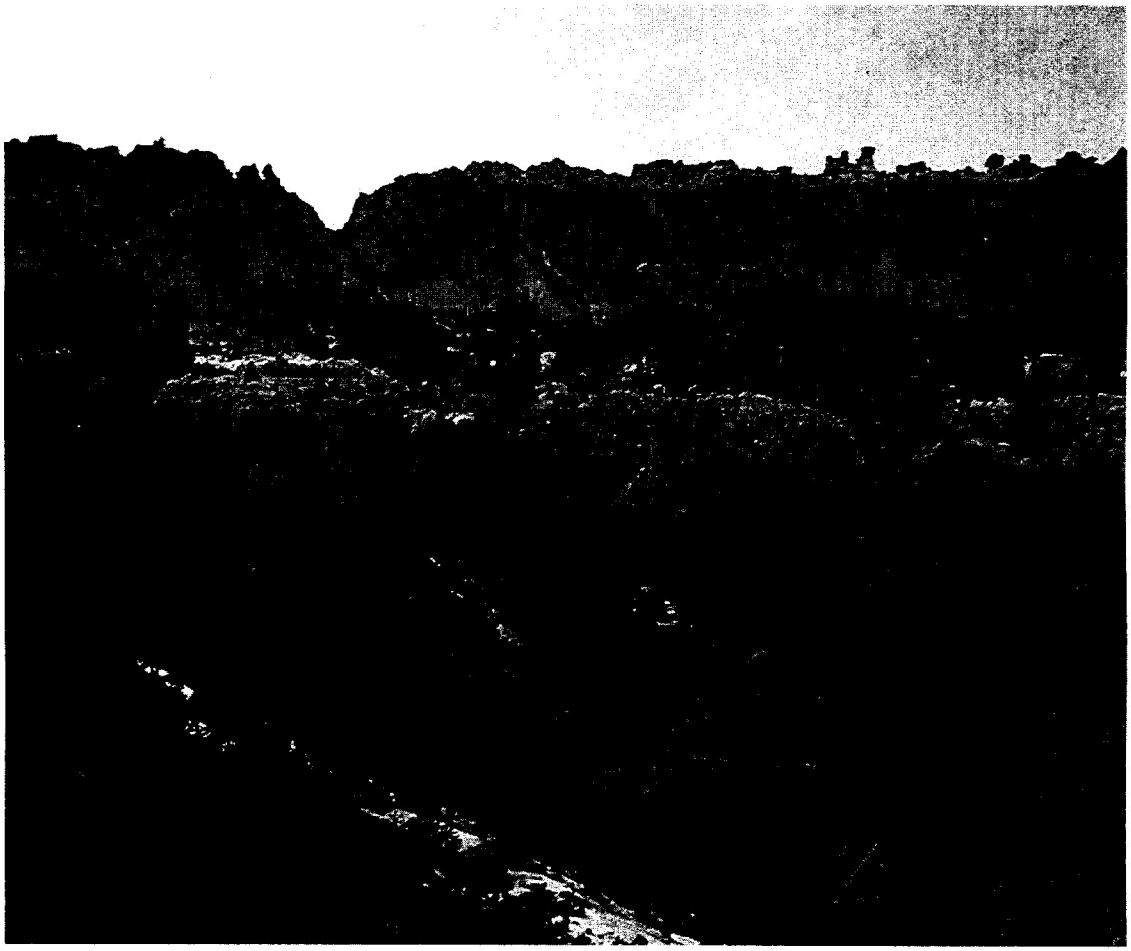
CHAPTER 3.5 EXCERPTED FROM:

Ely Proposed Resource Management Plan/Final Environmental Impact Statement



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COOPERATING AGENCIES:

Great Basin National Park
Humboldt-Toiyabe National Forest
Nellis Air Force Base
Nevada Department of Transportation
Nevada Division of Minerals
Nevada Department of Wildlife
Nevada State Historic Preservation Office

Lincoln County
Nye County
White Pine County
Duckwater Shoshone Tribe
Ely Shoshone Tribe
Moapa Band of Paiutes
Yomba Shoshone Tribe

BLM

Ely Field Office / Nevada

3.5 Vegetation Resources

3.5.1 Existing Conditions

The planning area is located in a dry climate characterized by annual losses of water through evaporation and transpiration that exceed annual water gains in precipitation. Two divisions of dry climates commonly are recognized: the arid desert and the semiarid steppe (U.S. Department of Agriculture Natural Resources Conservation Service 2003). The greatest portion of the planning area (northern two-thirds) lies within the semiarid, cold desert steppe better known as the Great Basin ecological system. The southern portion lies within the arid, hot desert, Mojave Desert ecological system with a transitional vegetation zone between it and the Great Basin. The Great Basin and the Mojave Desert are distinguished by the presence of distinctive native shrub communities, dominated by sagebrush and creosotebush, respectively.

