with more bare ground. Where management such as rotational summer use, fencing, and upland water development has been introduced and/or historically implemented, healthy, vigorous, and diverse understory grasses and forbs are present, and bare ground is minimized between plants. Although increaser species are present throughout the area, most are proportional to more desirable bunchgrass, forb, and shrub species. Within managed grazing allotments outside of the Adobe Town HMA, desirable or key forage species are, in most cases, more numerous, available to grazing, and evenly-spaced between shrubs than will be found in pastures/allotments where uncontrolled, season-long grazing occurs.

Within the Adobe Town HMA, wild horses become a third user of the vegetative resource in addition to livestock and wildlife. Actions and tools which are specified for the management of wild horses are limited to the use of gathers and removals of portions of the horse population on a continuing basis in order to sustain the population at AML. The AML is determined to be a population level that can be supported by the available forage in conjunction with amounts removed by other uses, including livestock and wildlife. During the last several years, even this management tool has been largely removed (due to logistical, legal, and/or political constraints), and the vegetative resource within the affected allotments is showing the negative effects of supplying grazing forage to bands of horses which number around 2½ times what is deemed appropriate. Similar to unmanaged cattle use, wild horse distribution is uneven and concentrated around limited water sources (picture 56-1). It takes place throughout the year, and more importantly, throughout the growing season, regulated only by availability of forage and water sources. As population levels have risen dramatically in the last several years, impacts to forage, particularly bunchgrasses and perennial forbs on sites with higher productivity, have risen. Utilization has been observed at high to extreme levels in areas where little use was made previously due to the relatively remote location and longer distance to water sources. Vegetation surrounding limited water sources, which experienced high utilization levels even prior to the current wild horse population boom, is grazed extremely heavily by a combination of species and periods of use. Some of the effects observed within the HMA include a lack of perennial understory bunchgrasses and increased bare ground, an abundance of annual forbs, and lower vigor, production, and density of grasses and shrubs within the saltbush steppe community, as well as in draws dominated by the sagebrush-grass vegetation type. On many Nuttalls' saltbush flats, it is evident that heavy grazing use has affected the individual saltbush plants to the point that some plants are completely incapable of regeneration, and the remainder of the stand will require a significant period free from grazing pressure to recover to pre-grazed levels. Due to the combined grazing effects from domestic livestock and unrestricted wild horse use, it is difficult to determine which use most impacts the vegetation.

Vegetation in this area is used seasonally to varying degrees. Summer use by pronghorn antelope occurs throughout the area, primarily in the lower elevation sagebrush-grasslands and scattered throughout the Adobe Town badlands and Kinney Rim country. Winter pronghorn use usually occurs south of the Wyoming/Colorado line, causing little impact to vegetation within the subject area. Mule deer use during the spring, summer, and fall occurs primarily in the mixed sagebrush/mountain shrub-grasslands at higher elevations, primarily around and over the Flat Tops, although scattered deer utilize the broken country from Willow Creek to the top of Kinney Rim and the mixed sagebrush/mountain shrub/juniper woodlands of Powder Rim. Observations of vegetation within this winter range indicate that summer use by mule deer has little to no effect on key species such as mountain mahogany, serviceberry, Wyoming big sagebrush, and bitterbrush. Vegetation utilized during the winter months through this area can truly be considered "crucial" winter range, as it appears that it is heavily utilized only during more severe winters, as large numbers of deer are pushed from the higher transitional and winter range outside of Baggs. Although always used by deer in the winter, recent easy winters have not concentrated large numbers in the area, as evidenced by actual observation of animal numbers, as well as lower utilization levels on key shrub species on Powder Rim west of Sand Creek. Important species including bitterbrush, serviceberry, and mountain mahogany display relatively low to moderate levels of browsing in the area covering Powder Mountain east to Anthill Knob, a key area within the winter range where deer seem to converge annually, regardless of weather conditions. Key mountain shrubs in this area appear to be in the best condition of any on the entire Baggs mule deer winter range (from Dad to Baggs and between Horse Mountain and Powder Mountain along the Wyoming/Colorado state line.) Although these shrub stands appear to be in comparably good health, there is evidence that many stands are reaching, or have reached, a stage of older-mature to decadent, as evidenced by a large percentage of dead plants and/or dead portions of live shrubs. Additionally, many shrub stands are experiencing various levels of evergreen encroachment, as older stands of junipers adjacent to them spread outward, out-competing and converting portions of the stands. Although individual junipers show little evidence of browsing use or highlining, the understory vegetation is sparse within dense stands, and species diversity is significantly lower than can be observed adjacent to or within more open stands. Vegetation used by elk is primarily concentrated to a combination of grasses, dried forbs, and limited browse species utilized during the winter months. Although use occurs during the summer months, the limited number of animals and their highly wandering nature make it relatively immaterial in comparison to summer cattle and especially wild horse use (both of which exhibit high dietary overlap with elk). As with mule deer, elk populations and use levels rise dramatically during the winter months when migratory animals from as far as Steamboat Lake in Colorado increase the population on Powder Rim two to threefold. Even at these higher levels, the population does not appear to adversely affect the vegetation on Powder Rim, most likely because the use occurs on vegetation in dormancy, and is not revisited on individual plants during the same season. Summer utilization levels (by cattle, wild horses, and/or summer elk populations) of forage species used by elk has not appeared to adversely affect winter range forage amounts, apparently leaving enough standing forage to sustain wintering herds. Winter forage use by elk can be found throughout Powder Rim and occurs in rougher country avoided by cattle during the summer, but is also concentrated within limited areas previously treated by wildfire. Photo point documentation of the vegetation in these wildfire areas reveals that, although shrub regeneration is limited, forage production continues to be very good.

