Duck Creek BLM Allotment monitoring and analysis report
Wild Utah Project, Western Watersheds Project, Oct 2008

Updated 28 Oct 2008

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See the appendix to this report for all the figures listed in this report.
Introduction

The pages that follow describe the results of four years of monitoring of habitat and grazing use of the Duck Creek Allotment. Wild Utah Project and Western Watersheds Project in conjunction with other partners, the county, permit holders, land managers, scientists from Utah State, and other federal and state agency members have been part of a long term Rich County Coordinated Resource Management (CRM) program. Duck Creek has been the focus of attention for this community management program.

Wild Utah Project Western Watershed Project support the goals of the Rich County CRM which has promised to manage in a manner that leads to healthy ecosystems using adaptive management. In order to accomplish this, we first need to know the ecological health of habitat today. With this information, we can compare today’s conditions against those conditions that habitat should be when healthy. This comparison can then determine if under current land use, standards are met or not. When improvement is called for, management would change in a way that shifts the condition of habitat towards its ecological potential. Over time, monitoring and grazing use leads to change through an iterative process that leads to healthy habitat. These are the elements of adaptive management endorsed by the CRM and the Department of Interior.

For the past four years, Wild Utah Project, Western Watershed Projects, and others have conducted monitoring in the Duck Creek Allotment. At the end of each season (2005 through 2008), we have provided BLM and other members of the Rich County CRM with copies of our data. Any additional copies of our field work and analysis, including photographs taken on our monitoring sites, is available on request.

In some cases, BLM’s monitoring corroborates our field work. For example, BLM conducted four transects where they collected data on the productivity of plant species. Those data seem to match well and support our findings for productivity in similar sites in Duck Creek. In other cases, BLM’s monitoring does not agree with the conditions that we recorded as we conducted monitoring in the Duck Creek Allotment.

Here is a brief summary of our findings:

- For the past four years, utilization of palatable forage by livestock in many upland areas has been above the standard based on our monitoring method (the USDA inter-agency

1 http://www.richcocrm.org/HTML_pages/A_the_plan/A1_obj_ecosys.htm

Paired Plot utilization estimation method\(^3\).

- BLM’s utilization monitoring method often reports utilization that is well below the amount that we measured using the USDA inter-agency Paired Plot utilization estimation method\(^3\). BLM’s method is subjective and unverifiable. Our method is factually based and verifiable.

- BLM reports that the utilization standard in upland areas is being met.

- Riparian utilization by livestock based on stubble height monitoring by both BLM and us shows that the standards are not met in most years at most sites.

- When we compared stubble height monitoring data with paired plot monitoring that we conducted in riparian sites, we found that areas that met the stubble height standard also experienced utilization of well over 50% (often over 90%) of nearby riparian grasses and forbs.

- BLM’s records on grazing use are inconsistent with actual grazing that is occurring. BLM’s records show that reported grazing use and billed grazing numbers of AUMs often differ. Further, both billed and “actual use” numbers of AUMs sometimes are higher than the permitted number. Finally, our monitoring in the field shows that, in some cases, the number of AUMs grazed can be substantially less than reported by the permit holders and less than that found in grazing bills. As a result, BLM is unable to produce a record that accurately describes the amount of grazing that is occurring.

- For the past two years, our field monitoring has shown that BLM has begun implementing the deferred rotation grazing system called for in the EA. BLM has not provided us with a document that records the implementation of the current deferred/rotation grazing program, such as the time livestock enter a Duck Creek pasture and exit pastures. In addition to this we have not seen a record that presents the reasons for moving from one pasture to the next. This information was requested by FOIA.

- The EA promises that this deferred rotation grazing system will improve riparian habitat and springs and streams will eventually function properly. The improvement predicted in this EA for riparian areas has not occurred. Riparian areas impacts from grazing have not lessened based on BLM and our monitoring.

- This EA calls for flexible management that affects the number and timing of livestock based on a number of factors. This would require ongoing monitoring which has not occurred in the past. A second problem is that BLM does not have a written procedure that outlines condition thresholds that, when crossed, would lead to changes in management.

- Even when conditions warrant change under BLM’s flexible management, BLM has failed to act as promised. The late growing season in 2008 should have led to a delay in the turnout date for cattle but did not.

- Riparian assessments using BLM’s properly functioning condition assessment emphasize a stream’s ability to resist erosion. Because this is the only one of several standards that need to be checked, BLM’s assessment method fails to fully determine if rangeland health standards are met. Even if a stream is found to function properly under the PFC assessment method, that stream may still not meet all the standards. Wildlife needs, one of the standards, are not being met in most streams in this allotment, even in streams that
this EA reports are functioning properly.

- Upland rangeland health assessments under report degraded rangelands. By design, areas that have experienced loss of grass production and have significant amounts of bare ground, for example, are often scored to be near their best possible condition when this is not the case. The subjective nature of BLM’s upland rangeland health assessment indicators coupled with an inconsistency in using these indicators to see if standards are met makes this method biased and prone to fail to identify all impaired conditions.
- Grazing carrying capacity analysis, as defined in range science and required by the land use plan (MFP), was not conducted in this EA.
- Palatable forage production in Duck Creek is far less than that reported by BLM in the EA. We found it to be typically one third of what the EA suggested.
- We are unable to complete a range capacity analysis at this time because BLM failed to provide the information requested in our most recent FOIA. However, using current information that would over estimate carrying capacity, we have determined that the current permitted number exceeds the carrying capacity of this allotment.
- BLM’s grazing management would lead to continued habitat degradation based on applying the Grazing Response Index.
- Even if grazing is managed to be within the true carrying capacity of the allotment, riparian areas are still very likely to be over utilized in Duck Creek. We recommend that the grazing program for this allotment be designed to ensure riparian areas meet ecological standards.

Because of the collective nature of these problems, the Duck Creek allotment is experiencing grazing management that is largely disconnected from habitat conditions and actual grazing practices. Adaptive management under these circumstances is not possible. Productivity of this allotment is today impaired and the proposed management promises to continue this impairment. That, for all practical purpose, makes this impairment permanent. This degradation of wildlife habitat puts at risk not only wildlife but also the continuation of ranching in this allotment.
Grazing Utilization Monitoring Methods

Wild Utah Project - Western Watershed Project Monitoring Methods (Paired Plot Method):
Beginning in 2005, Wild Utah Project, Western Watersheds Project and Western Wildlife Conservancy began an intensive monitoring program in Duck Creek Allotment. We established range monitoring sites to assess the productivity and grazing use of nonwoody plants. Based on the federal interagency technical reference manual for utilization studies and residual range plant measures, the Wild Utah Project has established seventeen monitoring sites in this allotment to apply the paired plot method for measuring plant utilization.3

Livestock generally prefer herbaceous to woody plants for forage. As such, livestock grazing is known to decrease the abundance of perennial grasses and forbs in shrub interspaces through selective grazing on herbaceous matter.4 This in turn increases the competitive advantage for sagebrush seedlings in the interspaces, which it time can lead to increased shrub cover in grazed communities. Because livestock prefer herbaceous plants to woody plants, nearly all measures of forage utilization used by public land agencies focus on utilization estimates of grasses and/or forbs.

The paired plot method compares forage from sites protected from livestock grazing and nearby unprotected sites. Using a sample frame, grass and other non-woody plants are clipped, bagged, dried, and weighted. TR1734-3 describes the advantages and disadvantages of this method:
1) Advantage: This method is a simple and direct way of measuring utilization.
2) Advantage: Little training is required and accuracy is generally high.
3) Disadvantage: This method is time consuming, and ungrazed areas that are protected for foraging are required.
4) Disadvantage: Where periods of use are long, this method does not provide information about the cumulative production of forage plants unless the cages are moved at a short

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time interval.

5) New plots must always be established once the study plots have been clipped.\(^5\)

In addition to this, examiners are asked to identify individual species and bag clipped samples in separate bags for each species. Since site productivity and utilization was the primary data that Wild Utah Project/Western Watersheds project needed, we simplified this process by placing all grass species samples in one bag and all other herbaceous plants species clipped in another bag labeled “forbs.” Cages were placed prior to livestock entering the allotment and samples taken after cattle and horses had left the allotment. Cages were moved after sampling was conducted. For these reasons, our utilization cages met the requirements for cumulative forage production required in this method. We made the method more robust (representative of the site’s grazing use) by clipping ten unprotected (grazed) samples for each cage. In some cases, we have three cages to represent a site. The method described in TR1734-3 only requires one sample in an unprotected site.

The Rich County CRM established a monitoring committee in 2004 and a set of criteria that monitoring should follow. We applied to this committee for review of our monitoring method using the paired plot method. We also notified and received verbal permission from BLM to place monitoring sites in the allotment. The grazing permit holders were contacted and permission given by them to cross private lands in order to reach sites on BLM lands.

From 2005 to 2007, each of these plots had one utilization cage (type 5) which measured four feet on a site and three feet high. Wrapped in chicken wire, these cages normally excluded rabbits and larger grazers. These cages were placed in specific monitoring locations prior to livestock arriving to the allotment. In the Duck Creek Allotment, we placed 10 utilization cages in 2005.\(^6\)

At each site we clipped all nonwoody plants within a sample frame under the utilization cage. We repeated this sampling in ten frames outside the cage using a pattern shown in Figure 1. On five transects with headings of 0, 72, 144, 216, and 288 degrees, we placed sample frames alongside the tape at 50 and 100 foot intervals. In situations where the sample area included an inconsistent area (a road for example), then another suitable nearby site was used and the change recorded in the data sheet. This clipping occurred after cattle and horses had left the Duck Creek Allotment. Later in most years, sheep would return to Duck Creek for further grazing in the winter after we had completed our survey for that year. Because we did not account for the late


sheep grazing in Duck Creek, our utilization data are likely to under report the overall utilization that occurs.

A representative sample of these air dried bags were further oven dried to determine a calibration coefficient between air dried weights and oven dried weights. Reported analysis will be based on the air dried weights. We used a conversion factor to change grams of forage per sample frame to pounds of forage per acre. This conversion involved subtracting the bag weight from the sample and then multiplying the grams of forage by 10.67 to convert the sample to the units of pounds per acre.

In addition to collecting these forage weights, ground cover was also estimated and recorded at each frame site. In riparian areas along the riparian vegetation band near water, stubble heights of key species such as Nebraska sedge were also measured using the agency standard monitoring method.

At riparian habitat sites with utilization cages, the sampling frame locations were chosen to ensure that vegetation sampled represented the riparian site. For this reason, we sampled cages 50 and 100 feet upstream from the cage and downstream. Figure 2 shows the orientation of sampling which conforms to the stream path.

In 2007 and 2008, we added additional cages at sites in order to make our data more robust. Figure 3 shows that additional cages were placed at the ends of two transects. This has increased and today, there are 32 cages at 17 sample sites. We continued to conduct clipping samples around a central cage and each year all the cages are moved. Ten samples are taken outside the cage and now with two or three cages at that site, we have more samples inside protected cages. In riparian areas, we also added a second cage to each riparian site.