As discussed further in Section 3.5.2, these vegetation communities are products of the various natural and human-related disturbances and environmental factors occurring during the past 200 years. As noted by Tausch et al. (1993), the warming trend of the past century has coincided with increased livestock grazing in the early 1900s and a reduced frequency of fire. All of these factors have contributed to existing vegetation communities and patterns.

The planning area lies within all or portions of five Major Land Resource Areas as delineated by the U.S. Department of Agriculture Natural Resources Conservation Service and modified to reflect current knowledge from recent soils data (**Map 3.5-1**). The general characteristics of these Major Land Resource Areas are summarized in **Table 3.5-1**. Actual land cover types representing major vegetation types are displayed in **Map 3.5-2**. The major vegetation types that occur in the planning area within the broad cover classes are listed in **Table 3.5-2** with their relative abundance.

The array of vegetation types in the planning area (except riparian/wetland) are broken down in **Table 3.5-3** with respect to their current conditions relative to the range of desired conditions discussed in Section 2.5.5. Existing conditions of the major vegetation types are further discussed in the remainder of this section. Appendix C discusses the state and transition models that help explain how these vegetation communities change over time and in response to various environmental factors.

Vegetation communities, as described in the ecological site descriptions, express the composition and cover consistent with site potential for a variety of species. Therefore, ecological site descriptions would be used as the initial basis for determining the desired range of conditions for vegetation within this RMP. State and transitions models are being used to guide treatments to meet the standards. These models are based on the potential existence of multiple successional pathways and multiple steady states within a pathway for any given ecological site (Westoby et al. 1989; Tausch et al. 1993; Stringham et al. 2003). These models describe the anticipated vegetation changes on a given ecological site over time in response to various types of disturbances and environmental factors.

A vegetation state is a recognizable, relatively resistant and resilient complex of phases with attributes that include characteristic climate, soil resource including soil biota, and the associated above ground plant

Table 3.5-1
General Characteristics of Major Land Resource Areas of the Planning Area

Major Land Resource Area	Major Plant Indicators	Elevation/Topography	Climate	Acres and Percent of the Planning Area	Associated Watersheds	Special note
25	Bluebunch wheatgrass, Thurber needle grass, Idaho fescue, low sagebrush, antelope bitterbrush, Utah juniper	4,590 to 7,540 feet on rolling plateaus and gently sloping basins, some steep mountains, Steep, north-south trending ranges are separated by broad basins filled with alluvium.	Average annual precipitation is from 8-15 inches, Precipitation is evenly distributed thought the year, but is low from midsummer to early autumn. Growing season is 90 to 120 days.	76,038 acres or 1 percent of the planning area	Huntington Valley, Newark	Salt desert shrub plant communities that occur in association with Major Land Resource Area 25 sagebrush grass communities are recognized as either Major Land Resource Areas 24, 28A, or Major Land Resource Land Area 28B, depending on plant species composition.
28A	Galleta, bluebunch wheatgrass, Indian ricegrass, needle-and-thread, mutton grass, black sagebrush, winterfat, antelope bitterbursh, kochia, single leaf pinyon, Utah juniper	4,000 to 6,500 feet in basins and 6,500 to 11,000 in mountains. Nearly level basins bordered by long, gently sloping alluvial fans between widely separated north-south trending steep mountain ranges.	Average annual precipitation is 5 to 8 inches at lower elevations to 20+ inches on higher mountains. Significant rainfall occurs during the growing season in the form of summer convection storms. Growing season is 60 to 160 days.	2,455,907 acres or 21 percent of the planning area	Antelope Valley, Cave Valley, Deep Creek, Dry Lake Valley, Dry Valley, Eagle Valley, Escalante Desert, Fox-gap Mountain, Hamblin Valley, Lake Valley, North Antelope, North Spring Valley, Panaca Valley, Patterson Wash, Rose Valley, Snake Valley North, Snake Valley South, South Spring Valley, Spring Valley, Spring Valley South East, Spring Valley South West, White River Central	8 to 12 inches rainfall – dominant shrub is Wyoming big sagebrush; black sagebrush is dominant when root depth is restricted. On deep soils basin big sagebrush and basin wildrye communities predominate. 12 to 14 inches rainfall - dominant shrub is mountain big sagebrush with Utah juniper and pinyon. 14 to 18 inches rainfall – dominant shrubs are mountain big sagebrush, antelope bitterbrush, Utah serviceberry, and pinyon.
28B	Bluebunch wheatgrass, Indian ricegrass, needle-and-thread, mutton grass, black sagebrush, winterfat, antelope biterbursh, single leaf pinyon, Utah juniper	4,500 to 6,500 feet in valley and basins and from 6,500 to 13,000 feet in the mountains. Nearly level valleys and basins are bordered by long, gently sloping to strongly sloping alluvial fans between north-south trending steep mountains.	Average annual precipitation ranges from 5 to 25 inches, increasing with elevation. Driest period is from mid-summer to mid autumn. Growing season is 60 to 120 days.	3,711,386 acres or 33 percent of the planning area	Antelope Valley, Big Sand Springs Valley, Butte, Cave Valley, Central Little Smokey Valley, Coal Valley, Deep Creek, Duck Creek Basin, Duck Water, Egan Basin, Garden Valley, Gleason Creek, Huntington, Jakes Valley, Lake Valley, Long Valley, Newark, North Antelope, North Little Smoky Valley, North Spring Valley, Park Range, Railroad Valley, Ruby Valley, Smith Valley, Snake Valley North, Snake Valley South, South Little Smoky Valley, South Spring Valley, South Steptoe, Spring Valley, Steptoe A, Steptoe B, Steptoe C, White River Central, White River North	8 to 12 inches of precipitation - dominant shrubs are winterfat, black sagebrush, and Wyoming big sagebrush. 12 to 16 inches rainfall - Utah juniper and pinyon, are extensive in the mountains. 16 inches rainfall or more - dominant shrubs are mountain big sagebrush, snowberry, serviceberry, curleaf mountain mahogany, quaking aspen, and mixed conifer.