As in the other portions of the watershed, vegetation treatment has been limited and wildfires have been aggressively suppressed throughout this area, to an even higher extent than has been experienced at higher elevations. During the last ten to fifteen years, only two significant wildfire events have occurred on Powder Rim, treating less than 1,500 total acres of mixed sagebrush, mountain shrubs, and juniper (picture 57-2). Both wildfires were suppressed prior to gaining any significant size (the first was monitored until it reached between 800 and 1,000 acres, after which it was put out, and the second received full suppression action due to its proximity to the first event.) There have been no significant vegetation treatments undertaken in the area during the recent timeframe, although several are planned for the next few years. The last major vegetation treatment accomplished on the rim was a chemical sagebrush treatment in Pasture A of the Powder Rim allotment, in which sagebrush has revegetated to levels at or above those existing prior to treatment. Both wildfire events occurred during extreme environmental and climatic conditions (hot, dry weather), causing removal of mountain shrub species which remain absent to this time, probably due to the intensity of burn conditions scarifying growth nodules and/or actually completely killing

moderately-sprouting shrub species. Although these events have probably not completely "converted" the vegetation community in the long-term from sagebrush/mountain shrubs to grassland, succession towards mid-to-late level seral stages appears to be slower than would be expected with a planned treatment implemented under ideal prescription conditions. Over the rest of this habitat, as well as the remainder of this portion of the watershed, the lack of periodic stand-replacement type events has allowed sagebrush and mountain shrub species to reach a level of over-maturity and decadence, and juniper woodland communities threaten to encroach on and overwhelm portions of the shrub lands. In many cases, understory grasses and forbs (and in the case of juniper woodlands, the understory shrubs as well) have been suppressed by the large, mature shrubs; resulting in lower vigor, density, and diversity of these species. Dense, over-mature/decadent sagebrush grasslands have also become incapable of reaching their potential for forage production and/or nutritional value. The Sand Creek and Shell Creek watersheds, which encompass almost all of the western two-thirds of this area, have received the least amount of natural and intentional vegetation treatments of anywhere in the watershed. Although it is not practical to treat many of the sagebrush-grass and saltbush shrub steppe communities in this area, the lower elevation flats and rolling hills contain many dense stands of basin big sagebrush, which are obviously mature to decadent. Many of these sites have developed on deeper soils, allowing the sagebrush to grow to extreme heights and exhibit exceedingly high aerial canopy cover. Ground cover, plant density, species diversity, and overall production and vigor under these stands has plummeted. The low amounts of introduced treatments in these types of systems has led to a preponderance of heavy, mature basin big sagebrush stands scattered throughout the area where soils allow their development.

Overall, vegetation in the Little Snake River watershed can be considered to be in good health relative to the seral stage to which it has developed. Desirable species (including herbaceous and browse species important for livestock and wildlife forage, as well as those important for ground cover) are present at worst, usually found in locations where they are less available or vulnerable to grazing animals, and are prevalent at best, found interspersed throughout the various plant communities, with high vigor and density. Although less desirable increaser species are present in varying degrees throughout the watershed, in most cases, their presence does not indicate poor health or nonfunctional vegetation communities. The majority of the watershed has undergone the implementation of various BMPs, to some extent, which favor more desirable forage species over increasers, and the results can be readily observed in the form of more plentiful bunchgrasses, higher ground cover, greater plant diversity, and higher vigor and nutritional value of individual plants. Throughout various portions of the watershed, invader and weed species can be found, but these populations exist at relatively low levels and have not converted entire communities. Additionally, implementation of various BMPs, as well as application of various control methods, are being and can be utilized to manage, if not eliminate, many of these small-scale infestations. All of these observations are indications of properly functioning upland vegetation communities.