Cattle typically do not graze grass and other plants that are protected under shrubs. We wanted to know what percent of the total forage was located in protected sites under shrubs and how this affected the total range capacity analysis. In 2007 and 2008, we clipped herbaceous forage in five frames in a pattern around our cages that represented protected plants under shrubs. We also clipped nonwoody plants in five frame at sites that represented plants accessible to livestock. These plants are found in the interspaces between shrubs. We wanted to include this analysis since this factor is not accounted for in typical range capacity analysis and thus, forage production available for livestock overestimated. To help calibrate this new aspect of our forage utilization measurements in 2007 and 2008, canopy cover assessments were conducted to determine the fraction of the area that was shrub covered.

All of our data (plant weights, stubble heights, and ground cover) were compiled in a MS Excel spreadsheet. Added to this spreadsheet was information on the plant community type. For the Duck Creek allotment, soil survey soil map unit classifications were used. At each site, digital photographs were taken of the cage and one transect outside the cage. The spreadsheet also includes photo file identification for these photographs. GIS maps were also produced showing
the location of each utilization cage. Figure 4 shows the survey sites that WWP/WUP used for data collection for utilization and also BLM’s monitoring sites. Over the space of four years, our data collection has assembled approximately 1200 samples that involved nearly 1,000 hours of labor to collect. All these data collected to date are available for download from a web site described in the appeal: [http://www.box.net/shared/u5qsobjswk](http://www.box.net/shared/u5qsobjswk)

**BLM’s Upland Utilization Monitoring Method**

The ocular utilization estimation method that the BLM prefers calls for estimating the amount of above-ground biomass removed from a key plant species. Walking a transect, individual plants are examined and judged to fall into one of seven utilization categories:

- **0-5% utilization**  “the key species show no evidence of grazing use or negligible use.”
- **6-20%**  “the key species has the appearance of very light grazing. Plants may be topped or slightly used. Current seed stalks and young plants are little disturbed.”
- **21-40%**  “the key species may be topped, skimmed, or grazed in patches. Between 60 and 80 percent of current seed stalks remain intact. Most young plants are undamaged.”
- **41-60%**  “Half of the available forage (by weight) on key species appears to have been utilized. 15-25% of current seed stalks remain intact.”
- **61-80%**  “Move than half of the available forage on key species appears to have been utilized. Less than 10% of the current seed stalks remain. Shoots of rhizomatous grasses are missing.”
- **81-95%**  “The key species appears to have been heavily utilized and there are indications of repeated use. There is no evidence of reproduction or current seed stalks.”
- **96-100%**  “The key species appears to have been completely utilized. The remaining stubble is utilized to the soil surface.”

In the field, individual key species plants are observed and a dot placed in the appropriate percentage utilization categories. The resulting number of dots (counts per category) is then multiplied by the midpoint of the category. The sum of the amounts is then divided by the total counts to arrive at a percentage. This method violates mathematical analysis methods used in assessing data. The correct method that should be used to report these data would list the percent of the sample that fell in a category. For example, a correct method to interpret these data would be to say that 62% of the monitored samples were in the utilization range of 41 to 60% utilization. The reason for this is that each plant has a largely unknown utilization amount. For example if plant one was utilized 40%, plant 2 is 38% and plant 3 is 35%, then this dot averaging method would report 30% utilization when the average utilization actually is 38%.

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For this reason, it is inappropriate to average dots to create a number. The correct way to use such data is to report the most populated range and to note the deviation. Independent scientific evaluation of this monitoring method would have been likely to spot this problem.

No other information could be found on how observers could consistently score based on terms such as “skimmed or grazed in patches.” No information is offered on how in the field to consistently rank a plant as skimmed or not. The amount of the plant that needs to be removed in order for a plant to be determined as skimmed is not defined. Likewise, the term “patches” is not defined in a way that will lead to consistent data collection. The physical form that defines a grazed plant and number of plants that need to be “grazed” in order to make a patch is not defined. Does removal of part of one or more leaves on a grass bunch constitute a “grazed “ plant? Because these terms are not well defined, the observer using this method is likely to produce varying results depending on who does the survey.

The key species-ocular method that BLM uses requires that on each site a protected area be established. This requires placing a protective cage at each BLM utilization site. These are then moved each grazing season. We have visited most of BLM’s utilization sites and have yet to see utilization cages at these sites. While BLM takes photographs at most utilization monitoring sites each year, none of these photos show the presence of a utilization cage. Without these cages, it is not possible to accurately compare protected from unprotected areas. Grasses and other plants that grow under a shrub often are less well developed and not representative of grass that grows in the spaces between shrubs.

The key species-ocular method requires that for each key species, training transects be clipped, dried and weighted in order to calibrate ocular estimates with physical measurements. Based on documents supplied as a result of our FOIA request, BLM has no evidence that they follow this critical requirement to validate their monitoring method.

Advantages of the key species method are:

1) Field use is fast.
2) Vegetation is not disturbed.

Disadvantages are:

1) Cages are required at each site
2) Training and a record are required in order to affirm accuracy.
3) Interpretation of terms can be subjective.
4) Except for training record, survey observations can not be validated.

Holechek et al (2001) described BLM monitoring as using “qualitative methods” and concludes “(t)he primary concern regarding these surveys has been that they are subjective and their
reliability cannot be readily quantified with standard statistical procedures." As a result, results from BLM’s utilization monitoring are variable and unreliable in making management decisions.

At a Rich County CRM meeting in late 2007, Jim Catlin (Wild Utah Project) presented a comparison between the monitoring that BLM conducts for utilization and the results of our paired plot method. At this presentation we outlined the differences between the Ocular (“Key Species”) Utilization Method that the BLM prefers, and the Paired Plot Method, with emphasis on the qualitative interpretation of the amount of the plant used in the ocular method. If Wild Utah Project completed a survey using the key species method, our results are likely to be questioned since it is based on these subjective terms. The results of this method are observations that cannot be validated.

Upland Utilization Monitoring: Comparison of the results from the Paired Plot Method and the BLM’s Ocular Utilization Estimation Method

BLM has conducted utilization monitoring at eight sites in 2005, 2007 and 2008 using the ocular (“key species”) method of gauging forage utilization. Wild Utah Project/Western Watersheds Project (WUP/WWP) has conducted utilization monitoring at seven upland sites in 2005 and twelve upland sites in 2006, 2007, and 2008 using the Inter-Agency Paired Plot Method.

In 2005, BLM took advantage of a newly completed east-west fence to rest the northern half of the allotment. Rest was required in order to protect recent shrub treatments in the northern half of the allotment. Three of BLM’s utilization sites were in the north half of the allotment which was rested in 2005 to allow for recovery of range treatments. Five BLM utilization sites were in the southern, grazed half of the allotment.

At five of the BLM utilization sites, Wild Utah Project had either a nearby utilization monitoring site or a site with similar characteristics to BLM’s site. Figure 5 shows the location and utilization estimates measured by BLM and by WUP/WWP in 2005.

In 2005, BLM and WUP/WWP data for utilization monitoring in the rested half of the allotment showed grazing use generally below the utilization standard. BLM reported utilization was between 11-14%. Our utilization monitoring for upland areas in the north half of the allotment ranged from 10% to 53%. The high number found at our site U6 was likely caused by the late completion of the western end of the separating fence.

Also in 2005 in the grazed southern part of the allotment BLM reported that grazing use ranged from 20% to 37% in upland areas. WUP/WWP utilization monitoring in nearby sites show utilization ranged from 68% to 77% Riparian sites in the grazed half of the allotment showed utilization of 98%. Our monitoring showed that grazing use in 2005 exceeded the utilization

standard. BLM’s monitoring results showed that the standards were being met at their sites.

Table 1 presents a comparison of utilization over time in the Duck Creek Allotment. Both BLM and WUP/WWP monitoring data are presented. BLM reports that utilization is well under the required standard at each site and in each year. For the past four years we have been physically collecting measures of nonwoody plant production and comparing this with the residual nonwoody plants left at the end of grazing season. Our data show that in most years, grazing utilization exceeds the standard by a significant amount.

### Table 1 Upland Utilization Monitoring, Duck Creek Allotment

<table>
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<tr>
<th>Upland Site</th>
<th>Sites</th>
<th>meters between</th>
<th>2005 BLM</th>
<th>2006 BLM</th>
<th>2007 BLM</th>
<th>2008 BLM</th>
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<tr>
<td>DC 1</td>
<td>U8</td>
<td>133m</td>
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<tr>
<td>DC 2</td>
<td>U6</td>
<td>256m</td>
<td>STLE 16% POA 12% rested</td>
<td>53% rested</td>
<td>65%</td>
<td>STLE 26% POA 25</td>
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<tr>
<td>DC 3</td>
<td>U9</td>
<td>487m</td>
<td>STLE 12% rested</td>
<td>27% rested</td>
<td>20%</td>
<td>STLE 11% PONE 8% AGSP 12%</td>
</tr>
<tr>
<td>DC 4</td>
<td>na</td>
<td></td>
<td>STLE 13% POA 17%</td>
<td></td>
<td>STLE 34% POA 32%</td>
<td>STLE 28% POA 20%</td>
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<tr>
<td>DC 5</td>
<td>U1</td>
<td>134m</td>
<td>AGSM 18% AGSP 21%</td>
<td>77%</td>
<td>67%</td>
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<tr>
<td>DC 7</td>
<td>U2</td>
<td>256m</td>
<td>PSSP 17% POA 23%</td>
<td>75%</td>
<td>73%</td>
<td>PORE 32% AGSM 30%</td>
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<tr>
<td>DC 8</td>
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<td></td>
<td>POA 31% PSSP 30%</td>
<td></td>
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<tr>
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<td>U3</td>
<td></td>
<td></td>
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<td>50%</td>
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<tr>
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<td></td>
<td>40%</td>
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<td></td>
<td></td>
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<td>80%</td>
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</tr>
<tr>
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<td></td>
<td></td>
<td>62%</td>
<td>79%</td>
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The marked differences between the utilization rates determined by the BLM and our method at the same or adjacent monitoring sites raises profound questions on the validity of BLM’s qualitative and subjective utilization method.

Good grazing management should lead to no site exceeding the utilization standard. Using an average of various utilization rates, which is what the BLM often does in environmental analyses, can lead to large numbers of areas exceeding the standard allowed for utilization. The overall average utilization for all of our upland sites is 52% for utilization of forbs and grass. This hides the important information that eight of our fifteen sites were over the standard. More importantly five of these sites were over 80% utilization in upland areas. If one site shows that utilization for even one species is over the standard, then management actions is required in order to prevent degradation of that site.

