Appendix C
Devils Gate Allotment Evaluation – Standard 1: Upland Sites

This portion of the evaluation is structured to assess more detailed information on each of the three main pastures/fields within the allotment. The largest pasture is the Indian Creek Pasture which has been subdivided into some smaller pastures/fields as noted in the introduction and further described below. One of these pastures is the Devils Gate Riparian Pasture which will be evaluated as a separate pasture. The third pasture/field is located on the south end of the allotment called the Devils Gate Field.

Indian Creek Pasture

The north and northeastern parts of this pasture take in much of the southern parts of Stag Mountain. Most of the canyons drain into the North Fork of the Humboldt River to the west, including Cottonwood Creek and Indian Creek, with one canyon on the east edge draining into Pole Creek which goes into the Marys River. As one comes out of the mountains, the terrain changes to lower hills and dissected fans with mostly dry drainages that stretch toward the North Fork of the Humboldt River. Closer to the river the terrain changes to somewhat higher hills, or drops onto flat terraces before encountering the higher hills and cliffs that border the river.

Most of the perennial water in this pasture comes from springs in the mountains and from the North Fork of the Humboldt River on the lower end. There are also a few springs that emerge from the upper edge of the fan located in the east central part of the pasture. During the summer, most of the springs don't flow very far. Of course, during spring runoff there can be water flowing in the main drainages from the mountains down to the North Fork of the Humboldt River. Water can also flow farther down some of the main drainages in the fall, such as Cottonwood Creek and Indian Creek, when water flows tend to increase. Water for the Devils Gate Pipeline that was installed in 2006/07 comes from one of the springs that emerge from the upper fan called Little Big Spring. The pipeline runs toward the south and west from Little Big Spring over to the Devils Gate Riparian Pasture with five water trough locations distributed along the pipeline.

The types of vegetation communities in this pasture are primarily big sagebrush/bunchgrass and low sagebrush or black sagebrush/bunchgrass communities with both types of communities often creating mosaics of big and low or black sagebrush areas spread across the landscape. Bitterbrush and snowberry plants are mixed-in with some of the patches of sagebrush. There are only a few small aspen patches in the mountains and they are mostly associated with springs. Willows are present around many of the springs and seeps. In 2001 and 2006, parts of Stag Mountain burned with much of the sagebrush in the burn areas being killed; however, sagebrush has been reestablishing and, at least in the 2001 burn areas, has become common in many of the plant communities.

Prior to 2002, the Indian Creek Pasture was one large pasture without any internal fences. Since that time, several new fences have been constructed within the pasture which now sub-divides the larger pasture as further described below. Please see Map 1 in Appendix A.

In 2001, the Stag and Isolation Fires burned parts of the upper/northeastern Indian Creek Pasture. Following the fires, a new fence was constructed which separated the burned areas from the unburned areas in order to rest the burned areas while allowing livestock to graze the unburned parts of the pasture. This fence has been retained with the idea that creating smaller fields within the larger Indian Creek Pasture would allow for increased control of livestock use, and could be incorporated into future livestock management plans. The area above the fence is now referred to as the Upper Indian Creek Field with the area below the fence referred to as the Lower Indian Creek Field.

In 2006, the Charleston Fire burned the Cottonwood Creek area in the northwestern part of the Indian Creek Pasture. Following the 2006 fire, a new fence was constructed to enclose most of the Cottonwood watershed. This new fence, along with the western part of the fence constructed after the 2001 fires, resulted in the creation of two fields in the Cottonwood watershed now referred to as the Upper Cottonwood Field and the Lower Cottonwood Field. These fences have also been retained to increase control of livestock use.

In 2006, another new fence was constructed to enclose a stretch of the North Fork of the Humboldt River and adjacent hills along the western edge of the Indian Creek Pasture labeled the Devils Gate Riparian Pasture. This fence was constructed to better control livestock periods of use for the purpose of improving the riparian and aquatic habitat associated with the river. A new spring development and pipeline system that stretches across the middle part of the Indian Creek Pasture were also installed in 2006/07 to improve livestock distribution with most of the troughs placed outside the riparian pasture. Please refer to Map 1 in Appendix 4A.

Livestock Use and Use Patterns

Over the years covered by this evaluation, cattle use normally started between mid-April and mid-May, with a few years of use starting in either June or July. Part of the cattle herd that would graze in the lower Devils Gate Field from April to May/June would be moved into the Indian Creek Pasture between mid-May and mid-June to join the other cattle already there, although there were a few years when the cattle would stay in the lower Devils Gate Field and not join the cattle in the Indian Creek Pasture. For about half of the years, the cattle would be moved out of the Indian Creek Pasture between late August and mid-September. For the remaining years, the cattle were moved out of the pasture between late September and mid to late October. Please refer to Appendix D for the annual summaries of the actual use by livestock, including the AUMs of use, periods of use, level of utilization recorded for the key forage plants, and the carrying capacity calculations. Also see Appendix P for the allotment carrying capacity analysis.

Like the cattle, the bands of sheep would begin grazing the Indian Creek Pasture between mid-April and mid-May. In late June/early July, the sheep bands would be moved north into the adjoining Stag Mountain Allotment and/or moved farther north to their Forest Service grazing allotments in the Jarbidge Mountains. The sheep would normally re-enter the Indian Creek Pasture the latter part of August and then be removed the latter part of September.

There were a few years when parts of the Indian Creek Pasture were closed to livestock use to allow for vegetation recovery after the fires. In addition, the Devils Gate Riparian Pasture was

closed to livestock use between 2007 and 2010 with the subsequent use in that pasture reported separately (See Table D4 in Appendix D).

The animal unit months (AUMs) of forage use by cattle in the Indian Creek Pasture, based on 27 years of actual use data, averaged 3,633 AUMs and ranged from a low of 1,278 AUMs to a high of 5,746 AUMs. Sheep use, based on 21 years of actual use data, averaged 1,007 AUMs and ranged from a low of 69 AUMs to a high of 1,844 AUMs.

There is only one year (1995) of use pattern observations in the low to mid-elevations. Those observations stated use was slight to light. One of the monitoring sites labeled Key Area DG-01 is located in this area. A key area is a small area that represents the larger surrounding area commonly grazed by livestock. Utilization data collected in 1995 at DG-01 indicated that use on the needlegrasses, an important forage grass, was 24% (light use) of current year's growth which is consistent with the use pattern observations. Looking at the data collected at DG-01 over the years, the levels of utilization ranged mostly from light to moderate/high moderate. The light levels of use were generally associated with the lower levels of actual livestock use and the higher levels of forage utilization associated with higher stocking levels.

There are three years of use pattern observations (1993, 1995, and 1996) in the mountains. Key Area DG-02 is also located in the upper elevations of the mountain on a gently sloped part of a lower side-slope. In 1993, use pattern observations above Key Area DG-02 described use levels as light to moderate on the side slopes with heavy to severe use in all drainages. Utilization data collected at Key Area DG-02 in 1993 showed moderate use on the key forage grasses and light use on bitterbrush. In 1995, use patterns were described as generally moderate to heavy on the mountain with heavy to severe use around the waters. Utilization data collected at Key Area DG-02 in 1995 showed light to moderate use on the key forage grasses and slight use on bitterbrush. In 1996, use was described as heavy to severe in the lower drainages and light to moderate in the upper areas. Utilization data collected at Key Area DG-02 in 1996 showed light to high moderate use on the key forage grasses and light/low moderate use on bitterbrush. This information portrays the normal kinds of use patterns associated with livestock use which are generally higher levels of use around the waters and the common trailing routes to and from water, including the relatively narrow drainages, with lower levels of use on the remaining areas.

An assessment of the effects from plant utilization, in part, involves comparing the levels of observed utilization to utilization objectives. Utilization is the proportion or degree of current year's forage production that is consumed or destroyed by animals (including insects). Utilization objectives are the levels of annual use or loss of forage considered acceptable and still leave adequate ground cover to minimize soil erosion, provide for good plant vigor, and provide for wildlife habitat needs and the needs of other organisms that encompass the larger ecosystem "web of life". Analysis of the impacts of utilization are more specifically addressed based on data collected at the two long-term upland monitoring sites in this pasture labelled as Key Areas DG-01 and DG-02.