The nonfunctional or at-risk aspect of upland vegetation communities in the watershed that is evident centers on the late seral stage of development that the vast majority of shrub stands and woodlands have reached without disturbance or stratification. This can be observed as the predominance of even-aged and structural classes of overstory shrub stands that have reached a level of mature to decadent. As noted previously, in every portion of the watershed, the predominant overstory shrub or woodland community can be considered monotypic, with few, if any, instances of early or mid-seral shrub communities interspersed within the landscape. Although a *portion* of any vegetation community should be expected to exist in a mature to decadent (or late seral) stage in order to be considered healthy and properly functional, there also must be a mixture of early to mid seral components mixed throughout, on a community or landscape scale. Unfortunately, this is not the case within the majority of the Little Snake River watershed, where late seral communities dominate. As dominant shrub and/or woodland vegetation continues to age and decline, individual plants or portions of them die and are not replaced by juvenile seedlings or tillers, and understory vegetation decrease in density, abundance, and diversity. Production and vigor of understory grasses and forbs decreases, and less vegetation remains after growth, leaving less litter above and below ground, supporting less overall nutrient cycling. Less desirable species such as coniferous trees in aspen stands and junipers in sagebrush and mountain shrub stands continue to encroach and outcompete the more desirable components. Aspects of the vegetation, including values for ground cover, big game habitat, and livestock forage, decrease, putting the entire community into an "at risk" category. Additionally, the communities can be considered at risk due to the homogeneous and continuous nature of

these dense, mature shrub stands, because the potential exists to lose large blocks of vegetation to catastrophic wildfire events, as few vegetation transition-type fuel breaks are located (or placed) within landscape vegetation communities.

4) Reference Conditions:

Generally, historical influences on vegetation in the watershed were similar to those that shape the communities today. Environmental conditions, including soil conditions, climate, topography, and elevation determined the general composition, location, and interaction of vegetation communities, which were and are influenced by additional, less constant factors. Due to low human population levels in this remote area, influences by native peoples were probably relatively minor and/or secondary in nature (e.g., the influence that hunting cultures had on seasonal use of certain areas by grazing game animals). Prior to settlement of the area by Euro-Americans, additional factors that probably had the most influence on vegetation conditions would have been limited to grazing impacts from native ungulates and catastrophic stand-replacement type natural events such as wildfires. The combination of varied, wandering use patterns and the random occurrence of wildfire, which removed vegetation in a haphazard pattern, probably led to a diversified vegetation pattern that was thoroughly stratified in age class and seral stage, as well as vertical and horizontal structure.

The early descriptions of the Little Snake River watershed tend to suggest the presence of grazing ungulates throughout, including seasonally migratory species such as bison, pronghorn, mule deer (called black-tailed deer in many early journals), and elk. Additionally, bighorn sheep and grizzly bears could be found, even at lower elevations. Although wildlife population levels prior to the adoption of structured harvest strategies and conservation measures in the first half of the 1900s can only be estimated, most of the species remain (excepting bison, bighorn sheep, and the large predators including wolves and grizzly bears). Topographic and climatic factors would have dictated seasonal use areas and migration patterns then, much as they do today. Additionally, Native American cultural relics such as tools and/or petroglyphs survive as evidence that they did at least seasonally inhabit some of the more remote areas of the watershed, such as the Adobe Town rims and the Powder Rim/Shell Creek country, following seasonal movements of the big game species they hunted for their livelihoods. Although, as indicated by various accounts, limited, isolated groups or herds of bison could be found through the watershed on a resident basis, the area was probably also used by extremely large herds of the animals in more of a cyclic nature as their wanderings covered an extremely vast amount of country. In any case, it can be reasonably inferred that vegetation in various portions of the watershed was utilized by grazing ungulates throughout the year, which rotated from area to area dependent on climatic conditions much as happens today with migratory big game herds. What is not clear, however, is if high amounts of grazing use were applied to various portions of the watershed by large, concentrated herds of animals on a cyclical or continuing basis, and if so, what the intensity and/or repetition of use might be.

As mentioned previously, Native Americans inhabited various portions of the watershed on an at least seasonal basis. Although it is not certain to what level they made use of horses, it can be inferred that any herds that traveled with the bands made use of the forage in a nomadic nature, resulting in relatively low, seasonal impacts. Wild horse herds in the area largely appeared after the initial Euro-American settlement during the late 1800s, and grew as the permanent human agricultural presence increased, and domestic stock escaped or were grazed “free-range” and incorporated into passing bands. Until passage of the Wild Free-Roaming Horse and Burro Act in 1971, wild or feral horses inhabited almost all of the Little Snake River watershed north of the state line, including the area east of Wyoming Highway 789 and the Upper Muddy Creek basin. Until passage of the Act, they were managed only to the extent of what they were worth. Free-ranging horse populations were controlled by gathers and/or culling by private individuals, and there was no real data that defined populations and/or resource impacts by the animals. After management was implemented, horses were removed from the portion of the watershed east of Highway 789, and government gathers were utilized to remove excess animals from the rangelands within management units. In other words, historical impacts to the vegetation resource within the Little Snake River watershed from wild, free-ranging horses were largely unknown prior to the management act. Actions taken towards the animals to influence their impacts would have been haphazard, uncoordinated, and the results completely indecipherable. It can be inferred, however, that impacts would have been

similar to those at present within HMAs to the extent that seasonality, duration, and intensity of use on vegetation were and are governed totally by the animals themselves, subject only to climatic and topographical influences. The portion of the watershed east of Highway 789 no longer experiences any impact from wild horse grazing.