This EA makes the case that increased water sites and distribution will lead to a more uniform grazing use across this allotment. Based on our four years of data, this appears not to be the case. We found that for this allotment, there is not a correlation between grazing utilization and distance to water. Figure 6 show the distance from water verses utilization for upland sites. Some upland sites close to water show high use and others low use.

Perhaps the most important part of our research is the finding that grazing utilization appears to be correlated with site productivity. Low productivity sites show little use while, during the same period, high productivity sites show high grazing use. Figure 7 shows the correlation of utilization with site productivity. To the best of our knowledge, this is the first time such a study has been conducted.

This is an allotment that, for arid lands, has a number of water sources. This allotment has six streams totaling 3.45 miles in length and 29 spring/wetland areas that total about 39 acres in the allotment. These are distributed throughout the four pastures. 95% of the lands in this allotment are within 1.5 miles of an existing surface water source. In an allotment like this there appears to be a correlation between low productivity and low utilization and high productivity and high utilization.

For an allotment with this availability of water, our findings conclude that the best way improve the distribution of cattle to promote uniform utilization is to increase the productivity of all sites to their potential.

Grazing practices are contingent on utilization being below the standard. If the BLM finds
utilization to be above the standards, then grazing practices need to change to reduce the utilization to below the standard. If the monitoring method fails to report accurately the true amount of utilization, the right management decisions can not be made. For this reason, we ask that BLM apply our data and methods in making future decisions.

Figures 6 and 8 display maps for 2005 and 2008 that show the location of BLM’s utilization monitoring sites and our sites. These maps also display the utilization for forbs and grasses at our sites. On BLM sites, we average the utilization for the key species at each site and the map displays that average. In 2005 cattle and sheep mostly grazed in the southern half of the allotment. While the actual use reports and billing shows that full use of AUMs was claimed to be grazed, conversations with the permit holder indicated that several hundred cow/calf pairs less were grazed by moving them in that year to another allotment.

In 2008, we conducted a census on livestock use of the allotment and found that just over 800 AUMs were grazed while the billing records showed that slightly higher than the permitted number were grazed on BLM permitted lands in Duck Creek. The utilization shown in Figure 8 for 2008 showed that a number of sites had grazing under the 50% utilization standard. However, this map also shows that 7 upland sites exceeded the standard and all riparian sites showed grazing utilization higher than 90%. The 62% reduction in stocking levels of AUMs in 2008 did show some improvement over earlier years but no improvement was seen in riparian areas.

**Riparian Utilization**

The EA justifies changes in range management primarily to improve riparian areas. Page 13 of the EA lists a number of springs and streams that fail to meet standards, many because of livestock grazing. The utilization standard for riparian areas presented in the EA is 50% for non-woody plants.

BLM has not conducted utilization monitoring in riparian areas. Instead, they have adopted a stubble height standard usually applied to a key species such as Nebraska Sedge. The unwritten assumption BLM makes is that if the stubble height standard is met, then the utilization standard is also met.

In a 2006 memo, BLM reported stubble heights of sedges in two creeks in the Duck Creek allotment. This monitoring effectively measured grazing use that occurred in 2005. The survey was conducted in early April prior to livestock turnout thus taking advantage of post grazing season regrowth. According to BLM, stubble height within an ungrazed exclosure on Duck Creek showed that sedge height averaged 12 inches. Stubble height of sedge in the grazed area of this stream averaged “just over 2 inches” high well under the standard. In the south fork of Sixmile Creek, the average stubble height of sedges was 2 inches in the surveyed areas. In Sixmile Creek, grasses were used for stubble height measurement and BLM claimed ranged from

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9 Memo to Mike Gates from Tyler Staggs, 11th April 2006, “Duck Creek Stubble Height Report.”
2 to 12 inches high with an average of 8 inches. This memo noted, “There appears to have been little use of this riparian area during the past grazing year. This is most likely due to the active riding that was conducted by the permittees to protect the seedings on nearby private lands.”

In grazed pastures, BLM’s stubble height findings were similar to those measured by WUP/WP along those same creeks. Nebraska sedge average stubble heights ranged by site from 2.3 inches to 1.7 inches. In the pasture that was rested in this year, stubble height for sedge was measured at 6.4 inches. Nebraska Sedge in the exclosure on Duck Creek averaged 23 inches high.

At the end of grazing season in 2006 WWP/WUP measured stubble height in three locations. Stubble height in Duck Creek averaged 4 inches high (WUP site U5). In south fork of Six Mile Creek (U10), sedge stubble height averaged 3 inches high. On Six Mile Creek (U7) the measure also averaged 3 inches high. These measures are close to the utilization standard requiring the key species to be 5 inches high or higher.

Using our paired plot monitoring for these same riparian sites, we measured riparian green line vegetation consumption. At site U5 in 2006, utilization was 79%. At U7 utilization was 84%. At U10, utilization was measured as 73%. All of these levels exceed the 50% standard for riparian areas.

In 2007, stubble heights were measured on Duck Creek (two sites near U5) and found to average 3 inches high. Site U7 measured 3 inches high and site U10 measured 3.1 inches high. Our paired plot utilization monitoring found for U5 96% utilization, for U7 91% and for U10 96% utilization. This is significantly over the allowed utilization.

In 2008, the stubble height monitoring that we conducted in the same sites as in 2007 showed that utilization was more than the standard allowed. See John Carter’s report for riparian monitoring in 2008.¹⁰

One of the chief goals of this grazing decision for Duck Creek is to improve the condition of riparian areas by reducing grazing utilization in these areas. In 2007 and 2008, BLM grazed Duck Creek in a four pasture rotation system. Based on the utilization found in riparian areas in 2007 and 2008, the deferred/rotation grazing system has not showed any improvement in grazing utilization in riparian areas.

Our comparative studies of stubble height monitoring and pair-plot utilization monitoring show that Nebraska sedge, an increaser, is not an appropriate monitoring species for riparian grazing utilization. What is very troubling in that while height of some sedges are close to the standards, utilization of riparian grasses and forbs nearby are no where near meeting that standard. Other researchers have found similar results to us. For example, Kentucky bluegrass can reach one

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inch or less while still allowing Nebraska sedge to meet the standard for height. Hall and Bryant (1995) report that Kentucky blue grass can be grazed to a height of 3/4 inch and “less desirable sedges are essentially ungrazed.”

Grazing Practices

The combination of information on the condition of habitat, how much is being grazed (utilized) and the AUMs and season of use of livestock is critical in order to evaluate and manage livestock grazing. In this section, we discuss grazing practices and how the number of grazing animals are recorded. The EA does not provide any information on the history of grazing use in this allotment. Reported grazing use from “actual use reports” is not compiled. As a result, it is not possible from this EA to determine precisely what grazing practices were in place before the decision.

This section supplements information in the EA to describe past grazing use by summarizing BLM’s records and providing the results of our field surveys.

Grazing use records

The grazing period in Duck Creek for cattle and horses is supposed to be 117 days (the 10th of May through the 7th of September) and the number of livestock that permitted to be grazed is 400 cow/calf pairs and 14 horses and 765 sheep with lambs. Sheep graze in an additional period the late fall and early winter.

Agency records provide two sources of information. The first is the billing record that for each permit holder shows the time grazing is predicted to occur and number of livestock expected to graze. This bill is issued and paid prior to the grazing season starting. The second record is created two weeks after the end of the grazing season. This post season record (referred to by BLM as the Actual Grazing Use Report) is partly completed by the permit holder and partly by BLM. The permit holder records the date kind, and numbers of livestock that entered and exited the allotment. BLM then uses these entries to calculate the number of AUMs of grazing that took place. At the bottom of the page on BLM’s actual grazing use report (Form 4130-5, Nov 2004) the following is printed, “Title 18 USC 1001 makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious, or fraudulent statements or representations as to any matter within its jurisdiction.”

BLM has provided us with a number of the billing and Actual Grazing Use reports for the Duck Creek Allotment. These records identify information by each grazing permit authorization number and cover the grazing use by each of the permit holders in Duck Creek. We have summarized the total number of AUMs that were billed and paid for in Table 2.

On the 24th of June, 2008, Jim Catlin and Larry Swanson conducted a survey of the distribution and number of grazing livestock in the Duck Creek Allotment. This is a grazing allotment where all livestock are viewable from the air. Circling the allotment at an altitude of 1,000 ft above the ground, we made four separate passes noting the location and number of mature cows and horses. These were marked on a map and then entered in our GIS system. No sheep were seen. Later in September, no sheep were seen in the allotment as field data collection was...
On the fly-over, JC and LS reported ten pairs of cows/calves were in Pasture 1 and six pairs were in Pasture 3 and the rest were in pasture 2. The total number counted was 209 cow/calf pairs and 2 horses. Assuming that these livestock were in the allotment in all of the grazing season, grazing use in the four pastures would have totaled about 815 AUMs in 008. In 2008 no sheep grazing took place. During the year, we had teams in the allotment at a number of times and no sheep were seen to use the allotment.

Table 2  AUMs for grazing use in the Duck Creek Allotment

<table>
<thead>
<tr>
<th>Grazing use, AUMs</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Billed AUMS</td>
<td>2,734</td>
<td>3,318</td>
<td>3,319</td>
<td>3,319</td>
</tr>
<tr>
<td>Reported grazing use*</td>
<td>2132</td>
<td>2,445</td>
<td>1915</td>
<td>pending</td>
</tr>
<tr>
<td>Permitted number</td>
<td>2,134</td>
<td>2,134</td>
<td>2,134</td>
<td>2,134</td>
</tr>
<tr>
<td>WUP Surveyed grazing use</td>
<td>2,305</td>
<td></td>
<td>815</td>
<td></td>
</tr>
</tbody>
</table>

*The actual use reports are incomplete and in some cases information missing. The row on reported grazing use in Table 2 may change if better information becomes available.

In 2006, on the 26th of June, we conducted a similar over flight to count and locate where cows were grazing in the Duck Creek Allotment. We counted 471 mature cows and horses. Most of the cattle were located in Pasture 1, the northwest pasture. There were significant number of cattle in Pastures 2 and 3. The few horses present were in Pasture 2. The permit calls for 400 cow/calf pairs and 14 horses to be allowed to graze.

If we make a few conservative assumptions, we can estimate the number of AUMs that were grazed in 2006. First we assume that the number we counted in our survey in 2006 were present for the full grazing season. Second, we assume that the full number of sheep was grazed that year. Sheep were seen to graze in 2006 in Duck Creek Allotment but not counted by us.

The problem is compounded by the absence of records on grazing use for specific pastures. BLM’s actual use reports and the billing records have provisions to collect this information. However, this is absent from all the records that BLM has provide us. While the actual grazing use report offers opportunity to keep this record, pasture rotation information has not been collected for this allotment. The absence of information on pasture rotation is a common problem in many allotments.