Key Areas DG-01 and DG-02 were established in 1987. Both of these key areas are located in the Indian Creek Pasture with DG-01 representing the lower hills and fans, and DG-02 representing the mountain area. More recent monitoring sites were established to either monitor

the recovery of burned areas (monitoring sites labeled DGWA, DGWR, and SDGP) or established as part of a broader land health assessment (LHA) effort (monitoring sites labeled as DG-05 and DG-06).

Key Area DG-01

This key area was established within the rolling hills in the east central part of the pasture to monitor livestock use and plant community conditions and trends. The frequency transect runs east to west and is located on the lower part of a hill slope. The elevation at the key area is about 5,940 ft. The vegetation community at this key area is a big sagebrush and needlegrass plant community classified as a Loamy 8-10" ecological site (025XY019NV) based on the soil survey. However, observations of the upper soil profile at this key area in 2012 found that the soil does not appear to be characteristic of the kinds of soils normally associated with Loamy 8-10" ecological sites. The kind of soil observed at this key area in 2012 and its relationship to the vegetation community growing on the site are more specifically discussed in the analysis below. This key area did not burn during the evaluation period. Please refer to Appendix B for a series of photos over time at Key Area DG-01.

Based on a visit to this site in the fall of 2014, Wyoming big sagebrush, Douglas rabbitbrush, Thurber needlegrass (and possibly Webber needlegrass), squirreltail, and Sandberg bluegrass are common. There are some Indian ricegrass plants present as well which are more readily observed on the outer perimeter of the ant mounds. Ant mounds are common. This key area is a mosaic of patches of big sagebrush/perennial grass and patches of perennial grass with some rabbitbrush. The needlegrasses dominate the more open patches of grass. There were also minor amounts of cheatgrass. Perennial plant cover is high given the elevation and precipitation zone; however, there are some spots with relatively wide spaces between the grasses that indicate there is room for some additional plant establishment.

The soil surface is generally light colored and fine textured although there are gravels/cobbles/rocks below the surface as can be seen in the some of the water pathways coming off the hill-slope from above.

This key area, as well as much of the Stag Mtn. area, appears to have been affected by summer cloudbursts in 2014. Water pathways were common on this key area. The water pathways originate from the mid-slope of the hill where overland flows accumulated in spots and spilled-over a somewhat steeper part of the slope to initiate water pathways that would run up to 25 yards until the lower slope flattened enough for the water to spread and deposit the accompanying soil particles. Pedestalled grasses of both the larger and smaller perennial grasses were somewhat common in the area.

Since the needlegrasses are considered desirable perennial bunchgrasses and preferred forage for livestock, they were selected as the key forage plants on which to monitor utilization levels.

The utilization objective for these key upland forage grasses is as follows:
Table C1.

Key Species	Utilization Objective
Needlegrasses (STIPA)	Average of 50% of current year's growth.

From the utilization data collected at Key Area DG-01, average annual use on the needlegrasses was 41% based on 13 years of data, with use ranging from a low of 20% to a high of 59%. There were several years when use levels were between 55% to 59% utilization which indicates there may have been some impacts to the vigor of the needlegrasses. However, most of the data years show utilization at or below the utilization objective conducive to maintaining good vigor. Please refer to Appendix D for the annual summaries of the actual use by livestock, including the AUMs of use, periods of use, level of utilization recorded for the key forage plants, and the carrying capacity calculations.

On June 30, 2014, utilization data collected in the vicinity of the key area indicated there had been 75% use on bluebunch wheatgrass. This was the first year data were collected on bluebunch wheatgrass which hadn't been previously identified as being present on this key area. This was also the first year that utilization data were collected at this key area since construction of the Devils Gate Pipeline. One of the troughs on the pipeline is only a few hundred yards away. On October 30, 2014, utilization data were collected again which showed that average use on the needlegrasses was 27%; however, bluebunch wheatgrass was not observed. The differences in the identification of the key forage species and levels of utilization observed in 2014 indicates that a closer inspection of the key area is warranted.

Frequency Trend

The percent frequency of occurrence of a particular plant is the average number of times that kind of plant falls within the sample frame when the sample frame is placed at multiple spots along transects in the study area. Collecting frequency data in the same area over a period of years can provide information as to whether or not populations of particular kinds of plants in the community are changing over time. The frequency data can then be evaluated to indicate whether or not livestock grazing is significantly affecting the plant populations.

Evaluation of the frequency trend data collected between 1987 and 2012 at Key Area DG-01 indicates there have been no significant changes in the perennial grasses, with Sandberg bluegrass, the needlegrasses, and squirreltail common in the understory; however, there appears to be a significant decline of the big sagebrush. Cheatgrass and Hoods phlox are also common which indicates the plant community has been subject to some degradation in the past. Please refer to Appendix E for the data summaries of the frequencies of occurrence of each plant species for each year that data were collected.

Over the four separate years that frequency trend data were collected (1987, 1990, 1994, and 2012), there appears to be some needlegrass species identification differences. In 1987, the data on both Thurber needlegrass and Webber needlegrass indicated they were both common; however, the data from 1990 shows very little Webber needlegrass while Thurber needlegrass was still common. In 1994, the data again shows both Thurber and Webber needlegrasses being common, whereas the data from 2012 only shows Thurber needlegrass being present. If we compare the data on the needlegrasses from 1987 and 1994, when both Thurber and Webber needlegrasses were common in the data sets, there appears to be no significant changes in either species. If we compare the data on the needlegrasses from 1990 and 2012, when Thurber needlegrass was the only common needlegrass in the data sets, there appears to be no significant

change either, although the data shows a modest increase by 2012. Thus, the needlegrasses don't seem to be showing any significant changes over time which indicates that the levels of utilization on these key forage grasses haven't adversely affected their long-term survival.

The frequency data also shows that cheatgrass and Hoods phlox are present in the plant community. Cheatgrass, a non-native invasive annual grass, can readily establish in an area that has been disturbed and/or degraded. Hoods phlox is a native perennial forb that is usually a minor component of native plant communities; however, it tends to increase after a plant community has been degraded. The frequency data indicates that cheatgrass is present in low to moderate amounts with Hoods phlox present in moderate to high amounts. The frequencies of occurrence for both cheatgrass and Hoods phlox showed little change over the evaluation period which indicates that adverse impacts to this area probably occurred prior to the current evaluation period.

The frequency data on Wyoming big sagebrush shows a significant decline from 1987 to 1994. The data also shows a decline, but not a statistically significant decline, in big sagebrush between the data collected in 1994 and again in 2012. Although frequency data isn't available for this key area prior to 1987, it is possible that some of the decrease in the big sagebrush between 1987 and 1994 could have been the loss of young sagebrush that sprouted during the wet weather cycle of 1983-1986 with many of the young shrubs lost during the dry cycle of years that followed in the late 1980s and early 1990s, and from competition for moisture with the mature sagebrush already occupying much of the area. This kind of rise of young sagebrush followed by their decline was observed at other locations in northern Nevada during the same time frame. However, the declines may also be attributable to the loss of big sagebrush from drought stress and/or aroga moth damage. Aroga moths can strip the leaves from sagebrush stems. As noted above, observations of the upper soil profile at this site in 2012 didn't match soils previously identified as supporting Loamy 8-10" ecological sites. The notes about the soil profile stated there was a hardpan (restrictive layer) at 10 inches whereas the observers expected to find a deeper soil. This soil and vegetation community appears to be similar to what was found at Key Area SM-01 located in the Stag Mountain Allotment to the north. SM-01 is also a big sagebrush and needlegrass site with a hardpan present between 5 and 10 inches below the soil surface. Evaluation of the data and photos from SM-01 suggested that the relatively shallow soil for a big sagebrush site may result in heightened stresses to big sagebrush during drought and that these periodic stresses, possibly in conjunction with aroga moth damage, could cause reductions in the big sagebrush and result in some open patches within the big sagebrush community. The photos from DG-01 also show the loss of at least some of the mature big sagebrush over time and development of some open patches of grass that seems to parallel what was observed at SM-01.