Historical documentation, mostly in the form of journals, descriptions, and writings of explorers who traversed the area in the mid-1800s, compared and contrasted with additional accounts made in the same area during the same general time frame, can paint a picture of the overall landscape. Although generally vague to the point that overall vegetation, range, and/or habitat communities and sites cannot be delineated, they do provide a fairly recognizable overview of the area between Rawlins, Baggs, Bitter Creek, and the Wyoming/Colorado state line.

Overall, the general historical vegetation description of the Muddy Creek watershed appears to closely correspond to the existing communities. Although the popular perception of western rangelands prior to Euro-American settlement is that of rolling grasslands and foothills bounded by timbered mountains, which have only relatively recently (in the last century and a half) been turned to shrub-dominated steppe type communities due to grass use by livestock, accounts offer a different view, indicating shrub dominance in this area through the mid-and-late-1800s. John C. Fremont's party viewed the general area as early as 1845 and indicated that in the area west of Overland Crossing of the Platte River (east of the Muddy Creek watershed), there was "nothing to be seen but artemisia bushes." The description of the general area west of present-day Rawlins was that of "a continued and dense field of artemisia, which now entirely covered the country in such a luxuriant growth that it was difficult that laborious for a man on foot to force his way through, and nearly impracticable for our light carriages." When army topographer Howard Stansbury traveled from Bitter Creek to Muddy Creek in fall of 1850, covering the northwest portion of the watershed including the Upper Barrel Springs Draw area, he discussed how grass was very scarce, barely enough to feed the mules, and that sagebrush furnished fuel. Around 15 miles south of present-day Wamsutter, he recorded thin grass, small sage, greasewood, and in the sandy places, small cacti. The Bryan Wagon Road Survey commented on the area during a July 1858 trip. About 15 miles south of Red Desert (in the area of Upper North Barrel Springs Draw), they described white clay bluffs sparsely covered with cedars, which lay to the south, bunch grasses scattered over the country near camp sufficient for the animals, and sage used as fuel. F.V. Hayden traveled through the area in September, 1868, performing geological exploration and wrote; "This vast barren sage plain stretches far westward [from Pass Creek] to Bitter Creek and Green River, with very little grass or water for the traveler . . . ."

Stansbury's party, on reaching Muddy Creek, around 20 miles south of present-day Creston Junction, observed some junipers on the surrounding buttes, the first trees since leaving the Green River, and noted that grass was scanty. As they moved to the east (towards the headwaters of Muddy Creek and Bridger Pass), the hills closed in, forming a narrow valley where there were many deep-cut channels with nearly perpendicular sides. A few aspen were noted in the bottom, with many sagebrush, some eight feet high. When the Bryan Wagon Road Survey crossed from the Sage Creek basin to the headwaters of Muddy Creek in 1856, they noted, "The thick growth of sage was very much in our way, obstructing the passage of wagons, and fatiguing men and animals very much." They also noted that grass was scarce and an isolated growth of pines in a nearby valley. They also observed that near the head of Muddy Creek, the "country rough from gullies and sagebrushes . . . . Sage for fuel, besides willows from the bank of the creek." There was bunch grass mingled with the sage near the mouth of Littlefield Creek, but after another mile, grass became scarce, and beyond this point, any grass of consequence disappeared, and sage was the only fuel to be had. When F.V. Hayden passed through during the fall of 1870, he noted an improvement in vegetation as he approached Bridger Pass from the west and that groves of aspen and pine were seen.

Early exploration of the higher elevation country, including the Savery and Sandstone Creek area, occurred during the summer of 1844, by John C. Fremont, the army topographer. The expedition observed aspen and willow thickets and plenty of game, including buffalo, elk, antelope, bighorn sheep, and deer, and noted, "The country here appeared more variously stocked with game than any part of the Rocky mountains we had visited; and its abundance is owing to the excellent pasturage, and its dangerous character as a war ground." About the Elk Head (Little Snake) River in the Baggs area, they noted, "The characteristic plant along the river is F. vermicularis [greasewood], which generally covers the bottoms; mingled with this, are

saline shrubs and artemisia… The country on either side was sandy and poor, scantily wooded with cedars, but the river bottoms afforded good pasture."

Finally, a party including W.A. Richards surveyed the southern Wyoming border during 1873, and, in addition to feeding the party with a steady stream of wild game which was plentiful throughout the Sierra Madre mountain range, noted that the terrain and vegetative cover turned fairly desolate west of the Baggs area. Again, the dominant vegetation was sagebrush, and as they moved west, they "camped on [a] dry creek [Cherokee Creek] . . . . The country here perfectly worthless. Nothing but sagebrush and greasewood. Soil sandy clay."