Not accurately knowing how many cattle graze and when they graze becomes a serious problem. It is not possible to evaluate the performance of grazing practices if BLM records don’t describe what took place. Therefore, in our remedy, we ask BLM to periodically survey grazing use, and record this use in the field keeping records of numbers and locations. We further ask that BLM require that the actual grazing use reports are accurately completed, submitted on time, and
If our analysis is correct, we can conclude from these records that BLM has, at least once, billed more than the grazing use reported. If this is correct, permit holders may be entitled to a refund.

**Rotation/Deferred Grazing System**
This EA proposes to establish a four pasture rotation/deferred grazing program. For the past two years, BLM has had four pastures in the same configuration that the EA decision proposes as a solution in order to improve riparian conditions. Several years ago, a six pasture system was suggested that would provide rest once every six years for one pasture and grazing at different times in each of the other five pastures. BLM has not provided analysis to show in an analytic way how each of these grazing systems differ from each other and with the original grazing system when the allotment was one pasture.

In practice, grazing has been deferred and rotated among the four pastures during 2007 and 2008. Data collected in 2007 and 2008 reflect conditions after the new rotation/deferred grazing program was in effect. Based on two years of this new grazing system being in place, we should now be seeing improvements promised in the EA.

BLM has not offered proof that the changed grazing system proposed in this decision would lead to improvement of the range or meet required goals. The preponderance of evidence generated from grazing experiments over the past 60 years has consistently indicated that rotational grazing is not superior to continuous grazing on rangelands (Briske et al. 2008). 

As mentioned earlier in the riparian utilization section, riparian utilization exceeds standards in the deferred rotation system even when the stocking number is reduced significantly.

**Range Readiness, Timing of Livestock Turnout.**

Page 3 of the Notice of final decision for Duck Creek states, “(l)ivestock grazing will occur with flexibility to make changes in response to conditions and challenges on the allotment as they arise.” On page 4 and 5, BLM states, “(m)ovement from one pasture to another would be authorized to occur either on the specified dates, when specific idealization levels suggest the need or considering climatic conditions. Move dates would be adjusted by the authorizing officer in consultation with the permittees to balance use between pastures when monitoring indicates the need. Inflexible adherence to any type of rotation schedule may inevitably lead to over grazing by not matching the utilization with the growth rates and needs of the plants on any particular year.”

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climatic conditions warrant more or less than scheduled time in a pasture to benefit proper resource management and prevent overgrazing, then prior authorization must be requested and approved by the authorized officer when flexibility is required.”

Determining when to start grazing is a critical factor that can influence habitat condition over a longer period of time. Starting grazing too early reduces plant leaf area for photosynthesis that is needed to replace carbohydrates depleted over winter and during green up. Plant vigor is reduced, stands are thinned, total forage production is lowered, and disease, insect, and weed infestations are increased. Pastures and range damaged by grazing too early may take several years of rest before the stand regains productivity (Frank et al. 1993).

The need to pay special attention to range readiness has been long known. Smith (1936) found that premature grazing was one of the foremost causes of range deterioration. Grazing the first blades of grass produced by the plant exhausts the plant’s reserves too quickly and can have serious repercussions on the long-term viability of the plant. Hedrick (1958), who also studied range readiness, concluded that Agropyron inerme were ready to graze when about 35% of their total weight had developed which occurred when this species was 10 inches high.

BLM claims that range readiness occurs on the 10th of May in a typical year. There is no supporting justification for this determination. The MFP for this allotment requires grazing to start on the 26th of May for allotments that lack a signed allotment management plan. Duck Creek does not have a signed allotment management plan.

Even if we assume that plant growth will reach range readiness for grazing on the 10th of May on most years in Duck Creek, when the growing season is delayed due to prolonged cold, grazing should start later. These are exactly the climate conditions that justify a change in grazing practices described in BLM’s call for flexibility. It just so happens that these conditions were met this year. In 2008, the cooler temperatures delayed plant development by two weeks.

Evidence on the ground verified that this was the case. Cattle entered the Duck Creek Allotment in 2008 on the date set in the grazing permit, on the 10th of May. One the 26th of May, John Carter and Bob Edwards visited this allotment and took measurements of the height of grass in a number of locations. Even sixteen days after cattle had entered this allotment, grass still was in its early growth stage, and thus not range ready. Grass was below a standard needed for Sage Grouse brooding and also had not reached Haun growth stage 3.5.


In a report BLM argued that the height of grass was higher than we measured and the range ready for grazing.\textsuperscript{17} However, BLM has not been able to produce any document that describes how they determine range readiness and the scientific studies that justify their choice. For this reason, BLM’s choice on range readiness appears to be arbitrary.

There are methods that provide a consistent means for determining range readiness. Range scientists have developed methods that apply to the key species of interest and can be used in areas like Duck Creek. Scheduling the start of grazing based on stages of plant development is the most reliable method\textsuperscript{18}. This approach takes into account the difference in weather from one year to the next.\textsuperscript{19}

Frank et al. (1993)\textsuperscript{20} also recommends that range readiness (when grazing starts) should not be based just on the height of the plant since this is location specific but rather on the stage of the development stage of the plant. They commonly use the Haun plant development stage scale.\textsuperscript{21} They recommend that range readiness is reached when the grass plant has three fully developed leaves and a fourth is half as long as the third. This growth stage is Haun 3.5.

Frank and Hofman (1989) have developed a method to estimate when growth stage 3.5 is reached for grass species based on temperature information. Plant growth correlates well with an estimate of the growth degree days which is the sum of the daily average temperature above 40 degrees accumulated during the growing season. For needlegrass this stage is reached with 1209 growth degree days.\textsuperscript{22} We have provided BLM with this information and suggested that they consider using this method in determining range readiness in Duck Creek. We have not had a reply to our request.

The 2008 BLM EA for Duck Creek states “The potential plant or vegetative growth period for the Duck Creek allotment is approximately May 1 through October 15 (168 days), this is the time period in which the average temperature is above 40 degrees F. The allotment is used from May 10 through Sept 7 and also from Sept 20 through Oct 15 during this potential plant growth

\textsuperscript{17} Tyler Staggs. 2008. Memo to the Duck Creek File, range conditions on Duck Creek, 15 May 2008.


\textsuperscript{19} http://www.mda.state.mn.us/protecting/conservation/harvest.htm


period.” May 1st to October 15 is actually 165 days.

Using the growth degree days’ method, we assessed range readiness for Duck Creek in 2008. For the Duck Creek Allotment we used the weather station records from the nearest long term site located in Randolph, Utah about nine miles south of the Duck Creek Allotment. Randolph is a few hundred feet lower than the most of and Duck Creek Allotment. Thus, temperatures in Duck Creek might even be cooler than at Randolph and thus the range readiness might be even a few days later that it would be at Randolph. Randolph’s weather site has 30 years of data and reports that, average temperature of 40 degrees Farheit occurs typically on the 15th of May, two weeks later than BLM indicates in the EA.

Using these weather data, we calculated the growth degree days for average conditions and then compared this with 2008 data. The growth degree day, based on 30 years of temperature data, typically reaches 320 on the 10th of May. In 2008 it did not reach this growth degree day value until the 18th of May in 2008, almost a week late. Figure 9 describes the average expected growth degree days and that found in 2008 for the weather station at Randolph, Utah, the nearest weather station to Duck Creek.

A growth degree day value of 320 is too low for most native grasses to be ready for grazing. For example, needlegrass requires a growth-degree-day total of 1209 to be at Haun growth stage 3.5. In Duck Creek this growth-degree-day total is typically not reached until mid June.

The accumulated growing degree days for tall fescue is:

<table>
<thead>
<tr>
<th>Development stage</th>
<th>GDD</th>
</tr>
</thead>
<tbody>
<tr>
<td>second leaf fully elongated</td>
<td>186</td>
</tr>
<tr>
<td>Third-lead fully expanded</td>
<td>312</td>
</tr>
<tr>
<td>forth-leaf fully elongated</td>
<td>517</td>
</tr>
<tr>
<td>boot emergence/post emergence</td>
<td>825</td>
</tr>
<tr>
<td>Stamen emergence (flowering)</td>
<td>1168</td>
</tr>
<tr>
<td>Seed harvest</td>
<td>1688</td>
</tr>
</tbody>
</table>

Other range scientists recommend that longer term grazing (where the grazing duration is one or more months long) not begin until the grass has produced seed. This is after the boot stage of growth and requires higher GDD scores than Frank (1989) uses. The boot stage is where the plant concentrate on seed head production. The boot stage is defined as the time when the seed head is enclosed within the sheath of the flag leaf. Frank et al call for grazing earlier in the transition phase.23

BLM’s 2008 decision calls for changing management based on several factors. One of those are

23(http://forages.oregonstate.edu/projects/regrowth/main.cfm?PageID=12
precipitation and temperatures that affect plant productivity. In 2008, the growing season began late due to a prolonged winter temperatures. The growing season was significantly delayed. We also argue that BLM has not applied the best available knowledge on range readiness. There appears to be a documented method on how they analyze conditions and arrive at a consistent determination when change is needed.

As evidenced this year, there appears to have been a need for response yet none was made by BLM. Grazing started at the time allowed in the permit.

Because BLM lacks a process to determine range readiness and when faced with a significant need to act, they have not applied the flexibility promised. This flexibility requires an ongoing field presence to monitor utilization levels, plant growth conditions, and other factors several times a month. In the past, BLM only conducts utilization monitoring once a year. Many years only see utilization monitoring every other year. The management flexibility BLM requests requires continuous ongoing monitoring that, we believe, will not occur often enough. BLM has not showed any document that shows they are increasing monitoring that is called for in this EA. For these reasons, the flexibility in management promised in the decision is unlikely to lead to improved conditions.
Riparian Assessments, Proper Function Condition Assessments

Many of the streams and springs in the Duck Creek Allotment are heavily impacted as a result of grazing. Some areas appear to be pockmarked with numerous hoof-sized holes thereby eliminating the historic channel. Native riparian plants expected on these sites are often replaced with an exotic grass, Kentucky bluegrass, which is tolerant of heavy grazing. Nebraska sedge, an increaser in heavily grazed areas, is often more prevalent than expected. Woody riparian plants, such as the expected willows, are only found in the form of a few very old plants, and are not regenerating.

The policy for Utah requires that BLM maintain and restore where needed riparian areas to properly functioning condition.24 For lotic riparian areas (flowing streams), BLM applies Technical Reference 1737-15.25 This Technical Reference defines “functioning properly” in a very narrow manner. A proper functioning stream is one that can resist excessive erosion during high flow events.26 27 To assess this resistance to erosion a number of characteristics are assessed, most of which are tied back to examining erosion.

Controlling erosion is extremely important and this assessment method is a value to management for identifying this need. However, PFC assessments described in TR 1734-9 do not determine if a stream meets all of BLM’s rangeland health standards.28 Standard 2 of the Rangeland Health Standards for Utah requires that streams be “capable of withstanding high stream-flow events.” The PFC assessment method does address whether this standard is met for the indicated values found in a) c) and d) of standard 2.