Plant Community Production, Composition, and Ecological Condition

There are six (6) years of data on vegetative production collected between 1987 and 2014. Please refer to Appendix F for the summaries of plant production, relative composition, and ecological condition.

Ecological condition ratings are based on how similar an existing native plant community is compared to a native plant community unaffected by the activities of man (potential natural community-PNC). A numerical rating of condition is based on an on-the-ground sample of

vegetation production, by plant species, and then compared to descriptions of PNC developed by the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS). A numerical rating of condition for the plant community is expressed as a percent, ranging from 0 – 100 percent, with lower percentages indicating less similarity with the PNC and higher percentages indicating more similarity with the PNC. Seral stages are simply categories of condition in which the numerical ratings fall. The early seral stage is a category that covers numerical ratings from 0 – 25%; mid seral from 26 – 50%; late seral from 51 – 75%; and PNC from 76 – 100%.

Management objectives and management actions for public lands are developed considering existing conditions in relation to satisfactory or desired conditions to achieve and sustain healthy landscapes for multiple uses including watershed stability, plant vigor and resilience, wildlife forage and habitat, and livestock use. Satisfactory or desired conditions commonly range from upper mid seral to late seral to PNC taking into account the variations in ecological conditions compatible with providing for soil stability, plant resilience, and supporting the diversity of uses.

The summary table for Key Area DG-01 shows substantial variations between some years for a number of individual species weights and compositions. We often find that these variations in vegetative production are primarily due to differences in the timing and amounts of precipitation received for plant growth between years, differences in temperature during the growing season, and variations in the placement of the vegetation sampling frames and/or associated correction factors. Weather variations can have positive or negative effects on plant production, and can also favor some species in one year and other species in a different year. The routes of the sampling transects can also be somewhat different between years. Plants species can group together and not be evenly distributed across the area, thus the same plant groupings may not be sampled between years. In addition, the correction factors that are applied to the data in an attempt to standardize the data on green weights to what the dry weights would be at full growth may not be accurate for all the plant species. For example, the data on Wyoming big sagebrush shows it produced about 41 lbs/acre in 2012 whereas two years later in 2014 it supposedly produced about 1,050 lbs/acre. Some of this variation is likely due to 2012 being a drought year with 2014 generally being a more productive year, but it seems unlikely the big sagebrush produced more than 25 times the amount of vegetation in 2014 compared to 2012. All of the differences between years also affect the ecological condition ratings which fluctuated from mid-seral to late-seral conditions.

The ecological condition ratings were based on similarities to the Loamy 8-10” ecological site (025XY019NV). Although this key area couldn’t be verified as a Loamy 8-10” site, based on observations of the upper soil profile in 2012, the vegetation community is similar enough to the Loamy 8-10” kind of site that it is reasonable to use it as a reference in this evaluation.

The variations in the production and composition of individual plant species, and for the plant community, over the evaluation period, don’t provide enough consistency from which to draw reliable conclusions regarding plant community conditions and trends. Thus, we will need to rely on the evaluation of other data from which to draw conclusions.

Plant Cover, Soil Stability, and Hydrologic Function
There are only two (2) years of data on plant cover at DG-01, with one set of data collected in 2003 and two different data sets collected in 2012. Please refer to Appendix G for the cover data summaries.

Plant cover data from 2003, using the line intercept (LI) method, resulted in vegetative cover of approximately 28%. In 2012, vegetative cover using the ends of the frequency frame found only about 11% vegetative cover (basal cover was 6.0% and canopy cover was 5.2%). This low level of vegetative cover in 2012 could be attributed to it being a poor year for plant production and possibly some continuing reduction in big sagebrush; however, a different set of cover data also collected in 2012, using the line point intercept (LPI) method, found vegetative cover was 62%. If we consider that an acceptable level of vegetative cover is 20-30%, based on the Loamy 8-10" ecological site description, the relatively low level of 11% cover, based on data collected using the frequency frame, indicates there may be an inadequate amount of vegetative cover for soil stability and hydrologic function. However, the data showing there was 62% vegetative cover, based on the LPI method, indicates there would have been adequate amounts of cover. Although the vegetative/foliar cover results using the LPI method tend to be higher than the results using the points on the frequency frame, based on a review of data collected at other key areas, the large differences in results between the two sampling methods at this key area seem unusually large and contradictory. Collection of additional cover data is needed to resolve the contradiction and further evaluate whether or not the amount of cover indicates there is an acceptable level to meet the Upland Standard.

In August of 2012 at Key Area DG-01, as part of a data collection effort on rangeland health, specialists noted there were some water flow patterns and pedestalling of some of the grasses on the steeper hill-slopes. This was also observed during a site visit in the fall of 2014, as noted above. These observations are similar to what were seen at Key Area SM-01 in the Stag Mountain Allotment with that evaluation suggesting the area was more prone to run-off due to the presence of a relatively shallow hardpan of soil which slows the drainage of water. As the upper soil layers become saturated, such as during a summer cloudburst, the extra moisture accumulates and can flow across the soil surface taking some of the soil with it. The relatively shallow soil at Key Area DG-01, along with the presence of a moderate slope on the hill associated with the key area, are likely principal factors in the development of water flow patterns and the removal of soil from around some of the grasses (pedestalling).

In this case, it appears the excess moisture falling on the hill is able to accumulate enough water by the time it reaches the mid-slope to initiate water flow pathways that can run to the bottom of the hill where the slope flattens enough for the water to spread and deposit the soil particles carried by the water. Some of the photos in the vicinity of Key Area DG-01 in Appendix B show this effect. This is not uncommon on south facing hills with moderate or steeper slopes. The vegetative cover on south facing slopes is normally reduced because they are more directly exposed to the sun which causes the soils to dry faster thus reducing the number of plants that can be supported on the site. This makes these slopes more susceptible to erosion compared to north facing slopes that retain moisture longer and normally support a higher level of cover. What we often see is that the upper/top part of a hill has a noticeable amount of top soil and a good cover of vegetation because the extra water, such as from a cloudburst, doesn't flow fast

enough to erode that soil; however, as the water moves down the south facing slope, it can accumulate enough energy on the mid-slope to develop water flows that erode the soil. This process can cause the soil on the mid to lower slope to be thinner and further limit its ability to support perennial vegetation cover. Some of the photos in the vicinity of Key Area DG-01 in Appendix B show this effect.

In addition, pedestalling of some of the grasses may also be due to erosion of the upper soil layer that had accumulated around the base of big sagebrush. When the cover of big sagebrush is reduced, such as when it dies, erosion of the soil mound that had accumulated around its base can occur. In the absence of the protective layer of sagebrush leaves, the soil around the grasses that had been growing in the soil mound can also erode from rainfall impacts and overland water flows creating a pedestalled effect.

An additional observation from 2012 pertains to the color of the soil. A note from the land health assessment team stated the soil was light (ochric) colored. Light colored soils can be indicative of a soil low in carbon, the main ingredient in organic matter. There may have been some accelerated erosion that moved top soil off the site indicating some loss of organic matter on the hill-slope as the soil moved downhill, with some soil gains and losses on the lower hill-slope as some of the soil settled on the more gentle terrain with some transported further below.

In summary, the plant community at Key Area DG-01 appears to have transitioned from one dominated by big sagebrush with a grass/forb understory to a plant community with a patchwork of areas that are either dominated by big sagebrush/perennial grass or more open areas dominated by perennial grasses with some rabbitbrush. Observations of the area in 2014 along with interpretation of the frequency trend data indicate that most of the area has adequate vegetative cover to meet the Upland Standard. Collection of additional cover data would help to further evaluate site conditions. However, there are indications of residual degradation, probably from impacts prior to this evaluation period, and there are still some spots that could increase vegetative cover and further enhance soil stability and hydrologic function.