Table 3.5-1 (Continued)

Major Land Resource Area	Major Plant Indicators	Elevation/Topography	Climate	Acres and Percent of the Planning Area	Associated Watersheds	Special note
29	Galleta, King's desertgrass, Indian ricegrass, needle-and-thread, black sagebrush, antelope bitterbrush, desert bitterbrush, cliffrose, Bailey greasewood, single leaf pinyon, Utah juniper	3,000 to 13,000 feet on Boundary Peak in White Mountains. North-south trending mountains ranges are separated by broad valleys bordered by sloping fans and pediments.	Average annual precipitation ranges from 3 inches in lower areas to over 20 inches on higher mountains. Summers are dry and hot, but convection storms of high intensity and short duration are common in July and August. In the eastern portion of the major land resource area, summer storms occur frequently enough to influence the production and species composition of plant communities. Growing season is 60 to 200 days.	4,293,679 acres or 37 percent of the planning area	Beaver Dam Wash, Big Sands Springs Valley, Cave Valley, Central Little Smoky Valley, Clover Creek North, Clover Creek South, Coal Valley, Coyote Springs, Delamar Valley, Dry Lake Valley, Dry Valley, Duck Water, Eagle Valley, Emmigrant, Escalante Desert, Fox-gap Mountain, Garden Valley, Kane Spring Wash, Meadow Valley Wash North, Meadow Valley Wash South, North Little Smoky Valley, Panaca Valley, Park Range, Patterson Wash, Railroad Valley, Rose Valley, Sand Hollow Wash, Sand Spring Valley, South Little Smoky Valley, Tikaboo Valley, Toquop Wash, Tule Desert, White River Central, White River North, White River South	8 to 12 inches rainfall – dominant shrub is Wyoming big sagebrush: black sagebrush is dominant when root depth is restricted. 12 to 16 inches rainfall – dominant shrubs are mountain big sagebrush, antelope bitterbrush. Utah serviceberry, and Utah juniper and pinyon are extensive. Salt desert shrub communities dominated by bailey greasewood and shadscale or shadscale and bud sagebrush occur extensively throughout the low elevations.
30	Big galleta, bush muhly, Indian ricegrass, desert needlegrass, white bursage, creosotebush, catclaw, mesquite	500 to 6000 feet. Most valleys and basins in this area range between 2000 to 4000 feet. Widely spaced, north-south trending mountain ranges are separated by broad valleys bordered by smooth, gently sloping alluvial slopes.	Average annual precipitation ranges from 3 inches in lower areas to over 20 inches on higher mountains. Summers are dry and hot, but convection storms of high intensity and short duration are common in July and August. In the eastern portion of the major land resource area, summer storms occur frequently enough to influence the production and species composition of plant communities.	863,001 acres or 8 percent of the planning area	Beaver Dam Wash, Coyote Springs, Emmigrant, Kane Spring Wash, Meadow Valley Wash North, Meadow Valley Wash South, Sand Hollow Wash, Tikaboo Valley, Toquop Wash, Tule Desert, White River South	In the eastern portion of the area, plant species more representative of the Sonoran Desert are intermingled with the Mojave Desert vegetation. Shrubs include creosotebush, white bursage, range ratany, shadscale, Joshua tree and other yuccas, catclaw, and ephedra. Saltcedar, mesquite, and other phreatophytes are common along stream floodplains. Shadscale, desert needlegrass, Indian ricegrass, fluffgrass, and bottlebrush squirreltail are important plants associated with the creosotebush and white bursage communities in the western portion of the area.

communities. Vegetation conditions (e.g., composition and cover) within a watershed or across vegetation types could range from herbaceous dominated to shrub dominated states, but individual life forms (i.e., shrub, forbs, and grasses) would be present or could return after fire or other disturbances within ranges expressed in the ecological site guides. Transitions are the trajectory of system change between states that would not cease before the establishment of a different state. The transition to undesired states and phases would be avoided if possible. States are relatively stable and resistant to disturbance up to a threshold point. A threshold is the boundary between two states, such that one or more of the ecological processes has been irreversibly changed. The term "phase" is used to describe each of the multiple, identifiable plant communities within a particular state. Communities may shift over time between phases in response to various environmental factors, but these shifts are commonly reversible as the environmental factors return to earlier conditions. The overall goal would be to attain a diverse mixture (mosaic) of vegetation states and phases consistent with site potential and watershed objectives.