However, these rangeland health standards layout other requirements that are not assessed by the PFC assessment process. Under Standard 2 for riparian and wetland areas, additional indicators are required to be assessed in order to see if the standards are met. Standard 2 b) requires vegetation that reflects the “desired plant community or riparian and wetland soil moisture characteristics, diverse age structure and composition, high vigor, large woody debris when site potential allows, and providing food, cover and other habitat needs for dependent animal


26Ibid, page 5, 6,


species.” These are eight additional indicators not covered by PFC assessments.

PFC assessments also do not evaluate whether Standard 3 (maintaining populations of desired species). Standard 3 requires that frequency, diversity, density, age classes, and productivity of desired native species are adequate to maintain native threatened, endangered and special status species. These species include a range of plants, insects, fish, amphibians, and others. PFC also does not assess whether standard 4, tied to state and national water quality standards, is met. These standards include metrics relating to human health and also to meeting the needs of wildlife. Water temperature is a critical factor for cold water fisheries and a water quality standard.

Streams that are found to be functioning at risk do not meet rangeland health standards. However, streams that are found using TR 1737-15 to be functioning properly may or may not meet rangeland health standards. Additional assessments are needed in order to ensure all the standards are met.

Even within the limited function of a stream’s resistance to erosion from high flow, the PFC assessment process has proven to be inconsistent and arbitrary in making a determination of proper function or not. Several reasons explain this. The first reason for this inconsistency in making assessments is that this process calls for a comparison of a section of stream with conditions that represent this site at its ecological potential. Such sites at or near their ecological potential are extremely rare. As a result, the observer performing the assessment lacks a good example of what a stream should be like.

The second reason that PFC assessments are often inconsistent is because the questions that are asked of stream conditions are the result of personal value judgments that are not verifiable. Here is one example. Question 1, “floodplain above bankfull is inundated in relatively frequent events” calls for a yes or no answer. For downcut streams, this is often interpreted to mean that the current narrow green verge at the edge of the stream represents the true flood plain. When in actual fact, the downcut stream no longer can reach the true flood. Down cut streams lower the water table with a resulting change of vegetation from wide riparian meadow to valley sagebrush. The impact of downcutting is sometimes not correctly captured by many who use this tool.

Most of the questions call for professional judgment and, in the absence a factual standard or reference for comparison, and the answers given in the PFC assessment can not be verified. Here are a few terms that lead to subjective interpretation: “contribution . . to degradation”, “relatively frequent events”, “in balance” with the landscape setting, “diverse age-classes” “high vigor”, and “adequate source of woody material.” Terms such as these are opinions that can not be assessed against a common standard. The PFC assessment technical reference and associated agency training do not offer a method for consistently answering questions with these subjective terms. As a result, assessment surveys differ depending on who conducts the survey.
Once each question is answered, the final determination if the stream is function properly depends on a “preponderance of evidence.” There is no guidance on how to use the information in order to reach a determination that a riparian area does or doesn’t function properly. A stream can have most questions answered no (habitat problems) and be found to function properly. Streams can have only one question show a problem and two be “tweeners” (half way between yes and no) and be found to not function properly. Duck Creek DCr1A is an example of this.

The lack of reference conditions for comparison leads to many observers viewing today’s degraded conditions as the norm. The subjectivity of PFC assessments generally leads to fewer impacted streams from being determined as functioning at risk.
Rangeland Health Assessments, Rangeland Standards

BLM is required to determine if rangelands (habitat) meet rangeland health standards. If the site does not meet standards and grazing is a factor, then range management changes are called for to lead to change that will make habitat meet the standards.29

BLM uses the Technical Reference 1734-6 *Interpreting Indicators of Rangeland Health* to determine if rangelands meet BLM Standards for Rangeland Health. This Technical Reference calls for a systematic process that assesses eighteen indicators that determine whether the rangeland health standards are met.

Indicators are assessed by comparing the site to conditions in a reference site. The preferred reference site is one that is similar to the survey site and close to the ecological conditions that were found in presettlement times. Ecological Site Descriptions produced by NRCS are also recommended to describe habitat conditions at or near their ecological potential. NRCS uses the term historic climax plant community to describe ecological conditions in presettlement times.

In making this comparison, the surveyor then gives an indicator a score of 1 to 5 to signify the “degree of departure (of the surveyed site) from (the) ecological site description and/or ecological reference area.” One of the indicators is the amount of bare soil. A site in the best condition would score a 5 (none to slight departure) because the “amount and size of bare areas nearly ... match that expected for this site.” For a score of 3 (moderate departure), “bare areas are of moderate size and sporadically connected.” The score of 1 (extreme departure) would have bare areas that “are large and generally connected.”

Terms such as “moderate sized” and “large” are without units and open to subjective interpretation. One of the most serious problems is that there are often no adequate reference sites and even the ones that exist are in less than ideal condition. Because this method calls for a comparison, the absence of a good reference has lead to inconsistent interpretation and has been a serious problem.

Duck Creek’s rangeland health assessments offer a good example of this problem. We will use one site to explain the nature of this problem but these problems are common to most of the rangeland health assessments for this Allotment. Figure 10 presents a photograph that was taken in 2008 at the location of Rangeland Health Assessment site DC-1. This photo shows that there is active and recent pedestaling. Bare ground, which occupies most of the interspaces between shrubs, has exposed soil thus leading to erosion, and now one or more inches of topsoil have been lost. Litter is largely absent except under shrubs. The second photo in Figure 11 shows what this site should be when at its potential. This reference photo shows sagebrush habitat in an

area that only sees livestock grazing for one week a year.

BLM applied the methods found in TR 1734-6 and found this site, DC-1 had a score of 5 (no departure from reference conditions). Table 3 shows how BLM’s resulting score for this and one other site.

The BLM in Utah needs to follow the Utah Standards and Guidelines for Healthy Rangelands\textsuperscript{30} to see if rangeland health standards are met. These standards offer some measurable indicators that must be followed when making determinations that the standards are met.

For upland soils, standard 1 requires the following indications:

a) sufficient cover and litter to protect the soil surface from excessive water and wind erosion, promote infiltration, detain surface flow, and retain soil moisture loss by evaporation.

b) The absence of indicators of excessive erosion such as rills, soil pedestals, and active eroding gullies.

c) The appropriate amount, type and distribution of vegetation reflecting the presence of (1) the desired plant community, where identified in the land use plan, or (2) where the desired plant community is not identified, a community that equally sustains the desired level of productivity and properly function ecological conditions.

Duck Creek DC-1 site does not meet standard 1 as shown in photo 1. When compared with a site at its potential, excessive erosion, insufficient litter, and loss of nonwoody plant productivity, especially grasses, describes conditions that mean that this site does not meet standards.

By careful design and subjective field assessments, rangeland health assessments can become biased and thus fail to accurately report whether habitat meets rangeland standards or not. The bias in the scoring of indicators and its application by range management staff leads to assessments that failed to identify many areas that in actual fact do not meet rangeland health standards.

Table 3 below summarizes all the indicators used in making rangeland health assessments and the resulting scores for two sites in Duck Creek. The right most column describes measures that could be taken in making this assessment. BLM rarely makes these measurement and normally uses subjective interpretations to arrive at an indicator score.

### Table 3. Upland Rangeland Health Assessment Scores for Duck Creek

<table>
<thead>
<tr>
<th>Rangeland Health Assessment</th>
<th>DC 8</th>
<th>DC-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qualitative Indicator</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>1. Rills</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>2. water flow patterns</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>3. pedestals and or terracettes</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>4. bare ground</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>5 gullies</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>6. wind-scoured, blowout . . .</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>7. litter movement</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>8. soil surface resistance or</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>9. soil surface loss or degradation</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>10. plant community composition</td>
<td>4</td>
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<tr>
<td>11. compaction layer</td>
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<tr>
<td>12. functional/structural groups</td>
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<tr>
<td>13. plant mortality / decadence</td>
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<td>5</td>
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<tr>
<td>14. litter amount</td>
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<td>15. annual production</td>
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<td>16. invasive plants</td>
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<tr>
<td>17. reproductive capability of</td>
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</tr>
<tr>
<td>Reference sheet (Appendix 2) required</td>
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</tbody>
</table>

Figure 10 shows a photograph that gives you a quick snapshot of the characteristics of this site. As the photo shows, pedestals and terracettes are evident and as much as an inch of soil recently lost. The TR 1727-6 evaluation matrix offers this description that most matches these conditions, “moderate active pedestalal; terracettes common, some rocks and plats are pedestalal with occasional exposed roots.” This would receive a score of 2 for moderate to extreme departure from the reference sheet. As you can see, BLM reported this indicator as a 5.

A number of other associated indicators at this same site likewise should have been scored lower. Had an independent survey team conducted this survey and followed the procedure as intended, this site would have been found to not meet rangeland health standards.

By design, BLM has been making an effort to even further weaken this assessment method’s ability to accurately identify the condition of rangelands. Over time, BLM has updated the
Technical Reference 1727-6 to make more areas meet standards. In the 2000 version of this reference, each indicator had a table that described the conditions that qualified a site score. In the 2005 version, this direction was removed and no help is offered in this later version on how to consistently score. As a result, more recent rangeland health scores are inconsistent.

In one case, the 2005 version retains a table indicating how to score for bare ground. The 2005 version added information indicating that large areas of bare ground are more acceptable. This change (revision) leads to under reporting habitat problems. A comparison of these two versions of TR 1726-6 is shown in Table 4.

Table 4  Comparison of the 2000 and 2005 editions for Indicator 4 in TR 1726-6

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>None to slight (5)</td>
<td>Amount and size of bare areas nearly to totally match that expected for the site.</td>
<td>20-30% bare ground; bare patches should be less than 8-10” diameter and not connected; occasional 12” patches associated w/shrubs. Larger bare patches are associated with ant mounds and small mammal disturbances.</td>
</tr>
<tr>
<td>Slight to moderate (4)</td>
<td>Slightly to moderately higher than expected for the site. Bare areas are small and rarely connected.</td>
<td>30-45% bare ground. Bare spaces greater than 12” diameter and rarely connected. Bare areas associated with surface disturbance are larger (&gt;15”) and may be connected to other bare patches.</td>
</tr>
<tr>
<td>Moderate, (3)</td>
<td>Moderately higher than expected for the site. Bare areas are of moderate size and sporadically connected.</td>
<td>45-60% bare ground with much connectivity especially associated with surface disturbance. Individual bare spaces are large and dominate the area.</td>
</tr>
<tr>
<td>Moderate to Extreme (2)</td>
<td>Moderately to much higher than expected for the site. Bare areas are large and occasionally connected.</td>
<td>60-75% bare ground. Bare patches are large (&gt;24” diameter) and connected. Surface disturbance areas becoming connected to one another. Connectivity of bare ground broken occasionally buy contiguous ground cover.</td>
</tr>
<tr>
<td>Extreme to total (1)</td>
<td>Much higher than expected for the site. Bare areas are large and generally connected.</td>
<td>Greater than 75% bare ground with entire area connected. Only occasional areas where ground cover is contiguous, mostly patchy and sparse.</td>
</tr>
</tbody>
</table>
Based on review of likely reference sites, site DC-1 should have almost no bare ground. See Carter’s report on reference site surveys along Highway 30 inside the highway fence protected from grazing. Litter coupled with plant cover are expected for sage step communities like this to cover almost all the ground.