Evaluation of the utilization observations during this evaluation period indicates that livestock use probably wouldn't have adversely affected the long-term health of the key forage grasses, which is supported by the assessment of the frequency data; therefore, livestock use appears to have been in conformance with the guidelines.

Key Area DG-02

This key area was established in 1987 in the upper elevations of Stag Mountain to monitor livestock use and plant community conditions and trends. This study area sits at the bottom of a gentle side-slope. The elevation at the key area is about 7,080 ft. The vegetation community at this key area is a Mountain big sagebrush/bitterbrush/perennial grass plant community classified as a Loamy Slope 12-16" ecological site (025XY012NV) based on the soil survey. However, observations of the upper soil profile at this key area in 2012 concluded that the soil does not appear to be characteristic of the kinds of soils normally associated with this ecological site. Although a look at the soil didn't verify the key area as a Loamy Slope 12-16" ecological site, descriptions of the kinds of vegetation normally found on that kind of ecological site seem to fit well with the vegetation that is present on the site; therefore, it is reasonable to reference it in this

evaluation. This key area burned in the 2001 Stag Fire. Please refer to Appendix B for a series of photos over time at Key Area DG-02.

Based on a visit to this site in the fall of 2014, Mountain big sagebrush, snowberry, Douglas rabbitbrush, and perennial grasses (Idaho fescue, bluebunch wheatgrass, and the bluegrasses) are common, with the perennial grasses co-dominant with the shrubs. Although the big sagebrush and bitterbrush would have been substantially reduced by the 2001 fire, they are both reestablishing in the community. Cheatgrass is present but in minor amounts, and a modest amount of stunted scotch thistle was observed as well. This area is well covered with perennial grasses and shrubs.

Based on observations in 2012, the soil is deep consisting of sandy loams and sandy clay loams, with the soil surface a brown color.

The key forage species at this key area have been identified as Idaho fescue, bluebunch wheatgrass, and bitterbrush.

The utilization objectives for these key upland forage plants are as follows:
Table C2.

Key Species	Utilization Objective
Idaho fescue and Bluebunch wheatgrass	Average of 50% of current year's growth.
Bitterbrush	Average of 25% of current year's growth from spring use Average of 45% of current year's growth from summer/fall use

From the utilization data collected at Key Area DG-02, average annual use on Idaho fescue was 42% based on 13 years of data, with use ranging from a low of 8% to a high of 63%. In 1996, use was observed to be 55%, and in 1997 use was observed to be 63%, which indicates there may have been some impacts to vigor. However, these were the only years when the utilization levels were noticeably above the utilization objective, with most of the data years showing utilization at or below the utilization objective conducive to maintaining good vigor. Please refer to Appendix D for the annual summaries of the actual use by livestock, including the AUMs of use, periods of use, level of utilization recorded for the key forage plants, and the carrying capacity calculations.

From the utilization data collected on bluebunch wheatgrass, average annual use was 38% based on 11 years of data, with use ranging from a low of 7% to a high of 67%. In 1992, use was observed to be 60%, and in 1997 use was observed to be 67%, which indicates there may have been some impacts to vigor. However, these were the only years when the utilization levels were noticeably above the utilization objective, with most of the data years showing utilization at or below the utilization objective conducive to maintaining good vigor.

From the utilization data collected on bitterbrush, average annual use observed in the summer/fall was 36% based on 12 years of data, with use ranging from a low of 17% to a high of 52%. The 52% use was observed in 1998 and 48% in 1988, with the remaining years at or below

the utilization objective. There is only one year of utilization data for spring use which was recorded as 10%, and the use appeared to be mostly by deer.

The utilization data indicates that utilization of key forage plants probably didn't adversely affect their long-term health.

Frequency Trend

The percent frequency of occurrence of a particular plant is the average number of times that kind of plant falls within the sample frame when the sample frame is placed at multiple spots along transects in the study area. Collecting frequency data in the same area over a period of years can provide information as to whether or not populations of particular kinds of plants in the community are changing over time. The frequency data can then be evaluated to indicate whether or not livestock grazing is significantly affecting the plant populations.

Evaluation of the frequency trend data collected between 1987 and 2012 at Key Area DG-02 indicates that up to the year 2000, most of the species didn't change much, including the key species Idaho fescue, bluebunch wheatgrass, and bitterbrush. Two other perennial grasses seemed to increase substantially by 2000 which were the bluegrasses and Basin wildrye, although Basin wildrye still occurred at relatively low levels. The increases in the bluegrasses and Basin wildrye may be related to the wet weather cycle from 1995-1999. When frequency data were collected again in 2012, all of the perennial grass species had declined, with the exception of bluebunch wheatgrass. Bluebunch wheatgrass increased significantly by 2012, with cheatgrass also increasing to moderate levels. Both bitterbrush and big sagebrush declined as well. Bitterbrush and big sagebrush are readily killed by fire and would have been lost in the 2001 fire; however, the 2012 data shows big sagebrush is reestablishing quite well but bitterbrush is still at relatively low levels. Please refer to Appendix E for the data summaries of the frequencies of occurrence of each plant species for each year that data were collected.

Both Idaho fescue and bluebunch wheatgrass were seeded after the 2001 fires and Key Area DG-02 was included in that aerial seeding. The results from monitoring site DGWR, which is located about one-half mile below the key area and in the same drainage, showed relatively good establishment of both grasses. Some of the decreases of perennial grasses at the key area may be related to 2012 being a low precipitation year, but we may also be seeing losses of Idaho fescue from the 2001 fire. Both Idaho fescue and bluebunch wheatgrass can be lost when fire intensity is high. There is insufficient information to explain why Idaho fescue declined substantially compared to bluebunch wheatgrass which increased substantially; none-the-less, both species continue to have relatively high levels of frequency.

There are only a couple of years of utilization data collected since the 2001 fires, both of which show low levels of use. If we compare the actual use levels reported after the 2001 fires to the actual use and utilization levels recorded before the fires, it seems that utilization after the fires would most likely have been in the acceptable range.

In summary, the data portrays the vegetation community at DG-02 as being well represented by a variety of perennial grasses and shrubs, with bluebunch wheatgrass and Idaho fescue dominating the grasses, and big sagebrush, rabbitbrush, and snowberry common in the plant community.

Plant Community Production, Composition, and Ecological Condition
There are five (5) years of data on vegetative production collected at DG-02 between 1987 and 2014. Please refer to Appendix H for the summaries of plant production, relative composition, and ecological condition.

The summary table for Key Area DG-02 shows that bluebunch wheatgrass increased substantially after the 2001 fires and that production declined for most of the other grasses, with the exception of the needlegrasses in 2014. These results mostly parallel the results from the frequency data discussed above. However, needlegrass production was quite high in 2014, about 320 lbs/acre, which were mostly Thurber needlegrass and a little western needlegrass, but the data collected in 2012 only showed 4.0 lbs/acre for the needlegrasses. This seems to indicate the needlegrasses may be patchy, with the 2014 transect sampling a cluster(s) of needlegrasses and the 2012 transect missing those patches.

Regarding the shrubs, the data shows that snowberry increased and bitterbrush decreased after the fires, which is consistent with our experience. Snowberry readily re-sprouts after fire and increases its production for some years until big sagebrush and bitterbrush reestablish at high enough levels to again suppress snowberry production. Bitterbrush is often killed by fire and can take decades for it to become common again in the community. The data on big sagebrush and rabbitbrush show they are common in the community but the data between years is more variable and most likely due to the data being collected along somewhat different transect lines within the key area. As noted earlier, observations at this key area in 2014 found that big sagebrush and bitterbrush are becoming more common.

The ecological condition ratings for all of the years data were collected showed the plant community in late seral condition. The ecological condition ratings were based on the Loamy Slope 12-16" ecological site description (025XY012NV). Although this key area wasn't verified as a Loamy Slope 12-16" site, based on observations of the upper soil profile in 2012, the vegetation community is similar enough that it is reasonable to use it as a reference in this evaluation.