Although further vegetative descriptions of the area during settlement (late 1800s through the first half of the 20th century) are scattered, photographs taken throughout the area, and in particular along the Overland Trail and Rawlins to Baggs stage road, can be observed. Many of these photographs, although of various quality, indicate that shrub dominated communities were abundant, if not the norm, at least in the vicinity of the sites where photographs were taken.

If taken as a whole and compared to and against each other, these accounts tend to suggest that the majority of the upland vegetation in the Little Snake River watershed varied little from that which is noted today, dominated by heavy sagebrush and mountain shrubs with inclusions of aspen woodlands at higher elevations, dropping to juniper woodlands scattered over and within rolling sagebrush-grasslands and arid saltbush steppe communities, relatively low in production. One comment, from John C. Fremont's 1844 exploration, tends to suggest that upland spring/seep sites and corresponding riparian areas may have been more common. As they moved north from the Little Snake River up the Savery Creek drainage and north across the surrounding hills, "every hollow had a spring of running water, with good grass." While many hollows and draws in the Sierra Madre foothills do hold small seeps and occasionally run water, the declaration that "every hollow" contains such a water source would seem to be excessive at this juncture.

Historical or reference vegetation conditions in the Little Snake River watershed prior to extended human influence appear to mimic those found today; i.e. species composition and general distribution are probably very similar. The amount and distribution of various communities and their interspersion between others was varied from the present. Additionally, the seral stage of communities and age class structure at any given time was likely much more diverse. Influences on vegetation historically were mostly limited to "natural" events, primarily the grazing patterns of wild, free-roaming ungulate populations and the occurrence of stand-replacement events such as wildfire. In the ensuing period, the type of animals that exhibit the most influence on vegetation throughout the watershed has changed with the introduction of both managed and free-roaming seasonal livestock grazing, free-ranging wild horse populations within the HMAs, and migratory wildlife populations that are now manipulated by organized human harvest. In the last century, human influence has also led to the virtual eradication of large-scale, random, stand-replacement type vegetation treatments throughout the majority of the watershed and the manipulation and management of those that do occur.

5) Synthesis and Interpretation:

As described and discussed previously, upland vegetative species within the Little Snake River watershed are very similar at present to that which would have been encountered prior to settlement of the area. The principal changes are in the type of animals, which utilize the resource, and the amount of disturbance that is levied towards the vegetation from other human activities. Sagebrush and mixed sagebrush-mountain shrub grasslands and aspen and juniper woodlands continue to dominate the landscape throughout the watershed. The most obvious changes in vegetation on the landscape are evident where all or a portion of an existing community has been removed or "converted" to some other type. This can be observed along roads and trails in the landscape, which cut through and dissect large-scale community types; well pads or structures erected within the landscape; or agricultural conversion such as irrigated or dry-land farming where the native vegetation has been removed to make way for croplands (most commonly alfalfa or native grass hay land in various portions of the watershed). Less obvious are changes within vegetation communities that have occurred naturally as communities evolve or have gradually been altered through

the addition, subtraction, or manipulation of additional influences (e.g., a shift in vegetation consumed as traditional livestock uses are supplanted by animals with different dietary preferences).

Shifts in vegetation communities from historical conditions are partially the result of use by grazing ungulates. Generally, grazing use throughout the watershed has placed pressure on developing vegetation through various portions of its seasonal life cycle. Late spring and early summer grazing by cattle, sheep, horses, and/or big game wildlife species places the majority of grazing pressure on growing herbaceous material. As the summer hot season progresses, cattle and horse use within the watershed continues to primarily remove grasses, while sheep (which are mostly absent from BLM-managed public lands in the watershed at this time) and wildlife use tends to shift towards browse species on uplands. Fall and winter use by cattle, horses, and wintering elk herds, although still focused on grasses, removes mostly dead and dormant material, and sheep, pronghorn, and winter mule deer use removes portions of the summer's growth mostly on shrub species mixed with dried and desiccated forbs. Shifts in composition that have occurred internally in various upland vegetation communities in the watershed (due to grazing pressure by ungulates) have been primarily driven by the following factors: continuous, repeated, and sustained grazing pressure on selected, preferred herbaceous species through their peak growth periods (primarily on cool-season bunchgrasses during late spring and early-to-mid-summer), and intense, concentrated, and sustained seasonal browse use on preferred shrub species (by wintering big game herds) in stands that have reached a high overall level of late-maturity to decadence.