The updated guide rightly identifies mammal and insect causes for bare ground should not warrant a reduced score for the site. However, the amount of bare ground now expected at even sites near their potential leads to sites with high scores (5) when there are serious problems with soil loss due to excessive bare ground.

If you compared Duck Creek site DC-1 with a sagebrush community near Twin Creeks, you would see that Site DC-1 has bare areas that occupy most of the inter space between shrubs, are of moderate in size, and are often interconnected with other bare areas. If you use the 2000 version of TR 1736-6, you should chose a score of 3 (moderate departure from reference conditions). However if you use the 2005 version, a score of 5 (no to slight departure) would be justified because the bare ground cover is 16% for this site.

Some of the qualitative indicators miss key habitat problems by lumping plants at risk with invasive and increaser plants. Indicator 15, Annual Production, compares the current standing crop of native, exotic, woody, and nonwoody plants against a reference area. Even when objective measurements are made in the field, this indicator often misses serious plant community productivity loss for shrub communities.

Page 56 describes the process to determine ecological site condition. This is based on a comparison by production of each individual species against a reference community. For this EA, BLM used NRCS ecological site descriptions to provide the list of expected species and their amount of annual production.

One example demonstrates the problem with BLM’s approach using this method, BLM ecological site DC-18. At this BLM site they determined that the ecological similarity site index was 53% and the ecological condition “late seral” or good. [Note that you can be half of the site’s species and productivity gone and this scoring method still says that the site is good. This inherent bias within the assessment process is a serious problem that needs to be addressed. The choice of the scoring for this similarity index is not supported by any ecological scientific study.]

For the moment, let’s accept the method and focus on how BLM used it. BLM used a piece of magic that BLM performed to get scores of “good.” BLM’s analysis incorrectly used the wrong site productivity amount when dividing into the site’s sum of occurring plants. They should have divided this number by the total amount found in the Ecological Site Description for this site (Loamy 10-14). This is 1760 lb/acre. Had they done so, the similarity site index would have been 33% or fair (mid seral) instead of two grades higher “good.” Instead, BLM chose a site productivity that appears to have no relationship to the scoring system used with the ecological
Lastly, the three categories described in the EA on page 57 for function, function at risk and improperly functioning are different from what is recommended in the most recent TR 1734-6 (Version 4-2005). BLM offers no explanation for their choice for differing from the current process. Version 4 of upland health assessment calls for an evaluation of departure of each indicator in three areas: soil/site stability, hydrologic function, and biotic integrity. This EA does not follow this process and, as a result, it is not consistent with the recommended assessment approach that BLM must follow to determine if the site is meeting standards.

Shrub communities, such as the sagebrush steppe, are clusters of shrubs spaced with areas occupied in the past often by nonwoody plants. Grass and herbaceous plants filled these inter spaces in shrub communities during presettlement times. But in Duck Creek, the grass production and production from other nonwoody plants has been significantly reduced. The scoring of Indicator 15, by design, misses this important problem in shrub and forest settings.

Annual production considers plant growth from shrubs and non-woody plants. Because they are lumped together, the high shrub annual growth is averaged with the low grass and forb productivity to lead to a score of a slight departure from the ecological reference. For this reason, areas with grass production that is one quarter of its potential may be score at the highest score (5) because shrub production is much more and overwhelms the scoring for this indicator for production. At Site DC-1, shrub annual production accounted for 80% of the surveyed productivity.

Most of these indicators are qualitative and, thus assessments can not be verified or repeated by independent observer. The final decision that a site meets standards requires that a “preponderance of evidence” be used to determine if the site meets standards. No guidance is given on how to use the collected information in the assessment to reach a consistent conclusion.

Rangeland health assessments are subjective and open to widely differing interpretations. Many of the indicators are designed to favor higher scores for degraded habitat that does not meet standards. As a result, rangeland health assessments conducted by range staff to judge the adequacy of their management has failed to accurately report the condition of today’s habitat.

Because of the problems both inherent in TR 1734-6 and the subjective problems caused by those using this method in the field, rangeland health assessments are inconsistent and often inaccurate in reporting if rangeland health standards are met.
Range capacity analysis

Grazing management starts with an assessment of the forage production of a grazing allotment in order to determine just how much grazing the allotment can be supported. Grazing practices are designed with a base stocking level based on the carrying capacity.

“According to Professor Jerry L. Holechek, a professor of range science at the University of New Mexico, selection of the correct stocking rate is the most important of all grazing management decisions from the perspective of vegetation, livestock, wildlife, and economic return. The stocking rate is the amount of land allocated each animal unit for the grazing season “[T]he maximum stocking rate possible without inducing damage to vegetation or related resources” is the carrying capacity for an allotment. 43 CFR 4100.0-5. While the stocking rate for a specific allotment may vary from year to year due to fluctuating forage production, the carrying capacity is generally considered to be the average number of animals a particular range area will sustain over time.”31

In the past, the stocking rate was based on the forage produced on capable lands and on how much of that forage can be allocated to livestock use. Past range capacity analysis was based on assumptions about range capability and how much could be allocated to livestock. We will show how these assumptions are out of line with today’s ecological and rangeland health standards. Applying today’s policy leads to even lower grazing numbers to meet today’s standards.

Several factors are used in determining a stocking rate. These factors include:

1) The amount of forage that livestock use. This is expressed in pounds of forage per month needed for an Animal Unit Month. This typically is a cow and calf pair.
2) Adjustments are made for the distance from water. Capacity reductions in forage production are calculated for three categories of distances from water: none up to a mile from water, 50% for 1-2 miles and 100% for over 2 miles from water.
3) Adjustments are also made for slope. Up to 10% slope has no reduction on grazing capacity, 11-30% slope would reduce capacity for those sloped lands by 30%. 31-60% slope would reduce capacity by 60% and over 60% is considered ungrazable and has a 100% reduction in forage produced.
4) Grazing timing and readiness also play a role in determining the capacity. Rangelands that are grazed for much of the growing season require a later grazing turnout than do rangelands that are grazed for two weeks or less.32
5) Forage production and proper utilization required by each species plays a significant factor in determining the amount of forage that an allotment produces.


32 Personal communication with Professor Roger Banner.
With each assumption is a specific numeric amount that is used in a formula to calculate the stocking number. The EA on page 13 claims that moderate use is appropriate for this type of range land and that calls for 41-50% forage utilization. Holechek et al (2004) is cited as the source and no page number for the cited source is given in the EA. As a result, BLM has then chosen the standard used in management in this allotment calls for grazing to be below 50%.

Holechek’s Range Management Principles & Practices text that BLM cited actually does not support BLM’s 50% utilization level. Page 223 provides a table (Table 8) which lists the percent use of key species for moderate grazing in range types. For the types found in Duck Creek, this level of grazing is 30-40%. This table goes on to say that rangelands “in poor condition or grazed during active growth should receive the lower utilization level.” Holechek recommends 30% utilization. If BLM follows this range management practices text, the standard would be 30%.

The EA lists reference three studies that are not cited in the text, Holechek (1988), Holechek et al (1998) and Holechek (2001). We reviewed these and find that they do not support BLM’s utilization standard. These, in fact call for grazing utilization levels less than this EA establishes. Holechek (1988) repeats the information almost exactly in the same format as now found in Holechek’s Range Management Principles & Practices. Holechek et al (1998) confirmed that rotation systems “were more advantageous in humid prairie ecosystems” and “had limited or no benefit in more arid range types” and “(t)here is no evidence that rotation grazing schemes had any advantages over season long grazing”.

The need to reduce utilization on lands that are significantly less than their potential has long been known. In 1958, Hedrick recommended 35% utilization in order to restore damaged rangelands.

The Forest Service R4 Range Analysis Handbook Page 61.6-1 (July 1964) found that grazing at utilization levels of 25% leads to an increase in production over time while grazing at a utilization level of 50% leads to significant decline in productivity over time.

Another assumption made in making stocking determinations is the amount of forage that is needed to be consumed for one AUM. The EA does not state which number is used in this

33 Holechek (text), pg 223.
decision. For a complete analysis of the forage required for one AUM see Dr. Carter’s paper on this topic.\textsuperscript{37}

But first, let’s look at range capacity for Duck Creek using traditional assessment methods. Let’s assume that one animal unit month (AUM) uses 1000 lb of forage and the habitat will allow livestock to take half of what grows (utilization of 50%). Note that this is 1,000 lb of oven dried forage. Most field data are air dried weight and as a result 26 lb/day oven dry weight equals 30 lb/day dry air weight.

Over the years, cattle have gotten heavier and today need more forage per cow than twenty years ago when the pounds per AUM was established. Carter (2008) argues that using air dry weights and today’s cow/calf weights, an AUM should require 1,532 lb per AUM. BLM at a national level has been approached with this information and asked to update this important factor. No reply has been received.

Forage production in the allotment is best estimated by the protected cage clipping method (paired plot) that we conducted for the past four years. In 2005 BLM conducted some clipping as well and that data is similar to ours. Forage production varies from year to year mostly because of changes in precipitation. It has long been known that using an average year is not appropriate when determine stocking levels. In 1936, Talbot stated, “(t) to maintain the resource, ranges should be stocked on the basis of slightly below average year.”\textsuperscript{38}

BLM claims that the productivity of this allotment is more than adequate for this stocking level. Page 12 of the EA makes the claim that the productivity of the allotment averages 740 lb/acre of livestock forage. This makes the assumption of 50% utilization and 1000 lb/AUM and the number that BLM suggests of 2.7 acres/AUM (page 12 of the EA). BLM claims that the carrying capacity of this allotment is 8,400 AUMs for the full allotment.

Both our and BLM’s data show this estimate does not match real conditions found today in this allotment. Much less forage is produced in this allotment than claimed in the EA. The average forage produced in 2006 from our twelve upland sites was 213 lb/acre of nonwoody plants. The average grass production was 133 lb/acre for this same period. 2006 is a good year for this comparison, since this was one of the few years that was not listed as either dry or a drought by the U.S. Drought Monitor.

BLM states that the demand for forage is 6 acres per AUM or 167 lb/acre. This is just under the average forage production that we estimated to be 213 lb/acre. Using these EA assumptions, the carrying capacity of BLM’s lands in the allotment is 2733 AUMs based on 213 lb/acre, 1000 lb/AUM, and 12,834 acres of capable BLM lands.