In summary, the data portrays a vegetation community that consists of a variety of perennial grasses and shrubs which are likely providing an acceptable level of soil stability and hydrologic function to meet the Upland Standard.

Plant Cover, Soil Stability, and Hydrologic Function
There are three (3) years of data on plant cover at DG-02, with one set of data collected in 1991, one data set from 2000, and two different data sets collected in 2012. Please refer to Appendix G for the cover data summaries.

Plant cover data from 1991, using the line intercept (LI) method, resulted in vegetative cover of approximately 26%. In 2000, vegetative cover using the ends of the frequency frame found about 44% cover (basal cover was 15.1% and canopy cover was 29%). In 2012, the data collected using the frequency frame again found about 33% vegetative cover (basal cover was

15.9% and canopy cover was 19.8%); however, a different set of cover data also collected in 2012, using the line point intercept (LPI) method, found vegetative cover was about 75%.

The normal levels of vegetative cover (basal + crown) for a Loamy Slope 12-16" ecological site are 40-50%. The relatively low level of vegetative cover in 1991 (26% cover) could be attributed to it being during a below normal precipitation cycle of years, with cover increasing to 44% by 2000 following a string of wet years from 1995-99. The cover data from 2012, collected using the frequency frame, showed a drop again to 33% cover which could be due to 2012 being a drought year in conjunction with the lower levels of shrubs following the 2001 fires. However, the 2012 data collected using the LPI method indicated there was a relatively high amount (75%) of vegetative cover. As noted in the evaluation of cover data from Key Area DG-01, the data collected using the LPI method seems to result in higher readings of cover compared to the frequency method. Although, we're not going to determine which method is the most accurate in this evaluation, we can still draw some conclusions when we also include an assessment of the photos taken in 2012. When we looked at the photos, it is apparent that the key area is well covered with perennial grasses and shrubs. Please see the photos for 2012 at Key Area DG-02 in Appendix B. Regardless of which cover values we refer to, it appears that vegetative cover is providing soil stability and hydrologic function adequate to meet the Upland Standard, with the qualifier that higher levels of cover are likely to accrue as the shrubs continue to increase in the community.

In addition, in July 2012, as part of a data collection effort on rangeland health at this key area, specialists noted a minor amount of pedestalling in one patch and a slight amount of litter movement, but they had no issues with the condition of the plant community overall.

In summary, the data for DG-02 portrays a vegetation community that consists of a variety of perennial grasses and shrubs which are likely providing an acceptable level of soil stability and hydrologic function to meet the Upland Standard.

Evaluation of the utilization observations during this evaluation period indicates that livestock use probably wouldn't have adversely affected the long-term health of the key forage grasses or shrubs; therefore, livestock use appears to have been in conformance with the guidelines.

Stag Fire of 2001 and Monitoring Sites DGWA, DGWR and SGDP

After the Stag Fire, much of the burn area was seeded with the seeds of desirable plant species. There were two seed mixes. One seed mix included thickspike wheatgrass, Streambank wheatgrass, Basin wildrye, Canby bluegrass, and Wyoming big sagebrush. The monitoring site established to track success of this seeding and recovery within the burn area was labeled DGWA. The second seed mix included bluebunch wheatgrass, Idaho fescue, and Wyoming big sagebrush. The monitoring site established to track success of this seeding and recovery within the burn area was labeled DGWR.

The rehabilitation objectives for the seeded areas called for the establishment of an average of three (3) seeded perennial grasses/square meter (M^2) with credit also given for the regrowth of native perennial plants (native release) that survived the fire. In 2002, monitoring sites were established in both of these treatment areas and data collected again in 2003 and 2004. The 2004

data for the two study sites are summarized in the table below, and show that the density objective was met at both study sites. Detailed information is provided in Appendix I.

Table C3: 2001 Stag Fire Rehabilitation Summary – Perennial Grass Densities/Square Meter for DGWA and DGWR Study Sites			
Date: 2004			
Study Site and Year	Seeded/M^2	Native Release/M^2	Total/M^2
DGWA			
2004	11.78 (8.3)[1]	29.8 (10.4)[1]	41.58 (18.7)[1]
DGWR			
2004	4.5	4.62	9.12

[1] The numbers in parentheses are grass densities adjusted to be equivalent to medium sized perennial bunchgrasses. For example, a density of 5 thickspike wheatgrass plants (medium height but small basal area), or a density of 3 Sandberg bluegrass (short height and somewhat small basal area) were judged to be equivalent to 1 medium sized bunchgrass.

Monitoring Site SGDP

In addition to the rehabilitation objectives for the seeded areas, there was also a rehabilitation objective established for the recovery of native upland areas that were not seeded.

The objective for unseeded native uplands was that perennial herbaceous production of the burned area be equal to or greater than the perennial herbaceous production of the same/similar ecological site nearby that was not burned. In 2003, data were collected in an area labeled SDGP (see Map 2 in Appendix A and photos in Appendix B) to collect data on herbaceous production. Monitoring results showed the burned area had 1,405.27 lbs/acre of perennial herbaceous production with the adjacent unburned site having 1,407.55 lbs/acre. The production was close enough for the rehabilitation objective to have been met.

Charleston Fire of 2006

The Charleston Fire burned the upper and middle parts of the Cottonwood drainage in the northwest corner of the Indian Creek Pasture. A fence was constructed to enclose the burned portion in the Cottonwood drainage, and a couple of the drainages were seeded.

The 2009 report regarding progress towards attainment of the rehabilitation objectives stated the objective of having a minimum density of three mature perennial bunchgrasses had been met. This conclusion was based on ocular observations of plant densities in the burn area which were considered to be similar to the density results found at monitoring site GOWL-02 for the Gopher Fire which is included in the evaluation of the Devils Gate Field below.

At GOWL-02, the combined densities of the medium sized perennial bunchgrasses (squirreltail, Indian ricegrass, needle and thread, and bluebunch wheatgrass) were 3.48/square meter which met the rehabilitation objective for grass density and, with the addition of the densities of Sandberg bluegrass, perennial forbs, and shrubs, the total plant density exceeded the minimum established for rehabilitation. Please refer to Appendix J for more details.

DG-05 and DG-06 Land Health Assessment (LHA) Monitoring Sites
In 2012, the LHA monitoring team collected information on land health including foliar cover, soil stability, and hydrologic function, at three additional sites (DG-04, DG-05, and DG-06). DG-05 and DG-06 were randomly selected within the Lower Indian Creek Pasture and the data from those sites are evaluated immediately below. Monitoring site DG-04 is located within the Devils Gate Riparian Pasture and the data from that site is evaluated separately under that pasture name. The LHA program follows the Assessment, Inventory, and Monitoring (AIM) strategy (Toevs *et al.* 2011), distinguished by a set of core indicators, standardized field methods, remote sensing, and a statistically valid study design to provide nationally recognized and scientifically defensible data to track changes over time. The LHA monitoring effort was initiated several years ago to collect data on public land health using methods described by Herrick *et al.* (2009) and Interpreting Indicators of Rangeland Health (IIRH) methodology (Pellant, 2005).

DG-05
This site is located on the lower part of Stag Mountain at an elevation of about 6,350 feet in an unburned area just below the 2001 Stag Fire perimeter. The fence that was built after the fire is just above this monitoring site. Water in Indian Creek is about one-half mile to the northwest. See Map 1 in Appendix A and photos in Appendix B. The monitoring site crosses two vegetation communities, one with big sagebrush/bitterbrush/grass and one with black sagebrush/bitterbrush/grass, with some mixing of the two sites. There is a well-worn livestock trailing route that runs through the area. The soil was described as all sandy and/or cobbly with bedrock at 5-8 inches, which is a shallow soil. When the soil was looked at in 2012, they didn't verify what kind(s) of ecological site(s) would normally be found on the site. Total foliar cover was 56% with about two-thirds of the cover provided by shrubs (rabbitbrush-12.0%, bitterbrush-11.3%, big sagebrush-8.7%, and black sagebrush-5.3%). Most of the remaining cover was provided by perennial grasses (Sandberg bluegrass-28.7%, an unidentified perennial grass-6.0%, bluebunch wheatgrass-2.7%, squirreltail-1.3%, and Thurber needlegrass-0.7%), with cheatgrass at 2.0% cover. Prickly phlox (2.7% cover), Hoods phlox (2.7%), and false dandelion (0.7%) were also found along the cover transects. See Table 2 in Appendix G for a summary of the cover data from 2012.