Title 1 of the Healthy Forest Restoration Act requires identification and mapping of the fire regimes and fire regime condition classes on BLM-administered lands at risk of wildland fire and insect or disease epidemics. Data extrapolated from fire regime condition class maps as well as current condition of vegetation states indicate the following approximate acreages for fire regime condition classes: Class 1 is 277,000 acres, Class 2 is 2.2 million acres, and Class 3 is 8.9 million acres.

Shrub Lands

Approximately 68 percent of the planning area vegetation is characterized as sagebrush, salt desert shrub, or Mojave Desert (**Table 3.5-2**). Within the shrub land vegetation type there are many plant communities described, of which creosotebush, blackbrush, shadscale, salt desert shrub, winterfat, and sagebrush are most widespread. Current conditions of the major vegetation types are presented in **Table 3.5-3**.

Table 3.5-2
Major Vegetation Types Found on the Public Lands in the Planning Area

Vegetation Type	Approximate Area (acres)	Proportion of the Planning Area (percent)
Pinyon-juniper	3,593,400	31.5
Aspen	7,000	0.1
High elevation conifers	56,000	0.5
Salt desert shrub	1,221,000	10.7
Sagebrush[1]	5,619,500	49.3
Mountain mahogany	46,000	0.4
Mojave Desert vegetation	850,000	7.5
Riparian/wetland	3,100	0.0
Nonnative seedings[2]	269,500	2.4

[1] Sagebrush category includes broad array of sagebrush species and communities as well as grassland inclusions.
[2] Seedings duplicate areas listed in other categories.

Source: Estimates have been extrapolated from Ecological Status Inventory and Southwest ReGAP data.

Table 3.5-3
Current Conditions of Major Vegetation Types

Pinyon-Juniper		
	Herbaceous State	9%
	Herbaceous State (Immature Woodland Phase)	1%
	Tree State (Mature Woodland Phase)	9%
	Tree State (Overmature Woodland Phase)	81%
	Tree State (Annual Invasives Phase)	0%
Aspen		
	Herbaceous State (Herbaceous, and Herbaceous-Shrub and Sapling Phase)	0%
	Herbaceous State (Immature Phase)	0%
	Tree State (Mature Woodland Phase)	40%
	Tree State (Overmature Woodland Phase)	60%
High-elevation Conifer		
	Herbaceous State (Herbaceous, and Herbaceous/Sapling Phase)	0%
	Herbaceous State (Immature Woodland Phase)	0%
	Tree State (Mature Phase)	43%
	Tree State (Overmature Phase)	57%
Salt Desert Shrub		
	Herbaceous State	18%
	Shrub State	64%
	Altered: Annual Invasive/Exotic	18%
	Altered: Perennial Nonnative Seeded	0%
Sagebrush		
	Herbaceous State	18%
	Shrub State	54%
	Tree State (Expansion of pinyon and juniper into shrublands)	17%
	Annual	9%
	Seeded	2%
Mountain Mahogany		
	Herbaceous State (Herbaceous Phase)	0%
	Herbaceous State (Shrub Phase)	0%
	Shrub State (Shrub - Herbaceous Phase)	5%
	Shrub State (Shrub Phase)	42%
	Shrub - Tree Like State (No Understory Phase)	53%
Creosotebush-Bursage		
	Herbaceous State	42%
	Shrub State	43%
	Altered State (Annual Invasive and Exotics)	15%
Blackbrush		
	Herbaceous State	60%
	Shrub State	30%
	Altered State (Annual Invasive and Exotics)	10%
Nonnative Seeding		
	Herbaceous State	35%
	Shrub State	49%
	Tree State (Expansion of pinyon and juniper into nonnative seedings)	15%
	Altered: Annual Invasive	1%

At the lower elevations in the hot desert climate regime of Major Land Resource Area 30, ephemeral vegetation grows in response to infrequent precipitation events and tolerates extended dry periods. Perennial vegetation associated with Major Land Resource Area 30 also is adapted to extended dry periods, and responds similarly to ephemeral vegetation by growing immediately after infrequent precipitation events. In this unit, shrub communities are variously dominated by blackbrush, creosotebush, and bursage. Current management is to manage for a minimum of 15 percent canopy for each ecological site in the Mojave Desert as determined by native perennial species and within the limitations of ecological site potential.