Historically, the higher elevations within the watershed were grazed by a combination of summer cattle and transitional (spring and fall) and summer sheep use (picture 62-1). Lower elevations to the west were traditionally used as winter sheep grounds, with limited amounts of summer cattle grazing, usually in higher fringe areas. The summer, season-long grazing that occurred repeatedly during the last century has generally allowed more of an influence by increaser species within communities and tended to push more desirable decreasers to more unavailable locations (such as within shrubs and in rougher terrain). Availability and predominance by more desirable forage species is enhanced as distance is gained from water sources, and terrain becomes steeper. Winter use areas at lower elevations, where herded bands of sheep have been moved throughout the terrain in a nomadic fashion, tend to retain most of the desirable increaser forage species in a more available fashion, due to the timing and duration of use (dormant season and relatively-short periods of use which are not repeated during any one year.) Livestock grazing management changes have and can be implemented in order to mitigate the effects of growing season grazing pressure and include pasture or use area rotational systems that manipulate the duration, intensity, and timing of use to provide deferment and/or recovery periods for vegetation growth. Fencing and/or herding are used to control the livestock's activities during use periods, facilitating implementation of rotational systems, and upland water developments are designed to more evenly distribute levels of vegetation use throughout pastures and allotments, protect isolated riparian sites, and provide watering locations to dry pastures. Additionally, the predominant vegetation (typically shrubs) can be treated or removed, allowing increases in more productive herbaceous vegetation which creates higher amounts of forage, higher overall nutritional value, and can create useable forage in areas which were previously underutilized. These types of treatments are usually temporary in nature, and revert to pre-treatment conditions after the passage of various time frames, allowing other areas to be manipulated during the interim and creating a mosaic of vegetation types. During the last half of the 20th century, all of these practices have been implemented, to various extents; throughout the watershed where summer cattle grazing use occurs. Due to political and/or logistical limitations, vegetation treatments have been restricted in the watershed more than implementation of other BMPs. During the last 25 years, as many of the traditional winter sheep use areas have undergone conversions to summer cattle use allotments, additional BMPs have been implemented at lower elevations, where customarily, none were required. A limitation that is frequently encountered when winter sheep use areas are converted to cattle use is a lack of adequate control measures to manage the use. This can lead to trespass problems and additional or unauthorized use on the subject or adjoining allotments. Where vegetation in winter sheep use areas has or can be damaged due to special uses (e.g., traditional bedding grounds, areas where sheep have "yarded up" due to weather), future management would include avoidance by herded bands for an appropriate recovery period.

Where wild horse bands inhabit the watershed, the use of BMPs to control their effects on vegetation is limited. Within the Adobe Town HMA, the ability to manage horse impacts is limited to maintenance of

the population to an AML of between 600 and 800 total animals, and outside of the HMA, the management of wild horse impacts should not be an issue, as there should be no animals in these allotments. Historically, population levels were controlled through the use of culling and gathers by private interests, which for the most part kept numbers at a level compatible with livestock use in the watershed. After passage of the Wild Free-Roaming Horse and Burro Act, the responsibility of maintaining horse populations was passed to the federal government. In the eastern portion of the Little Snake River watershed (east of Wyoming Highway 789), the BLM has fulfilled this obligation by removing horses, as called for under the management strategy. West of the highway, both inside and adjacent to the Adobe Town HMA, the BLM has fallen short of its responsibilities due to inadequate funding and/or political and logistical constraints. The number of horses inhabiting the Adobe Town HMA is in excess of 2000, and a significant number roam outside the HMA, where management strategies stipulate their absence. The management plan for the Adobe Town HMA makes the assumption that the desired AML will not lead to negative impacts to upland or riparian vegetation, even in the absence of BMPs, but quantifiable data has never been gathered to determine if this is the case (in the current analysis, wild horse numbers have been above desired AML since 1997.)

Wildlife impacts to vegetation, although applied across the watershed, tend to most directly impact preferred, desirable shrub species on transitional, winter-yearlong, and to a lesser extent truly "crucial" winter habitat for mule deer. Most intensive negative impacts can be observed on the mid-elevation transitional and wintering habitat, where large herds have settled in for the last several "easy" winters and removed large portions of the current and previous years' vegetative growth. Although herd numbers are at or near objective, the numbers of animals utilizing the habitat probably has less effect on the vegetation than does the overall age class uniformity and maturity of the stands. As the individual plants reach a stage of over-maturity and decadence, annual vegetative production decreases, and as the current and/or portions of the previous years' growth is removed, the plants become more and more hedged, further deteriorating overall stands. New, juvenile plants are removed quickly if they are available, due to the higher palatability and/or nutritional content, leading to an overall loss of productivity and further aging of the stand. Additionally, as stands age, rival vegetation surrounding the shrubs, such as junipers, tends to spread into and intermingle with the shrubs, out-competing them and shifting the overall community composition. Management changes that would focus on stratifying shrub stands and diversifying overall community composition, stand age and structural class, and habitat production would center on setting portions of the communities back to early seral stages, in staggered time frames. This would involve the application of treatments to remove portions of the existing vegetation in a mosaic pattern, allowing recolonization of new, juvenile shrub species, new and additional herbaceous species, and shifting the community composition immediately following conversion. Treatments can be designed in scope, coverage, seasonality, and implementation methods to achieve predetermined objectives and to allow medium to long-term community development towards habitat objectives. Treatments can also be planned and implemented so that total vegetation community conversion is not achieved or encouraged, allowing shrub stands to evolve towards pre-treatment conditions over an extended timeframe. In many areas considered "crucial" winter range in the watershed, shrub stands appear to be in better overall health, most likely due to more limited seasonal use, affecting less of the current year's growth, and very rarely extending into the previous year's production. These shrub stands, however, mimic those found at higher elevations in that they are composed of a monotype of even-aged, mature to decadent shrubs, which continue to age and lose productivity and vigor, and are increasingly encroached upon by less desirable juniper woodlands. Portions of these stands can be treated and set back in succession before reaching the point at which "stand replacement" type events are the only treatment option, whether planned or naturally occurring. They can also be treated while the opportunity is presented and before a hard winter pushes large numbers of wintering wildlife into these areas and severely impacts desirable shrub species.