Vegetative production data were collected at this site in 2014 which also portrays the area as dominated by the shrubs (even more so than portrayed by the cover data), with relatively low amounts of perennial grasses. See Appendix M for a summary of the 2014 production data.

The comments regarding the indicators of rangeland health made by the LHA team in 2012 stated there were many water flow patterns mostly related to the livestock trailing areas. There were many pedestalled grasses and most were within the water flow patterns, and there were terracettes on the lower half of the site. The woody litter was being kicked around by the cattle and the small litter was being moved by water. Livestock trampling/trailing was moderate to severe, and the sandy soil was prone to disturbance.

Although the ecological sites weren't identified based on observations of the soil in 2012, with the soil being rather shallow (5-8" to bedrock), it seems reasonable to refer to the big sagebrush part as a Shallow Loam 8-12" site (025XY021NV) or Shallow Loam 14-16" site

(025XY042NV), or some transition between the two, and the black sagebrush part as a Clay Slope 10-14" (025XY055NV). The shallow soil (5-8" to bedrock) is most likely associated with the black sagebrush site. The big sagebrush area most likely has soils where their roots can get somewhat deeper, possibly through some fractured bedrock and more rock cobbles. Normal vegetative cover described in the ecological site descriptions for the big sagebrush/Shallow Loam sites ranges from 10-25%, with the vegetative cover for the black sagebrush/Clay Slope site ranging from 15-30%.

The vegetative cover data from 2012 showed the cover was 56% which exceeds the normal levels described in the ecological site descriptions. However, the cover and production data, and photos, show the area is dominated by shrubs with reduced amounts of perennial grasses in the understory, and that most of the perennial grasses are Sandberg bluegrass, a shallow rooted grass. The 2012 observations regarding the indicators of rangeland health described an area adversely impacted by livestock resulting in many water flow patterns and pedestalled grasses. Absent these substantial impacts from livestock use, we might have seen some water flow patterns and pedestalling of the grasses simply due to the low water holding capacity of the shallow soils, but it seems that the livestock walking around and through the area has reduced the understory vegetation and created more water pathways for accelerated erosion. One analogy would be a dirt road that receives enough vehicle use to harden the soil surface and kill any seedlings trying to establish in the tire tracks of the road, and these longer pathways allow water to gather and flow down the road with enough energy to erode the soil. These kinds of conditions can be expected along commonly used livestock trailing routes. In addition, the preponderance of the shallow rooted Sandberg bluegrass in the understory also indicates a reduced level of hydrologic function. The shallow roots of Sandberg bluegrass are not as effective as the more deeply rooted grasses in slowing the movement of subsurface water.

In summary, this monitoring site seems to have been altered to such a degree that it does not meet the Upland Site Standard, and that continuing livestock impacts indicate that livestock use is not in conformance with the guidelines.

DG-06

This site is located in the low rolling hills in the southwest part of the Lower Indian Creek Field at an elevation of about 5,800 feet, with the North Fork of the Humboldt River a little over a mile to the west. This area has not been affected by fire. See Map 1 in Appendix A and photos in Appendix B. The monitoring site is a stunted Wyoming big sagebrush/perennial grass plant community identified in 2012 as a Shallow Loam 8-10" ecological site (024XY047NV) with a sandy soil and a lot of gravel on the surface, and shallow rooting zone. The ecological site descriptions states that this kind of site should be dominated by Wyoming big sagebrush and Thurber needlegrass.

In 2012, total foliar cover was found to be 53.3%. Most of the cover was split between the shrubs and perennial grasses, with modest amounts of cheatgrass and forbs providing the remainder. See Table G2 in Appendix G for a summary of the cover data from 2012.

The normal vegetative cover described in the Shallow Loam 8-10" ecological site description is 10-20% cover. The vegetative cover data from 2012 showed the cover was 53.3% which exceeds the normal levels described in the ecological site descriptions.

The comments regarding the indicators of rangeland health made by the LHA team in 2012 stated there were some short water flow patterns and pedestalling in steeper areas, and there were a couple of areas where water ponded including a spot with an abandoned ant mound. There were also some dead sagebrush, and cheatgrass was scattered throughout.

The short water flow patterns and pedestalling in steeper areas could indicate some impairment in water retention; however, these could also be natural effects of excessive water from summer cloudbursts impacting a shallow soil with a low water holding capacity. The ecological site description says the potential for sheet and rill erosion is moderate to high depending on slope.

Vegetative production data were collected at this site in 2014 which portrays the area as dominated by the shrubs, with about two-thirds of the vegetative production provided by the shrubs (Wyoming big sagebrush and rabbitbrush). Hoods phlox and prickly phlox provided most of the perennial forb production (about 14%), with about the same percentage for the perennial grasses combined (Sandberg bluegrass, squirreltail, and Thurber needlegrass), and about 2% cheatgrass. The ecological condition was rated at 54.4% which is a low late seral condition. See Appendix N for a summary of the 2014 production data.

The dominance of the shrubs (in terms of vegetative production) with lower levels of perennial grasses, along with phloxes being common in the area, indicates this plant community could have been adversely affected by livestock use. There is only one year of utilization observations that may reflect livestock use in this area during the evaluation period, which is from 1995. Use pattern observations in 1995 stated use in the low to mid elevations was slight to light. Key Area DG-01 was established to represent use in the mid to lower elevations and is located about one mile from water (at least prior to the 2006/07 installation of water troughs on the Devils Gate Pipeline nearby) which is a similar distance to water from DG-06. The key forage grass at DG-01 is Thurber needlegrass which would also be the key forage grass at DG-06. If we extrapolate the evaluation of utilization observations at DG-01 to DG-06, the grazing use on Thurber needlegrass during the evaluation period would also likely have been acceptable. If the vegetation community at DG-06 has been adversely affected by livestock use, it may be more likely that those impacts occurred prior to the current evaluation period.

If we look at the 2012 photos, it appears the vegetation is well distributed with only a modest number of spots with more space than would be expected between plants, with some of those spots being ant mounds.

In summary, this monitoring site may have been adversely affected in the past, but when we consider the kind of soil, vegetative cover, vegetative production, and photos, it seems the area has an adequate amount of vegetation to meet the Upland Site Standard. This conclusion, along with analysis of forage utilization, indicates that livestock use was most likely in conformance with the guidelines during the evaluation period.

The summary for the Indian Creek Pasture is that most of the pasture meets the Upland Site Standard and that livestock grazing is generally in conformance with the guidelines. However, the livestock trailing routes associated with livestock traveling to and from, and parallel to, the reliable water sources do not meet the Standard, as represented by monitoring site DG-05; therefore, livestock impacts to these area are not in conformance with the guidelines.

Devils Gate Riparian Pasture

Prior to 2006/07, this pasture was part of the larger Indian Creek Pasture. As explained previously, a fence was constructed to create this pasture with the main focus on improving the riparian and aquatic habitat along the North Fork of the Humboldt River. Much of the river flows through a canyon with a fairly narrow valley and steep side-slopes and cliffs; however, there are a few wide spots as well. From the river, most of the pasture runs to the east and up relatively steep hills and then becomes more gentle terrain on the upper/east side of the pasture. The lower parts of both the Cottonwood and Indian Creek drainages travel through this pasture to meet the river. For the most part, due to the steep slopes near the river and steep slopes that border the lower side drainages, livestock use and trailing routes are concentrated along the river bottom, side drainages and lower side-slopes until they reach the upper/eastern hills in the pasture where the terrain is more moderate. The eastern part of the pasture has broader uplands where the livestock can get away from the drainage bottoms.