Lower elevations of Major Land Resource Area 29 are characterized by extensive salt desert shrub communities dominated by greasewood and shadscale or shadscale and bud sagebrush. Salinization is a dominant phenomenon resulting from high evaporation. Salty crusts accumulate on the soil surface. Salt-loving plants, or halophytes, such as saltbush and shadscale dominate large portions of the area because other plants have few or no physiological capabilities to tolerate the high salt conditions. Winterfat occurs both in pure monospecific stands and as a primary component of mixed shrub communities, commonly with shadscale. Distribution of salt desert shrub vegetation within the planning area is shown on **Map 3.5-3**.

Within Major Land Resource Areas 28a, 28b, and 29, the mid-elevations are dominated by various species, forms, and densities of sagebrush. Nearly all species and varieties of sagebrush are endemic to the western U.S. where this group of species is the most widely distributed of all shrubs (**Map 3.5-4**). The most widespread of these in the planning area are black, Wyoming big, mountain big, and big sagebrush, although others occur. The local sagebrush species and varieties are separated along ecological gradients related to soil and climate conditions (Young and Evans 1986). For example, the occurrence of deep soils coincides with the distribution of big sagebrush in the Great Basin (Hironaka 1986). The 12-inch mean annual precipitation line generally divides the ranges of Wyoming big and mountain big sagebrush.

Mountain mahogany sites occur on slopes at the mid to higher elevations. Mountain mahogany is long-lived, and many stands are mature with individual plants reaching tree size in height and diameter. Mature mahogany tends to be shade intolerant and loses its competitive advantage when overtopped by conifers (Schulz et al. 1990). Distribution of mountain mahogany sites within the planning area is illustrated on **Map 3.5-5**. Most mountain mahogany sites occur within the same elevation range as mountain big sagebrush.

Native perennial bunchgrasses, such as bluebunch wheatgrass, bottlebrush squirreltail, Indian ricegrass, and Great Basin wildrye, historically were associated with the interspaces between sagebrush plants. In many areas today, the perennial bunchgrasses have been replaced by a variety of invasive annual species such as halogeton and cheatgrass, as the result of fires, lack of fires, past grazing practices, or various soil disturbances (**Map 3.5-6**). For further discussion of cheatgrass in the planning area, refer to Section 3.21, Noxious and Invasive Weed Management. Crested wheatgrass, an introduced species, has been seeded in some areas, and has become well established in some areas. In addition to its value for livestock, wild horses, and some wildlife species, it has proven to have both fire resistance and soil-binding abilities. Where crested wheatgrass occurs, it can preclude dominance by cheatgrass.

Forests and Woodlands

Approximately 31 percent of the planning area is pinyon-juniper woodlands, dominated by single leaf pinyon pine and/or Utah juniper (**Table 3.5-2**) (**Map 3.5-7**). Pinyon-juniper woodland is predominant at the lower elevations of the mountain slopes. Less than 1 percent of the area is occupied by forests of ponderosa pine, white fir, spruce, aspen, and bristlecone pine distributed primarily on steep mountain slopes and ridges.

Over 80 percent of the pinyon-juniper woodland type contains high tree densities and high canopy closure with little or no understory. Annuals, mainly cheatgrass, dominate the understory of an estimated 9 percent of the woodland type (**Table 3.5-3**).

Aspen plant communities in the planning area generally occur as small stands in isolated pockets, mainly on northern and eastern slopes at higher elevations on the mountains and within drainages (**Map 3.5-8**). Approximately 7,000 acres of this type are identified in the planning area. Approximately 60 percent of this community is characterized as being over-crowded with coniferous trees. Many of these stands have little or no aspen regeneration (**Table 3.5-3**).

Kay (2001) found in his study of aspen communities in central Nevada that excessive herbivory, primarily by domestic livestock, is a key factor limiting regeneration of these stands. Because environmental conditions are rarely favorable for growth and establishment of aspen seedlings, the species spreads and regenerates primarily through vegetative propagation, i.e., root sprouting. The young shoots, both leaves and stems, are highly palatable to various grazing animals including livestock and wild ungulates.

High elevation conifer forests cover an estimated 56,000 acres of the planning area (**Map 3.5-9**). Approximately half (57 percent) of this area is characterized as being in the overmature phase of the tree state with canopy cover exceeding 40 percent (**Table 3.5-3**).

Riparian/Wetland Vegetation

As discussed in Section 3.3, Water Resources, there is a limited amount of surface water in the planning area that manifests in perennial and ephemeral streams, small lakes, and groundwater springs. Riparian areas are transition areas between permanently saturated wetlands and the surrounding upland areas. These areas are characterized by vegetation or physical characteristics that reflect the relatively higher availability of moisture. Definitions contained in BLM Technical Reference 1737 exclude ephemeral streams and washes where riparian vegetation is absent as riparian areas in need of special management (BLM 1998a).