Loss of vegetation that occurs due to the proliferation of roads and trails, although proportionally smaller than other impacts, tends to be more evident and can be equally severe on a small scale because all vegetation is totally removed along the entire area of impact. Even improved roads, if not adequately designed and/or drained, lead to vegetation loss/community conversion on adjoining lands through increased erosion/sedimentation immediately along the route and introduction of less desirable species from disturbance along the route. As noted in the watershed health section, there is a large need for further work on nearly all improved roads to reach an adequate level of improvement practices (gravelling,

additional culverts, wing-ditching, water-bars) to minimize or eliminate overland flow alterations and vegetation species movement/colonization. Equipment used to sustain or improve highly traveled routes should be maintained in a weed-free status, as noxious weed infestations have arisen in areas of recent maintenance in various portions of the watershed. Recreational use of roads and trails, and particularly the pioneering of new trails by illegal off-highway driving is increasing dramatically, including problems stemming from hunting, joy-riding and (especially noted during the last few years) the increasing popularity of antler hunting in the late winter and spring. Greater availability of disposable wealth has led to greater availability of all terrain vehicles (particularly 4-wheelers) and pickup trucks, which have exacerbated this impact, particularly in areas with easy access and proximity to towns, but also at an alarming pace in remote portions of the watershed.

Reclamation standards, and their application (or lack thereof) directly affect the vegetation through the watershed by allowing or precluding an unoccupied niche, which less desirable increasers or invader species attempt to fill. Poor reclamation practices, found in various portions of the watershed, mostly on developed and/or capped well pads, lead to an increase in weedy species, mostly halogeton and cheatgrasses, which thrive and spread to surrounding rangelands. Good or even adequate vegetation reclamation, which can also be found throughout the watershed, most notably on pipeline routes, results in little unoccupied space for infestation, high forage production, and the proliferation of desirable introduced or annual species which tend to remain within the project's right-or-way area and only affect the surrounding rangeland in a limited manner.

6) Recommendations:

At the present, the review of upland vegetation conditions in the upper Colorado River watershed reveals generally good overall community health. Natural ecological and biological processes appear to be functioning adequately overall, although concerns about current, and especially near-future, functionality of certain community types remain. Specifically, the review group has determined that the majority of upland vegetation communities are properly functioning in relation to the seral stage to which they have evolved. Several specific communities, however, elicit concerns due to their uniformity of age and structural class, and the imminent onset of over-maturity to decadence throughout the majority of sagebrush stands, aspen stands, and juniper woodlands in the watershed and mountain shrub stands/mixed sagebrush/mountain shrub grasslands on winter-yearlong and transitional big game habitat.

Specifically, aspen stands throughout the watershed do not meet the standard for upland vegetation health due to decadence and decreasing occurrence and coverage of these stands. Although concentrated at the higher elevations, many of these stands are scattered through lower elevations in more isolated pockets, totaling around 14,000 acres of land within the watershed. The other vegetative community in the watershed that does not meet the standard for rangeland health is mountain shrub, sagebrush, and juniper plant communities located on mule deer crucial winter range between Horse Mountain and Poison Basin along the Wyoming/Colorado state line, and north from Baggs along Muddy Creek. These shrub communities cover approximately 40,000 acres within the watershed. Livestock grazing is a componet in the management scenario of these plant communities, but it is not the principle factor in non-attainment of this Standard.

In spite of these concerns, the diversity, vigor, productivity, and overall amount of upland vegetation within the watershed, as well as the cooperation exhibited by the majority of livestock permittees towards grazing management, suggest that no insurmountable vegetation health problems are evident on a significant scale in most vegetation communities. Due to the existing conditions and general vegetation community heath on uplands, the management responsibility by private industry, agricultural interests, and agencies which design and mitigate impacts to the vegetative resources from natural resource uses, and the generally small number of management issues that need to be dealt with, it is determined that the remainder of the Little Snake River watershed is meeting Standard #3 – Upland Plant Health. The following recommendations would expand upon the successes already achieved and help to meet desired resource conditions in the future.