The North Fork of the Humboldt River provides most of the perennial water in this pasture; however, there is also some water that rises in the Cottonwood drainage (the Indian Creek drainage is usually dry), and there is a trough in the upper/southeast corner of the pasture that gets its water from the Devils Gate Pipeline.

The upland vegetation consists mostly of big sagebrush/grass and black sagebrush/grass sites. There is a very limited amount of information regarding specific upland vegetative conditions and livestock use in this pasture, most of which is information from more recent years. Of course, prior to the pasture fence being constructed in 2006/07, both cattle and sheep grazed the area as part of their authorized use within the larger Indian Creek Pasture, with some of the cattle likely staying along the river from spring to fall. After the fence was constructed, the pasture was closed to livestock use for four (4) years, although some unauthorized cattle use was observed during this time. Beginning in 2011, cattle have been authorized to graze within this pasture for certain limited periods of use. Please refer to Table D4 in Appendix D for the more recent livestock use including AUMs and periods of use.

In 2006, parts of what are now within the riparian pasture burned in the Sugarloaf Fire, with some of the burn area seeded thereafter. Please see Map 2 in Appendix A. One monitoring site, labeled SLWW-01, was established to track recovery of the seeded areas. This monitoring site is located on an upland terrace next to the North Fork of the Humboldt River. Please see Map 1 in Appendix A.

Parts of the burn area were aerially seeded with Sherman big bluegrass, Basin wildrye, thickspike wheatgrass, bluebunch wheatgrass, and Wyoming big sagebrush. Rehabilitation

objectives were established for the rehabilitation treatments and to describe the acceptable levels of recovery for the area to be reopened to livestock grazing.

The rehabilitation objectives called for a minimum of three mature (3) perennial bunchgrasses per square meter rooted firmly in the soil, and a qualitative assessment of soil and site stability, and hydrologic function, that results in ratings of none to slight departure from that expected from the same kind of ecological site considered to be in stable condition. The size of the mature bunchgrasses were to be equivalent to medium sized perennial grasses such as bluebunch wheatgrass, Thurber needlegrass, Indian ricegrass, squirreltail, and Idaho fescue sometimes referred to as tall stature grasses.

In the fall of 2009, data were collected along with other observations to determine if the rehabilitation objectives had been met. The 2009 results showed that the seeded perennial grasses had a combined density of 6.54/square meter, most of which were from Basin wildrye and thickspike wheatgrass, which met the rehabilitation objective; however, there was very little in the way of other residual native perennial grasses, with most of the remaining vegetative densities provided by big sagebrush seedlings (2.52/square meter) and relatively low densities of weedy species. Please see Table J1 in Appendix J for the specific density results. It isn't surprising there was little in the way of perennial grasses on this area prior to being reseeded because there would have been excessive livestock use next to the river over decades of time. About the time this area burned and was reseeded, the riparian pasture fence was constructed and the pasture closed to livestock use through 2010. Although there was some unauthorized cattle use during at least one year during the closure period, the reduced livestock use, including the reduced periods of authorized use beginning in 2011, should have improved the chances of survival for the seeded species.

DG-04

In 2012, one monitoring site labeled DG-04 was established in this pasture to collect upland information for land health assessment (LHA). Please see Map 1 in Appendix A. This site is located in the upper hills about three-quarters of a mile above the river and about one-half mile south of the Indian Creek drainage, and three-quarters of a mile below the trough on the Devils Gate Pipeline. The monitoring site has a southwest facing exposure with a moderate slope at an elevation of about 5,900 feet.

This monitoring site was identified as a Shallow Calcareous Loam 8-10" (024XY030NV) ecological site which is normally dominated by black sagebrush and Thurber needlegrass. However, a substantial amount of the shrub cover was recorded as Mountain big sagebrush which isn't normally found in the black sagebrush site noted above; therefore, it seems the monitoring site is a mixture of two ecological sites. The big sagebrush part of the site may be similar to a Shallow Slope 8-12" (024XY028NV) which is normally dominated by big sagebrush and bluebunch wheatgrass. The notes from 2012 stated there were a lot of cobbles and gravels on the soil surface, and they hit a hardpan at 10 inches down.

In 2012, total foliar cover was found to be 46.0%. A little over half the cover was provided by the shrubs (big sagebrush, black sagebrush, and rabbitbrush), with about one-third of the cover from perennial grasses, mostly Sandberg bluegrass with some squirreltail, with the perennial

forbs, mostly phloxes, providing the remaining cover. No bluebunch wheatgrass or needlegrass or cheatgrass were recorded along the transect lines; however, needlegrasses can be seen in at least one of the photos. The notes taken at this site said cheatgrass was present but rare. See Table G2 in Appendix G for a summary of the cover data from 2012 and Appendix B for photos.

The normal vegetative cover described in the Shallow Calcareous Loam 8-10" ecological site description is 15-30% cover. The normal vegetative cover described in the South Slope 8-12" ecological site description is 25-40% cover. The vegetative cover data from 2012 showed the cover was 46% which is above the normal levels described in the ecological site descriptions.

Additional comments regarding the indicators of rangeland health made by the LHA team in 2012 stated there were severe water flow patterns along with some ponding, pedestalled grasses were common, some terracettes on the upper part of the area only, and that low numbers of perennial grasses were slightly impacting infiltration. The overall rating of the site was "slight to moderate departure" from reference conditions, with the water flow patterns and pedestalled grasses each rated as "moderate departure" from reference conditions.

Vegetative production data were collected at this site in 2014 with about eighty-three percent (83%) of the vegetative production provided by the shrubs. In this case, black sagebrush provided most of that production with relatively low amounts for Wyoming big sagebrush and rabbitbrush. The forbs provided about 10% of the production with most of it from Hoods phlox. The remaining production (7.0%) was from the perennial grasses, most of which was Sandberg bluegrass with low amounts of Thurber needlegrass and squirreltail. The ecological condition rating was 55.9%, based on the Shallow Calcareous Loam 8-10" site description, which is a low late seral condition. See Appendix 4L for a summary of the 2014 production data.

The severe water flow patterns and pedestalled grasses observed may be related to abnormally high runoff events on a somewhat shallow soil with a moderate slope. The ecological site descriptions state the potential for sheet and rill erosion is moderate to high depending on slope. The slope of the monitoring site was noted as 25% by the 2012 LHA team, with the photos indicating that the upper part of the site is steeper than the lower part of the site. When the upper soil layers fill with water, the excess water can accumulate and flow downslope creating water flow patterns and pedestalled grasses. The soil surface has a high amount of cobbles and gravels that would provide a relatively high amount of resistance to soil erosion. Severe water flow patterns may only be able to develop from high intensity runoff events such as summer cloudbursts or rapid melting of a heavy accumulation of hail or snow. However, the low levels of perennial grasses, especially the low levels (or absence) of the more deeply rooted perennial grasses such as Thurber needlegrass and bluebunch wheatgrass, indicates that at least the hydrologic function of this plant community is impaired.

The high level of shrub cover and the gravel/cobble surface, along with the low cover of grasses, may be adequate to meet the Upland Standard on the lower side of the monitoring site where the slope is more modest; however, there is at least some slight to moderate impairment to hydrologic function because most of the grasses are shallow rooted. On the upper side of the monitoring site where the slope is steeper, the low amount of perennial grasses make it more questionable as to whether it has sufficient cover to limit overland flows to an acceptable level,

and the paucity of the more deeply rooted grasses that are valuable for slowing the movement of subsurface water downslope also indicates some impairment of the hydrologic function of this part of the site.

Regarding livestock impacts during the evaluation period, there is little information about this specific area. As described in the analysis of utilization at DG-06 above, observations of other areas indicates that utilization of the key forage grasses would likely have been acceptable during the evaluation period, and that reduced levels of the key forage grasses may more likely to have occurred prior to this current evaluation period. Since 2007, livestock use on the uplands in the riparian pasture has likely been acceptable in light of the limited use authorized. Livestock use that is designed to improve riparian habitat is normally acceptable for the uplands as well. See Table D4 in Appendix D for the more recent livestock use including AUMs and periods of use.