Riparian wetland sites in the planning area are lentic, which refers to standing water as in lakes, springs, and bogs, or lotic, where water is flowing as in rivers and streams. There are approximately 188 miles and 3,100 acres of riparian/wetland vegetation in the planning area associated with lotic and lentic environments, respectively (BLM 2001b, BLM unpublished data). Riparian/wetland vegetation communities are diverse in composition and structure, ranging from herbaceous wetlands to drainages dominated by woody plants. Sedges, rushes, and cattails characterize herbaceous wetlands in the planning area. Virtually

all of the riparian areas in the planning area are classified as emergent herbaceous wetlands. Important woody riparian plants in the planning area include narrow-leaf cottonwood, willows, aspen, chokecherry, water birch, and dogwood, depending primarily on elevation and stream gradient.

One of the most substantial riparian habitats in the planning area is Meadow Valley Wash, located predominantly in Major Land Resource Area 30. Meadow Valley Wash is one of only two perennial streams within Major Land Resource Area 30. Altered hydrologic conditions in Meadow Valley Wash are subject to frequent flash floods. This riparian area has been noted to have unstable soils and high levels of runoff, which have led to landslides and associated increases in sediment loading to the stream. In 2005, wildland fires and floods occurred in Meadow Valley Wash. These events have substantially affected the current condition of these riparian areas.

3.5.2 Trends

Limited quantitative data exist regarding trends of vegetation communities within the planning area. However, the general consensus among BLM managers and scientific advisors to the agency is that the general patterns of movement toward thresholds for key vegetation communities, especially sagebrush, observed in other portions of the Great Basin are equally valid within the planning area. Thus, while the rates of decline are not defined under current knowledge, it appears that historic deterioration in these communities continues to varying degrees under current management.

Shrub Lands

Substantial alterations of shrub communities in various portions of the Great Basin have been identified and attributed to historical poor grazing management, the introduction and rapid expansion of annual bromes on degraded rangelands, increased fire suppression since the early 1900s, and the resulting changes in fire regime (Pellant 1990; Sparks et al. 1990; Whisenart 1990; Billings 1994). For example, in south-central Oregon, Miller and Rose (1999) found that the most rapid period of establishment of western juniper in mountain big sagebrush steppe communities occurred between 1885 and 1925, a period of above average precipitation, few fires, and intensive livestock grazing. Within the planning area these alterations are less advanced, but definitely present as pending threats. In creosotebush and sagebrush dominated communities, shrub recovery after fire is slow, because most of the shrub species are easily killed by fire and have no adaptations to fire, such as resprouting. Pre-settlement fire return intervals in the sagebrush zones of the Great Basin varied from 12 to 140 years (see Section 3.20). According to Perryman et al. (2003), sagebrush communities at higher elevations and moisture levels have experienced decreasing fire frequencies (lengthened fire return intervals) that have been accompanied by increasing abundance of pinyon and juniper trees in these communities and reduced abundance of perennial herbaceous understory species. In lower elevation, drier sagebrush communities and salt desert shrub communities, the reduction in perennial herbaceous understory species, due largely to past grazing management and increased competition from shrubs in the absence of a normal fire regime, has been accompanied by substantial increases in the abundance of invasive annual grasses. Competition for available soil resources from nonpalatable species is the predominant factor deteriorating plant productivity, plant survival, and site resilience in many areas. Past grazing from large ungulates may have made this problem worse in local

situations by favoring root growth of woody species such as sagebrush or pinyon and juniper trees. This transition provides sporadic periods of abundant fine fuels for increased fire frequencies. The combination of increased fire suppression and abundant fine fuels, such as cheatgrass, makes many of these communities more susceptible to stand-replacing fires.

Frequent fire in the salt desert shrub and sagebrush types in portions of the Great Basin over the last 25 years is a recent trend, largely attributable to the establishment of cheatgrass (West 1994). The reduction in shrub cover following major fires has facilitated a rapid and extensive conversion to a cheatgrass system with short fire return intervals (Meyer et al. 2001) (see Section 3.21, Noxious and Invasive Weed Management). Altered fire regimes have further affected species composition, shrub densities, fuel loads, and processes such as nutrient cycling (Perryman et al. 2003).

At some mid and low elevations, decades of fire suppression and overly intense, prolonged, or poorly timed grazing have led to shrub dominant sagebrush systems that cover large portions of the landscape. These areas are characterized by sagebrush plants with few perennial herbaceous grasses and forbs in the understory. Monocultures of even-aged sagebrush are common in the planning area.