However, this does not explain the high levels of grazing use that we see in this allotment. You should be able to correlate the amount of forage that grows in a year, the amount of grazing use that occurs and the utilization level. In 2006, we measured utilization that typically was XXX in the unrested part of the allotment. Part of the problem is that the amount of grazing in the records is not accurate.

BLM assumes that the amount of forage that a AUM consumes is less than the amount that today’s larger cows consume. Based on analysis of the current weight of cow / calf pairs, typically 1534 lb of forage today is needed for today’s cow calf pair for one month. The EA suggests that a stocking level of 2134 AUMs for the BLM part of this allotment can be supported by the forage produced.

In addition to this, BLM allocates a larger fraction of the forage produced (utilization amount) for livestock than can be grazed and still meet ecological and multiple use obligations. The tradition of leave-half-take-half is in conflict with current range science and ecological obligations. Needs for wild grazers, plant community restoration, habitat resilience, plant community structure, and more suggest that utilization levels of 30% or less are warranted.

The assumptions of 2.7 acres/AUM of forage (assuming 1000 lb/AUM, and 50% utilization) are inappropriate for the conditions found in this allotment. The next sections go into detail explaining the background behind each of these points.

BLM did not conduct range capacity analysis as required in the current land use plan. The current land use plan is the Randolph Management Framework Plan (MFP). The numbers BLM gave for carrying capacity on page 12 of the EA fails to follow the analysis required by the MFP. This EA does not cite an earlier analysis that determined the carrying capacity for the Duck Creek Allotment.

This MFP makes the following decision, “Carrying capacities for each allotment will be based upon the forage production on suitable acreage in each allotment.” The stocking level is required to be within the carrying capacity of the allotment.

When such a capacity analysis is conducted, this analysis begins with first determining which lands are capable of supporting livestock grazing. Distance from water, slope, and a base forage production amount are all factors. From those lands capable, BLM then determines those lands suitable for livestock grazing. Based on the Comb Wash Decision (IBLA UT-06-91-1), suitability determinations need to consider the full range of multiple uses. Some of the specific factors that need to be included in suitability include soil erosion, water infiltration, soil compaction, trampling & erosion of streambanks, damage to archaeological sites, contamination.

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of cultural sites, and degradation of wildlife habitat. In order to make “a reasoned and informed
decision whether grazing (in these specific places) is in the public interest,” (pg 3 Comb Wash
Decision) consideration of these factors coupled with utilization and trend analysis needs to be
applied “when setting stocking rates.” (pg 25, Comb Wash Decision.) For lands found suitable,
the forage production on an average year is then calculated and, using utilization and proper use
factors, the amount that can be assigned to livestock determined. The resulting total amount of
available forage is then divided by the amount consumed by a cow calf pair in one month. The
standard normally used is 1,000 lb of forage equals one AUM which is the same as cow calf pair
grazing for a month. The resulting number of AUMs that can be supported at the utilization rate
chosen for the forage available in this area then represents the areas’ carrying capacity.

This is the analysis that is traditionally used when BLM conducts range capacity analysis. Such
an analysis was required as part of the remedy in the Nickel Creek IBLA decision and is required
in the Randolph MFP.

BLM does present an opinion on what the stocking capacity is for the BLM lands in Duck Creek.
However this is not based on the structured and required carrying capacity analysis just
described. Page 12 of the EA states that “(t)he acres/AUM potentially available based on the
production data for approximately 12,873 acres of upland ecological sites on public lands (refer
to Table 8 in Chapter 3 of this EA) was approximately 2.7 acres/AUM. BLM offers no
information on how this number was derived. If we make the following assumptions we can
estimate roughly the productivity that is needed in order to support this opinion. If we assume
that an AUM consumes 1000 lb of forage and half of what grows can be allocated to cows, then
the 2.7 Acres/AUM represents 740 lbs of palatable forage for livestock per acre.

Field data show that the 740 lb/acre of forage is higher than the current forage production in this
allotment. In 2005, BLM conducted ecological site studies at a number of sites and found that
much less forage grows then suggested in the EA. Duck Creek site 1, typical of a more
productive ecological site, produced 271 lb/acre of palatable plants according to BLM data. In a
PowerPoint presentation made to the Rich County CRM, BLM compared their 2005 data with
Wild Utah Project’s data. While BLM found that productivity was higher than what we
measure, both their measures and ours were significantly less than the quantity presented in the
EA.40

The production of grass and forbs based on WUP/WWP monitoring is shown in Table 5 for the
past four years. The utilization percentages in WUP/WWP monitoring include some plants,
forbs, that are not palatable for livestock and, as a result, these values are likely to overestimate
the forage available for livestock.

40 BLM, Salt Lake Field Office. 2006. PowerPoint presentation titled Duck Creek Livestock Grazing Allotment,
Rich County, Utah, 2005 Survey and Monitoring.
Table 5  WUP/WWP forage production for nonwoody plants in Duck Creek (lb/acre)

<table>
<thead>
<tr>
<th></th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grasses</td>
<td>547 lb/acre</td>
<td>133</td>
<td>213</td>
<td>262</td>
</tr>
<tr>
<td>Forbs</td>
<td>395</td>
<td>105</td>
<td>46</td>
<td>125</td>
</tr>
<tr>
<td>Total</td>
<td>942</td>
<td>214</td>
<td>259</td>
<td>387</td>
</tr>
<tr>
<td>Precipitation</td>
<td>Above average</td>
<td>Below average</td>
<td>Below average</td>
<td>Below average</td>
</tr>
</tbody>
</table>

The ecological site descriptions for these sites also show that forage production for habitat in today’s state is much lower than the 750 lb/acre. There are several steps that are needed to be taken in order to interpret ecological site descriptions and derive this conclusion. For this example, we will use the Loamy, 10-14” ecological site description. This ecological site description applies to 50% of the BLM lands in the allotment. The first step is to determine which plant community state reflects today’s conditions. Each of the four states described in the ecological site have different characteristics. For Duck Creek, the big sage/rhizomatous wheatgrass state matches conditions today. The Loamy 10-14 Ecological Site Description describes this state as,

“This plant community is the result of severe disturbance such as brush management or wildfire followed by improper grazing. With sagebrush removed, it is dominated by green rabbit brush. Rhizomatous wheat grasses, low growing bunchgrasses such as Sandberg bluegrass, and unpalatable annual and perennial forbs dominate the herbaceous understory. Forbs such as prairie smoke, lupine, and thistles are common. There is a substantial amount of bare ground. The total annual production (air-dry weight) of this state is about 250 pounds per acre, but it can range from about 100 lbs./acre in unfavorable years to about 500 lbs./acre in above average years.” Ecological Site Description pg 8, Site: R034AY222WY

This state characterizes a number of the rangeland health sites and is recognized by BLM as the appropriate state on pages 61-63 of EA. The annual plant productivity described includes woody and nonwoody plants. This ecological site description makes the assumption that about half or more of the production is from shrubs. This means that nonwoody plants are likely to produce about 125 pounds/acre per year for a site in this state.

Productivity in terms of annual plant production that would be expected for Duck Creek is described in ecological site descriptions. The ecological sites found in Duck Creek are listed in Table 8 on page 55 of the EA. BLM’s plant productivity estimates made on page 12 of the EA are not supported by the information found in the ecological site descriptions. One example
demonstrates this. Ecological site R034AY122wy (Loamy 7-9GR) represents 32% of BLM acres in the allotment. The Loamy 7-9GR Ecological Site if in historic climax plant community state (at ecological potential), has a annual production of woody and herbaceous plants of between 300 to 700 lb/acre. Such a plant community would be dominated by grass (75% of composition) with sagebrush being less prevalent. This clearly does not reflect today’s conditions. The predicted grazing capacity for a climax community is about 6 acres per AUM or about 150 lb/acre of livestock palatable forage would be consumed.

Today, these rangelands are not at this historic climax plant community state but, rather now represent a plant community that is dominated by shrubs. The big sage/rhizomatous wheatgrass state more accurately represents this habitat in today’s conditions.

“This plant community is the result of frequent and severe grazing. A thick canopy of Wyoming big sagebrush and rabbitbrush dominate, often exceeding 40% of the annual production. Thickspike wheatgrass, Letterman needlegrass, and bluegrasses dominate the understory with decreased amounts of bluebunch wheatgrass, Indian ricegrass, and needle and thread. The total annual production (air-dry weight) of this state is about 175 pounds per acre, but it can range from about 100 lbs./acre in unfavorable years to about 350 lbs./acre in above average years. In this state, the annual production (air-dry weight) is about 175 lb/acre for shrubs, grasses, and forbs. The carrying capacity for this ecological site in this state is reported to be 0.05 AUM./acre or 20 Acres/AUM.” pg 7, 2005, Ecological Site Description R034AY122WY

The AUMs per acre for available forage comes from a formula that divides the amount of forage produced in the allotment by the amount one AUM would consume and dividing that result into the number of acres in the area in question.

Net annual forage has been measured by WWP/WUP using the paired plot method described in the Interagency Technical Reference for utilization studies and residual measurements (U.S. DOI 1996, page 70). Under this method, forage from protected and unprotected plots is clipped and weighed at the end of the growing season. Net forage is that forage left after natural and small wild grazers have reduced the plant biomass in the area. (More on our methods is found in the next section.)

In 2007, a dry year, our data found the following. The canopy cover (protected space for grass and forbs) represented 28% cover on average.

The average productivity of protected areas under shrubs in upland areas was:

<table>
<thead>
<tr>
<th>Forage Type</th>
<th>Productivity (lb/acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forbs</td>
<td>31</td>
</tr>
<tr>
<td>Grass</td>
<td>141</td>
</tr>
<tr>
<td>Total</td>
<td>152</td>
</tr>
</tbody>
</table>

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The average productivity found inside our utilization cages for upland areas is:

- **forbs**: 46 lb/acre
- **grass**: 213 lb/acre
- **total**: 259 lb/acre

The average amount of residue that remained in grazed areas (clipped from sites outside the cages that are unprotected by shrubs) are:

- **forbs**: 21 lb/acre
- **grass**: 53 lb/acre
- **total**: 66 lb/acre

These annual productivity data show conditions typical for much of this allotment. They show that the productivity of this allotment is impaired when compared with the productivity at its potential. Forage production of 300 to 700 lb/acre is possible with habitat at its potential according to the ecological site descriptions. Again this is well demonstrated by the samples we took from protected sites which have not been grazed in decades along Highway 30. Protected by a fence, these sites showed much higher productivity than the rest of the allotment even in a dry period.

Not all plants are considered palatable for livestock. BLM did not appear to take palatability or desirability into account in its ESI production calculations. This is also an important factor that must be considered in arriving at stocking rates. For example, BLM provided us with an NRCS Ecological Site Description (ESD) for “Loamy 7–9” map unit with its ESI data taken for the Duck Creek Allotment. That ESD provides NRCS’ interpretation of whether grasses, forbs or shrubs are not used, undesirable, desirable, preferred or toxic to cattle, sheep, horses, mule deer, antelope and elk. The following Table 6 presents a summary from that ESD for forb and grass species desirability by cattle.