In Summary for the Devils Gate Riparian Pasture, evaluation of the data and other observations indicate that some of the uplands are likely meeting the Upland Standard; however, evaluation of the data from monitoring site DG-04 indicates that it is questionable on some of the steeper slopes. Evaluation of the data from monitoring site SLWW-01 indicates that the uplands close to water had very low levels of perennial herbaceous plants prior to being reseeded, and would have been impaired to such an extent that they would not have met the Upland Standard. However, reseeding of at least some of these areas after the 2006 fire seems to have improved those areas to the point where they may now at least marginally meet the standard, although additional observations would help confirm these indications.

Regarding the effects of livestock use, the rather limited information on utilization indicates that use on the broader uplands away from water and the main trailing routes would have likely been acceptable during the evaluation period; however, livestock use near water and the main trailing routes along the river and connected side drainages were likely unacceptable, at least until authorized livestock use changed with creation of the riparian pasture. The limited use periods since 2006/07 should be providing the opportunity for impaired areas to make significant progress towards meeting the Upland Standard, and also indicates that authorized livestock use is likely in conformance with the guidelines.

Devils Gate Field/Pasture

The Devils Gate Field is located at the southern end of the Devils Gate Allotment. See Map 1 in Appendix A. The western half of the pasture is mostly private land with some low mountains and dissected fans that drain westward into the North Fork of the Humboldt River. The eastern half of this field is a checkerboard of public and private lands with terrain that is flat to gently sloped fans that drain east towards the Mary River.

Water is available from a well on private lands in the east-central part of the field and at a water gap on the North Fork of the Humboldt River located on private lands in the southwest corner of the field.

The upland vegetation consists mostly of big sagebrush/grass sites; however, most of the field burned in the 2006 Gopher Fire, which killed the big sagebrush, with some reseeding with big sagebrush seed and other species thereafter. See Map 2 in Appendix A.

There is a very limited amount of information regarding specific upland vegetative conditions and livestock use in this pasture. Cattle are the only kind of livestock that normally graze in this field. Actual use reports show that part of the cattle herd would graze in this field from April to May/June and would then be moved into the Indian Creek Pasture between mid-May and mid-June to join the other cattle already there, although there were a few years when the cattle would stay in the lower Devils Gate Field and not join the cattle in the Indian Creek Pasture. Please refer to Table 3 in Appendix D for the livestock use including AUMs and periods of use.

There were only utilization observations from one year, 1977, which showed heavy use on the needlegrasses and Indian ricegrass.

GOWL-02 (DG-03) Monitoring Site

Prior to the 2006 Gopher Fire, there weren't any monitoring sites established in this field. After the fire, a monitoring site labeled GOWL-02 (now also labeled as DG-03) was established to monitor recovery of the burned and seeded area. This monitoring site is located on the southern end of the field and sits on a flat to very gently sloped area about 1.6 miles south of the well at an elevation of 5,875 feet. See Map 2 in Appendix A and photos in Appendix B.

Part of the burn area was aerially seeded with western yarrow, small burnet, and Wyoming big sagebrush. Rehabilitation objectives were established for the rehabilitation treatments and to describe the acceptable levels of recovery for the area to be reopened to livestock grazing.

The rehabilitation objectives called for a minimum of three mature (3) perennial bunchgrasses per square meter rooted firmly in the soil, and a qualitative assessment of soil and site stability, and hydrologic function, that results in ratings of none to slight departure from that expected from the same kind of ecological site considered to be in stable condition. The size of the mature bunchgrasses were to be equivalent to medium sized perennial grasses such as bluebunch wheatgrass, Thurber needlegrass, Indian ricegrass, squirreltail, and Idaho fescue sometimes referred to as tall stature grasses.

In the fall of 2008 and 2009, data were collected along with other observations to determine if the rehabilitation objectives had been met. The 2009 results were that none of the seeded species were observed growing on the monitoring site; however, the combined densities of the medium sized perennial bunchgrasses that survived the fire were 3.48/square meter (included squirreltail, Indian ricegrass, needle and thread, and bluebunch wheatgrass) which met the rehabilitation objective for grass density and, with the addition of the densities of Sandberg bluegrass, perennial forbs, and shrubs, the total plant density exceeded the minimum established for rehabilitation. Please see Table 2 in Appendix 4J for the specific density results.

Also in 2009, vegetative cover data were collected at this monitoring site using the ends of the density frame. The results from that data collection showed that total vegetative cover was

24.9% (basal cover was 4.7% and canopy cover was 20.2%). Please see Table 3 in Appendix J for the specific cover results.

In 2012, data on cover were collected again at this site under the label DG-03, using the line point intercept (LPI) method, and observations regarding the indicators of rangeland health were made as part of the effort to collect information for land health assessment (LHA). Based on observations of the upper soil profile, this monitoring site was identified as a Loamy 8-10" (025XY019NV) ecological site which, according to the current site description, is dominated by big sagebrush and bluebunch wheatgrass; however, a draft revision of this ecological site shows Thurber needlegrass would be the dominant perennial grass with bluebunch wheatgrass as a minor component. The ecological site description states that normal vegetative cover levels should be 20-30%.

The foliar cover from 2012 was found to be 48%. The perennial grasses provided half the cover (squirreltail, Sandberg bluegrass, and Idaho fescue), with an additional one-fourth of the cover by cheatgrass. Big sagebrush and rabbitbrush provided about 16% of the total cover, with the forbs (mostly Hoods phlox) providing about 12% of the remaining cover. See Table 2 in Appendix G for a summary of the cover data from 2012 and Appendix B for photos.
Both the cover data from 2009 and 2012 fall within or above the expected levels of cover.

The comments regarding the indicators of rangeland health made by the LHA team in 2012 stated there were a few water flow patterns and some pedestalling in those patterns, with the patterns being stable and short. Cheatgrass was present but mostly only in disturbed areas. The summary ratings based on the indicators were "none to slight" departure from reference conditions regarding soil stability and hydrologic function, with biotic integrity rated at "slight to moderate" departure from reference conditions because of the amount of cheatgrass present.

Vegetative production data were collected at this site in 2014 with about eighty-five percent (85%) of the vegetative production provided by the perennial grasses, most of which was squirreltail with a modest amount of Sandberg bluegrass and low level of Indian ricegrass. Cheatgrass production was only about 2%. Hoods phlox provided most of the forb production of about 11%, with rabbitbrush providing the only shrub production which was about 2%. The ecological condition was rated as early seral (15.4%) due to the loss of big sagebrush from fire, and the lack of what should be the dominant perennial grass (Thurber needlegrass). See Appendix K for a summary of the 2014 production data.

In summary for the Devils Gate Field, the density and cover data, production data, comments regarding the indicators of rangeland health, and the photos, indicate that the area is well covered with perennial grasses and forbs that are likely meeting the Upland Standard on this relatively flat site. Vegetative cover should increase as the shrubs reestablish within the area.

Although there is little information on livestock use, the more recent data and observations at this site seem to indicate that livestock impacts have been acceptable; therefore, their use appears to be in conformance with the guidelines.

References

Herrick JE, Van Zee JW, Havstad KM, Burkett LM, Whitford WG. 2005. Monitoring Manual for Grassland, Shrubland and Savanna Ecosystems, Volume I: Quick Start. :36.

Pellant, M., P. Shaver, D.A. Pyke, and J.E. Herrick. 2005. Interpreting indicators of rangeland health, version 4. Technical Reference 1734-6. U.S. Department of the Interior, Bureau of Land Management, National Science and Technology Center, Denver, CO. BLM/WO/ST-00/001+1734/REV05. 122 pp.

Toevs, G.R., J.J. Taylor, C.S. Spurrier, W.C. MacKinnon, and M.R. Bobo. 2011. Bureau of Land Management Assessment, Inventory, and Monitoring Strategy: For integrated renewable resources management. Bureau of Land Management, National Operations Center, Denver, CO.