Rowland et al. (2003) estimated that approximately 43 percent of the sagebrush communities in the planning area are at moderate and 24 percent at high risk of displacement of sagebrush by cheatgrass. They similarly estimated 21 percent moderate risk and 36 percent high risk for displacement of other susceptible native species by cheatgrass. They rated approximately 3 percent of the sagebrush communities at moderate risk and 32 percent at high risk for replacement of sagebrush cover types by pinyon-juniper woodlands. Connelly et al. (2004) indicated that the displacement of sagebrush by the expansion of pinyon-juniper woodlands has severely reduced the area of the sagebrush ecological system and degraded its habitat quality.

Pinyon and juniper trees have been expanding into grass and shrub lands throughout the west for decades as described below under Forests and Woodlands. Tree presence appears to be highest in black sagebrush communities.

The recent trend within sagebrush communities are increasing abundance of young pinyon and juniper trees. Junipers tend to be more widespread than the pinyons and first to establish in lower elevations. Principal factors contributing to changes in tree density and distribution have been identified by various researchers as historic improper grazing, fire suppression, global warming, and increased carbon dioxide, all of which seem to favor woody species proliferation.

Blackburn and Tueller (1970) concluded that the invasion of pinyon and juniper into black sagebrush communities at several sites in the planning area was very limited until the late 1800s and early 1900s when rapid expansion of the woodland species occurred at numerous locations. At these sites, the most rapid invasion by both pinyon and juniper occurred after 1920. They attributed the accelerated invasion by both species to a combination of overgrazing, fire suppression, and climatic changes (particularly when a series of drought years is followed by several moist years). Tausch et al. (1981) conducted a study of pinyon-juniper woodlands in 18 randomly selected mountain ranges in the Great Basin and found that

approximately 40 percent of the sampled plots had trees establishing during the past 150 years. They note that this period generally coincides with introduction of heavy livestock grazing, harvest of trees for mining and smelting activity, and increased fire suppression following settlement of the region.

Most researchers agree that fire was historically the controlling factor preventing pinyon and juniper trees from expanding into shrub communities, and the lack of fire has allowed pinyon and juniper seedlings to increase in shrub communities adjacent to their historic landscape position on ridgetops and high rocky ground (Burkhardt and Tisdale 1969, 1976; Miller and Tausch 2001). Historic livestock grazing that decreased herbaceous plant densities has further facilitated the current rates of woody plant expansion into shrublands.

Forests and Woodlands

Along with expansion of pinyon and juniper into shrublands, the trend of increasing numbers of young trees and increasing tree density in the pinyon-juniper woodlands has led to two distinct trends within the pinyon-juniper woodland zone. Increased tree densities contribute to fuel loading, and when ignitions do occur, they may sustain extremely hot fires under suitable conditions. Secondly, increased tree densities have been accompanied by a widespread reduction of herbaceous understory components, probably through competition for sunlight and nutrients, which has led to accelerated rates of soil loss (Tausch and West 1995; Naillon et al. 1999; West 1999; Perryman et al. 2003).

As a community type, aspen has been declining in the Intermountain West since shortly after European settlement (Kay 2001). Kay's (2001) studies of aspen communities in central Nevada concluded that generally poor conditions prevail, and that many stands have not reproduced in over 100 years. As discussed in Section 3.5.1, this absence of regeneration appears to be primarily the result of herbivory by livestock and wildlife. As a result of minimal regeneration, these aspen communities tend to be even-aged. Bartos and Campbell (1998) advocated prompt action by resource managers to preserve western aspen stands. Within various situations, the necessary actions may include fire, cutting, fencing, spraying, chaining, or other approaches to enhance regeneration.

Native and nonnative insect and disease populations currently known to be affecting local forest and woodland areas include the pinyon Ips beetle, dwarf mistletoe, and white pine blister rust. A recent, dramatic increase in pinyon mortality in various localities throughout the West has been attributed to pinyon Ips responding to prolonged drought that weakened trees and a series of mild winters that have enabled rapid increases in beetle populations. A Nevada BLM news release of July 2, 2004, indicates that "Insect damage to pinyon and juniper woodlands is severe in...White Pine County..." Climate change is, and would continue to be, a major factor determining insect and disease conditions.

White pine blister rust is an introduced disease, which is infecting and causing widespread mortality in all five-needle pines. It recently has been found in the Jarbidge and Ruby Mountains and is expected to infect neighboring mountains in the foreseeable future (U.S. Department of Agriculture Forest Service 2003; Vogler and Charlet 2004). There is concern that white pine blister rust could have substantial adverse effects upon bristlecone pine populations, if it becomes established in close proximity.

Riparian/Wetland Areas

Declines in native woody riparian species have been documented throughout the West and Great Basin. The extent to which woody riparian vegetation has been reduced from its former distribution in the planning area is not known.

The exotic tree tamarisk has become established in waterways throughout the Intermountain West including available habitat in the planning area, where it has replaced native woody riparian species such as cottonwood and willows. Inventories to date have located tamarisk infestations on approximately 12,500 acres and along 123 miles of watercourses.