<table>
<thead>
<tr>
<th>Grass or Forb</th>
<th>Not Used</th>
<th>Undesirable</th>
<th>Desirable</th>
<th>Preferred</th>
<th>Toxic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grass</td>
<td>0 (0%)</td>
<td>4 (12%)</td>
<td>13 (38%)</td>
<td>17 (50%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Forb</td>
<td>0 (0%)</td>
<td>26 (59%)</td>
<td>9 (20%)</td>
<td>2 (5%)</td>
<td>7 (16%)</td>
</tr>
</tbody>
</table>

This summary is revealing. While most grasses are desirable or preferred by cattle, only 25% of forbs are desirable or preferred with 59% undesirable and 16% toxic. For sheep, only 13 of 44 listed forbs are desirable or preferred, nearly the same as for cattle.

In assessing range carrying capacity, this would indicate that many of the forbs growing in Duck Creek are unlikely to be desirable forage plants. Range capacity analysis needs to assess the forage production taking into account which plants are desirable and preferred.

This discussion cannot replace a complete range-capacity analysis. However it raises serious questions about the assumptions and conclusions made in the EA about stocking capacity.
WWP/WUP could not conduct a carrying capacity analysis because we need missing information. This information included which lands are capable, wild grazers’ utilization needs, forage palatability, and which lands are both capable and suitable for grazing. However, we can make a rough back-of-the-envelope estimate in the absence of this information that is very likely to overestimate the carrying capacity of the allotment. In the future, we hope to work with BLM to conduct a proper analysis.

Here are a number of rough estimates based on a set of assumptions:

1. **Acreage:** 12,834 (EA page 12)
   - Pounds of forage for one AUM, 1000 lb/AUM
   - Percent of BLM lands with available forage, 100%
   - Allowed utilization: 50%
   - Average forage production per acre: 259 lb/acre (our 2007 data)
   - Capacity: 1,662 AUMS

Note that the permit allows 2,134 AUMs for this same sized area. Estimate number 1 uses our forage production data with BLM’s other assumptions for a rough first estimate of carrying capacity. This assessment follows Talbert (1936) advice to make carrying capacity assessments using slightly below average production years. See Figure 12 that describes the precipitation history for Duck Creek based on nearby weather stations.

2. **Acreage:** 12,834 (EA page 12)
   - Pounds of forage for one AUM, 1534 lb/AUM
   - Percent of BLM lands with available forage, 72%
   - Allowed utilization: 30%
   - Average forage production per acre: 259 lb/acre (our 2007 data)
   - Grazing days: 165, 5.4 months.
   - Capacity: 468 AUMS
   - Cattle pairs: 87 cow calf pairs

Estimate 2 uses the same sized area but allocates forage to a cow/calf pair that reflects today’s sized cows. This estimate also takes into consideration forage that is protected from grazing under shrubs. WWP/WWP plant community cover assessments shows that shrub canopy cover averages 28% across the allotment. Lastly, this estimate uses the utilization standard recommended in Holechek’s grazing management text, the same reference cited by BLM in the EA.

The range capacity analysis of the past was designed for agricultural operation of rangelands. Today ecological standards call for range capacity that considers the needs of other wild grazers, plant community structure, soil nutrient cycles, and other factors. In 2003, a range capacity
analysis tool was developed that is based on ecological standards and health.\textsuperscript{41} Past range capacity analysis is currently inconsistent with today’s requirements to manage for the health of ecosystems.

We welcome working with BLM on an ecologically based grazing capacity analysis. Designing grazing programs based on an ecologically-based carrying capacity was one of our goals as part of the adaptive management process.

**Grazing Response Index**

BLM present no objective method to analyze the results from different grazing practices. The terms “deferred” and “rotation” are used without any analytic review of the results these may bring. There is no systematic analysis that assesses the grazing program that this EA proposes to the habitat goals that BLM wants to achieve.

One tool that offers this metric is called the Grazing Response Index (GRI). The GRI was developed by the Colorado State University Extension Service and USDA-Initiative for Future Agriculture and Food Systems. Utah State University’s Behavioral Education for Human, Animal, Vegetation & Ecosystem Management (BEHAVE) program recommends this tool in making grazing management decisions. The USU website describes, “GRI assesses the effects of grazing on plants during the current year and aids in planning grazing for the next year. GRI uses three factors related to plant health to evaluate impacts of grazing—frequency and intensity of defoliation (grazing), and opportunity for the plant to recover\textsuperscript{42, 43}

Frequency relates to the number of times plants are grazed during the grazing period and is measured in the length of time grazing occurs. Intensity assesses the amount of utilization that occurs. Opportunity reflects the amount of regrowth and recovery that occurs after grazing. Each of these three factors has a numeric score which when summed is the GRI score. A total score that is positive indicates that management is beneficial to rangeland health. A negative sum indicates that management is harmful. A zero rating is neutral.

The scoring for frequency is:

\begin{itemize}
  \item [+1] seven or fewer days of grazing
  \item [0] seven to fourteen days of grazing
\end{itemize}


\textsuperscript{42}Utah State University. 2007. Grazing response index: a simple effective method to evaluate plant response to grazing. www.behave.net

\textsuperscript{43}Roath, R. 1999. The grazing response index (GRI). Rangelands, 21(4)3-6 (August).
-1 more than fourteen days of grazing

Intensity is scored:
+1 less than 40% utilization
0 41 to 55% utilization
-1 greater than 55% utilization

Opportunity to recover has the following scores based on the appearance of vegetation at the end of the growing season:

+2 full recovery – plants appear ungrazed or barely grazed or plants had a full opportunity for growth before grazing. Multiple pastures and rest.
+1 partial recovery – grazed but regrew fairly well after grazing. Multiple pastures and rest.
0 some recovery – allotment with 2 pastures
-1 little recovery – allotment with 2 pastures
-2 no recovery – season long grazing, if heavily grazed, assign a -2

The Duck Creek Allotment grazing practices can be assessed based on the monitoring information we have collected for past and the deferred rotation grazing program. Table 7 displays the results of our application of this index to the Duck Creek Allotment.

<table>
<thead>
<tr>
<th></th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>-1</td>
<td>-1</td>
<td>-1</td>
<td>-1</td>
</tr>
<tr>
<td>Intensity</td>
<td>0</td>
<td>-1</td>
<td>-1</td>
<td>0</td>
</tr>
<tr>
<td>Opportunity</td>
<td>-2</td>
<td>-1</td>
<td>-1</td>
<td>-1</td>
</tr>
<tr>
<td>GRI rating</td>
<td>-3</td>
<td>-3</td>
<td>-3</td>
<td>-2</td>
</tr>
</tbody>
</table>

Note that this score does not consider ecological conditions and, especially, riparian management. The emphasis of this is primarily to manage rangelands as efficient agricultural operations. If ecological standards were integrated into GRI, the scores for grazing practices conducted in the past and proposed in this EA would likely lead to lower GRI scores that shown in Table 7.

Even with the current rotation system, the GRI scores indicate that grazing as described in this EA is likely to lead to further deterioration of rangelands in the Duck Creek Allotment.
Duck Creek BLM Allotment monitoring and analysis report, 2008
Wild Utah Project and Western Watersheds Project

Appendix of figures (photographs, drawings, maps, graphs, and other illustrations).

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<td>Figure 2</td>
<td>Paired plot method, sample clipping frame pattern for riparian monitoring sites</td>
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<td>2</td>
</tr>
<tr>
<td>Figure 3</td>
<td>Paired plot method, sample clipping frame pattern for upland sites with three cages</td>
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<td>3</td>
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Figure 1  Paired plot method, sample clipping frame pattern for upland monitoring sites

Figure 2  Paired plot method, sample clipping frame pattern for riparian monitoring sites
Figure 3  Paired plot method, sample clipping frame pattern for upland sites with three cages
Figure 4 Utilization-productivity monitoring sites used by WWP/WUP
Figure 5  2005 utilization monitoring, comparison of BLM and WWP/WUP
Figure 6  Duck Creek, lack of correlation between distance from water and amount of utilization

Percent Grass Utilization (2008) vs. distance from water

Miles from nearest water source (considering fence restrictions)
Figure 7  Duck Creek, correlation of habitat forage productivity and the amount of utilization
Figure 8  2008 utilization monitoring, comparison of BLM and WWP/WUP sites

Duck Creek, BLM Utilization Monitoring, 2008

Legend
- ▲ BLM utilization monitoring 2008
- ◦ WUP/WWP utilization monitoring sites
- ◼ duckcreek_alot
- ▼ Springs, Troughs, and Some Streams
- — pasture fences

Wild Utah Project, Oct, 2008
Figure 9  Growth Degree Days for Duck Creek Allotment

Cumulative Growth Degree Days, Duck Creek

- Randolph, UT 30 year average
- Randolph 2008
- Cattle on date, Duck Creek Allotment
Figure 10 Pedestalling caused by erosion, BLM transect DC-1
Figure 11 Reference site (HW 30 ROW), photo of survey frame site
Figure 12 Summary of precipitation history for the Duck Creek Allotment

<table>
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<tr>
<th>Station</th>
<th>Laketown</th>
<th>Randolph</th>
</tr>
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<tbody>
<tr>
<td>Oct - March 2005</td>
<td>11.35</td>
<td>8.55</td>
</tr>
<tr>
<td>Oct - March 2006</td>
<td>7.32</td>
<td>7.21</td>
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<td>Oct - March 2007</td>
<td>5.46</td>
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<tr>
<td>Oct – March 2008</td>
<td>7.32</td>
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<tr>
<td>Average Year Oct - March</td>
<td>6.26</td>
<td>5.36</td>
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<tr>
<td>Apr - Jun 2005</td>
<td>8.98</td>
<td>6.92</td>
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<td>Apr - Jun 2006</td>
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<td>Apr - Jun 2007</td>
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<td>Apr – Jun 2008</td>
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<td>3.07</td>
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<tr>
<td>Average Year Apr - Jun</td>
<td>3.60</td>
<td>3.35</td>
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<tr>
<td>July - Sep 2005</td>
<td>0.97</td>
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<tr>
<td>July - Sep 2006</td>
<td>3.52</td>
<td>4.61</td>
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<tr>
<td>July - Sep 2007</td>
<td>3.19</td>
<td>3.61</td>
</tr>
<tr>
<td>July – Sep 2008</td>
<td>nd</td>
<td>nd</td>
</tr>
<tr>
<td>Average Year July - Sep</td>
<td>2.53</td>
<td>3.58</td>
</tr>
</tbody>
</table>

>10% Below Normal
>10% Above Normal
Within 10% of Normal

For the nearest stations to Duck Creek, Laketown and Randolph, 2005, 2006 and 2008 Oct – March precipitation was above normal.


July – Sep precipitation is generally not effective in assessing plant community productivity due high evaporation.