Continue to implement or manage using best management practices (BMPs) for livestock grazing. These practices utilize, but are not limited to, the control of season, duration, intensity, and distribution of livestock use to meet desired resource objectives for upland vegetation as well as riparian habitat. Specific dates or timing of use must be decided on a case-by-case basis specific to the management unit and/or site limitations. Methods that can be used to achieve resource conditions include, but are not limited to, livestock control by pasture fencing or herding, water developments, vegetation treatments, and/or the manipulation of livestock turn-out/removal dates.

Identify and correct problems with improved roads which affect vegetation community health and/or composition, including the implementation of mitigation and/or improvements to improved travel routes that will modify overland flow regimes and erosion/deposition patterns which influence the surrounding and adjacent vegetation communities. Pioneered and/or illegally located two-tracks or trails should be dealt with on a more location-specific basis, perhaps centered on prominent recreational/habitat type landforms (e.g., Powder Rim between Sand Creek and Powder Mountain, the Flat Tops, Willows/Sand Hills area, etc.) There is a need throughout the watershed to remove duplicate/redundant motorized vehicle travel routes, as well as unimproved routes creating vegetation or watershed-damaging disturbance, although the scale of such management should be dependent on the issues involved with the specific, identified management unit. Enforcement of travel regulations, including ticketing of illegal off-highway use and increasing reparations for violations should be implemented throughout the watershed. Cooperative management with the Wyoming Game and Fish Department, as well as private landowners, should be coordinated so that consistency is developed throughout the watershed for dealing with off-highway use violations.

Vegetation treatments designed to modify the age and structural composition of predominant shrub stands and stratify the seral stage mix within stands should be continued and/or initiated and implemented throughout the watershed. Although the inventory, classification, and categorization of shrubland habitat and impacts throughout the watershed should be continued and finalized as quickly as possible, treatments should continue in the interim in order to remove portions of decadent communities and manipulate the structure of others before they reach a stage of over-maturity which limits management options. Where treatments are utilized to improve the health and productivity of sagebrush and sagebrush/mountain shrub communities, they should attempt to promote juvenile, palatable shrub seedlings within the community in addition to increasing the herbaceous component. Where management units include decadent or dying (shrinking) aspen stands, treatments can incorporate design features to remove old, decadent, and diseased trees and material (via stand replacement), or at a minimum, remove understory vegetation and litter (with low-intensity, creeping flame fronts within stands) in order to promote suckering of new clones and turnover of the stand(s). Many juniper stands have reached stages of maturity and decadency, which preclude treatment by all but an undesirable, intense, stand-replacing crown fire or chemical treatment removing all existing vegetation. In these cases, management strategies could incorporate removal techniques such as limited mechanical treatment to create broken, open “islands” within the stand(s). Although mechanical treatments are in many cases prohibitively expensive, they may be the only remaining, viable treatment option for extensive old-aged stands that consist only of a juniper overstory with sparse, scattered understory vegetation. Removal of encroaching species (mostly juniper and some limited conifer encroachment within aspen stands) in manageable vegetation communities can be accomplished through the use of traditional, controlled-intensity prescribed burns removing vegetation in a mosaic pattern. Treatment methods and post-treatment management of burns designed to improve watershed health should (at least initially) maximize herbaceous vegetation and litter in order to provide healthy, productive forage and habitat for livestock and wildlife. Treatment and management objectives should strive to focus on and address changes and improvements to the predominant vegetative community rather than expected secondary effects (positive and negative) to narrowly-defined rangeland “users” (e.g., wildlife vs. livestock burns). Polarization from user groups and single resource advocates can be more effectively avoided if objectives specifically address rangeland vegetation health issues, rather than focus on what can be construed as single species or single use management. On a long-term basis, treatments and pre/post-treatment management should be designed to promote healthy, diverse, natural rangeland conditions rather than the creation of homogeneous monotype communities covering large tracts of land. Species, age, and structural diversity should be stressed in management plans rather than medium to long-

term vegetation community “conversion” that continues current trends and conditions, albeit with different primary species.

Wild horse populations in the Adobe Town HMA should be reduced and maintained from current levels to AML of 600 to 800 horses. Bands of wild horses occupying rangelands outside the HMA should be removed or hazed into the HMA and combined into the AML population. Monitoring of impacts to the vegetation within the HMA should attempt to determine what effects wild horses have on their habitat when maintained at the desired population level and to what extent these effects are compatible with other multiple use activities occurring in the area. Develop additional water sources to reduce the dependence on existing water sources and the long duration to year-long use by wild horses around these sites to improve vegetative vigor, cover, and diversity.

Oil and gas extraction companies should be held to established reclamation standards on active and abandoned (dry hole) well pad sites in order to mitigate construction impacts to the disturbance site and to surrounding rangelands. Additionally, reclamation of former well-site access roads should be stringently inspected and enforced. Livestock management would be facilitated by properly constructing and promply repairing damage to fences and cattleguards caused by oil and gas activities. Construction and reclamation equipment should be thoroughly cleaned and inspected prior to movement between work sites to ensure that undesirable vegetation species are not carried and spread throughout the watershed.