A total of 108 sites (primarily springs) have been assessed for proper functioning condition, representing approximately 393 acres of lentic communities. Of these, 294 acres or 75 percent were classified as being in proper functioning condition; 85 acres or 22 percent were classified as functioning at risk (**Table 3.5-4**). The remainder were determined to be non-functional. Throughout the entire planning area, it is estimated that approximately 713 acres of riparian communities may be non-functional or functioning at risk.

Table 3.5-4
Riparian Conditions of Select Sites in the Planning Area Based on Field Assessment of Proper Functioning Condition in Lentic Environments

	Function Class					
	Proper Functioning Condition		Functioning At Risk		Non-functioning	
Trend	Number of Sites	Acres	Number of Sites	Acres	Number of Sites	Acres
Upward	8	7	3	15	0	0
Downward	0	0	9	26	0	0
Unknown	62	287	13	44	13	14
Totals	**70**	**294**	**25**	**85**	**13**	**14**

Source: Unpublished BLM data.

3.5.3 Current Management

Vegetation resources are managed to meet existing land use plan goals and objectives and achieve land health standards.

Nonnative seedings are represented on approximately 270,000 acres of the planning area. These are largely characterized by crested wheatgrass, which was planted in the Great Basin over several decades.

Vegetation treatments conducted in the planning area between 1990 and 2004 are tabulated in **Table 3.5-5** according to type of activity. Over a 13-year period, an average of approximately 12,700 acres per year actively were managed primarily through burning, seeding, and chaining. Seeding with aerial- and ground-based equipment accounts for 80 percent of the acres treated during this period. The highest

number of acres is attributable to seeding activities accomplished in 2000 and 2001 after wildland fires (see Section 3.20). Fire rehabilitation during 1990 and 1997 also coincide with wildland fire activity.

Table 3.5-5
Acres of Vegetation Treated per Year in the Planning Area
1990 through 2004[1]

Year	Treatment Type (acres)				Total Acres Treated	Wildland Fires
	Seeding[1]	Mechanical Including Chaining[2]	Prescribed Fire[1]	Fire Rehabilitation[3]		
1990	0	600	0	7,180	7,780	2,022
1991	600	0	0	0	600	205
1992	15	0	580	0	595	2,603
1993	400	0	0	0	400	37,669
1994	200	855	100	21,683	22,838	58,917
1995	0	1,650	0	0	1,650	1,122
1996	0	580	2,700	11,785	15,065	51,504
1997	430	1,034	1,000	8,247	10,711	10,255
1998	0	634	2,600	16,942	20,176	14,439
1999	0	0	4,103	6,559	10,662	42,701
2000	0	0	447	21,698	22,145	31,831
2001	0	1,137	2,927	12,209	16,273	16,236
2002	309	1,152	614	16,159	18,234	17,844
2003	0	2,470	530	382	3,382	792
2004	950	1,320	2,260	9,925	14,455	10,549
Total Acres	**2,904**	**11,432**	**17,861**	**132,769**	**164,966**	**298,689**

[1] Excluding chemical weed treatments.
[2] Source: Range improvement projects database.
[3] Source: Unpublished BLM data.

Chaining and other methods such as fire, herbicide, and traditional tree cutting are used to reduce canopy cover of woody species. Although not accounted for in **Table 3.5-5**, tamarisk removal has been occurring in riparian habitats in the planning area consistent with the listing of tamarisk as a noxious weed by the State of Nevada.

Although riparian areas are a small portion of the eastern Nevada landscape, they are disproportionately valuable for watershed function, wildlife habitat, and recreation. In 1989, the BLM issued a Riparian Policy and Procedures Handbook, which increased the level of special management direction for riparian areas.

The BLM's Riparian Wetlands Initiative for the 1990s directed field units to restore or maintain riparian-wetland areas so that 75 percent or more would achieve proper functioning condition by 1997.

In order to integrate disturbance ecology, management activities, and vegetation growth and development across large and variable landscapes for site evaluation and management purposes, state and transition models were conceived in the 1980s (Westoby et al. 1989, Stringham et al. 2003, Briske et al. 2005). The models provide a means for organizing complex sets of ideas about the different interrelated processes

directing ecological system change and the role management can take in affecting those processes. Use of the model can improve analysis, monitoring, and management in semi-arid rangelands (see Appendix C).

Management recommendations have been developed based on general draft state and transition models and LANDFIRE Biophysical setting models for vegetation communities in the planning area. To date, management recommendations, threshold indicators, and desired conditions are available for black, Wyoming big, and mountain big sagebrush; winterfat; and shadscale communities. Additional recommendations for aspen and mountain shrub types are in progress.

The Ely Field Office currently manages the three designated natural areas and two research natural areas. These areas bring attention to, and protect selected components of the special and unique native flora within the planning area. These five special designations total approximately 12,600 acres and feature bristlecone pine, pygmy sage, swamp cedar, and riparian gallery forests (see Section 3.22, Special Designations).